Interventions used to improve control of blood pressure in patients with hypertension (Review)

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Interventions used to improve control of blood pressure in patients with hypertension

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Editorial group: Cochrane Hypertension Group.


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ABSTRACT

Background
Patients with high blood pressure (hypertension) in the community frequently fail to meet treatment goals - a condition labelled as "uncontrolled" hypertension. The optimal way to organize and deliver care to hypertensive patients has not been clearly identified.

Objectives
To determine the effectiveness of interventions to improve control of blood pressure in patients with hypertension. To evaluate the effectiveness of reminders on improving the follow-up of patients with hypertension.

Search methods
All-language search of all articles (any year) in the Cochrane Controlled Trials Register (CCTR) and Medline; and Embase from January 1980.

Selection criteria
Randomized controlled trials (RCTs) of patients with hypertension that evaluated the following interventions:
(1) self-monitoring
(2) educational interventions directed to the patient
(3) educational interventions directed to the health professional
(4) health professional (nurse or pharmacist) led care
(5) organisational interventions that aimed to improve the delivery of care
(6) appointment reminder systems

Outcomes assessed were:
(1) mean systolic and diastolic blood pressure
(2) control of blood pressure
(3) proportion of patients followed up at clinic

Data collection and analysis
Two authors extracted data independently and in duplicate and assessed each study according to the criteria outlined by the Cochrane Handbook.
Main results

72 RCTs met our inclusion criteria. The methodological quality of included studies varied. An organized system of regular review allied to vigorous antihypertensive drug therapy was shown to reduce systolic blood pressure (weighted mean difference (WMD) -8.0 mmHg, 95% CI: -8.8 to -7.2 mmHg) and diastolic blood pressure (WMD -4.3 mmHg, 95% CI: -4.7 to -3.9 mmHg) for three strata of entry blood pressure, and all-cause mortality at five years follow-up (6.4% versus 7.8%, difference 1.4%) in a single large RCT- the Hypertension Detection and Follow-Up study. Other interventions had variable effects. Self-monitoring was associated with moderate net reduction in systolic blood pressure (WMD -2.5 mmHg, 95% CI: -3.7 to -1.3 mmHg) and diastolic blood pressure (WMD -1.8 mmHg, 95% CI: -2.4 to -1.2 mmHg). RCTs of educational interventions directed at patients or health professionals were heterogeneous but appeared unlikely to be associated with large net reductions in blood pressure by themselves. Nurse or pharmacist led care may be a promising way forward, with the majority of RCTs being associated with improved blood pressure control and mean SBP and DBP but these interventions require further evaluation. Appointment reminder systems also require further evaluation due to heterogeneity and small trial numbers, but the majority of trials increased the proportion of individuals who attended for follow-up (odds ratio 0.41, 95% CI 0.32 to 0.51) and in two small trials also led to improved blood pressure control, odds ratio favouring intervention 0.54 (95% CI 0.41 to 0.73).

Authors’ conclusions

Family practices and community-based clinics need to have an organized system of regular follow-up and review of their hypertensive patients. Antihypertensive drug therapy should be implemented by means of a vigorous stepped care approach when patients do not reach target blood pressure levels. Self-monitoring and appointment reminders may be useful adjuncts to the above strategies to improve blood pressure control but require further evaluation.

Plain Language Summary

What interventions improve the control of high blood pressure

There is little evidence as to how care for hypertensive patients should be organized and delivered in the community to help improve blood pressure control. This review aimed to determine the effectiveness of interventions whose objective was to improve follow-up and control of blood pressure in patients taking blood pressure lowering drugs. We included studies that had as population of interest adult patients with essential hypertension in an ambulatory setting. The interventions included all those that aimed to improve blood pressure control. The outcomes assessed were mean systolic and diastolic blood pressure, control of blood pressure and the proportion of patients followed up at clinic.

Seventy two randomised controlled trials met our inclusion criteria. The range of interventions used included (1) self-monitoring, (2) educational interventions directed to the patient, (3) educational interventions directed to the health professional, (4) health professional (nurse or pharmacist) led care, (5) organizational interventions that aimed to improve the delivery of care, (6) appointment reminder systems. The trials showed a wide variety of methodological quality, part of which may be attributed to poor reporting. An organized system of regular review allied to vigorous antihypertensive drug therapy was shown to reduce blood pressure and all-cause mortality in a single large RCT- the Hypertension Detection and Follow-Up study. Other interventions had variable effects. Weighted data analysis showed that self-monitoring was associated with moderate net reductions in systolic blood pressure (weighted mean difference -2.5 mmHg, 95% CI: -3.7 to -1.3 mmHg) and diastolic blood pressure (weighted mean difference -1.8 mmHg, 95% CI: -2.4 to -1.2 mmHg). Trials of educational interventions directed at patients or health professionals were heterogeneous but appeared unlikely to be associated with large net reductions in blood pressure by themselves. Nurse or pharmacist led care may be a promising way of improving control in patients with hypertension, with the majority of RCTs being associated with improved blood pressure control, improved systolic blood pressure and more modestly improved diastolic blood pressure, but these interventions require further evaluation. Appointment reminder systems increased the proportion of individuals who attended for follow-up (absolute difference 16%, but this pooled result should be treated with caution because of the heterogeneous results from individual RCTs) and in two small trials also led to improved blood pressure control, odds ratio favouring intervention 0.54 (95% CI 0.41 to 0.73).

We conclude that an organized system of registration, recall and regular review allied to a vigorous stepped care approach to antihypertensive drug treatment appears the most likely way to improve the control of high blood pressure. Health professional (nurse or pharmacist) led care and appointment reminder systems requires further evaluation. Education alone, either to health professionals or patients, does not appear to be associated with large net reductions in blood pressure.
BACKGROUND

High blood pressure (hypertension) is an important public health problem in terms of associated stroke and cardiovascular events. It is mostly of unknown aetiology, is easy to diagnose and is readily preventable by blood pressure reduction. Extensive epidemiological data have strengthened the well-recognised relationship between blood pressure and cardiovascular disease risk and have confirmed the importance of systolic BP as a determinant of risk (Prospective Studies Collaboration 2002). Evidence from randomized trials has shown that effective drug treatment reduces the risk of cardiovascular morbidity and mortality (Collins 1994; Gueyffier 1999). However, there is ongoing concern that the benefits demonstrated in randomized trials of antihypertensive drug treatment are not implemented in everyday clinical practice (Burnier 2002). Community-based studies throughout the world show that blood pressure goals are achieved in only 25 to 40% of the patients who take antihypertensive drug treatment (Burnier 2002; Hyman 2001; Chobanian 2001; Smith 1990), a situation that has remained unchanged for the last 30 years (Wilber 1972).

The quality of care patients with hypertension receive from health professionals has a clear impact on their risk of suffering a cardiovascular event. Observational studies in the UK have shown that inadequate control of blood pressure and poor follow-up is associated with a significant risk of stroke and avoidable vascular deaths (Du 1997; Payne 1993). In terms of the process of care that hypertensive patients receive, characteristics of the patient, health professional and the healthcare system in which they are given their medical care have been implicated in poor blood pressure control. Lack of adherence to medication and not having a primary care physician were associated with poor blood pressure control in a US study (Shea 1992). More recent studies have shown that frequent contact with health care professionals does not guarantee better blood pressure control unless there is more vigorous use of antihypertensive drugs (Hyman 2001; Berlowitz 1998), and that individual practitioners vary substantially in their clinical performance when managing hypertension in the community (Frijling 2001). These observations have led some commentators to suggest that poor control of blood pressure in the community may be due to ineffective management and inadequate practice organisation, described jointly as “clinical inertia” (Phillips 2001). Use of self monitoring of blood pressure by patients and professionals has gained popularity and is now recommended in certain patients in some national and international guidelines. A recent meta-analysis of randomised trials on the subject did suggest a benefit in terms of mean blood pressure and blood pressure control (Cappuccio 2004).

Whilst there is a strong evidence-base for the benefits of antihypertensive drug therapy (Collins 1994; Blood 2000; Staessen 2001), there is little clear evidence as to how care for hypertensive patients should be organized and delivered in the community to help improve blood pressure control. This systematic review aims to update and build upon previous reviews (Ebrahim 1998; Fahey 2006), to summarize the evidence from randomized controlled trials that evaluate different models of care that have been used to improve the control and follow-up of patients with hypertension.

OBJECTIVES

The objectives of this review are to:

1. Evaluate which models of care are effective in improving “control” of high blood pressure;
2. Evaluate the effectiveness of reminders on improving the follow-up of patients with hypertension.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized trials of interventions that have sought to evaluate different models of care for patients with hypertension with the overall aim of improving blood pressure control or follow-up care of patients. Included studies had to be RCTs with a contemporaneous control group where patient care in the intervention group(s) was compared with either no intervention or usual care. We excluded studies using interventions not intended to increase blood pressure control by organisational means, particularly drug trials and trials of non-pharmacological treatment.

Types of participants

The population of interest was composed of adult patients (aged 18 years or over) with essential hypertension (treated or not currently treated with blood pressure lowering drugs) in a primary care, outpatient or community setting.

Types of interventions

The interventions were aimed at improving control of blood pressure or clinic attendance and were classified as:

1. self-monitoring
2. educational interventions directed to the patient
3. educational interventions directed to the health professional
4. health professional (nurse or pharmacist) led care
5. organisational interventions that aimed to improve the delivery of care
6. appointment reminder systems

Types of outcome measures

Studies were included if they reported:

1. mean systolic blood pressure (mean SBP) and/or mean diastolic blood pressure (mean DBP)
2. control of blood pressure (blood pressure threshold that determines “control” being pre-specified or defined by each randomized trial’s investigators)
3. proportion of patients followed-up at clinic

Search methods for identification of studies

The following electronic databases were searched for primary studies:

a) The Cochrane Central Register of Controlled Trials (2007, Issue 4)

Electronic databases were searched using a strategy combining a variation of the Cochrane Highly Sensitive Search Strategy for identifying randomized trials in MEDLINE: sensitivity-maximizing version (2008 revision) with selected MeSH terms and free text terms relating to hypertension. No language restrictions were
used. The MEDLINE search strategy was translated into the other databases using the appropriate controlled vocabulary as applicable. Full strategies for all English language databases are included in Appendix 1, Appendix 2, Appendix 3.

Other sources:

c) Reference lists of all papers and relevant reviews identified
d) Authors of relevant papers were contacted regarding any further published or unpublished work
e) Authors of trials reporting incomplete information were contacted to provide the missing information
f) ISI Web of Science was searched for papers that cite studies included in the review

Data collection and analysis

Two of the authors (LG and AM) assessed lists of citations and abstracts independently. We were not masked with regard to authors or journal. Each reviewer indicated whether a citation was potentially relevant (i.e. appearing to meet the inclusion criteria), was clearly not relevant, or gave insufficient information to make a judgement. To be included, a study had to meet all the inclusion criteria. We (LG and AM) resolved differences by discussion and final adjudication was performed by TF and SS. We obtained reprints of all potentially relevant citations

We (LG and AM) independently extracted data in duplicate on study design, methods, clinicians and patients, interventions, outcomes and potential sources of bias using a structured data collection form. We wrote to the corresponding authors of studies to request missing data, clarify study details and enquire about unpublished studies.

For assessment of study quality, we collected data on inclusion and exclusion criteria; randomization procedure; allocation concealment; blinding of participants, providers of care and outcome assessors; and losses to follow-up (Clarke 2000). We also identified those studies that used a cluster design, which has the potential for unit of analysis errors, and performed a sensitivity analysis excluding those studies which may have been analyzed incorrectly.

We examined the effects on blood pressure between interventions at follow-up (systolic and diastolic blood pressure) according to the six pre-defined intervention categories. We compared and pooled the mean blood pressure differences from baseline to final follow-up in the intervention and control groups using the weighted mean difference approach (see Cochrane Heart Group web site: http://www.epi.bris.ac.uk/cochrane/stats3.html). When only partial information about the variance was provided in RCT reports, we calculated variances using the method described by Dollman (Pollman 1992). We have taken account of the correlation of baseline and final blood pressure measurements by using empirical data from the Caerphilly data set which examined the correlation between baseline and 5-year follow-up blood pressure measurements in 2000 men ($r=0.568$ for systolic and $r=0.514$ for diastolic blood pressure) (personal communication Margaret May, Department of Social Medicine, University of Bristol).

For blood pressure control and clinic attendance at follow-up, statistical and clinical significance was evaluated by means of estimating odds ratios with 95% confidence intervals. Individual study definitions of control of blood pressure and attendance at clinic were used. For both continuous and categorical outcomes, we checked the meta-analyses for heterogeneity by visual inspection and by Cochran’s test. When heterogeneity is significant, the individual study results are presented to illustrate the magnitude of blood pressure reduction reported but no overall pooled results are presented. Pooled odds ratios and their 95% confidence intervals were calculated with The Cochrane Collaboration RevMan 5 software.

RESULTS

Description of studies

Seventy-two unique randomized controlled trials met the inclusion criteria. Four of these trials had single or multiple companion publications or studies associated with them (Levine 1979 and Morisky 1983; Hypertension 1979 Hypertension 1979a and Hypertension 1982; Heltlevik 1998 and Heltlevik 1999; Takala 1979 and Takala 1983) giving a total of 77 studies included in the analysis. Four randomised controlled trials had a factorial design and are included twice under separate intervention headings - Hennessy (education-health professional and education-patient) (Hennessy 2006), Pierce (self-monitoring and education-patient) (Pierce 1984), Sackett (education-patient and organisation of care) (Sackett 1975), and Dickinson (education-health professional and organisation of care) (Dickinson 1983). There were also two three-armed RCTs: one of a telephone reminder, a mailed reminder and usual care (Contreras 2005) and a second of patient education, home monitoring from a family member actively participating in their care and a usual care arm (Earp 1982). Of the seventy two randomized controlled trials that met the inclusion criteria, 14 used a cluster design (Dickinson 1981; Evans 1986; Gullion 1987; Heltlevik 1998; Heltlevik 1999; McAlister 1986; Montgomery 2000; New 2004; Ornstein 2004; Baqu’Äö 2005; Hennessy 2006; Marquez 2004; McManus 2005; Turnbull 2006). In four of these, no adjustment was made for clustering effect (Evans 1986; Dickinson 1981; Gullion 1987; Turnbull 2006) and in two of these trials we could not ascertain whether adjustment was made for clustering effect (Baqu’Äö 2005; Marquez 2004). Thus we identified six trials as having potential unit of analysis errors. A sensitivity analysis excluding those studies did not significantly alter our main results below.

Risk of bias in included studies

The reported methodological quality of included studies was generally poor to moderate. The randomization process was described in thirty (42%) of the seventy two trials included whilst only fourteen (19%) had adequate allocation concealment (Figure 1). In 15 studies (21%) the outcome assessors were blind to the treatment allocation and losses to follow-up of 20% or more occurred in 18 (25%) of studies.
Figure 1. Methodological quality graph: review authors’ judgements about each methodological quality item presented as percentages across all included studies.

For a detailed summary of each of the 72 included RCTs, see Table 1.

Effects of interventions


Pooled data from 12 RCTs that reported on differences in mean SBP (Halme 2005; McManus 2005; Carnahan 1975; Soghikian 1992; Friedman 1996; Bailey 1998; Mehos 2000; Vetter 2000; Rogers 2001; Artinian 2001; Midanik 1991; Rudd 2004) showed that self-monitoring was associated with a significant reduction of -2.5 mmHg (95% confidence intervals (CI): -3.7 to -1.3 mmHg). However significant between-group heterogeneity for mean SBP (range -10 to +5 mmHg) was apparent in this group of studies. Pooled data from 14 RCTs on difference of mean DBP (Carnahan 1975; Soghikian 1992; Friedman 1996; Bailey 1998; Mehos 2000; Vetter 2000; Rogers 2001; Haynes 1976; Johnson 1978; Artinian 2001; Midanik 1991; Rudd 2004; McManus 2005; Halme 2005), showed that self-monitoring was associated with a more modest reduction of -1.8 mmHg (95% CI -2.4 to -1.2 mmHg). In the six RCTs that reported on control of blood pressure (Pierce 1984, Rogers 2001; Vetter 2000; Earp 1982; Baqu'Äö 2005; Halme 2005), there was no significant improvement in blood pressure control seen (odds ratio 0.97, 95% CI 0.81 to 1.16). The remaining RCT that did not report any usable data concerning blood pressure control, reported a mean arterial blood pressure difference of 3 mmHg in favour of the intervention (Zarnke 1997). However, this RCT was of a short duration (8 weeks follow-up).

(2) Educational interventions directed to the patient (n=20 RCTs) (Pierce 1984; Sackett 1975; Billault 1995; Burrelle 1986; Earp 1982; Fielding 1994; Gullion 1987; Hamilton 1993; Martinez-Amenos 1990; Morisky 1983; Muhlhauer 1993; Roca-Cusachs 1991; Tanner 1981; Watkins 1987; Webb 1980; Zisser 1982; Cakir 2006; Hennessy 2006; Hunt 2004; McKinstry 2006). Eleven RCTs reported mean difference SBP, thirteen RCTs reported mean difference DBP, and seven reported BP control. For mean difference in SBP and DBP outcomes, pooling of results from individual RCTs produced heterogeneous results, so pooled mean differences are not valid. The reported mean difference in SBP ranged from -15.7 mmHg to +1.3 mmHg, and mean difference in DBP was reported with a range from -8.7 mmHg to +7.1 mmHg. In terms of blood pressure control (eight RCTs), there was a trend towards improved blood pressure control and this was significant (odds ratio 0.83, 95% CI 0.75 to 0.91). Three RCTs did not report relevant outcome data (Gullion 1987; Hamilton 1993; Martinez-Amenos 1990), but did report increases in patient knowledge (Martinez-Amenos 1990). Two of these RCTs reported no difference in blood pressure control (Gullion 1987; Martinez-Amenos 1990). One RCT reported an improvement in SBP but not DBP at six months follow-up (Hamilton 1993).


Educational interventions directed towards the physician were not associated with a significant decrease in mean SBP (mean difference -0.4 mmHg, 95% CI -1.1 to +0.2 mmHg) or DBP (mean difference -0.4 mmHg, 95% CI -1.1 to +0.3 mmHg) whilst control of blood pressure produced heterogeneous results (odds ratio ranged from 0.8 to 1.0).

(4) Health professional (nurse or pharmacist) led care (n=12 RCTs) (Bogden 1998; Garcia-Pena 2001; Hawkins 1975; Jewell 1988; Logan 1975; Park 1996; Solomon 2002; de Castro 2006; Schroeder 2005; Sookanekun 2004; Tobe 2006; Tonstad 2007). Health professional (nurse or pharmacist) led care may be a promising way of delivering care, with the majority of RCTs being associated with improved blood pressure control. For all three outcomes, pooling of results from individual RCTs produced heterogeneous results, so pooled mean differences may not be valid. Mean difference in SBP was reported in ten RCTs with a range of difference in mean SBP from -13 mmHg to 0 mmHg. Mean difference in DBP was reported in eleven RCTs, ranging from -8 mmHg to 0 mmHg. Control of blood pressure was reported in six RCTs and produced heterogeneous results (odds ratio ranged from 0.1 to 0.9).

(5) Organisational interventions that aimed to improve the delivery of care (n=9 RCTs) (Sackett 1975; Dickinson 1981; Brook 1983; Bulpitt 1976; Hypertension 1979; Hypertension 1979a; Hypertension 1982; Robson 1989; Takala 1979; Takala 1983; Turnbull 2006; Wetzels 2007).

For all three outcomes, pooling of results from individual RCTs produced heterogeneous results, so pooled mean differences may not be valid and the range of mean difference in SBP and DBP is illustrated in MetaView. Of note, the largest RCT, the Hypertension Detection and Follow-Up Program (HDFP), produced substantial reductions in SBP and DBP across the three groups in this RCT (patients were stratified according to level of entry DBP level, weighted mean difference -8.2/-4.2 mmHg, -11.7/-6.5 mmHg, -10.6/-7.6 mmHg for the three strata of entry blood pressure). At five year follow-up, these reductions in blood pressure were associated with a significant reduction in all-cause mortality (6.4% versus 7.8%, risk difference 1.4%). Two RCTs did not report relevant
outcome data (Robson 1989; Brook 1983), but one did report improved recording of blood pressure (Robson 1989).

(6) Appointment reminder systems (n=8 RCTs) (Ahluwalia 1996; Barnett 1983; Bloom 1979; Cummings 1985; Fletcher 1975; Krieger 1999; Contreras 2005; Marquez 2004).

In five RCTs, reminder systems were associated with an improvement in follow-up. One RCT of a mailed postcard reminder was not associated with improved follow-up (Ahluwalia 1996). The pooled results though favouring appointment reminder systems for follow-up of patients (odds ratio of being lost to follow-up 0.4, 95% CI 0.3 to 0.5) are heterogeneous because of the single outlying RCT and the pooled results should be treated with caution. Four other RCTs (studies classified under the other intervention headings but incorporated some form of reminder intervention such as postal reminders or computer generated feedback) were associated with significantly improved follow-up attendance by patients (Dickinson 1981; Hamilton 1993; Hawkins 1979; Takala 1979; Takala 1983).

Pooled data from two small RCTs, one a three-armed study of telephone reminder, mailed reminder and usual care (Contreras 2005) and the other a parallel study of SMS reminder versus usual care (Marquez 2004) gave heterogenous results in terms of systolic and diastolic blood pressure but did show a significant improvement in blood pressure control, odds ratio 0.54 (95% CI 0.41 to 0.73).

**DISCUSSION**

**Key findings from this review**

The main findings from this systematic review is to a large extent dominated by the findings from the largest RCT, the HDFP study (Hypertension 1979; Hypertension 1979a; Hypertension 1982). Though partly intended as a trial to assess the value of systematic identification of hypertensive patients (Davis 2001), the key ingredients of how patients with established hypertension and taking antihypertensive drug treatment were managed - free care, registration, recall and regular review in tandem with a rigorous stepped care approach to antihypertensive drug treatment - should be emphasized as this multi-faceted intervention was effective in terms of reaching blood pressure goals and reducing all-cause mortality. It is interesting to note that a two-year post trial surveillance study showed that blood pressure control was attenuated when the stepped-care arm of the study was discontinued. This lack of control was associated with a decline in the use of antihypertensive medication (Hypertension 1986).

The other significant finding from this review is that self-monitoring was associated with a decline in systolic blood pressure (2.5 mmHg) and diastolic blood pressure (1.8 mmHg). Although this blood pressure reduction does not appear substantial in clinical terms, it appears to be nonetheless a useful adjunct to care and is likely to lead to a reduction in cardiovascular events. Further evaluation in larger RCTs and prospective studies including cardiovascular outcomes are warranted. Other interventions assessed in this systematic review did not produce clear results. None of the other interventions were associated with large, clinically important, reductions in either systolic or diastolic pressure, see MetaView. Education alone, directed either to patients or health professionals appears unlikely to influence control of blood pressure as a single intervention, as results were highly heterogeneous or of marginal clinical importance. Use of health care professionals such as nurses and pharmacists, though producing significantly heterogeneous results, did have mainly favourable effects, and merit further definitive evaluation in larger RCTs. Lastly, reminders (postal, computer or telephone based) were associated with an improvement in the follow-up and control of patients with hypertension but produced heterogeneous results in terms of systolic and diastolic blood pressure. This finding is consistent with the organisational structure of the HDFP study and re-iterates the importance of systematic recall systems when organising care for hypertensive patients.

**Context of other studies**

There are elements identified from this review that appear to be associated with improved blood pressure control and are consistent with findings from observational studies and previous systematic reviews. In a large community-based study, patients who received intensive antihypertensive drug therapy were significantly more likely to have reduced systolic blood pressure of 6.3 mmHg compared to an increase of 4.8 mmHg in those who received less intensive antihypertensive drug therapy (Berlowitz 1998). A more recent observational study showed that antihypertensive drug therapy was initiated or changed in only 38% of episodes of care, despite documented uncontrolled hypertension for at least six months (Davis 2001; Oliveria 2002). Lack of practice organisation is associated with a failure to achieve treatment surrogate goals in hypertension, diabetes and secondary prevention of coronary heart disease (Phillips 2001).

A recent systematic review of self monitoring also produced similar findings of modest but potentially important benefit in systolic and diastolic blood pressure (Cappuccio 2004 errat). This is important in light of the fact that self monitoring is now practiced by up to two thirds of the hypertension population in the US and Europe (Pickering 2008). We have found substantially more RCT evidence in terms of hypertension management than a recent systematic review that examined interventions used in disease management programmes for patients with chronic illness (Weingarten 2002). In that review, eight hypertension-related RCTs were cited, which provided some evidence of benefit in terms of education directed at the patient and provider (health professional) (Weingarten 2002). In this systematic review of 72 RCTs, the subset of RCTs where the intervention was directed at the patient (n=20) or physician (n=10) does not support this finding, showing no clinically important evidence for patient or health professional education as an effective implementation strategy in the management of hypertension.

**Study limitations**

There are several shortcomings that need to be highlighted in this systematic review. The HDFP study was designed as an intervention that would identify newly diagnosed hypertensive patients and then start or modify antihypertensive treatment in those with untreated as well as uncontrolled hypertension (Davis 2001). A consequence of this study design is that a differential number of people were receiving antihypertensive drug treatment in the two arms. At follow-up in year five, 81.2% of patients in the stepped care arm were taking antihypertensive medication compared to 64.2% of patients in the referred care arm (see details on included studies). So though it appears that the systematic follow-up and stepped care approach in HDFP is an important element in effective clinical care and prompts rigorous antihypertensive drug treatment, it is not possible to distinguish between the independent effect of these interventions on blood pressure control. Several other RCTs included both treated and untreated hypertensive patients and had

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differential rates of antihypertensive drug prescribing (Vetter 2000; Midanik 1991; Rudd 2004; Ornstein 2004; Contreras 2005), with rates of prescribing at higher levels in the intervention arm at follow-up. Secondly, many RCTs contained multi-faceted interventions that did not fit into a single intervention category. For example, several RCTs that were included under categories of patient education, physician education, health professional led care and organisation of care also incorporated some form of reminder intervention such as postal reminders or computer generated feedback (Dickinson 1991; Hamilton 1993; Hawkings 1979; Takala 1979; Takala 1983). Consequently, it has been difficult to attribute how far single elements that make up complex interventions exert their independent effect on blood pressure control. In terms of self monitoring, it is well established that "office" blood pressure readings are around 10/5mmHg higher when compared to ambulatory or self monitored readings (Staessen 1997; Staessen 2004; Williams 2004). Several of the RCTs did not make any recommendations about the need for adjustment of target blood pressure readings when self monitoring was the intervention being assessed, nor did they appear to anticipate lower blood pressure readings in the self monitoring group (Bailey 1998; Johnson 1978; Pierce 1984; Baqü 2005). This may have attenuated the impact of self monitoring on blood pressure control because of failure to intensify treatment. Poor adherence to therapy is thought to be associated with poor control of blood pressure (Shea 1992) and medication adherence in hypertension is estimated to be only around 50% to 70% (Ebrahim 1998). Yet only a few trials examined the relationship between adherence to medication and control of blood pressure (Haynes 1976; Johnson 1978; Sackett 1975; Schrauder 2005; Sokanekun 2004; de Castro 2006; Wetzels 2007) despite the significant influence that adherence may have on blood pressure control. Future studies will need to be designed to assess the relationship between poor adherence and poor response to antihypertensive drugs in patients with good adherence. Cluster design was used in 14 of the 71 randomized controlled trials that met the inclusion criteria. The majority (8) of these trials correctly adjusted for clustering effect. However, in those six trials that did not, the potential exists for unit of analysis errors. However, sensitivity analysis excluding those studies did not significantly alter our main results. Lastly, not all RCTs reported on the outcomes of blood pressure achieved or blood pressure control. This has meant that the relevant a priori outcomes have not been reported for all included RCTs, and pooling of data from all RCTs has not been possible. Two further trials were identified which were published outside the search dates and thus were not included in the analysis. The first was a 2 x 2 randomized controlled trial with two year follow-up comparing two self-management interventions for improving BP control among 636 hypertensive patients in two university-affiliated primary care clinics (Boonworth 2002). Patients received usual care, a behavioral intervention (bimonthly tailored nurse-administered telephone intervention targeting hypertension-related behaviours), home BP monitoring three times weekly, or the behavioral intervention plus home BP monitoring. Combined home BP monitoring and tailored behavioral telephone intervention improved BP control, systolic BP, and diastolic BP at 24 months relative to usual care. The success of this combination of self-monitoring and nurse-led care appears to consolidate some of the findings of our review. The second was a randomized controlled trial in 14 community pharmacies in Edmonton, Alberta, Canada, of 227 patients with diabetes who had BPs higher than 130/80 mm Hg on two consecutive visits two weeks apart (McLean 2008). In patients who had diabetes and hypertension that were relatively well controlled, a pharmacist and nurse team based intervention resulted in a clinically important improvement in BP.

**AUTHORS' CONCLUSIONS**

**Implications for practice**

Despite these limitations important messages emerge from this systematic review. Effective delivery of hypertensive care requires a systematic approach in the community, incorporating regular review of patients and a willingness to intensify antihypertensive drug treatment, usually by adding additional classes of antihypertensive drugs, when blood pressure goals are not being met (Hypertension 1979; Hypertension 1979a; Hypertension 1986; Davis 2001). This approach of intensive drug therapy and "tight" control of blood pressure has been demonstrated to be possible in clinical trials in hypertensive and diabetic patients alike (Hansson 1999; UK PDS 1998). There are reports of successful systematic care of hypertensive patients in the community over a 20 year period (Hart 1991), but the challenge is to translate these findings into usual clinical care.

**Implications for research**

In terms of future studies, careful preliminary work is needed when developing and testing complex interventions and thought needs to be given as to how their individual and combined effects are measured (Campbell 2000). Aside from definitive RCTs examining the effects of self-monitoring and allied health professional led care (pharmacist and nurses), there is also a paucity of evidence in terms of computer-based clinical decision support systems (CDSs) in hypertension and how adherence-enhancing strategies influence subsequent blood pressure control (Ebrahim 1998). HDFP was a well-funded study with substantial staffing resources. This meant that the "stepped care" intervention was provided by a highly motivated workforce. An economic evaluation of delivering organised care to hypertensive patients should accompany future studies. Lastly, none of the included RCTs attempted to manage hypertension in the context of overall cardiovascular risk. Future studies need to be congruent with hypertension guidelines that recommend treatment and control of blood pressure in combination with multi-factorial risk reduction (Ramsay 1999).

**Conclusions**

Effective delivery of hypertension care in the community requires a rigorous approach in terms of identification, follow-up and treatment with antihypertensive drugs. This systematic review shows that such an approach is likely to translate into reductions in cardiovascular mortality and morbidity (Hypertension 1979; Hypertension 1979a; Hypertension 1986; Davis 2001). Supplementary and alternative models of care, including self monitoring of blood pressure by patients, blood pressure management by allied health care professionals and CDSs require further development and evaluation. Educational interventions directed to either patients or health professionals alone are unlikely to produce clinically important reductions in either systolic or diastolic blood pressure.
ACKNOWLEDGEMENTS

We are very grateful to Margaret Burke (Cochrane Heart Group) for help with searching and to Shah Ibrahim who was an author on the original review. Our thanks also to Alison Blenkinsopp, Barry Carter, Sandy Logan, Frank Sullivan, Hayden Bosworth, Brian Haynes, David Jewell, Jim Krieger, Richard McManus, Steven Ornstein, Mike Phelan, Mary Rogers, Lin Song, Kelly Zarnke and Peter Whincup concerning clarification about individual RCTs and providing additional data. Thanks to Craig Ramsay for advice concerning factorial trials. We are grateful to Curt Furberg for facilitating contact with the investigators of US-based studies. Our particular thanks to Charlie Ford for information regarding the Hypertension Detection and Follow-Up Program (HDFP) study. Lastly, we are grateful to Debbie Farrell for administrative support.
**REFERENCES**

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Burrelle 1986 *(published data only)*


Cakir 2006 *(published data only)*


Carnahan 1975 *(published data only)*


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Roumie 2006

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**Williams 2004**


* Indicates the major publication for the study

### Characteristics of Studies

**Characteristics of included studies [ordered by study ID]**

**Ahuwalia 1996**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Parallel, individuals, hospital outpatients in a single hospital clinic, USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Hypertensive (SBP 180mmHg and/or DBP 110mmHg), 95% African American, 49% uninsured, mean age 56</td>
</tr>
</tbody>
</table>
| Interventions      | (1) Mailed reminder- postcard addressed in the presence of the patient and mailed next day as a reminder to attend clinic in a week’s time  
(2) No reminder card, given routine clinic appointment |
| Outcomes           | (1) First follow up visit to walk-in clinic or a continuity medicine clinic- no difference at 6 months (E) 45/53, 85% versus (C) 48/54, 89%  
Duration of FU 6 months |
| Notes              | No blood pressure data collected at outcome |

**Risk of bias**

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<tr>
<th>Bias</th>
<th>Authors' judgement</th>
<th>Support for judgement</th>
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**Artinian 2001**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Pilot RCT</th>
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<tbody>
<tr>
<td>Participants</td>
<td>Age &gt;18 years, SBP &gt;140mmHg or &gt;90mmHg or for diabetic patients ?130mmHg or ?85mmHg</td>
</tr>
<tr>
<td>Interventions</td>
<td>(1) Home BP telemonitoring- self monitoring at home and transmitting BP readings over telephone line to care providers in order to “facilitate telecounselling and treatment planning”. BP readings transmitted 3 times per week for 12 weeks. (2) Nurse-managed community based BP monitoring. (3) Usual care</td>
</tr>
<tr>
<td>Outcomes</td>
<td>(1) Blood pressure- mean change SBP 25 mmHg, mean change DBP 14mmHg (E) versus mean change SBP +1 mmHg, mean change DBP 2mmHg Duration of FU 3 months</td>
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<tr>
<td>Notes</td>
<td>Small pilot study with short follow up period</td>
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Artinian 2001 (Continued)

Allocation concealment? Unclear risk B - Unclear

### Bailey 1998

**Methods**
Parallel, individuals based in general practitioner surgeries, Australia

**Participants**
Patients who were about to start BP lowering treatment who did not practice self-measurement, <7% previously untreated, mean age 53.5 years.

**Interventions**
1. Self monitoring - use of an OMRON HEM706 monitor. Asked to record BP twice daily for 8 weeks
2. Usual care - no self recording

**Outcomes**
1. Blood pressure control - significantly worse (E) 148/89mmHg versus (C) 142/89.
2. Process of medical care - more vigorous in (C) group in terms of increase, addition of medication
3. Compliance (pill count) (E) 88% versus (C) 94% NS

Duration of FU 8 weeks

**Notes**
23% patients were not interested in future self-measurement
Outcome assessment: 24 hour ambulatory monitoring
Physicians not instructed to achieve a treatment goal or protocol
Significant disagreement between self monitoring and office measurement found by 19% physicians and 16% patients. In (E) group negative finding most likely due to the fact that physicians were less likely to alter drug regimen when self-monitoring readings were lower than office BP measurement. Finding most likely to due different responses to process of care no protocol concerning treatment intensification was provided in this RCT. No adjustment to the lower self monitor readings were made and no intensification was associated with the intervention

### Risk of bias

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### Baqu, Äö 2005

**Methods**
Cluster RCT, Parallel, 180 Primary care basic health care units (BCU) throughout Spain, randomised by BCU (n=180), analysed by patient (n=1325)

**Participants**
Patients with poorly controlled essential hypertension, defined as systolic blood pressure \( \geq 140 \) or diastolic blood pressure \( \geq 90 \) mm Hg.

**Interventions**
The patients were given an OMRON HEM-705CP automatic blood pressure monitor on two occasions, for use during 15 days at weeks 6 and 14. Blood pressure was recorded at each visit (baseline, 6, 8, 14, 16, and 24 weeks).

**Outcomes**
Control of blood pressure, considered systolic/diastolic blood pressure \(<140/90\) mm Hg (130/85 in patients with diabetes).

**Notes**
Original in Spanish and only translation of abstract available. Full text in Spanish did not give denominator for follow-up at 24 weeks so data from follow-up at 16 weeks used.

### Risk of bias

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### Baqu'Äö 2005 (Continued)

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### Barnett 1983

<table>
<thead>
<tr>
<th>Methods</th>
<th>Parallel, individuals based in one community-based health centre in USA.</th>
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</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Physicians nurse-practitioners (numbers not stated). Patients (n= 115) with sustained hypertension and/or diagnosis of hypertension and placed on therapy, &lt;2 repeat BP measurements after initial visit. 49% female, mean age 43 years (42% older than 45 years), 17% black mean initial BP 150/102mmHg, 7% with history of hypertension, 4% with history of cardiovascular disease, 15% with family history of hypertension, 34% diagnosed obese</td>
</tr>
<tr>
<td>Interventions</td>
<td>(1) Computer reminder to GP- automated surveillance system utilizing computer-based medical record system, generated automatic reminder to GP to check BP of patients. &quot;No attempt was made to monitor the quality of care as to the degree of BP control&quot;. (2) Usual care.</td>
</tr>
<tr>
<td>Outcomes</td>
<td>(1) Evaluate extent BP FU was attempted or achieved, (E) 62/63 (98%) versus (C) 24/52 (46%). (2) Repeat BP recorded (E) 44/63 (70%) versus (C) 27/52 (52%). (3) Degree of DBP control achieved (DBP &lt;100mmHg) (E) 44/63 (70%) versus (C) 27/52 (52%).</td>
</tr>
<tr>
<td>Notes</td>
<td>Intervention improved follow up of patients and in those who were followed up DBP was significantly improved. Stratified according to age (45) and DBP (100mmHg)</td>
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### Risk of bias

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### Billault 1995

<table>
<thead>
<tr>
<th>Methods</th>
<th>Parallel, individuals in a single outpatient clinic, Paris, France.</th>
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<tbody>
<tr>
<td>Participants</td>
<td>Individuals who attended hypertension clinic, no entry SBP/DBP defined, 88% (C) 83% (E) on BP lowering drugs. 63% male</td>
</tr>
<tr>
<td>Interventions</td>
<td>(1) Booklet with personalised standardised medical information explained to patient and their family doctor. Ten items included on the basis of usefulness of managing hypertension. Patients asked to complete with family doctor and mail carbon copy to outpatient clinic for entry into computerised record. (2) Usual care Patients in both groups encouraged to visit family doctor 1-3 times per trimester according to severity of hypertension</td>
</tr>
<tr>
<td>Outcomes</td>
<td>(1) Process of care in terms of use of services. (2) SBP/DBP- (E) 145.1/88.2mmHg versus (C) 146.2/86.8; no difference between groups (3) Other cardiovascular risk factors (smoking, exercise, body weight- no difference between groups. Duration of FU 1 year</td>
</tr>
</tbody>
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**Interventions used to improve control of blood pressure in patients with hypertension (Review)**

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Billault 1995 (Continued)

Notes 44/82 (54%) of intervention group who were followed up completed personal medical record.

Risk of bias

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Bloom 1979

Methods Parallel, individuals based after a work-site screening programme US

Participants Patients with elevated blood pressure 140/90mmHg. Average age 40, white, male 82%, well educated 60% with a masters degree or higher

Interventions (1) Educational material about hypertension, reinforced by a hypertension counsellor one week later, designed to improve appointment keeping and knowledge (2) No educational material or counsellor follow up.

Outcomes (1) Number seeking medical care/appointment- significantly improved 15/27 (E- 55.5%), 7/27 (C-25.9%) (2) Knowledge about hypertension- increased in (E) 3.22 versus (C) 2.26 Duration of FU 3 months

Notes RCT concerned with initial follow up of patients identified as having sustained hypertension after screening programme

Risk of bias

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Bogden 1998

Methods Parallel, individuals in a single OPD clinic in US

Participants Patients with increased blood pressure, either: 150 or 95mmHg 140 or 90mmHg with CVS risk factors or target organ damage Mean age 55 sd13, 25% mixed Hawaiian ancestry, 57% high school graduates, 87% health insurance

Interventions (1) Pharmacist interacted with physicians and patients: Patients: "Go through medication history "Answered questions "Encouraged compliance Physicians: "Reviewed laboratory data with doctors "Attached "recommendations" about blood pressure treatment Control: usual medical care without pharmacist involvement

Outcomes (1) % patients with controlled BP (<140 and <90mmHg)- improved 27/49 (E) 9/46 (C) p<0.001
Bogden 1998 (Continued)

(2) Mean reduction in SBP/DBP at follow up—improved (E) 132/85mmHg versus (C) 145/92mmHg p<0.01
(3) Mean medication cost decreased $6.8 (E) increased $6.5 (C)

Duration of FU 16 months

Notes
No contamination between doctors
Intervention superior to usual care
Process of care in intervention arm. Pharmacist made 162 recommendations to doctors:
10 new (additional) medication to be started
34 medication dose increase
12 stop medication
5 reduce medication due to side effects
16 renew medication at existing dosage
52 switch to a cheaper drug
20 newer more effective drug

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Brook 1983

Methods Cluster RCT, families unit of randomisation

Participants 2005 Families living in six US cities (47% men, 18% non white, mean age 33.4, range 14-61) Results are reported for subset of hypertensive subjects, 24.7% (n=294) full health insurance, 24.5% (n=562) partial health insurance.

Interventions (1) Full health insurance- (2) Partial health insurance (three groups at different levels of re-imbursement: (a) Individual - 95% OPD to ceiling of $150, all inpatient (b) Intermediate- 25-50% both OPD and inpatient up to $1000 (c) Catastrophic- 95% both OPD and inpatient up to $1000

Outcomes (1) Mean DBP- improved by -1.9mmHg (2) Mean SBP- improved by -1.8mmHg (3) General health (4) Health habits (5) Risk of dying Duration of FU: 3 years

Notes SBP/DBP reported but baseline DBP lower than follow up (see tables 3 and 5 in original report). Subsequent report suggested lower SBP/DBP at follow up adjusted for blood pressure at baseline (see table 2 and text), high losses to FU No details on process of BP care, but free care increased physician contacts and better lifestyle changes Subgroup analysis: Low-income people with high BP had greater improvement than high-income—3.5mmHg (low income) versus 1.1mmHg (high-income)

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Bulpitt 1976

Methods Parallel, individuals based in 3 hospital hypertension clinics in UK
Interventions used to improve control of blood pressure in patients with hypertension (Review)

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**Bulpitt 1976** (Continued)

**Participants**
Intervention directed at hospital physicians (number not stated). 278 patients with diagnosed hypertension referred to clinics. Characteristics of patients: computer group: 56% female, mean age 51 years, mean lying BP 178/105 mmHg; control group: 53% female, mean age 48 years, mean lying BP 177/106 mmHg

**Interventions**
(1) Computer-held records- allowed doctor to record clinical information in structured format.
(2) Standard hospital notes

**Outcomes**
(1) Content of patient record 15 items- overall better recording in computer group
(2) Length of time of consultation- longer in E (39.9 mins) than C (31.4 mins) at initial consultation, subsequent consultations no difference.
(3) Patient investigations during RCT- no difference
(4) Drop outs- 25/136 (E- 18%) 36/142 (C- 25%)
(4) Average SBP and DBP- no difference (E) 149/96 mmHg (C) 149/97 mmHg

Duration of FU 12 months.

**Burrelle 1986**

**Methods**
Parallel, individuals, hospital outpatients and primary care, USA

**Participants**
16 treated and non-adherent elderly hypertensive patients, 75% black, 75% women, mean age 69.

**Interventions**
(1) Home visits, education and special dosing devices; addressed psycho-social problems and compliance problems by means of: medication planners; special dosing devices; individualized instruction on disease states and treatments- Treatment Information on Medications for the Elderly (TIME)
(2) Usual care

**Outcomes**
(1) Blood pressure control- no difference between groups, (E) 167.8/89.2 mmHg versus (C) 165.8/86.8 mmHg
(2) Compliance (Pill counts and direct questioning, taking >80% of medication)- Percent of pills taken: 92% (E) versus 71% (C) (p<0.001)
(3) % with controlled hypertension, no difference, (E) 1/8, 13% versus (C) 1/8, 13%

Duration of FU 8 weeks

**Risk of bias**

**Bias**

**Authors' judgement**
Unclear risk

**Support for judgement**
B - Unclear
Cakir 2006

Methods
Parallel, Outpatient hypertension clinic at a university hospital in Istanbul, Turkey

Participants
Persons were eligible if had been diagnosed with hypertension (i.e., mean systolic BP of 140 mmHg and/or mean diastolic BP, DBP, of 90 mmHg on 3 separate occasions during a 3-week period), and were able to complete the questionnaire unaided and were aged 18 to 65 years of age. Major exclusion criteria were currently participating in a structured dietary program aimed at weight reduction, regular participation in physical activity during the previous 3 months, regular use of drugs that affect dyslipidemia, use of weight-loss medications, a prior cardiovascular event, or ischemic heart disease.

Interventions
Patient education ("lifestyle intervention") while participants in the control group were provided with routine outpatient services and were asked to maintain their usual lifestyles, including dietary and exercise habits, for 6 months until they were reexamined.

Duration: 6 months

Outcomes
The primary outcome was SBP. Additional outcomes included DBP, fasting lipids, obesity parameters, alcohol consumption, smoking, and stress management at 6 months.

Notes

Risk of bias

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Carnahan 1975

Methods
Parallel

Participants
VA outpatient clinic US, starting treatment, n=100 (male 98), mean age 54 (E) 57 (C)

Interventions
(1) Self Monitoring, Instructed to use own sphygmomanometer twice a day. Readings recorded and delivered to the clinic when visiting. (2) usual care

Outcomes
(1) Mean SBP/DBP- SBP lower at 6 months FU in (E), 7.5mmHg difference DBP no difference at FU

Duration FU: 6 months

Notes
No SDs available, estimated to be 20mmHg SBP, 10mmHg DBP

Risk of bias

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Coe 1977

Methods
Parallel, individuals based in 2 hospital hypertension clinics in US

Participants
Hospital physicians
(number not stated)
116 patients, 90.5% female, mean age 52 years, all black unselected, consecutive referrals to clinics during 6-month period. Characteristics:
(1) Mean of 3 separate pretreatment BP measurements > 140/95 mmHg
(2) Three return visits while on treatment
(3) BP medication taken as prescribed

Interventions
(1) Computer-generated treatment recommendations by algorithm; generated drug type and dose recommendations to physician
(2) Usual physician care

Outcomes
(1) Blood pressure - reported in three strata of DBP, <95, 95-105, >105 but no differences between (E) 152.5/99.6 mmHg versus (C) 148.7/96.5 mmHg
(2) Compliance - self report, no difference
(3) Drugs prescribed - patterns of drug use the same.

Duration of FU months uncertain but weeks of treatment varied within a range of 21 to 40 weeks

Notes
Difficult to interpret as trial reported on all outcomes by means of initial DBP strata.
Mean SBP/DBP was non significantly better in (C) versus (E).
Overall conclusion computer generated treatment (E) and usual care by physicians (C) was equivalent.

Risk of bias

Bias
Allocation concealment?
Authors' judgement
Unclear risk
Support for judgement
B - Unclear

Contreras 2005

Methods
To study the efficacy of telephone and mail intervention in therapeutic compliance among patients with mild to moderate hypertension.

Design. A prospective controlled multicenter clinical trial with 3 arms

Participants
Eighty-five primary care centers in Spain, with a duration of 6 months. Patients. A total of 636 patients with newly diagnosed or uncontrolled hypertension were included. Interventions. T

Interventions
he patients were randomized and distributed between the following groups: (i) control (CG) - under routine clinical management; (ii) mail intervention (MIG) - received a mailed message reinforcing compliance and reminding of the visits (15 days, 2 and 4 months), - (iii) telephone intervention (TIG) - received a telephone call at 15 days, then at 7 and 15 weeks.

Outcomes
Five hundred and thirty-eight patients completed the study (261 males); 85.5% were compliers (CI=82.5-88.5, n=460). The MPC was 95.1 +/- 19.6% (CI=93.28-96.92). The CG consisted of 182 individuals, MIG=172 and TIG=184. Compliers represented 69.2% of the CG (CI=62.5-75.9%), 91.3% (CI=87.1-95.5) of the MIG (p=0.0001) and 96.2% of the TIG (CI=93.5-98.9%); the final MPC was 89.6% +/- 15 in CG, 96.6% +/- 12 in MIG and 99.1 +/- 26.8 in TIG (p=0.0001). The percentage of controlled subjects was 47.2% in CG (CI=40-54.4), 61.3% in MIG (CI=54.1-68.5%) and 63.3% in TIG (CI=56.4-70.2%) (p<0.05). Conclusions. TIG and MIG are effective measures for improving patient compliance in hypertension.
This is a three arm study of a mail intervention, a telephone intervention and a usual care group.

**Risk of bias**

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**Cummins 1985**

Methods

Hypertensive patients attending in a single urban family practice

Participants

Patients, aged 19 to 96, mean age 60. 62% female, 91% black, 11% newly diagnosed, 75% SBP <140mmHg and DBP >90mmHg

Interventions

(1) Appointment reminder- reminder card sent one week in advance of appointment and telephone patients who missed appointments to schedule new ones (2) Usual care

Outcomes

(1) Appointment keeping rate-appointments improved in (E-87%) versus (C- 79%). (2) Dropouts from treatment- drop outs less at 4 months in experimental group (E- 87/486, 18%) versus (C- 150/487, 31%) (3) Blood pressure control- average SBP/DBP improved in experimental group(SBP-2mmHg, p=0.18 and DBP -1mmHg, p=0.75) (4) Proportion of patients with controlled hypertension (<140/90)- 31% (E) versus 25% (C) Duration FU 8 months

**Risk of bias**

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**de Castro 2006**

Methods

double-blind randomized clinical trial,

Setting. Single hospital clinic outpatient in brazil

Participants

A total of 71 patients in a single hospital clinic outpatient in brazil

Included: >18 years, with uncontrolled hypertensive,

Interventions

(i) control (CG) - under routine clinical management and sham intervention

(ii) intervention (IG) - received a Pharmaceutical care programme delivered by 9 trained pharmacists: Patient education and support

Outcomes

ABPM after 6 months (large cuff was used in >32cm arms)

**Risk of bias**
### de Castro 2006 (Continued)

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### Dickinson 1981

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<tr>
<th>Methods</th>
<th>Factorial, Cluster, RCT</th>
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<tr>
<td>Participants</td>
<td>Four clinical teams in Family Medicine Centre in USA, 4 faculty physicians 37 residents. Each team received on of the interventions. 250 Patients, 69.9% female, mean age 49.6 years, 70.4% white mean weight 78.9kg, mean baseline BP 159/89mmHg. Inclusion criteria: (1) Hypertensive patients visiting practice during 4-month baseline period (2) Elevated systolic or diastolic pressure at last baseline visit (3) At least one visit during 7-month intervention period</td>
</tr>
<tr>
<td>Interventions</td>
<td>(1) Computer-generated feedback-monthly feedback reports on individual patients for physician, containing identification, age, date of last visit and latest BP in those with uncontrolled hypertension (age 18-44 &gt;/=140/90; 45-64 &gt;/=150/95; age &gt;64 &gt;/=160/95) or overdue appointments (2) Education programme- designed to increase physician awareness about non-compliance, plan long term management based on periodic assessment, encourage family, behavioural and drug therapies. Three separate self instructions (3) Both (4) Neither</td>
</tr>
<tr>
<td>Outcomes</td>
<td>1) Follow up appointments increased in interventions-feedback 3.4, education 3.3, both 3.2, control 2.6 NS. (2) Knowledge-significantly improved in physicians who received education only, feedback 76, education 84, both 78, control 74 (3) Blood pressure control- no difference - feedback 145/86mmHg, education 149/85mmHg, both 149/84mmHg, control 148/83 4% with controlled hypertension- non significant differences, feedback 65%, education 63%, both 57%, control 58% Duration of FU 7 months.</td>
</tr>
<tr>
<td>Notes</td>
<td>Intervention randomised by, directed at physicians, analysis by patient No account taken of clustering. Explains uneven patient numbers per arm of RCT</td>
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### Earp 1982

<table>
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<tr>
<th>Methods</th>
<th>Parallel Individuals</th>
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<tr>
<td>Participants</td>
<td>Hypertension, taking BP medication that had been initiated, altered or re-started. Based in outpatient hypertension clinic or family practice clinic n=218, mean age 48, 59% female, 77% black</td>
</tr>
<tr>
<td>Interventions</td>
<td>(1) Home visits- over 18 months by nurse or pharmacist. Provided a &quot;test of how effectively home-visiting health practitioners could motivate and/or reinforce positive health behaviours, including medication compliance&quot; (2) Home visits plus involvement of &quot;significant other&quot;- involved daily/several times a week BP monitoring (3) Usual care</td>
</tr>
<tr>
<td>Outcomes</td>
<td>(1) Home visit group versus usual care: proportion of patients in each group with uncontrolled hypertension (DBP &gt;/=95mmHg)- significant effect at year 2 (E) 21% versus (C) 42%, not significant at year 1 (E) 34% versus (C) 34%.</td>
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Earp 1982 (Continued)

(2) Home visit and involvement of significant other versus usual care; proportion of patients in each group with uncontrolled hypertension (DBP 95mmHg): non significant effect at year 2 (E) 25% versus (C) 42%, not significant at year 1 (E) 39% versus (C) 34%.

Duration of FU: 1 year

Notes

Large proportions lost to follow up at year 2, hence follow up at 1 year when pooling data. Mean number of BP medication taken declined in the two intervention group (1.7 to 1.5 Group 1 and 1.5 to 1.4 Group 2) but increased in control group (Group 3 1.6 to 1.8); between group differences non significant.

Risk of bias

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Evans 1986

Methods

Cluster- physicians stratified to solo or group practice and randomly allocated within strata

Participants

Canadian family physicians. Eligible patients, age 30 to 69 years, either DBP >90mmHg at one home visit and taking BP medication or no BP medication and DBP >90mmHg on 3 times at home visits

Interventions

(1) Mailed CME to physicians 14 weekly instalments of information, chart and fu appointment system to encourage detection and recall of patients (2) Usual care

Outcomes

(1) Blood pressure- (DBP<90mmHg. (E) 67% versus (C) 67%, non significant. (2) # visits for BP check- no difference (3) # patients told BP elevated- no difference (4) # patients on BP medication- no difference (5) Mean % compliance rate- no difference (6) % patients with controlled blood pressure- no difference

Duration FU 1 year

Notes

Cluster RCT- BP data aggregated at cluster level. No difference found between intervention and usual care, 76% (E) and 79% (C) patients on BP medication.

Risk of bias

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Fielding 1994

Methods

Parallel, individuals at four work sites in the US

Participants

Patients with increased blood pressure, either: SBP 140 and/or DBP 90mmHg identified during work-site screening. 16%female, 30.5% taking BP lowering drugs

Interventions

(1) IMPACT consisted of monthly 10 minute individual sessions for patients with counsellor at work site that included:

- Assessment of current behaviours
- Discussion re: treatment goals
**Fielding 1994** (Continued)

"Compliance
"Mailed monthly package including personalised blood pressure information
"Incentives offered e.g. coupons for free sports equipment
"Sites were requested to offer at least six classes or demonstrations related to BP control during the year

(2) Usual care

| Outcomes | (1) Mean SBP/DBP changes -
| | SBP: significantly improved 138.1mmHg (E) versus 144.5mmHg (C)
| | DBP: no difference 86mmHg (E) versus 86.5mmHg (C)
| | Adjusted difference:
| | SBP 7.6mmHg, p<0.05
| | DBP 2.4mmHg, NS
| | Duration of FU 1 year

Notes
Statistically significant change for SBP (but not DBP) after adjustment for age, sex and baseline blood pressure
A significantly higher proportion of intervention group started BP lowering drugs (E) 13/49, 26.5% (C) 5/52, 9.6%

**Risk of bias**

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**Fletcher 1975**

Methods
Parallel, individuals based in single emergency room in US

Participants
Patients who attended emergency department with DBP 100mmHg and who had been given a follow up appointment for a medical clinic

Interventions
(1) Reminder (letter or phone) to attend follow up appointment at clinic, offer of assistance if problems arose, followed up until attended clinic or missed two consecutive appointments
(2) Usual care

Outcomes
(1) Returned to initial medical clinic appointment significantly improved 62/74 (E- 84%), 44/70 (C- 63%).
(2) Blood pressure control the same at FU 38/74 (E- 51%), 37/70 (C- 53%)

Duration of FU 5 months

Notes
Improved initial attendance but blood pressure control in both groups the same. Process of care more vigorous in (E) group but (E- 38%), (C- 33%) said that they were on BP lowering drugs.
Blood pressure control defined in age-specific categories
20-39 <140/90
40-59 <150/95
>60 <160/100

**Risk of bias**

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</table>
### Friedman 1996

**Methods**
Parallel, individuals from 29 different communities, Boston, USA

**Participants**
Under care of physician for hypertension on BP lowering drugs, SBP \(\geq 160\) mmHg or DBP \(\geq 90\) mmHg on average two readings. 90% white, 77% female, mean age 76 years

**Interventions**
1. Home monitoring and telecommunication system
   *Weekly automated home blood pressure recording.
   *Telephone-linked computer system (TLC)- computer-based telecommunications system that converses with patients in their homes, patients contacted weekly. Provides advice concerning their blood pressure, understanding of BP lowering medication, adherence to medication, symptoms that might relate to side effects of therapy. Information directed to patient's physician
2. Usual care

**Outcomes**
1. Adherence to medication- improved by 18% (E) vs 12% (C), \(p=0.03\).
2. Mean change in SBP/DBP- no difference for SBP, (E) 158.5mmHg versus (C) 156.4mmHg, \(p=0.2\); significant difference for DBP, (E) 80.9mmHg versus (C) 83.2mmHg, \(p=0.02\);
3. Cost effectiveness- most cost effective for non-adherent patients

Duration of FU 6 months.

**Notes**
Cost effectiveness measured all computer and telecommunication costs, facilities charges, supplies and support personnel for start-up and maintenance of the system. Cost effectiveness ratios were computed for medication adherence improvement and DBP decrease using regression analysis

**Risk of bias**

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### Garcia-Pena 2001

**Methods**
Parallel, individuals, elderly (60) age-stratified sample recruited from 12 family medical centres, Mexico city, Mexico

**Participants**
Hypertension, mean SBP 160 or/both DBP 90 in untreated patients or treated hypertension patients Mean BP level 161.9/90.8 (C) 162.1/90.9 (E) average age 70.6 years

**Interventions**
1. Nurse-based intervention
   *Nurses trained in aging and clinical aspects of hypertension including:
   *Personal interviews
   *Health behaviour change models
   *Process of negotiation
   *Ethical aspects of home visits
   On each visit nurse did the following:
   *Measured BP
   *Discussed baseline health check and discussed lifestyle changes
   *Guided patients in healthier lifestyle and negotiated specific targets
   *Revised pharmacological treatment
   *Adherence encouraged
   Frequency of visits 2-4 weeks
2. Usual care from institute's clinic and mailed pamphlet about hypertension

**Outcomes**
1. Blood pressure- mean change SBP 3.31 mmHg \(p=0.03\), mean change DBP 3.67mmHg \(p<0.001\)
2. Weight -1.1 kg significantly reduced
Garcia-Pena 2001 (Continued)

(3) Sodium excretion -5.8 ns
(4) Control BP <160/90mmHg improved 36.5% (E) versus 6.8% (C)
(5) Exercise- slow walking exercise increased (E) 9.1% versus decreased (C) 0.7%
(6) Not taking antihypertensive drugs (E) 15.9% versus (C) 26.9%
(7) Antihypertensive drug usage- increased in (E) change from baseline12.5% versus (C) 5.3%, difference 7.2% p=0.02

Duration of FU 6 months

Notes
Well conducted RCT. Nurse intervention aimed at both pharmacological and non-pharmacological management of hypertension. Had positive effect on mean SBP/DBP and BP control with increases in number taking antihypertensive medications. Non pharmacological treatment also effective at reducing weight, increasing exercise with non significant reduction in sodium excretion

Risk of bias

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<td>Low risk</td>
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Gullion 1987

Methods
Factorial RCT, randomised by physician (n=111), analysed by patient (n=2583), San Francisco USA. Average of 23 patients per practice

Participants
Hypertensive patients using anti-hypertensive medication, had a DBP >90mmHg at some stage of their care. Age range 20-80 years

Interventions
(1) Medical education-
"Individualised feedback on medical record information, detailed peer-review
"Syllabus material
"Educational session by means of telephone call with faculty expert discussing feedback reports and syllabus materials.
(2) Behavioural education-
"Individualised feedback on patient survey summaries, detailed peer-review
"Syllabus material
"Educational session, telephone call with faculty expert discussing feedback reports and syllabus materials
(3) Both interventions
(4) Neither intervention

Outcomes
(1) DBP- no difference between four groups either for mean DBP (85.17, 85.59, 85.16, 85.79 mmHg respectively) or for % with controlled DBP (68.65%, 66.78%, 67.93%, 68.25% respectively) at follow up.
(2) Lifestyle outcomes- no difference apart from decreased BMI in behavioural group.
(3) Health promotion advice given- more likely to be given advice re: medication regimen, side effects of drugs, sodium intake in behavioural group.

Duration of FU 1 year

Notes
Negative RCT with regard to primary outcome of DBP. Caution required with interpretation of lifestyle and health promotion outcomes. Multiple comparisons.

DBP reported but not usable because no baseline numbers randomised reported or standard deviations

Risk of bias
### Gullion 1987 (Continued)

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### Halme 2005

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<tr>
<th>Methods</th>
<th>Multicenter, randomized, parallel-group study in 55 primary care health centres in Finland.</th>
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<tbody>
<tr>
<td>Participants</td>
<td>269 patients randomised and 232 analysed: (119 C and 113 E). Persons were eligible if had been diagnosed with hypertension (i.e., mean BP of 140/90 or higher measured twice each time at 4 consecutive occasions), consent, aged between 20-75 years of age, and were excluded with obesity, secondary or malignant hypertension, A fib or flutter.</td>
</tr>
<tr>
<td>Interventions</td>
<td>Intermittent self-monitoring of BP. Home BP was measured in the self-monitoring (SM) group at 0, 2, 4, and 6 months, and in the control (C) group at 0 and 6 months.</td>
</tr>
<tr>
<td>Outcomes</td>
<td>SBP, DBP and % controlled, Duration: 6 months</td>
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<tr>
<td>Notes</td>
<td>&quot;Home&quot; results only used in analysis as by definition self-monitoring takes place outside office.</td>
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### Hamilton 1993

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<tr>
<th>Methods</th>
<th>Parallel, individuals based in hypertension clinic in tertiary care teaching medical centre, US</th>
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<tr>
<td>Participants</td>
<td>Thirty four treated hypertensives DBP 90mmHg and/or SBP 160 mmHg, participating in therapeutic hypertension regimen. Mean age 54 years, white, married, high school educated.</td>
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<tr>
<td>Interventions</td>
<td>(1) Postcard reminder one week before the next regularly scheduled appointment, a 30 to 40 min intervention with the nurse practitioner before the appointment with the physician (including tailored care plan, information on hypertension, discussion of risk factors, max. 45 min total time), follow up phone call one month after the intervention to evaluate the negotiated plan of care. (2) Usual care - no self recording</td>
</tr>
<tr>
<td>Outcomes</td>
<td>(1) SBP/DBP - improved SBP difference -17.3 mmHg, not DBP -4.7 mmHg, (p=0.03 and 0.22 respectively) (2) Compliance (self report) - no difference, adherence score of 27.5 in intervention group vs 24.5 in control group (p=0.12) (3) Mean number of appointments kept - improved 97% (E) v 74% (C) (p=0.04) (4) Physician rated patient adherence - improved (E), adherence score of 29.18 in intervention group vs 23.92 in control group (p=0.005) Duration of FU 6 months</td>
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<tr>
<td>Notes</td>
<td>SBP improved, mean number of appointments kept improved in (E) group, adherence no difference on self-report Small RCT</td>
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### Hamilton 1993 (Continued)

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#### Hawkins 1979

**Methods**
Parallel Individuals

**Participants**
Medical OPD clinic, San Antonio, US, patients for hypertension (42% E) (49% C) and diabetes or both (28% E) (21% C), mean age 61 (E) 60 (C), >90% Mexican Americans, (female 76% E, 78% C)

**Interventions**
1. Clinical pharmacist- chronic disease management in OPD setting (medical care monitored by family practice faculty)
2. Usual care by physician

**Outcomes**
1. Kept-clinic appointments
2. Compliance with medication (prescription record)- improved diuretic only: 60.5% adherent (E) vs 52.9% (C) (p<0.7), diuretic plus methyl dopa: 84.6 % (E) vs 65.4% (C) (p=0.2)
3. Kept OPD appointments- 83.3% (E) vs 73.8% (C) (p<0.0005)
4. Frequency of clinic visit- 6.69 (E) vs 5.38 (C) (p=<0.001)
5. Mean SBP (E) 147mmHg versus 141 (C); p<0.01. Mean DBP 84mHg (E) versus 84mHg (C) non significant.

**Duration FU** 24-29 months

**Notes**
Improved for pharmacist led care(E) for:
1. Kept OPD appointments
2. Frequency of OPD appointments
3. Mean SBP between group comparison- improved in (E) group but worse for DBP

#### Risk of bias

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### Haynes 1976

**Methods**
Parallel Individuals

**Participants**
Hypertensive males (n=39), not compliant (pill counts <80%) or at goal DBP (90mmHg) after 6 months (previously enrolled in a separate RCT, see Sackett 1975)

**Interventions**
1. Patient self monitoring and education, includes:
   "Home self-measurement of BP
   "Home BP and medication charting
   "Tailoring- patients interviewed to improved medication taking
   "Increased supervision and reinforcement- fortnightly review including positive re-enforcement.
All interventions supervised and executed by non health professional programme coordinator

---

*Interventions used to improve control of blood pressure in patients with hypertension (Review)*

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Haynes 1976 (Continued)

Outcomes

(1) Compliance- increased in experimental group (E) 65.8 versus (C) 43.2, p=0.025
(2) Control of DBP- increased in experimental group, (E) 93.1mmHg versus (C) 96.4mmHg, p=0.12
(3) Combined compliance and DBP targets- increased in experimental group

Duration of FU 1 year.

Notes

(1) No data given- change in DBP and compliance reported
(2) Experimental group patients received significantly more attention than control patients (5 hours over 6 months)
(3) Physicians treating experimental patients prescribed more vigorously

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Hennessy 2006

Methods

Cluster factorial randomized trial.

SETTING: Academic health system using an ambulatory electronic medical record.

Participants

A total of 10,696 patients with a diagnosis of hypertension cared for by 93 primary care providers. Randomised by provider (n=93), analysed by patient (n=7159).

Interventions

Academic detailing, provision of provider-specific data about hypertension control, provision of educational materials to the provider, and provision of educational and motivational materials to patients.

Outcomes

The primary outcome was blood pressure control, defined as a blood pressure measurement below 140/90 mm Hg, and was ascertained from electronic medical records over 6 months of follow-up.

Notes

This trial is factorial involving education of provider and patient. absolute data only for BP and control data entered

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Hetlevik 1998

Methods

Cluster (29 health centres, 53 family practitioners), analysed by patient (2239 patients). Two regions in Norway.

Participants

Hypertensive patients (baseline BP level given), mean age 64 years, 57% female.

Interventions

(1) Computer based decision support system (CDSS). Doctors and assistants trained and received a user manual. Re-enforcement by means of telephone repetitions seminar on risk intervention and further demonstration of CDSS.
(2) Usual care

Interventions used to improve control of blood pressure in patients with hypertension (Review)

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Hetlevik 1998 (Continued)

Outcomes

(1) SBP/DBP - SBP no difference (E) 156.8mmHg versus (C) 155.6mmHg NS, DBP (E) 88.8mmHg versus 89.8mmHg, p<0.05 (2) Cholesterol (3) % smokers (4) BMI (5) Coronary heart disease risk score. All other outcomes no different between groups (6) Recording of risk factor data - improved slightly in (E) group for cholesterol and family history. Duration of FU 24 months.

Notes

Only 104 (11%) patients had CDSS used on them during trial period.

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Hetlevik 1999

Methods

Cluster (29 health centres, 53 family practitioners), analysed by patient (2239 patients). Two regions in Norway.

Participants

Hypertensive patients (baseline BP level given), mean age 64 years, 57% female.

Interventions

(1) Computer based decision support system (CDSS). Doctors and assistants trained and received a user manual. Re-enforcement by means of telephone repetitions seminar on risk intervention and further demonstration of CDSS. (2) Usual care

Outcomes

(1) SBP/DBP - SBP (E) 156.8mmHg versus (C) 155.6mmHg NS, DBP (E) 88.8mmHg versus 89.8mmHg, p<0.05 (2) Cholesterol (3) % smokers (4) BMI (5) Coronary heart disease risk score. All other outcomes no different between groups (6) Recording of risk factor data - improved slightly in (E) group for cholesterol and family history. Duration of FU 24 months.

Notes

Only 104 (11%) patients had CDSS used on them during trial period.

Risk of bias

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Hunt 2004

Methods

Primary care practice-based research network in which 9 clinics located in Portland, Oregon

Participants

Patients with mildly uncontrolled hypertension as defined as a last blood pressure of 140 to 159/90 to 99 mmHg from query of an electronic medical record database.

5473 total randomised and 312 analysed (E 162 and C 150)
Hunt 2004 (Continued)

Interventions
Patients randomized to intervention were mailed 2 educational packets approximately 3 months apart. The first mailer included a letter from each patient's primary care provider. The mailer included a booklet providing an overview of hypertension and lifestyle modification and a refrigerator magnet noting target blood pressure. The second mailing also included a letter from the patient's primary care provider, a second educational booklet focused on medication compliance and home blood pressure monitoring, and a blood pressure logbook. The control group consisted of similar patients receiving usual care for hypertension.

Outcomes
The primary outcome was blood pressure control, defined as a blood pressure measurement below 140/90 mm Hg, and was ascertained from electronic medical records over 6 months of follow-up. Also SBP and DBP as secondary outcomes.

Patients from each group were randomly selected for invitation to participate in a study visit to measure blood pressure and complete a survey (intervention n=162; control n=150). No significant difference was found in mean blood pressure between intervention and control patients (135/77 mmHg vs 137/77 mmHg; P=.229). Patients in the intervention arm scored higher on a hypertension knowledge quiz (7.48 +/- 1.6 vs 7.06 +/- 1.6; P=.019), and reported higher satisfaction with several aspects of their care. No significant difference was seen in the prevalence of home blood pressure monitoring ownership or use.

Notes

Risk of bias

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Hypertension 1979

Methods
Patients identified at 14 "HDFP centres throughout the US (13 by residential area- census tract, probability sample of larger areas, entire housing projects or in one centre by employment roll of industries). Randomisation at the patient level after initial screening. Initially screened for DBP, 2 stage process: (1) All 158,056 screened (89% of all age-eligible patients), if average DBP was 95mmHg invited for second screen at clinic, regardless of whether taking BP lowering drugs or not. (2) If mean DBP 90mmHg, patient eligible and randomised. 10,940 agreed to randomisation Randomisation stratified according to entry DBP and HDFP centre: (1) Stratum i- 90-104 mmHg, n= 7,825 (71.5%) (2) Stratum ii- 105-114 mmHg, n=2,052 (18.8%) (3) Stratum iii- 115 mmHg, n=1,063 (9.7%) No SBP entry criteria and no upper limits of BP 11,386 persons randomised but 446 subsequently excluded due to randomisation error that occurred at one clinic

Participants
Inclusion criteria: (1) Men and women age 30 to 69 years (2) Average home screening DBP 95mmHg (3) Confirmed follow up DBP 90mmHg Exclusion criteria: (1) Terminally ill (2) Institutionalised 10,940 randomised, 54% male, 45% black Antihypertensive drugs taken at start of RCT: SC (26.3%), RC (25.7%)

Interventions
(1) Stepped care (SC), designed to provide rigorous, systematic, antihypertensive drug treatment by means of:
"Free care- visits, drugs, investigations, transport
"Emphasis placed on clinic attendance and compliance- pill counts used
"Convenience- low waiting times, parmedical personnel, physician on call
"Stepped drug treatment according to BP response
"Patients seen at intervals determined by their clinical status, at least every 4 months, and generally every 2 months

(2) Referred care (RC): referred to their "primary sources of care, usually own physicians.
Hypertension 1979

(Continued)

All SC (E) and RC (C) participants seen at home at years 1, 2, 4 and 5 for health history and BP measurement and at the clinic at years 2 and 5 for an examination. At each contact each RC participant was advised to visit a physician. If severe hypertension (DBP 115 mm Hg or end organ damage) special steps were taken to achieve contact with a physician.

Outcomes

1. # (%) on antihypertensive medication - higher for SC 81.2%, compared to RC 64.2% by year 5.
2. SBP/DBP level - lower for SC (130/84 mm Hg) vs RC (140/89) at 5 year FU
3. % controlled blood pressure (HDFP goal) - improved SC versus RC.
4. All cause mortality - significantly better 350/5485 (6.38%) vs 421/5455 (7.78%)

All outcomes apply across 3 strata of entry DBP. Most of BP reduction occurred by end of year 1

Duration FU 1 and 5 years (mortality)

Notes

Data reported in 3 strata of entry DBP

At one year 84.4% (SC) versus 59.1% (RC) taking antihypertensive medication
   Step 1 - 32.7% vs 12.1%
   Step 2 - 23.6% vs 16%
   Step 3 - 3.3% vs 2.3%
   Step 4 - 2% vs 2%

Total drug status known at 1 year, 82.4% SC v 82.8% RC

Intensity of BP medication in SC at 5 years: 42% taking single drug - step 1, 27% taking two drugs - step 2, 9% taking 3 drugs - step 3, 11% taking 4 or more drugs, step 4 and 5 at 5 years

HDFP defined goal DBP as 90 mm Hg for those entering with DBP 100 mm Hg or receiving antihypertensive therapy and a 10 mm Hg decrease for those entering with DBP of 90-99 mm Hg.

Mortality FU 5 years, mean BP data reported at 1 year and 5 years

Risk of bias

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Hypertension 1979a

Methods

Patients identified at 14 "HDFP centres throughout the US (13 by residential area - census tract, probability sample of larger areas, entire housing projects or in one centre by employment roll of industries). Randomisation at the patient level after initial screening. Initially screened for DBP, 2 stage process:
   (1) All 158,096 screened (89% of all age-eligible patients), if average DBP was 95 mm Hg invited for second screen at clinic, regardless of whether taking BP lowering drugs or not.
   (2) If mean DBP 90 mm Hg, patient eligible and randomised. 10,940 agreed to randomisation Randomisation stratified according to entry BP and HDFP centre:
      (1) Stratum i - 90-104 mm Hg, n= 7,825 (71.5%)
      (2) Stratum ii - 105-114 mm Hg, n=2,052 (18.8%)
      (3) Stratum iii - 115 mm Hg, n=1,063 (9.7%)

No SBP entry criteria and no upper limits of BP

11,386 persons randomised but 446 subsequently excluded due to randomisation error that occurred at one clinic

Participants

Inclusion criteria:
   (1) Men and women age 30 to 69 years
   (2) Average home screening DBP 95 mm Hg
   (3) Confirmed follow up DBP 90 mm Hg
Hypertension 1979a (Continued)

Exclusion criteria:
(1) Terminally ill
(2) Institutionalised

10,940 randomised, 54% male, 45% black

Antihypertensive drugs taken at start of RCT: SC (26.3%), RC (25.7%)

Interventions
(1) Stepped care (SC), designed to provide rigorous, systematic, antihypertensive drug treatment by means of:
"Free care- visits, drugs, investigations, transport
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"Patients seen at intervals determined by their clinical status, at least every 4 months, and generally every 2 months

(2) Referred care (RC): referred to their "primary sources of care, usually own physicians.

All SC (E) and RC (C) participants seen at home at years 1, 2, 4 and 5 for health history and BP measurement and at the clinic at years 2 and 5 for an examination. At each contact each RC participant was advised to visit a physician. If severe hypertension (DBP 115mmHg or end organ damage) special steps were taken to achieve contact with a physician.

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(1) # (% ) on antihypertensive medication- higher for SC 81.2%, compared to RC 64.2% by year 5.
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HDFP defined goal DBP as 90mmHg for those entering with DBP 100mmHg or receiving antihypertensive therapy and a 10mmHg decrease for those entering with DBP of 90-99mmHg.

Mortality FU 5 years, mean BP data reported at 1 year and 5 years

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Interventions used to improve control of blood pressure in patients with hypertension (Review)
Hypertension 1982

Methods
Patients identified at 14 "HDFP centres throughout the US (13 by residential area- census tract, probability sample of larger areas, entire housing projects or in one centre by employment roll of industries). Randomisation at the patient level after initial screening. Initially screened for DBP, 2 stage process:
(1) All 158,096 screened (89% of all age-eligible patients), if average DBP was 95mmHg invited for second screen at clinic, regardless of whether taking BP lowering drugs or not.
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No SBP entry criteria and no upper limits of BP
11,386 persons randomised but 446 subsequently excluded due to randomisation error that occurred at one clinic

Participants
Inclusion criteria:
(1) Men and women age 30 to 69 years
(2) Average home screening DBP 95mmHg
(3) Confirmed follow up DBP 90mmHg
Exclusion criteria:
(1) Terminally ill
(2) Institutionalised
10,940 randomised, 54% male, 45% black
Antihypertensive drugs taken at start of RCT: SC (26.3%), RC (25.7%)

Interventions
(1) Stepped care (SC), designed to provide rigorous, systematic, antihypertensive drug treatment by means of:
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Duration FU 1 and 5 years (mortality)

Notes
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At one year 84.4% (SC) versus 59.1% (RC) taking antihypertensive medication
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Mortality FU 5 years, mean BP data reported at 1 year and 5 years

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**Jewell 1988**

**Methods**

Hypertensive patients in a single practice in the UK

**Participants**

Patients aged 30-64 years. Newly diagnosed: raised DBP >100 mmHg aged 30-39, >105 mmHg aged >40. Previously diagnosed: DBP >95 mmHg on 3 measurements at a single visit

**Interventions**

(1) Nurse-led clinic. Agreed protocol determined treatment and frequency of attendance in both groups. Target was to reduce DBP <90 mmHg, 15 minute consultation. Note: both nurse led and doctor led care was by means of identical protocol.

(2) Usual care - general practitioner 10 minute consultation

**Outcomes**

(1) Mean SBP/DBP: between group difference in mean SBP -0.8 mmHg (-8.7 to 24.7) NS, DBP - 0.4 mmHg (-6.2 to 7) NS.

(2) Proportion with DBP <90 mmHg

10/15 (E - 67%)

12/19 (C - 63%)

(3) Quality of data recording (better in nurse group for pulse, weight, urine testing)

(4) Frequency of attendance (no difference, mean annual rates 5.7 (C) 6 (E) groups.

(5) Knowledge of medication (no difference)

(6) Reactions to the service (no difference)

Duration FU 1 year

**Notes**

**Risk of bias**

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**Johnson 1978**

**Methods**

Factorial RCT, randomised at individual level, stratified by age and sex.

**Participants**

Screened from a Canadian shopping centre, n=140 (male 82), age 35-65 years
All taking BP lowering medication for 1 year with uncontrolled hypertension (DBP 95mmHg)

Interventions
1. Self recording- given BP recording device, take BP daily and take charts with BP records to their physician
2. Home visits- BP measured in their homes every 4 weeks with result given to them and physician. Both groups visited at home after 2 weeks
3. Both interventions
4. Neither intervention

Outcomes
1. Changes in mean DBP- no difference
2. Changes in mean compliance- no difference.
3. Changes mean compliance in those with initial compliance <80%- no difference
4. Change mean DBP in those with initial problems remembering to take BP medication- subgroup effect in initially difficult to remember group
5. Change in strength in therapy- no difference

Duration of FU 6 months

Notes
More "explanatory" RCT, follow on from Haynes. In contrast to positive findings in Haynes RCT, this RCT proved to be negative. Main difference in this RCT is that home visitors dealt with only measurement of BP, no attempts made to influence medication taking. No standardised treatment regimen or goal BP advocated to treating physicians

Risk of bias

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Krieger 1999

Methods
Parallel, individuals in a single "low income" area of Seattle, USA

Participants
Hypertensive patients (entry SBP 140mmHg or DBP 90mmHg). 4761 had BP measured, 759 (15.9%) eligible, 421 (55.5%) participated. Overall, 40% taking BP lowering medication, 79% black, 66% below federal poverty level, 33% BP 160/100mmHg. All participants paid $25 for completing study

Interventions
1. Outreach and tracking by community health worker. Provided: referral to medical care and assistance with finding a provider; ensure appointment with health worker; appointment reminder letter; follow up patient (up to 3 times) to see if appointment kept; new appointment if one missed (up to 3 times); assistance to reduce barriers to care including transport, child care or other services
2. Usual care

Outcomes
1. Follow up appointment within 90 days- (E) 95/146 (65.1%) versus (C) 77/165 (46.7%).
2. SBP/DBP-improved SBP (E) 139.4mmHg versus (C) 141mmHg, DBP no difference (E) 84.6mmHg versus (C) 84.3mmHg

Duration of FU 3 months.

Notes
Study designed to assess follow up within 30 days. Large differential loss to follow up (greater in intervention arm). Mean SBP/DBP data provided by authors of study
No intention to treat analysis.

Risk of bias

Interventions used to improve control of blood pressure in patients with hypertension (Review)
Krieger 1999 (Continued)

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Levine 1979

Methods
Factorial trial with 8 groups of various combinations of the 3 interventions and control individuals at two hypertension clinics in US

Participants
91% black, median age 54 years, 70% female, low income ($45250 median yearly income). BP (mmHg) entry criteria based on age:
- 20-39: >140/90
- 40-59: >150/95
- 60: 160/100

Interventions
(1) Three interventions:
- "Exit interview- individualised 5-10 minute counselling session, explaining and re-inforcing instructions to the patient"
- "Instructional session with adult at home concerning adherence and follow up care"
- "Group sessions- three, one hour sessions led by social worker"
(2) Usual care with none of above interventions

Outcomes
(1) Deviation in weight from ideal weight- significantly better in patients who received all 3 interventions compared to those who received none
(2) Appointment keeping (ratio of kept/scheduled)- improved in group who received all 3 interventions versus control at 2 yrs (E) .68 versus (C) .63; no difference at 5 yrs (E) .95 versus (C) .83
(3) Adherence to drug therapy- all improved, greatest in 3 intervention arm versus control (53% vs 40%)
(4) % patients with controlled BP - increased at 2 years (E) 52% versus (C) 42%; 5 years (E) 66% versus (C) 56%. Significantly better in four intervention groups compared to control at 5 years
(5) All cause mortality- cumulative mortality better in all experimental groups combined (12.9) compared to control group (30.2)
(6) Cost effectiveness- multiple interventions appear more effective, not necessarily more cost effective. Authors feel that may be better to use single interventions depending on setting and financial constraints (821)

Notes
Multiple comparisons in results section: 7 intervention arms and one control group
In addition no a priori sub-group analysis

Blood pressure control age-specific categories
<40 <140/90, 40-59 <150/95
60, <160/100

Substantially greater numbers lost to follow up in (C) arm at 2 and 5 years

Risk of bias

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**Logan 1979**

**Methods**
Parallel Individuals

**Participants**
Volunteers from business settings with newly diagnosed hypertension (DBP 95mmHg, or DBP 91-94mmHg and SBP >140mmHg)

**Interventions**
(1) Work-site care- nurse management according to a standard protocol- including drug regimen and regular review, once monthly if BP not controlled
(2) Usual care from their own family physicians

**Outcomes**
(1) # patients taking BP treatment- increased in Experimental group (177/206, 86% vs 108/204, 53%)
(2) Mean DBP- improved in (E) 94.3mmHg versus (C) 90.3mmHg, p<0.01.
(3) Reach goal DBP- 50% (E) versus 28.9% (C).
(4) Compliance-better in experimental group (67.6% vs 49.1%)

Duration of FU 6 months

**Notes**
Goal DBP <90mmHg if entry DBP >95mmHg; or <6mmHg in those with entry DBP 95mmHg or less.

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**Marquez 2004**

**Methods**
Comparative, controlled, multicenter, randomized cluster study.

**Participants**
SETTING: 26 primary care health centers in Spain. PARTICIPANTS: 26 researchers were randomized to a control group or an intervention group (52 patients each, for a total of 104 patients). All patients were receiving monotherapy for uncontrolled hypertension.

104 total eligible patients 52 IG and 52 CG

Analyzed 33 CG and 34 IG

**Interventions**
Patients in the control group received their physician's usual interventions. Patients in the intervention group received messages and reminders sent to their mobile phones 2 days per week during 4 months.

**Outcomes**
Tablets were counted and blood pressure was measured at the start of the study and 1, 3, and 6 months later. The percentage of compliers, mean percentage of compliance and degree of control of hypertension were compared. The reduction in absolute and relative risk was calculated, as was the number of individuals needed to treat to avoid noncompliance.

**Notes**

**Risk of bias**

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### Martinez-Amenos 1990

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<th>Parallel Individuals</th>
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<td>Participants</td>
<td>Hypertension Registry from 19 primary care centres in Spain. Mean age 61 years, 59% female. Initial volunteers asked if they wished to participate; those agreeing were randomised and labelled &quot;motivated&quot; group; group who declined to participate also followed up &quot;non motivated&quot;</td>
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| Interventions | (1) Individual education- comments and explanations to errors encountered in answers to baseline knowledge questionnaire  
(2) Team education- 2 talks given by nurses or doctors with AV material to 8-12 patients  
(3) Control group |
| Outcomes | (1) Proportion of patients in each group with uncontrolled hypertension (SBP <160, DBP <95mmHg)- within group increase reported for both intervention arms, individual 50.4% to 60.9%, team, 55.8% to 68.8%, non significant within group change in control group, 54.4% to 58.9%  
(2) Patient knowledge- no between group difference, individual 19.79, Team 20.58, control 19.78  
Duration of FU: 2 months |
| Notes | Knowledge increased within all 3 groups over time, between group comparison not statistically tested  
No baseline numbers per arm of study reported  
% control BP not included in meta-analysis as no denominator data available at start of RCT |

### Risk of bias

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### McAlister 1986

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<tr>
<th>Methods</th>
<th>Cluster (60 doctors initially, 10 dropped out), parallel, Toronto Canada</th>
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| Participants | N=50 general practitioners, 1241 (E) 990 (C), hypertensive patients with one of the following:  
(1) DBP >90 mmHg on treatment  
(2) DBP >104 mmHg not on treatment  
(3) DBP >90 or <105 mmHg unless evidence of complications or risk factors  
(4) Newly detected patients with "high blood pressure" detected during the trial |
| Interventions | (1) Computer generated feedback to physician: "Cumulative chart of patient's DBP  
"Inter and Intra practice DBP ranking  
"Commentary on treatment by GP according to a "stepped care" approach  
(2) Control group filled out same forms but no feedback given |
| Outcomes | 1)Workload: GPs in experimental group saw more patients  
(2) Mean score on length of follow up: better in intervention 199.3 days (E) vs 167days (C)  
(3) Drop outs: 37.5% (E) vs 42.1% (C)  
(4) In all patients DBP reading in those with initial DBP > 104mmHg: 88.5mmHg (E) vs 93.3mmHg (C), net DBP change 0.8mmHg P <0.1  
(5) % patients with controlled DBP (90mmHg):- 88.9% (E) versus 87.5% (C) NS  
(6) # days with sustained DBP control 323 (E) vs 259(C)  
(7) # times visited GP: 13.3 (E) vs (17.4) |

Interventions used to improve control of blood pressure in patients with hypertension (Review)

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McAlister 1986 (Continued)

Duration 16 months

Notes
Multiple outcomes reported, some favourable for experimental arm - saw more patients who were less likely to drop out of care. Doesn't appear to have had an impact on overall DBP control but other measures of BP control favoured intervention group such as number of days with sustained DBP control. This was achieved with fewer visits in the intervention group.

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McKinstry 2006

Methods
Parallel, single blind, Single urban general practice over 1 year in the UK.

Participants
Patient-held guideline with written explicit exhortation to challenge care when appropriate. Two hundred and ninety-four of 536 eligible patients on the practice hypertension register were recruited, all of whom were randomised into one of two groups. Two hundred and thirty-six patients completed the study. All > 18 years with one SBP > 150 were invited to take part. No exclusions

Interventions
Primary outcome: average systolic blood pressure. Secondary outcomes: proportion of patients with blood pressure < 150 mmHg systolic and < 90 mmHg diastolic, average cholesterol, proportion of patients prescribed statins and aspirin according to guideline, hospital anxiety and depression score

Outcomes
Primary outcome: average systolic blood pressure. Secondary outcomes: proportion of patients with blood pressure < 150 mmHg systolic and < 90 mmHg diastolic, average cholesterol, proportion of patients prescribed statins and aspirin according to guideline, hospital anxiety and depression score. No clinically, or statistically significant differences were found between intervention and control with respect to all parameters or in anxiety and depression levels. Statin and aspirin use improved throughout the course of the study in both groups. Statin use showed a trend (P = 0.02) in favour of control.

12/12 follow up

Notes
Only absolute values for BP measure, control data entered

Risk of bias

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McManus 2005

Methods
Parallel, in eight general practices in south Birmingham

Participants
441 people receiving treatment in primary care for hypertension but not controlled below the target of < 140/85 mm Hg.

Interventions
Patients in the intervention group received treatment targets along with facilities to measure their own blood pressure at their general practice; they were also asked to visit their general practitioner or prac-
Outcomes

Primary outcome: change in systolic blood pressure at six months and one year in both intervention and control groups. Secondary outcomes: change in health behaviours, anxiety, prescribed antihypertensive drugs, patients’ preferences of method of blood pressure monitoring, and costs.

400 (91%) patients attended follow up at one year. Systolic blood pressure in the intervention group had significantly reduced after six months (mean difference 4.3 mm Hg (95% confidence interval 0.8 mm Hg to 7.9 mm Hg)) but not after one year (mean difference 2.7 mm Hg (-1.2 mm Hg to 6.6 mm Hg)). No overall difference was found in diastolic blood pressure, anxiety, health behaviours, or number of prescribed drugs. Patients who self monitored lost more weight than controls (as evidenced by a drop in body mass index), rated self monitoring above monitoring by a doctor or nurse, and consulted less often. Overall, self monitoring did not cost significantly more than usual care (251 pounds sterling (437 dollars; 364 euros) (95% confidence interval 233 pounds sterling to 275 pounds sterling) versus 240 pounds sterling (217 pounds sterling to 263 pounds sterling).

12 months follow up

Notes

Well designed study carried out in primary care.

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Mehos 2000

Methods

Parallel, individuals in a single family medicine clinic, US

Participants

41 uncontrolled hypertensives, SBP 140-179mmHg and/or DBP 90-109mmHg, currently on treatment, mean age 59 years, 70% women

Interventions

(1) Home blood pressure monitoring, diary and instruction to measure blood pressure, information on hypertension and risk factors, subsequent evaluation by clinical pharmacist (2) Usual care

Outcomes

(1) SBP, DBP and mean BP- all reduced in (E) group, SBP (E) 140.8mmHg versus (C) 146.9mmHg (p=0.069), DBP (E) 80.6mmHg versus (C) 85.6mmHg (p=0.02), (2) Compliance (self report)- mean adherence 82% (E) vs 89% (C) (p=0.29) (3) Drug alteration (dosage increase, addition or switch)- 83% (E) vs 33% (C) (p=0.29) (4) Quality of life (SF36)- no difference between groups

Duration of FU 6 months

Notes

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### Midanik 1991

**Methods**
Parallel, individuals, from a single foundation health plan in California, US.

**Participants**
204 untreated hypertensive patients with "mild" hypertension- SBP <180mmHg and DBP 90-99mmHg

**Interventions**
(1) Self monitoring- patients trained to take two consecutive readings twice a week. Sent in readings every 4 weeks for one year (2) Usual care

**Outcomes**
(1) Blood pressure- mean change SBP -1 mmHg, mean change DBP -1 mmHg (E) versus mean change SBP +1 mmHg, mean change DBP -1 mmHg Duration of FU 1 year

**Notes**
Untreated subjects with 18% of (E) and 17% of (C) patients taking antihypertensive medication at the end of the RCT

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### Montgomery 2000

**Methods**
27 general practice in UK, Cluster RCT, patients on register

**Participants**
Hypertensive patients aged 60-80 taking BP lowering drugs. Randomly selected from practice register

**Interventions**
(1) Computer based decision support system (CDSS)
(2) Risk chart
Both interventions provided health professional (general practitioner or practice nurse) with explicit cardiovascular risk. Based on New Zealand hypertension guidelines.
(3) Usual care

**Outcomes**
(1) Cardiovascular risk- no change in CVD risk between 3 groups
(2) SBP/DBP- adjusted analysis, chart group had better mean SBP reading than usual care (difference 4.6mmHg)
(3) Proportion of patients with controlled hypertension (<160/90)- no difference between two intervention groups chart 39.7%, CDSS 47.5% and control 40.7%
(4) Medication change- intensity of BP medication prescriing greater in chart group compared to usual care

Duration of FU 1 year

**Notes**

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### Morisky 1983

**Methods**

Factorial trial with 8 groups of various combinations of the 3 interventions and control individuals at two hypertension clinics in US

**Participants**

91% black, median age 54 years, 70% female, low income ($45250 median yearly income). BP (mmHg) entry criteria based on age:
- 20-39: >140/90
- 40-59: >150/95
- 60: >160/100

**Interventions**

1. Three interventions:
   - "Exit interview - individualised 5-10 minute counselling session, explaining and re-inforcing instructions to the patient"
   - "Instructional session with adult at home concerning adherence and follow up care"
   - "Group sessions- three, one hour sessions led by social worker"
2. Seven experimental groups and one control group
3. Usual care with none of above interventions

**Outcomes**

1. Deviation in weight from ideal weight- significantly better in patients who received all 3 interventions compared to those who received none
2. Appointment keeping (ratio of kept/scheduled)- improved in group who received all 3 interventions versus control at 2 yrs (E) .68 versus (C) .63; no difference at 5 yrs (E) .95 versus (C) .83
3. Adherence to drug therapy- all improved, greatest in 3 intervention arm versus control (53% vs 40%)
4. % patients with controlled BP - increased at 2 years (E) 52% versus (C) 42%; 5 years (E) 66% versus (C) 56%. Significantly better in four intervention groups compared to control at 5 years
5. All cause mortality- cumulative mortality better in all experimental groups combined (12.9) compared to control group (30.2)
6. Cost effectiveness- multiple interventions appear more effective, not necessarily more cost effective. Authors feel that may be better to use single interventions depending on setting and financial constraints[821]

Duration of FU 2 and 5 years.

**Notes**

Multiple comparisons in results section: 7 intervention arms and one control group
In addition no a priori sub-group analysis
Blood pressure control age-specific categories
- <40 <140/90,
- 40-59 <150/95
- 60, <160/100

Substantially greater numbers lost to follow up in (C) arm at 2 and 5 years

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### Muhlhauser 1993

**Methods**

10 general practices Germany, 20 hypertensive patients randomly selected (age 30-60 years)

**Participants**

Hypertension (mean last 2 measurements 160 and/or 95). Taking BP medication (E 77%, C 86%)

**Interventions**

1. Hypertension treatment and teaching programme (HTTP) consisted of:
   - Four consecutive meetings lasting 60-90 mins in groups of 4-6.
Muhlhauser 1993 (Continued)

"Provided by physician assistants
"Responsibility including BP self monitoring
"Confirming diagnosis and treatment by using home BP measurements
"Emphasis on non-pharmacological treatment
Doctors (8 hours) and assistants (20 hours) in intervention practices attended preparatory course but RCT aimed principally at patients

(2) Usual care

Outcomes
(1) Change in SBP/DBP - significantly improved at follow up, difference SBP 5mmHg, DBP 4mmHg
(2) Proportion of patients with controlled hypertension (<140/90)- no difference (E) 14% versus 15%
(C)
(3) # BP drugs taken
Duration of FU 18 months

Notes
(1) Only 46 (46%) in intervention group received intervention (2) Cluster RCT not accounted for design or analysis.
(3) Well conducted RCT but differential losses to FU
(4) Less people in intervention group taking BP medication at end of RCT (mean # (E)- 1.2, (C) 1.8)

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New 2004

Methods
Cluster RCT General practices

Participants
44 general practices, Salford, UK, 10303 participants

Interventions
(1) Educational outreach: specialist nurses arranged a schedule of visits with general practitioners and practice nurses, reminding them of protocols and clinical targets; provided educational material and protocols used in secondary care for nurse and doctor interventions including stepping up pharma-cotherapy when necessary. (2) usual care

Outcomes
(1) Proportion of participants reaching blood pressure target/OR: no difference between groups OR 1.01 (95% CI 0.8 to 1.3, p=0.93).

Notes
Study funded by pharmaceutical company.

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Ornstein 2004

Methods
Cluster RCT, 20 community-based family or general internal medicine practices in 14 US states. 44 physicians, 17 "midlevel" providers and approximately 200 staff members
Ornstein 2004 (Continued)

Participants
Of 87,291 patients from 20 practices, 7772 (8.9%) with hypertension. At baseline 40% (E) and 43.7% (C) had "controlled" blood pressure (<140/90).
21 study indicators included:
- Hypertension (5) including most recent BP measurement <140/90 for patients with a diagnosis of hypertension
- Hyperlipidemia (2)
- Coronary heart disease (6)
- Heart failure (1)
- Atrial fibrillation (1)
- Diabetes (6)

Interventions
(1) Multi-method quality improvement (QI)-
- Practice site visits (6-7, 1-2 day site visits in a two year period) involving physicians and pharmacist with expertise in academic detailing. Healthcare providers encouraged to use (QI) tools
- Two-day network meetings in each study year. Initial meeting directed at lead clinician with "best practice" presentations made by participating clinicians who were performing well. Clinical and administrative staff attended second meeting
(2) Usual care - received copies of practice guidelines and quarterly performance reports

Outcomes
(1) Control BP <140/90 mmHg improved 58.4% (E) versus 51.9% (C), adjusted difference 8.0 (0.0 to 16.0), p=0.047
Duration of FU 2 years

Notes
General multi-method across 6 conditions and 21 quality indicators. Overall intervention practices improved 22.4 percentage points in terms of indicators at or above target, compared to 16.4 in control practices, difference 6.0 percentage points (p>0.2).
Patients in intervention practices had greater improvements than control practices for diagnosis of hypertension and blood pressure control

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Park 1996

Methods
Parallel, individuals two pharmacies, US

Participants
Taking BP lowering treatment or had BP 140/90 mmHg. mainly white treated hypertensives, 50% women, mean age 60 years

Interventions
(1) Pharmacist administered monthly patient management including education, medication changes, verbal counselling and written information on hypertension and risk factors
(2) Traditional pharmacy services

Outcomes
(1) SBP/DBP- improved SBP (E) 143.2mmHg versus (C) 148.6mmHg, DBP (E) 83.2mmHg versus (C) 83.7mmHg, no between group p values reported
(2) Control of blood pressure (<140/90 mmHg)- improved 52.2% (E) vs 17.4% (C), p<0.02
(3) Compliance (pill counts, unaware)- mean adherence 86.8% (E) vs 89.1% (C) no p value reported
(4) Self reported quality of life- in general higher in (E) vs (C) group
(5) Time spent with patient- higher in (E) group, particularly at first visit
Duration of FU 4 months
**Park 1996** (Continued)

Notes

**Risk of bias**

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**Pierce 1984**

Methods  
Factorial, individuals, single general practice clinic, Western Australia

Participants  
Uncontrolled hypertensives (SBP 160 and/or DBP 95) taking BP medication, mean age 57 years, 60% women,

Interventions  
(1) Self monitoring of blood pressure: 30 min briefing, monthly recording chart  
(2) Health education programme promoting a healthy cardiovascular lifestyle: four meetings, 90 min duration, max 12 participants, encouraged to make action goals, information (risk factors for heart disease, stress, diet)  
(3) Both interventions  
(4) Usual care

Outcomes  
(1) Blood pressure control- Education: 83% (E) vs 67% (C) (p<0.05, effect size unclear) p<0.05 Monitoring: 74% (E) vs 78% (C) NS  
(2) Compliance (pill count, self report)- No significant difference between groups: Education: 27% good adherers versus 24% in control group. Monitoring: 30% Both interventions: 26%  
(3) Patient Knowledge- no difference

Duration of FU 12 months

Notes  
Health education appears more beneficial in controlled blood pressure than self monitoring. Blood pressure reduction, target blood pressure level not defined

**Risk of bias**

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**Robson 1989**

Methods  
Parallel, individuals based in a single family practice in UK

Participants  
Patients registered in the practice. Age 30-64. Also concerned with recording and follow up of other cardiovascular risk factor data and cervical screening follow up

Interventions  
(1) Recording and follow up of blood pressure and other cardiovascular risk factors with practice nurse or general practitioner aided by computer  
(2) Usual general practitioners follow up

Outcomes  
(1) Blood pressure recording in all patients- increased 1511/1620 (E- 93%) 1160/1586 (C- 73%)  
(2) Blood pressure recording in hypertensive patients- increased 104/107 (E- 97%) 90/116 (C- 69%)
Robson 1989 (Continued)

(3) Other cardiovascular risk factors- all increased recording in intervention group, smoking, family history and cholesterol

Duration of FU 2 years

Notes
Improved recording of blood pressure and other cardiovascular risk factors

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Roca-Cusachs 1991

Methods
Parallel, individual in a hypertension clinic, Spain

Participants
Newly diagnosed hypertensive patients (excluded age ≥70, illiterate and "high probability of non attendance") Entry SBP/DBP noted but no threshold required for eligibility. Mean values were:
(E) 156.3/95.8
(C) 160.3/96.1

Interventions
(1) Patient education-
"Booklet at initial entry into study
"Two educational talks. First educational talk given by pharmacist and doctor, covered information about hypertension, treatment adherence and appointments; second educational talk given by dieticians covered non-pharmacological treatments.
"Personal tutorial meeting one month later- solve problems, clarify misunderstandings and re-enforce knowledge.
(2) Usual care

Outcomes
(1) Weight- no difference
(2) Mean SBP/DBP- no difference
(3) Withdrawals- 39% (E) vs 26% (C) significant difference
(4) Knowledge questionnaire- improved knowledge in (E) group
(5) Number of BP pills taken- no difference
(6) Biochemical markers- no difference

Duration of FU 6 months

Notes
(1) Knowledge improved, other outcomes no difference, withdrawal from the programme greater in the (E) 39% versus (C) 25%
(2) Large proportion of (E) failed to attend an educational session, 83/138 (60%).
(3) Sub-group analysis showed that 55/138 (40%) who attended one or more educational session did not have a different outcome in terms of all outcome measures at follow up, including SBP/DBP than those in intervention group who failed to attend sessions 83/138 (60%), except that those who attended had significantly higher probability of not withdrawing overall 3.6% vs 63%.

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Rogers 2001

Methods
Medical outpatients department, patients covered by insurance under care of 5 internists, New York state, US.

Participants
Previous diagnosis of hypertension but were being considered for change in BP medication because:
(1) SBP 140 or DBP 90 despite current antihypertensive therapy
(2) Side effects from drugs
(3) SBP >180 or DBP >110 without current antihypertensive therapy

Interventions
(1) Telecommunication service with 3 components:
"Automated BP at home with no self report"
"Central processing of BP readings"
"Weekly reports to both physician and patient. When physicians received report forms that indicated increased blood pressure they adjusted BP medication via telephone call, office visit or both. Readings minimum of 3 days each week for minimum 8 weeks
(2) Usual care

Outcomes
(1) Mean change in arterial blood pressure- improved -2.8mmHg (E) versus +1.3 (C) p=0.013
(2) Mean change in systolic blood pressure- improved -4.9mmHg (E) versus -0.1 (C) p=0.047
(3) Mean change in diastolic blood pressure- improved -2mmHg (E) versus +2.1 (C) p=0.012

Notes
Change in mean arterial BP primary outcome via 24 hr ambulatory reading
Change in BP medication related to change in mean arterial BP and was more common in intervention group, 33% (E) versus 7% (C) group.
No change in median number of office visits
Difference in median length of FU (longer in intervention group, 79 vs 72 days)
Satisfaction with care same in both groups

Rudd 2004

Methods
Parallel RCT, two medical clinics

Participants
Hypertension- SBP ?140 mmHg or DBP ?90mmHg in previous six months or history of drug treatment. Drug therapy for patients with 150 mmHg or DBP 95 mmHg.

Interventions
(1) Self measurement with nurse management based on algorithm. Twice daily measurement, after 14 measurements mailed to nurse care manager who used this BP data to give management. Additional interventions included tips on enhancing drug adherence and recognition of possible side effects; printed materials; follow up calls at 1 week, 1, 2 and 4 months. Nurse contacted physicians to initiate new drugs not did not contact physicians when changing medication dosage. Increase in drug dose occurred when <80% measurements met criterion of 130/85mmHg. (1)

Outcomes
Usual care

Notes
(1) Blood pressure- mean change DBP -6.5 mmHg (E) versus mean change DBP 3.4 mmHg (C) (2) Increase in taking and intensification of antihypertensive drugs-22% (E) and 30% (C) patients taking antihypertensive medication, changed to 96% (E) and 78% (C). Significant increase in number taking ? drugs 70% (E) and 46% (C). (3) Improved adherence to mediation-80.5% (E) versus 69.2% (C) Duration of FU 6 months
Rudd 2004 (Continued)

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Sackett 1975

Methods
- Factorial RCT
- Steel mill employees in Canada

Participants
- Hypertension 95mmHg on repeated measurement. Not currently treated. n=230.

Interventions
1. Augmented convenience (AC): Saw on-site physicians during working hours and on full pay versus usual care of seeing their own GP
2. Mastery learning (ML): Educational programme designed to give them the facts about hypertension, including compliance advice and reminders about pill-taking. Information supplied in audio-casette and booklet. Mastery learning re-emphasised by a "patient educator"
3. Both intervention
4. Usual care

Outcomes
1. Number men placed on BP medication increased in both groups
   - AC (87/114, 76% vs 57/116, 49%)
   - ML (80/115, 70% vs 64/115, 56%)
2. Compliance- no difference
   - AC (47/87, 54% vs 29/57, 51%)
   - ML (40/80, 50% vs 36/64, 56%)
3. Compliance and at goal BP (<90mmHg)- no difference
   - AC (20/87, 23% vs 11/57, 19%)
   - ML (19/80, 24% vs 12/64, 19%)

Duration of FU 6 months

Notes
- Knowledge improved significantly in the Mastery learning group (85% vs 18%). Individual compliance rates bore no relationship to knowledge.

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Sanders 2002

Methods
- Cluster RCT, two of three primary care group practices, Virginia, US. 22 primary care physicians

Participants
- Hypertension and diabetes, 30 years of older, on medication for both conditions, blood pressure "greater than normal" on an index visit.

Interventions
1. Chart reminder- consisted on a bright cardstock consisting of information on the following: description of the problem; recommended target blood pressures, algorithm for suggested care (modified from US JNC VI guidelines). Participating physicians not reminded in any other way.
### Sanders 2002 (Continued)

(2) Usual care

| Outcomes | (1) Blood pressure- mean SBP 148mmHg (E) versus 150.87, p=0.14, mean DBP 75.14mmHg (E) versus 77.21mmHg (C), p=0.16  
(2) Medication change- 31% (E) versus 36% (C), p=0.51  
Duration of FU “as soon as feasible after the chart reminder was placed and the clinic visit conducted.” |
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<td>Notes</td>
<td>Cluster RCT analysed at individual level</td>
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### Schroeder 2005

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<th>Methods</th>
<th>To evaluate the effect of nurse-led adherence support for people with uncontrolled high blood pressure compared with usual care.</th>
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</table>
| Participants | 245 women and men recruited with uncontrolled hypertension (> or = 150/90 mmHg) from 21 general practices in Bristol, UK.  
All patients with hypertension coded and latests SBP ?150 and/or DBP 90 in last 6 months |
| Interventions | Participants were randomized to receive nurse-led adherence support or usual care alone. |
| Outcomes | Main outcome measures were adherence to medication (’timing compliance’) and blood pressure.  
Duration: 6 months |
| Notes | absolute only |

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### Soghikian 1992

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<th>Methods</th>
<th>Parallel, 430 individuals in four medical centres, California, USA referred by 67 physicians</th>
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| Participants | Hypertension but no entry BP level required or defined. DBP <90mmHg in 60% (C) 59% (E), 90-104mmHg 33% (C) 37% (E), 105mmHg 7% (C) 4% (E) patients. 82% (C) 88% (E) patients taking BP lowering medication.  
14% had end organ damage of cardiovascular event during the year of the trial |
| Interventions | (1) Home blood pressure measurement- patients asked to measure BP twice weekly, mail record of BP, medications and side effects to project office every 4 weeks. Data compiled and sent to each patient’s physician. Non compliant patients were contacted and urged to submit readings.  
(2) Usual care |
Soghikian 1992 (Continued)

Outcomes
(1) Use of medical services- mean number hypertension related office visits 1.2 less in (E) group, telephone calls 0.8 more in (E) group, procedures per patient the same.
(2) Cost of services- mean cost significantly lower $88.28 (E) vs $125.37 (C)
(3) Blood pressure control lower in (E) group - mean SBP (E) 135.9mmHg versus (C) 142mmHg unadjusted difference-6.1mmHg NS; DBP (E) 86.2mmHg versus (C) 88mmHg, unadjusted difference-1.8mmHg. NS
(4) Patient and physician satisfaction- high for (E) group

Duration of FU 1 year

Notes Costs lower in (E) group (29%) with a non significant trend in reduction of SBP/DBP.

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Solomon 2002

Methods Parallel, individuals from ten departments of Veterans Affairs medical centres and one academic medical centre, US

Participants Treated hypertensive patients (dihydropyridine and/or diuretic therapy) (n=133), 64% caucasian, 28% black, 96% men, mean age 67 years,

Interventions
(1) Patient-centred pharmaceutical care model (employing standardised care) implemented by clinical pharmacy residents, scheduled visits at one-month intervals for a total of five visits
(2) Usual care

Outcomes
(1) Blood pressure control- SBP improved (E) 138.5mmHg versus (C) 144.9mmHg (p<0.05), DBP (E) 80.2mmHg versus (C) 83.2mmHg NS
(2) Compliance (pill count, self report)- better compliance scores (0.23 vs 0.61) in (E) group (p<0.05)
(3) Mean number of hospitalisations/other health care provider visits- significantly higher in (C) group

Duration of FU 6 months

Notes Losses to follow up not reported

Risk of bias

Bias Authors' judgement Support for judgement
Allocation concealment? Unclear risk B - Unclear

Sookanekun 2004

Methods Pre-test, post-test controlled group study.

Participants Adults with hypertension from hospital and 2 primary care units

Interventions Patients were monitored monthly by reviewing their medications and supported by providing pharmaceutical care and counseling.
Sookaneknun 2004 (Continued)

Outcomes

Systolic and Diastolic BP; % achieving targets

Notes

From a total of 235 patients, the treatment group (n = 118) had a significant reduction in both systolic (S) and diastolic (D) BP compared with the 117 patients of the control group (p = 0.037, 0.027, respectively). The 158 patients (76 treatment, 82 control) with BPs \( \geq 140/90 \) mm Hg at the beginning of the study showed significant BP reductions (p = 0.002 SBP, 0.008 DBP). The proportion of 158 patients whose BP became stabilized was higher in the treatment group (p = 0.017).

Risk of bias

<table>
<thead>
<tr>
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<tr>
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</tbody>
</table>

Takala 1979

Methods

Hypertensive patients identified through systematic screening of 1245 individuals. To be included had to have two BP readings, six months apart with high blood pressure or not on BP treatment

Participants

Hypertensive patients in Finland, n=147, aged 40-49, SBP 160mmHg or DBP 95mmHg; aged 50-64, SBP 170mmHg or DBP 105mmHg. Drug treatment started in 78/93 (84%) in intervention group and 86/100 (86%) in control group

Interventions

(1) "Improved treatment system" included: Written treatment instructions. Card with details of BP readings, drugs prescribed, time of next appointment. Appointments at one monthly intervals. Invitation for outpatient review; appointment if defaulted on any appointment. (2) Usual care

Outcomes

(1) "Dropping out" of system- failing to keep outpatient follow up appointment. Improved in (E) 3/100 versus (C) 16/102 (2) Control of SBP/DBP reported separately in two age groups (aged 50) (3) % patients in each group who attained BP goal, 31% (E) vs 17% (C) Duration of FU 1 and 2 years.

Notes

Risk of bias

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Takala 1983

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Takala 1983 (Continued)

Outcomes

(1) "Dropping out" of system- failing to keep outpatient follow up appointment. Improved in (E) 3/100 versus (C) 16/102
(2) Control of SBP/DBP reported separately in two age groups (aged 50)
(3) % patients in each group who attained BP goal, 31% (E) vs 17% (C)

Duration of FU 1 and 2 years.

Notes

Risk of bias

Bias | Authors' judgement | Support for judgement
---|---|---
Allocation concealment? | Unclear risk | B - Unclear

Tanner 1981

Methods

Hypertensive patients attending in a single urban family practice.
Both groups visit family practice every 2 weeks for 4 months- total 8 appointments.

Participants

Diagnosis of hypertension from computer search with DBP 90mmHg, age 18-65.
50 identified, 30 agreed to participate; 11 males. 14 black

Interventions

(1) Intervention group given "Guide to essential hypertension" content included: hypertension; medication; diet; stress; exercise; smoking; lifestyle; BP monitoring techniques. Encouraged to ask questions and discuss problems when at practice visits.
(2) Usual care

Outcomes

(1) Knowledge- baseline and follow up-within group comparison knowledge
E-13.53 to 14.40 increase
C- 13.26 to 13.26 no change.
Between group score significantly better in E versus C group.
(2) Control of DBP- no difference

Duration of FU 4 months

Notes

Risk of bias

Bias | Authors' judgement | Support for judgement
---|---|---
Allocation concealment? | Unclear risk | B - Unclear

Tobe 2006

Methods

Hypertensive diabetic First Nations patients registered through community screening clinics, home care nurses, health aides randomized, prospective, open-label study with 2 parallel groups
693 patients were assessed for eligibility, Canada

Participants

Diagnosis of hypertension
with SBP greater or equal to 130mmHg
DBP greater or equal to 80mm Hg
Diagnosis of type 2 diabetes mellitus
99 identified, 95 agreed to participate 48 intervention group, 47 control group

Interventions used to improve control of blood pressure in patients with hypertension (Review)
Tobe 2006 (Continued)

Interventions
(1) Medical clinic measurement of blood pressure by home care nurse using BpTRU automated oscillometric blood pressure cuff
(2) Healthy lifestyle classes stressing a healthier dietary regimen, exercise, smoking cessation and drug adherence

Outcomes
(1) Primary outcome measure: mean change in SBP from baseline to the final visit in the intervention group compared with the control group
(2) Secondary outcome measure: mean change in DBP over time in the 2 groups, change in urine albumin status and incidence of adverse events

Notes

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<td>Allocation concealment?</td>
<td>Unclear risk</td>
<td>D - Not used</td>
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Tonstad 2007

Methods
RCT

Participants
Subjects that participated in a health screening with systolic blood pressure 140-169 mm Hg and diastolic blood pressure 90-99 mm Hg at a minimum of three separate readings treated or not treated with antihypertensive drugs.

Interventions
Randomly allocated either to monthly nurse-led lifestyle counselling (intervention group, N=31) or to conventional primary care (control group, N=20) to be followed by lifestyle counselling.

Outcomes
Systolic and diastolic BP

Notes
The mean (S.D.) baseline and end of study blood pressure was 157 (9)/94 (6) mm Hg and 147 (9)/91 (8) mm Hg, respectively, in the intervention group versus 153 (9)/94 (4) and 143 (10)/92 (8) mm Hg, respectively, in the control group (NS between the groups).

Risk of bias

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<td>Allocation concealment?</td>
<td>Low risk</td>
<td>A - Adequate</td>
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</table>

Turnbull 2006

Methods
Pilot cluster randomized controlled trial (stratified for rurality) of 67 general practices (including 371 patients) across two Australian states.

Participants
Persons were eligible if had mild to moderate hypertension (i.e., mean systolic BP of ≥ 140 mmHg and/or mean diastolic BP, DBP, of ≥ 90 mmHg on 3 separate occasions during a 3-week period), and were able to complete the questionnaire unaided and aged between 18 and 75 years.

Source of patients: A proposed study group consisted of all persons (N = 320) who had visited the outpatient hypertension clinic between November 2000 and September 2001. 76 eligible but 6 did not consent.
Interventions
The central platform of this program is an information communication technology package for risk assessment and management, access to a dietitian commissioned by the program and a tailored set of audiovisual and written material.

Outcomes
The primary outcome was SBP, which was measured after a 6-month interval. Additional outcomes included DBP, fasting lipids, obesity parameters, alcohol consumption, smoking, and stress management at 6 months follow-up.

Notes

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</table>

Vetter 2000

Methods
Parallel, individuals 244 practitioners in Switzerland, 4 patients per practitioner recruited

Participants
Hypertension, SBP 160-200mmHg or DBP 95-115mmHg in untreated patients or uncontrolled patients or who wished to change BP lowering drug because of low tolerance

Interventions
(1) Home measurement of blood pressure by patients
(2) Usual care

Outcomes
(1) Blood pressure control- SBP improved (E) 145.1mmHg versus (C) 147.6mmHg (p=0.02), DBP improved (E) 88.7mmHg versus (C) 90.1mmHg (p=0.038). (2) % with controlled hypertension (DBP 90mmHg) 66.2% (E) vs 59.8mmHg (ns)

Duration of FU 8 weeks

Notes
All patients treated with same BP lowering drug, Losartan 50mg once daily. No compliance data so not possible to say improved BP control due to improved compliance. Home BP measurement produced small BP change at 8 weeks

Risk of bias

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</table>

Watkins 1987

Methods
6 General practices UK
n=414, 41% male

Participants
Hypertension determined from medical records age range 35-64

Interventions
(1) Information booklet on hypertension sent out to patients
Watkins 1987 (Continued)

(2) Usual care

Outcomes
(1) (1) Systolic blood pressure- no difference 149.2mmHg (C) versus 149.8mmHg (E)
(2) Diastolic blood pressure- no difference 94.9mmHg (C) versus 95.3mmHg (E)
(2) Knowledge- slight increase in knowledge score in intervention group

Duration of FU 1 year

Notes
Drop outs not reported in each arm

Risk of bias

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Webb 1980

Methods
Parallel, individuals who were patients of 14 family practice residents US

Participants
Patients had to have at least: one year history of hypertension; uncontrolled DBP 90mmHg; taking BP lowering drugs

Interventions
(1) Education- three group education sessions by nurse-health educator (causes, nature, implications and treatment of hypertension)
(2) Counselling- three "individualized" counselling sessions
(3) Usual care- three appointments with family physician

Outcomes
(1) DBP- no difference between either group and usual care- education (E1) 88.9mmHg versus (C) 88.1mmHg, counselling (E2) 87.4mmHg versus 88.1mmHg
(2) Compliance- no difference between either group and usual care
(3) Return for follow up appointment- no difference education (E1)10.1 versus (C) 10.2, counselling (E2) 11.2 versus 10.2

Duration of FU 6 months

Notes
Negative RCT, data pooled from education arm of trial

Risk of bias

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Wetzels 2007

Methods
Parallel RCT, This study was designed to evaluate the effectiveness of electronic monitoring of adherence in lowering blood pressure (BP) in comparison with usual care.

Participants
43 Gps in Holland, Number of patients randomised: 258 (168 C. and 90 I.) 2:1 randomization employed, Number of patients analysed: 253 (164 C. and 89 I.)

Persons were eligible if had been diagnosed with hypertension (? SBP 160 or DBP 95) and inadequate BP control despite drugs and indication for Rx escalation
### Wetzels 2007 (Continued)

#### Interventions
A total of 258 patients with high BP despite use of antihypertensive medication were randomly assigned to either continuation of usual care (with adjustment in antihypertensive medication if necessary) or to the introduction of electronic monitoring. Adherence to antihypertensive medication was monitored for 2 months without medication changes.

#### Outcomes
The primary outcome measure was the proportion of patients who reached target BP levels after a 5-month follow-up period.

At 5 months, 50.6% of the patients in the usual care group reached adequate BP, vs 53.7% in the electronic monitoring group ($P = .73$). The percentages of patients with drug additions or increases in dosage were higher in the usual care group compared with those in whom adherence was monitored ($P < .01$). **CONCLUSION:** These data show that electronic monitoring in comparison to usual care results in similar BP control but leads to fewer drug changes and less drug use. This result is likely to be achieved by improving adherence. Hence a strategy that includes electronic monitoring has the potential to prevent unnecessary treatment escalation in patients with poor adherence.

#### Notes
Not sure if the intervention fits here or where? Good data for entering (not done)

### Risk of bias

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### Zarnke 1997

#### Methods
Parallel individuals from eleven family physicians and one tertiary hypertension research unit, Canada

#### Participants
Age 52 (E) 56 (C), 13 (42%) male, average BP readings <160/95, taking BP lowering drugs or receiving non-pharmacological advice

#### Interventions
(1) Patient-directed group - instructed in home BP measurement, measured own BP twice daily and instructed by means of algorithm to change own BP medication, if still exceed goal to contact family doctor
(2) Office-based group - adjustments to BP medication made by family doctor

#### Outcomes
(1) Change in daytime mean arterial BP adjusted for baseline measurement- decreased significantly in (E) group -0.95 versus +1.9 (C)
(2) Compliance (doses missed per week- (E) 0.05 versus (C) 0.2 NS
(3) Quality of life scores- no difference
(4) Indices of health care resource use- total number of physician visits significantly greater in (E) group, no difference in total number of BP drugs used

Duration of FU 8 weeks

#### Notes
Small RCT (n=31), short period of follow up

### Risk of bias

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</table>
### Zismer 1982

**Methods**  
Hypertensive patients in a single urban family practice. 176 eligible, 50 randomly selected, 39 agreed to take part. 3 groups- two separate intervention groups treated as the same in the analysis.

**Participants**  
Diagnosis of hypertension or receiving BP lowering drugs or elevated BP for 2 consecutive visits 140 or 90mmHg within previous 12 months  
37 black, 21 male, average age 45 (E) 56 (C), age range 21 to 76.

**Interventions**  
(1) Experimental group A- Educational “self-care” intervention: pill taking; appointment keeping; dietary sodium reduction  
(2) Experimental group B-received additional support from family member.  
(3) Usual care

**Outcomes**  
(1) Systolic blood pressure- improved 150.9mmHg (C) versus 130.5mmHg (E), p<0.01.  
(2) Diastolic blood pressure- improved 92mmHg (C) versus 85mmHg (E), p<0.001.  
(3) Frequency of visits- no difference between groups in mean number of visits  
Duration of FU 6 months

**Notes**  
BP readings at baseline and FU were mean of last 3 readings  
Control group was not similar to experimental group: 10 years older and diagnosed for longer

### Risk of bias

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### Characteristics of excluded studies [ordered by study ID]

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
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<tbody>
<tr>
<td>Andrejak 2000</td>
<td>Randomised trial of once daily versus twice daily ace inhibitor. Outcome compliance as judged by mem’s monitored. Once daily medication better than twice daily dosage. Included in adherence systematic review. Excluded: adherence RCT</td>
</tr>
<tr>
<td>Artinian 2007</td>
<td>Control group not a proper control group as received enhanced usual care.</td>
</tr>
<tr>
<td>Asmar 2007</td>
<td>Not a RCT: ‘preselected’ GP’s were randomised and then asked to include the first 4 consecutive eligible patients agreeing to participate. No record of eligible patients who did not participate</td>
</tr>
<tr>
<td>Bachman 2002</td>
<td>Accuracy and quality of self-reported home blood pressure values assessed. 48 patients randomised to receive information about storage capabilities of a home measuring device or not. Accuracy and interpretation of home blood measurement increased in the informed group. Reason for exclusion: intervention not aimed directly at improving blood pressure control; no blood pressure data reported.</td>
</tr>
<tr>
<td>Barron-Rivera 1998</td>
<td>Randomised trial of education programme to patients. Outcome was well-being and quality of life. Excluded: no report on blood pressure control in the process of care.</td>
</tr>
<tr>
<td>Ben Said</td>
<td>Randomised trial of assessment education interventions - same trial as reported by Consoli. Excluded: no outcome on blood pressure or process of care reported.</td>
</tr>
<tr>
<td>Binstock 1988</td>
<td>Excluded because no “usual care” group.</td>
</tr>
<tr>
<td>Study</td>
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<tr>
<td>Birtwhistle 2004</td>
<td>Equivalence RCT of three month versus six month follow up. Reason for exclusion:</td>
</tr>
<tr>
<td></td>
<td>(1) Neither intervention met inclusion criteria of the review. No additional intervention directed at either patient, health professional or organisation of care. Finding that BP control was equivalent between three and six month follow up arms of the study. Both groups saw health professional much more often than planned over the three years- mean (sd) visits per patient in three month group 18.8 (8.06) versus 16.2 (8.45) in six month group.</td>
</tr>
<tr>
<td>Blenkinsopp 2000</td>
<td>Parallel, cluster randomised, 20 community pharmacy sites, UK. 180 treated hypertensives, 62% age 60 or over. (1) Pharmacist delivered, Structured, brief questioning protocol on medication problems; including advice, information and referral to general practitioner versus usual care, delivered three times at two-month intervals (2) Usual care. (1) % with controlled hypertension- of those patients with initially uncontrolled hypertension (160/90mmHg) (E) 35.7% versus (C) 17.1% were controlled at follow up (p&lt;0.05), no difference in BP control in those who were controlled at start of study (2) Compliance (self report)- 62% (E) versus 50% (C) (p&lt;0.05) (3) Patient satisfaction- high level with service and no significant differences between groups. Duration of FU 6 months. Substantial losses to follow up. Subgroup analysis of % controlled blood pressure, therefore not included in analysis. Reason for exclusion: no blood pressure data.</td>
</tr>
<tr>
<td>Bond 1984</td>
<td>Non-randomised trial of clinical pharmacologist nurse clinician improving documentation, for blood pressure control and rheumatology/renal screening. Excluded: no BP outcome data</td>
</tr>
<tr>
<td>Borbolla 2007</td>
<td>Participants were not patients with a diagnosis of hypertension</td>
</tr>
<tr>
<td>Bosworth 2009</td>
<td>Patient education and provider decision support to control blood pressure in primary care: A cluster randomized trial. Excluded as no usual care arm.</td>
</tr>
<tr>
<td>Broege 2001</td>
<td>40 hypertensive men and women randomly assigned to “home” self measurement with subsequent management and medication change compared to “clinic” group where medication adjusted based upon readings taken by project nurse. Reasons for exclusion: 1. Includes treated and untreated hypertensive patients. Drug treatments adjusted downward or treatment initiated depending on BP reading and drug treatment status. Not possible to detect effect of self monitoring on treated blood pressure alone. 2. No usual care- both groups experienced monitoring- self monitoring at home or nurse monitoring in clinic.</td>
</tr>
<tr>
<td>Burke 2005</td>
<td>Participants were volunteers to a research studies unit and thus the setting for the study was not ambulatory care.</td>
</tr>
<tr>
<td>Cappuccio 2004</td>
<td>Systematic review of home monitoring. 18 RCTs included- several RCTs excluded from this review that Cappuccio included. These are (with reasons why excluded from this review in brackets): Binstock- no usual care group included. Stahl- non randomised trial, patients allocated “sequentially”. Midanik-</td>
</tr>
<tr>
<td>Caro 1998</td>
<td>Non-randomised trial. Observational study of compliance and persistence with therapy, excluded for these reasons.</td>
</tr>
<tr>
<td>Carter 2008</td>
<td>Quasi randomised trial. No proper control group due to presence or absence of clinical pharmacists and due to education intervention given to physicians and patients in control group.</td>
</tr>
<tr>
<td>Celis 1998</td>
<td>A randomised controlled trial protocol comparing self measurement of blood pressure against conventional blood pressure measurement. Protocol of trial. Excluded: no results reported.</td>
</tr>
<tr>
<td>Chabot 2003</td>
<td>Not an RCT</td>
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</table>

*Interventions used to improve control of blood pressure in patients with hypertension (Review)*

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<table>
<thead>
<tr>
<th>Study</th>
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</thead>
<tbody>
<tr>
<td>Charlesworth 1984</td>
<td>Quasi randomised trial. Patients assigned random numbers and then rank ordered. The first 32 were given intervention, the next 22 were in the control group. Intervention was of stress management outcome SBP and DBP was significantly reduced in the stress management group. Excluded: intervention and wasn’t properly randomised.</td>
</tr>
<tr>
<td>Consoli</td>
<td>Randomised trial of computer assisted programme intervention was educational. Outcome knowledge increased at two months in intervention group compared to control. Excluded as no outcome on blood pressure or process of care reported.</td>
</tr>
<tr>
<td>Consoli SM, Ben2</td>
<td>Randomised trial of computer assisted programme intervention was educational. Outcome knowledge increased at two months in intervention group compared to control. Excluded as no outcome on blood pressure or process of care reported</td>
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</tr>
<tr>
<td>Cranney 1999</td>
<td>Non-randomised trial 9 pairs of practices matched by means of overall blood pressure control and then randomised to educational intervention directed to health professionals in the practice. The outcome was a stated threshold for blood pressure control. Excluded because of non-randomised trial design.</td>
</tr>
<tr>
<td>De Luca 2005</td>
<td>Not an RCT as GPs outside the network could not be randomised.</td>
</tr>
<tr>
<td>Den 2004</td>
<td>Control group did not receive usual care. Had a fixed drug regimen as part of usual care.</td>
</tr>
<tr>
<td>Denver 2003</td>
<td>120 Type 2 diabetic patients with uncontrolled hypertension (BP &gt;140/90) randomised to usual GP care or nurse-led outpatient care. Nurse led care associated with improved systolic blood pressure. Reasons for exclusion: (1) patients allocated by means of alternation rather than randomisation (2) setting.</td>
</tr>
<tr>
<td>Djerassi 1990</td>
<td>Non-randomised trial, before/after design. Intervention was based in factories program of follow-up treatment by planned doctor and nurse versus usual care by family doctor in other factories. Outcomes number of percentage of people treated with an intervention group was greater.</td>
</tr>
<tr>
<td>Dusing 1998</td>
<td>Observational study of 1603 patients in 320 private practices in Germany. Investigated change in antihypertensive therapy within six months of start of study. Inadequate BP control most important reason for change in 48.4% of patients in the cohort, others include: adverse effects 30.1%, patient dissatisfaction 20%, non-compliance 16.8%, cost 4.9%.</td>
</tr>
<tr>
<td>Elmer 2006</td>
<td>Participants were patients with pre-hypertension and not patients with hypertension</td>
</tr>
<tr>
<td>Erickson 1997</td>
<td>A non-randomised trial of pharmacist care which involved reviewing medical records, taking drug history, assessing patients specific drug issues, concerns about taking drugs, lifestyle, compliance and knowledge all direct to the patient. Outcomes SBP and DBP were reduced in the group who received a pharmacist’s care at 5 months. Quality of life measures were the same. Trial excluded because it was not randomised.</td>
</tr>
<tr>
<td>Flack 1995</td>
<td>Observational study reporting adherence rates with different classes of anti-hypertensive agents.</td>
</tr>
<tr>
<td>Flack 2000</td>
<td>Randomised trial of slow versus fast titration of blood pressure lowering drugs.</td>
</tr>
<tr>
<td>Foote 1983</td>
<td>Quasi randomised controlled trial. Four interventions, screening and referral to physician, referral to physician and semi-annual follow-up, referral to physician and more frequent follow-up, and onsite treatment. Outcome was the number of people under treatment, control and proved in the last three groups.</td>
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<tr>
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<tr>
<td>Fu 2005</td>
<td>No English translation could be found.</td>
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<tr>
<td>Girvin 1999</td>
<td>A randomised trial cross-over design of single versus twice a day Enalapril. The outcomes were of compliance which increased with the single dose medication and blood pressure control which is better in the twice a day medication group. Reason for exclusion, adherence randomised trial, included in the adherence systematic review.</td>
</tr>
<tr>
<td>Godley 2003</td>
<td>Evaluation of a quality improvement programme for hypertension management. Intervention consisted of educating healthcare providers and recommending appropriate pharmacotherapy for compelling indications. 30,721 hypertensive patients identified from pharmacy claims, 417 patients randomly selected for note review. Overall level of blood pressure control stated to have improved from 37.2% to 49.2% at follow up. Reason for exclusion: not a randomised study; no comparison group.</td>
</tr>
<tr>
<td>Goldstein 2005</td>
<td>Not an RCT to test an intervention to improve blood pressure control.</td>
</tr>
<tr>
<td>Gonzalez-Fernandez</td>
<td>Parallel, individuals, hospitalised for &quot;non-hypertensive related diseases) in a single hospital, Puerto Rico. 60 treated hypertensives, 55% women, mean age 59 years. (1) In-hospital education- 4 educational interventions: &quot;knowing high BP&quot; by a physician; &quot;diet and high BP&quot; by a dietician; &quot;exercise and high BP&quot; by a health educator; &quot;medications and compliance in high BP&quot; by physician and pharmacy student. (2) Usual care. (1) Blood pressure control- SBP and DBP improved in (E) 137mmHg versus (C) 154mmHg (p=0.005), diastolic (E) 89mmHg versus 98mmHg (p=0.006) (2) Compliance (direct questioning and pill count)- adherence improved by 66% in the intervention group compared to 16% in usual care group (p=0.04). Reason for exclusion: hospital-based RCT. Duration of FU 8 weeks</td>
</tr>
<tr>
<td>Grimm</td>
<td>A randomised trial of four different class of anti-hypertensive agents and quality of life. Excluded: no data on BP control, no interventions other than different classes of anti-hypertensive drugs.</td>
</tr>
<tr>
<td>Hatcher 1986</td>
<td>Factorial randomised trial of health education intervention. Three levels of intervention medication schedules, diet, appointment keeping, family member, reinforcements and small group meeting. Excluded as intervention was based on ? ? education and no outcomes on blood pressure control in the process of care.</td>
</tr>
<tr>
<td>Herbert 2004</td>
<td>2x2 factorial RCT of 28 peer learning groups involving 200 family physicians in British Columbia, Canada. Interventions: personalised prescribing feedback relating to hypertension; case-based educational module. Evidence-based prescribing improved in both groups (increase in thiazide prescribing as first line agents). Reason for exclusion: no blood pressure outcomes reported.</td>
</tr>
<tr>
<td>Hyman</td>
<td>Questionnaire study self reported physician practice excluded for that reason.</td>
</tr>
<tr>
<td>Inui 1976</td>
<td>Before/after study intervention with tutor physician educating patients regarding their hypertension. Excluded: not a randomised trial.</td>
</tr>
<tr>
<td>Iso 1996</td>
<td>Randomised trial of health education advice (non-pharmacological) follow-up was at 6 months and one and half years. Excluded: intervention was based around health education/counselling advice.</td>
</tr>
<tr>
<td>Iso H,</td>
<td>Randomised trial of health education classes to patients. Excluded as intervention was non-pharmacological advice.</td>
</tr>
<tr>
<td>Jennett 1986</td>
<td>RCT of continuing medical education in the context of treatment of hypertension. Intervention focused on three learning objectives: 1) physicians reschedule diagnosed hypertensive patients (aged 50 years or older) not as yet in control, to be seen at least every month until controlled; 2) physicians take blood pressure of hypertensive patients in the supine position and also within one minute after standing on every visit and the patient's position is recorded with their blood pressure record; 3) physicians ask patients who have not yet got controlled blood pressure about their compliance in taking prescribed medication and record the answer. Two educational formats used: 1)</td>
</tr>
<tr>
<td>Study</td>
<td>Reason for exclusion</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Krishan 1979</td>
<td>Non-randomised trial of nurse practitioner and integrated physician supervised management in community hypertension clinics versus usual care. No difference in outcome of blood pressure control.</td>
</tr>
<tr>
<td>Lee 2006</td>
<td>Participants were 200 community-based patients aged 65 years or older taking at least 4 chronic medications and not specifically patients with hypertension.</td>
</tr>
<tr>
<td>Levine 2003</td>
<td>Randomised trial of community health workers providing less intensive care (education, counselling and information about gaining access to free ongoing care in the community) versus more intensive care (all components of less intensive intervention plus additional home visits, further educational messages and social support mobilization through family members). At 40 months follow up, both groups experienced improvement in blood pressure control (significant within group difference from baseline blood pressure readings). Less intensive group had greater blood pressure control compared to more intensive group but difference was not significant. Reason for exclusion: no usual care group.</td>
</tr>
<tr>
<td>Lewis 1967</td>
<td>Randomised trial of nurse clinics versus usual care in outpatient clinic. The population included patients with Hypertension and Atherosclerotic Disease, Obesity, Arthritis and Psychophysiological Disorders. The outcomes are preferences for care, costs and process of care in terms of examinations and investigations. Excluded: no data on process or outcome of blood pressure care.</td>
</tr>
<tr>
<td>Liehr 2006</td>
<td>This study examined the blood pressure (BP)-lowering effect of adding story-centered care (i.e., carefully attending to another’s narrative) to standard lifestyle intervention (i.e., exercise training and nutrition counselling) and thus was a trial of a non-pharmacological treatment</td>
</tr>
<tr>
<td>Linjer 1997</td>
<td>Non-randomised trial. Discussion paper regarding percentage of patients eligible in randomised trials generally at low risk in trial participants.</td>
</tr>
<tr>
<td>Littenberg 1990</td>
<td>Non-randomised trial. Cost effectiveness study of increased blood pressure.</td>
</tr>
<tr>
<td>Marquez 2000</td>
<td>Randomised trial intervention being health education through group sessions with postal back-up. Outcomes were compliance with blood pressure medication. Excluded as no outcome in terms of blood pressure control reported.</td>
</tr>
<tr>
<td>Mashru 1997</td>
<td>Before after study of interpractice audit following educational programme concerning diagnosis and management of hypertension. Six general practices in NW London, UK, 750 hypertensive patients. At two years follow up, two thirds of patients remained &quot;uncontrolled&quot; (BP=160/90).</td>
</tr>
<tr>
<td>McDowell 1989</td>
<td>Non hypertensive patients registered with a large family practice (Canada). Interventions: computer reminder to GP, letter to patient, nurse telephone call to patient. Outcome was whether blood pressure was checked or not. Effect of reminders was &quot;modest&quot;</td>
</tr>
<tr>
<td>McInnes 1995</td>
<td>Non-randomised trial two patients were matched and then randomised to it. Shared care or clinical care. The intervention was computerised shared care versus hospital clinical care in outpatients departments. The outcome showed there were less drop-outs for shared care and they were better adequately used in terms of patient management in shared care compared to usual care. Shared care was more cost effective. Blood pressure control was similar in both groups.</td>
</tr>
<tr>
<td>Mckenney 1973</td>
<td>A pharmacist intervention directly at patients improved knowledge compliance with medication and blood pressure control, however not randomised properly. Patients assigned consecutive numbers then randomised according whether they had odd or even numbers</td>
</tr>
<tr>
<td>Study</td>
<td>Reason for exclusion</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mitchell 2004</td>
<td>Quasi-randomisation study. Randomisation occurred at the level of practice but data collected at the level of the patient. Patients not randomised. Thus patient numbers increase from baseline to follow-up.</td>
</tr>
<tr>
<td>Mitchell 2005</td>
<td>Quasi-randomisation study. Randomisation occurred at the level of practice but data collected at the level of the patient. Patients not randomised. Thus patient numbers increase from baseline to final</td>
</tr>
<tr>
<td>Morisky 2002</td>
<td>Control group did not receive usual care but rather were receiving the CHIP programme.</td>
</tr>
<tr>
<td>Murray 1988</td>
<td>Not hypertensive patients. Population: persons “at risk” of developing hypertension. Intervention: direct mail to prompt attendance at clinic, either single, multiple or no mail. Outcome: number of patients who had a blood pressure checked or discussed with their physician</td>
</tr>
<tr>
<td>Pheley 1995</td>
<td>Observational study of nurse based hypertension clinic with no comparison group.</td>
</tr>
<tr>
<td>Putnam 1989</td>
<td>40 family physicians from the Dalhousie University Division of Continuing Medical Education separated into 3 groups according to extent of involvement in establishing essential criteria for hypertension management. No difference in control of blood pressure in these family physician’s patients at 18 months follow up. Reason for exclusion: non-randomised trial</td>
</tr>
<tr>
<td>Roumie 2006</td>
<td>No proper control group. Providers who cared for eligible patients were randomly assigned to receive an e-mail with a Web-based link to the Seventh Report of the Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC 7) guidelines (provider education); provider education and a patient-specific hypertension computerized alert (provider education and alert); or provider education, hypertension alert, and patient education, in which patients were sent a letter advocating drug adherence, lifestyle modification, and conversations with providers (patient education).</td>
</tr>
<tr>
<td>Simon 2005</td>
<td>Quasi-randomised trial: Randomisation occurred at the level of practice but data collected at the level of the patient. Patients not randomised. Thus patient numbers increase from baseline to final</td>
</tr>
<tr>
<td>Staessen 2004</td>
<td>Randomised trial of treatment based on (1) BP measured at home (3 consecutive measurements twice daily) versus (2) BP measured at physician’s office (average of 3 consecutive readings taken by physician during practice hours). Reason for exclusion: (1) Assessed self monitoring in the context &quot;as guides to initiate and titrate antihypertensive drug treatment&quot; (2) Treated and untreated patients included. At follow-up (median 350 days), more home BP than office BP patients had stopped antihypertensive drugs with no difference between groups of patients who had progressed to multiple drug treatment. Final office, home and 24-hour ambulatory BP measurements were higher in the home BP group than in the office BP group.</td>
</tr>
<tr>
<td>Stahl 1984</td>
<td>Non-randomised trial. Self and family read blood pressure monitoring groups plus nurse education. Excluded because of non-randomised study.</td>
</tr>
<tr>
<td>Statson 1977</td>
<td>Non-randomised trial. Examining the cost effectiveness of treatment of hypertension</td>
</tr>
<tr>
<td>Stephenson 1999</td>
<td>Non-randomised trial.</td>
</tr>
<tr>
<td>Study</td>
<td>Reason for exclusion</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Thomas 2006</td>
<td>No outcome data specific to hypertensive patients available. Corresponding author emailed and no response.</td>
</tr>
<tr>
<td>Tu 1999</td>
<td>Parallel, individuals 222 attending a &quot;health unit clinic&quot;, carried out in a veteran home in Taiwan, China. Hypertension, SBP 140 or DBP 90 in untreated patients or treated hypertension patients BP level not stated. Average age 74.6 years. (1) Medical education group (MEG)- monthly meeting concerning cognition, attitude self-care behaviours for hypertension (2) Health education- same content but delivered every other month group (EOMG). Differences between groups not clearly reported. Stated that no difference in attitudes and behaviour between groups. Blood pressure no difference in SBP but higher DBP in EOMG. Between group differences not clearly stated. Table 3, within group differences all improved for &quot;cognition, behaviours and attitudes&quot; scores and &quot;blood pressure marking&quot; changes. Duration of FU 6 months. Reason for exclusion: no BP data for both arms of study reported.</td>
</tr>
<tr>
<td>UK PDS 1998</td>
<td>Randomised trial of tight less tight blood pressure control. Excluded because its not reporting on process and organisational issues in hypertension care.</td>
</tr>
<tr>
<td>van den Hoogen 1990</td>
<td>Non randomised study. &quot;Experimental&quot; study but no mention of randomisation. 15 general practices in the Netherlands, newly detected patients with hypertension two years prior to start of study aged 36-55 years. Intervention: computer-assisted monitoring system, provides monthly feedback on treatment results, regular meetings at practices where surveys discussed. Outcome: improved surveillance and control of blood pressure in computer group</td>
</tr>
<tr>
<td>Waeb 1999</td>
<td>Randomised trial of compliance in terms of aspirin versus placebo from the HOT randomised controlled trial</td>
</tr>
<tr>
<td>Weiner 1980</td>
<td>Cluster- six &quot;industrial settings&quot; randomised. Ohio county clinics US, SBP&gt;140 or DBP &gt;90 age 19-39, SBP &gt;150 or DBP &gt;90 age 40-64. (1) Nurse management. Involved reinforcement to take medication, information about side effects of medications, diet instruction, BP checks, weight checks, education and counselling regarding &quot;an understanding and acceptance of hypertension&quot;, (2) Usual care. Positive RCT reported. Experimental patients had better: (1) Decreases in maximum SBP (p=0.02) (2) Average SBP (p=0.02) (3) % overweight (p=0.01) (4) Improved knowledge (p=0.002). Duration FU 3 months. No difference found for maximum and average DBP between (E) and (C). Only very brief account of RCT with no details of baseline or follow up blood pressure. Reason for exclusion: no blood pressure data.</td>
</tr>
<tr>
<td>Weir 2002</td>
<td>Questionnaire survey a combination of lifestyle medication taking in half outcomes</td>
</tr>
<tr>
<td>Wollard 1995</td>
<td>Randomised trial at two levels of intensity, lifestyle advice/counselling from practice nurses. Outcome was lifestyle and non-pharmacological change in patients. Excluded because intervention was based on non-pharmacological advice and outcomes included lifestyle changes. Of note intervention was more effective than usual care.</td>
</tr>
<tr>
<td>Wyka-Fitzgerald 1984</td>
<td>Randomised trial of nurse education programme directed at patients intervention was non-pharmacological advice so excluded for this reason.</td>
</tr>
<tr>
<td>Zernike 1998</td>
<td>Randomised trial of structured patient-centred education programme versus normal information. Outcome patient knowledge which was increased and structured intervention. Excluded as no outcomes reported on blood pressure control or process of care.</td>
</tr>
</tbody>
</table>
## Characteristics of ongoing studies [ordered by study ID]

### Bosworth

<table>
<thead>
<tr>
<th>Trial name or title</th>
<th>Hypertension Intervention Nurse Telemedicine Study (HINTS): testing a multifactorial tailored behavioral/educational and a medication management intervention for blood pressure control. 2007;153(6):918-924.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>RCT</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Patients with hypertension</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Multifactorial tailored behavioral/educational and a medication management intervention for blood pressure control.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Blood pressure control.</td>
</tr>
<tr>
<td><strong>Starting date</strong></td>
<td>2007-2009</td>
</tr>
<tr>
<td><strong>Contact information</strong></td>
<td><a href="mailto:boswo001@mc.duke.edu">boswo001@mc.duke.edu</a></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Trial nearing completion</td>
</tr>
</tbody>
</table>

### Carter

<table>
<thead>
<tr>
<th>Trial name or title</th>
<th>A Trial to Evaluate Physician/Pharmacist Collaboration to Improve Blood Pressure Control: An effectiveness study.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>Cluster Randomized Trial</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>Patients with hypertension</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>Physician/Pharmacist led intervention</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Blood Pressure Control</td>
</tr>
<tr>
<td><strong>Starting date</strong></td>
<td>Not known</td>
</tr>
<tr>
<td><strong>Contact information</strong></td>
<td><a href="mailto:barry-carter@uiowa.edu">barry-carter@uiowa.edu</a></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Duration of the intervention was 6 months. Submitted for publication</td>
</tr>
</tbody>
</table>

### Coppola

<table>
<thead>
<tr>
<th>Trial name or title</th>
<th>Improving the primary prevention of stroke in older patients in general practice: a randomized controlled trial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Methods</strong></td>
<td>Practices were randomised by size and location to receive a specific intervention package or not. This included the use of a scoring system to identify those at particularly high risk. Emphasis was placed on the identification of risk and the use of interventions targeted on the major risk factors: Identification and management of raised blood pressure, smoking cessation, and use of aspirin. Agreement was reached within the practice about the use of risk scores, and levels of intervention. Control practices received no contact until the casenote review.</td>
</tr>
</tbody>
</table>

---

Interventions used to improve control of blood pressure in patients with hypertension (Review)  
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### Coppola (Continued)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>Elderly patients (aged between 60 to 75 years) registered in 20 general practices in London UK</td>
</tr>
<tr>
<td>Interventions</td>
<td>Intervention directed at health professionals in general practices. One hour seminar</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Blood pressure control</td>
</tr>
<tr>
<td>Starting date</td>
<td>Not known</td>
</tr>
<tr>
<td>Contact information</td>
<td><a href="mailto:pwhincup@sghms.ac.uk">pwhincup@sghms.ac.uk</a></td>
</tr>
<tr>
<td>Notes</td>
<td>Trial remains unpublished at the time of the current update.</td>
</tr>
</tbody>
</table>

### Krieger

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial name or title</td>
<td>SHIP Clinic-Based Program</td>
</tr>
<tr>
<td>Methods</td>
<td>Not known</td>
</tr>
<tr>
<td>Participants</td>
<td>1. Patients currently at a participating clinic with a diagnosis of hypertension.</td>
</tr>
<tr>
<td></td>
<td>2. Low income.</td>
</tr>
<tr>
<td></td>
<td>3. Caucasian or African American.</td>
</tr>
<tr>
<td></td>
<td>4. Aged 18 or older</td>
</tr>
<tr>
<td>Interventions</td>
<td>1. Patient care co-ordinator at each clinic.</td>
</tr>
<tr>
<td></td>
<td>2. Computerised tracking system.</td>
</tr>
<tr>
<td></td>
<td>3. Linkage with outreach workers.</td>
</tr>
<tr>
<td></td>
<td>4. Linkage with community-based resources</td>
</tr>
<tr>
<td>Outcomes</td>
<td>1. Mean systolic and diastolic blood pressure.</td>
</tr>
<tr>
<td></td>
<td>2. Non-pharmacological behaviour change</td>
</tr>
<tr>
<td></td>
<td>3. Control of blood pressure</td>
</tr>
<tr>
<td>Starting date</td>
<td>Not known</td>
</tr>
<tr>
<td>Contact information</td>
<td>James Krieg er</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:James.krieger@METROC.GOV">James.krieger@METROC.GOV</a></td>
</tr>
<tr>
<td>Notes</td>
<td>RCT complete, anticipated publication in 2003. However, author could not be contacted at the above email addresses at the time of the current update.</td>
</tr>
</tbody>
</table>

### Logan

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial name or title</td>
<td>Mobile phone-based remote patient monitoring system for management of hypertension in diabetic patients</td>
</tr>
<tr>
<td>Methods</td>
<td>Phase 1 involved a series of focus-group meetings with patients and primary care providers to guide the system’s development.</td>
</tr>
<tr>
<td>Participants</td>
<td>In Phase 2, 33 diabetic patients with uncontrolled ambulatory hypertension were enrolled in a 4-month pilot study, using a before-and-after design to assess its effectiveness in lowering BP, its acceptability to users, and the reliability of home BP measurements.</td>
</tr>
<tr>
<td>Interventions</td>
<td>Home BP tele-management system that actively engages patients in the process of care.</td>
</tr>
</tbody>
</table>
### Logan (Continued)

<table>
<thead>
<tr>
<th><strong>Outcomes</strong></th>
<th>Mean systolic and diastolic blood pressure and control of blood pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting date</strong></td>
<td>Not known</td>
</tr>
<tr>
<td><strong>Contact information</strong></td>
<td><a href="mailto:LOGAN@lunenfeld.ca">LOGAN@lunenfeld.ca</a></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>In final year of RCT, Results available in June 2010</td>
</tr>
</tbody>
</table>

### Zarnke

| **Trial name or title** | Not known |
| **Methods** | Not known |
| **Participants** | Patients with uncontrolled hypertension |
| **Interventions** | Patient-directed self measurement |
| **Starting date** | Not known |
| **Contact information** | kelly.zarnke@lhsc.on.ca |
| **Notes** | RCT complete, data being analysed. Remians unpublished and author remains uncontactable. |

### DATA AND ANALYSES

#### Comparison 1. Active intervention versus control

<table>
<thead>
<tr>
<th>Outcome or subgroup title</th>
<th>No. of studies</th>
<th>No. of participants</th>
<th>Statistical method</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Self monitoring (systolic blood pressure)</td>
<td>12</td>
<td>2492</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-2.53 [-3.73, -1.34]</td>
</tr>
<tr>
<td>2 Self monitoring (diastolic blood pressure)</td>
<td>14</td>
<td>2598</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-1.81 [-2.39, -1.23]</td>
</tr>
<tr>
<td>3 Self monitoring (BP control)</td>
<td>6</td>
<td>2237</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.97 [0.81, 1.16]</td>
</tr>
<tr>
<td>4 Patient education (systolic blood pressure)</td>
<td>11</td>
<td>8901</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-0.57 [-1.22, 0.08]</td>
</tr>
<tr>
<td>5 Patient education (diastolic blood pressure)</td>
<td>13</td>
<td>9050</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.46 [0.07, 0.86]</td>
</tr>
<tr>
<td>6 Patient education (BP control)</td>
<td>7</td>
<td>7950</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.83 [0.75, 0.91]</td>
</tr>
<tr>
<td>Outcome or subgroup title</td>
<td>No. of studies</td>
<td>No. of participants</td>
<td>Statistical method</td>
<td>Effect size</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>7 Physician education (systolic blood pressure)</td>
<td>7</td>
<td>9998</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-0.43 [-1.07, 0.22]</td>
</tr>
<tr>
<td>8 Physician education (diastolic blood pressure)</td>
<td>7</td>
<td>9998</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>0.59 [0.21, 0.96]</td>
</tr>
<tr>
<td>9 Physician education (BP control)</td>
<td>7</td>
<td>21144</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.85 [0.80, 0.90]</td>
</tr>
<tr>
<td>10 Health professional led care (systolic blood pressure)</td>
<td>10</td>
<td>2235</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-2.52 [-3.77, -1.27]</td>
</tr>
<tr>
<td>11 Health professional led care (diastolic blood pressure)</td>
<td>11</td>
<td>2682</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-1.49 [-2.02, -0.96]</td>
</tr>
<tr>
<td>12 Health professional led care (BP control)</td>
<td>6</td>
<td>1506</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.30 [0.24, 0.38]</td>
</tr>
<tr>
<td>13 Organisation/protocol driven care (systolic blood pressure)</td>
<td>9</td>
<td>7664</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-6.00 [-8.81, -7.79]</td>
</tr>
<tr>
<td>14 Organisation/protocol driven care (diastolic blood pressure)</td>
<td>9</td>
<td>7664</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-4.27 [-4.65, -3.89]</td>
</tr>
<tr>
<td>15 Organisation/protocol driven care (BP Control)</td>
<td>7</td>
<td>11998</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.45 [0.41, 0.48]</td>
</tr>
<tr>
<td>16 Appointment reminder (outcome: lost to follow up at clinic)</td>
<td>6</td>
<td>1704</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.41 [0.32, 0.51]</td>
</tr>
<tr>
<td>17 Appointment reminder (systolic blood pressure)</td>
<td>2</td>
<td>787</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-4.56 [-6.31, -2.81]</td>
</tr>
<tr>
<td>18 Appointment reminder (diastolic blood pressure)</td>
<td>2</td>
<td>787</td>
<td>Mean Difference (IV, Fixed, 95% CI)</td>
<td>-0.53 [-2.01, 0.95]</td>
</tr>
<tr>
<td>19 Appointment reminder (outcome: blood pressure control)</td>
<td>2</td>
<td>767</td>
<td>Odds Ratio (M-H, Fixed, 95% CI)</td>
<td>0.54 [0.41, 0.73]</td>
</tr>
</tbody>
</table>

### Analysis 1.1. Comparison 1 Active intervention versus control, Outcome 1 Self monitoring (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference Fixed, 95% CI</th>
<th>Weight</th>
<th>Mean Difference Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artinian 2001</td>
<td>6</td>
<td>-25 (13.9)</td>
<td>9</td>
<td>1 (14.1)</td>
<td>0.69%</td>
</tr>
<tr>
<td>Bailey 1998</td>
<td>31</td>
<td>18.9 (19.4)</td>
<td>29</td>
<td>-13 (19)</td>
<td>1.51%</td>
</tr>
<tr>
<td>Carnahan 1975</td>
<td>49</td>
<td>-18 (18.5)</td>
<td>48</td>
<td>-10.5 (14.9)</td>
<td>3.2%</td>
</tr>
<tr>
<td>Friedman 1996</td>
<td>110</td>
<td>-11 (13.4)</td>
<td>123</td>
<td>-10.6 (13.7)</td>
<td>11.77%</td>
</tr>
<tr>
<td>Halme 2005</td>
<td>113</td>
<td>-7.7 (15.3)</td>
<td>119</td>
<td>-4.5 (16.2)</td>
<td>8.69%</td>
</tr>
<tr>
<td>McManus 2005</td>
<td>189</td>
<td>-8.9 (15.3)</td>
<td>211</td>
<td>-6.6 (16.2)</td>
<td>14.98%</td>
</tr>
<tr>
<td>Methos 2000</td>
<td>18</td>
<td>-17.1 (15.8)</td>
<td>18</td>
<td>-7 (13.9)</td>
<td>1.51%</td>
</tr>
<tr>
<td>Midanik 1991</td>
<td>74</td>
<td>-1 (15.8)</td>
<td>72</td>
<td>1 (17.3)</td>
<td>4.94%</td>
</tr>
</tbody>
</table>

Interventions used to improve control of blood pressure in patients with hypertension (Review)

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## Analysis 1.2. Comparison 1 Active intervention versus control, Outcome 2 Self monitoring (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rogers 2001</td>
<td>56</td>
<td>55</td>
<td>-4.9 (13.5)</td>
<td>5.7%</td>
<td>-4.8 [8.8, 0.2]</td>
</tr>
<tr>
<td>Rudd 2004</td>
<td>74</td>
<td>76</td>
<td>-14.2 (17.6)</td>
<td>4.26%</td>
<td>-8.5 [-14.2, 2.71]</td>
</tr>
<tr>
<td>Soghikian 1992</td>
<td>200</td>
<td>190</td>
<td>-1.5 (13.9)</td>
<td>14.95%</td>
<td>-3.3 [6.39, 0.21]</td>
</tr>
<tr>
<td>Vetter 2000</td>
<td>295</td>
<td>325</td>
<td>-21 (14.5)</td>
<td>27.8%</td>
<td>-0.5 [2.77, 1.77]</td>
</tr>
<tr>
<td><strong>Total</strong>*</td>
<td><strong>1216</strong></td>
<td><strong>1276</strong></td>
<td><strong>-2.53 [-3.73, -1.34]</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau^2=0; Chi^2=26.79, df=11 (P=0.0); I^2=58.93%

Test for overall effect: Z=4.15 (P<0.0001)

## Analysis 1.3. Comparison 1 Active intervention versus control, Outcome 3 Self monitoring (BP control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baqu'Å– 2005</td>
<td>345/487</td>
<td>380/570</td>
<td>1.21 [0.94, 1.58]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earp 1982</td>
<td>29/74</td>
<td>16/47</td>
<td>1.25 [0.58, 2.68]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halme 2005</td>
<td>80/113</td>
<td>100/119</td>
<td>1.12 [0.24, 0.87]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pierce 1984</td>
<td>15/55</td>
<td>7/29</td>
<td>1.18 [0.42, 3.32]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rogers 2001</td>
<td>36/60</td>
<td>35/61</td>
<td>1.11 [0.54, 2.3]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vetter 2000</td>
<td>100/296</td>
<td>131/326</td>
<td>0.76 [0.55, 1.05]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>1085</strong></td>
<td><strong>1152</strong></td>
<td><strong>1.07 [0.81, 1.41]</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test for overall effect: Z=6.09 (P<0.0001)
## Analysis 1.4. Comparison 1 Active intervention versus control, Outcome 4 Patient education (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment N Mean(SD)</th>
<th>Control N Mean(SD)</th>
<th>Mean Difference Fixed, 95% CI</th>
<th>Weight</th>
<th>Mean Difference Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billault 1995</td>
<td>82 -2.7 (16.5)</td>
<td>85 -1.6 (14.6)</td>
<td>1.18 (0.77)</td>
<td>1.88%</td>
<td>-1.1[-5.83,3.63]</td>
</tr>
<tr>
<td>Burrelle 1986</td>
<td>8 -13.2 (16)</td>
<td>8 -5.8 (14.8)</td>
<td>-7.4[-22.5,7.7]</td>
<td>0.18%</td>
<td>-7.4[-22.5,7.7]</td>
</tr>
<tr>
<td>Cahir 2006</td>
<td>30 -8.9 (10.7)</td>
<td>30 1.1 (9)</td>
<td>-9.8[-15,-5]</td>
<td>1.68%</td>
<td>-9.8[-15,-5]</td>
</tr>
<tr>
<td>Fielding 1994</td>
<td>74 -10.9 (19.3)</td>
<td>71 -2.4 (19.5)</td>
<td>-8.5[-14.82,2.18]</td>
<td>1.06%</td>
<td>-8.5[-14.82,2.18]</td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>3617 -13 (15.6)</td>
<td>3542 -3 (15.7)</td>
<td>1.88%</td>
<td>80.18%</td>
<td>1.88%</td>
</tr>
<tr>
<td>Hunt 2004</td>
<td>135 -9 (11.4)</td>
<td>150 -7 (11.8)</td>
<td>6.8[-14.82,2.18]</td>
<td>0.18%</td>
<td>6.8[-14.82,2.18]</td>
</tr>
<tr>
<td>McInnestry 2006</td>
<td>130 -1 (19.7)</td>
<td>131 2 (19.3)</td>
<td>3.28[-0.73,4.18]</td>
<td>1.81%</td>
<td>3.28[-0.73,4.18]</td>
</tr>
<tr>
<td>Muhlhauser 1993</td>
<td>86 -8 (13.5)</td>
<td>74 -3 (13.9)</td>
<td>-5.2[-9.26,-0.74]</td>
<td>0.18%</td>
<td>-5.2[-9.26,-0.74]</td>
</tr>
<tr>
<td>Roca-Cusachs 1991</td>
<td>84 -16.7 (18.5)</td>
<td>111 -18 (21.6)</td>
<td>1.33[-4.34,6.94]</td>
<td>0.18%</td>
<td>1.33[-4.34,6.94]</td>
</tr>
<tr>
<td>Watkins 1987</td>
<td>204 -0.2 (16.6)</td>
<td>210 -0.8 (18.6)</td>
<td>3.28[0.56,1.44]</td>
<td>1.81%</td>
<td>3.28[0.56,1.44]</td>
</tr>
<tr>
<td>Zismer 1982</td>
<td>26 -13.1 (13.9)</td>
<td>13 2.6 (16.2)</td>
<td>-15.7[-26,-5.4]</td>
<td>0.18%</td>
<td>-15.7[-26,-5.4]</td>
</tr>
<tr>
<td><strong>Total</strong>*</td>
<td><strong>4476</strong></td>
<td><strong>4425</strong></td>
<td><strong>100%</strong></td>
<td><strong>-0.57[-1.22,0.08]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau²=0; Chi²=37.29, df=10(P=0.0001); I²=73.18%

Test for overall effect: Z=1.72(P=0.09)

## Analysis 1.5. Comparison 1 Active intervention versus control, Outcome 5 Patient education (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment N Mean(SD)</th>
<th>Control N Mean(SD)</th>
<th>Mean Difference Fixed, 95% CI</th>
<th>Weight</th>
<th>Mean Difference Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billault 1995</td>
<td>82 1.3 (7.8)</td>
<td>85 -0.1 (11.2)</td>
<td>1.4[-1.52,4.32]</td>
<td>1.81%</td>
<td>1.4[-1.52,4.32]</td>
</tr>
<tr>
<td>Burrelle 1986</td>
<td>8 -4.1 (11.9)</td>
<td>8 -11.2 (13.1)</td>
<td>7.1[-5.16,19.36]</td>
<td>0.1%</td>
<td>7.1[-5.16,19.36]</td>
</tr>
<tr>
<td>Cahir 2006</td>
<td>30 -7 (7.9)</td>
<td>30 1.6 (6.5)</td>
<td>-8.6[-12.26,-4.94]</td>
<td>1.15%</td>
<td>-8.6[-12.26,-4.94]</td>
</tr>
<tr>
<td>Fielding 1994</td>
<td>74 -5.6 (9.7)</td>
<td>71 -1.7 (9.8)</td>
<td>-3.9[-7.07,-0.73]</td>
<td>1.53%</td>
<td>-3.9[-7.07,-0.73]</td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>3617 -2 (9.5)</td>
<td>3542 -3 (9.6)</td>
<td>-7.9[-10.5,4.44]</td>
<td>78.82%</td>
<td>-7.9[-10.5,4.44]</td>
</tr>
<tr>
<td>Hunt 2004</td>
<td>162 -5 (9.9)</td>
<td>150 -3 (10.3)</td>
<td>-2.45[-2.95,0.25]</td>
<td>3.06%</td>
<td>-2.45[-2.95,0.25]</td>
</tr>
<tr>
<td>McInnestry 2006</td>
<td>130 -4 (10.6)</td>
<td>131 -2 (11.1)</td>
<td>-2.43[-2.93,0.33]</td>
<td>2.23%</td>
<td>-2.43[-2.93,0.33]</td>
</tr>
<tr>
<td>Muhlhauser 1993</td>
<td>86 -5 (7.3)</td>
<td>74 -2 (8.2)</td>
<td>-3.5[-4.52,-0.58]</td>
<td>2.63%</td>
<td>-3.5[-4.52,-0.58]</td>
</tr>
<tr>
<td>Roca-Cusachs 1991</td>
<td>84 -7.6 (9.5)</td>
<td>111 -9.5 (11.7)</td>
<td>-2.9[0.7,4.4]</td>
<td>1.74%</td>
<td>-2.9[0.7,4.4]</td>
</tr>
<tr>
<td>Tanner 1981</td>
<td>15 -3.7 (9.9)</td>
<td>15 -3.9 (9.9)</td>
<td>0.2[-4.7,4.14]</td>
<td>0.63%</td>
<td>0.2[-4.7,4.14]</td>
</tr>
<tr>
<td>Watkins 1987</td>
<td>204 0.3 (9.3)</td>
<td>210 -0.1 (9.3)</td>
<td>0.4[0.4,13.92,1.19]</td>
<td>4.81%</td>
<td>0.4[0.4,13.92,1.19]</td>
</tr>
<tr>
<td>Webb 1980</td>
<td>37 -6.8 (9)</td>
<td>55 -3.5 (8.4)</td>
<td>-3.3[-6.95,0.35]</td>
<td>1.16%</td>
<td>-3.3[-6.95,0.35]</td>
</tr>
<tr>
<td>Zismer 1982</td>
<td>26 -8.2 (8.9)</td>
<td>13 0.5 (10.9)</td>
<td>-8.7[-15.54,1.67]</td>
<td>0.33%</td>
<td>-8.7[-15.54,1.67]</td>
</tr>
<tr>
<td><strong>Total</strong>*</td>
<td><strong>4555</strong></td>
<td><strong>4495</strong></td>
<td><strong>100%</strong></td>
<td><strong>0.46[0.07,0.86]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau²=0; Chi²=37.29, df=10(P=0.0001); I²=73.18%

Test for overall effect: Z=1.72(P=0.09)
### Study or subgroup | Treatment | Control | Mean Difference | Weight | Mean Difference |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td>Fixed, 95% CI</td>
</tr>
<tr>
<td>Heterogeneity: Tau²=0; Chi²=65.69, df=12(P&lt;0.0001); I²=81.73%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z=2.32(P=0.02)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Favours treatment</th>
<th>-10</th>
<th>-5</th>
<th>0</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favours control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Analysis 1.6. Comparison 1 Active intervention versus control, Outcome 6 Patient education (BP control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H, Fixed, 95% CI</td>
<td></td>
<td>M-H, Fixed, 95% CI</td>
</tr>
<tr>
<td>Earp 1982</td>
<td>14/41</td>
<td>16/47</td>
<td>0.99%</td>
<td>1[0.42,2.43]</td>
<td></td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>1238/3617</td>
<td>1363/3542</td>
<td>91.19%</td>
<td>0.83[0.76,0.92]</td>
<td></td>
</tr>
<tr>
<td>McKinstry 2006</td>
<td>59/130</td>
<td>60/131</td>
<td>3.29%</td>
<td>0.98[0.61,1.6]</td>
<td></td>
</tr>
<tr>
<td>Morisky 1983</td>
<td>15/44</td>
<td>24/40</td>
<td>1.67%</td>
<td>0.34[0.14,0.84]</td>
<td></td>
</tr>
<tr>
<td>Mulhhauser 1993</td>
<td>74/86</td>
<td>63/74</td>
<td>0.95%</td>
<td>1.08[0.44,2.61]</td>
<td></td>
</tr>
<tr>
<td>Pierce 1984</td>
<td>10/59</td>
<td>9/27</td>
<td>1.03%</td>
<td>0.41[0.14,1.17]</td>
<td></td>
</tr>
<tr>
<td>Sackett 1975</td>
<td>61/80</td>
<td>26/32</td>
<td>0.89%</td>
<td>0.74[0.27,2.07]</td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>4057</strong></td>
<td><strong>3893</strong></td>
<td><strong>100%</strong></td>
<td><strong>0.83[0.75,0.91]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total events: 1471 (Treatment), 1561 (Control)
Heterogeneity: Tau²=6.54, df=6(P=0.37); I²=8.2%
Test for overall effect: Z=4.02(P<0.0001)

<table>
<thead>
<tr>
<th>Favours treatment</th>
<th>0.1</th>
<th>0.2</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favours control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Analysis 1.7. Comparison 1 Active intervention versus control, Outcome 7 Physician education (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td>Fixed, 95% CI</td>
</tr>
<tr>
<td>Coe 1977</td>
<td>60</td>
<td>-19.5 (21.1)</td>
<td>56</td>
<td>-18.3 (27)</td>
<td>0.53%</td>
</tr>
<tr>
<td>Dickinson 1981</td>
<td>78</td>
<td>-10.20.9)</td>
<td>33</td>
<td>-11 (23.8)</td>
<td>0.48%</td>
</tr>
<tr>
<td>Evans 1986</td>
<td>102</td>
<td>-12.2 (13.7)</td>
<td>81</td>
<td>-13 (19.6)</td>
<td>1.64%</td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>3617</td>
<td>-3 (15.6)</td>
<td>3542</td>
<td>-3 (15.7)</td>
<td>79.1%</td>
</tr>
<tr>
<td>Hetlevik 1999</td>
<td>816</td>
<td>-2.3 (19.1)</td>
<td>1023</td>
<td>-0.8 (18.3)</td>
<td>13.98%</td>
</tr>
<tr>
<td>Montgomery 2000</td>
<td>199</td>
<td>-3 (18.1)</td>
<td>130</td>
<td>1 (20.3)</td>
<td>2.25%</td>
</tr>
<tr>
<td>Sanders 2002</td>
<td>135</td>
<td>-7.1 (18.5)</td>
<td>126</td>
<td>-0.3 (18.9)</td>
<td>2.02%</td>
</tr>
<tr>
<td>**Total ***</td>
<td><strong>5007</strong></td>
<td><strong>4991</strong></td>
<td><strong>100%</strong></td>
<td><strong>-0.43[-1.07,0.22]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau²=13.38, df=6(P=0.04); I²=55.16%
Test for overall effect: Z=1.29(P=0.2)

<table>
<thead>
<tr>
<th>Favours treatment</th>
<th>-10</th>
<th>-5</th>
<th>0</th>
<th>5</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favours control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Analysis 1.8. Comparison 1 Active intervention versus control, Outcome 8 Physician education (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montgomery 2000</td>
<td>199</td>
<td>130</td>
<td>-1 (9.1)</td>
<td>2.9%</td>
<td>-1.19, 3.19</td>
</tr>
<tr>
<td>Coe 1977</td>
<td>60</td>
<td>56</td>
<td>-13.4 (13.2)</td>
<td>0.62%</td>
<td>-3.63, 5.83</td>
</tr>
<tr>
<td>Dickinson 1981</td>
<td>78</td>
<td>33</td>
<td>-5 (13.9)</td>
<td>0.4%</td>
<td>-1.69, 4.89</td>
</tr>
<tr>
<td>Evans 1986</td>
<td>102</td>
<td>81</td>
<td>1 (6.9)</td>
<td>2.62%</td>
<td>0.3, 2.26</td>
</tr>
<tr>
<td>Hetlevik 1999</td>
<td>816</td>
<td>1023</td>
<td>-1.8 (9.3)</td>
<td>20.51%</td>
<td>-0.6, 1.42</td>
</tr>
<tr>
<td>Sanders 2002</td>
<td>135</td>
<td>126</td>
<td>-3.4 (10.8)</td>
<td>1.89%</td>
<td>-2.1, 8.01</td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>3617</td>
<td>3542</td>
<td>-2 (9.5)</td>
<td>70.15%</td>
<td>10.56, 1.44</td>
</tr>
</tbody>
</table>

Total ***

Heterogeneity: Tau^2 = 0; Chi^2 = 15.62, df = 6 (P = 0.02); I^2 = 61.58%

Test for overall effect: Z = 3.09 (P < 0).

### Analysis 1.9. Comparison 1 Active intervention versus control, Outcome 9 Physician education (BP control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dickinson 1981</td>
<td>14/78</td>
<td>3/16</td>
<td>0.15%</td>
<td>0.85</td>
<td>0.24, 3.78</td>
</tr>
<tr>
<td>Evans 1986</td>
<td>42/102</td>
<td>37/81</td>
<td>0.9%</td>
<td>0.83</td>
<td>0.46, 1.5</td>
</tr>
<tr>
<td>Hennessy 2006</td>
<td>1238/3617</td>
<td>1363/3542</td>
<td>33.53%</td>
<td>0.83</td>
<td>0.76, 1.52</td>
</tr>
<tr>
<td>Mailing 1986</td>
<td>35/319</td>
<td>35/283</td>
<td>1.22%</td>
<td>0.87</td>
<td>0.53, 1.44</td>
</tr>
<tr>
<td>Montgomery 2000</td>
<td>120/199</td>
<td>77/130</td>
<td>1.37%</td>
<td>1.05</td>
<td>0.67, 1.64</td>
</tr>
<tr>
<td>New 2004</td>
<td>1282/2474</td>
<td>1319/2531</td>
<td>23.26%</td>
<td>0.99</td>
<td>0.88, 1.1</td>
</tr>
<tr>
<td>Novotny 2004</td>
<td>1850/4466</td>
<td>1600/3326</td>
<td>39.57%</td>
<td>0.77</td>
<td>0.7, 0.84</td>
</tr>
</tbody>
</table>

Total (95% CI)

Heterogeneity: Tau^2 = 0; Chi^2 = 12.86, df = 6 (P = 0.05); I^2 = 53.33%

Test for overall effect: Z = 5.86 (P < 0.001)

### Analysis 1.10. Comparison 1 Active intervention versus control, Outcome 10 Health professional led care (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bogden 1998</td>
<td>49</td>
<td>46</td>
<td>-23 (22.6)</td>
<td>2.12%</td>
<td>-12, -20.57</td>
</tr>
<tr>
<td>de Castro 2006</td>
<td>30</td>
<td>34</td>
<td>-6 (14.7)</td>
<td>3.07%</td>
<td>-5, -12.13</td>
</tr>
<tr>
<td>Garcia-Pena 2001</td>
<td>345</td>
<td>338</td>
<td>-6.8 (17.4)</td>
<td>23.4%</td>
<td>-3.3, -5.88</td>
</tr>
<tr>
<td>Hawkins 1979</td>
<td>349</td>
<td>280</td>
<td>-2 (14.1)</td>
<td>41.43%</td>
<td>0, -1.94</td>
</tr>
<tr>
<td>Park 1996</td>
<td>23</td>
<td>27</td>
<td>-12.3 (15.8)</td>
<td>1.69%</td>
<td>-13, -22.59</td>
</tr>
<tr>
<td>Schroeder 2005</td>
<td>110</td>
<td>94</td>
<td>-6.1 (15.7)</td>
<td>6.99%</td>
<td>-1.7, -4.42</td>
</tr>
<tr>
<td>Solomon 2002</td>
<td>63</td>
<td>70</td>
<td>-8.2 (15.2)</td>
<td>4.59%</td>
<td>-6.9, -12.72</td>
</tr>
<tr>
<td>Sookaneknun 2004</td>
<td>118</td>
<td>117</td>
<td>-23.3 (17.2)</td>
<td>7.42%</td>
<td>-5.7, -10.28</td>
</tr>
</tbody>
</table>

Total events: 4581 (Treatment), 4434 (Control)

Heterogeneity: Tau^2 = 0; Chi^2 = 12.86, df = 6 (P = 0.05); I^2 = 53.33%

Test for overall effect: Z = 5.86 (P < 0.001)
### Analysis 1.11. Comparison 1 Active intervention versus control, Outcome 11 Health professional led care (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td>Fixed, 95% CI</td>
</tr>
<tr>
<td>Tobe 2006</td>
<td>48</td>
<td>-24 (13.6)</td>
<td>47</td>
<td>-17 (18.1)</td>
<td>3.75%</td>
</tr>
<tr>
<td>Tonstad 2007</td>
<td>29</td>
<td>-10 (8.7)</td>
<td>18</td>
<td>-10 (9.2)</td>
<td>5.54%</td>
</tr>
</tbody>
</table>

**Total ***

<table>
<thead>
<tr>
<th>N</th>
<th>Mean(SD)</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1164</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: $\tau^2=0$; $\chi^2=23.46$, df=9(P=0.03); $I^2=61.63$

Test for overall effect: $Z=3.96(P<0.0001)$

Favours treatment 10

Favours control 5

### Analysis 1.12. Comparison 1 Active intervention versus control, Outcome 12 Health professional led care (BP control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H, Fixed, 95% CI</td>
<td></td>
<td>M-H, Fixed, 95% CI</td>
</tr>
<tr>
<td>Bogden 1998</td>
<td>22/49</td>
<td>37/46</td>
<td>8.19%</td>
<td>0.2(0.08,0.5)</td>
<td></td>
</tr>
<tr>
<td>Garcia-Pena 2001</td>
<td>220/345</td>
<td>316/338</td>
<td>45.02%</td>
<td>0.12(0.08,0.2)</td>
<td></td>
</tr>
<tr>
<td>Jewell 1988</td>
<td>5/15</td>
<td>7/19</td>
<td>1.6%</td>
<td>0.86(0.21,3.55)</td>
<td></td>
</tr>
<tr>
<td>Logan 1979</td>
<td>102/204</td>
<td>146/206</td>
<td>28.27%</td>
<td>0.41(0.27,0.62)</td>
<td></td>
</tr>
<tr>
<td>Park 1996</td>
<td>11/23</td>
<td>21/26</td>
<td>4%</td>
<td>0.22(0.06,0.78)</td>
<td></td>
</tr>
<tr>
<td>Sookaneknun 2004</td>
<td>40/118</td>
<td>50/117</td>
<td>12.92%</td>
<td>0.69(0.41,1.17)</td>
<td></td>
</tr>
</tbody>
</table>

**Total (95% CI)**

<table>
<thead>
<tr>
<th>N</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>754</td>
<td></td>
</tr>
</tbody>
</table>

Total events: 400 (Treatment), 577 (Control)

Heterogeneity: $\tau^2=0$; $\chi^2=27.99$, df=5(P<0.0001); $I^2=62.14$

Test for overall effect: $Z=9.89(P<0.0001)$

Favours treatment 10

Favours control 0.1
### Analysis 1.13. Comparison 1 Active intervention versus control, Outcome 13 Organisation/protocol driven care (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td></td>
</tr>
<tr>
<td>Bulpitt 1976</td>
<td>80</td>
<td>-28.8 (17.6)</td>
<td>71</td>
<td>-28.4 (17.1)</td>
<td>2.16%</td>
</tr>
<tr>
<td>Dickinson 1981</td>
<td>51</td>
<td>-12 (19.7)</td>
<td>33</td>
<td>-11 (23.8)</td>
<td>0.7 %</td>
</tr>
<tr>
<td>Hypertension 1979</td>
<td>2872</td>
<td>-23.6 (16.2)</td>
<td>1718</td>
<td>-15.4 (17.5)</td>
<td>64.06%</td>
</tr>
<tr>
<td>Hypertension 1979a</td>
<td>811</td>
<td>-38.9 (17.6)</td>
<td>542</td>
<td>-27.2 (18.6)</td>
<td>17 %</td>
</tr>
<tr>
<td>Hypertension 1982</td>
<td>438</td>
<td>-52.3 (21.9)</td>
<td>311</td>
<td>-41.7 (21.4)</td>
<td>6.73%</td>
</tr>
<tr>
<td>Takala 1979</td>
<td>39</td>
<td>-26 (18.4)</td>
<td>36</td>
<td>-29 (17.5)</td>
<td>1%</td>
</tr>
<tr>
<td>Takala 1983</td>
<td>36</td>
<td>-35 (18.5)</td>
<td>34</td>
<td>-38 (18)</td>
<td>0.91%</td>
</tr>
<tr>
<td>Turnbull 2006</td>
<td>154</td>
<td>0.7 (17.3)</td>
<td>185</td>
<td>1.4 (17.4)</td>
<td>4.82%</td>
</tr>
<tr>
<td>Wetzes 2007</td>
<td>164</td>
<td>-16 (18.4)</td>
<td>89</td>
<td>-14 (20.1)</td>
<td>2.62%</td>
</tr>
</tbody>
</table>

**Total *** 4645 3019 100% -8 [-8.81, -7.18]**

Heterogeneity: Tau²=0; Chi²=59.2, df=8(P<0.0001); I²=86.49%
Test for overall effect: Z=19.25(P<0.0001)

Favours treatment 10 5 0 5 10 Favours control

### Analysis 1.14. Comparison 1 Active intervention versus control, Outcome 14 Organisation/protocol driven care (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td></td>
</tr>
<tr>
<td>Bulpitt 1976</td>
<td>80</td>
<td>-9.2 (8.8)</td>
<td>71</td>
<td>-9.4 (8.5)</td>
<td>1.88%</td>
</tr>
<tr>
<td>Dickinson 1981</td>
<td>51</td>
<td>-6 (9.9)</td>
<td>33</td>
<td>-4 (14.7)</td>
<td>0.44%</td>
</tr>
<tr>
<td>Hypertension 1979</td>
<td>2872</td>
<td>-10.9 (7.3)</td>
<td>1718</td>
<td>-6.7 (8.1)</td>
<td>65.73%</td>
</tr>
<tr>
<td>Hypertension 1979a</td>
<td>811</td>
<td>-20.8 (7.2)</td>
<td>542</td>
<td>-14.3 (9)</td>
<td>17.48%</td>
</tr>
<tr>
<td>Hypertension 1982</td>
<td>438</td>
<td>-30.5 (9.8)</td>
<td>311</td>
<td>-22.9 (12.2)</td>
<td>5.34%</td>
</tr>
<tr>
<td>Takala 1979</td>
<td>39</td>
<td>-12 (9.2)</td>
<td>36</td>
<td>-15 (8.7)</td>
<td>0.87%</td>
</tr>
<tr>
<td>Takala 1983</td>
<td>36</td>
<td>-11 (9.2)</td>
<td>34</td>
<td>-16 (9)</td>
<td>0.79%</td>
</tr>
<tr>
<td>Turnbull 2006</td>
<td>154</td>
<td>-0.1 (7.7)</td>
<td>185</td>
<td>0 (7.7)</td>
<td>5.29%</td>
</tr>
<tr>
<td>Wetzes 2007</td>
<td>164</td>
<td>-10 (10.4)</td>
<td>89</td>
<td>-9 (9.7)</td>
<td>2.17%</td>
</tr>
</tbody>
</table>

**Total *** 4645 3019 100% -4.27 [-4.65, -3.89]**

Heterogeneity: Tau²=0; Chi²=111.36, df=8(P<0.0001); I²=92.82%
Test for overall effect: Z=22.11(P<0.0001)

Favours treatment 10 5 0 5 10 Favours control

### Analysis 1.15. Comparison 1 Active intervention versus control, Outcome 15 Organisation/protocol driven care (BP Control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H, Fixed, 95% CI</td>
<td></td>
<td>M-H, Fixed, 95% CI</td>
</tr>
<tr>
<td>Dickinson 1981</td>
<td>15/51</td>
<td>3/16</td>
<td>1.81 [0.45, 7.27]</td>
<td>0.15%</td>
<td>1.06 [0.55, 2.04]</td>
</tr>
<tr>
<td>Fletcher 1975</td>
<td>36/74</td>
<td>33/70</td>
<td>0.83%</td>
<td>0.83%</td>
<td></td>
</tr>
</tbody>
</table>

Favours treatment 0.1 0.2 0.5 1 2 5 10 Favours control

---

Interventions used to improve control of blood pressure in patients with hypertension (Review)

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### Study or subgroup

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Weight</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypertension 1979</strong></td>
<td>1925/5485</td>
<td>3077/5455</td>
<td>100%</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
</tr>
<tr>
<td>Sackett 1975</td>
<td>67/87</td>
<td>23/28</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>0.38%</td>
</tr>
<tr>
<td>Takala 1983</td>
<td>49/71</td>
<td>57/69</td>
<td>100%</td>
<td>0.42[0.39,0.45]</td>
<td>0.85%</td>
</tr>
<tr>
<td>Turnbull 2006</td>
<td>126/154</td>
<td>130/185</td>
<td>100%</td>
<td>0.42[0.39,0.45]</td>
<td>1.02%</td>
</tr>
<tr>
<td>Wetzel 2007</td>
<td>49/164</td>
<td>34/89</td>
<td>100%</td>
<td>0.42[0.39,0.45]</td>
<td>1.47%</td>
</tr>
</tbody>
</table>

Total (95% CI) 6086 5912 100% 0.45[0.41,0.48]

Total events: 2267 (Treatment), 3357 (Control)

**Analysis 1.16**. Comparison 1 Active intervention versus control, Outcome 16 Appointment reminder (outcome: lost to follow up at clinic).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Weight</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahluwalia 1996</td>
<td>8/53</td>
<td>6/54</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>2.17%</td>
</tr>
<tr>
<td>Barnett 1983</td>
<td>1/63</td>
<td>28/52</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>12.97%</td>
</tr>
<tr>
<td>Bloom 1979</td>
<td>12/27</td>
<td>20/27</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>4.77%</td>
</tr>
<tr>
<td>Cummings 1985</td>
<td>70/486</td>
<td>129/487</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>47.38%</td>
</tr>
<tr>
<td>Fletcher 1975</td>
<td>12/74</td>
<td>26/70</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>9.62%</td>
</tr>
<tr>
<td>Krieger 1999</td>
<td>51/146</td>
<td>88/165</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>23.09%</td>
</tr>
</tbody>
</table>

Total (95% CI) 849 855 100% 0.41[0.32,0.51]

Total events: 154 (Treatment), 297 (Control)

**Analysis 1.17**. Comparison 1 Active intervention versus control, Outcome 17 Appointment reminder (systolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference Fixed, 95% CI</th>
<th>Weight</th>
<th>Mean Difference Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contreras 2005</td>
<td>172 -22.4 (14.6)</td>
<td>182 -22.1 (11.5)</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>40.51%</td>
</tr>
<tr>
<td>Contreras 2005</td>
<td>184 -31.6 (12.4)</td>
<td>182 -22.1 (11.5)</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>50.97%</td>
</tr>
<tr>
<td>Marquez 2004</td>
<td>34 -19.1 (13.3)</td>
<td>33 -23.8 (11.7)</td>
<td>95.29%</td>
<td>0.42[0.39,0.45]</td>
<td>8.52%</td>
</tr>
</tbody>
</table>

Total *** 390 397 100% -4.56[-6.31,-2.81]

Heterogeneity: Tau²=0.0; Chi²=12.01, df=4(P=0.0001); I²=94.12%

Test for overall effect: Z=5.11(P<0.0001)
## Analysis 1.18. Comparison 1 Active intervention versus control, Outcome 18 Appointment reminder (diastolic blood pressure).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean(SD)</td>
<td>N</td>
<td>Mean(SD)</td>
<td>Fixed, 95% CI</td>
</tr>
<tr>
<td>Contreras 2005</td>
<td>184</td>
<td>-19.8 (32.9)</td>
<td>182</td>
<td>-12.7 (9.6)</td>
<td>+</td>
</tr>
<tr>
<td>Contreras 2005</td>
<td>172</td>
<td>-12.9 (6.6)</td>
<td>182</td>
<td>-12.7 (9.6)</td>
<td>-</td>
</tr>
<tr>
<td>Marquez 2004</td>
<td>34</td>
<td>-10.7 (9.1)</td>
<td>33</td>
<td>-12.3 (6.1)</td>
<td>+</td>
</tr>
<tr>
<td>Total ***</td>
<td>390</td>
<td></td>
<td>397</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau²=0; Chi²=8.17, df=2(P=0.02); I²=75.53%
Test for overall effect: Z=0.7(P=0.48)

---

## Analysis 1.19. Comparison 1 Active intervention versus control, Outcome 19 Appointment reminder (outcome: blood pressure control).

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Treatment</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td>M-H, Fixed, 95% CI</td>
<td></td>
<td>M-H, Fixed, 95% CI</td>
</tr>
<tr>
<td>Contreras 2005</td>
<td>66/180</td>
<td>95/180</td>
<td></td>
<td>47.96%</td>
<td>0.52[0.34,0.79]</td>
</tr>
<tr>
<td>Contreras 2005</td>
<td>62/160</td>
<td>95/180</td>
<td></td>
<td>43.66%</td>
<td>0.57[0.37,0.87]</td>
</tr>
<tr>
<td>Marquez 2004</td>
<td>12/34</td>
<td>16/33</td>
<td></td>
<td>8.38%</td>
<td>0.58[0.22,1.54]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>374</td>
<td>393</td>
<td></td>
<td>100%</td>
<td>0.54[0.41,0.73]</td>
</tr>
</tbody>
</table>

Total events: 140 (Treatment), 206 (Control)
Heterogeneity: Tau²=0; Chi²=0.1, df=2(P=0.95); I²=0%
Test for overall effect: Z=4.14(P<0.0001)

---

## ADDITIONAL TABLES

### Table 1. Quality of included randomized trials

<table>
<thead>
<tr>
<th>Study ID</th>
<th>Randomization</th>
<th>Allocation concealed</th>
<th>Blinding</th>
<th>Losses to follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnahan</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>1/50 (E- 2%) 2/50 (C- 4%) 1/50 (E- 2%) 2/50 (C- 4%) 1/50 (E- 2%) 2/50 (C- 4%)</td>
</tr>
<tr>
<td>Hawkins</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>225/574 (E- 39.2%) 294/574 (C-51.2%)</td>
</tr>
<tr>
<td>Evans</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>Yes- BP check Staff &quot;blind&quot; to</td>
<td>5/107 (E- 5%) 10/91 (C- 11%)</td>
</tr>
<tr>
<td>Hypertension Detection and Follow-up (HDFP)</td>
<td>Randomisation done centrally, stratified by centre (n=14) and entry DBP strata (n=3)</td>
<td>Yes, coordinating centre prepared sealed opaque envelopes. An envelope was drawn sequentially and attached to participant's data form at the time of DBP screening. Envelope opened after baseline.</td>
<td>No - neither participant or clinic blind to randomisation. BP outcome not blinded.</td>
<td>967/5485 (E - 17.6%) 938/5422 (C - 17.2%) status of antihypertensive drug treatment not known at 1 year (includes lost to FU/dead/missing data)</td>
</tr>
</tbody>
</table>

| Jewell | Method not stated | Not stated | No | 15/17 (E - 12% 19/19 (C - 0%) |

| Cummins | "Randomisation list" | Not stated | Yes | 446/486 (E - 8%) 420/487 (C - 14%) |

| Tanner | "Randomly assigned through a table of random numbers" | Not stated | No | 15/15 (E - 0%) 15/15 (C - 0%) |

| Zismer | Not stated | Not stated | No | 26/26 (E - 0%) 13/13 (C - 0%) |

| Watkins | Not stated but stratified by age, sex, practice and last recorded BP | Not stated | Yes | 414/565 (Overall - 27%) |

| Rogers | Randomisation stratified by # prescription medications | Yes - to physicians and clinical research staff but once completed "open" | No | 56/60 (E - 7%) 55/61 (C - 10%) |

| Muhlhauser | Randomisation process for 10 participating practices. 20 patients per practice selected by means of random number chart | Not stated | No | 86/100 (E - 14%) 74/100 (C - 26%) |

| Montgomery | Randomisation by means of random number table by a researcher not involved in study. Practices stratified by computer system used (2 alternative computer systems) | Yes | No | 202/229 (E 1 12%) 199/228 (E 2 - 13%) 130/157 (C - 17%) |

| Takala | Method not stated | Not stated | No | 25/100 (E - 25%) 32/102 (C - 31%) |
| Sackett          | Method not stated | Not stated | Yes     | Factorial RCT  
(1) Convenience  
Augmented 6/114 (E- 5%)  
Normal 4/116 (C- 3%)  
(2) Mastery learning  
Yes 8/115 (E-7)  
No 2/115 (C-2%) |
|-----------------|------------------|-----------|--------|----------------|
| Haynes          | Minimisation, method not stated, patients stratified according to important prognostic factors in previous RCT by Sackett20 | Not stated | Yes    | 0/20 (E- 0%)  
1/19 (C- 5%) |
| Logan           | Method not stated | Not stated | Yes    | Factorial RCT  
(1) Self recording of blood pressure  
(E- 34/36- 6%)  
(2) Home visits  
(C-34/36- 6%) |
| Johnson         | Method not stated | Not stated | Yes    | Free care versus 3 forms of cost-sharing plans.  
Blood pressure outcome:  
Free care (E- 134/294, 46%)  
Cost share (C- |
| Brook           | By means of "random sampling techniques that made the distribution of family characteristics in each as similar as possible" | Not stated | No     | 3 arm RCT  
Follow up at year 1 and 2  
Group 1-  
1 year- 74/99, 25%  
2 year- 55/99, 44%  
Group 2-  
1 year- 41/56, 27%  
2 year- 39%  
Group 3(control)-  
1 year- 47/63, 25%  
2 year- 38/63, 40% |
| Earp            | Method not stated | Not stated | No     | 5/30 (E- 17%)  
5/30 (C- 17%) |
| Martinez-Amenos | Method not stated | Not stated | No     | No details on losses to FU provided |
| McAllister      | Practice cluster stratified by:  
1) partners  
2) Ethnicity randomisation by "shuffled deck of cards" | Not stated | No     | 5/30 (E- 17%)  
5/30 (C- 17%) |
| Bogden          | Randomisation by last digit of social security number:  
Odd # (E)  
Even # (C) | Not stated | Yes    | 1/50 (E- 2%)  
4/50 (C- 8%) |
| Fielding        | Randomisation by means of random numbers table | Not stated | No     | 6/80 (E- 7%)  
8/79 (C- 10%) |
<table>
<thead>
<tr>
<th>Morisky and Levine</th>
<th>Randomisation through &quot;simple random sampling procedures&quot;</th>
<th>Not stated</th>
<th>No</th>
<th>Overall 64/400 (16%) Control of BP (C) 40/50 (20%) 2 yrs 30/50 (40%) 5 yrs (E) all 3 intervention 44/50 (12%) 2 yrs 42/50 (16%) 5 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zarnke</td>
<td>Randomisation by means of computer generated list in blocks of six. Asymmetric allocation scheme (2:1 E:C)</td>
<td>Not stated</td>
<td>No</td>
<td>0/20 (E- 0%) 1/11 (C- 9%)</td>
</tr>
<tr>
<td>Ro- ca-Cusachs</td>
<td>Research nurse &quot;allocated every patient to one of the two groups using a random scale balanced for age and BP&quot;</td>
<td>No</td>
<td>Yes</td>
<td>54/138 (E- 39%) 38/149 (C- 26%)</td>
</tr>
<tr>
<td>Soghikian</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>15/215 (E- 7%) 25/215 (C- 12%)</td>
</tr>
<tr>
<td>Billault</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>82/101 (E- 19%) 85/99 (C- 14%)</td>
</tr>
<tr>
<td>Gullion</td>
<td>Method not stated, physicians stratified according to four criteria: (1) % patients whose DBP controlled. (2) % patients responding to the survey (3) Physician’s ethnic group (4) Specialty</td>
<td>Not stated</td>
<td>Yes</td>
<td>(1) Medical- 27 (2) Behavioural- 28 (3) Both- 30 (4) Neither- 27</td>
</tr>
<tr>
<td>Friedman</td>
<td>Randomized &quot;using a paired randomisation protocol&quot;</td>
<td>Not stated</td>
<td>Yes</td>
<td>23/133 (E- 17%) 11/134 (C- 8%)</td>
</tr>
<tr>
<td>Hetlevik</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>816/984 (E- 17.1%) 1255 (C- 18.5%)</td>
</tr>
<tr>
<td>Krieger</td>
<td>Randomisation based on computer-generated random number table</td>
<td>Sealed opaque envelopes, sequentially numbered. Not clear who allocated individuals to groups</td>
<td>No</td>
<td>146/209 (E- 30.1%) 165/212 (C- 22.2%)</td>
</tr>
<tr>
<td>Dickinson</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>51/51(E feedback- 0%) 78/78 (E education- 0%) 88/88 (E both- 0%) 33/33 (C neither- 0%)</td>
</tr>
<tr>
<td>Barnett</td>
<td>Method not stated but stratified by age and initial DBP (100mmHg or &lt;100mmHg)</td>
<td>Not stated</td>
<td>No</td>
<td>44/63 (E- 30%) 27/52 (C- 48%)</td>
</tr>
<tr>
<td>Bulpitt</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>25/136 (E- 18%) 36/142 (C- 25%)</td>
</tr>
<tr>
<td>Coe</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>Yes</td>
<td>56/56 (E- 0%)</td>
</tr>
</tbody>
</table>
### Table 1. Quality of included randomized trials (Continued)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Method Used</th>
<th>Randomization Details</th>
<th>Follow-up</th>
<th>Group Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robson</td>
<td>Random number tables</td>
<td>Not stated</td>
<td>No</td>
<td>7/1620 (E- 7%) 1586 (C- 7%)</td>
</tr>
<tr>
<td>Bloom</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>Yes</td>
<td>12/27 (E- 44%) 19/27 (C- 74%)</td>
</tr>
<tr>
<td>Fletcher</td>
<td>Patients were &quot;divided by means of a table of random numbers&quot;</td>
<td>Not stated</td>
<td>Uncertain</td>
<td>144/155 (93%) followed up at five months. Group losses to FU not reported</td>
</tr>
<tr>
<td>Bailey</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>Yes</td>
<td>29/30 (E- 3%) 31/32 (C- 3%)</td>
</tr>
<tr>
<td>Webb</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>Yes</td>
<td>37/37 (E1-0%) 31/31 (E2-0%) 55/55 (C-0%)</td>
</tr>
<tr>
<td>Hamilton</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>0/17 (E- 0%) 4/17 (C- 24%)</td>
</tr>
<tr>
<td>Park</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>5/32 (E-16%) 6/32 (C-19%)</td>
</tr>
<tr>
<td>Mehos</td>
<td>Yes &quot;randomized using a deck of cards&quot;</td>
<td>Not stated</td>
<td>No</td>
<td>2/20 (E- 10%) 3/21 (C- 14%)</td>
</tr>
<tr>
<td>Pierce</td>
<td>Yes &quot;minimisation&quot;</td>
<td>Not stated</td>
<td>Yes</td>
<td>59/59 (E health education)-0% 54/57 (E monitor-8.5%)</td>
</tr>
<tr>
<td>Solomon</td>
<td>Yes, random number tables</td>
<td>Not stated</td>
<td>No</td>
<td>63/63 (E- 0%) 70/70 (C- 0%) 63/63 (E- 0%) 70/70 (C- 0%)</td>
</tr>
<tr>
<td>Burelle</td>
<td>Not stated</td>
<td>Not stated</td>
<td>No</td>
<td>8/8 (E-0%) 8/8 (C-0%)</td>
</tr>
<tr>
<td>Ahluwalia</td>
<td>Yes, computer generated random number table</td>
<td>Not stated</td>
<td>No</td>
<td>8/8 (E-0%) 8/8 (C-0%)</td>
</tr>
<tr>
<td>Vetter</td>
<td>Not stated</td>
<td>Not stated</td>
<td>No</td>
<td>296/296 (E-0%) 326/326 (C-0%)</td>
</tr>
<tr>
<td>Bogden</td>
<td>Randomisation by last digit of social security number: Odd # (E) Even # (C)</td>
<td>Not stated</td>
<td>Yes</td>
<td>1/50 (E- 2%) 4/50 (C- 8%)</td>
</tr>
<tr>
<td>Garcia-Pena</td>
<td>Randomisation by computer</td>
<td>Yes</td>
<td>Yes</td>
<td>345/345 (E-0%) 338/338 (C-0%)</td>
</tr>
<tr>
<td>Artinian</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>6/6 (E), 9/9 (C)</td>
</tr>
<tr>
<td>Midanik</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>74/102 (E- 28%) 72/102 (C- 30%)</td>
</tr>
<tr>
<td>New</td>
<td>Method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>99/506 (19.6%) in intervention group compared to 132/508 (26.0%) in control group</td>
</tr>
<tr>
<td>Rudd</td>
<td>Computer-generated assignment</td>
<td>Not stated</td>
<td>Blind outcome assessment</td>
<td>74/74 (E-0%) 74/74 (0%)</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------</td>
<td>------------</td>
<td>-------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Ornstein</td>
<td>&quot;Balanced adaptive randomisation scheme&quot;, 3 practice characteristics were: practice specialty, practice size and geographical location</td>
<td>Not stated</td>
<td>No-open RCT</td>
<td>4446/4446 (E-0%) 3326/3326 (C-0%)</td>
</tr>
<tr>
<td>Mc Manus</td>
<td>Random number generator and opaque envelopes</td>
<td>Yes</td>
<td>No-open RCT</td>
<td>25/214 (E-12%) 14/227(C-6%)</td>
</tr>
<tr>
<td>Baque</td>
<td>Unsure as only have translation of abstract</td>
<td>Unsure as only have translation of abstract</td>
<td>No-open RCT</td>
<td>133/703 (C-19%) 487/622 (E-22%)</td>
</tr>
<tr>
<td>Halme</td>
<td>Block randomisation 2: 3 OR 3: 2 BLOCKS</td>
<td>Not stated</td>
<td>No-open RCT</td>
<td>37/269 (14%)</td>
</tr>
<tr>
<td>Cakir</td>
<td>Centrally via Computer-generated assignment</td>
<td>Yes</td>
<td>Blind outcome assessment</td>
<td>2/32 (E-6%) 8/38 (C-21%)</td>
</tr>
<tr>
<td>Hunt</td>
<td>Computer-generated assignment</td>
<td>Yes</td>
<td>Blind outcome assessment</td>
<td>Not provided</td>
</tr>
<tr>
<td>McKInstry</td>
<td>Computer random generation</td>
<td>Yes</td>
<td>Blind outcome assessment</td>
<td>17/148 (E-11%) 16/146 (C-11%)</td>
</tr>
<tr>
<td>Hennesey</td>
<td>Comercially available spreadsheet programme</td>
<td>Not stated</td>
<td>Blind participant</td>
<td>1784/5401(E-33%) 1753/5295(C-33%)</td>
</tr>
<tr>
<td>Sookanek-nun</td>
<td>Simple randomisation technique?</td>
<td>Not stated</td>
<td>Blind participant</td>
<td>5/118 (E-4%) 3/117 (C-3%)</td>
</tr>
<tr>
<td>De Castro</td>
<td>Stratified by gender though a computer generated sequence.</td>
<td>Not stated</td>
<td>Double-blind randomized clinical trial</td>
<td>4/34 (E-12%) 3/37 (C-8%)</td>
</tr>
<tr>
<td>Tonstad</td>
<td>Presealed numbered consecutive envelopes with a 3:2 ratio for assignment to intervention or control groups</td>
<td>Opaque envelopes</td>
<td>No</td>
<td>2/31 (E-7%) 2/20 (C-10%)</td>
</tr>
<tr>
<td>Schroeder</td>
<td>Stratified by age and sex using computer generated numbers</td>
<td>Yes</td>
<td>No-open RCT</td>
<td>18/128 (E-14%) 23/117 (C-20%)</td>
</tr>
<tr>
<td>Wetzels</td>
<td>Computer generated centrally by Trial Coordinating Centre</td>
<td>Yes</td>
<td>Blind treatment providers</td>
<td>4/168 (E-2%) 1/90 (C-1%)</td>
</tr>
</tbody>
</table>
### Table 1. Quality of included randomized trials (Continued)

<table>
<thead>
<tr>
<th>Author</th>
<th>Recruitment Methodology</th>
<th>Blinding</th>
<th>Allocation</th>
<th>Total (E)</th>
<th>Total (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnbull</td>
<td>Remote computer generated</td>
<td>Yes</td>
<td>No</td>
<td>9/170 (E-5%)</td>
<td>8/201 (C-4%)</td>
</tr>
<tr>
<td>Marquez</td>
<td>Done centrally by two investigators who were not field investigators but method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>18/52 (E-35%)</td>
<td>19/52 (C-36%)</td>
</tr>
<tr>
<td>Contreras</td>
<td>Done centrally by two investigators who were not field investigators but method not stated</td>
<td>Not stated</td>
<td>No</td>
<td>98/636 (total-15%)</td>
<td>No breakdown</td>
</tr>
<tr>
<td>Tobe</td>
<td>Opaque sealed envelopes using permuted block design</td>
<td>No</td>
<td>No</td>
<td>2/50 (E-4%)</td>
<td>2/49 (C-4%)</td>
</tr>
</tbody>
</table>

### APPENDICES

**Appendix 1. CENTRAL search strategy**

#1 MeSH descriptor HYPERTENSION explode all trees 11049

#2 blood next pressure in Record Title 4480

#3 hypertens* in Record Title 12324

#4 (#1 or #2 or #3) 18179

#5 MeSH descriptor PHYSICIANS explode all trees 723

#6 MeSH descriptor PATIENT CARE MANAGEMENT explode all trees 9866

#7 MeSH descriptor PATIENT CARE PLANNING explode all trees 1066

#8 MeSH descriptor PATIENT CARE TEAM explode all trees 974

#9 MeSH descriptor PATIENT EDUCATION explode all trees 3728

#10 MeSH descriptor PATIENT PARTICIPATION explode all trees 488

#11 MeSH descriptor AMBULATORY CARE INFORMATION SYSTEMS explode all trees 22

#12 MeSH descriptor FEEDBACK explode all trees 705

#13 MeSH descriptor INFORMATION SYSTEMS explode all trees 1557

#14 MeSH descriptor MANAGEMENT INFORMATION SYSTEMS explode all trees 422

#15 MeSH descriptor Decision Support Systems, Clinical this term only 134

#16 MeSH descriptor Decision Making, Computer-Assisted this term only 110

#17 MeSH descriptor REMINDER SYSTEMS explode all trees 330

#18 MeSH descriptor GUIDELINES explode all trees 1337

#19 MeSH descriptor MEDICAL AUDIT explode all trees 244

#20 MeSH descriptor MEDICAL RECORDS explode all trees 1404

#21 MeSH descriptor Medical Records Systems, Computerized explode all trees 174
Interventions used to improve control of blood pressure in patients with hypertension (Review)

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Appendix 2. MEDLINE search strategy

1. exp Hypertension/ (167533)
2. (blood adj pressure).ti. (33263)
3. hypertens$.ti. (120524)
4. or/1-3 (208545)
5. exp physicians/ (62183)
6. exp Patient Care Management/ (351254)
7. exp Patient Care Planning/ (40740)
8. exp Patient Care Team/ (40160)
9. exp Patient Education/ (50057)
10. exp Patient Participation/ (11975)
11. exp Ambulatory Care Information Systems/ (1034)
12. exp Feedback/ (21503)
13. exp Information Systems/ (98899)
14. exp Management Information Systems/ (27680)
15. exp Decision Support Systems, Clinical/ (2297)
16. exp Decision Making, Computer-Assisted/ (46651)
17. exp Reminder Systems/ (1144)
18. exp Practice Guidelines/ (42659)
19. exp Guidelines as topic/ (64954)
20. exp Medical Audit/ (10918)
21. exp Medical Records/ (56232)
22. exp Medical Records Systems, Computerized/ (13174)
23. exp Primary Health Care/ (49856)
24. exp Physicians, Family/ (11443)
25. exp Primary Nursing Care/ (1868)
Interventions used to improve control of blood pressure in patients with hypertension (Review)

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Appendix 3. EMBASE search strategy

1. exp hypertension/ (224295)
2. blood pressure.ti. (26788)
3. hypertens$.ti. (86298)
4. or/1-3 (241489)
5. patient referral/ (24316)
6. patient education/ (24921)
7. information system/ (10983)
8. feedback system/ (19306)
9. exp practice guideline/ (132101)
10. medical audit/ (11229)
11. exp primary health care/ (38904)
12. general practitioner/ (28102)
13. nurse practitioner/ (1862)
14. nurse/ (14123)
15. health behavior/ (14365)
16. treatment planning/ (64890)
17. patient counseling/ (18957)
18. behavior therapy/ (19880)
19. motivation/ (16574)
20. self monitoring/ (1519)
21. self care/ (5850)
22. occupational health nursing/ (1062)
23. ((patient$ or program$) adj3 (educat$ or manage$ or train$ or teach$)).tw. (97871)
24. ((manage$ or monitor$) adj3 (hypertension or blood pressure)).tw. (9279)
WHAT'S NEW

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 February 2010</td>
<td>New search has been performed</td>
<td>Substantive update completed</td>
</tr>
<tr>
<td>17 February 2010</td>
<td>New citation required and conclusions have changed</td>
<td>New citation with change in authors. New data demonstrate that self-monitoring is associated with moderate net reduction in systolic and diastolic blood pressure.</td>
</tr>
</tbody>
</table>

HISTORY

Protocol first published: Issue 2, 2002
Review first published: Issue 1, 2005
### CONTRIBUTIONS OF AUTHORS

All authors contributed to the design, article review, data extraction, analysis and write up of the review.

### DECLARATIONS OF INTEREST

None declared.

### SOURCES OF SUPPORT

**Internal sources**
- No sources of support supplied

**External sources**
- NHS R&D Primary Care Career Scientist Award, UK.
- Medical Research Council Health Services Research Training Fellowship Scheme, UK.
- Health Research Board, Cochrane Fellowship Scheme, Ireland.

### INDEX TERMS

**Medical Subject Headings (MeSH)**
*Blood Pressure [drug effects]; Antihypertensive Agents [*therapeutic use]; Blood Pressure Monitoring, Ambulatory; Education, Medical, Continuing; Hypertension [drug therapy] [*therapy]; Patient Education as Topic; Randomized Controlled Trials as Topic; Self Care

**MeSH check words**
Humans