Effectiveness of nurse-led interventions versus usual care to manage hypertension and lifestyle behaviour: a systematic review and meta-analysis

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Received 19 December 2022; revised 26 April 2023; accepted 27 April 2023; published 3 May 2023

Aims

This review aimed to investigate the effectiveness of nurse-led interventions vs. usual care on hypertension management, lifestyle behaviour, and patients’ knowledge of hypertension and associated risk factors.

Methods

A systematic review with meta-analysis was conducted following Joanna Briggs Institute (JBI) guidelines. MEDLINE (Ovid), EmCare (Ovid), CINAHL (EBSCO), Cochrane library, and ProQuest (Ovid) were searched from inception to 15 February 2022. Randomized controlled trials (RCTs) examining the effect of nurse-led interventions on hypertension management were identified. Title and abstract, full text screening, assessment of methodological quality, and data extraction were conducted by two independent reviewers using JBI tools. A statistical meta-analysis was conducted using STATA version 17.0.

Results

A total of 37 RCTs and 9731 participants were included. The overall pooled data demonstrated that nurse-led interventions may reduce systolic blood pressure (mean difference −4.66; 95% CI −6.69, −2.64; I² = 83.32; 31 RCTs; low certainty evidence) and diastolic blood pressure (mean difference −1.91; 95% CI −3.06, −0.76; I² = 79.35; 29 RCTs; low certainty evidence) compared with usual care. The duration of interventions contributed to the magnitude of blood pressure reduction. Nurse-led interventions had a positive impact on lifestyle behaviour and effectively modified diet and physical activity, but the effect on smoking and alcohol consumption was inconsistent.

Conclusion

This review revealed the beneficial effects of nurse-led interventions in hypertension management compared with usual care. Integration of nurse-led interventions in routine hypertension treatment and prevention services could play an important role in alleviating the rising global burden of hypertension.

Registration

PROSPERO: CRD42021274900

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Introduction

Hypertension is a serious medical condition that significantly increases the risk of cardiovascular disease (CVD). It is commonly defined as systolic blood pressure (SBP) and diastolic blood pressure (DBP) ≥ 140/90 mm Hg and is the leading risk factor for global mortality. An estimated 1.39 billion people were estimated to have hypertension, and fewer than one in five people have the condition under control. Modifiable lifestyle behaviours such as smoking, harmful use of alcohol, and unhealthy diet play a crucial role in contributing to the burden of hypertension and heart disease. Policies and effective interventions aimed at promoting healthy behaviour are essential to reduce the growing burden of hypertension.

Effective hypertension management combines pharmacotherapy and lifestyle management. In addition, increasing patient knowledge of hypertension and its associated risk factors is an important preventive strategy; it supports the modification of lifestyle behaviours, empowers self-care, and, therefore, reduces cardiovascular risk, eventually enhancing secondary prevention of CVDs. Education and counselling interventions aimed at optimizing patient knowledge can improve patient clinical outcomes and prevent complications. Despite the crucial role of counselling and education, patient care often limits its focus to clinical management and pharmacotherapy; it does not always include a comprehensive care approach, which can affect patient health outcomes.

Emerging nurse-led models of care, coordinated primarily by registered nurses, advanced practice nurses, and/or nurse practitioners, are facilitating the implementation of nurse-led clinics that involve patients and their families/carers in managing their health conditions. As expected, nurse-led clinics have nurses as primary caregivers who work collaboratively with other members of a multidisciplinary team (e.g., physicians, social workers, and allied health). Another form of nurse-led care refers to the ‘substitution’ of care from a physician to a nurse; this is a growing trend towards ‘task-shifting’—meaning that some of the tasks previously undertaken by physicians are now moved to nurses acting either as a delegate (i.e., under the supervision of a physician) or independently (substitution). Traditional physician-led services are usually focused on the medical management of hypertension. However, as part of a holistic approach, counselling and education interventions are considered an essential supplement to medical management and nurses may be well placed in supporting patients to attain healthy lifestyle behaviours to optimize blood pressure management. Randomized controlled trials (RCTs) have revealed conflicting evidence on the effectiveness of nurse-led interventions on blood pressure management and lifestyle behaviour modification.

Keywords
Nurse led • nurse managed • nurse • hypertension • lifestyle behaviour
A preliminary search was conducted, and two systematic reviews were identified in this area. A recent review by Stephen et al., 2022 was limited to interventions by nurses working only in primary care settings, and it did not address the effect of nurse-led interventions on patients’ knowledge of hypertension. Another earlier review was published in 2010 and did not comprehensively address the effective-ness of nurse-led interventions on lifestyle behaviour modification or patients’ knowledge of hypertension. Therefore, this systematic review aimed to comprehensively synthesize evidence on the effective-ness of nurse-led interventions on BP management, lifestyle behaviour modification, and patients’ knowledge of hypertension and associated risk factors by reviewing up-to-date RCTs to inform policy and clinical practice guidelines.

Methods

A systematic review was conducted according to a priori PROSPERO–registered protocol (CRD42021274900)37 and in accordance with JBI methodology for effectiveness reviews. The reporting of this review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The protocol defined the population, intervention, comparator and outcome (PICO) of the review. Eligible participants were patients with diagnosed hypertension, the intervention was nurse-led care, the compara-tor was usual care/physician-led care, and the outcomes of the review included SBP and DBP, health behaviour modification, and knowledge of hypertension and associated risk factors.

Study selection

Inclusion criteria were developed from the PICO question. We considered RCT studies that included patients with primary or essential hypertension who were recruited from primary care, secondary or tertiary health care facilities, aged 18 years and over, and who received nurse-led interventions compared with usual care. We excluded studies where nurses either supple-mented the work of physicians, where it was not clear that the interven-tion was nurse led, and where the effect of the intervention between the nurse and the physician could not be distinguished.

Nurse-led interventions were those in which a nurse was the coordin-ator of patient care delivery, or the nurse worked autonomously and/or in collaboration with the physician and the patient in determining appropri-ate patient care. These may be described as nurse-led clinics, nurse prac-titioner clinics, structured educational and counselling services, and technology-based nurse interventions including mobile health, telehealth, and smartphone applications. We included studies of nurse–physician sub-stitution, the transfer of task(s) or role(s) formerly performed by a physician to a nurse, who may practice autonomously, or according to a protocol, or under supervision of specialist medical staff. Nurse-led care may also com-prise specialized nurses leading multi-disciplinary teams and conducting evaluation of healthcare needs, counselling, education, empowerment, treatment, and case management. The intervention could be delivered in hospital outpatient departments, at primary care settings, at home or in the community, and through face-to-face or telehealth consultation.

We considered studies that primarily reported on BP as a clinical out-come measured either as a continuous outcome (in mm Hg) or as a dichot-omous outcome (controlled blood pressure defined as systolic and diastolic BP < 140/90 mm Hg). Secondary outcomes were health behaviour modi-fication, reported as smoking cessation, alcohol moderation or abstinence, eating a healthy diet (e.g. consuming adequate servings of fruit and vegeta-bles per day or salt reduction), physical activity (measured self-reported duration of physical activity), and knowledge of hypertension and associated risk factors (measured either as continuous or categorical outcome).

Data search and sources

The databases searched were MEDLINE (Ovid), EmCare (Ovid), CINAHL (EBSCO), Cochrane Library, and ProQuest (Ovid). Randomized control trials published from inception to 15 February 2022 were included. Studies published in any language were considered for inclusion. An initial limited search of CINAHL was conducted, and the identified articles were then used to develop a full search strategy for CINAHL (see Supplementary material online, Appendix S1). This search strategy was adapted for each included database. The reference lists of all studies selected for critical appraisal were further screened for additional studies.

Study selection

The citations of all captured studies were uploaded into Endnote version 20.0 (Clarivate Analytics, PA, USA), and duplicates were removed. The title and abstracts of studies were screened against the study inclusion criteria by two independent reviewers. The full text of studies of interest was re-tried, and the citation was imported into JBI SUMARI. Studies were screened for congruence with the inclusion criteria by two reviewers working independently (LB, SN, AP, JR, SC, HD, TS, VP, KN, and LG). Where re-quired, authors were contacted by email for clarification. All suitable studies underwent data extraction and synthesis, and reasons for exclusion were reported. Any disagreements related to inclusion or exclusion of studies at any stage of the review were resolved through discussion. Methods and results of the search, the study selection and inclusion process, and the results of the critical appraisal were reported.

Methodological quality

Eligible studies were critically appraised by two independent reviewers for methodological quality using standardized critical appraisal instruments from JBI for RCT studies. The results of the critical appraisal were presented in table and narratively.

Data synthesis and analysis

Data were extracted from each study by two independent reviewers using JBI SUMARI. Any disagreements that arose between the reviewers were re-solved through discussion. A statistical meta-analysis was conducted using RevMan version 5.4.1 and random effect. Effect sizes were expressed as weighted final post-intervention mean differences (MD) with their 95% confidence intervals. Heterogeneity was assessed statistically using the standard I² test. Where there was high heterogeneity, sensitivity analysis was done. Subgroups were analysed for studies reporting SBP and DBP at different times. Where statistical pooling of outcomes was not possible, data were described narratively and in tables, where appropriate.

A funnel plot was generated using STATA version 17.0 as there were more than ten studies included in the meta-analysis. Harbord test was per-formed to test funnel plot asymmetry.

Assessing certainty in the findings

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) method was used for assessment of certainty of the study findings. Summary of findings tables were generated using GRADEpro GDT software (McMaster University, ON, Canada) and pre-sented for the study outcomes of SBP and DBP.

Results

Search result

A search of six databases yielded 1493 articles. After removing duplica-ties using Endnote and manually, 914 articles were uploaded to JBI SUMARI for the title and abstract screening. Only randomized control trial studies were included in this review. After excluding irrelevant ar-ticles, full-text articles were retrieved and screened by two independ-ent reviewers; this resulted in 35 articles that met the eligibility criteria. An additional 12 studies were identified by screening the in-cluded studies’ reference lists. Two of these fulfilled the eligibility cri-teria. In total, 37 articles met the eligibility criteria for this review. Figure 1 details the selection process and reasons for exclusion.

Assessment of methodological quality

All the reviewed studies measured outcomes in the same way for the treatment and control groups and used appropriate statistical analysis. Among the included studies, 94.6% analysed participants in the groups...
to which they were randomized, 83.8% used true randomization, and in 81.1% of studies, the treatment groups were similar at baseline. The study participants were blinded in only 13.5%, 16.2% blinded those delivering treatment, and in 30% of the studies, allocation to treatment groups was concealed (see Supplementary material online, Table S1).

**Characteristics of the included studies**

The 37 included studies were published between 2001 and 2021. Fourteen studies (38%) were conducted in the United States of America (US), 10 (27%) in Europe, 7 (19%) in Asia, 5 (13.5%) in the United Kingdom, and 1 from Africa. Twenty-nine studies (78%) were published since 2010, and seven studies (19%) were published since 2020. The number of study participants ranged from 26 to 829, and overall, 9731 participants were enrolled in the studies. More than half (56%) of the studies were single site, and the majority (76%) was based in primary healthcare facilities. The details of the characteristics of the included studies and outcomes reported are summarized in Supplementary material online, Table S2.

Defining hypertension as a SBP of ≥140 and/or DBP of ≥90 mm Hg was most common; however, two studies defined hypertension in the absence of co-morbidities as SBP ≥150 and/or DBP ≥ 90 mm Hg.22,23 The current use of antihypertensive medication or therapy was specified in six studies, while one study stipulated those participants needed to be ex-cluded people on other treatments. The intervention was delivered face to face, in seven studies, telephone calls, and the shortest was 2 months. Twenty studies measured final outcomes at 6 months or less, 16 studies reported at 12 months or longer, and 1 study reported at 9 months. All the included studies reported on SBP and DBP, except three studies which reported only on SBP. Of the 37 studies included, 31 studies specified those interventions included in the meta-analysis. One study reported the percentage of patients who achieved blood pressure control.39

**Primary outcomes**

**Effect on systolic blood pressure**

Based on pooled data, at 6 months or less, nurse-led care may reduce SBP compared with usual care (MD −6.48; 95% CI −9.32, −3.64; P < 0.001; I² = 84.56; 20 RCTs; low certainty evidence, random effects) (Figure 2-A). At 12 months, nurse-led intervention makes little or no difference on SBP (MD −1.58; 95% CI −3.17, 0.01; P = 0.12; I² = 36.03; 11 RCTs; moderate certainty evidence) (Figure 2-B). Overall data demonstrated that nurse-led interventions may reduce SBP (MD −4.66; 95% CI −6.69, −2.64; P = 0.00; I² = 83.32; 31 RCTs; low certainty evidence) compared with usual care. The nurse-led interventions may reduce SBP...
by \(\sim 5\) mm Hg than the usual care programs. The overall heterogeneity statistics \(I^2 = 83.32\%\), means 83% of the variability in the effect size estimates is due to between-study differences. A sensitivity analysis has been conducted by excluding two studies, Artinin 2001 and Hacihasanoglu 2011, which were considered as potential outliers. The overall heterogeneity has reduced to 68% after exclusion. The overall effect size has narrowed down to \(-3.78\) (95% CI: \(-5.41, -2.15\)). There were no small study effects or publication bias (\(P = 0.25\)) for overall results, at 6 months (\(P = 0.56\)) and 12 months (\(P = 0.64\)); then, there was no significant small study effect or publication bias.

**Figure 2** Effect of nurse-led intervention on systolic blood pressure at 6 or less months, 12 months, and overall.
Effect on diastolic blood pressure
At 6 months, nurse-led care may reduce DBP compared with usual care (MD $-2.88; 95\% CI -4.34, -1.43; P = 0.00; I^2 = 77.71; 20 RCTs; low certainty evidence, random effect) (Figure 4-A). At 12 months, nurse-led intervention probably makes little or no difference in terms of reducing DBP (MD $-0.10; 95\% CI -1.14, 0.95; P = 0.10; I^2 = 36.93; 9 RCTs; moderate certainty evidence) compared with usual care (Figure 4-B). Based on overall pooled nurse-led interventions may reduce DBP (MD $-1.91; 95\% CI -3.06, -0.76; P = 0.00; I^2 = 36.93; 29 RCTs; low certainty evidence) compared with usual care, (Figure 4-C). After excluding Artinian 2001 and Hacihasanoglu 2011 studies from analysis, the overall heterogeneity has reduced to 68%. The overall effect size has narrowed down to $-1.47 (95\% CI: -2.43, -0.51). The overall heterogeneity statistics $I^2 = 36.93\%$, means 37% of the variability in the effect size estimates is because of the between-study differences, which was mainly due to studies reported at 6 months ($I^2 = 77\%$, $P = 0.00$). There were no small study effects or publication bias ($P = 0.40$) for overall results, at 6 months ($P = 0.58$) and 12 months ($P = 0.59$); then, there was no significant small study effect or publication bias (Figure 5).

Dietary risk behaviours
Eleven studies reported outcomes related to diet, with all these studies using self-reported questionnaires for data collection. Six studies reported that nurse-led intervention programs improved dietary outcomes such as salt intake. Cicolini et al., 2013$^{30}$ found that fruit intake significantly increased among those who received nurse-led intervention at 6 months of intervention; however, salt consumption did not significantly change. Towfighi et al., 2021$^{41}$ reported that the intervention group had greater improvements in salt intake (difference, 15.4 [95\% CI, 4.4 to 26.0]; $P = 0.004$). In Chiu and Wong, 2010$^{30}$, the control group achieved significantly improved scores in diet ($Z = -2.71, P = 0.007$) but no significant difference when comparing between groups.

Secondary outcomes
Where reported, the studies used different reporting and outcome measures for the secondary outcomes, thus meta-analysis was not possible and the findings are presented narratively.

Smoking status
Eleven studies investigated the smoking status$^{22,29,33,41,42,46,50,54,57}$ Eligible studies utilized a variety of methods to evaluate the smoking status, including the percentage of smokers, MD, and interquartile range. Two studies demonstrated a reduction in the percentage of smokers following nurse-led hypertension management$^{33,54}$ At 6 months, Cicolini et al., 2013$^{50}$ reported a significant reduction in the average number of cigarettes smoked in the intervention group from 11.1 (SD 10.6) to 5.5 (SD 5.4). In contrast, the other studies did not demonstrate a significant reduction in smoking in people receiving nurse-led interventions.$^{22,29,30,40,42,57}$

Alcohol consumption
Eight studies investigated the change in alcohol consumption.$^{30,40,42,46,50,54,57}$ At 6 months, Cicolini et al., 2013$^{30}$ found a significant reduction in the average units of daily alcohol consumption in the intervention group from 1.74 (SD 1.5) to 0.68 (SD 0.9). Similarly, Kabayama et al., 2021$^{59}$ also reported significantly lower weekly alcohol consumption in the intervention group than in the control group (256 ± 206 g/w vs. 413 ± 260 g/w, respectively, $P = 0.02$). Interestingly, at 12 months, Kastarin et al., 2022$^{57}$ reported a significantly greater net reduction in alcohol consumption in the intervention group. However, the difference between the intervention and control groups disappeared at 2 years. Other studies did not observe a significant reduction in alcohol consumption in people receiving nurse-led interventions.
Nurse-led interventions in hypertension and lifestyle behaviour

Measures included the level and/or duration of activity, frequency and duration of follow-up varied. All studies utilized self-measures of physical activity and at least one stage of their follow-up. Measures of physical activity and of the 37 studies included, 11 collected outcomes of physical activity in both groups, with no significant difference between groups.

Outcomes: systolic and diastolic blood pressure

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>No. of participants (studies)</th>
<th>Certainty of the evidence (GRADE)</th>
<th>Relative effect (95% CI)</th>
<th>Anticipated absolute effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall SBP assessed with: mm Hg follow-up: range 2 months to 12 months</td>
<td>6202 (30 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean overall SBP was 142.4 mm Hg lower (6.6 lower to 2.4 lower)</td>
</tr>
<tr>
<td>Overall DBP assessed with: mm Hg follow-up: range 2 months to 12 months</td>
<td>5318 (29 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean overall DBP was 79.8 mm Hg lower (3.0 lower to 0.7 lower)</td>
</tr>
<tr>
<td>SBP at 6 months or less assessed with: mm Hg follow-up: range 2 months to 6 months</td>
<td>2466 (20 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean SBP at 6 months or less was 143.9 mm Hg lower (9.3 lower to 3.6 lower)</td>
</tr>
<tr>
<td>DBP at 6 months or less assessed with: mm Hg follow-up: range 2 months to 6 months</td>
<td>2466 (20 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean DBP at 6 months or less was 78.9 mm Hg lower (4.3 lower to 1.4 lower)</td>
</tr>
<tr>
<td>SBP at 12 months assessed with: mm Hg</td>
<td>3736 (11 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean SBP at 12 months was 140 mm Hg lower (3.1 lower to 0.01 higher)</td>
</tr>
<tr>
<td>DBP at 12 months assessed with: mm Hg</td>
<td>2852 (9 RCTs)</td>
<td>⊗⊗⊗⊗</td>
<td>—</td>
<td>The mean DBP at 12 months was 80.4 mm Hg higher (1.1 higher to 0.9 higher)</td>
</tr>
<tr>
<td>Physical activity assessed with: Narrative</td>
<td>3736 (11 RCTs)</td>
<td>—</td>
<td>—</td>
<td>Nurse-led interventions improved level of physical activity</td>
</tr>
</tbody>
</table>

*The risk in the intervention group (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). CI confidence interval; MD: mean difference.
GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect.

Five studies reported significant increases in physical activity at final follow-up,30,36,44,50,57 Cicolini et al., 2014,50 reported a significant between-group increase in mean minutes of daily physical activity at 6 months. Kolcu et al., 2020,36 also found rates of regular exercise increased between baseline and the 6-month post-test for the intervention group, at a significantly higher level than the control group ($\chi^2 = 13.691, P < 0.001$). In Zhu et al., 2018,30 a significant increase in scores for adherence to activity recommendations was observed in both the intervention group ($\chi^2 = 30.43, P < 0.001$) and control group ($\chi^2 = 12.68, P = 0.031$) at 16th-week follow-up.

The two studies with the longest follow-up periods for activity reported sustained improvements in activity in the intervention group at the end of the follow-up period. Chiu et al., 2010,44 followed patients for 1 year. The odds of maintaining moderate physical activity levels for 12 months were estimated to be OR 1.67 (95% CI 1.23 to 2.26, P = 0.001) for members of the intervention group. For patients in the Kastarin et al., 2002,37 study, the self-reported activity of the intervention group had significantly increased at 2-year follow-up in comparison with the control group (difference in change 11.3, 95% CI 1.8 to 20.8).
Knowledge of hypertension and associated risk factors

Four studies measured the effect of nurse-led interventions on the knowledge of hypertension. Most of the studies used questionnaires developed by the research team to evaluate the knowledge of hypertension. In contrast, Still et al., 2020, used the Hypertension Knowledge-Level Scale (HK-LS). Two studies reported no significant difference in hypertension knowledge between the intervention and control groups after intervention. At 24 weeks, Kolcu et al., 2020, found a significantly higher hypertension knowledge score (mean ± SD) in the intervention group than that in the control group (20.75 ± 1.01 vs. 12.21 ± 2.48, respectively, \( P < 0.001 \)). Similarly, Shelli et al., 2019, found significant improvement in hypertension knowledge among those who received the nurse-led intervention compared with usual care (F (1122) = 1.91, \( P < 0.001 \)). None of the interventions reported a significant difference in blood pressure at 6 or less months, 12 months, and overall.

![Figure 4](https://academic.oup.com/eurjcn/advance-article/doi/10.1093/eurjcn/zvad040/7148296) Effect of nurse-led intervention on diastolic blood pressure at 6 or less months, 12 months, and overall.
the studies reported outcomes related to knowledge of hypertension risk factors.

Discussion

This review comprehensively synthesized evidence from 37 RCT studies and demonstrated that nurse-led interventions were more effective in reducing SBP and DBP compared with usual care. However, the effect on lifestyle behaviour modification and knowledge of hypertension was either inconsistently reported or not reported by the included studies.

The range of nurse-led interventions is evolving and demonstrated to be effective in improving patient outcomes, particularly in chronic cardiovascular conditions such as hypertension. The development of complex interventions has to be underpinned by a systematic theory. Theory provides a framework guiding the selection of intervention components from a huge array of what might work, and it helps to identify appropriate outcomes for measuring the effects of the intervention. Complex interventions are commonly used in the health and social care services, public health practice, and other areas of social and economic policy that have consequences for health. The interventions delivered by the included studies were delivered using multiple methods, in different contexts and settings, by personnel with different levels of experiences, over different periods of time at different frequencies of intervention and among populations with different socio-cultural backgrounds. The studies underpinned the development of interventions with different theoretical frameworks and models, including the Health Belief Model, the 5A framework, Ryan and Swain’s Individual and Family Self-Management Theory, the 4C (comprehensiveness, collaboration, coordination, and continuity) framework, and nurse-led hypertension management model developed from the chronic care model and 4C model.

The most prominent nurse-led interventions evaluated and found to be effective were education and counselling interventions delivered face to face or remotely via telehealth, and nurse prescription interventions. Education and counselling to support and empower self-management and lifestyle modification play an important role in hypertension management and reducing life-threatening complications.

The interventions included in this review were delivered through home visit, at clinical and community levels. Evidence showed that nurse-led interventions positively affect clinical outcomes for patients with chronic conditions. The development of complex interventions through policy and clinical guidelines may contribute to improving hypertension treatment outcomes.

Blood pressure lowering through interventions reduces the risk of major cardiovascular events such as stroke, coronary heart disease, and heart failure. A study reported that a 5 mm Hg reduction of SBP reduced the risk of major CVD events by 10%. Another meta-analysis demonstrated that a 10 mm Hg reduction of SBP reduced the risk of major CVD events by 20%, coronary heart disease by 17%, stroke by 27%, heart failure by 28%, and death from all causes by 13%. Our review evidence demonstrated that nurse-led interventions reduce blood pressure, and this has important clinical significance in terms of preventing major hypertension-related complications such as hypertensive heart disease and improving clinical outcomes for patients.

Lifestyle behaviour modification plays an essential role in the management of hypertension. Education and counselling interventions and strategies to achieve lifestyle behaviour modification are vital components of nurse-led interventions. Nurse-led interventions showed much promise to modify lifestyle behaviours; the findings of this study also showed that nurse-led interventions modify dietary behaviours, as part of lifestyle modification. Studies which measured a variety of dietary outcomes and reported that nurse-led interventions increased fruit intake, improved diet score, dietary habits, and reduced salt or sodium intake compared with usual care were included in our review. The finding that nurse-led interventions improved physical activity stands with prior finding which investigated the beneficial effect of nurse–physician substitution. However, the findings of this study were inconsistent and heterogeneous in terms of measuring and reporting the effect of nurse-led interventions.
intervention on smoking and alcohol. Only a few studies reported that nurse-led interventions changed the smoking behaviour; however, other studies did not confirm this. Similarly, limited studies reported a significantly lower alcohol consumption among nurse-led interventions compared with usual care, supported by another systematic review.

Improving patient’s understanding of their health condition and related health behaviour was associated with improved adherence to recommended lifestyle modification. So, interventions aimed at improving health literacy through education and counselling program are essential to promote health behaviour change and further improve clinical outcomes. Two studies reported that nurse-led interventions significantly improved the knowledge of hypertension, however, none of the studies investigated the knowledge of hypertension risk factors, and this needs further investigation.

The WHO 2021 report indicated that hypertension is a major cause of premature death worldwide, and only one in five adults have it under control. One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030. Involving nurses in hypertension management and implementing existing evidence of nurse-led interventions and implementation strategies at both community and clinical levels can significantly contribute to primary and secondary prevention of CVD, contributing to achieving the global target to reduce the burden, particularly the rising prevalence of hypertension.

The study was not without limitation. Due to the heterogeneity of measurements and inconsistency of reporting, meta-analysis for effect on health behaviour outcomes was not conducted. There might be recall bias and social desirability bias introduced as most of the studies assessed health behaviour outcomes by self-report. Most of the included studies had not blinded participants and personnel, and this might have introduced performance and observer bias. The effects of a complex intervention might often be highly dependent on context. Most of the studies were conducted in developed countries, which raises concerns whether these results would be generalizable to other settings, for example those with limited access to or availability of resources. The studies were conducted across a very long period, and this might have mixed up the effect of the interventions delivered with changes that could have happened in health services over time, making it difficult to ascertain which component of the intervention is responsible for the effect. Although more than half of the included studies were pooled in the meta-analysis of effect on blood pressure, we were not able to include the remaining studies due to the lack of consistency of reporting data suitable for meta-analysis.

Conclusions

Nurse-led interventions are emerging and have been found to be effective in hypertension management. This review identified a variety of nurse-led intervention approaches. Overall, nurse-led interventions were found to be superior in terms of effectiveness in the management of hypertension as compared with usual care. The magnitude of reduction in SBP was decreased from 6 or less months of follow up duration to 12 months and longer, and it disappeared for DBP. Nurse-led interventions improved diet and physical activity; however, the effect on smoking and alcohol consumption was inconsistent across studies. The effect on patients’ knowledge of hypertension and associated risk factors needs further investigation as the evidence is limited. Integration of nurse-led interventions in routine care can significantly optimize hypertension management and contribute to primary and secondary prevention of CVD.

Supplementary material

Supplementary material is available at European Journal of Cardiovascular Nursing online.

Acknowledgements

We are grateful to Flinders University librarian, Shannon Brown, for her support with developing the search strategy.

Author contributions

L.N.B., contributed to the conceptualization, methodology, data cur- ration, data analysis, writing of the original draft, and project administra- tion. J.R., S.N., A.B., V.P., T.S., and S.C. contributed to the methodology, data curation, data analysis, and writing of the original draft. A.B., H.A.D., L.G.G., R.A.C., K.N., and S.H. contributed to the methodology and critical revision of the manuscript. A.G. contributed to the analysis and interpretation of the findings. J.M.H. contributed to the conceptualization, methodology, critical revision of the manuscript, and supervision.

Funding

Flinders University, Caring Futures Institute (Cardiac Focus Area Research Grant, 2021), covered the cost of JBI comprehensive systematic review training for the reviewers.

Conflict of interest: None declared.

Data availability

The data underlying this article are available in the article, Supplementary material online, Table S2.

References


