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Effectiveness of educational interventions on hypertensive patients' self-management behaviours: an umbrella review protocol

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Keywords:	Hypertension < CARDIOLOGY, Systematic Review, Blood Pressure, EPIDEMIOLOGY, GENERAL MEDICINE (see Internal Medicine), Health Education

Effectiveness of educational interventions on hypertensive patients' self-management behaviours: an umbrella review protocol

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Abstract

Background: Although different educational interventions have been widely used to manage and treat hypertension, alone or in combination with other interventions, there is a significant variation in their claimed effectiveness.

Review question/objective:

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

The review question is: Do educational interventions, alone or in combination with other interventions, improve self-management practices among patients with hypertension?

Methods: We will conduct a review of systematic reviews involving studies that implemented educational interventions, alone or in combination with other interventions, designed to change self-care practices among hypertensive patients who are 18 years and above, regardless of their sex and ethnicity. A comprehensive literature search will be conducted on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. Endnote and RefWorks are the two bibliographic databases that will be used to organise search results. We will present the effects of the educational interventions, alone or in combination with other interventions, on hypertension self-management practices (medication adherence, low salt diet, physical activity, weight management practices, alcohol reduction and smoking cessation). We will report the outcome data with 95% confidence intervals for each study. Relative Risk (RR), Mean differences or Odd Ratios will be used, depending on the measuring indices in each study, for the primary and secondary outcomes.

Ethics and dissemination: We hope to publish this umbrella review in a peer-reviewed journal. The findings will also be presented as conference papers.

Review registration: PROSPERO - CRD42022375581

Keywords: umbrella review, educational interventions, self-management, hypertension, systematic review

Word count: 3000

Strengths of this study

By this umbrella review, we hope to:

- Detect significant findings that are repeated or related in various systematic reviews

- To guide researchers towards future research and the design of clinical trials
- To update recommendations for clinical practice

Background

Due to the growing adult population and changes in lifestyles, the burden of hypertension and diabetes in sub-Saharan Africa has increased [1]. A significant, controllable risk factor for the onset of coronary heart disease, congestive heart failure, renal failure, stroke, eye issues, and renal dysfunction is elevated blood pressure [2,3]. Self-management techniques are the actions people take to establish structure, routine, and control in their lives. Patients take control of their health through self-management practices, which include moderate exercise (at least three times per week), weight loss, and dietary changes [4]. According to the Joint National Committee on Prevention, Detection, Evaluation and Treatment of Hypertension, self-care activities are crucial in the management of hypertension [5-8].

Education on hypertension is regarded as one of the important interventions in the management of hypertension. Along with blood pressure control, education on hypertension has been demonstrated to increase patient understanding and self-management abilities, assisting patients in making decisions to effectively manage their medical state [9,10]. Healthcare professionals are intentional in delivering either one-on-one or group-based educational interventions, alone or in combination with other interventions, to help their patients achieve therapeutic goals. The significant variation in the claimed effectiveness of the different educational interventions used to manage and treat hypertension suggests the need for an umbrella review to detect significant findings that are repeated or related [11-20], which could guide future research and the design of clinical trials.

Objective of this review

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

Methods/Design

This review protocol is being reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement's guidelines for reporting (Additional file). The protocol is registered on PROSPERO (CRD42022375581).

Eligibility criteria

Types of participants

This umbrella review will examine systematic reviews involving sample populations of the patient:

a) Aged 18 years and above (either the mean age of the participants in the study is at least 18 years old or at least 50% of the review's participants must be at least 18 years).
b) Diagnosed with hypertension as the only chronic illness (at least 50% of those included in the reviews should have been diagnosed with hypertension as the only chronic disease)
c) Ambulatory (at least 50% of those included in the review should reside in their own homes).
d) No history of significant cardiac complications throughout the study (at least 50% of those included in the reviews should not have had a history of significant cardiac complications).

e) Received an educational intervention, alone or in combination with other interventions (at least 50% of those included in the reviews should have received an educational intervention, alone or in combination with other interventions).

Reviews that do not go into enough detail about the sample populations of the studies they include will be excluded. We will also exclude reviews on non-hypertensive patients and patients who do not have hypertension diagnosed as the only chronic illness.

Types of intervention (s)/ phenomena of interest

This umbrella review will include reviews which evaluated various forms of educational interventions, alone or in combination with other interventions, that are designed to change the recommended hypertension self-care management practices namely:

a) medication adherence
b) eating low-salt diets
c) engaging in physical activities
d) engaging in weight management practices
e) reduction of alcohol consumption
f) smoking cessation

The educational interventions could either be a one-on-one intervention or a group-based intervention.

Outcomes

The primary outcome of this umbrella review will be changes in self-management practices, while the secondary outcomes will be the number of patients who were able to

achieve blood control and the changes in health-related quality of life measured using standardised generic questionnaires (example SF-36, 15D, and the EQ-5D-5L).

Search methods for identification of studies

We will conduct a comprehensive literature search on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. Search terms will be words related to educational intervention AND hypertensive patients AND hypertension self-management practices AND systematic reviews. Before charting the evidence, the search will be conducted once again on the selected databases to find any relevant articles that may have escaped notice during the initial search (e.g. newly published). We will manage the search results using Endnote and RefWorks. Full text of potentially relevant articles will then be screened against the review's inclusion and exclusion criteria. Differences in opinion will be resolved through discussion to reach a mutual agreement. The study screening and selection process will be reported using the standardized JBI instrument designed for umbrella reviews [21] (Supplementary material - Appendix 1). We would include systematic reviews that reported study-specific information such as the 95% confidence intervals, effect size and sample size.

Charting the evidence

Studies which meet the eligibility criteria will be appraised for methodological quality using the standardized critical appraisal instruments from the JBI System for the Unified Management, Assessment and Review Instrument and The JBI Reviewers' Manual 2014

[22] (Supplementary material - Appendix II). To ascertain whether research quality affects the conclusions of the umbrella review, we will apply sensitivity analysis based on the study quality. Using the following scale, we will evaluate each study's quality based on the findings of the critical appraisal: Low quality is defined as meeting 0–33% of the requirements, medium quality is defined as meeting 36%–66% of the criteria, and high quality is defined as meeting 67% of the criteria. Results from the included studies will be extracted using the JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses [23] (Supplementary material - Appendix III). The information to be extracted from each study will include study details, author/year, study objectives, participants (characteristics and number), setting/context, description of the intervention (randomised or non-randomised), search details, sources searched, range (years) of included studies, number of studies included, types of studies included, country of origin of included studies, appraisal, appraisal instrument used, appraisal rating, method of analysis, outcomes assessed, results/findings, effect size reported with 95% confidence interval, the study-specific estimated risk for side effects/negative outcomes reported with 95% confidence interval (risk ratios, odd ratios or mean differences), significance/direction, and heterogeneity.

If we identify two systematic reviews that evaluated the effect of an educational intervention alone or in combination with other interventions on the same self-management behaviours like medication adherence, smoking cessation or alcohol reduction, we will choose the one that had the most studies included (or, if there were an equal number, the more recent one).

Outcome measure

Our primary outcome will be changes in hypertension self-management behaviours associated with an educational intervention.

We want to find out which educational intervention worked in improving the self-management behaviours of hypertensive patients (if it did not work, why?), what type of educational intervention (one-on-one or group based) is most effective in improving self-management behaviours and delivered by who (nurse, pharmacist or medical doctor).

The results will then be narratively summarised and discussed with respect to the review's objective and the broader scientific literature. There will be recommendations made, gaps in the body of evidence will be pointed out, and future research directions will be emphasised.

Data extraction and management

Using the JBI data extraction form for review for systematic reviews and research syntheses, two members of the review team (BU-K, AI, AAB, AS, MMA, UAK), working independently, will extract data and summarise information on studies. Any disagreements will be resolved through dialogue with a third review author (IS). The information about the longest follow-up will be retrieved from studies that provide more than one outcome period (for example, 6 and 12 months). In cases where data are discovered to be lacking, we will get in touch with the study's corresponding author to ask for the missing information or to get study specifics clarified.

Measures of treatment effect

We will present the effects of the educational intervention, alone or in combination with other interventions, on hypertension self-management practices (medication adherence, low salt diet, physical activity, weight management practices, alcohol reduction and smoking cessation). We will report the outcome data with 95% confidence intervals for

each study. Continuous outcomes between the intervention and control groups will be presented and quantified as mean difference (MD) and overall effect size, for example, the prevalence of hypertension self-management practices pre-and post-intervention. Relative Risk (RR), Mean differences or Odd Ratios (OR) will be used, depending on the measuring indices in each study, for the primary and secondary outcomes. Where possible, we will estimate a common effect size for comparisons, for example by converting IRR to RR and then OR.

Analysis software

We would perform analysis using the most recent meta-analytic software in R packages [24]. Furthermore, we will explore the best analytic options for estimating heterogeneity between studies [25].

Discussion

By this umbrella review, we hope to identify significant findings that are repeated or related in various systematic reviews. This will serve as a guide to researchers towards future research and the design of clinical trials. Findings from our study will inform decisions and update recommendations for clinical practice. We hope to publish this umbrella review in a peer-reviewed journal. The findings will also be presented as conference papers.

Potential study limitations

We would aim to report all potential limitations in the umbrella review. These would for example include any areas of the medical knowledge that have not yet been published by systematic reviews. We would also aim to identify limitations in studies that may demonstrate strong effects but have underlying limitations in data/sample size.

List of abbreviations

RR: relative risk

MD: mean difference

OR: odd ratio

PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis

Ethics approval and consent to participate in the study

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding information

None

Authors' contributions

BOU-K, UAK and IS devised the study and developed conceptual ideas. BOU-K and UAK led the protocol development. BOU-K, UAK and AI drafted the manuscript. All authors helped refine and re-draft the manuscript and approved the final version.

Acknowledgements

Not applicable.

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Supplementary material

Appendix I: Screening tool based on the eligibility criteria.

1. Name of author and year of publication
2. Name of journal
3. Title
4. Initials of the reviewer
5. Design: Is the review a systematic review or meta-analysis? Yes or No
6. Language: Is the review published in English? Yes or No
7. Review type: a) Is the review an effectiveness review that takes quantitative evidence into account? Yes or No b) If a mixed-methods review, does the review include quantitative data focusing on the effectiveness of educational interventions whether used independently or in conjunction with other interventions? Yes or No
8. Participants: Is the review limited to adults aged 18 and up who have been diagnosed with hypertension? Yes or No
9. Intervention: Is the intervention of interest to the study objective? Yes or No
10. Outcome: Does the review report on any of the following outcomes? Effectiveness of educational intervention, alone or in combination with other interventions on hypertension self-management practices (medication adherence, low salt diet, weight management practices, physical activity, alcohol consumption, smoking cessation) OR effectiveness of educational interventions, alone or in combination with other interventions on blood pressure control OR Effectiveness of educational

intervention, alone or combined with other interventions on her health-relationality of life. Yes or No
If you answered 'Yes' to questions 5-10, please include the study. **If you have not answered 'Yes' to questions 5-10, please exclude the study**

Appendix II: JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses

Reviewer:				
Date:				
Author:				
Year:				
1. Is the review question clearly and explicitly stated?	Yes	No	Unclear	Not applicable
2. Were the inclusion criteria appropriate for the review question?				
3. Was the search strategy appropriate?				
4. Were the sources and resources used to search for studies adequate?				
5. Were the criteria for appraising studies appropriate?				
6. Was critical appraisal conducted by two or more reviewers independently?				

7. Were there methods to minimize errors in data extraction?				
8. Were the methods used to combine studies appropriate?				
9. Was the likelihood of publication bias assessed?				
10. Were recommendations for policy and/or practice supported by the reported data?				
11. Were the specific directives for new research appropriate?				
Overall appraisal: Include Exclude Seek further information				
Comments (include the reason for exclusion)				

Appendix III: JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses

Study Details	
Author/year	

Objectives	
Participants (characteristics/total number)	
Setting/context	
Description of Interventions/ phenomena of interest	
Search Details	
Sources searched	
Range (years) of included studies	
The number of studies included	
Types of studies included	
Country of origin of incl. studies	
Appraisal	
Appraisal instruments used	
Appraisal rating	
Analysis	
Method of analysis	
Outcome assessed	
Results/Findings	
Significance/direction	
Heterogeneity	
Comments	

PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al : Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* **2015 4:1**

An Editorial from the Editors-in-Chief of *Systematic Reviews* **details why this checklist was adapted - Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors.** *Systematic Reviews* **2016 5:15**

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☒	☐	2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☒	
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☒	☐	48
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☒	☐	18
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	☒	☐	173
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☐	☒	
Support					
Sources	5a	Indicate sources of financial or other support for the review	☒	☐	220-221
Sponsor	5b	Provide name for the review funder and/or sponsor	☐	☒	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☐	☒	
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	☒	☐	62-65

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☒	☐	72-25
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☒	☐	
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☒	☐	81-113
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☐	☒	
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☒	☐	172-180
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☒	☐	173-175
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☒	☐	173-178
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☒	☐	181-185
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☒	☐	161-163
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☒	☐	181-192
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	☒	☐	185-189
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☐	☒	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-	☐	☒	

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		regression)			
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☒	☐	194-196
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☒	☐	194-196
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☒	☐	194-196

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Primary Subject Heading:	Evidence based practice
Secondary Subject Heading:	Cardiovascular medicine, Evidence based practice, Global health, Medical management, Research methods
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Abstract

Background: Although different educational interventions have been widely used to manage and treat hypertension, alone or in combination with other interventions, there is a significant variation in their claimed effectiveness.

Review question/objective:

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

The review question is: Do educational interventions, alone or in combination with other interventions, improve self-management practices among patients with hypertension?

Methods: We will conduct a review of systematic reviews involving studies that implemented educational interventions, alone or in combination with other interventions, designed to change self-care practices among hypertensive patients who are 18 years and above, regardless of their sex and ethnicity. Following the guidelines set forth in the PRISMA statement, a comprehensive literature search will be conducted from September to December 2023 on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. We will present the effects of the educational interventions, alone or in combination with other interventions, on hypertension self-management practices. We will report the outcome data with 95% confidence intervals for each study. Relative Risk (RR), Mean differences or Odd Ratios will be used, depending on the measuring indices in each study.

Ethics and dissemination: Ethical approval will not be required as this study will use aggregated data from previously published systematic reviews. However, this study has been reviewed by the Health Research and Ethics Committee, and we have registered the protocol in PROSPERO (CRD42022375581). We confirm that all methods were performed following the guidelines of the Declaration of Helsinki.

Review registration: PROSPERO - CRD42022375581

Keywords: umbrella review, educational interventions, self-management, hypertension, systematic review

Word count: 3000

Strengths of this study

- We will provide a comprehensive overview of existing evidence by aggregating findings from systematic reviews of randomised controlled trials.

- We will ensure consistency in the selection and evaluation of included studies.
- We will provide broader insights by examining various interventions across multiple studies.
- Our study will assess the consistency of results across various systematic reviews, thereby enhancing the robustness of our conclusions.

Background

Due to the growing adult population and changes in lifestyles, the burden of hypertension and diabetes in sub-Saharan Africa has increased [1]. A significant, controllable risk factor for the onset of coronary heart disease, congestive heart failure, renal failure, stroke, eye issues, and renal dysfunction is elevated blood pressure [2,3]. Self-management techniques are the actions people take to establish structure, routine, and control in their lives. Patients take control of their health through self-management practices, which include moderate exercise (at least three times per week), weight loss, and dietary changes [4]. According to the Joint National Committee on Prevention, Detection, Evaluation and Treatment of Hypertension, self-care activities are crucial in the management of hypertension [5-8].

Education on hypertension is regarded as one of the important interventions in the management of hypertension. Along with blood pressure control, education on hypertension has been demonstrated to increase patient understanding and self-management abilities, assisting patients in making decisions to effectively manage their medical state [9,10]. The use of mobile-app self-assisted educational intervention has shown to reduce the systolic blood pressure and diastolic blood pressure in patients with hypertension [11]. This result may be explained by the fact that giving patients personalised feedback and recommendations based on their health information and conditions may be able to help them interpret changes in their vital signs and educate them on how to handle various situations involving the variability in

their vital signs [11]. Healthcare professionals are intentional in delivering either one-on-one or group-based educational interventions, alone or in combination with other interventions, to help their patients achieve therapeutic goals. The significant variation in the claimed effectiveness of the different educational interventions used to manage and treat hypertension suggests the need for an umbrella review to detect significant findings that are repeated or related [12-21], which could guide future research and the design of clinical trials.

Objective of this review

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

Methods/Design

This review protocol is being reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement's guidelines for reporting (Additional file). The protocol is registered on PROSPERO (CRD42022375581).

Eligibility criteria

Types of participants

This umbrella review will examine systematic reviews involving sample populations of the patient:

a) Aged 18 years and above.
b) Diagnosed with hypertension as the only chronic illness (≥50% of those included in the reviews should have been diagnosed with hypertension as the only chronic disease)
c) Ambulatory (≥ 50% of those included in the review should reside in their own homes).

d) No history of significant cardiac complications throughout the study (≥ 50% of those included in the reviews should not have had a history of significant cardiac complications).

e) Received an educational intervention, alone or in combination with other interventions (≥50% of those included in the reviews should have received an educational intervention, alone or in combination with other interventions).

Reviews that do not go into enough detail about the sample populations of the studies they include will be excluded. We will also exclude reviews on non-hypertensive patients and patients who do not have hypertension diagnosed as the only chronic illness.

Types of intervention (s)/ phenomena of interest

This umbrella review will include reviews which evaluated various forms of educational interventions, alone or in combination with other interventions, that are designed to change the recommended hypertension self-care management practices namely:

a) medication adherence

b) eating low-salt diets

c) engaging in physical activities

d) engaging in weight management practices

e) reduction of alcohol consumption

f) smoking cessation

The educational interventions could either be a one-on-one education or a group-based teaching. Educational intervention in this umbrella review includes patient education workshops/seminars, individual counselling, written educational materials (pamphlets, brochures), and digital health education (using mobile apps or websites).

We will include systematic reviews of studies conducted between 2000 to 2023. Only studies reported in the English language will be included in this review. We hope to include systematic reviews of randomised controlled trials and cohort studies. Editorials, conference abstracts, letters will be excluded.

Outcomes

The primary outcome of this umbrella review will be changes in self-management practices, while the secondary outcomes will be the number of patients who were able to achieve blood control and the changes in health-related quality of life measured using standardised generic questionnaires (example SF-36, 15D, and the EQ-5D-5L).

Search methods for identification of studies

We will conduct a comprehensive literature search from September to December 2023 on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. Search terms will be words related to educational intervention AND hypertensive patients AND hypertension self-management practices AND systematic reviews (Supplementary material, Appendix 1). Before charting the evidence, the search will be conducted once again on the selected databases to find any relevant articles that may have escaped notice during the initial search (e.g., newly published). We will manage the search results using Endnote and RefWorks. Full text of potentially relevant articles will then be screened against the review's inclusion and exclusion criteria. Differences in opinion will be resolved through discussion to reach a mutual agreement. The study screening and selection process will be reported using the standardized JBI instrument designed for umbrella reviews [22] (Supplementary material -

Appendix 2). We would include systematic reviews that reported study-specific information such as the 95% confidence intervals, effect size and sample size.

Charting the evidence

Studies which meet the eligibility criteria will be appraised for methodological quality using the standardized critical appraisal instruments from the JBI System for the Unified Management, Assessment and Review Instrument and The JBI Reviewers' Manual 2014 [23] (Supplementary material - Appendix 3). To ascertain whether research quality affects the conclusions of the umbrella review, we will apply sensitivity analysis based on the study quality. Using the following scale, we will evaluate each study's quality based on the findings of the critical appraisal: Low quality is defined as meeting 0–33% of the requirements, medium quality is defined as meeting 36%–66% of the criteria, and high quality is defined as meeting 67% of the criteria. Results from the included studies will be extracted using the JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses [24] (Supplementary material - Appendix 4). The information to be extracted from each study will include study details, author/year, study objectives, participants (characteristics and number), setting/context, description of the intervention (randomised or non-randomised), search details, sources searched, range (years) of included studies, number of studies included, types of studies included, country of origin of included studies, appraisal, appraisal instrument used, appraisal rating, method of analysis, outcomes assessed, results/findings, effect size reported with 95% confidence interval, the study-specific estimated risk for side effects/negative outcomes reported with 95% confidence interval (risk ratios, odd ratios or mean differences), significance/direction, and heterogeneity.

If we identify two systematic reviews that evaluated the effect of an educational intervention alone or in combination with other interventions on the same self-management behaviours as medication adherence, smoking cessation or alcohol reduction, we will choose the one that had the most studies included (or, if there were an equal number, the more recent one).

Outcome measure

Our primary outcome will be changes in hypertension self-management behaviours associated with an educational intervention.

We want to find out which educational intervention worked in improving the self-management behaviours of hypertensive patients (if it did not work, why?), what type of educational intervention (one-on-one or group based) is most effective in improving self-management behaviours and delivered by who (nurse, pharmacist, or medical doctor).

The results will then be narratively summarised and discussed with respect to the review's objective and the broader scientific literature. There will be recommendations made, gaps in the body of evidence will be pointed out, and future research directions will be emphasised.

Data extraction and management

Using the JBI data extraction form for review for systematic reviews and research syntheses, two members of the review team (BU-K, AI, AAB, AS, MMA, UAK), working independently, will extract data and summarise information on studies. Any disagreements will be resolved through dialogue with a third review author (IS). The information about the longest follow-up will be retrieved from studies that provide more than one outcome period (for example, 6 and 12 months). In cases where data are discovered to be lacking,

we will get in touch with the study's corresponding author to ask for the missing information or to get study specifics clarified.

Measures of treatment effect

We will present the effects of the educational intervention, alone or in combination with other interventions, on hypertension self-management practices (medication adherence, low salt diet, physical activity, weight management practices, alcohol reduction and smoking cessation). We will report the outcome data with 95% confidence intervals for each study. Continuous outcomes between the intervention and control groups will be presented and quantified as mean difference (MD) and overall effect size, for example, the prevalence of hypertension self-management practices pre-and post-intervention. Relative Risk (RR), Mean differences or Odd Ratios (OR) will be used, depending on the measuring indices in each study, for the primary and secondary outcomes. Where possible, we will estimate a common effect size for comparisons, for example by converting IRR to RR and then OR. Subgroup analyses will be performed for primary outcomes that are reported in at least two trials in each subgroup. These analyses will be stratified by the nature of the intervention to identify which educational interventions are effective for blood pressure control.

Patient and Public involvement

No patient involved.

Analysis software

We would perform analysis using the most recent meta-analytic software in R packages [25]. Furthermore, we will explore the best analytic options for estimating heterogeneity between studies [26].

Discussion

In this review, we will determine which educational interventions—and the theoretical frameworks that underlie them—were most promising for additional research and improvement. We hope to identify significant findings that are repeated or related in various systematic reviews. We will make robust recommendations by selecting high-quality and well-designed studies. This will serve as a guide to researchers towards future research and the design of clinical trials. Findings from our study will inform decisions and update recommendations for clinical practice.

Strengths and potential study limitations

We will provide a high-level synthesis of evidence by summarising findings from multiple systematic reviews, giving a broader perspective on the effect of educational intervention on self-management behaviours among patients with hypertension. We anticipate some limitations in this study. First, due to variations in methodologies and interventions, it may be challenging to draw definitive conclusions. However, we will conduct subgroup analysis to identify potential sources of heterogenicity and present findings as a narrative synthesis if statistical pooling is inappropriate. Second, we anticipate that some of the systematic reviews which meet the inclusion criteria may have flaws with its methodology, data analysis or reporting. We will use the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Supplementary material, Appendix 2) to report only high-quality systematic reviews. We will report potential biases in the primary studies included in the systematic reviews. We would aim to report all potential limitations in the umbrella review at the end of this study.

List of abbreviations

RR: relative risk

MD: mean difference

OR: odd ratio

PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis

Ethics approval and consent to participate in the study

Ethical approval will not be required as this study will use aggregated data from previously published systematic reviews. However, this study has been reviewed by the Health Research and Ethics Committee, and we have registered the protocol in PROSPERO (CRD42022375581). We confirm that all methods were performed following the guidelines of the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding information

None

Authors' contributions

BOU-K, UAK and IS devised the study and developed conceptual ideas. BOU-K, UAK, AAB, AS, MMA led the protocol development. BOU-K, UAK, AI and IS drafted the manuscript. All authors helped refine and re-draft the manuscript and approved the final version.

Acknowledgements

Not applicable.

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Supplementary material

Appendix 1

Search strategy

1. Main concept: educational intervention; hypertensive patients; self-management behaviours
2. These concepts will be combined the concepts using Boolean operators (AND, OR) and parentheses for grouping:

   (educational intervention* OR health education OR patient education) AND (hypertensive patient* OR hypertension OR high blood pressure) AND (self-management behavior* OR self-care OR self-management OR lifestyle changes)

2a. Medline/Pubmed: ("educational intervention"[Title/Abstract] OR "health education"[Title/Abstract] OR "patient education"[Title/Abstract]) AND ("hypertensive patient"[Title/Abstract] OR "hypertension"[Title/Abstract] OR "high blood pressure"[Title/Abstract]) AND ("self-management behavior"[Title/Abstract] OR "self-care"[Title/Abstract] OR "self-management"[Title/Abstract] OR "lifestyle changes"[Title/Abstract])

2b. Embase: ('educational intervention'/exp OR 'health education'/exp OR 'patient education'/exp) AND ('hypertensive patient'/exp OR 'hypertension'/exp OR 'high blood pressure'/exp) AND ('self-management behavior'/exp OR 'self-care'/exp OR 'self-management'/exp OR 'lifestyle changes'/exp)

2c. PsycINFO: (educational intervention OR health education OR patient education) AND

(hypertensive patient OR hypertension OR "high blood pressure") AND (self-management behavior OR self-care OR "self-management" OR "lifestyle changes")

2d. CINAHL: (educational intervention OR health education OR patient education) AND (hypertensive patient OR hypertension OR "high blood pressure") AND (self-management behavior OR self-care OR "self-management" OR "lifestyle changes")

2e. Web of Science Core Collection: ("educational intervention" OR "health education" OR "patient education") AND ("hypertensive patient" OR "hypertension" OR "high blood

pressure") AND ("self-management behavior" OR "self-care" OR "self-management" OR "lifestyle changes")

2f. Google Scholar: "educational intervention" OR "health education" OR "patient education" AND "hypertensive patient" OR "hypertension" OR "high blood pressure" AND "self-management behavior" OR "self-care" OR "self-management" OR "lifestyle changes"

Appendix 2: Screening tool based on the eligibility criteria.

1. Name of author and year of publication
2. Name of journal
3. Title
4. Initials of the reviewer
5. Design: Is the review a systematic review or meta-analysis? Yes or No
6. Language: Is the review published in English? Yes or No
7. Review type: a) Is the review an effectiveness review that takes quantitative evidence into account? Yes or No b) If a mixed-methods review, does the review include quantitative data focusing on the effectiveness of educational interventions whether used independently or in conjunction with other interventions? Yes or No
8. Participants: Is the review limited to adults aged 18 and up who have been diagnosed with hypertension? Yes or No
9. Intervention: Is the intervention of interest to the study objective? Yes or No
10. Outcome: Does the review report on any of the following outcomes? Effectiveness of educational intervention, alone or in combination with other interventions on hypertension self-management practices (medication adherence, low salt diet,

weight management practices, physical activity, alcohol consumption, smoking cessation) OR effectiveness of educational interventions, alone or in combination with other interventions on blood pressure control OR Effectiveness of educational intervention, alone or combined with other interventions on her health-relationality of life. Yes or No
If you answered 'Yes' to questions 5-10, please include the study. **If you have not answered 'Yes' to questions 5-10, please exclude the study**

Appendix 3: JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses

Reviewer:				
Date:				
Author:				
Year:				
1. Is the review question clearly and explicitly stated?	Yes	No	Unclear	Not applicable
2. Were the inclusion criteria appropriate for the review question?				
3. Was the search strategy appropriate?				
4. Were the sources and resources used to search for studies adequate?				

5. Were the criteria for appraising studies appropriate?				
6. Was critical appraisal conducted by two or more reviewers independently?				
7. Were there methods to minimize errors in data extraction?				
8. Were the methods used to combine studies appropriate?				
9. Was the likelihood of publication bias assessed?				
10. Were recommendations for policy and/or practice supported by the reported data?				
11. Were the specific directives for new research appropriate?				
Overall appraisal: Include Exclude Seek further information				
Comments (include the reason for exclusion)				

Appendix 4: JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses

Study Details	
Author/year	
Objectives	
Participants (characteristics/total	

number)	
Setting/context	
Description of Interventions/ phenomena of interest	
Search Details	
Sources searched	
Range (years) of included studies	
The number of studies included	
Types of studies included	
Country of origin of incl. studies	
Appraisal	
Appraisal instruments used	
Appraisal rating	
Analysis	
Method of analysis	
Outcome assessed	
Results/Findings	
Significance/direction	
Heterogeneity	
Comments	

PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al : Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* **2015 4:1**

An Editorial from the Editors-in-Chief of *Systematic Reviews* **details why this checklist was adapted - Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors.** *Systematic Reviews* **2016 5:15**

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☒	☐	2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☒	
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☒	☐	48
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☒	☐	18
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	☒	☐	173
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☐	☒	
Support					
Sources	5a	Indicate sources of financial or other support for the review	☒	☐	220-221
Sponsor	5b	Provide name for the review funder and/or sponsor	☐	☒	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☐	☒	
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	☒	☐	62-65

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☒	☐	72-25
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☒	☐	
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☒	☐	81-113
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☐	☒	
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☒	☐	172-180
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☒	☐	173-175
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☒	☐	173-178
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☒	☐	181-185
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☒	☐	161-163
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☒	☐	181-192
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	☒	☐	185-189
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☐	☒	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-	☐	☒	

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		regression)			
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☒	☐	194-196
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☒	☐	194-196
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☒	☐	194-196

BMJ Open

Effectiveness of educational interventions on hypertensive patients' self-management behaviours: an umbrella review protocol

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-073682.R2
Article Type:	Protocol
Date Submitted by the Author:	26-Jul-2023
Complete List of Authors:	Ukoha-kalu, Blessing; University of Nigeria, Clinical Pharmacy and Pharmacy Management Isah, Abdulmuminu; University of Nigeria, Clinical Pharmacy and Pharmacy Management Biambo, Aminu; Usmanu Danfodiyo University, Clinical Pharmacy and Pharmacy Practice Samaila, Aliyu ; Usmanu Danfodiyo University, Clinical Pharmacy and Pharmacy Practice Abubakar, Mustapha; Nigerian Defence College, Pharmacy Kalu, Ukoha; Hull University Teaching Hospitals NHS Trust, Pediatric surgery Soyiri, Ireneous; University of Hull, Hull York Medical School
Primary Subject Heading:	Evidence based practice
Secondary Subject Heading:	Cardiovascular medicine, Evidence based practice, Global health, Medical management, Research methods
Keywords:	Hypertension < CARDIOLOGY, Systematic Review, Blood Pressure, EPIDEMIOLOGY, GENERAL MEDICINE (see Internal Medicine), Health Education

Effectiveness of educational interventions on hypertensive patients' self-management behaviours: an umbrella review protocol

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Abstract

Background: Although different educational interventions have been widely used to manage and treat hypertension, alone or in combination with other interventions, there is a significant variation in their claimed effectiveness.

Review question/objective:

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

The review question is: Do educational interventions, alone or in combination with other interventions, improve self-management practices among patients with hypertension?

Methods: We will conduct a review of systematic reviews involving studies that implemented educational interventions, alone or in combination with other interventions, designed to change self-care practices among hypertensive patients who are 18 years and above, regardless of their sex and ethnicity. Following the guidelines set forth in the PRISMA statement, a comprehensive literature search will be conducted from September to December 2023 on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. We will present the effects of the educational interventions, alone or in combination with other interventions, on hypertension self-management practices. We will report the outcome data with 95% confidence intervals for each study. Relative Risk (RR), Mean differences or Odd Ratios will be used, depending on the measuring indices in each study.

Ethics and dissemination: Ethical approval is not required as this study will use aggregated data from previously published systematic reviews. However, we have registered the protocol in PROSPERO (CRD42022375581). We confirm that all methods will be performed following the guidelines of the Declaration of Helsinki. The findings from this study will be disseminated through presentations at academic conferences and publication in peer-reviewed international journals.

Review registration: PROSPERO - CRD42022375581

Keywords: umbrella review, educational interventions, self-management, hypertension, systematic review

Word count: 3098

Strengths and Limitations

- We will provide a comprehensive overview of existing evidence by aggregating findings from systematic reviews of randomised controlled trials.
- We will ensure consistency in the selection and evaluation of included studies.
- We will provide broader insights by examining various interventions across multiple studies.
- Our study will assess the consistency of results across various systematic reviews, thereby enhancing the robustness of our conclusions.
- Due to variations in methodologies and interventions, it may be challenging to draw definitive conclusions.

Background

Due to the growing adult population and changes in lifestyles, the burden of hypertension and diabetes in sub-Saharan Africa has increased [1]. A significant, controllable risk factor for the onset of coronary heart disease, congestive heart failure, renal failure, stroke, eye issues, and renal dysfunction is elevated blood pressure [2,3]. Self-management techniques are the actions people take to establish structure, routine, and control in their lives. Patients take control of their health through self-management practices, which include moderate exercise (at least three times per week), weight loss, and dietary changes [4]. According to the Joint National Committee on Prevention, Detection, Evaluation and Treatment of Hypertension, self-care activities are crucial in the management of hypertension [5-8].

Education on hypertension is regarded as one of the important interventions in the management of hypertension. Along with blood pressure control, education on hypertension has been demonstrated to increase patient understanding and self-management abilities, assisting patients in making decisions to effectively manage their medical state [9,10]. The use of

mobile-app self-assisted educational intervention has shown to reduce the systolic blood pressure and diastolic blood pressure in patients with hypertension [11]. This result may be explained by the fact that giving patients personalised feedback and recommendations based on their health information and conditions may be able to help them interpret changes in their vital signs and educate them on how to handle various situations involving the variability in their vital signs [11]. Educational interventions utilising personalised medication management plans [12-14], reminder systems [13], and counselling sessions [12] among patients with cardiovascular diseases have shown significant improvements in medication adherence rates. However, some studies showed varying results, indicating the need for tailored interventions to address individual barriers and motivations [15,16]. Educational interventions focusing on lifestyle modifications, including dietary changes, physical activity promotion, and stress management, were found to be effective in enhancing self-management behaviours [17,18]. Several factors influenced the effectiveness of educational interventions on hypertensive patients' self-management behaviours, including the duration and intensity of the intervention, patient engagement [19,20], health literacy levels [21], cultural sensitivity [21], and healthcare provider support [19].

Healthcare professionals are intentional in delivering either one-on-one or group-based educational interventions, alone or in combination with other interventions, to help their patients achieve therapeutic goals. The significant variation in the claimed effectiveness of the different educational interventions used to manage and treat hypertension suggests the need for an umbrella review to detect significant findings that are repeated or related [20,22-30], which could guide future research and the design of clinical trials.

Objective of this review

The objective of the umbrella review is to determine the effectiveness of educational interventions, alone or in combination with other interventions, for improving blood pressure control and self-management practices among hypertensive patients.

Methods/Design

This review protocol is being reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement's guidelines for reporting (Additional file). The protocol is registered on PROSPERO (CRD42022375581).

Eligibility criteria

Types of participants

This umbrella review will examine systematic reviews involving sample populations of the patient:

a) Aged 18 years and above.
b) Diagnosed with hypertension as the only chronic illness (≥50% of those included in the reviews should have been diagnosed with hypertension as the only chronic disease)
c) Ambulatory (≥ 50% of those included in the review should reside in their own homes).
d) No history of significant cardiac complications throughout the study (≥ 50% of those included in the reviews should not have had a history of significant cardiac complications).
e) Received an educational intervention, alone or in combination with other interventions (≥50% of those included in the reviews should have received an educational intervention, alone or in combination with other interventions).

Reviews that do not go into enough detail about the sample populations of the studies they include will be excluded. We will also exclude reviews on non-hypertensive patients and patients who do not have hypertension diagnosed as the only chronic illness.

Types of intervention (s)/ phenomena of interest

This umbrella review will include reviews which evaluated various forms of educational interventions, alone or in combination with other interventions, that are designed to change the recommended hypertension self-care management practices namely:

a) medication adherence
b) eating low-salt diets
c) engaging in physical activities
d) engaging in weight management practices
e) reduction of alcohol consumption
f) smoking cessation

The educational interventions could either be a one-on-one education or a group-based teaching. Educational intervention in this umbrella review includes patient education workshops/seminars, individual counselling, written educational materials (pamphlets, brochures), and digital health education (using mobile apps or websites).

We will include systematic reviews of studies conducted between 2000 to 2023. Only studies reported in the English language will be included in this review. We hope to include systematic reviews of randomised controlled trials and cohort studies. Editorials, conference abstracts, letters will be excluded.

Outcomes

The primary outcome of this umbrella review will be changes in self-management practices, while the secondary outcomes will be the number of patients who were able to achieve blood control and the changes in health-related quality of life measured using standardised generic questionnaires (example SF-36, 15D, and the EQ-5D-5L).

Search methods for identification of studies

We will conduct a comprehensive literature search from September to December 2023 on six electronic databases: Medline, Embase, PsycINFO, CINAHL, Web of Science Core Collection and Google Scholar. Search terms will be developed using database-specific indexed terms and text words derived from the review aim. Search terms will be words related to educational intervention AND hypertensive patients AND hypertension self-management practices AND systematic reviews (Supplementary material, Appendix 1). Before charting the evidence, the search will be conducted once again on the selected databases to find any relevant articles that may have escaped notice during the initial search (e.g., newly published). We will manage the search results using Endnote and RefWorks. Full text of potentially relevant articles will then be screened against the review's inclusion and exclusion criteria. Differences in opinion will be resolved through discussion to reach a mutual agreement. The study screening and selection process will be reported using the standardized JBI instrument designed for umbrella reviews [31] (Supplementary material - Appendix 2). We would include systematic reviews that reported study-specific information such as the 95% confidence intervals, effect size and sample size.

Charting the evidence

Studies which meet the eligibility criteria will be appraised for methodological quality using the standardized critical appraisal instruments from the JBI System for the Unified Management, Assessment and Review Instrument and The JBI Reviewers' Manual 2014 [32] (Supplementary material - Appendix 3). To ascertain whether research quality affects the conclusions of the umbrella review, we will apply sensitivity analysis based on the study quality. Using the following scale, we will evaluate each study's quality based on the findings of the critical appraisal: Low quality is defined as meeting 0–33% of the requirements, medium quality is defined as meeting 36%–66% of the criteria, and high quality is defined as meeting 67% of the criteria. Results from the included studies will be extracted using the JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses [33] (Supplementary material - Appendix 4). The information to be extracted from each study will include study details, author/year, study objectives, participants (characteristics and number), setting/context, description of the intervention (randomised or non-randomised), search details, sources searched, range (years) of included studies, number of studies included, types of studies included, country of origin of included studies, appraisal, appraisal instrument used, appraisal rating, method of analysis, outcomes assessed, results/findings, effect size reported with 95% confidence interval, the study-specific estimated risk for side effects/negative outcomes reported with 95% confidence interval (risk ratios, odd ratios or mean differences), significance/direction, and heterogeneity.

If we identify two systematic reviews that evaluated the effect of an educational intervention alone or in combination with other interventions on the same self-management behaviours as medication adherence, smoking cessation or alcohol reduction, we will choose the one that had the most studies included (or, if there were an equal number, the more recent one).

Outcome measure

Our primary outcome will be changes in hypertension self-management behaviours associated with an educational intervention.

We want to find out which educational intervention worked in improving the self-management behaviours of hypertensive patients (if it did not work, why?), what type of educational intervention (one-on-one or group based) is most effective in improving self-management behaviours and delivered by who (nurse, pharmacist, or medical doctor).

The results will then be narratively summarised and discussed with respect to the review's objective and the broader scientific literature. There will be recommendations made, gaps in the body of evidence will be pointed out, and future research directions will be emphasised.

Data extraction and management

Using the JBI data extraction form for review for systematic reviews and research syntheses, two members of the review team (BU-K, AI, AAB, AS, MMA, UAK), working independently, will extract data and summarise information on studies. Any disagreements will be resolved through dialogue with a third review author (IS). The information about the longest follow-up will be retrieved from studies that provide more than one outcome period (for example, 6 and 12 months). In cases where data are discovered to be lacking, we will get in touch with the study's corresponding author to ask for the missing information or to get study specifics clarified.

Measures of treatment effect

We will present the effects of the educational intervention, alone or in combination with other interventions, on hypertension self-management practices (medication adherence,

low salt diet, physical activity, weight management practices, alcohol reduction and smoking cessation). We will report the outcome data with 95% confidence intervals for each study. Continuous outcomes between the intervention and control groups will be presented and quantified as mean difference (MD) and overall effect size, for example, the prevalence of hypertension self-management practices pre-and post-intervention. Relative Risk (RR), Mean differences or Odd Ratios (OR) will be used, depending on the measuring indices in each study, for the primary and secondary outcomes. Where possible, we will estimate a common effect size for comparisons, for example by converting IRR to RR and then OR. Subgroup analyses will be performed for primary outcomes that are reported in at least two trials in each subgroup. These analyses will be stratified by the nature of the intervention to identify which educational interventions are effective for blood pressure control.

Patient and Public involvement

No patient involved.

Analysis software

We would perform analysis using the most recent meta-analytic software in R packages [34]. Furthermore, we will explore the best analytic options for estimating heterogeneity between studies [35].

Discussion

In this review, we will determine which educational interventions—and the theoretical frameworks that underlie them—were most promising for additional research and improvement. We hope to identify significant findings that are repeated or related in various systematic reviews. We will make robust recommendations by selecting high-quality and well-designed studies. This will serve as a guide to researchers towards future research and the

design of clinical trials. Findings from our study will inform decisions and update recommendations for clinical practice.

Potential strengths and limitations

We will provide a high-level synthesis of evidence by summarising findings from multiple systematic reviews, giving a broader perspective on the effect of educational intervention on self-management behaviours among patients with hypertension. We anticipate some limitations in this study. First, due to variations in methodologies and interventions, it may be challenging to draw definitive conclusions. However, we will conduct subgroup analysis to identify potential sources of heterogenicity and present findings as a narrative synthesis if statistical pooling is inappropriate. Second, we anticipate that some of the systematic reviews which meet the inclusion criteria may have flaws with its methodology, data analysis or reporting. We will use the JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses (Supplementary material, Appendix 2) to report only high-quality systematic reviews. We will report potential biases in the primary studies included in the systematic reviews. We would aim to report all potential limitations in the umbrella review at the end of this study.

Ethics and dissemination

Ethical approval is not required as this study will use aggregated data from previously published systematic reviews. However, we have registered the protocol in PROSPERO (CRD42022375581). We confirm that all methods will be performed following the guidelines of the Declaration of Helsinki. The findings from this study will be disseminated through presentations at academic conferences and publication in peer-reviewed international journals.

List of abbreviations

RR: relative risk

MD: mean difference

OR: odd ratio

PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis

Consent for publication

Not applicable.

Availability of data and materials

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Funding information

None

Authors' contributions

BOU-K, UAK and IS devised the study and developed conceptual ideas. BOU-K, UAK, AAB, AS, MMA led the protocol development. BOU-K, UAK, AI and IS drafted the manuscript. All authors helped refine and re-draft the manuscript and approved the final version.

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Not applicable.

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Supplementary material

Appendix 1

Search strategy

1. Main concept: educational intervention; hypertensive patients; self-management behaviours
2. These concepts will be combined the concepts using Boolean operators (AND, OR) and parentheses for grouping:

   (educational intervention* OR health education OR patient education) AND (hypertensive patient* OR hypertension OR high blood pressure) AND (self-management behavior* OR self-care OR self-management OR lifestyle changes)

2a. Medline/Pubmed: ("educational intervention"[Title/Abstract] OR "health education"[Title/Abstract] OR "patient education"[Title/Abstract]) AND ("hypertensive patient"[Title/Abstract] OR "hypertension"[Title/Abstract] OR "high blood pressure"[Title/Abstract]) AND ("self-management behavior"[Title/Abstract] OR "self-care"[Title/Abstract] OR "self-management"[Title/Abstract] OR "lifestyle changes"[Title/Abstract])

2b. Embase: ('educational intervention'/exp OR 'health education'/exp OR 'patient education'/exp) AND ('hypertensive patient'/exp OR 'hypertension'/exp OR 'high blood pressure'/exp) AND ('self-management behavior'/exp OR 'self-care'/exp OR 'self-management'/exp OR 'lifestyle changes'/exp)

2c. PsycINFO: (educational intervention OR health education OR patient education) AND

(hypertensive patient OR hypertension OR "high blood pressure") AND (self-management behavior OR self-care OR "self-management" OR "lifestyle changes")

2d. CINAHL: (educational intervention OR health education OR patient education) AND (hypertensive patient OR hypertension OR "high blood pressure") AND (self-management behavior OR self-care OR "self-management" OR "lifestyle changes")

2e. Web of Science Core Collection: ("educational intervention" OR "health education" OR "patient education") AND ("hypertensive patient" OR "hypertension" OR "high blood

pressure") AND ("self-management behavior" OR "self-care" OR "self-management" OR "lifestyle changes")

2f. Google Scholar: "educational intervention" OR "health education" OR "patient education" AND "hypertensive patient" OR "hypertension" OR "high blood pressure" AND "self-management behavior" OR "self-care" OR "self-management" OR "lifestyle changes"

Appendix 2: Screening tool based on the eligibility criteria.

1. Name of author and year of publication
2. Name of journal
3. Title
4. Initials of the reviewer
5. Design: Is the review a systematic review or meta-analysis? Yes or No
6. Language: Is the review published in English? Yes or No
7. Review type: a) Is the review an effectiveness review that takes quantitative evidence into account? Yes or No b) If a mixed-methods review, does the review include quantitative data focusing on the effectiveness of educational interventions whether used independently or in conjunction with other interventions? Yes or No
8. Participants: Is the review limited to adults aged 18 and up who have been diagnosed with hypertension? Yes or No
9. Intervention: Is the intervention of interest to the study objective? Yes or No
10. Outcome: Does the review report on any of the following outcomes? Effectiveness of educational intervention, alone or in combination with other interventions on hypertension self-management practices (medication adherence, low salt diet,

weight management practices, physical activity, alcohol consumption, smoking cessation) OR effectiveness of educational interventions, alone or in combination with other interventions on blood pressure control OR Effectiveness of educational intervention, alone or combined with other interventions on her health-relationality of life. Yes or No
If you answered 'Yes' to questions 5-10, please include the study. **If you have not answered 'Yes' to questions 5-10, please exclude the study**

Appendix 3: JBI Critical Appraisal Checklist for Systematic Reviews and Research Syntheses

Reviewer:				
Date:				
Author:				
Year:				
1. Is the review question clearly and explicitly stated?	Yes	No	Unclear	Not applicable
2. Were the inclusion criteria appropriate for the review question?				
3. Was the search strategy appropriate?				
4. Were the sources and resources used to search for studies adequate?				

5. Were the criteria for appraising studies appropriate?				
6. Was critical appraisal conducted by two or more reviewers independently?				
7. Were there methods to minimize errors in data extraction?				
8. Were the methods used to combine studies appropriate?				
9. Was the likelihood of publication bias assessed?				
10. Were recommendations for policy and/or practice supported by the reported data?				
11. Were the specific directives for new research appropriate?				
Overall appraisal: Include Exclude Seek further information				
Comments (include the reason for exclusion)				

Appendix 4: JBI Data Extraction Form for Review for Systematic Reviews and Research Syntheses

Study Details	
Author/year	
Objectives	
Participants (characteristics/total	

number)	
Setting/context	
Description of Interventions/ phenomena of interest	
Search Details	
Sources searched	
Range (years) of included studies	
The number of studies included	
Types of studies included	
Country of origin of incl. studies	
Appraisal	
Appraisal instruments used	
Appraisal rating	
Analysis	
Method of analysis	
Outcome assessed	
Results/Findings	
Significance/direction	
Heterogeneity	
Comments	

PRISMA-P 2015 Checklist

This checklist has been adapted for use with systematic review protocol submissions to BioMed Central journals from Table 3 in Moher D et al : Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* **2015 4:1**

An Editorial from the Editors-in-Chief of *Systematic Reviews* **details why this checklist was adapted - Moher D, Stewart L & Shekelle P: Implementing PRISMA-P: recommendations for prospective authors.** *Systematic Reviews* **2016 5:15**

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
ADMINISTRATIVE INFORMATION					
Title					
Identification	1a	Identify the report as a protocol of a systematic review	☒	☐	2
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	☐	☒	
Registration	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	☒	☐	48
Authors					
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	☒	☐	18
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	☒	☐	173
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	☐	☒	
Support					
Sources	5a	Indicate sources of financial or other support for the review	☒	☐	220-221
Sponsor	5b	Provide name for the review funder and/or sponsor	☐	☒	
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	☐	☒	
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	☒	☐	62-65

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	☒	☐	72-25
METHODS					
Eligibility criteria	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for eligibility for the review	☒	☐	
Information sources	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	☒	☐	81-113
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	☐	☒	
STUDY RECORDS					
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	☒	☐	172-180
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	☒	☐	173-175
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	☒	☐	173-178
Data items	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	☒	☐	181-185
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	☒	☐	161-163
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	☒	☐	181-192
DATA					
Synthesis	15a	Describe criteria under which study data will be quantitatively synthesized	☒	☐	185-189
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., I^2, Kendall's tau)	☐	☒	
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-	☐	☒	

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		regression)			
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	☒	☐	194-196
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)	☒	☐	194-196
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	☒	☐	194-196