Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Hypertension evidence-based nutrition practice guideline.

Bibliographic Source(s)

Academy of Nutrition and Dietetics. Hypertension evidence-based nutrition practice guideline. Chicago (IL): Academy of Nutrition and Dietetics; 2015. Various p.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Dietetic Association (ADA). Hypertension evidence based nutrition practice guideline. Chicago (IL): American Dietetic Association (ADA); 2008. Various p. [3 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Recommendations

Major Recommendations

Ratings for the strength of the recommendations (Strong, Fair, Weak, Consensus, Insufficient Evidence), conclusion grades (I-V), and statement labels (Conditional versus Imperative) are defined at the end of "Major Recommendations."

Hypertension (HTN): Medical Nutrition Therapy (MNT) 2015

HTN: Effectiveness of MNT

MNT provided by a registered dietitian nutritionist (RDN) is recommended to reduce blood pressure (BP) in adults with HTN. A strong body of research indicates that MNT provided by an RDN using individual or group sessions reduces BP in persons with HTN or pre-hypertension.

Strong, Imperative

HTN: Duration and Frequency of MNT Encounters

To reduce BP in adults with HTN, the RDN should provide MTN encounters at least monthly for the first year. After the first year, the RDN should schedule follow up sessions at least two to three times per year to maintain reductions in BP. A strong body of research indicates that reductions in systolic blood pressure (SBP) up to 10 mmHg and in diastolic blood pressure (DBP) up to 6 mmHg were achieved in the first three months of MNT provided every other week for at least three sessions. Similar significant reductions in BP were reported at six to 12 months when

MNT was provided at least monthly, or with follow-up provided after five or more sessions. Sustained reductions in BP for up to four years were reported when MNT was provided at least two to three times per year.

Strong, Imperative

Recommendation Strength Rationale

- Conclusion statement is Grade I.

HTN: Vitamin D 2015

HTN: Vitamin D

The RDN should encourage adults with HTN to consume adequate amounts of vitamin D to meet the dietary reference intakes (DRI). While important for health, vitamin D may or may not aid in BP control. Data from observational and intervention studies are inconclusive regarding the association between vitamin D status or intake (from supplements or food sources) and BP in individuals with HTN.

Weak, Imperative

Recommendation Strength Rationale

- Conclusion statement is Grade III.

HTN: Potassium 2015

HTN: Dietary Potassium

The RDN should encourage adults with HTN to consume adequate amounts of dietary potassium to meet the DRI to aid in BP control. Research indicates that potassium excretion as a marker of dietary intake was inversely associated with BP. In a dietary intervention study, increasing potassium intake up to 2,000 mg increased the likelihood of DBP control.

Fair, Imperative

HTN: Potassium Supplements

If an adult with HTN is unable to meet the DRI for potassium with diet and food alone, and if not contraindicated by risks and harms, the RDN may consider recommending potassium supplementation of up to 3,700 mg per day to aid in BP control. Research indicates that potassium supplementation up to approximately 3,700 mg reduced SBP and DBP by 3 mmHg to 13 mmHg and 0 mmHg to 8 mmHg, respectively, in adults with HTN.

Fair, Conditional

Recommendation Strength Rationale

- Conclusion statements are Grade II.

HTN: Calcium 2015

HTN: Dietary Calcium

The RDN should encourage adults with HTN to consume adequate amounts of dietary calcium to meet the DRI to aid in BP control. Research indicates that dietary calcium intake of 800 mg or more per day reduced SBP up to 4 mmHg and DBP up to 2 mmHg in adults with HTN.

Fair, Imperative

HTN: Calcium Supplements

If an adult with HTN is unable to meet the DRI for calcium with diet and food alone, the RDN may consider recommending calcium supplementation of 1,000 mg to 1,500 mg per day to aid in BP control. A strong body of research indicates that calcium supplementation of 1,000 mg to 1,500 mg per day reduced SBP up to 3.0 mmHg and DBP up to 2.5 mmHg in adults with HTN.

Strong, Conditional

Recommendation Strength Rationale

- Conclusion statement for *Dietary Calcium* is Grade II.
- Conclusion statement for *Calcium Supplements* is Grade I.

HTN: Magnesium 2015

HTN: Dietary Magnesium

The RDN should encourage adults with HTN to consume adequate amounts of dietary magnesium to meet the DRI. While important for health, adequate dietary magnesium may or may not aid in BP control. Results from two studies suggest that the relationship between magnesium intake from food sources and BP in adults with HTN is unclear.

Weak, Imperative

HTN: Magnesium Supplements

If an adult with HTN is unable to meet the DRI for magnesium through food and diet alone, the RDN may consider recommending magnesium supplementation of up to 350 mg per day to aid in BP control. Research indicates that magnesium supplementation of 240 mg up to 1,000 mg per day reduced SBP by 1.0 mmHg to 5.6 mmHg and DBP by 1.0 mmHg to 2.8 mmHg in adults with HTN.

Fair, Conditional

Recommendation Strength Rationale

- Conclusion statement for *Dietary Magnesium* is Grade III.
- Conclusion statement for *Magnesium Supplements* is Grade II.

HTN: Sodium 2015

HTN: Sodium

The RDN should counsel on reducing sodium intake for BP reduction in adults with HTN. Research indicates that lowering dietary sodium intake to 1,500 mg to 2,000 mg per day reduced SBP and DBP up to 12 mmHg and 6 mmHg, respectively.

Strong, Imperative

Recommendation Strength Rationale

- Conclusion statement is Grade I.

HTN: Dietary Approaches to Stop Hypertension (DASH) Dietary Pattern 2015

HTN: DASH Diet

The RDN should counsel on a DASH dietary pattern plus reduced sodium intake for BP reduction in adults with HTN. Research indicates that in adults with pre-hypertension and HTN, the DASH dietary pattern, compared with the typical American diet lowered SBP by 5 mmHg to 6 mmHg and DBP by 3 mmHg. Reducing sodium intake in those consuming the typical American diet or DASH diet also lowered BP. DASH in combination with a reduced sodium diet lowered BP more than reduced sodium intake alone. The effect was greater in those with HTN.

Strong, Imperative

HTN: DASH Diet and Weight Reduction

For overweight or obese adults with HTN, the RDN should counsel on a calorie-controlled DASH dietary pattern for weight management and BP reduction. Research indicates that the DASH diet with a sodium range of 1,500 mg to 2,400 mg reduced SBP by 2 mmHg to 11 mmHg and DBP by 0 mmHg to 9 mmHg in overweight or obese hypertensive adults, regardless of anti-hypertensive medications. DASH plus weight reduction resulted in greater reductions in SBP of 11 mmHg to 16 mmHg and DBP of 6 mmHg to 10 mmHg than weight reduction alone.

Strong, Imperative

Recommendation Strength Rationale

- Conclusion statements from the American Heart Association/American College of Cardiology (AHA/ACC) Prevention Guideline supporting *HTN: DASH Diet* – Strength of Evidence: High, High, Moderate

- Conclusion statement for *DASH Diet and Weight Reduction* is Grade I.

HTN: Alcohol 2015

HTN: Alcohol Intake in Moderate Drinkers

If an adult with HTN is a moderate drinker, the RDN should advise that reducing or refraining from alcohol may or may not aid in BP management. Research indicates that the effect of alcohol on BP is unclear in moderate drinkers with HTN, since studies in this population yielded contradictory results.

Weak, Conditional

HTN: Alcohol Intake in Heavy Drinkers

If an adult with HTN is a heavy drinker, the RDN should recommend abstinence from alcohol to aid in BP management. Research indicates that abstinence from alcohol resulted in a decrease in SBP of up to 28 mmHg and a decrease in DBP of up to 18 mmHg in chronic heavy drinkers with HTN.

Strong, Conditional

Recommendation Strength Rationale

- Conclusion statement for *HTN: Alcohol Intake in Moderate Drinkers* is Grade III.
- Conclusion statement for *HTN: Alcohol Intake in Heavy Drinkers* is Grade I.

HTN: Physical Activity 2015

HTN: Physical Activity

The RDN should encourage adults with HTN to engage in regular aerobic activity to lower BP. Physical activity should be of moderate intensity to vigorous intensity three to four times per week for an average of 40 minutes per session. Research indicates that among adult men and women at all BP levels, including individuals with HTN, aerobic physical activity decreases systolic BP and diastolic BP, on average by 2 mmHg to 5 mmHg and 1 mmHg to 4 mmHg, respectively. Typical interventions shown to be effective for lowering BP include aerobic physical activity of, on average, at least 12 weeks of duration, with three to four sessions per week, lasting on average 40 minutes per session and involving moderate-intensity to vigorous-intensity physical activity.

Strong, Imperative

Recommendation Strength Rationale

- Conclusion statement from the AHA/ACC Prevention Guideline Strength of Evidence: High.

Definitions

Recommendations are categorized in terms of either *imperative* or *conditional* statements.

- *Imperative* statements are broadly applicable to the target population and do not impose restraints on their pertinence. Imperative recommendations may include terms such as "should" or "may" and do not contain conditional text that would limit their applicability to specified circumstances.
- *Conditional* statements clearly define a specific situation or population. Conditional recommendations are often presented in an if/then format, such that
  if CONDITION then ACTION(S) because REASON(S)

Fulfillment of the condition triggers one or more guideline-specified actions.

Conclusion Grading Table

Strength of Evidence Elements	Grades				
	I Good/Strong	II Fair	III Limited	IV Expert Opinion Only	V Grade Not Assignable
Quality • Scientific rigor/validity • Considers design and execution	Studies of strong design for question Free from design flaws, bias and execution problems	Studies of strong design for question with minor methodological concerns OR Only studies of weaker study design for question	Studies of weak design for answering the question OR Inconclusive findings due to design flaws, bias or execution problems	No studies available Conclusion based on usual practice, expert consensus, clinical experience, opinion, or extrapolation from basic research	No evidence that pertains to question being addressed
Consistency Of findings across studies	Findings generally consistent in direction and size of effect or degree of association, and statistical significance with minor exceptions at most	Inconsistency among results of studies with strong design OR Consistency with minor exceptions across studies of weaker designs	Unexplained inconsistency among results from different studies OR Single study unconfirmed by other studies	Conclusion supported solely by statements of informed nutrition or medical commentators	Not available
Quantity • Number of studies • Number of subjects in studies	One to several good quality studies Large number of subjects studies Studies with negative results having sufficiently large sample size for adequate statistical power	Several studies by independent investigators Doubts about adequacy of sample size to avoid Type I and Type II error	Limited number of studies Low number of subjects studies and/or inadequate sample size within studies	Unsubstantiated by published studies	Relevant studies have not been done
Clinical Impact • Importance of studies outcomes • Magnitude of effect	Studied outcome relates directly to the question Size of effect is clinically meaningful Significant (statistical) difference is large	Some doubt about the statistical or clinical significance of effect	Studies outcome is an intermediate outcome or surrogate for the true outcome of interest OR Size of effect is small or lacks statistical and/or clinical significance	Objective data unavailable	Indicates area for future research

Strength of Evidence Elements	I Good/Strong	II Fair	III Limited	IV Expert Opinion Only	V Grade Not Assignable
Generalizability To population of interest	Studied population, intervention and outcomes are free from serious doubts about generalizability	Minor doubts about generalizability	Serious doubts about generalizability due to narrow or different study population, intervention or outcomes studied	Generalizability limited to scope of experience	Not available

Adapted by the Academy of Nutrition and Dietetics (AND) from: Greer N, Mosser G, Logan G, Wagstrom Halaas G. A practical approach to evidence grading. Jt Comm. J Qual Improv. 2000; 26:700-712.

Criteria for Recommendation Rating

Statement Rating	Definition	Implication for Practice
Strong	A Strong recommendation means that the workgroup believes that the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation), and that the quality of the supporting evidence is excellent/good (grade I or II). In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Fair	A Fair recommendation means that the workgroup believes that the benefits exceed the harms (or that the harms clearly exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong (grade II or III). In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.	Practitioners should generally follow a Fair recommendation but remain alert to new information and be sensitive to patient preferences.
Weak	A Weak recommendation means that the quality of evidence that exists is suspect or that well-done studies (grade I, II, or III) show little clear advantage to one approach versus another.	Practitioners should be cautious in deciding whether to follow a recommendation classified as Weak, and should exercise judgment and be alert to emerging publications that report evidence. Patient preference should have a substantial influencing role.
Consensus	A Consensus recommendation means that Expert opinion (grade IV) supports the guideline recommendation even though the available scientific evidence did not present consistent results, or controlled trials were lacking.	Practitioners should be flexible in deciding whether to follow a recommendation classified Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.
Insufficient Evidence	An Insufficient Evidence recommendation means that there is both a lack of pertinent evidence (grade V) and/or an unclear balance between benefits and harms.	Practitioners should feel little constraint in deciding whether to follow a recommendation labeled as Insufficient Evidence and should exercise judgment and be alert to emerging publications that report evidence that clarifies the balance of benefit versus harm. Patient preference should have a substantial influencing role.

Adapted by the Academy of Nutrition and Dietetics (AND) from the American Academy of Pediatrics, Classifying Recommendations for Clinical Practice Guideline, Pediatrics. 2004;114;874-877. Revised by the AND Evidence-Based Practice Committee, Feb 2006.

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Hypertension (HTN):

- Pre-hypertension (120-139/80-89 mmHg)
- Stage 1 hypertension HTN (140-159/90-99 mmHg)
- Stage 2 HTN (≥160/≥100 mmHg)

Guideline Category

Counseling

Management

Treatment

Clinical Specialty

Cardiology

Family Practice

Internal Medicine

Nursing

Nutrition

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Dietitians

Health Care Providers

Nurses

Physical Therapists

Physician Assistants

Physicians

Public Health Departments

Students

Guideline Objective(s)

Overall Objective

To provide medical nutrition therapy (MNT) guidelines for hypertension (HTN)

Specific Objectives

- To define evidence-based recommendations for registered dietitian nutritionists (RDNs) that are carried out in collaboration with other healthcare providers
- To guide practice decisions that integrate medical and lifestyle interventions (nutritional, physical activity, and behavioral elements)
- To reduce variations in practice among RDNs
- To promote self-management strategies that empower the patient to take responsibility for day-to-day management and to provide the RDN with data to make recommendations to adjust MNT or recommend other therapies to achieve clinical outcomes
- To enhance the quality of life for the patient, utilizing customized strategies based on the individual's preferences, lifestyle and goals
- To develop content for intervention that can be tested for impact on clinical outcomes
- To define the highest quality of care within cost constraints of the current healthcare environment

Target Population

- Adult patients (19 to 79 years) with pre-hypertension or hypertension (HTN)
- Population groups where the HTN recommendations may be indicated include:
    - Cardiovascular disease
    - Diabetes mellitus (type 2)
    - Overweight and obese
    - Older persons
    - Individuals with unhealthy lifestyle (high sodium intake, excessive alcohol intake, low physical activity)
    - African Americans

Note: The scope of the guideline is not intended for the following: people with HTN related to chronic kidney disease, normotensive adults for prevention of HTN, and children and teens.

Interventions and Practices Considered

Screening and Referral

1. Medical nutrition therapy (MNT) provided by a registered dietician nutritionist (RDN)
2. Duration and frequency of MNT

Nutrition Interventions

1. Encouraging vitamin D consumption from diet or supplements
2. Encouraging potassium consumption from diet or supplements
3. Encouraging calcium consumption from diet or supplements
4. Encouraging magnesium consumption from diet or supplements
5. Counseling on reducing dietary sodium intake
6. Counseling on Dietary Approaches to Stop Hypertension (DASH) dietary pattern
7. Counseling on a calorie-controlled DASH dietary pattern for weight reduction
8. Providing advice on alcohol reduction or abstinence in moderate and heavy drinkers
9. Encouraging aerobic physical activity

Major Outcomes Considered

- Blood pressure (BP) control
- Reduction in systolic BP (SBP) and diastolic BP (DBP)

- Costs of medical care
- Risks and harms associated with supplements

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

General Methods for Collecting/Selecting the Evidence

The following list provides an overview of the steps which the Academy evidence analysis team goes through to identify research through database searches.

1. Plan the search strategy to identify the current best evidence relevant to the question. The plan for identification and inclusion of articles and reports should be systematic and reproducible, not haphazard. Write out the original search strategy and document adjustments to the strategy if they occur. Allow for several iterations of searches.
    - List inclusion and exclusion criteria. The workgroup will define the inclusion and exclusion criteria. These criteria will be used in defining the search strategy and for filtering the identified research reports. The Academy uses only peer-reviewed research; that is, articles accepted for evidence analysis must be peer-reviewed and published in a juried publication. Additionally, the Academy only uses human subjects in its research and does not include animal studies in its evidence analysis.
    - Identify search words. During the process of considering outcomes, interventions, nutrition diagnoses, and assessments, the workgroup may have identified a number of specific terms or factors that were important, but were not included in the actual question. These terms can be used as additional search terms to help identify relevant pieces of research. Both text word search and keyword search using Medical Subject Headings (MeSH) definitions may be used.
    - Identify databases to search. PubMed, Medline, CINAHL, EMBASE, Cochrane, Agricola, DARE, TRIP, AHRQ and ERIC are some common databases for clinical nutritional research. Note that search terms can vary depending on the database.
2. Conduct the search. Depending on the number and type of sources found in the initial search, adjustments might have to be made in the search strategy and to inclusion/exclusion criteria, and additional searches run. Changes to the search plan should be recorded for future reference. Document the number of sources identified in each search.
3. Review titles and abstracts. At this point, a filtering procedure is used to determine whether a research article matches the inclusion criteria and is relevant to the work group's questions. Typically, the lead analyst, along with a member of the expert workgroup, first reviews the citations and abstracts to filter out reports that are not applicable to the question. If a determination cannot be made based on the citation and abstract, then the full text of the article is obtained for review.
4. Gather all remaining articles and reports. Obtain paper or electronic copies of research articles that remain on the list following the citation and abstract review. If there are less than six citations, it could mean that the search was too specific to identify relevant research or that research has not been done on this topic. A broadened search should be tried. When there is a long list of citations, ascertain whether it includes articles that are tangential to the question or address the question in only a general way. In this case a more focused search strategy may be necessary.

Specific Methods for This Guideline

The recommendations in the guideline were based on a systematic review of the literature. Searches of PubMed were performed on the following topics:

- Medical nutrition therapy (MNT)
- Vitamins (vitamin D)
- Minerals (potassium, calcium, magnesium, and sodium)

- DASH diet patterns
- Alcohol
- Physical activity

Each evidence analysis topic has a link to supporting evidence, where the Search Plan and Results can be found. Here, the reader can view when the search plan was performed, inclusion and exclusion criteria, search terms, databases that were searched and the excluded articles.

Number of Source Documents

The number of supporting documents for all of the reviewed topics is below:

- Recommendations: 15
- Conclusion statements: 13
- Evidence summaries: 13
- Article worksheets: 69

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Conclusion Grading Table

Strength of Evidence Elements	**Grades**				
	I Good/Strong	**II Fair**	**III Limited**	**IV Expert Opinion Only**	**V Grade Not Assignable**
Quality • Scientific rigor/validity • Considers design and execution	Studies of strong design for question Free from design flaws, bias and execution problems	Studies of strong design for question with minor methodological concerns OR Only studies of weaker study design for question	Studies of weak design for answering the question OR Inconclusive findings due to design flaws, bias or execution problems	No studies available Conclusion based on usual practice, expert consensus, clinical experience, opinion, or extrapolation from basic research	No evidence that pertains to question being addressed
Consistency Of findings across studies	Findings generally consistent in direction and size of effect or degree of association, and statistical significance with minor exceptions at most	Inconsistency among results of studies with strong design OR Consistency with minor exceptions	Unexplained inconsistency among results from different studies OR Single study unconfirmed by other studies	Conclusion supported solely by statements of informed nutrition or medical commentators	Not available

Strength of Evidence Elements			Grades		
	I Good/Strong	II Fair	III Limited	IV Expert Opinion Only	V Grade Not Assignable
Quantity • Number of studies • Number of subjects in studies	One to several good quality studies Large number of subjects studies Studies with negative results having sufficiently large sample size for adequate statistical power	Several studies by independent investigators Doubts about adequacy of sample size to avoid Type I and Type II error	Limited number of studies Low number of subjects studies and/or inadequate sample size within studies	Unsubstantiated by published studies	Relevant studies have not been done
Clinical Impact • Importance of studies outcomes • Magnitude of effect	Studied outcome relates directly to the question Size of effect is clinically meaningful Significant (statistical) difference is large	Some doubt about the statistical or clinical significance of effect	Studies outcome is an intermediate outcome or surrogate for the true outcome of interest OR Size of effect is small or lacks statistical and/or clinical significance	Objective data unavailable	Indicates area for future research
Generalizability To population of interest	Studied population, intervention and outcomes are free from serious doubts about generalizability	Minor doubts about generalizability	Serious doubts about generalizability due to narrow or different study population, intervention or outcomes studied	Generalizability limited to scope of experience	Not available

Adapted by the Academy of Nutrition and Dietetics (AND) from: Greer N, Mosser G, Logan G, Wagstrom Halaas G. A practical approach to evidence grading. Jt Comm. J Qual Improv. 2000; 26:700-712.

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Step 1: Formulate the Evidence Analysis Question

Specify a focused question in a defined area of practice. Three key items are used to generate good quality questions: an analytical framework to identify links between factors and outcomes; the PICO (population, intervention, comparison intervention, outcome) format to write questions; and the Nutrition Care Process to serve as a framework.

Step 2: Gather and Classify the Evidence

This step involves developing a search plan to conduct a detailed literature search. The search plan clearly defines the inclusion and exclusion criteria and identifies the key search terms and outcomes necessary to conduct a comprehensive search. The search plan and all literature search results are documented and assessed for inclusion eligibility.

Step 3: Critically Appraise Each Article (Risk of Bias)

This step involves critically assessing each included article for methodologic quality. Each study is evaluated based on appropriateness of study design and the quality of how the study was conducted by using the Academy's risk of bias tool called the Quality Criteria Checklist (QCC).

Step 4: Summarize the Evidence

This step involves achieving two major tasks. First, key data from the included articles is extracted by using the Academy's Web-based data extraction template. Second, summarizing the evidence extracted from each study into a brief, coherent, and easy-to-read summary. The end result of this phase is called the Evidence Summary.

Step 5: Write and Grade the Conclusion Statement

This step includes developing a concise conclusion statement for the research question and assigning a grade to the conclusion statement. The grade reflects the overall strength and weakness of evidence in forming the conclusion statement. The grading scale used by the Academy is: Grade I (good/strong), II (fair), III (limited/weak), IV (expert opinion only), or V (not assignable) (see the "Rating Scheme for the Strength of the Evidence" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Development of Evidence-Based Nutrition Practice Guidelines

The expert work group, which includes practitioners and researches with a depth of experience in the specific field of interest, develops the disease-specific guideline. The guideline development involved the following steps:

1. Review the conclusion statements: The workgroup meets to review the materials resulting from the evidence analysis, which may include conclusion statements, evidence summaries, and evidence worksheets.
2. Formulate recommendations for the guideline integrating conclusions from evidence analysis: The workgroup uses an expert consensus method to formulate the guideline recommendations and complete the various sections on the recommendation page. These include:
    - Recommendation(s): This is a course of action for the practitioner. The recommendation is written using two brief and separate statements. The first statement is "what" the dietitian should do or not do. The second statement describes the "why" of the recommendation. More than one recommendation may be formulated depending on a particular topic and the supporting conclusion statements.

        Rating: The rating for the recommendation is based on the strength of the supporting evidence. The grade of the supporting conclusion statement(s) will be help determining this rating (see the "Rating Scheme for the Strength of the Recommendations" field).

        Label of conditional or imperative: Each recommendation will have a label of "conditional" or "imperative." Conditional statements clearly define a specific situation, while imperative statements are broadly applicable to the target population without restraints on their pertinence.

        Risks and harms of implementing the recommendations: Includes any potential risks, anticipated harms or adverse consequences associated with applying the recommendation(s) to the target population.

        Conditions of application: Includes any organizational barriers or changes that would need to be made within an organization to apply the recommendation in daily practice. Also includes any conditions which may limit the application of the recommendation(s). For instance, application may be limited to only people in an inpatient setting, or not applicable for pregnant women. Facilitators for the application of the guideline may also be listed here. Conditional recommendations will always have conditions specified. Imperative recommendations may have some general conditions for application.

        Potential costs associated with application: Includes any costs that may be associated with the application of this recommendation such as specialized staff, new equipment or treatments.

        Recommendation narrative: Provides a brief description of the evidence that supports this recommendation.

        Recommendation strength rationale: Provides a brief list of the evidence strength and methodological issues that determined the recommendation strength.

        Minority opinions: If the expert work group cannot reach consensus on the recommendation, the minority opinions may be

listed here.
Supporting evidence: Provides links to the conclusions statements, evidence summaries and worksheets related to the formulation of this recommendation(s).

3. References not graded in the Academy's evidence analysis process: Recommendations are based on the summarized evidence from the analysis. Sources that are not analyzed during the evidence analysis process may be used to support and formulate the recommendation or to support information under other categories on the recommendation page, if the workgroup deems necessary. References must be credible resources (e.g., consensus reports, other guidelines, position papers, standards of practice, articles from peer-reviewed journals, nationally recognized documents or Web sites). If recommendations are based solely on these types of references, they will be rated as "consensus." Occasionally recommendations will include references that were not reviewed during the evidence analysis process but are relevant to the recommendation, risks and harms of implementing the recommendation, conditions of application, or potential costs associated with application. These references will be listed on the recommendation page under "References Not Graded in the Academy's Evidence Analysis Process."
4. Develop a clinical algorithm for the guideline: The workgroup develops a clinical algorithm based on Academy's Nutrition Care Process, to display how each recommendation can be used within the treatment process and how they relate to the Nutrition Assessment, Diagnosis, Intervention and Monitoring and Evaluation.
5. Complete the writing of the guideline: Each disease-specific guideline has a similar format which incorporates the Introduction (includes: Scope of the Guideline, Statement of Intent, Guideline Methods, Implementation, Benefits and Risks/Harms of Implementation), Background Information and any necessary Appendices. The work group develops these features.
6. Criteria used in guideline development: The criteria used in determining the format and process for development of Academy's guidelines are based on the following tools and criteria for evidence-based guidelines:
   - Guideline Elements Model (GEM), which has been incorporated by the American Society for Testing and Materials (ASTM) as a Standard Specification for clinical practice guidelines.
   - Appraisal for Guidelines Research and Evaluation (AGREE) Instrument
   - National Guideline Clearinghouse (NGC) www.guideline.gov.

Rating Scheme for the Strength of the Recommendations

Conditional versus Imperative Recommendations

Recommendations are categorized in terms of either *imperative* or *conditional* statements.

Imperative statements are broadly applicable to the target population and do not impose restraints on their pertinence. Imperative recommendations may include terms such as "should" or "may" and do not contain conditional text that would limit their applicability to specified circumstances.
Conditional statements clearly define a specific situation or population. Conditional recommendations are often presented in an if/then format, such that
if CONDITION then ACTION(S) because REASON(S)

Fulfillment of the condition triggers one or more guideline-specified actions.

Criteria for Recommendation Rating

Statement Rating	Definition	Implication for Practice
Strong	A Strong recommendation means that the workgroup believes that the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation), and that the quality of the supporting evidence is excellent/good (grade I or II). In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Fair	A Fair recommendation means that the workgroup believes that the benefits	Practitioners should generally follow a Fair

Statement Rating	Definition	Implication for Practice
	exceed the harms (or that the harms clearly exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong (grade II or III). In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.	recommendation but remain alert to new information and be sensitive to patient preferences.
Weak	A Weak recommendation means that the quality of evidence that exists is suspect or that well-done studies (grade I, II, or III) show little clear advantage to one approach versus another.	Practitioners should be cautious in deciding whether to follow a recommendation classified as Weak, and should exercise judgment and be alert to emerging publications that report evidence. Patient preference should have a substantial influencing role.
Consensus	A Consensus recommendation means that Expert opinion (grade IV) supports the guideline recommendation even though the available scientific evidence did not present consistent results, or controlled trials were lacking.	Practitioners should be flexible in deciding whether to follow a recommendation classified Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.
Insufficient Evidence	An Insufficient Evidence recommendation means that there is both a lack of pertinent evidence (grade V) and/or an unclear balance between benefits and harms.	Practitioners should feel little constraint in deciding whether to follow a recommendation labeled as Insufficient Evidence and should exercise judgment and be alert to emerging publications that report evidence that clarifies the balance of benefit versus harm. Patient preference should have a substantial influencing role.

Adapted by the Academy of Nutrition and Dietetics (AND) from the American Academy of Pediatrics, Classifying Recommendations for Clinical Practice Guideline, Pediatrics. 2004;114;874-7. Revised by the AND Evidence-Based Practice Committee, Feb 2006.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Each guideline is reviewed internally and externally using the Appraisal of Guidelines for Research and Evaluation (AGREE) instrument as the evaluation tool. The external reviewers consist of a multidisciplinary group of individuals (may include dietitians, doctors, psychologists, nurses, etc.). The guideline is adjusted by consensus of the expert panel and approved by Academy's Evidence-Based Practice Committee prior to publication on the Evidence Analysis Library (EAL).

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

The guideline contains conclusion statements that are supported by evidence summaries and evidence worksheets. These resources summarize the important studies (randomized controlled trials [RCTs], clinical trials, observational studies, cohort and case-control studies) pertaining to the conclusion statement and provide the study details.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

A priority aim and benefit of implementing the recommendations in this guideline would be to improve the percentage of individuals who are able to meet their treatment goal of reducing blood pressure (BP).

Potential Harms

Safety issues should be considered for each form of treatment recommended. Use clinical judgment when evaluating patients with co-morbid conditions.

Risk/Harm Considerations

- In healthy people, excess calcium intake from food is rare; excess intake from calcium supplements is more likely. When taking calcium supplements, individuals should not exceed the tolerable upper intake level (UL) for calcium (≥2,500 mg for age 18-50 or 2,000 mg for ≥51 years). Exceeding the UL for calcium may be associated with excessively high levels of calcium in the blood (known as hypercalcemia) that may cause renal insufficiency, vascular and soft tissue calcification, hypercalciuria (high levels of calcium in the urine) and kidney stones, constipation, interference with the absorption of iron and zinc, increased risk of kidney stones, increased risk of prostate cancer and cardiovascular disease.
- Caution use of magnesium supplements in excess of 350 mg in persons with impaired renal function or kidney failure due to increased risk of magnesium toxicity. When taking magnesium supplements, individuals should not exceed the UL for magnesium (350 mg or more). In healthy people, excess magnesium from food does not pose a health risk. High doses of supplemental magnesium (particularly the following forms: magnesium carbonate, chloride, gluconate, and oxide) or medications containing magnesium can result in diarrhea, nausea and abdominal cramping.
- When reducing sodium to control blood pressure (BP), the registered dietitian nutritionist (RDN) should apply clinical judgment for those with certain medical conditions (e.g., heart failure) and/or who are taking medications (e.g., thiazide diuretics), which can cause hyponatremia.

See also "Factors to consider when exploring treatment options" in the original guideline document under "Benefits and Risks/Harms of Implementation."

Contraindications

Contraindications

Supplementation of potassium or use of potassium-containing salt substitutes may be contraindicated in the following individuals with hypertension (HTN):

- Those with certain medical conditions, such as renal failure, diabetes mellitus with hyporeninemic hypoaldosteronism and obstructive uropathy, which impair renal excretion of potassium
- Those taking medications, such as angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, and potassium-sparing diuretics, which increase the risk of hyperkalemia

Qualifying Statements

Qualifying Statements

- This nutrition practice guideline is meant to serve as a general framework for handling clients with particular health problems. The independent skill and judgment of the health care provider must always dictate treatment decisions.
- Evidence-based nutrition practice guidelines are developed to help dietetic practitioners, patients and consumers make shared decisions about health care choices in specific clinical circumstances. If properly developed, communicated and implemented, guidelines can improve care.
- While they represent a statement of best practice based on the latest available evidence at the time of publishing, they are not intended to overrule professional judgment. Rather, they may be viewed as a relative constraint on individual clinician discretion in a particular clinical circumstance. These nutrition practice guidelines are provided with the express understanding that they do not establish or specify particular standards of care, whether legal, medical or other. The independent skill and judgment of the health care provider must always dictate treatment decisions. These nutrition practice guidelines are provided with the express understanding that they do not establish or specify particular standards of care, whether legal, medical or other.
- This guideline recognizes the role of patient preferences for possible outcomes of care, when the appropriateness of a clinical intervention involves a substantial element of personal choice or values. With regard to types of evidence that are associated with particular outcomes, two major classes have been described. Patient-oriented evidence that matters (POEM) deals with outcomes of importance to patients, such as changes in morbidity, mortality or quality of life. Disease-oriented evidence (DOE) deals with surrogate end-points, such as changes in laboratory values or other measures of response. Although the results of DOE sometimes parallel the results of POEM, they do not always correspond. When possible, the Academy of Nutrition and Dietetics (AND) recommends using POEM-type evidence rather than DOE. When DOE is the only guidance available, the guideline indicates that key clinical recommendations lack the support of outcomes evidence.

Implementation of the Guideline

Description of Implementation Strategy

The publication of this guideline is an integral part of the plans for disseminating the Academy of Nutrition and Dietetics (AND) evidence-based recommendations on hypertension (HTN) to all dietetics practitioners engaged in, teaching about or researching HTN as quickly as possible. National implementation workshops at various sites around the country and during the Academy Food Nutrition Conference Expo (FNCE) are planned. Additionally, there are recommended dissemination and adoption strategies for local use of the Academy Pediatric Weight Management Evidence-Based Nutrition Practice Guideline.

The guideline development team recommended multi-faceted strategies to disseminate the guideline and encourage its implementation. Management support and learning through social influence are likely to be effective in implementing guidelines in dietetic practice. However, additional interventions may be needed to achieve real change in practice routines.

Implementation of the Hypertension Guideline will be achieved by announcement at professional events, presentations and training. Some strategies include:

- National and local events: State dietetic association meetings and media coverage will help launch the guideline.
- Local feedback adaptation: Presentation by members of the work group at peer review meetings and opportunities for continuing education units (CEUs) for courses completed.
- Education initiatives: The guideline and supplementary resources will be freely available for use in the education and training of dietetic interns and students in approved Accreditation Council for Education in Nutrition and Dietetics (ACEND) programs.
- Champions: Local champions will be identified and expert members of the recommendation team will prepare articles for publications. Resources will be provided that include PowerPoint presentations and pre-prepared case studies.
- Practical tools: Some of the tools that will be developed to help implement the guideline include specially designed resources such as clinical algorithms, a tool kit, and a slide presentation.

Specific distribution strategies include:

Publication in full: The guideline is available electronically at the AND Evidence Analysis Library Web site and will be announced to all Academy Dietetic Practice Groups. The Academy Evidence Analysis Library will also provide downloadable supporting information.

Implementation Tools

Patient Resources

Quick Reference Guides/Physician Guides

Slide Presentation

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

Living with Illness

IOM Domain

Effectiveness

Patient-centeredness

Identifying Information and Availability

Bibliographic Source(s)

Academy of Nutrition and Dietetics. Hypertension evidence-based nutrition practice guideline. Chicago (IL): Academy of Nutrition and Dietetics; 2015. Various p.

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2015

Guideline Developer(s)

Academy of Nutrition and Dietetics - Professional Association

Source(s) of Funding

Academy of Nutrition and Dietetics (AND)

Guideline Committee

Hypertension Evidence-Based Guideline Workgroup

Composition of Group That Authored the Guideline

Workgroup Members: Diane DellaValle, PhD, RDN (*Chair);* Karen Corbin, PhD, RD (resigned 12/2014); Denise Donaldson-Kaiser, MBA, MS, RD, CDN (resigned 1/2014); Shannon Lennon-Edwards, PhD, RD; Brigid McVaugh, MS, RD/LD; Melissa Prest, MS, RD, LDN, CSR; Susan Rodder, MS, RD, LD (starting 2/2015)

Financial Disclosures/Conflicts of Interest

In the interest of full disclosure, the Academy has adopted the policy of revealing relationships workgroup members have with companies that sell products or services that are relevant to this topic. Workgroup members are required to disclose potential conflicts of interest by completing the Academy Conflict of Interest Form. It should not be assumed that these financial interests will have an adverse impact on the content, but they are noted here to fully inform readers.

Karen Corbin - received a grant from the American Heart Association, NIH

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Dietetic Association (ADA). Hypertension evidence based nutrition practice guideline. Chicago (IL): American Dietetic Association (ADA); 2008. Various p. [3 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available to members from the Academy of Nutrition and Dietetics (AND) Web site .

Availability of Companion Documents

The following is available:

- Hypertension evidence-based nutrition practice guideline. Executive summary of recommendations. Chicago (IL): Academy of Nutrition and Dietetics; 2015. Available from the Academy of Nutrition and Dietetics (AND) Web site .
- Hypertension evidence-based nutrition practice guideline. PowerPoint presentation. Chicago (IL): Academy of Nutrition and Dietetics; 2015. 39 p. Available for purchase from the eatrightStoreWeb site .
- Evidence analysis manual: research and strategic business development. Steps in the Academy evidence analysis process. Chicago (IL): Academy of Nutrition and Dietetics; 2012 Aug. 112 p. Available from the AND Web site .
- Handu D, Moloney L, Wolfram T, Ziegler P, Acosta A, Steiber A. Academy of Nutrition and Dietetics methodology for conducting systematic reviews for the Evidence Analysis Library. J Acad Nutr Dietet. 2016 Feb;116(2):311-8. Available from the AND Web site .

Patient Resources

The following is available:

- You and your blood pressure: beating out hypertension. Chicago (IL): Academy of Nutrition and Dietetics; 2013. Available from the eatrightStore Web site .

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This summary was completed by ECRI on September 1, 1998. It was verified by the guideline developer on December 1, 1998. The summary was updated by ECRI on April 16, 2004. The updated information was verified by the guideline developer on June 21, 2004. This summary was updated by ECRI Institute on November 6, 2008. The updated information was verified by the guideline developer on December 9, 2008. This summary was updated by ECRI Institute on August 3, 2016.

Copyright Statement

The Academy of Nutrition and Dietetics encourages the free exchange of evidence in nutrition practice guidelines and promotes the adaptation of the guidelines for local conditions. However, please note that guidelines are subject to copyright provisions. To replicate or reproduce this guideline, in part or in full, please obtain agreement from the Academy of Nutrition and Dietetics. Please contact Kari Kren at kkren@eatright.org for copyright permission.

When modifying the guidelines for local circumstances, significant departures from these comprehensive guidelines should be fully documented and the reasons for the differences explicitly detailed.

Disclaimer

NGC Disclaimer

The National Guideline Clearinghouseâ„¢ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria.

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.