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Effect of Lifestyle Modifications on Blood Pressure and BMI in Overweight or Obese Adults with Primary Hypertension

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EFFECT OF LIFESTYLE MODIFICATIONS ON BLOOD PRESSURE AND BMI IN OVERWEIGHT OR OBESE ADULTS WITH PRIMARY HYPERTENSION

by

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DEDICATION

I would like to dedicate this project to my grandpa Doc who was the reason for my career choice in medicine, without him I would have never been here.

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I would like to thank my advisor Dr Tom Blodgett, my professors throughout this time, Dr. Friedl, Dr Zeihen and their staff at their internal medicine clinic, and my family and friends who have dealt with me throughout this project.

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ABSTRACT

Hypertension (HTN) and obesity contribute to poor cardiovascular outcomes which can be managed with diet and exercise lifestyle changes. In addition, self-awareness (SA) of eating patterns can be a useful tool to promote adherence to lifestyle changes. The purpose of this project was to determine the effect of lifestyle education, the DASH diet, and tools to increase SA for adult clinic patients who were overweight with hypertension. The REAP and PIH tools were utilized to increase patients' SA of their diagnosis and current dietary habits. A literature search over five databases was conducted and analyzed thoroughly. National guidelines strongly recommend nonpharmacological interventions for adults who have a BMI >25 and HTN, including weight loss (WL), heart-healthy diet, sodium reduction, and increased physical activity (Whelton, et al., 2018). The literature identified aerobic exercise and the DASH diet as the best options for BP reduction and WL, while increasing participant's SA allows for a greater sense of self-worth and motivation to follow through with their WL (Jarl, et al., 2014; Kurcharska, et al., 2018). Patients included were recruited from a primary care clinic, 18 years old, had a BMI >25, and diagnosed with HTN. Education about HTN, obesity, the DASH diet, aerobic exercise, and how the REAP and PIH tools can raise SA about eating habits was proved monthly for 3 months. Participants' scores and demographics were recorded at baseline and at 3-months and were analyzed. Data between the pre- and post-intervention groups were analyzed using paired sample t-tests. The mean pre-intervention and post-intervention scores were analyzed using paired t-tests. No significant difference in BP and BMI was found, however there was a significant increase in PIH and REAP scores. The results demonstrated that a three-month program to reduce blood pressure and BMI may need a longer period of time to be successful. However, there were secondary outcomes that demonstrated increased self-awareness of eating habits and personal knowledge of their disease process.

CHAPTER 1

INTRODUCTION

Background

In the United states more cardiovascular deaths are related to hypertension than to any other modifiable risk factor such as smoking, dyslipidemia and poor dietary habits. Hypertension that is untreated or poorly controlled leads to significant morbidity and mortality, including cerebrovascular accidents, coronary artery disease, myocardial infarction, heart failure, and chronic kidney disease. Hypertension has been defined by the American Heart Association and the American College of Cardiology as a systolic blood pressure of 130mmHg or higher or diastolic blood pressure of 80mmHg or higher (Whelton, et al., 2017). These cutoff points were identified based on large epidemiologic studies that examined the risk for major atherosclerotic events at various blood pressure targets. Risk factors for primary, or essential, hypertension include: family history, gender, race, lack of physical activity, unhealthy diet, BMI over 25, sleep apnea, heavy alcohol use, high cholesterol, diabetes, and smoking (American Heart Association, 2017).

Of the 85.7 million individuals in the United States with hypertension, approximately half have a sustained blood pressure that is either untreated or poorly controlled (Mozaffarian, et al., 2016), which substantially increases the burden of chronic disease among adults and older adults. Although there is a linear relationship between blood pressure and major atherosclerotic event risk, this relationship becomes significantly more pronounced when the systolic blood pressure is at least 130 mmHg, or the diastolic blood pressure is at least 80 mmHg. Using this cutoff, the nationwide prevalence of hypertension is approximately 46% compared to 32% using a cutoff of 140/90 (Whelton et al., 2017). Furthermore, using the lower target goal emphasizes the importance of prevention, early detection, and aggressive treatment to decrease the risk of

cardiovascular disease. Effective blood pressure management has been shown to decrease the incidence of stroke, heart attack and heart failure (Fryar, et al., 2017).

The relationship between hypertension and poor cardiovascular outcomes is clear. However, a growing body of evidence also confirms that there are many additional factors that moderate this relationship. Among the most significant of these moderating factors is obesity (Hedayati, Elsayed & Reilly, 2011; James, et al., 2014; Jurio-Iriarte, & Maldonado-Martín, 2019; Leskinen, et al., 2018; Scordo, 2018; Semlitsch, et al., 2016). Obesity is defined as a body mass index (BMI) greater than or equal to 30 and as of 2016, about 93.3 million American adults were categorized as obese (CDC, 2018). Risk factors for obesity include: dietary patterns, physical inactivity, medication use, education, food marketing and environment (CDC, Adult obesity, 2017).

Research shows that approximately 60% of overweight and obese patients are found to have hypertension (Kyriazis, et al., 2014). The risk for cardiovascular disease, stroke, coronary artery disease, type 2 diabetes, and hypertension in obese individuals is significantly higher than in normal weight individuals (Benjamin, et al., 2018; Kyriazis, et al., 2014). Moreover, approximately 22.4% of all male deaths and 20.7% of all female deaths in 2015 were caused by poor dietary factors (Benjamin, et al., 2018). In 2017, the United States had 35,316 deaths from essential hypertension and hypertensive renal disease: about 10.8 deaths per 100,000 population (CDC, National, 2017). Both obesity and primary hypertension are modifiable risk factors that can be addressed through both diet and exercise.

In this chapter, the significance of hypertension and obesity in the primary care setting will be described. In addition, data supporting the urgent need for evidence-based concurrent management of hypertension and obesity at the project site was provided.

Statement of the Problem

Because hypertension and obesity both contribute to poor cardiovascular outcomes, and adults seeking primary care services often present with both hypertension and obesity, this

evidence-based practice project focused on the use of interventions to treat both of these conditions simultaneously to improve cardiovascular health.

Data from the Literature Supporting Need for the Project

Hypertension and obesity are two of the most prevalent chronic health conditions in the primary care setting, and they often occur together. These conditions are also quite challenging to manage as they are usually multifactorial and based on ingrained health behaviors that patients may find exquisitely difficult to change. However, evidence shows that risk for atherosclerotic cardiovascular disease can be effectively reduced by controlling both blood pressure and weight (Ndanuko, et al., 2016; Semlitsch, et al., 2016).

Maintaining blood pressure below the cutoff level of 130/90 can decrease risk of cardiovascular disease by 15% (James, et al., 2014; Ndanuko, et al., 2016; Semlitsch, et al., 2016; Wen & Wang, 2017; Whelton, et al., 2018). Weight reduction can also decrease the risk for cardiovascular disease through its beneficial effect on hypertension and other cardiovascular risk factors (e.g. type 2 diabetes mellitus, dyslipidemia), with a 1 mmHg decrease in systolic blood pressure for each kilogram of weight lost (James, et al., 2014; Mancia, et al., 2014; Semlitsch, et al., 2016; Shoulders & Powell, 2019; Whelton, et al., 2018). Research shows that patients who lost more than 6.8 kg were able to reduce their risk for hypertension by 22% compared to those who did not lose any weight (Kyriazis, et al., 2014).

Because obesity and hypertension are both significant predictors of cardiovascular disease and controlling both of these factors can effectively reduce cardiovascular risk, primary care interventions that result in both weight loss and controlled blood pressure should be identified and implemented whenever possible. Body weight loss is among the first line therapies for individuals with hypertension (Kurcharska, et al., 2018).

Clinical practice guidelines exist for the management of both obesity and hypertension (LeBlanc, et al., 2018; Whelton, et al., 2018). Recommended interventions for both conditions include pharmacological and nonpharmacological options. While antihypertensive medications

do not directly cause weight loss, and anti-obesity medications do not directly cause blood pressure reduction, the majority of nonpharmacological interventions, such as a healthy diet and regular exercise, do appear in both sets of guidelines. In combination with prescribed antihypertensives or anti-obesity medications, patient-centered interventions that focus on diet and exercise may provide the primary care provider with the opportunity to manage these two conditions simultaneously and with great effect.

Evidence suggests that basic nutritional counseling in the primary care setting is insufficient as a strategy to change unhealthy eating behaviors (Crittenden, Seibenhener, & Hamilton, 2017). However, utilizing a simple dietary assessment tool that focuses on individual patient factors related to food intake, attitudes, and behaviors can help to bridge the gap. The Rapid Eating and Activity Assessment for Patients (REAP) tool assesses patients' overall diet quality and eating habits, assesses readiness for dietary change, and identifies patients who need further dietary counseling (Gans, et al., 2006). A case-control study by Gudjinu and Sarfo (2017), demonstrated the use of the REAP tool by showing the positive correlation of a higher REAP score and the development of type 2 diabetes mellitus. Another case-control study by Kurka, Buman, and Ainsworth (2014), proved the validity of the REAP tool in a group of healthy adult athletes to screen for eating behavior by showing that a higher score was a predictor of obesity and unhealthy eating habits. Utilizing this tool in practice could help providers understand patient's dietary habits and educate them on what modifications to make to create a healthier lifestyle.

Self-awareness is another important step in the willingness to change. The Partners in Health (PIH) scale is used to assess a patient's chronic condition self-management knowledge and behaviors. The PIH assesses the following: if patients have knowledge of their condition; if they follow a treatment plan agreed upon with a provider; if they actively share in decision making with providers; if they monitor and manage signs and symptoms of their condition; if they manage the impact the condition has on the physical, emotional and social life; and if they

adopt lifestyles that promote (Petkov, Harvey, & Battersby, 2010). Battersby and colleagues (2015), performed a randomized controlled trial in community health centers and found that the baseline PIH score could be used to effectively screen for a patient's amount of self-management knowledge about their chronic illness. Furthermore, it could be used to develop tailored educational interventions and identify sources of support based on their needs. Utilizing this scale can help providers assess the patient's awareness of their condition and where further education is need.

The Dietary Approaches to Stop Hypertension (DASH) diet has been shown to consistently lower blood pressure in a diverse range of patients with hypertension and prehypertension. The DASH diet focuses on the intake of foods rich in protein, fiber, potassium, magnesium, and calcium such as fruits, vegetables, beans, nuts, whole grains, and low-fat dairy and limiting saturated fat and sugar (Appel, et al., 1997; Kucharska, et al., 2018). The DASH diet also reduces sodium intake by limiting processed foods. Compared with a usual American diet, a DASH type dietary pattern with low sodium reduced systolic blood pressure by 7.1 mmHg in adults without hypertension and by 11.5 mmHg in adults with hypertension (Benjamin, et al., 2018).

Research also suggests that the DASH diet may be effective at reducing BMI in patients who have obesity. In a three-month randomized control trial that evaluated weight loss in adults who consumed a DASH diet, the DASH diet resulted in a mean weight loss of 4.09kg from baseline (Kucharska, et al., 2018). Alternative dietary systems, such as the Mediterranean diet, the Nordic diet, and the ketogenic diet, have also been evaluated for the management of either hypertension or obesity, but only the DASH diet has demonstrated a significant effect on both of these conditions.

Increasing physical activity is also recommended to decrease blood pressure and weight in individuals with hypertension and obesity. Physical activity has the added benefit of improving aerobic fitness, a key indicator of cardiovascular disease risk. Current guidelines for both blood

pressure and obesity management suggest at least 30 minutes of moderate intensity aerobic exercise five times a week (Appel, et al., 2018; Jenkins, et al., 2017; Kyriazis, et al., 2014; LeBlanc, et al., 2018). Additional recommendations for physical activity include resistance training, stretching exercises (e.g. yoga, tai chi), and high-intensity interval training, but participation in these activities may be limited by geographical access, affordability, and psychological or sociocultural factors.

Data from the Clinical Agency Supporting Need for the Project

The EBP project was implemented at a facility in which there was a clear need to improve the management of both obesity and hypertension. The particular facility is an internal medicine clinic located in Froedtert Kenosha Medical Center, in Kenosha, Wisconsin. There are three physicians in this clinic who each see about 15 to 20 patients per day, on average. Each of the physicians typically has one medical assistant and one nurse working with them.

Purpose of the Evidence-Based Practice Project

The purpose of this EBP project was to answer the question: Is concurrent management of obesity and hypertension achievable through the use of the DASH diet, a regular exercise program, and self-awareness of eating patterns? A literature search and appraisal of evidence led to the development of an evidence-based approach to manage both obesity and hypertension in this primary care setting. Based on this literature review, a combination of the DASH diet, regular exercise, and self-awareness of eating patterns should help participants decrease their blood pressure and body mass index. This EBP project utilizes the REAP and PIH tools to educate participants and increase self-awareness of their diagnosis and current dietary habits. Increasing participant's level of self-awareness, allowed for a greater sense of self-worth and motivation to follow through with this intervention. As a result of this EBP project, the participants developed a healthier lifestyle through diet and exercise and continue to lose weight and maintain a blood pressure below 130/80 mmHg.

PICOT Question

Specifically, this project addressed the following PICOT question: Among adults, aged 18 or older, seen in the clinic with new or current diagnosis of primary hypertension and a BMI over 25 kg/m^2 (P), does the implementation of REAP and PIH surveys monthly for 3 months, use of the DASH diet, and a moderate-intensity exercise plan (I), compared to standard primary care management of hypertension and obesity in a retrospective sample of clinic patients (C), result in decreased blood pressure and BMI (O) within three months (T)?

Significance of the EBP Project

Hypertension and obesity are often managed in the primary care setting despite their complexity, demand for clinician time, and need for regular follow-up. Primary care providers are vitally positioned to ensure that patients receive care for these conditions at primary, secondary, and tertiary levels of prevention. Because there was a high proportion of patients with both obesity and hypertension at this practice site, concurrent management of both conditions was a high priority for clinic staff.

This project aimed to implement a standardized approach to the control of blood pressure and weight in this clinic location, based on evidence-based recommendations. This practice change consisted of interventions that address diet, exercise, and self-perceptions about the patient's health behaviors. The ultimate goal of this project is to improve long-term cardiovascular outcomes in patients with hypertension and obesity using effective, but relatively inexpensive, nonpharmacological approaches that can be implemented in the primary care setting. This EBP project has the potential to significantly improve care efficiency, health outcomes, and quality of life in patients with both hypertension and obesity.

CHAPTER 2

EBP MODEL AND REVIEW OF LITERATURE

The Iowa Model of Evidence-based Practice

The DNP student facilitator elected to incorporate the Iowa Model of Evidence-based practice to provide a systematic approach to guide practice change. The following provides an overview of the Iowa Model of EBP and the application in this EBP project.

Overview of EBP Model

The Iowa Model was developed by Marita G. Titler, PhD, RN, FAAN and her colleagues at University of Iowa Hospitals and Clinics in 1994, to guide the implementation of research into clinical practice and describe knowledge transformation (Buckwalter, et al., 2017). The first step of the Iowa Model of EBP is to identify a triggering issue or opportunity for growth and how it can be applied in a clinical setting. The triggering issue or opportunity can include a clinical or patient identified issue, organizational or national initiative, data or new evidence, accrediting bodies requirements, or a philosophy of care. Once the purpose has been established, a team is formed to develop, implement and evaluate the practice change (Melnyk & Fineout-Overholt, 2019). The team determines the feasibility and effectiveness of the practice change in the clinical setting through performing a thorough literature review of current evidence. The team will then weight the quality, quantity and consistency of the evidence. If there is sufficient evidence to support this issue, the team will design and pilot the practice change. The team will ensure patient engagement, consider available resources and develop a protocol, collect the baseline data, and develop an implementation plan. The team will ensure the clinicians are aware of the implementation plan and new protocol to help promote adoption of the practice change. The pilot results will be analyzed to determine adoption or modification of the practice. If the practice change is not deemed appropriate for adoption, the team will consider

alternatives. If the practice change is deemed appropriate, the team will identify the key personnel, solidify the change into the system, and monitor results for quality improvement.

Two examples of the Iowa Model of EBP in use include a study in emergency departments to improve patient care and decrease patient falls (McCarty, et al., 2018). McCarty and colleagues are utilizing the Iowa Model of EBP to continue to track outcomes and the long-term effects (2018). Cuevas and colleagues, (2019) utilized the Iowa Model of EBP to determine the effect of implementing an evidence-based standardized diabetes medication management guideline on day of procedure blood glucose levels. They found that this standardized tool accomplished a significant improvement in provider knowledge and confidence levels in managing preoperative diabetes medications (Cuevas, et al., 2019)

Application of EBP Model to DNP Project

This project became a triggering issue because a physician identified that blood pressure management, particularly in overweight or obese adults, was a substantial problem at his clinic. Prior to the EBP project, the clinic did not have a protocol in place for educating patients on the importance of lifestyle modifications and weight loss to improve blood pressure. This problem provided a priority opportunity to promote practice change due to the research behind poor cardiovascular health leading to possible stroke or myocardial infarction.

A team was formed with the clinical staff, two physicians, and the EBP Project Leader to weigh the quality, quantity and risks associated with the evidence found. A sufficient amount of evidence was found through a systematic review of the literature to design and implement this project.

The project was implemented utilizing the resources at the clinic such as a meeting space, standardized blood pressure cuff, scale and measuring tape. Baseline data was collected, retroactively from the participants medical records. The localized protocol was implemented at this internal medicine clinic and a plan was created. The implementation plan

was discussed with the physicians and staff members at the clinic, and reinforced at frequent intervals, to ensure the highest rate of participation in the patient population.

The post-implementation data were collected and analyzed to determine if the practice change is appropriate for adoption into practice.

Strengths and Limitations of EBP Model for DNP Project

The main strength of the Iowa Model for this EBP project was that it provides a clear guideline of the steps and components that are necessary for a collaborative approach to practice change. Unique to the Iowa Model of EBP is the idea of "triggers" and the idea that evidence-based practice may be set into motion by a clinical problem or knowledge from outside of the clinical area. The Iowa Model also incorporates the many feedback loops that can occur during the development process. The feedback loops are important for the following reasons: if one finds that the topic or issue is not a priority, the individual can consider another issue; if there is insufficient evidence, the team can conduct their own research and reassemble evidence; or if the change is not appropriate for adoption into practice, the team can consider alternatives and redesign the practice change. Furthermore, the Iowa model is geared toward point of care clinicians, so it facilitates the ease and timely adoption of the EBP change allowing for a wide variety of applications (Alexander & Allen, 2011; Bergstrom, 2011; Gordon, et al., 2008; Hermes & Lee, 2009; Madsen, et al., 2005; Missal, et al., 2010; Nelson, et al., 2012; White & Spruce, 2015).

A thorough search of the literature review provided an overall positive outlook on the Iowa Model of EBP. However, the few limitations of the Iowa Model include the many steps included in the Iowa Model which require a great amount of time and commitment for the project team members, and the project members may not have the authority to implement the change (Funk, Tornquist & Champagne, 1995). One other limitation of the Iowa Model is that the model does not specifically address the process of making staff aware of the practice change (Kowal, 2010; Schaffer, Sandau, & Diedrick, 2013).

Literature Search

Sources Examined for Relevant Evidence

An extensive literature search was conducted using multiple databases including Joanna Briggs Institute EBP database, Cochrane Library, CINAHL, MEDLINE (EBSCO host) and the USPSTF guidelines. Additional literature was also obtained from citation chasing. The purpose of this literature review was to evaluate the current evidence that supported lifestyle modifications that produced blood pressure changes. The most current evidence was collected, and the best lifestyle modifications were included in the design of this evidence-based project.

Search terms included Hypertension AND Diet OR Exercise* AND “Weight loss” OR “Weight Reduction” OR “Lose Weight” OR “Blood Pressure”. The number of results found in each database can be found in Table 2.1.

Inclusion criteria for the literature search comprised of publications from 2014 to the present. The publications had to be in the English language, scholarly or peer-reviewed journals, and covering adult populations with primary hypertension. Articles that addressed other comorbidities along with hypertension were excluded. Articles that addressed secondary hypertension were also excluded.

The initial literature search of MEDLINE and CINAHL produced 388 and 279 articles respectively and after a title review for relevance 20 and 57 were deemed relevant. After the title review, 96 relevant articles were identified, of which 51 did not meet the inclusion criteria after abstract review. In addition, nine duplicates were found between these two databases. The Joanna Briggs Institute EBP database, Cochrane Library and the U.S. Preventive Services Task Force (USPSTF) were also searched and yielded an initial 15 articles and, after review, two were included. A full-text review of the remaining 36 articles resulted in seven articles plus an additional three from a hand search performed. After reviewing the full text of these ten articles, that all ten met the inclusion and exclusion criteria based on the level and quality of evidence. Results are listed below (Table 2.1).

Table 2.1

Literature Search

Database	Articles Found	Duplicates	Abstracts Read	Articles Used
Joanna Briggs Institute	4	0	2	0
Cochrane	9	0	1	1
CINAHL	57	0	16	4
Medline	20	9	11	2
USPSTF	2	0	2	1
Hand Search	6	0	6	3
Total	96	9	36	10

Table 2.2
Evidence Table

Citation	Purpose	Design	Sample	Results	Level/ Quality
Gay, Rao, Vaccarino, & Ali (2016)	To evaluate different dietary interventions on BP through DASH diet, low calorie, low sodium, low sodium and high potassium, low sodium and low calorie, Mediterranean diet.	Systematic review and meta-analysis	24 articles were included with 23,858 total participants, with interventions ranging from 6-48 months.	Net reduction SBP -3.07mmHg, DBP -1.81mmHg, DASH: SBP -7.62mmHg and DBP -4.22mmHg; low calorie: SBP -3.18mmHg, DBP -1.28mmHg; low sodium: -2.06mmHg, DBP -1.30mmHg; low sodium and high potassium: SBP -3.14mmHg, DBP -2.01mmHg; low sodium and low calorie: SBP -2.38mmHg, DBP -1.33mmHg; Med diet: SBP -1.17mmHg, DBP -1.44mmHg	Level 1 High quality: A
Jarl, Tolentino, James, Clark, & Ryan (2014)	To evaluate cardiovascular risk reduction in overweight and obese hypertensive patients through DASH diet and lifestyle education utilizing the Rapid Eating Assessment for Patients and the Partners in Health questionnaires over a 2-month period	Cohort Study	26 participants, mean age 57, initial BMI 31.5	Patients had significant improvements in diet and lifestyle scores on both of the questionnaires as well as a weight loss averaging 3.6 pounds over the two-month intervention period.	Level 4 Good quality: B
Jenkins, Boucher, Ashbury, Sloan, Brown, El-Sohemy, Hanley, Willett, Paquette, de Souza, Ireland, Kwan, Jenkins, Pichika, & Kreiger (2017).	To evaluate the effect of current dietary recommendations on weight loss and cardiovascular risk factors with a 6-month period	RCT	685 participants divided into a control group and 3 intervention groups: dietary advice from DASH diet, weekly food provision, or food provision and dietary advice	Reduction in SBP -0.6 mmHg and DBP -0.8 mmHg and a reduction of BMI of only -0.4.	Level 2 Good quality: B
Juraschek, Miller, Weaver, & Appel (2017).	To evaluate the effects of sodium reduction and the DASH diet in relation to BP	RCT	412 participants split into a control/DASH intervention group given 3 different sodium levels in their diets over a 4-week period consisting of 50, 100, or 150 mmol/day of sodium	Combination of reduced sodium intake with the DASH diet lowered the SBP -5.3mmHg in the <130 mmHg group, -7.5mmHg in the 130-139 group, -9.7mmHg in the 140-149 group and -20.8mmHg in the >150 group. The highest levels of reduction in SBP occurred in the groups with the higher baseline SBP	Level 2 High quality: A
Kucharska, Gajewska, Kiedrowski, Sinska, Juszczyk, Czerw, Augustynowicz, Bobinski, Deptala, & Niegowska (2018).	To evaluate the impact of individualized nutritional therapy utilizing the DASH diet on BP, BMI and select biochemical markers in overweight or obese individuals with primary hypertension over the course of 3 months	RCT	126 participants in the control& intervention group. intervention group consisted of DASH diet plan and individual counseling	Decreased SBP -4.63 mmHg and DBP -2.6mmHg and decrease in BMI of -1.50	Level 2 High quality: A
Kyriazis, Rekleiti, Alonistioti, Sapountzi-	To evaluate the correlation between short term minimal weight loss and BP control in obese	Cohort Study	108 participants, 46 males, 62 females, average age of 52 for	BMI results of this trial included a decrease from 33.7 to 31.9 in males and 31.2 to 29.9 in females. SBP decrease from 149 to 134 mmHg in males	Level 4

Krepia, & Saridi (2014).	patients with hypertension over a 6-month intervention period		males and 50 for females	and 144 to 138 mmHg in females and a DBP decrease from 80 to 76 mmHg in males and from 74 to 73 mmHg in females	High quality: A
Ndanuko, Tapsell, Charlton, Neale, & Batterham (2016).	To evaluate the effects of different dietary patterns on BP in adults, through the DASH, Mediterranean, Nordic and Tibetan diets	Systematic review and meta-analysis	17 RCTs, ranging from 6 weeks to 2 years, published between 1999-2014	Reductions overall SBP: -4.26 mmHg and DBP: -2.38 mmHg. Highest reductions seen with DASH (SBP: -4.90mmHg DBP: -2.63mmHg) and Nordic diets (SBP: -5.20mmHg DBP: -3.85mmHg)	Level 1 High quality: A
Wen & Wang (2017).	To examine the effects of aerobic exercise on BP in hypertensive patients	Systematic review and meta-analysis	13 RCTs, ranging from 4 weeks to 6 months, published between 1985-2015	Reductions were found in SBP and DBP in the training group versus the controls. SBP: 8.56 mmHg and DBP: 3.87 mmHg	Level 1 Good quality: B
Semlitsch, Jeitler, Berghold, Horvath, Posch, Poggenburg, & Siebenhofer (2016).	To evaluate the long-term effects of weight reducing diets in people with hypertension through the change from baseline SBP&DBP change and body weight reduction	Systematic review and meta-analysis	8 RCTs, ranging from 6-36 months, total of 2100 participants, published between 1985-1998, participants either received a dietary intervention to lose weight or no intervention	Reduced SBP: -4.5mmHg and DBP: -3.2mmHg; weight loss interventions reduced weight by 4kg	Level 1 High quality: A
Whelton, Carey, Aronow, Casey, Collins, Dennison Himmelfarb, Depalma, Gidding, Jamerson, Jones, MacLaughlin, Muntner, Ovbiagele, Smith, Spencer, Staffor, Taler, Thomas, Williams, Williamson, & Wright (2018).	Summarize the guidelines for prevention, detection, evaluation, and management of high BP in adults recommended by ACC and AHA	Executive summary for guidelines from expert opinion		Strong recommendation for nonpharmalogical interventions including weight loss to reduce BP in adults who are overweight or obese with hypertension, heart-healthy diet, sodium reduction, increased physical activity, and decreased alcohol consumption. weight loss decreased BP in hypertensive participants by 5 mmHg and 2-3mmHg in normotensive participants; heart-healthy diet decreased BP in hypertensive participants by 11 mmHg and 3mmHg in normotensive participants; and aerobic exercise of 90-150 minutes/week decreased BP in hypertensive participants by 5/8 mmHg and 2/4 mmHg in normotensive participants	Level 7 High quality: A

Abbreviations: SBP: systolic blood pressure, DBP: diastolic blood pressure, BP: blood pressure, SMD: standard mean difference

Appraisal of Relevant Evidence

The Johns Hopkins Research Evidence Based Practice Appraisal tool was used to appraise the evidence found within the literature search (Dearholt & Dang, 2017). The evidence was appraised and assigned a grade A if the literature was of high quality and had consistent, generalizable results, a sufficient sample size, adequate control group, definitive conclusions, and consistent recommendations based on comprehensive literature review. The evidence was appraised and assigned a grade B if the literature was of good quality and had reasonably consistent results, a sufficient sample size, some control, fairly definitive conclusions, and reasonably consistent recommendations based on fairly comprehensive literature review. The evidence was appraised and assigned a grade C if the literature was of low quality and had little evidence with inconsistent results, insufficient sample size, and conclusions could not be drawn (Dearholt & Dang, 2017). In the following section, analysis and quality of each piece of evidence will be discussed.

Levels of Evidence

Ten sources of evidence were evaluated and rated using Melnyk & Fineout-Overholt's (2019) hierarchy of evidence. According to this hierarchy of evidence a Level I piece of evidence includes systematic reviews or meta-analyses of all relevant randomized control trials. Four pieces of evidence were deemed Level I. A Level II piece of evidence includes well designed randomized control trials. Three pieces were deemed Level II. Level III evidence includes well-designed controlled trials without randomization. Level IV evidence includes case-control and cohort studies that are well-designed. Two pieces were deemed Level IV. Level V evidence includes systematic reviews of descriptive and qualitative studies. Level VI evidence includes single descriptive or qualitative studies. Level VII evidence includes authorities' opinions or expert committee reports (Melnyk & Fineout-Overholt, 2019). One clinical practice guideline was deemed a level VII.

Level I evidence.

Wen and Wang (2017) examined the effects of aerobic exercise on blood pressure in hypertensive patients. The researchers conducted a meta-analysis of 13 randomized control studies. The studies included varied from four weeks to six months, with publication dates ranging from 1985-2015, and were slightly unbalanced in gender distribution with more males included than females. The researchers found significant reductions of systolic blood pressure and diastolic blood pressure in the aerobic exercise training groups versus the controls of 8.56 mmHg and 3.87 mmHg, respectively. The limitations of this meta-analysis include the need for longer studies and the need for longer follow up times for more accurate results.

Gay, Rao, Vaccarina and Ali (2016) evaluated the effects of various dietary interventions on blood pressure through a systematic review of published dietary interventions for hypertension management and their estimated blood pressure effects through meta-analysis. The 24 randomized control studies included were published between 1990-2015, enrolled only adult participants, and included only participants with primary hypertension. The studies varied in duration from 6 to 48 months of follow-up. The researchers found a blood pressure lowering effect for all dietary interventions of 3.07 mmHg and 1.81 mmHg for systolic and diastolic blood pressures respectively. The researchers found that the DASH diet was associated with the greatest overall blood pressure reduction of systolic blood pressure 7.62mmHg and diastolic blood pressure 4.22mmHg, similar to single drug therapies in early stage hypertension (Gay, Rao, Vaccarina & Ali, 2016). Overall, the researchers concluded that the DASH diet had the greatest lowering effect on blood pressure, however other dietary interventions, including the Nordic and Mediterranean diets, still had lowering effects.

Ndanuko and colleagues (2016) evaluated the effects of different dietary patterns on blood pressure in adults. The 17 randomized control trials included in this systematic review were published between 1999-2014 and ranged from 6 weeks to 2 years in duration. The four main diets included were the DASH, Mediterranean, Nordic and Tibetan. The DASH and Nordic

diets showed the highest levels of blood pressure lowering; however, there was still a lowering effect with the two other diets. The overall effect of blood pressure reduction was found to be 4.26 mmHg and 2.38 mmHg in systolic and diastolic blood pressure respectively. The limitations found between the trials was the difference in how the food was controlled, either given to the participant or not which could hinder with treatment group adherence.

Semlitsch and colleagues (2016) evaluated the long-term effects of weight reducing diets in people with hypertension through the change from baseline systolic and diastolic blood pressure change and body weight reduction. The researchers included eight randomized controlled trials ranging in duration from six to 36 months with a total of 2100 participants. Three of the eight studies suggested that systolic and diastolic blood pressures were effected by weight loss interventions with outcomes of reduced systolic and diastolic blood pressures of 4.5mmHg and 3.2mmHg respectively. Five of the eight studies suggested that weight loss interventions reduced weight as shown by the 4kg weight loss compared to the controls. Overall, the researchers found a positive correlation with weight loss interventions and blood pressure.

Level II evidence.

Kucharska and colleagues (2018) evaluated the impact of individualized nutritional therapy utilizing the DASH diet on blood pressure, body mass, and select biochemical markers in overweight or obese individuals with primary hypertension. This study was a well conducted randomized control trial with a three-month nutritional intervention with the DASH diet and individualized counseling. There was a total of 126 participants in the control and intervention group for this study and all of the participants were prescribed anti-hypertensive medication prior to the start of the trial. The intervention group was provided an individualized nutrition counseling and a three-month diet plan with monthly individual follow up appointments. The intervention group had significant reductions in the systolic and diastolic blood pressures of 4.63 mmHg and 2.6mmHg respectively and a decrease in BMI of 1.50. The control group had a

change in the systolic blood pressure of only 0.84 mmHg and an increase of diastolic blood pressure of 1.74mmHg and an increase in BMI of 0.30. This trial was an important addition to the effectiveness of adherence to a DASH diet and the subsequent reduction of blood pressure and BMI. The limitations of this study include the short duration of the trial and no follow-up after the initial three months to monitor for continued adherence.

Jenkins and colleagues (2017) evaluated the effect of current dietary recommendations on weight loss and cardiovascular risk factors through a randomized control trial including 919 participants. The researchers included the control group and then three interventions which included dietary advice consistent with the DASH diet, weekly food provision, or food provision and dietary advice. The interventions lasted six months with a twelve-month follow-up. Of the original 919 participants, 685 completed six months of the intervention. The main findings of this trial included a reduction in blood pressure of 0.6 mmHg and 0.8 mmHg for systolic and diastolic blood pressure respectively and a reduction of BMI of only 0.4 at the six-month follow-up. This trial provided evidence that even when food is provided to participants, adherence is not guaranteed, due to participants were still able to obtain other food items if they wished, and there is still a need for multiple approaches to change dietary habits.

Juraschek, Miller, Weaver, and Appel (2017) evaluated the effects of sodium reduction and the DASH diet in relation to blood pressure in a randomized control trial with 412 participants. The participants were randomized to a control diet or DASH diet. The participants in the DASH intervention group were given three different sodium levels in their diets over a four-week period consisting of 50, 100, or 150 mmol per day of sodium. The blood pressure reductions were categorized based on the baseline blood pressure readings of less than 130, 130 to 139, 140 to 149, and greater than 150 mmHg. The researchers found that the combination of reduced sodium intake with the DASH diet lowered the systolic blood pressure 5.3mmHg in the <130 mmHg group, 7.5 mmHg in the 130-139 group, 9.7 mmHg in the 140-149 group and 20.8 mmHg in the >150 group. The highest levels of reduction in systolic blood

pressure occurred in the groups with the higher baseline systolic blood pressure. This trial is important for future research showing the effects of sodium reduction and the DASH diet on the high-risk individuals with hypertension and blood pressures above 150mmHg. One limitation of this study was the short four-week duration of the interventions which may be unsustainable over a longer period of time.

Level III Evidence

There was no Level III evidence found in this literature review.

Level IV Evidence

Jarl and colleagues (2014) evaluated cardiovascular risk reduction in overweight and obese hypertensive patients through DASH diet and lifestyle education. A total of 26 patients were included in this cohort study. This trial intervention was completed by primary care nurse practitioners and utilized the Rapid Eating Assessment for Patients (REAP) and the Partners in Health (PIH) questionnaires. The REAP is a 27-question tool that measures the patient's intake of whole grains, fruits, vegetables, fat, saturated fat, sugary beverages and foods, sodium, alcoholic beverages, and physical activity level. The REAP also addresses the patient's food shopping and preparation habits and their willingness to change their eating habits. The PIH measures the patient's knowledge and behaviors related to self-management of their chronic health condition. Significant improvement in these questionnaires is associated with healthier eating behaviors and a healthier overall lifestyle (Gans, et al., 2006; Petkov, Harvey & Battersby, 2010). The REAP allowed the nurse practitioner to visualize the patient's dietary habits and educate the patient about healthier eating behaviors. The PIH allowed the patients to see the progress they were making individually by increasing their own knowledge. The researchers found that patients had significant improvements in diet and lifestyle scores on both of the questionnaires as well as a weight loss averaging 3.6 pounds over the two-month intervention period. This trial is significant for future practice due to improvements in the health of overweight and obese hypertensive participants in the short time frame. The implications for

nurse practitioner-led diet and lifestyle counseling needs further research with larger trials, however, the current trial provides a starting point for future research and clinical practice guidelines.

Kyriazis and colleagues (2014) evaluated the correlation between short term minimal weight loss and blood pressure control in obese patients with hypertension over a six-month intervention period. All of the participants in this trial were given low sodium diets aimed at lowering caloric intake, without the addition of any extra exercise program. The researchers conducted monthly phone calls with the participants to help the participants with their diet and stress the importance of adhering to the daily salt allowance. The BMI results of this trial included a decrease from 33.7 to 31.9 in males and 31.2 to 29.9 in females. The blood pressure results of this trial included a systolic blood pressure decrease from 149 to 134 mmHg in males and 144 to 138 mmHg in females and a diastolic blood pressure decrease from 80 to 76 mmHg in males and from 74 to 73 mmHg in females. This trial is significant for current guidelines due to the evidence supporting weight loss to aid in blood pressure reduction. Limitations of this trial include short term weight loss may not be sustained after the trial is completed and there were no physical activities included for the participants. Future research could include physical activity along with the weight loss diet in this trial to possibly result in even larger blood pressure reduction.

Levels V and VI Evidence

There was no Level V or VI evidence found in this literature review.

Level VII Evidence

Whelton and colleagues (2018) provided a summary of the guidelines for prevention, detection, evaluation, and management of high blood pressure in adults recommended by the American College of Cardiology and the American Heart Association. This guideline provides recommendations for patients with or at risk of developing cardiovascular disease and were intended to improve the quality of care for patients with hypertension.

The guideline found high quality of evidence to provide a strong recommendation for nonpharmacological interventions including: weight loss to reduce blood pressure in adults who are overweight or obese with hypertension, heart-healthy diet, sodium reduction, increased physical activity, and decreased alcohol consumption (Whelton, et al., 2018). The guideline states that:

- Weight loss decreased blood pressure in hypertensive participants by 5 mmHg and 2 to 3mmHg in normotensive participants;
- A heart-healthy diet decreased blood pressure in hypertensive participants by 11 mmHg and 3mmHg in normotensive participants; and
- Aerobic exercise of 90 to 150 minutes per week decreased blood pressure in hypertensive participants by 5 to 8 mmHg and 2 to 4 mmHg in normotensive participants.

Another strong recommendation found in this guideline included an expert opinion for behavioral and motivational strategies to achieve a healthy lifestyle. This guideline is an important piece of evidence in treating hypertension in clinical practice and should be used to guide further research.

Construction of Evidence-based Practice

Synthesis of Critically Appraised Literature

For this evidence-based project, relevant literature was appraised and reviewed for the effects of lifestyle modifications to aid in blood pressure and weight reduction in adults. The guidelines produced by the American College of Cardiology and the American Heart Association provide a strong recommendation for nonpharmacological interventions including: weight loss to reduce blood pressure in adults who are overweight or obese with hypertension, heart-healthy diet, sodium reduction, increased physical activity, and decreased alcohol consumption (Whelton, et al., 2018). Two reoccurring themes were found in the literature that focused on

dietary interventions and weight loss interventions to significantly reduce blood pressure. These strategies are consistent with current guideline recommendations.

The dietary interventions with the most significant blood pressure lowering effects included the DASH, Nordic, and low sodium diets. The most common dietary intervention found was the DASH diet with or without a low sodium component. In the systematic review by Gay, Rao, Vaccarino and Ali (2016), researchers found a reduction in systolic blood pressure of 7.62mmHg and diastolic blood pressure 4.22mmHg through the utilization of the DASH diet. Similarly, Juraschek, Miller, Weaver, and Appel (2017) found a net reduction in systolic blood pressure with the utilization of the DASH diet ranging from 5.3 to 20.8mmHg with the highest reductions in participants with baseline systolic blood pressures above 150mmHg. Kucharska, and colleagues (2018) also found a net reduction in systolic and diastolic blood pressures with the utilization of the DASH diet over three months of 4.63mmHg and 2.6mmHg respectively. In the review by Ndanuko and colleagues (2016) the DASH diet reduced systolic and diastolic blood pressures by 4.9mmHg and 2.63mmHg, respectively. One study included in the review showed a much less significant systolic and diastolic blood pressure reduction of 0.6mmHg and 0.8mmHg, which may be due to incomplete adherence to the DASH diet. Overall, research shows that the DASH diet has the potential to lower systolic and diastolic blood pressures.

One study also evaluated the effects of the Nordic diet, which includes an intake high in fruits, berries, vegetables, and fish, and low in red meats and animal fats, on the reduction of systolic and diastolic blood pressures. Authors reported that systolic and diastolic blood pressures decreased significantly by 5.20mmHg and 3.85mmHg, respectively. However, these results have not been replicated elsewhere, so additional research needs to be completed on the lowering effects of the Nordic diet in support of these results prior to recommending the Nordic diet to patients with primary hypertension.

The implementation of a low sodium diet was also a theme within the literature reviewed. Gay, Rao, Vaccarino and Ali (2016) found a reduction in systolic blood pressure of 2.06mmHg

and diastolic blood pressure 1.30mmHg utilizing only a low sodium diet. However, the combination of a low sodium and high potassium diet resulted in slightly higher reductions in systolic and diastolic blood pressures of 3.14mmHg and 2.01mmHg, respectively. The combination of low sodium and low-calorie diets resulted in a reduction in systolic and diastolic blood pressures of 2.38mmHg and 1.33mmHg, respectively. Kyriazis and colleagues (2014) led a six-month intervention utilizing a low sodium diet and found a larger reduction in systolic blood pressure in males of 15mmHg and females of 6mmHg, and diastolic blood pressure of 4mmHg in males and 1mmHg in females. While a low-sodium diet, whether alone or combined with other dietary guidelines, resulted in significant improvements on blood pressure, the effect of a low-sodium diet on blood pressure was not as significant as the effect of DASH. In addition, a low-sodium diet did not result in significant weight loss.

The combination of dietary and weight loss interventions was another theme within the literature. Jarl and colleagues (2014) found an overall weight reduction of 3.6 pounds over a two-month period utilizing the DASH diet and individualized lifestyle education. Kurcharska and colleagues (2018) found an overall reduction in systolic and diastolic blood pressure of 4.63 and 2.6mmHg, respectively, and BMI of 1.5 through utilization of the DASH diet and individualized nutritional therapy in a three-month intervention time frame. Kyriazis and colleagues (2014) led a six-month intervention utilizing a low sodium diet and found a BMI reduction of 1.8 in males and 1.3 in females, as well as a systolic blood pressure reduction in males of 15mmHg and females of 6mmHg, and diastolic blood pressure reduction of 4mmHg in males and 1mmHg in females. Semlitsch and colleagues (2016) evaluated weight reducing diets on blood pressure and weight reduction and found an overall weight loss of 4kg, as well as a reduction in systolic and diastolic blood pressures of 4.5 and 3.2mmHg.

Aerobic exercise also resulted in significant blood pressure reduction (Wen & Wang, 2017). The reduction in systolic blood pressure from aerobic exercise compared to the control groups was 8.56 mmHg and diastolic blood pressure was 3.87 mmHg (Wen & Wang, 2017).

Because aerobic exercise was effective at reducing both blood pressure, engaging in aerobic exercise would be a good lifestyle modification for individuals with primary hypertension looking to lower their blood pressure.

Best Practice Model Recommendation

In summary, the literature identified the DASH diet as one of the best options for blood pressure reduction and weight loss. A low-sodium diet is also effective at reducing blood pressure, but not at reducing weight. The combination of a low sodium DASH diet would be the most ideal for this evidence-based project to address the clinical problem. In addition, aerobic exercise was found to significantly reduce both weight and blood pressure. For this project, both the dietary intervention of a low sodium DASH diet and aerobic exercise were utilized following best practice recommendations. The recommendations included:

- Low sodium diet following the DASH guidelines
- Food diary logging the participants weekly intake
- Moderate intensity aerobic activity of 90 to 150 minutes per week, such as walking, bicycle riding, hiking, or swimming

The project began at a regular patient visit if the patient was deemed eligible to participate in this study. The participant filled out the REAP and PIH prior to meeting with the provider. The medical assistant or nurse obtained the participants' blood pressure in both arms, height and weight. Once in the room with the provider, they discussed the results of the REAP and PIH with the participant and assessed their dietary behaviors and methods of preparing and purchasing food. After this was completed the provider spent approximately thirty minutes with the participant educating them on hypertension, the DASH diet, and what constitutes moderate intensity aerobic exercise. The provider sent the participant home with sample recipes following the guidelines, different aerobic exercises, and the participant followed-up within one month. At the one-month follow-up visit the participant had their blood pressure, height and weight remeasured and re-take the REAP and PIH. The provider assessed the differences in the

scores after the one-month intervention and assessed if the participant needed more education. If the participant had positive outcomes, the provider had an easier time outlining the importance of following the dietary guidelines and exercises. There was a two-month follow-up appointment that was the same as the one-month follow-up. At the three-month follow-up appointment, the same measurements were taken and compared to the baseline measurements to determine if this project is worthy of implementing a practice change.

CHAPTER 3

IMPLEMENTATION OF PRACTICE CHANGE

The implementation of this evidence-based practice (EBP) project was performed over several months in an internal medicine clinic and encompassed the utilization of the Iowa Model of Evidence-Based practice as a guide. In this chapter, the project methods used to guide the EBP change in clinical practice are discussed, including the participants, setting, outcomes, design, measures, data analysis and implementation. The purpose of this EBP project is to determine if the use of the DASH diet, a regular exercise program, and self-awareness of eating patterns will cause a decrease in blood pressure and BMI.

Participants and Setting

Setting

The clinical site for this EBP project is an internal medicine clinic located in Kenosha, Wisconsin. The clinic provides services to all ages, with a majority of the patients over the age of 18 years old. The patient population was diverse, multicultural, and represents the various socioeconomic backgrounds within the surrounding community. There are three physicians in this clinic who each see about 15 to 20 patients per day, on average. Each of the physicians typically has one medical assistant and one nurse working with them and about two to three front desk attendants to check patients into the clinic.

Participants

The EBP project included participants from the approved clinical site. Participants who were eligible to participate were recruited during their appointments at the internal medicine clinic. The patient population is predominantly older adults due to two of the three physicians being in their 60s and practicing medicine in the same location for over twenty years.

Inclusion Criteria

In order to ensure generalizability and validity of project results, participants represented the target population. The inclusion criteria used to identify participants for this EBP project included:

- 18 years of age or older
- Speak English
- Be overweight or obese (BMI greater than or equal to 25)
- Have a diagnosis of primary hypertension
- Agree to participate in the EBP project, and attend future clinical visits
- Agree to participate in monthly follow up monitoring for three months

Exclusion Criteria

Patients who were ineligible to participate included patients under the age of 18, pregnant women, inability to understand English, diagnosis of dementia, and patients with secondary hypertension. Those patients were excluded for safety reasons, time constraints and lack of ability to properly participate in the project.

Pre-intervention group characteristics

There were 17 participants included in the intervention. Of the participants seven were females and ten were males. The age range of the participants ranged from 33 to 76 years old. There were two African American participants and 15 Caucasians. The initial visits ranged from August 21st to October 11th, 2019.

Intervention

The intervention was supported by conducting a systematic search across multiple databases to gather the best practice recommendations from good and high-quality pieces of evidence. Hypertension and obesity are two major issues seen at this internal medicine clinic.

Developing a standard guideline to help patients lose weight as well as decrease their blood pressures was key to implementing this EBP project.

The student project facilitator and physician met with the patient at their clinic visit and asked if the patient would participate in an EBP project. Once agreeable to participate, the patient was given a REAP and PIH survey and asked to complete these. The student project facilitator met with participants for about 30 minutes and provided evidence-based education regarding the health risk associated with hypertension and obesity. The provider and student facilitator discussed the REAP and PIH results with the patient and how these results could change in the next three months. The patient was also given dietary education following the DASH dietary guidelines. At the end of the initial visit the patient was provided time for questions and then provided a detailed handout with the DASH dietary guidelines, moderate intensity aerobic exercise ideas, and information on their next follow-up call. Outlines and examples of educational materials are provided in Appendix A.

The participant was provided instructions to look for three monthly follow up phone calls. At the follow up visits the participant filled out the REAP and PIH surveys given to them by the front desk assistant as they were waiting to be seen. The participant would be brought into the exam room for a blood pressure and BMI re-check and asked if they had any questions about the project. The student facilitator would meet with the participant and discuss their survey scores and blood pressure and BMI progress. At the three-month follow up, the participants filled out a final REAP and PIH and had final blood pressure and BMI measurements taken. The REAP and PIH surveys are important to allow the participants to see the progress they have made in terms of their eating habits.

Outcomes

The primary goal during the implementation period was to find a decrease in blood pressure and BMI in participants after following the DASH dietary guidelines and a moderate intensity exercise program. The primary outcomes were blood pressure and body mass index

(BMI). The blood pressure and BMI were collected directly from measurements at the clinic during the monthly follow up visits utilizing a standardized manual blood pressure cuff, scale, and stadiometer for height. Weight was measured in kilograms, and height was measured in centimeters. BMI was calculated automatically when height and weight data were entered into the clinic electronic medical record.

Secondary outcomes included the participants scores on the REAP and PIH tools. The REAP tool is a 32-item questionnaire that is self-administered by the patient. This tool assesses a patient's diet and physical activity and was found to have an excellent test-retest reliability (r = 0.86) (Gans, et al., 2006). The REAP tool correlates significantly with the Healthy Eating Index (r = 0.49) (Gans, et al., 2006).

The PIH tool is a 12-item questionnaire that is self-administered by the patient. This tool measures patients' chronic condition self-management knowledge and behaviors and was found to have good internal consistency (α = 0.82) (Petkov, Harvey, & Battersby, 2010).

Participant demographic information, including age, sex, ethnicity, race was self-reported as baseline measurements upon enrollment in the project. In addition, participant scores on the REAP and PIH tools were collected using hard-copy questionnaires upon enrollment in the project.

Data

Measures

The primary outcome of systolic and diastolic blood pressure change was measured in mmHg by rechecking participants blood pressure readings on the same arm each visit while sitting. BMI was measured as weight in kg divided by height in m^2. The weight, in pounds, and height, in inches, were measured utilizing a standardized digital scale and stadiometer. The medical assistant measured the participant's height and weight without shoes and wearing lightweight clothing only. The REAP and PIH tools were analyzed by the student project

facilitator and data was compared to pre-intervention. In addition, any participants who chose to drop out of participating in the project were recorded as attrition in the final project summary.

Collection

Data collection occurred during face-to-face visits between patients and the student project leader from September 1, 2019 through January 30, 2020. Data collection began after patients provided assent to participate in the EBP project. All participant data were recorded on project flowsheets. One flowsheet contained assigned participant number, date of birth, age, sex, ethnicity, and race. Another flowsheet contained the pre and post intervention measurements of BMI, weight, BP, REAP score, and PIH score in monthly increments.

Management and Analysis

Questionnaires and data collection forms were transferred from the hard-copy questionnaires to a password-protected Microsoft Excel spreadsheet. When all data for the project was entered, the spreadsheet was uploaded into the IBM SPSS version 24 software program. Means and standard deviations were calculated for all continuous data (age, weight, BMI, SBP, DBP, REAP score, and PIH score). Measures of weight, BMI, SBP, DBP, REAP score, and PIH score were compared from baseline to the end-of-study visit using paired *t*-tests. Categorical variables (sex, race, and ethnicity) were summarized using frequencies per category. All statistical analyses were performed using IBM SPSS version 24. Upon completion of the project, all hard-copy questionnaires were shredded using the clinic's contracted shredding service.

Time

Planning for the project was initiated in the summer of 2019 after a meeting with the project site providers. After explaining the prevalence and impact of uncontrolled hypertension and obesity, the project was proposed, and interest was expressed to develop an enhanced guideline. The approval to implement this three-month EBP project depended on demonstrating the quality and depth of the best practice evidence provided by the appraisal of available

literature. After careful review, the best practice evidence supported following a DASH diet and performing moderate intensity aerobic exercise to reduce blood pressure and BMI. The DASH dietary guidelines, moderate aerobic exercise examples, and REAP and PIH surveys were reviewed with the student project facilitator and providers. The project was implemented starting August 21st, 2019 and contained a rolling enrollment throughout the following two months.

Protection of Human Subjects

Before project implementation, approval was granted from the Valparaiso University Institutional Review Board (IRB). Additionally, project approval was granted by clinical site facilitators. All participants were provided a consent with the project's purpose, procedures, risks, benefits, voluntary participation, freedom to withdraw, and assurance of confidentiality. They were assured that there were no repercussions for the clinical care they would receive.

Participant confidentiality was maintained by securing participants information from the hardcopy paperwork was kept in a locked drawer until project completion that can only be accessed by the student project facilitator. When not in use, all project data were secured in a locked clinical room. Confidentiality was always observed as each participant was assigned a unique participant ID number that was unrelated to their date of birth, social security number, or medical record number. The data were entered into a spreadsheet that was password-protected and only accessed by the student project facilitator.

CHAPTER 4

FINDINGS

The purpose of this EBP project was to promote the DASH diet, along with a regular exercise program and self-awareness of eating patterns, to help manage obesity and hypertension. This project addressed the following PICOT question: Among adults, aged 18 or older, seen in the clinic with new or current diagnosis of primary hypertension and a BMI over 25 kg/m^2 (P), does the implementation of REAP and PIH surveys monthly for 3 months, use of the DASH diet, and a moderate-intensity exercise plan (I), compared to standard primary care management of hypertension and obesity in a retrospective sample of clinic patients (C), result in decreased blood pressure and BMI (O) within three months (T)? The project was designed as an evidenced-based intervention and took place at an internal medicine clinic in Kenosha, Wisconsin. The interventions were developed to evaluate the effects of the DASH diet on weight loss and blood pressure. A within-participant pre/post design was used. The following chapter reviews the demographic information and comparisons between the pre-intervention and post-intervention groups.

Participants

Size

During the rolling enrollment there were 40 patients who presented for wellness or physical exams, between the two providers, that qualified for the intervention. A total of 17 participants agreed to participate in the intervention. Of the 17 participants, 14 completed the full three-months of the intervention and follow-up.

Characteristics

The mean age of the sample was 54.71 (SD 15.21) with the minimum age of 31 and maximum age of 76. Over half of the participants were male and almost all were Caucasian.

Table 4.1

Demographics of participants

VARIABLE	DESCRIPTION
AGE (MEAN, SD)	54.71 (15.21)
GENDER (*N,* %)	
FEMALE	5 (35.7)
MALE	9 (64.3)
RACE (*N,*%)	
CAUCASIAN	13 (92.8)
AFRICAN-AMERICAN	1 (7.2)

Changes in Outcomes

The primary outcome analyzed were the pre- and post-intervention blood pressure and BMI scores. Secondary outcomes analyzed were the REAP and PIH survey scores.

Statistical Testing

Statistical testing was conducted using IBM SPSS Statistical software version 26. Summary statistics for SBP, DBP, and BMI included means and standard deviations. Pre-intervention SBP, DBP, and BMI values were compared to post-intervention values using paired *t*-tests. The main focus of the statistical analysis was to determine if the answer to the PICOT question was statistically significant when comparing the pre- and post-intervention scores. In addition, internal consistency and predictive validity were calculated for the REAP and PIH surveys.

Primary Outcome: BP and BMI

Results of the SBP, DBP, and BMI analyses are detailed in Table 4.2. There was a decrease in mean pre-intervention SBP and mean post-intervention SBP, from 139 mmHg to

135.07mmHg, respectively, but this difference was not statistically significant ($t(13)=1.262$, $p = .229$).

There was a very slight increase in mean DBP between the pre-intervention and post-intervention groups (79.57 vs 80.35, respectively), but this difference was not statistically significant ($t(13) = -0.173$, $p = .866$).

There was also a very slight increase in mean BMI between the pre-intervention and post-intervention groups (39.98 vs 40.13, respectively), but this difference was not statistically significant ($t(13) = -0.523$, $p = .610$).

Secondary Outcome: REAP and PIH Surveys

Reliability of the PIH survey was strong, with a Cronbach's α of 0.936.

Predictive validity of the PIH was tested by comparing the baseline PIH values to the three-month post-intervention scores. The correlation between these two values was strong and statistically significant, with a *Pearson's r* of 0.920 (p=0.01).

Reliability of the REAP survey was moderate, with a Cronbach's α of 0.778.

Predictive validity of the REAP was tested by comparing the baseline REAP values to the three-month post-intervention scores. The correlation between these two values was moderately strong and statistically significant, with a Pearson's *r* of 0.641 (p=0.01).

Table 4.3 presents the analysis of data from baseline to final REAP and PIH surveys to answer the question, "Did the intervention result in healthier eating behaviors, measuring using the REAP tool, and increased participation in health decisions, measured by the PIH survey?" From baseline to post-intervention, participants had significant improvement in their eating behaviors ($t(13) = -8.352$, $p = .000$) and in their participation in health care decisions ($t(13) = -3.704$, $p = .003$).

Significance

Table 4.2 further describes the significance of the primary and secondary outcomes.

Table 4.2

Effectiveness of Intervention on BP, BMI, REAP Scores, and PIH Scores

VARIABLE	MEAN PRE	SD	MEAN POST	SD	T	DF	P
SBP	139	13.07	135.07	10.93	1.262	13	.229
DBP	79.57	14.68	80.35	8.57	-.173	13	.866
BMI	39.98	9.33	40.13	9.19	-.523	13	.610
REAP	31.92	2.58	34	2.32	-3.704	13	.003
PIH	86	7.64	93.35	5.66	-8.352	13	.000

Table 4.3

Reliability and Validity of REAP and PIH

	REAP SURVEY	PIH SURVEY
CRONBACH'S ALPHA	0.778	0.936
PEARSON'S R (13)	0.641	0.920

CHAPTER 5

DISCUSSION

This project addressed the following PICOT question: Among adults, aged 18 or older, seen in the clinic with new or current diagnosis of primary hypertension and a BMI over 25 kg/m^2 (P), does the implementation of REAP and PIH surveys monthly for 3 months, use of the DASH diet, and a moderate-intensity exercise plan (I), compared to standard primary care management of hypertension and obesity in a retrospective sample of clinic patients (C), result in decreased blood pressure and BMI (O) within three months (T)? The project was designed as an evidenced-based intervention and took place at an internal medicine clinic in Kenosha, Wisconsin. The interventions were developed to evaluate the effects of the DASH diet on weight loss and blood pressure. A within-participant pre/post design was used. The following chapter will provide an explanation of the findings of this project, a discussion of the evidence-based practice (EBP) framework for this project, the strengths and weaknesses of this project, and the future implications of this project.

Explanation of Findings

Data collected during this EBP project were obtained utilizing demographic forms, pre and post intervention blood pressure and BMI readings and pre and post intervention REAP and PIH tools for analysis. The information was analyzed using IBM statistical analysis software SPSS version 26. The data that were analyzed included patient demographics, blood pressure, BMI, REAP score and PIH score. Documentation of the validity of the REAP and PIH surveys was discussed in previous chapters within this EBP report.

In total 17 persons agreed to participate in this EBP project, however three were excluded from the final analysis. The three exclusions occurred due to failure to finish the intervention and the project's ethical framework did allow participants to leave the project at any time.

The primary intervention for this project was utilizing the DASH (Dietary Approach to Stop Hypertension) dietary guidelines to reduce blood pressure and BMI. The primary outcomes that were measured for this EBP project included systolic blood pressure, diastolic blood pressure and body mass index (BMI). There was a decrease in mean systolic blood pressure from pre-intervention to post-intervention, from 139 mmHg to 135.07mmHg, respectively, but this difference was not statistically significant. The small reduction in systolic blood pressure is similar to the study by Jenkins and colleagues (2017), there was only a 0.6mmHg decrease in systolic blood pressure, which they attributed to participants being able to obtain their own food items. This is unlike the study by Gay, Rao, Vaccarina and Ali (2016), in which there was a decrease in systolic blood pressure by 7.62mmHg with the DASH diet. However, this finding could be due to longer intervention period, as their study duration ranged from 6-48 months. Kucharska and colleagues (2018) also had similar reduction in systolic blood pressures of 4.63mmHg which was in a three-month time frame. The study by Kucharska and colleagues (2018) was the closest in resemblance to this current EBP project because of the three-month intervention with monthly follow up appointments.

There was a very slight increase in mean diastolic blood pressure between the pre-intervention and post-intervention groups, from 79.57 mmHg to 80.35 mmHg, but this difference was also not statistically significant. The change in diastolic blood pressure is similar to the study by Jenkins and colleagues (2017), there was only a 0.8mmHg decrease in systolic blood pressure, which they attributed to participants being able to obtain their own food items. This is unlike the study by Gay, Rao, Vaccarina and Ali (2016), in which there was a decrease in diastolic blood pressure by 4.22mmHg with the DASH diet. However, this finding could be due to longer intervention period, as their study duration ranged from 6-48 months. Kucharska and colleagues (2018) also had similar reduction in diastolic blood pressures of 2.6mmHg which was in a three-month time frame.

There was also a very slight increase in mean BMI between the pre-intervention and post-intervention groups (39.98 vs 40.13, respectively), but this difference was not statistically significant. These findings could be due to limited time frame of three-months for the intervention or due to participant noncompliance. The small change in BMI is similar to the study by Jenkins and colleagues (2017), there was only a 0.4 decrease in BMI, which they attributed to participants being able to obtain their own food items.

The secondary outcomes of this project provided statistically significant (p = .000) data showing a significant improvement in their REAP (Rapid Eating and Activity Assessment for Patients) survey results, which indicates that participants had changed their eating habits and physical activity. A case-control study by Gudjinu and Sarfo (2017) found that a high REAP score led to a high chance of developing type 2 diabetes. Another case-control study by Kurka, Buman, and Ainsworth (2014), showed that a high REAP score is correlated with an increased risk for obesity and unhealthy eating habits. These studies indicate that improvement in REAP scores may have more benefits than just healthy eating habits and helping to decrease the risk for obesity, including the prevention of type 2 diabetes. The providers were able to understand the participants eating habits and educated them on the modifications to make to create a healthier lifestyle.

The secondary outcome of the PIH (Partners in Health) survey also provided statistically significant (p = .003) improvement in the participants' scores. Much like the randomized control trial run by Battersby and colleagues (2015), the PIH screened for the participants amount of self-management knowledge about their chronic illness. The baseline PIH scores allowed for a tailored educational approach for the participant's intervention. Jarl and colleagues (2014), found a significant improvement in diet and lifestyle scores for both the REAP and PIH surveys as well as a weight loss of 3.6 pounds over two months.

Applicability of the EBP Framework

The Iowa Model of Evidence-based practice was utilized as a framework to guide this project. The Iowa Model was developed by Marita G. Titler, PhD, RN, FAAN and her colleagues at University of Iowa Hospitals and Clinics in 1994, to guide the implementation of research into clinical practice and describe knowledge transformation (Buckwalter, et al., 2017). This framework was a great fit for this evidence-based practice project due to the clear steps to follow to implement evidence-based practice projects. No modifications were needed during the implementation process.

There was a clear triggering issue that was identified by the physician and this project allowed for the formation of a team. A thorough literature search was completed, and sufficient amounts of evidence were found to implement this project. The outcomes were determined to be decreased blood pressure and BMI and baseline data was collected on the participants. This evidence-based project was then implemented on the participants and post-implementation data were collected after the three-month intervention.

The Iowa Model framework strengths for this project included ease of use and the inclusion of feedback loops. The framework was geared towards providers in direct contact with patients and facilitated a clear guideline of steps and components that were necessary for a collaborative approach to practice change. The feedback loops were important to continually evaluate the project and the implementation process.

The weakness of the Iowa Model framework included the lack of clear guidelines on how to address the project site staff about the practice change during the implementation. There may have been easier methods to educate the staff on the practice change with other models. The only steps for educating staff was when the localized protocol was created. The Iowa Model also included many steps that are time consuming during the implementation process. Conducting the systematic search for a body of evidence was time consuming however the search added value to the project. The design process and piloting the practice change were also lengthy steps however they were needed to add the value to the project.

Strengths and Limitations of the DNP Project

Strengths

The strengths of this project include motivated project members and thorough literature review. The key stakeholders involved in this evidence-based practice project were motivated to see change and willing to implement the project. The stakeholders and staff showed willingness to continue with implementation of the dietary guidelines and surveys after completion of this project. The initial literature review showed a positive response to utilizing the DASH dietary guidelines and lowering blood pressure. The literature review provided a basis for the project and guided the implementation plan.

Limitations

The limitations of this project included time constraints, resistance to change and noncompliance. This project was implemented over a course of six months with rolling enrollment. The participants were recorded for three months at time to record their measurements and survey scores. The three-month time period of monitoring blood pressure and BMI may not have been a long enough period to identify change within this specific population. There were some participants who were resistant to change their dietary and exercise habits. Those participants continued with the three-month follow up, however, did not follow with the intervention. There were three participants lost to noncompliance with the intervention as they did not follow up at the three-month interval and did not return follow up phone calls.

Implications for the Future

Practice

This evidence-based practice project has implications for practice as a registered nurse as this could be an intervention registered nurses could recommend to providers or use autonomously. Adding this intervention to patients that need to lose weight as well as decrease their blood pressure would be beneficial to primary care practice.

The implications for an APRN in primary care practice are much greater. APRN's who utilize this intervention as a complement to guideline-based hypertension management can see improvements in their patient's blood pressure and BMI if closely monitored. The APRN can educate the patient about the DASH diet and the importance of low sodium with hypertension. Having a set handout for patients would be beneficial to the APRN because there would be a clear path to help patients reach their goals.

Theory

The implications this evidence-based practice project may have on theory within the nursing profession could include developing theories on the importance of self-awareness and lifestyle modification. The secondary outcomes were the only statistically significant outcomes for this project which is why they could potentially drive new theoretical work or support existing health promotion theories. This project supports Pender's Health Promotion model because the participants prior behavior and inherited and acquired characteristics influence beliefs, affect, and enactment of health-promoting behavior; helping the participants obtain a higher sense of self-efficacy can result in fewer perceived barriers to a specific health behavior; and health care providers are important sources of interpersonal influence that can increase commitment to and engagement in health-promoting behavior. If any future healthcare provider is searching to utilize health promotion to increase a patient's level of well-being, this project would be a perfect fit.

Research

This evidence-based practice project has implications for future research due to the insignificant evidence found in the three-month intervention period. Future research may include longer intervention periods, closer monitoring of patient's dietary habits, and detailed progress visits. The longer intervention period may provide more significant results than the three-month period. The closer monitoring of patient's dietary habits could improve patient adherence to the

dietary guidelines. Detailed progress visits could also improve patient adherence and increase the significance of the results.

Education

The evidence-based practice project has implications for future education due to the vast research behind the DASH diet and potential benefits for hypertensive patients. Utilizing this intervention in clinics could benefit the patients and providers due to adherence and patient satisfaction. Educating patients on their hypertension and the DASH diet could be beneficial for intervention adherence. Education is an important concept for future implementation attempts due to the need to provide patients with all of the necessary information to be able to be successful. This tool could be useful for providers to read with patient's that need to decrease their blood pressure or weight. If the healthcare team utilized this project for future patient use, there could be great benefits for the patient's long-term overall health and wellbeing.

Conclusion

Overall, this evidence-based practice project did not have statistically significant primary outcomes of decreased blood pressure or body mass index. Utilizing the Dietary Approach to Stop Hypertension (DASH) dietary guidelines did not produce the expected results of decreased blood pressure and BMI. There are many factors that could have influenced these results such as noncompliance to the dietary regimen, limited intervention time frame, or unwillingness to change.

However, the secondary outcomes did have a positive statistically significant result in the Rapid Eating and Activity Assessment for Patients (REAP) survey results and Partners in Health (PIH) results. This project provided participants with important information on their eating habits and allowed the providers to educate the participants where needed. The same was true for the PIH survey, once the providers had the results of the participants personal health knowledge and participation in care. The increase in the participant knowledge showed a small benefit of

this project which has potential for future work indicating a need for a longer time frame to implement this project.

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Autobiographical Statement

Mariska VanDenBergh

Ms. VanDenBergh started out her nursing career in a non-traditional manner. Initially she obtained her Bachelor of Science in Biology from Illinois Institute of Technology, while playing volleyball all four years. She then went on to obtain her Master of Science in Nursing from DePaul University in 2015 and her license as a registered nurse. After completion of her MSN she started working as a bedside nurse in a variety of different environments, such as a renal medical/surgical unit, neurologic ICU, transplant ICU and medical ICU. During this time while working as a bedside nurse, she decided to advance her career and become certified as a Family Nurse Practitioner. She is currently enrolled at Valparaiso University and will earn her Doctor of Nursing Practice in May 2020. She is a member of the Wisconsin Nursing Association and American Association of Nurse Practitioners. She aspires to work in a family practice setting after graduation.

Acronym List

ACC- American College of Cardiology

AHA- American Heart Association

APRN- Advanced practice registered nurse

BMI- Body mass index

BP- Blood pressure

CDC- Centers for Disease control

DASH- Dietary approach to stop hypertension

DBP- Diastolic blood pressure

DF- Degrees of freedom

EBP- Evidence-based practice

HTN- Hypertension

PIH- Partners in health

RCT- Randomized control trial

REAP- Rapid eating and activity assessment for patients

SBP- Systolic blood pressure

SMD- Standard mean difference

SD- Standard deviation

Appendix A

Adult Handout


DASH EATING PLAN
Getting Started on DASH
HEALTHY EATING, PROVEN RESULTS
It's easy to adopt the DASH eating plan. Even small changes made gradually lead to significant benefits. Follow these steps to begin a healthy lifestyle for a lifetime.
kale
kidney beans
blackberries
potato
salmon
1 Assess where you are now.
The DASH eating plan requires no special foods and has no hard-to-follow recipes. One way to begin is by using the free, interactive, online Body Weight Planner (niddk.nih.gov/bwp) to find out how many calories you need per day to maintain or reach your goal weight. Then fill in the What's on Your Plate? worksheet for a few days and see how your current food habits compare with the DASH plan. This will help you see what changes you need to make.
2 Discuss medication with your doctor.
If you take medication to control high blood pressure or cholesterol, you should not stop using it. Follow the DASH eating plan and talk with your doctor about your medication treatment as part of an overall plan for wellness.
3 Make DASH a part of your healthy life.
The DASH eating plan along with other lifestyle changes can help you control your blood pressure and lower blood cholesterol. Important lifestyle recommendations include: achieve and maintain a healthy weight, get regular physical activity, and, if you drink alcohol, do so in moderation (up to one drink per day for women and up to two drinks per day for men).
4 DASH is for everyone in the family.
Start with the meal plans in A Week With the DASH Eating Plan if you want to follow the menus similar to those used in the DASH trial— then make up your own using your favorite foods. In fact, your entire family can eat meals using the DASH eating plan because it can be adapted to meet varied nutritional needs, food preferences, and dietary requirements.
5 Don't worry.
Remember that on some days the foods you eat may add up to more than the recommended servings from one food group and less from another. Or, you may have too much sodium on a particular day. Just try your best to keep the average of several days close to the DASH eating plan and the sodium level recommended for you.
DASH EATING PLAN
The DASH Eating Plan is a heart healthy approach that has been scientifically proven to lower blood pressure and have other health benefits. To learn more, go to www.nhlbi.nih.gov/DASH.
NIH National Heart, Lung, and Blood Institute
1

DASH EATING PLAN

Making the Move to DASH

HEALTHY EATING, PROVEN RESULTS

Moving to heart healthy eating may seem difficult, but it doesn't have to be. Here are some tips to make DASH work for you.

peas

bell pepper

squash

shrimp

chickpeas

Change gradually.

- If you now eat one or two servings of vegetables a day, add a serving at lunch and another at dinner.
- If you don't eat fruit now or have juice only at breakfast, add a serving of fruit to your meals or have it as a snack.
- Gradually increase your use of milk, yogurt, and cheese to three servings a day. For example, drink milk with lunch or dinner, instead of soda, sugar-sweetened tea, or alcohol.
- Choose fat-free or low-fat (1 percent) milk, yogurt, and reduced-fat cheese to reduce your intake of saturated fat, cholesterol, and calories and to increase your calcium.
- Read the Nutrition Facts label on frozen and prepared meals, pizza, and desserts to choose those lowest in saturated fat and *trans* fat.

Vary your proteins.

- Choose lean cuts of meat and remove skin from poultry.
- Check the labels on ground meats and poultry and select those with lower saturated fat.
- Serve fish instead of meat or poultry once or twice each week.
- Include two or more vegetarian (meatless) meals each week.
- Aim to fill ½ your plate with vegetables and fruits, ¼ with whole grains, and ¼ with fish, lean meat, poultry, or beans.
- Add extra vegetables to casseroles, pasta, and stir-fry dishes.

Select nutritious, tasty snacks.

- Fruits offer great taste and variety. Use fruits canned in their own juice or packed in water. Fresh fruits are fast and easy and dried fruits are a good choice to carry with you or to have in the car.
- Try these snack ideas: unsalted rice cakes; nuts mixed with raisins; graham crackers; fat-free and low-fat yogurt; popcorn with no salt or butter added; raw vegetables.

Make healthy substitutions.

- Choose whole grain foods for most grain servings to get more nutrients, such as minerals and fiber. For example, choose whole wheat bread or whole grain cereals.
- If you have trouble digesting milk and milk products, try taking lactase enzyme pills with the milk products. Or, buy lactose-free milk.
- If you are allergic to nuts, use beans or seeds (such as sunflower, flax, or sesame seeds).

DASH EATING PLAN

Why the DASH eating plan works

HEALTHY EATING, PROVEN RESULTS

Scientific studies show that following DASH and eating less sodium can help you lower your blood pressure and LDL cholesterol.

What you choose to eat affects your chances of developing hypertension, otherwise known as high blood pressure. Blood pressure can be unhealthy even if it stays only slightly above the optimal level of less than 120/80 mmHg. The more your blood pressure rises above normal, the greater the health risk.

Scientists supported by the National Heart, Lung, and Blood Institute (NHLBI) have conducted multiple scientific trials since the Dietary Approaches to Stop Hypertension— or DASH eating plan— was developed more than 20 years ago. Their findings showed that blood pressures were reduced with an eating plan that emphasizes vegetables, fruits, and whole grains and includes fish, poultry, beans, nuts, and healthy oils. It limits foods that are high in saturated fat, such as fatty meats, full-fat dairy products, and tropical oils such as coconut, palm kernel, and palm oils. It is also lower in sodium compared to the typical American diet and reduces sugar-sweetened beverages and sweets.

The DASH eating plan follows heart healthy guidelines to limit saturated fat and *trans* fat. It focuses on eating more foods rich in nutrients that can help lower blood pressure— mainly minerals (like potassium, calcium, and magnesium), protein, and fiber. It includes nutrient-rich foods so that it also meets other nutrient requirements as recommended by the National Academies of Sciences, Engineering, and Medicine.

DAILY NUTRIENT LEVELS OF THE ORIGINAL DASH EATING PLAN

Total Fat	27% of calories
Saturated Fat	6% of calories
Protein	18% of calories
Carbohydrate	55% of calories
Sodium	2,300 mg*
Potassium	4,700 mg
Calcium	1,250 mg
Magnesium	500 mg
Cholesterol	150 mg
Fiber	30 g

*Lower sodium to 1,500 mg for further reduction in blood pressure, if needed.

The Science Behind the DASH Eating Plan

The importance of eating more vegetables, fruits, whole grains along with low-fat dairy, poultry, fish, beans, and nuts has been proven in multiple research trials. The combination of the DASH eating plan and reduced sodium creates the biggest benefit, lowering blood pressure significantly.

STUDY 1 Original DASH eating plan The first DASH trial involved 459 adults with systolic blood pressures of less than 160 mmHg and diastolic pressures of 80–95 mmHg. About 27 percent of the participants had high blood pressure. About 50 percent were women and 60 percent were African Americans. It compared three eating plans: one that included foods similar to what many Americans regularly eat; one that included foods similar to what many Americans regularly eat plus more fruits and vegetables; and the DASH eating plan. All three plans included about 3,000 milligrams of sodium daily. None of the plans were vegetarian or used specialty foods.

Results were dramatic. Participants who followed either the plan that included more fruits and vegetables or the DASH eating plan had reduced blood pressure. But the DASH eating plan had the greatest effect, especially for those with high blood pressure. Furthermore, the blood pressure reductions came fast—within 2 weeks of starting the plan.

STUDY 2 Varied sodium levels The second DASH trial looked at the effect on blood pressure of a reduced dietary sodium intake as participants followed either the DASH eating plan or an eating plan typical of what many Americans consume. This trial involved 412 participants. Participants were randomly assigned to one of the two eating plans and then followed for a month at each of the three sodium levels. The three sodium levels were: a higher intake of about 3,300 milligrams per day (the level consumed by many Americans), an intermediate intake of about 2,300 milligrams per day, and a lower intake of about 1,500 milligrams per day.

Results showed that reducing dietary sodium lowered blood pressure for both eating plans. At each sodium level, blood pressure was lower on DASH than on the typical American eating plan. The greatest blood pressure reductions were for DASH at the sodium intake of 1,500 milligrams per day. Those with high blood pressure saw the greatest reductions.

STUDY 3 Higher protein or healthy fats As the science around DASH evolves over time, the overall benefits to heart health continue to be evaluated. The OmniHeart (Optimal Macronutrient Intake Trial for Heart Health) trial studied the effect of replacing some daily carbohydrates— or carbs— with either protein or unsaturated fat. This trial included 164 adults who had systolic blood pressure readings of 120 to 159 mmHg. The trial compared three dietary patterns, each containing 2,300 mg of sodium per day— the original DASH plan, substituting 10 percent of daily carbs with protein, and substituting 10 percent of total daily carbs with unsaturated fat.

OmniHeart found that participants who followed either variation of DASH, substituting protein or unsaturated fat for carbs, had greater reductions in blood pressure and improvements in blood lipid levels than those who followed the original DASH eating plan.

Success with DASH

DASH along with other lifestyle changes can help you prevent and control high blood pressure. In fact, if your blood pressure is not too high, you may be able to control it entirely by changing your eating habits, losing weight if you are overweight, getting regular physical activity, and cutting down on alcohol. DASH also has other benefits, such as lowering LDL ("bad") cholesterol, and replacing some carbs with protein or unsaturated fat can have an even greater effect. Along with lowering blood pressure, lower cholesterol can reduce your risk for heart disease.

DASH EATING PLAN

Tips To Reduce Salt and Sodium

HEALTHY EATING, PROVEN RESULTS

Studies have found that the DASH eating plan can lower blood pressure in as fast as 2 weeks. Eating less sodium creates even bigger heart healthy benefits.

zucchini

Swiss cheese

bread

Eat your veggies.
Choose plain fresh, frozen, or canned (low-sodium or no-salt-added) vegetables and season them yourself.

Fresh is best.
Choose fresh or frozen skinless poultry, fish, and lean cuts of meat rather than those that are marinated, canned, smoked, brined, or cured.

Go "low or no."
Check the Nutrition Facts labels to compare sodium levels in foods. Choose low- or reduced-sodium, or no-salt-added versions of foods.

Pay attention to preparation.
Limit cured foods (such as bacon and ham); foods packed in brine (such as pickles, pickled vegetables, olives, and sauerkraut); and condiments (such as mustard, horseradish, ketchup, and barbecue sauce). Limit even lower sodium versions of soy sauce and teriyaki sauce, which should be used as sparingly as table salt.

Subtract, don't add.
Canned foods such as tuna and beans can be rinsed to remove some of the sodium. Cook rice, pasta, and hot cereals without salt. Cut back on instant or flavored rice, pasta, and cereal mixes, which usually have added salt.

Limit salty processed foods.
Skip or limit frozen dinners and mixed dishes such as pizza, packaged mixes, canned soups or broths, and salad dressings, which often have a lot of sodium. Prepare and eat more foods at home, where you can control how much sodium is added.

Spice it up.
Boost flavor with herbs, spices, lemon, lime, vinegar, or salt-free seasoning blends instead of salt or salty seasonings like soy sauce, spice blends, or soup mixes. Start by cutting salt in half and work your way toward healthy substitutes.

EASY TIPS FOR DINING OUT

Move the salt shaker away.
This simple first step could become second nature.

Research the restaurant's menu before going out.
Check online nutrition information and then avoid these on the menu: pickled, cured, smoked, soy sauce.

Make special requests.
Ask that your meal be prepared without added salt, MSG, or salty ingredients such as bacon, pickles, olives, and cheese.

Easy does it on the condiments.
A little goes a long way for mustard, ketchup, horseradish, pickles, and sauces with salt-containing ingredients.

Go for healthy appetizers and side dishes.
Choose fruit or vegetables instead of salty snacks, chips, or fries.

DASH EATING PLAN

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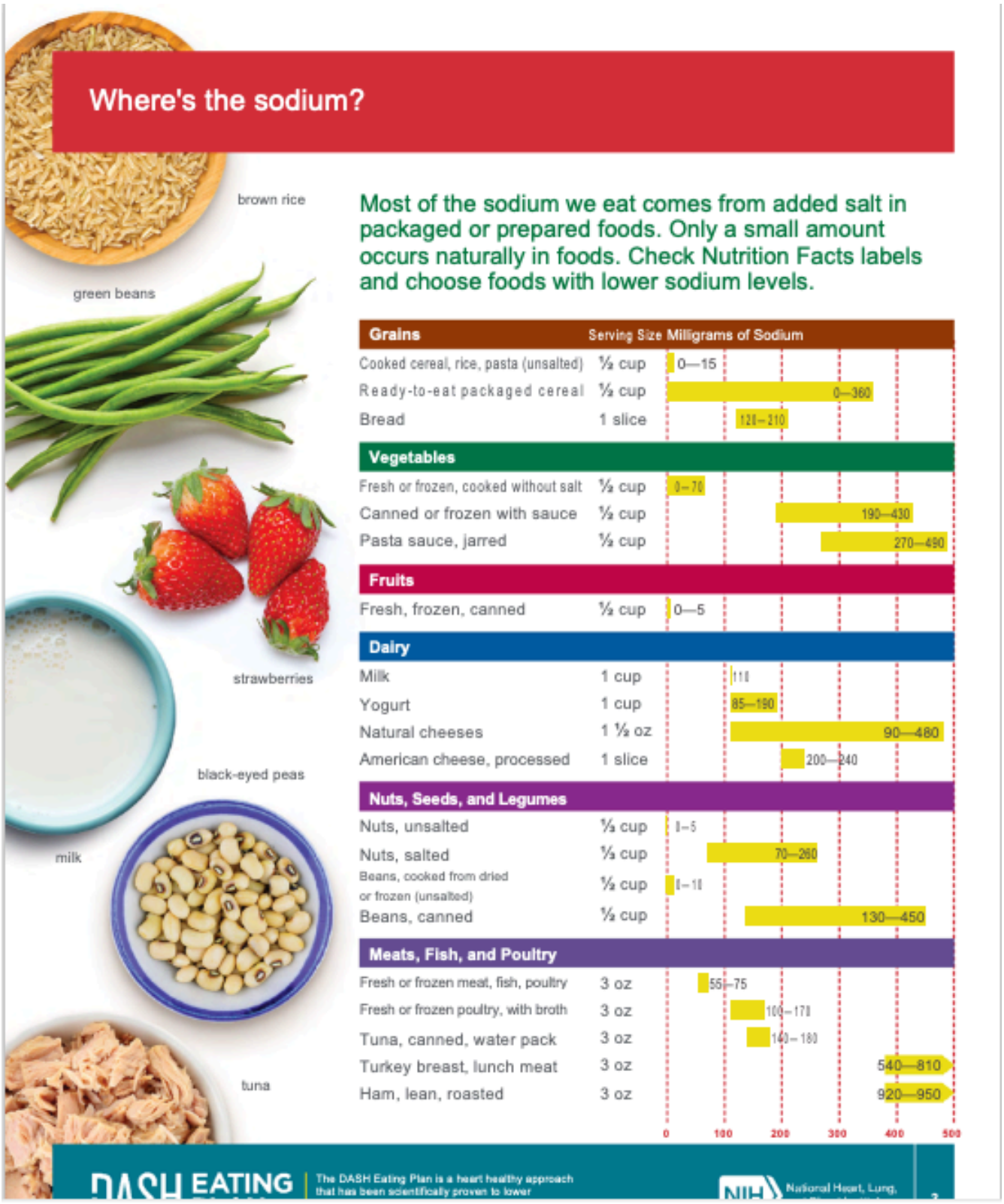
Where's the sodium?
brown rice
green beans
strawberries
black-eyed peas
milk
tuna
Most of the sodium we eat comes from added salt in packaged or prepared foods. Only a small amount occurs naturally in foods. Check Nutrition Facts labels and choose foods with lower sodium levels.
Grains
Serving Size
Milligrams of Sodium
Cooked cereal, rice, pasta (unsalted) ½ cup 0—15
Ready-to-eat packaged cereal ½ cup 0—360
Bread 1 slice 120—210
Vegetables
Fresh or frozen, cooked without salt ½ cup 0—70
Canned or frozen with sauce ½ cup 190—430
Pasta sauce, jarred ½ cup 270—490
Fruits
Fresh, frozen, canned ½ cup 0—5
Dairy
Milk 1 cup 110
Yogurt 1 cup 85—190
Natural cheeses 1 ½ oz 90—480
American cheese, processed 1 slice 200—240
Nuts, Seeds, and Legumes
Nuts, unsalted ½ cup 0—5
Nuts, salted ½ cup 70—260
Beans, cooked from dried or frozen (unsalted) ½ cup 0—10
Beans, canned ½ cup 130—450
Meats, Fish, and Poultry
Fresh or frozen meat, fish, poultry 3 oz 55—75
Fresh or frozen poultry, with broth 3 oz 100—170
Tuna, canned, water pack 3 oz 140—180
Turkey breast, lunch meat 3 oz 540—810
Ham, lean, roasted 3 oz 920—950
0
100
200
300
400
500
DASH EATING
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DASH EATING PLAN

A Week With the DASH Eating Plan

HEALTHY EATING, PROVEN RESULTS

Eating a variety of delicious foods and cutting back on salt can help lower your blood pressure. What are you waiting for? Take control of your heart health with the DASH eating plan.


whole grain roll


walnuts

kidney beans


bell pepper


chicken


yogurt

rosemary

The DASH eating plan requires no special foods and has no hard-to-follow recipes. The following DASH menus allow you to plan healthy, nutritious meals for a week. There are a variety of delicious whole foods that fill you up while fueling your body and lowering your blood pres-sure and cholesterol levels. You'll find plenty of fruits and vegetables, fish, poultry, lean meats, beans, nuts, whole grains and low-fat dairy.

Built around the recommended number of servings in each of the DASH food groups, these menus sometimes call for you to use lower sodium, low-fat, fat-free, or reduced-fat versions of products. **These menus are based on 2,000 calories a day.** Serving sizes should be increased or decreased for other calorie levels. Daily sodium levels are either 2,300 milligrams or, by making the suggested changes, 1,500 milligrams.

The total daily servings by DASH food group are listed at the top. Next to each food item on the daily menu, you can check the exact serving amount for that item.

These menus give examples of heart healthy meals. How can you create your own and make the DASH eating plan part of your daily life?

- Start by learning how your current food habits compare with the DASH eating plan by using the What's on Your Plate? worksheet for a few days.
- Explore the Heart Healthy Eating webpage (healthyeating.nhlbi.nih.gov) to try new foods or learn how to make old favorites heart healthy.
- Choose your favorite foods from each of the DASH food groups based on your daily calorie needs to make your own healthy menus.
- Don't worry if some days are off target for your daily totals. Just try your best to keep the average of several days close to the recom-mended servings and sodium levels.

Following the DASH eating plan means you'll be eating delicious food that is also good for you. It can help you control your blood pressure, manage your weight, and lower LDL (bad) cholesterol levels—keeping your heart healthy.


blueberries

KEY TO FOOD GROUPS | Grains | Vegetables | Fruits | Dairy | Meats, Fish, and Poultry | Nuts, Seeds, and Legumes | Fats and Oils | Sweets and Added Sugars

DASH EATING PLAN | The DASH Eating Plan is a heart healthy approach that has been scientifically proven to lower blood pressure and have other health benefits.

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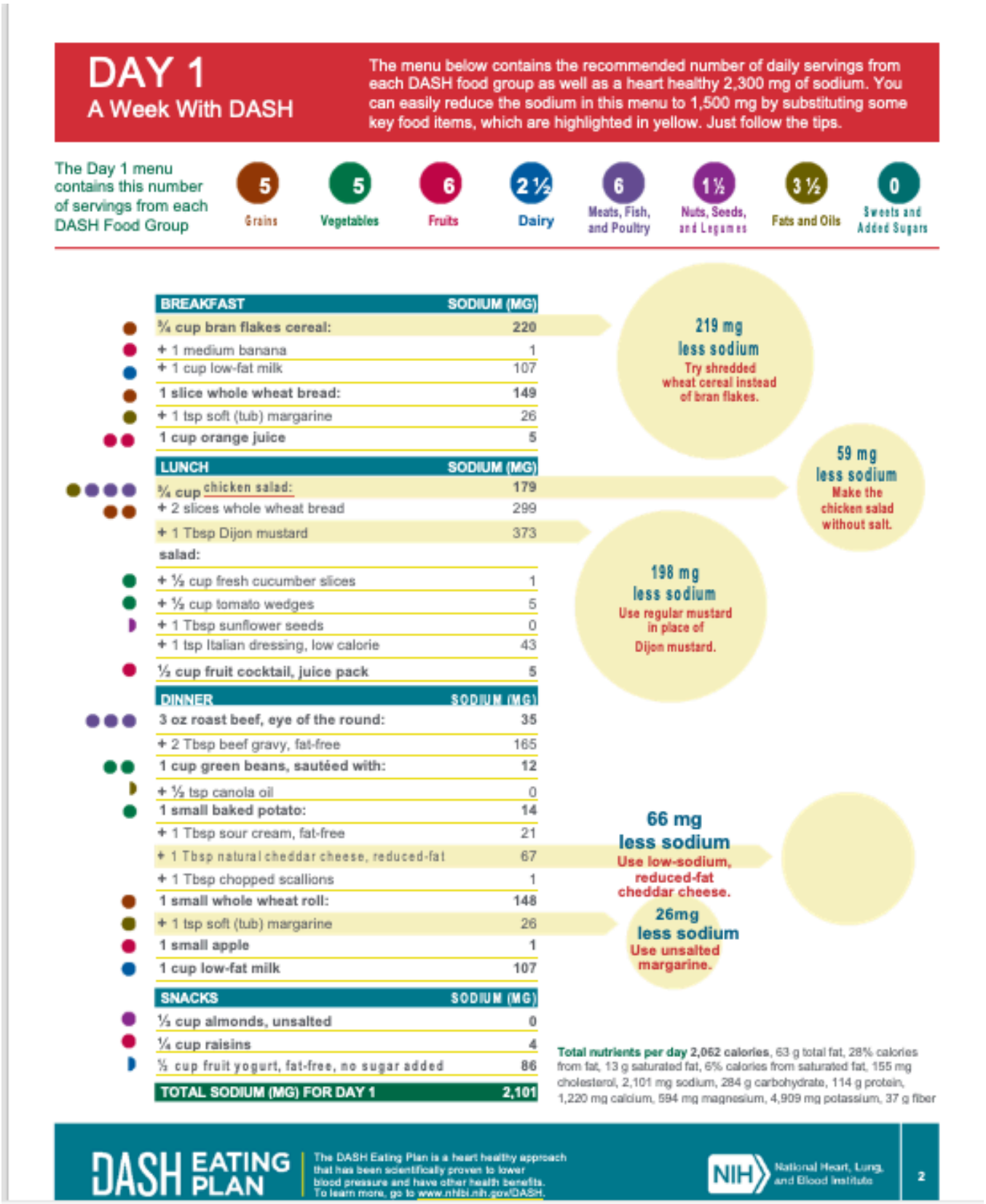

DAY 1
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 1 menu contains this number of servings from each DASH Food Group

5	5	6	2 ½	6	1	3 ½	0
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
¾ cup bran flakes cereal:	220
+ 1 medium banana	1
+ 1 cup low-fat milk	107
1 slice whole wheat bread:	149
+ 1 tsp soft (tub) margarine	26
1 cup orange juice	5

LUNCH	SODIUM (MG)
¾ cup chicken salad:	179
+ 2 slices whole wheat bread	299
+ 1 Tbsp Dijon mustard	373
salad:	
+ ½ cup fresh cucumber slices	1
+ ½ cup tomato wedges	5
+ 1 Tbsp sunflower seeds	0
+ 1 tsp Italian dressing, low calorie	43
½ cup fruit cocktail, juice pack	5

DINNER	SODIUM (MG)
3 oz roast beef, eye of the round:	35
+ 2 Tbsp beef gravy, fat-free	165
1 cup green beans, sautéed with:	12
+ ½ tsp canola oil	0
1 small baked potato:	14
+ 1 Tbsp sour cream, fat-free	21
+ 1 Tbsp natural cheddar cheese, reduced-fat	67
+ 1 Tbsp chopped scallions	1
1 small whole wheat roll:	148
+ 1 tsp soft (tub) margarine	26
1 small apple	1
1 cup low-fat milk	107

SNACKS	SODIUM (MG)
½ cup almonds, unsalted	0
¼ cup raisins	4
⅔ cup fruit yogurt, fat-free, no sugar added	86
TOTAL SODIUM (MG) FOR DAY 1	**2,101**

219 mg less sodium
Try shredded wheat cereal instead of bran flakes.

59 mg less sodium
Make the chicken salad without salt.

198 mg less sodium
Use regular mustard in place of Dijon mustard.

66 mg less sodium
Use low-sodium, reduced-fat cheddar cheese.

26mg less sodium
Use unsalted margarine.

Total nutrients per day 2,062 calories, 63 g total fat, 28% calories from fat, 13 g saturated fat, 6% calories from saturated fat, 155 mg cholesterol, 2,101 mg sodium, 284 g carbohydrate, 114 g protein, 1,220 mg calcium, 594 mg magnesium, 4,909 mg potassium, 37 g fiber

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DAY 2
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 2 menu contains this number of servings from each DASH Food Group

6	5¼	7	3	3	1½	1½	0
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
½ cup instant oatmeal	54
1 mini whole wheat bagel:	84
+ 1 Tbsp peanut butter	81
1 medium banana	1
1 cup low-fat milk	107

49 mg less sodium
Use regular oatmeal with 1 tsp cinnamon.

LUNCH	SODIUM (MG)
chicken breast sandwich:	
+ 3 oz cooked chicken breast, skinless	65
+ 2 slices whole wheat bread	299
+ 1 slice (¾ oz) natural cheddar cheese, reduced-fat	202
+ 1 large leaf romaine lettuce	1
+ 2 slices tomato	2
+ 1 Tbsp mayonnaise, low-fat	101
1 cup cantaloupe chunks	26
1 cup apple juice	21

199 mg less sodium
Use reduced-fat, low-sodium, natural Swiss cheese instead of reduced-fat, natural cheddar cheese.

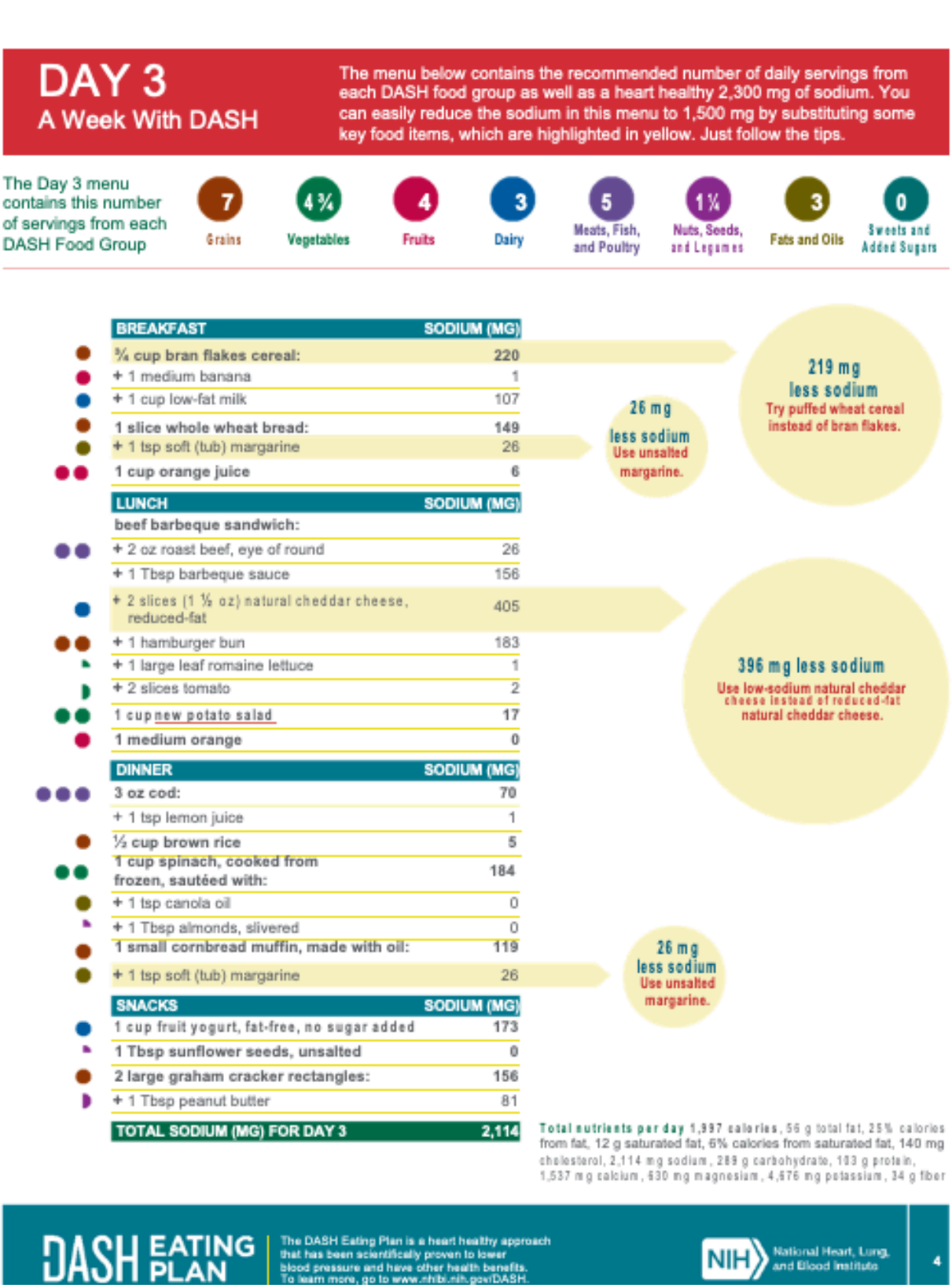
DINNER	SODIUM (MG)
1 cup spaghetti:	1
+ ¾ cup vegetarian spaghetti sauce	479
+ 3 Tbsp Parmesan cheese	287
spinach salad:	
+ 1 cup fresh spinach leaves	24
+ ¼ cup fresh carrots, grated	19
+ ¼ cup fresh mushrooms, sliced	1
+ 1 Tbsp vinaigrette dressing	1
½ cup corn, cooked from frozen	1
½ cup canned pears, juice pack	5

226 mg less sodium
Use low-sodium tomato paste in the vegetarian spaghetti sauce recipe.

SNACKS	SODIUM (MG)
⅓ cup almonds, unsalted	0
¼ cup dried apricots	3
1 cup fruit yogurt, fat-free, no sugar added	173

TOTAL SODIUM (MG) FOR DAY 2	2,035

Total nutrients per day 2,027 calories, 64 g total fat, 28% calories from fat, 13 g saturated fat, 6% calories from saturated fat, 114 mg cholesterol, 2,035 mg sodium, 288 g carbohydrate, 99 g protein, 1,370 mg calcium, 535 mg magnesium, 4,715 mg potassium, 34 g fiber


DAY 3
A Week With DASH
The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.
The Day 3 menu contains this number of servings from each DASH Food Group
7 Grains
4 ¾ Vegetables
4 Fruits
3 Dairy
5 Meats, Fish, and Poultry
1 ¼ Nuts, Seeds, and Legumes
3 Fats and Oils
0 Sweets and Added Sugars
BREAKFAST SODIUM (MG)
¾ cup bran flakes cereal: 220
+ 1 medium banana 1
+ 1 cup low-fat milk 107
1 slice whole wheat bread: 149
+ 1 tsp soft (tub) margarine 26
1 cup orange juice 6
LUNCH SODIUM (MG)
beef barbeque sandwich:
+ 2 oz roast beef, eye of round 26
+ 1 Tbsp barbeque sauce 156
+ 2 slices (1 ½ oz) natural cheddar cheese, reduced-fat 405
+ 1 hamburger bun 183
+ 1 large leaf romaine lettuce 1
+ 2 slices tomato 2
1 cup new potato salad 17
1 medium orange 0
DINNER SODIUM (MG)
3 oz cod: 70
+ 1 tsp lemon juice 1
½ cup brown rice 5
1 cup spinach, cooked from frozen, sautéed with: 184
+ 1 tsp canola oil 0
+ 1 Tbsp almonds, slivered 0
1 small cornbread muffin, made with oil: 119
+ 1 tsp soft (tub) margarine 26
SNACKS SODIUM (MG)
1 cup fruit yogurt, fat-free, no sugar added 173
1 Tbsp sunflower seeds, unsalted 0
2 large graham cracker rectangles: 156
+ 1 Tbsp peanut butter 81
TOTAL SODIUM (MG) FOR DAY 3 2,114
26 mg less sodium Use unsalted margarine.
219 mg less sodium Try puffed wheat cereal instead of bran flakes.
396 mg less sodium Use low-sodium natural cheddar cheese instead of reduced-fat natural cheddar cheese.
26 mg less sodium Use unsalted margarine.
Total nutrients per day 1,997 calories, 56 g total fat, 25% calories from fat, 12 g saturated fat, 6% calories from saturated fat, 140 mg cholesterol, 2,114 mg sodium, 289 g carbohydrate, 103 g protein, 1,537 mg calcium, 630 mg magnesium, 4,676 mg potassium, 34 g fiber
DASH EATING PLAN
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DAY 4
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 4 menu contains this number of servings from each DASH Food Group

4	4¾	7	3½	5	1	3	0
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
1 slice whole wheat bread:	149
+ 1 tsp soft (tub) margarine	26
1 cup fruit yogurt, fat-free, no sugar added	173
1 medium peach	0
½ cup grape juice	4
LUNCH	**SODIUM (MG)**
ham and cheese sandwich:	
+ 2 oz ham, low-fat, low-sodium	549
+ 2 slices whole wheat bread	299
+ 1 large leaf romaine lettuce	1
+ 2 slices tomato	2
+ 1 slice (¾ oz) natural cheddar cheese, reduced-fat	202
+ 1 Tbsp mayonnaise, low-fat	101
1 cup carrot sticks	84
DINNER	**SODIUM (MG)**
chicken and Spanish rice	341
1 cup green peas, sautéed with:	115
+ 1 tsp canola oil	0
1 cup cantaloupe chunks	26
1 cup low-fat milk	107
SNACKS	**SODIUM (MG)**
½ cup almonds, unsalted	0
1 cup apple juice	21
¼ cup apricots	3
1 cup low-fat milk	107
TOTAL SODIUM (MG) FOR DAY 4	**2,312**

26mg less sodium
Use unsalted margarine.

526 mg less sodium
Try roast beef tenderloin instead of low-fat, low-sodium ham.

198 mg less sodium
Use reduced-fat, low-sodium natural cheddar cheese.

126 mg less sodium
Use low-sodium tomato sauce in Spanish rice recipe.

Total nutrients per day 2,024 calories, 59 g total fat, 26% calories from fat, 12 g saturated fat, 5% calories from saturated fat, 148 mg cholesterol, 2,312 mg sodium, 279 g carbohydrate, 110 g protein, 1,417 mg calcium, 538 mg magnesium, 4,575 mg potassium, 35 g fiber

DAY 5
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 5 menu contains this number of servings from each DASH Food Group

5	6¼	5	2¼	6	1¼	2	0
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
1 cup whole grain oat rings cereal:	273
+ 1 medium banana	1
+ 1 cup low-fat milk	107
1 medium raisin bagel:	272
+ 1 Tbsp peanut butter	81
1 cup orange juice	5

269 mg less sodium — Try frosted shredded wheat instead of whole grain oat rings cereal.

67 mg less sodium — Use unsalted peanut butter.

tuna salad plate:	
+ ½ cup tuna salad	171
+ 1 large leaf romaine lettuce	1
+ 1 slice whole wheat bread	149
cucumber salad:	
+ 1 cup fresh cucumber slices	2
+ ½ cup tomato wedges	5
+ 1 Tbsp vinaigrette dressing	133
½ cup cottage cheese, low-fat:	459
+ ½ cup canned pineapple, juice pack	1
+ 1 Tbsp almonds, unsalted	0

96 mg less sodium — Use 6 low-sodium whole wheat crackers.

67 mg less sodium — Use fat-free yogurt dressing.

DINNER	SODIUM (MG)
3 oz turkey meatloaf	205
1 small baked potato:	14
+ 1 Tbsp sour cream, fat-free	21
+ 1 Tbsp natural cheddar cheese, reduced-fat, grated	67
+ 1 scallion stalk, chopped	1
1 cup collard greens, sautéed with:	85
+ 1 tsp canola oil	0
1 small whole wheat roll	148
1 medium peach	0

131 mg less sodium — Use low-sodium ketchup in turkey meatloaf.

66 mg less sodium — Use low-sodium, reduced-fat cheese.

147 mg less sodium — Use 6 small melba toast crackers instead of a whole wheat roll.

SNACKS	SODIUM (MG)
1 cup fruit yogurt, fat-free, no sugar added	173
2 Tbsp sunflower seeds, unsalted	0
TOTAL SODIUM (MG) FOR DAY 5	2,373

Total nutrients per day 1,976 calories, 57 g total fat, 26% calories from fat, 11 g saturated fat, 5% calories from saturated fat, 158 mg cholesterol, 2,373 mg sodium, 275 g carbohydrate, 111 g protein, 1,470 mg calcium, 495 mg magnesium, 4,769 mg potassium, 38 g fiber

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DAY 6
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 6 menu contains this number of servings from each DASH Food Group

6	5 ¾	5	2 ½	6	¾	3 ⅓	1
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
1 low-fat granola bar	81
1 medium banana	1
½ cup fruit yogurt, fat-free, no sugar added	86
1 cup orange juice	5
1 cup low-fat milk	107

LUNCH	SODIUM (MG)
turkey breast sandwich:	
+ 3 oz cooked turkey breast	48
+ 2 slices whole wheat bread	299
+ 1 large leaf romaine lettuce	1
+ 2 slices tomato	2
+ 2 tsp mayonnaise, low-fat	67
+ 1 Tbsp Dijon mustard	373
1 cup steamed broccoli, cooked from frozen	11
1 medium orange	0

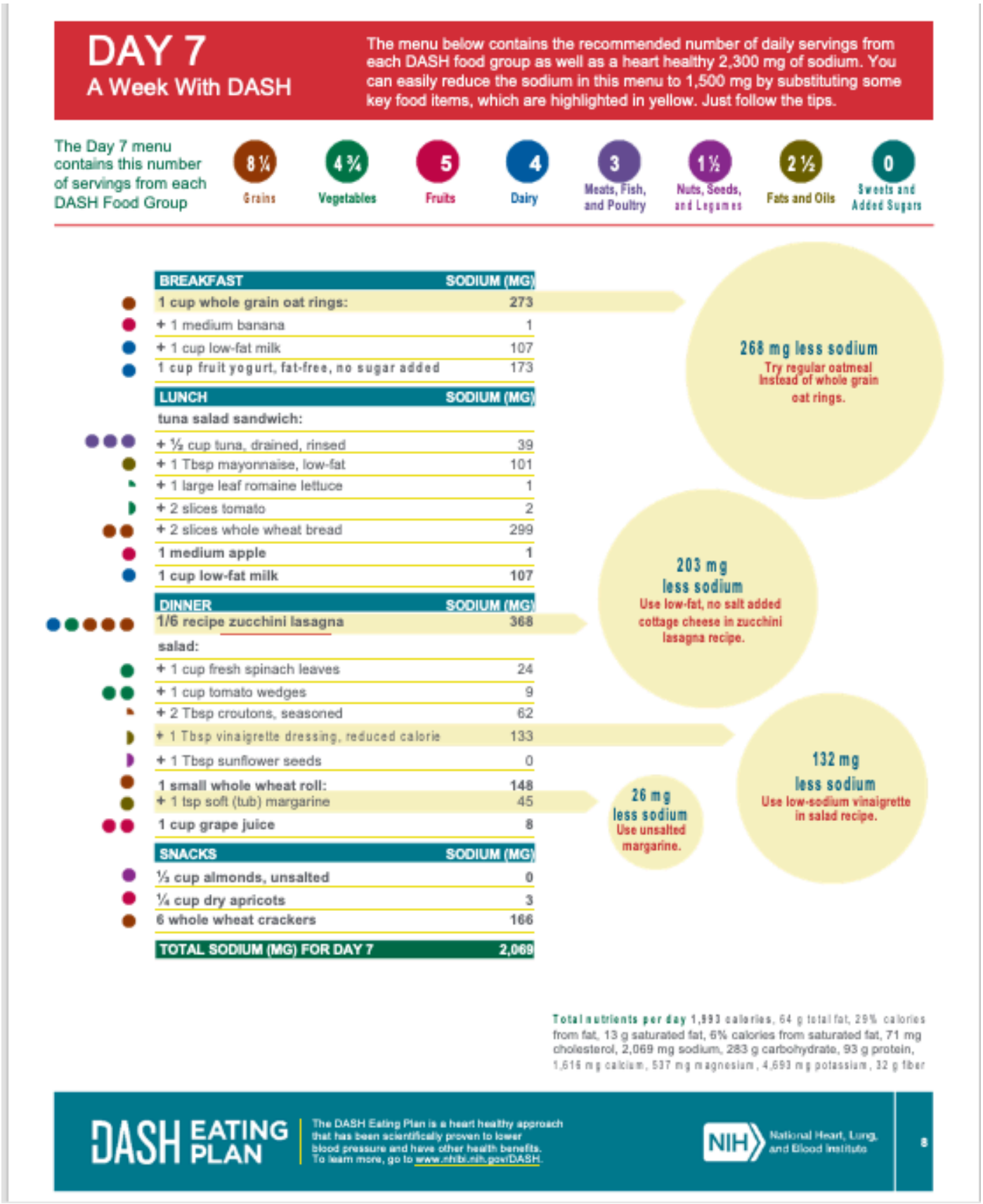
198mg less sodium

Use 1 Tbsp regular mustard instead of Dijon mustard.

DINNER	SODIUM (MG)
3 oz spicy baked fish	50
1 cup scallion rice	18
spinach sauté:	
+ ½ cup spinach, cooked from frozen, sautéed with:	92
+ 2 tsp canola oil	0
+ 1 Tbsp almonds, slivered, unsalted	0
1 cup carrots, cooked from frozen	84
1 small whole wheat roll:	148
+ 1 tsp soft (tub) margarine	26
1 small cookie	60

SNACKS	SODIUM (MG)
2 Tbsp peanuts, unsalted	1
1 cup low-fat milk	107
¼ cup dried apricots	3
TOTAL SODIUM (MG) FOR DAY 6	1,671

Total nutrients per day 1,939 calories, 58 g total fat, 27% calories from fat, 12 g saturated fat, 6% calories from saturated fat, 171 mg cholesterol, 1,671 mg sodium, 268 g carbohydrate, 105 g protein, 1,210 mg calcium, 548 mg magnesium, 4,710 mg potassium, 36 g fiber



DAY 7
A Week With DASH

The menu below contains the recommended number of daily servings from each DASH food group as well as a heart healthy 2,300 mg of sodium. You can easily reduce the sodium in this menu to 1,500 mg by substituting some key food items, which are highlighted in yellow. Just follow the tips.

The Day 7 menu contains this number of servings from each DASH Food Group

8 ¼	4 ¾	5	4	3	1 ½	2 ½	0
Grains	Vegetables	Fruits	Dairy	Meats, Fish, and Poultry	Nuts, Seeds, and Legumes	Fats and Oils	Sweets and Added Sugars

BREAKFAST	SODIUM (MG)
1 cup whole grain oat rings:	273
+ 1 medium banana	1
+ 1 cup low-fat milk	107
1 cup fruit yogurt, fat-free, no sugar added	173
LUNCH	**SODIUM (MG)**
tuna salad sandwich:	
+ ½ cup tuna, drained, rinsed	39
+ 1 Tbsp mayonnaise, low-fat	101
+ 1 large leaf romaine lettuce	1
+ 2 slices tomato	2
+ 2 slices whole wheat bread	299
1 medium apple	1
1 cup low-fat milk	107
DINNER	**SODIUM (MG)**
1/6 recipe zucchini lasagna	368
salad:	
+ 1 cup fresh spinach leaves	24
+ 1 cup tomato wedges	9
+ 2 Tbsp croutons, seasoned	62
+ 1 Tbsp vinaigrette dressing, reduced calorie	133
+ 1 Tbsp sunflower seeds	0
1 small whole wheat roll:	148
+ 1 tsp soft (tub) margarine	45
1 cup grape juice	8
SNACKS	**SODIUM (MG)**
⅓ cup almonds, unsalted	0
¼ cup dry apricots	3
6 whole wheat crackers	166
TOTAL SODIUM (MG) FOR DAY 7	**2,069**

268 mg less sodium
Try regular oatmeal instead of whole grain oat rings.

203 mg less sodium
Use low-fat, no salt added cottage cheese in zucchini lasagna recipe.

26 mg less sodium
Use unsalted margarine.

132 mg less sodium
Use low-sodium vinaigrette in salad recipe.

Total nutrients per day 1,993 calories, 64 g total fat, 29% calories from fat, 13 g saturated fat, 6% calories from saturated fat, 71 mg cholesterol, 2,069 mg sodium, 283 g carbohydrate, 93 g protein, 1,616 mg calcium, 537 mg magnesium, 4,693 mg potassium, 32 g fiber

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What's on Your Plate?

1,800—2,000 calories a day

Learn how your current food habits compare with the DASH eating plan by using this worksheet for 1—2 days. List the food amounts, calories, and sodium for all you eat and drink on a given day. Track your servings by checking off the corresponding number of circles.

To find your specific daily calorie needs, use the Body Weight Planner (niddk.nih.gov/bwp). Find the information about calories and the amount of sodium in foods on nutrition facts labels, mobile applications, or online.

TODAY'S DATE / /

BREAKFAST	CALORIES	SODIUM (MG)

LUNCH		

DINNER		

SNACKS		

Total your numbers. Your daily targets are 1,800—2,000 calories and a sodium level between 1,500 and 2,300 milligrams. If you miss your targets, see A Week With DASH for menu ideas to get closer to your goals.

TOTAL CALORIES

TOTAL SODIUM (MG)

DAILY SERVINGS

These are the recommended servings in the DASH eating plan food groups.

Fill in the number of servings that match the food item you've listed.

See how what you eat compares to the DASH eating plan.

Grains (mostly whole grains)
6—8 servings per day
○ ○ ○ ○ ○ ○ ○ ○

Vegetables
4—5 servings per day
○ ○ ○ ○ ○

Fruits
4—5 servings per day
○ ○ ○ ○ ○

Dairy (fat-free/low-fat)
2—3 servings per day
○ ○ ○

Lean Meats, Fish, and Poultry
6 servings or less per day
○ ○ ○ ○ ○ ○

Fats and Oils
2—3 servings per day
○ ○ ○

Nuts, Seeds, and Legumes
4—5 servings per week
○ ○ ○ ○ ○

Sweets and Added Sugars
5 servings or less per week
○ ○ ○ ○ ○

DASH EATING PLAN

The DASH Eating Plan is a heart healthy approach that has been scientifically proven to lower blood pressure and have other health benefits. To learn more, go to www.nhlbi.nih.gov/DASH.

NIH National Heart, Lung, and Blood Institute

Following the DASH Eating Plan

FOR 1,800 TO 2,000 CALORIES PER DAY

Grains

6—8 SERVINGS PER DAY

Sources of fiber and magnesium

SERVING SIZE
1 slice bread
1 oz dry cereal
½ cup cooked rice, pasta, or cereal

EXAMPLES
Oatmeal, grits, brown rice, unsalted pretzels and popcorn, whole grain cereal, whole wheat bread, rolls, pasta, English muffin, pita bread, bagel

Vegetables

4—5 SERVINGS PER DAY

Sources of potassium, magnesium, and fiber

SERVING SIZE
1 cup raw leafy vegetable
½ cup cut-up raw or cooked vegetable
½ cup vegetable juice

EXAMPLES
Broccoli, carrots, collards, green beans, green peas, kale, lima beans, potatoes, spinach, squash, sweet potatoes, tomatoes

Fruits

4—5 SERVINGS PER DAY

Sources of potassium, magnesium, and fiber

SERVING SIZE
1 medium fruit
¼ cup dried fruit (unsweetened)
½ cup fresh, frozen, or canned fruit, or fruit juice

EXAMPLES
Apples, apricots, bananas, dates, grapes, oranges, grapefruit, grapefruit juice, mangoes, melons, peaches, pineapples, raisins, strawberries, tangerines

Dairy

2—3 SERVINGS PER DAY

Sources of calcium and protein

SERVING SIZE
1 cup milk
1 cup yogurt
1 ½ oz cheese

EXAMPLES
Fat-free (skim) or low-fat (1%) milk or buttermilk; fat-free, low-fat, or reduced-fat cheese; fat-free or low-fat regular or frozen yogurt; fortified soy beverage; lactose-free products

Lean Meats, Fish, Poultry, and Eggs

6 SERVINGS OR LESS PER DAY

Sources of protein and magnesium

SERVING SIZE
1 oz cooked meats, fish, or poultry
1 egg

EXAMPLES
Chicken or turkey without skin; salmon, tuna, trout; lean cuts of beef, pork, and lamb

Fats and Oils

2—3 SERVINGS PER DAY

Sources of energy and vitamin E

SERVING SIZE
1 tsp soft margarine
1 tsp vegetable oil
1 tbsp mayonnaise
2 tbsp salad dressing

EXAMPLES
Soft margarine, vegetable oil (such as canola, corn, olive, or safflower), low-fat mayonnaise, light salad dressing

Nuts, Seeds, and Legumes

4—5 SERVINGS PER WEEK

Sources of energy, magnesium, protein, and fiber

SERVING SIZE
⅓ cup or **1 ½ oz** nuts (unsalted)
2 tbsp peanut butter
2 tbsp or **½ oz** seeds
½ cup cooked legumes (dry beans and peas)

EXAMPLES
Almonds, hazelnuts, mixed nuts, peanuts, walnuts, sunflower seeds, peanut butter, kidney beans, lentils, split peas

Sweets and Added Sugars

5 SERVINGS OR LESS PER WEEK

Sweets should be low in fat

SERVING SIZE
1 tbsp sugar
1 tbsp jelly or jam
½ cup sorbet, gelatin
1 cup lemonade

EXAMPLES
Fruit-flavored gelatin, fruit punch, hard candy, jelly, maple syrup, sorbet and ices, sugar

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Following the DASH Eating Plan

FOR 1,800 TO 2,000 CALORIES PER DAY

oatmeal

whole wheat bread

brown rice

kale

green beans

vegetable juice

Grains

6—8 SERVINGS PER DAY

Sources of fiber and magnesium

SERVING SIZE

1 slice bread
1 oz dry cereal
½ cup cooked rice, pasta, or cereal

EXAMPLES

Oatmeal, grits, brown rice, unsalted pretzels and popcorn, whole grain cereal, whole wheat bread, rolls, pasta, English muffin, pita bread, bagel

Vegetables

4—5 SERVINGS PER DAY

Sources of potassium, magnesium, and fiber

SERVING SIZE

1 cup raw leafy vegetable
½ cup cut-up raw or cooked vegetable
½ cup vegetable juice

EXAMPLES

Broccoli, carrots, collards, green beans, green peas, kale, lima beans, potatoes, spinach, squash, sweet potatoes, tomatoes

Following the DASH Eating Plan

FOR 1,800 TO 2,000 CALORIES PER DAY

Fruits

4—5 SERVINGS PER DAY

Sources of potassium, magnesium, and fiber

SERVING SIZE

1 medium fruit
¼ cup dried fruit (unsweetened)
½ cup fresh, frozen, or canned fruit, or fruit juice

EXAMPLES

Apples, apricots, bananas, dates, grapes, oranges, grapefruit, grapefruit juice, mangoes, melons, peaches, pineapples, raisins, strawberries, tangerines

Dairy

2—3 SERVINGS PER DAY

Sources of calcium and protein

SERVING SIZE

1 cup milk
1 cup yogurt
1 ½ oz cheese

EXAMPLES

Fat-free (skim) or low-fat (1%) milk or buttermilk; fat-free, low-fat, or reduced-fat cheese; fat-free or low-fat regular or frozen yogurt; fortified soy beverage; lactose-free products

DASH EATING PLAN

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Following the DASH Eating Plan

FOR 1,800 TO 2,000 CALORIES PER DAY

chicken

salmon

eggs

margarine

salad dressing

vegetable oil

Lean Meats, Fish, Poultry, and Eggs

6 SERVINGS OR LESS PER DAY

Sources of protein and magnesium

SERVING SIZE

1 oz cooked meats, fish, or poultry
1 egg

EXAMPLES

Chicken or turkey without skin; salmon, tuna, trout; lean cuts of beef, pork, and lamb

Fats and Oils

2—3 SERVINGS PER DAY

Sources of energy and vitamin E

SERVING SIZE

1 tsp soft margarine
1 tsp vegetable oil
1 tbsp mayonnaise
2 tbsp salad dressing

EXAMPLES

Soft margarine, vegetable oil (such as canola, corn, olive, or safflower), low-fat mayonnaise, light salad dressing

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Following the DASH Eating Plan

FOR 1,800 TO 2,000 CALORIES PER DAY

Nuts, Seeds, and Legumes

4—5 SERVINGS PER WEEK

Sources of energy, magnesium, protein, and fiber

SERVING SIZE

⅓ cup or **1 ½ oz** nuts
(unsalted) **2 tbsp** peanut butter
2 tbsp or **½ oz** seeds
½ cup cooked legumes (dry beans and peas)

EXAMPLES

Almonds, hazelnuts, mixed nuts, peanuts, walnuts, sunflower seeds, peanut butter, kidney beans, lentils, split peas

Sweets and Added Sugars

5 SERVINGS OR LESS PER WEEK

Sweets should be low in fat

SERVING SIZE

1 tbsp sugar
1 tbsp jelly or jam
½ cup sorbet, gelatin
1 cup lemonade

EXAMPLES

Fruit-flavored gelatin, fruit punch, hard candy, jelly, maple syrup, sorbet and ices, sugar

DASH EATING PLAN

The DASH Eating Plan is a heart healthy approach that has been scientifically proven to lower blood pressure and have other health benefits. To learn more, go to www.nhlbi.nih.gov/DASH.

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Move More
Making Physical Activity Routine

Heart disease is the leading cause of death in the United States. The good news is that you can lower your risk of getting it or having a stroke by simply moving more. Many types of activity can help your heart—going on a hike or taking the stairs, biking to the store or around the block, wheeling yourself in your wheelchair. Figure out what works best for you.

How much is enough?

As little as 60 minutes a week of moderate-intensity aerobic activity such as walking briskly helps your heart. For major health benefits, aim for at least 150 minutes (2½ hours) a week. Or go for 75 minutes a week of more vigorous activity such as playing basketball, running, or jumping rope, which gives the same benefits. The bottom line: More activity means a bigger boost to your health.

It's up to you how you reach your own personal targets. For example, 30 minutes of physical activity, five times a week, is one option if you're aiming for 150 minutes a week.

Can't carve out a lot of time in your day? Don't chuck your goal, chunk it! Try 10 minutes a few times a day, for example.

Only have 10 minutes? Consider:

- Walking briskly for 5 minutes, turning around and walking back
- Dancing (standing or seated) to three songs
- Getting off your bus early and walking the last stretch

You'll know you're moving enough to help your heart if

- ✓ Your heart is beating faster
- ✓ You're breathing harder
- ✓ You break a sweat

Or, try the talk test:

- ✓ During physical activities, like brisk walking, you should be able to talk, but not sing.
- ✓ During activities such as jogging, you can't say more than a few words without pausing for a breath.

Why move more?

Being active can:

- Protect your heart (even if you have heart disease)
- Improve blood flow
- Lower blood pressure and cholesterol levels
- Give you more stamina and ability to cope with stress

If you're inactive, you're nearly twice as likely to develop heart disease than if you're active. Learn more about the benefits of physical activity on the NHLBI website.

Get strong

In addition to aerobic activity, take time to strengthen your muscles. Try to work your leg, hip, back, chest, abdomen, shoulder, and arm muscles. Aim to do muscle strengthening twice a week in addition to your aerobic activities.

All adults should avoid inactivity.
Start gradually and increase slowly.

Learn more about:

CDC Target Heart Rate and Estimated Maximum Heart Rate

Different types of physical activity.

Recommendations for children, older people, and pregnant women.

nhlbi.nih.gov

NIH National Heart, Lung, and Blood Institute

The heart truth

Get motivated

Try these tips to make being active part of your everyday routine:

Add a friend or family member

- Take a yoga or other fitness class with a friend.
- Work on your fitness goals with your spouse or roommate.
- Go for a daily walk with a neighbor.

Do what you love

- If you enjoy the outdoors, try biking, hiking, golf, or gardening.
- Play with the children in your life.
- Check out swimming options near you or the track at a nearby school.
- Think of physical activity as a special time to refresh your body and mind.

Build activities into your day

- Do strength exercises while watching TV.
- Use a workout game on your gaming console.
- Take a walk during lunch.
- Meet friends for a walk or a bike ride instead of (or before) dinner or a movie.

When To Check With Your Doctor

Certain physical activities are safe for most people. If you have a chronic health condition such as heart disease, arthritis, diabetes, or other symptoms, talk with your doctor first.

Learn more about the risks of physical activity for certain groups on the NHLBI website.

Healthy Blood Pressure for Healthy Hearts

Tracking Your Numbers

It's important to get your blood pressure checked at least once a year. Use this worksheet to record your blood pressure numbers each time you visit the doctor or clinic.

It usually takes more than one reading to know if you have high blood pressure. If your blood pressure has been high, your doctor may want to see you more often. Ask your doctor what your target numbers should be and how often you should get checked.

My target blood pressure

_____ / _____

Blood pressure is measured as two numbers.

Systolic

Diastolic

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Date: _____ Blood Pressure _____ / _____

Learn more at www.nhlbi.nih.gov/hypertension

2008 Physical Activity Guidelines for Americans

Fact Sheet for Health Professionals on Physical Activity Guidelines for Adults

NUTRITION PHYSICAL ACTIVITY OBESITY

How much physical activity do adults need for health benefits?

Adults who are active are healthier, are less likely to develop many chronic diseases, and have better aerobic fitness than adults who are inactive. Adults need to do two types of physical activity each week to improve health – aerobic ***and*** muscle-strengthening activities.

Aerobic Activities

For **substantial health benefits**, adults need to do at least

- **2 hours and 30 minutes** (150 minutes) each week of **moderate-intensity*** aerobic activity,

OR

- **1 hour and 15 minutes** (75 minutes) each week of **vigorous-intensity*** aerobic activity,

OR

- An **equivalent mix of moderate- and vigorous-intensity** aerobic activity.

Aerobic activity should be performed for **at least 10 minutes at a time**, preferably, **spread throughout the week.**

***Intensity** is the level of effort required to do an activity.
A person doing **moderate-intensity** aerobic activity can talk, but not sing, during the activity.
A person doing **vigorous-intensity** activity cannot say more than a few words without pausing for a breath.

Muscle Strengthening Activities

Muscle strengthening should be done 2 or more days a week.

- All major muscle groups should be worked. These are the legs, hips, back, abdomen, chest, shoulders, and arms.
- Exercises for each muscle group should be **repeated 8 to 12** times per set. As exercises become easier, increase the weight or do another set.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
Division of Nutrition, Physical Activity, and Obesity
Physical Activity Guidelines for Adults • 07/09

How can adults get additional health benefits?

Aerobic Activities

For **greater health benefits**, adults should do

- **5 hours** (300 minutes) each week of **moderate-intensity** aerobic activity,

OR

- **2 hours and 30 minutes** (150 minutes) a week of **vigorous-intensity** aerobic activity,

OR

- An **equivalent mix of moderate- and vigorous-intensity** aerobic activity.

Health Benefits from Regular Physical Activity

Participating in regular physical activity provides many health benefits, as summarized below. Reducing risk of some of these conditions may require years of participation in regular physical activity. Other benefits, such as increased heart and lung—or cardiorespiratory—fitness, may require only a few weeks or months of participation.

Strong Evidence for Health Benefits

- **Lower risk of:**
  - Early death
  - Coronary heart disease
  - Stroke
  - High blood pressure
  - High cholesterol or triglycerides
  - Type 2 diabetes
  - Metabolic syndrome
  - Colon cancer
  - Breast cancer
- **Prevention of weight gain**
- **Weight loss, particularly when combined with reduced calorie intake**
- **Improved cardiorespiratory (aerobic) fitness and muscular strength**
- **Prevention of falls**
- **Reduced depression**

Aerobic Activities by Level of Intensity

There are different ways to classify intensity of exercise. **Absolute intensity** is the amount of energy expended per minute of activity. Moderate-intensity activities expend 3.0 to 5.9 times the amount of energy expended at rest. The energy expended in vigorous-intensity activities is 6.0 or more times the energy expended at rest.

Relative intensity is the effort required for an individual to do an activity. Relative intensity of aerobic activity is related to cardiorespiratory fitness. Less fit people generally require a higher level of effort than fitter people to do the same activity. Relative intensity can be estimated using a scale of 0 to 10, where sitting is 0 and the highest level of effort possible is 10. A moderate-intensity activity is a 5 or 6. A vigorous-intensity activity is a 7 or 8.

For most people, light daily activities such as shopping, cooking, or doing the laundry do not count toward the guidelines. Here are some examples of aerobic activities that require moderate-intensity and vigorous-intensity effort:

Level of Intensity	Type of Aerobic Activities
Moderate–Intensity A person doing **moderate-intensity** aerobic activity can talk, but not sing, during the activity.	• Brisk walking (3 miles-per-hour or faster, but not race walking) • Water aerobics • Bicycle riding slower than 10 miles per hour • Tennis (doubles) • Ballroom dancing • General gardening

Level of Intensity	Type of Aerobic Activities
Vigorous–Intensity A person doing **vigorous-intensity** activity cannot say more than a few words without pausing for a breath.	• Race walking, jogging, or running • Swimming laps • Tennis (singles) • Aerobic dancing • Bicycling 10 miles per hour or faster • Jumping rope • Heavy gardening (continuous digging or hoeing with heart rate increases) • Hiking uphill or with a heavy backpack

Muscle-Strengthening Activities

Adults also need to do muscle-strengthening activities **at least 2 days a week**, at a moderate to high level of intensity. These activities should **work all the major muscle groups**: the legs, hips, back, chest, abdomen, shoulders, and arms.

No specific amount of time is recommended for muscle strengthening, but exercises should be performed to the point at which it would be difficult to do another repetition. A **repetition** is one complete movement of an activity, like lifting a weight or doing a sit-up. Adults can do activities that strengthen muscles on the same or different days that they do aerobic activity, whichever works best. Muscle-strengthening activities do not count toward the aerobic activity total.

Below are some examples of muscle-strengthening physical activities for adults.

Types of Muscle-Strengthening Activity
• Lifting weights • Working with resistance bands • Doing exercises that use body weight for resistance (push-ups, sit-ups)

Ways for Adults to Get Physical Activity

To help adults understand the physical activity guidelines and to encourage them to add physical activity into their lives, the following materials are available at ***www.cdc.gov/physicalactivity:***

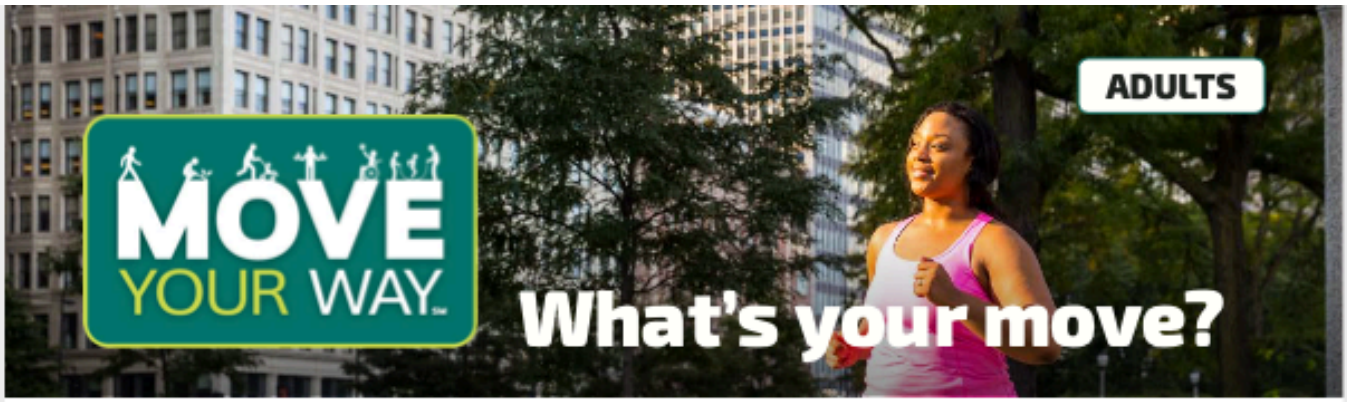
- Tips on getting active
- Videos showing how to do muscle-strengthening activities and what counts as aerobic and muscle-strengthening activities

In addition, the following Health and Human Services (HHS) Web site has information and tools to help adults become and stay active: ***www.health.gov/PAGuidelines.***

On this Web site you will find:

2008 Physical Activity Guidelines for Americans Toolkit to assist organizations in promoting the physical activity guidelines.

- Users' Guide – Promoting the Physical Activity Guidelines for Americans in Your Community: A Guide to Building Awareness and Participation
- *Physical Activity Guidelines for Americans* booklet
- *Be Active Your Way: A Guide for Adults*
- Be Active Your Way: A Fact Sheet for Adults
- At-A-Glance: A Fact Sheet for Professionals
- Posters, event flyers, Frequently Asked Questions (FAQs)



You know you need physical activity to stay healthy.
But did you know it can help you feel better right away?

Boost your mood | Sharpen your focus | Reduce your stress | Improve your sleep

So get more active — and start feeling better today.

How much activity do I need?

Moderate-intensity aerobic activity
Anything that gets your heart beating faster counts.

at least **150** minutes a week

AND

Muscle-strengthening activity
Do activities that make your muscles work harder than usual.

at least **2** days a week

Tight on time this week? **Start with just 5 minutes.** It all adds up!

Or get the same benefits in half the time. If you step it up to **vigorous-intensity** aerobic activity, aim for at least **75 minutes** a week.

Is it moderate or vigorous? Use the "talk test" to find out.

When you're being active, just try talking:

- If you're breathing hard but can still have a conversation easily, it's **moderate-intensity activity**
- If you can only say a few words before you have to take a breath, it's **vigorous-intensity activity**

What counts?

Whatever gets you moving!

Even things you have to do anyway

Even things that don't feel like exercise

You can get more active.

No matter who you are, where you live, on your own, or together.
You can find a way that works for you.

And over time, physical activity can help you live a longer, healthier life.

- ✓ Lower your risk of diseases like type 2 diabetes and some cancers
- ✓ Control your blood pressure
- ✓ Stay at a healthy weight

So take the first step. Get a little more active each day. **Move your way.**

Find tips to get moving and build a weekly activity plan.
health.gov/MoveYourWay/Activity-Planner