

IMPLEMENTING ADULT WAIST CIRCUMFERENCE MEASUREMENTS IN PRIMARY
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Implementing Adult Waist Circumference Measurements in Primary Care

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DOCTOR OF NURSING PRACTICE

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ABSTRACT

Overweight and obesity negatively affect multiple acute and chronic disease conditions (USDHHS & ODPHP, n.d.). Two of the most valid and reliable measurements of overweight and obesity are body mass index (BMI) and waist circumference (WC) (NHLBI, n.d.). Despite evidence that waist circumference measurement (WCM) can aid in stratifying risk, the predominant measurement of obesity is BMI alone (Ross et al., 2020).

The purpose of the practice improvement project involved creating a workflow to measure adult WC at wellness visits, increase the frequency of adult WCM, and documentation of WCM in the electronic health record (EHR). The project included increasing provider and nursing awareness and knowledge about the morbidity-associated risks of an elevated WCM through an educational session. Questions posed to participants during post-education debriefing, and post-implementation elicited feedback on the effectiveness of the educational session, anticipated and encountered barriers to WCM, anticipated patient response to WCM, encountered benefits, and perceived sustainability of WCM. Patients also received information about the health risks associated with an elevated WCM through readily accessible educational materials.

Data collected during the project included the number of patients allowing a WCM, patients refusing WCM, educational pamphlets given to patients, WCM documented in the EHR, and number of WCM discussed between patient and provider during the clinic visit. Participant responses to debriefing questions suggested the educational session effectively increased knowledge and awareness of the morbidity-associated risk of an elevated WCM. Post-implementation question responses identified challenges with nurse staffing and documentation of WCM in the EHR as the most commonly encountered barriers. The most common benefit was

that a WCM allowed an entry point for a conversation between patient and provider about health problems associated with increased central obesity. Patients allowing a WCM equaled 125, with only three patients refusing. Ninety-five percent of patients had a WCM documented in the EHR, 83% had the WCM discussed during the clinic visit, and 76% had the WCM documented in the providers' clinic notes. Over half of patients received an educational pamphlet on WC during the project. Since the project was successful, recommendations included continuing WCM at primary care wellness visits.

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DEDICATION

I dedicate this disquisition to my sons Marcus and Samuel Johnson. I love you both so much, and

I am proud to call you mine.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGMENTS	v
DEDICATION.....	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF ABBREVIATIONS.....	xiii
CHAPTER 1: INTRODUCTION.....	1
Background and Significance.....	1
Problem Statement.....	4
Purpose.....	5
Objectives.....	5
CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW.....	6
Theoretical Framework.....	6
Health System Support.....	7
Clinical Information Systems	7
Delivery System Design.....	8
Decision Support	8
Self-Management Support.....	9
Community Resources	9
Project Framework	9
Plan	10
Do.....	11
Study	11
Act.....	11

Literature Review	11
Search Strategy	12
Classification of Obesity	12
Cost of Obesity	13
Barriers to Addressing Obesity in Primary Care	14
Waist Circumference and Chronic Disease States.....	18
Barriers to Measuring Waist Circumference.....	22
Patient Perspectives on Obesity Management in Primary Care	23
CHAPTER 3: METHODS	24
Project Design	24
Plan-Do-Study-Act	24
Plan	25
Do.....	32
Study	34
Act.....	36
Timeline of Project Phases.....	36
Resources.....	37
CHAPTER 4: RESULTS	38
Objective One Results	38
Debriefing Questions	38
Post-Implementation Questions.....	39
Objective Two Results.....	41
Environmental Assessment	41
Return Demonstration of WCM	42
Data Collection Spreadsheets	42

Objective Three Results	44
CHAPTER 5: DISCUSSION AND RECOMMENDATIONS	46
Summary	46
Discussion	46
Objective One	46
Objective Two	53
Objective Three	56
Strengths	57
Limitations	58
Recommendations	59
Theoretical Framework.....	61
Implications for Practice	62
Dissemination.....	63
Conclusion	63
REFERENCES	65
APPENDIX A: PERMISSION TO USE NHLBI TABLE CLASSIFYING OVERWEIGHT AND OBESITY BY BODY MASS INDEX.....	78
APPENDIX B: PERMISSION TO USE PDSA MODEL GRAPHIC	80
APPENDIX C: PERMISSION TO CONDUCT STUDENT PROJECT AT ESSENTIA HEALTH FAMILY MEDICINE CLINIC.....	81
APPENDIX D: NDSU IRB APPROVAL LETTER	82
APPENDIX E: EMAIL NOTIFICATION OF PROJECT EDUCATIONAL SESSION AND CONSENT	83
APPENDIX F: EDUCATIONAL SESSION POWERPOINT PRESENTATION	85
APPENDIX G: ENVIRONMENTAL ASSESSMENT TOOL.....	90
APPENDIX H: PATIENT EDUCATION FLYER AND PAMPHLET.....	91

APPENDIX I: WAIST CIRCUMFERENCE MEASUREMENT GUIDELINES FOR HEALTHCARE PROFESSIONALS FROM THE INTERNATIONAL CHAIR ON CARDIOMETABOLIC RISK.....	93
APPENDIX J: NECK/WAIST FLOWSHEET FROM EHR.....	96
APPENDIX K: DATA COLLECTION SPREADSHEET	97
APPENDIX L: COMPLETED ENVIRONMENTAL ASSESSMENTS WEEK ONE AND TWO	98
APPENDIX M: EXECUTIVE SUMMARY	100

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks.....	13
2. Project Timeline	37
3. Paraphrased Comments on Debriefing Questions (N=15)	39
4. Qualitative Themes on Barriers.....	40
5. Qualitative Themes on Benefits	40
6. Qualitative Themes on Perceived Sustainability of Waist Circumference Measurements	40
7. Waist Circumference Measurement (Inches) (N=125)	43
8. Waist Circumference Measurement Documentation and Discussion (N=125)	43
9. Waist Circumference Educational Pamphlet Distribution (N=128).....	45

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Representation of The Chronic Care Model	7
2. PDSA Cycle	10

LIST OF ABBREVIATIONS

BMI	Body Mass Index
BPA	Best Practice Alert
EHFMC	Essentia Health Family Medicine Clinic.
WC	Waist Circumference.
WCM.....	Waist Circumference Measurement.

CHAPTER 1: INTRODUCTION

Background and Significance

Obesity is a multifaceted health issue resulting from a combination of biological, psychological, and social factors (Centers for Disease Control and Prevention [CDC], n.d.a.). During an annual meeting in June 2013, The American Medical Association (AMA, 2013) adopted a policy recognizing obesity as a chronic disease state. The AMA's classification has allowed for increased access to care and more research to identify strategies for the prevention and treatment of obesity to decrease its impact (Kyle et al., 2016). The United States Preventative Services Task Force (USPSTF, 2018) recommended that "clinicians offer or refer adults with a body mass index of 30 or higher to intensive, multicomponent behavioral interventions" (para 1). Similarly, the American College of Cardiology (ACC), American Heart Association (AHA), and The Obesity Society (TOS) published guidelines for managing overweight and obesity in adults and recommended that primary care providers refer patients to high-intensity lifestyle interventions (Jensen et al., 2014).

Yet, little awareness exists of obesity as a disease, even among health care providers (Christensen, 2020). Unfortunately, several researchers reported that providers continue to have the opinion that obesity is a result of individual choice. Placing blame creates barriers to addressing obesity in primary care and may result in potentially harmful consequences for patients with obesity. Health care provider barriers include insufficient training in obesity treatment, lack of time, and absent or limited referral resources (Glauser et al., 2015; McGowan, 2016; Tronieri et al., 2019).

Overweight and obesity are linked to multiple co-morbid and chronic disease conditions such as type 2 diabetes, metabolic disorder, heart disease, and certain forms of cancer (National

Institute of Diabetes and Digestive and Kidney Diseases [NIDDK], n.d.; United States Department of Health and Human Services [USDHHS] & Office of Disease Prevention and Health Promotion [ODPHP], n.d.). These conditions can lead to reduced quality of life and reduced life expectancy.

The prevalence of obesity among adults, adolescents, and children in the United States continues to increase. According to the CDC, the prevalence of obesity in adults increased from 30.5% in 1999-2000 to 42.4% in 2017-2018 (Hales et al., 2020). The prevalence of obesity among children and adolescents aged 2 to 19 is 18.5%, or 13.7 million individuals (CDC, n.d.b.). No significant difference in prevalence exists between males and females, showing that obesity does not discriminate by biological sex or age. Likewise, obesity does not discriminate based on ethnicity; however, certain ethnic groups have higher rates of obesity than others. Non-Hispanic black adults in the United States have the highest prevalence of obesity at 49.6% (Hales et al., 2020). Prevalence among Hispanic adults is 44.8%, 42.2% among non-Hispanic white adults, and 17.4% among non-Hispanic Asian adults. In North Dakota, the prevalence of obesity in adults was 33.1% and 14.9% in youth grades 9-12 in 2017 (Nagel & North Dakota Department of Health [NDDoH], 2019). The NDDoH identified decreasing obesity statewide as a part of its state health improvement plan for 2019-2021. According to the USDHHS and ODPHP (n.d.), one of the Healthy People 2030 objectives is to reduce the proportion of U.S. adults with obesity to 36%.

Central or abdominal obesity and general obesity are terms often used when referring to obesity. Central obesity refers to excess subcutaneous fat within the abdomen or trunk or excess visceral fat collected on intra-abdominal organs and structures (Appel et al., 2004; Bosomworth,

2019). General obesity refers to both central and peripheral fatness or increased weight compared to height.

Two of the most commonly used measurements to screen and diagnose overweight and obesity are body mass index (BMI) and waist circumference (WC) (National Heart, Lung, and Blood Institute [NHLBI], n.d.c). BMI is calculated by dividing a person's weight in kilograms by the person's height in meters squared (CDC, n.d.c). BMI is a frequently used indicator of general obesity. An individual with a BMI > 25 is believed to have high body fat; however, a BMI > 25 can also result from increased lean body mass from muscles or bones. When using BMI, adults 20 years or older fall into one of four categories. Adult weight is categorized as underweight when BMI is below 18.5, normal weight 18.5-24.9, overweight is 25.0-29.9, and obese is a BMI of 30 or greater. Obesity can be further divided into three classes; class one refers to adults with a BMI of 30-35, class two is 35-40, and class three is 40 or greater (CDC, n.d.c.). A high BMI can signal a patient's risk for co-morbid and chronic disease conditions (NHLBI, n.d.c.).

Waist circumference is another measure of obesity and is more specific to central or abdominal obesity. Bays et al. (2019) recommend measuring WC using a flexible inch tape placed "around the abdomen at the level of the anterior superior iliac crests, parallel to the floor" (p. 55). The CDC also recommends placing the measuring tape on a horizontal plane around the middle of the abdomen just above the iliac crest, keeping the tape tight while not compressing the skin, and measuring just after expiration (CDC, n.d.d.). Male adults with a waist circumference measurement (WCM) greater than 40 inches (102cm) and female adults with a measurement greater than 35 inches (88cm) correlate with obesity. The Obesity Medicine Association expands on this, stating that a measurement of greater than or equal to 35 inches for Asian males and greater than or equal to 31 inches for Asian females also correlates with obesity

(Welcome, 2017). Ross et al. (2020) recommend routine BMI and WCM in clinical practice, versus BMI alone, before developing a treatment plan for all patients. Since BMI does not differentiate lean body mass from fat mass, indices such as WC can be an adjunct for risk assessment of morbidity and mortality (Jayedi et al., 2020).

Problem Statement

Overweight and obesity are major contributors to the development of other chronic disease states. The NIDDK (n.d.) lists comorbidities to overweight and obesity, including type 2 diabetes, hypertension, heart disease, stroke, certain forms of cancer, sleep apnea, osteoarthritis, fatty liver disease, kidney disease, and pregnancy complications.

Obesity is a significant public health issue, and an important setting in which to address obesity is in primary care (Bright et al., 2019; Croghan et al., 2019; McGowan, 2016; Durrer Schutz et al., 2019). Primary care providers are often the first point of contact and are well-positioned to assist patients with weight management needs and goals. Providers can have a supportive and guiding role in the multidisciplinary approach to managing obesity. As part of their clinical role, primary care providers can role model healthy lifestyle practices and are leaders in continuing research on the treatment and management of obesity. With the AMA's recognition of obesity as a chronic disease, providers in the clinic setting need to treat patients with obesity the same as patients with other chronic disease states, where early recognition and diagnosis are important (AMA, 2013; Christensen, 2020).

Despite the existence of guidelines, algorithms, and treatment models, there continue to be gaps in treating patients with obesity (Bays et al., 2019). Despite evidence that WC can aid in identifying health risks, the predominant measurement of obesity is BMI alone (Cerhan et al., 2014). Primary care providers need to include WCM, in addition to BMI, to augment obesity

evaluation and risk reduction. The correlation between excess abdominal fat and increased health risk inspired the co-investigator to create a process for routine measurement of WC at primary care appointments.

Purpose

The primary purpose of this practice improvement project is to create a workflow to measure WC during primary care appointments at a mid-size primary care facility. A secondary purpose is to increase the frequency of WCM and electronic health record (EHR) documentation of WC at this facility.

Objectives

The objectives of this project are to:

1. Increase awareness and knowledge about the morbidity-associated risks of a WCM greater than 35 inches for women and 40 inches for men through an educational session to providers and nursing staff at an urban family medicine clinic.
2. Improve the frequency and consistency of adult WCM and documentation of WC in the EHR at wellness visits at an urban family medicine clinic in Fargo, ND, by developing a process for nurse measurement of WC.
3. Educate patients about the health risks associated with WCM above the recommended standard by providing patients with educational materials that are readily assessable in the clinic examination rooms.

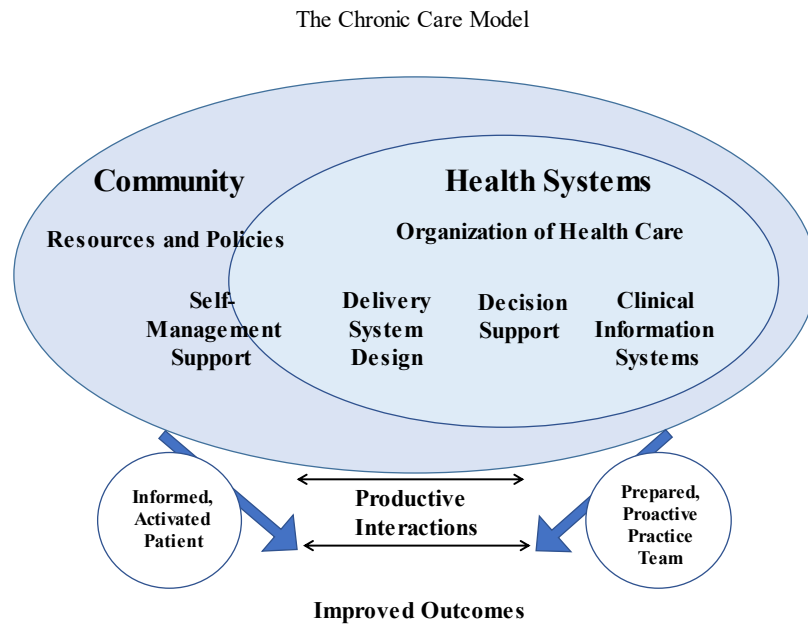
CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical Framework

The CDC (n.d.e.) defines chronic disease as a condition that lasts one year or more and requires ongoing medical attention. The AMA has now recognized obesity as a chronic disease, and as such, management of obesity involves a high-quality, multifaceted, team-based approach. The theoretical framework best suited to guide this project is The Chronic Care Model (CCM). This model was developed in 1998 by Dr. Edward Wagner, Director of the MacColl Institute for Healthcare Innovation, and colleagues of the Improving Chronic Illness Care program with support from The Robert Wood Johnson Foundation (Wagner, 1998). See figure 1 for a representation of the CCM. The CCM identifies six elements of a health care system that drive high-quality care for patients with chronic diseases (MacColl Center for Health Care Innovation [MCHCI], n.d.). The elements include health system support, clinical information systems, delivery system design, decision support, self-management support, and community resources. The co-investigator will apply the CCM to this project at Essentia Health Family Medicine Clinic (EHFMC) by focusing on the six elements.

Figure 1

Representation of The Chronic Care Model



Health System Support

Health system support is achieved when an organization’s culture supports chronic illness management and practice improvement. In addition, leadership support is crucial to foster change, quality improvement, and evidence-based practice (MCHCI, n.d.). Health system support will be critical to project success. Providers will need to make a practice change to incorporate WCM into assessing and diagnosing obesity versus relying on BMI alone. Enlisting a project sponsor within the organization will provide support for quality improvement for obesity management.

Clinical Information Systems

The second element of the CCM is clinical information systems (MCHCI, n.d.). Clinical information systems organize data regarding the individual patient’s health or patient population to facilitate efficient and effective care. Communicating trends of obesity in the patient

population could emphasize the need to incorporate WCM into practice. Sharing evidence supporting WCM to improve risk assessment in patients with obesity can promote tailored care planning. Clinical information systems help promote quality improvement and track evidence-based practice.

Delivery System Design

The CCM delivery system design focuses on improving patient health through a proactive instead of a reactive team approach (MCHCI, n.d.). Delivery system design speaks to the composition and function of the individuals who deliver care. Maximizing team members' use by having defined roles and tasks ensures effective and efficient care delivery. Additionally, how the team members' contribution improves outcomes through communication and collaboration should be noticeable to the patient. This project intends to optimize the nurse's role as part of the health care team to achieve efficient and correct WCM. Creating a process for nurses to measure WC provides a structured and planned interaction between the patient and the nurse.

Decision Support

Decision support includes increasing access to evidence-based guidelines and promoting care consistent with scientific evidence (MCHCI, n.d.). Also, sharing scientific evidence with patients encourages their participation in the care plan. The decision support element of the CCM will be included in the project when primary care providers are given evidence-based education about the importance and benefit of WCM. Decision support will also be included when providing evidence-based educational materials to the patient regarding WCM.

Self-Management Support

Self-management support involves assisting the patient in assuming an active role in their health and healthcare (MCHCI, n.d.). The decisions patients make and the behaviors they engage in affect current and future health. Self-management support is a partnership and collaboration between the patient and the provider to define the problem, establish priorities, set goals, and create a treatment plan. The project intervention, related to self-management support, involves providing evidence-based patient educational materials about WCM and identification of health risks. Patient education promotes the self-management of obesity.

Community Resources

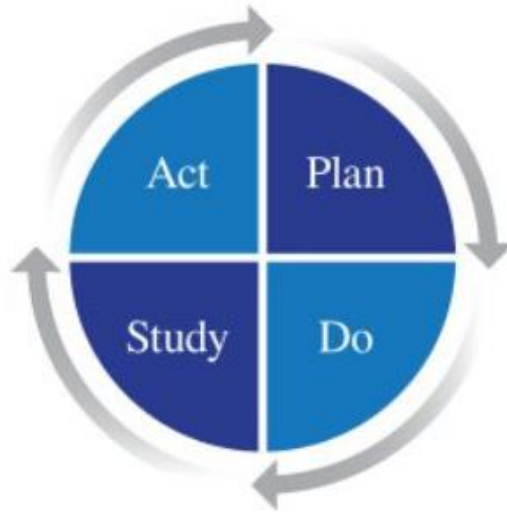
The final element of the CCM is community resources. Partnerships formed between the patient, the healthcare system, and community organizations support and develop interventions that enhance care for patients with obesity (MCHCI, n.d.). Providers can recommend state and national organizations with an abundance of helpful material available to promote self-help strategies. Community resource utilization promotes efficiency in chronic disease management by avoiding duplicative efforts.

Project Framework

The Plan, Do, Study, Act (PDSA) cycle, also known as the Deming Cycle, was built from the Plan, Do, Check, Act (PDCA) cycle first introduced by Walter Shewart in the 1920s (The W. Edwards Deming Institute, n.d.). Dr. W. Edwards Deming created the PDSA cycle as a model for developing, evaluating, and implementing changes that lead to the improvement of a product, process, or service. The cycle is divided into four steps. See figure 2.

Figure 2

PDSA Cycle



Note: PDSA cycle image is reprinted courtesy of The W. Edwards Deming Institute[®] and was originally published in *Out of the Crisis* by W. Edwards Deming, published by The MIT Press. (Appendix B)

Plan

The first step in the PDSA cycle is the Plan step. This step involves identifying a purpose or goal with measurable targets. As the name implies, the Plan step consists of preparation work. A team of varying knowledge, experience, roles, and responsibilities is assembled to answer questions about what is trying to be accomplished, how the change translates to improvement, and what changes are necessary for improvement (Minnesota Department of Health [MNDH], n.d.). Answering the preceding questions is necessary for the development of an aim statement. Next is to examine the details of the current process and what steps need to be made to accomplish the desired change. Finally, after thoroughly evaluating the process, the team must develop an action plan to implement the necessary steps to meet the objective.

Do

Once the team has developed an action plan in the Plan step, the next stage is the Do step. The Do step involves implementing the components of the action plan and implementing the change (MNDH, n.d.). Collecting data along the way is essential in the Do step. Data collection should include observations, any problems encountered, or any unanticipated effects.

Study

The next step of the model is the Study step. This step is similar to an evaluation of the aim statement compared to the data collected during step two (MNDH, n.d.). The study step is meant to aid the researcher in determining if the planned change resulted in a valuable improvement and if unintended side effects occurred. The study step also identifies any areas for improvement.

Act

The final step is the Act step. In the Act step, the change is standardized if the plan was determined to be successful (MNDH, n.d.). If the plan did not create valuable change, the theory, methods, or goal might need to be adjusted. In this event, the team is required to return to the Plan step and develop a new plan, thus beginning a new cycle. Even with a successful project, ongoing re-examination of the process is needed to determine further improvement.

Literature Review

An urgent health care crisis exists associated with the prevalence of obesity among adults in the United States (Hayes et al., 2017). This review of literature will include data related to obesity and chronic diseases, including the classification of overweight and obese, the economic costs associated with obesity, the barriers to addressing obesity in clinical practice, and information about WC and its relation to chronic disease states.

Search Strategy

A literature search, with the aid of a health librarian, included Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and PubMed databases. The search included English language articles with the following search terms: (“obesity” AND “primary care or primary health care or primary healthcare” NOT “children or adolescents or youth or child or teenager”), (“waist circumference” AND “obesity or overweight or fat or obese or unhealthy weight or high BMI”), (“waist circumference” AND “morbidity and mortality” AND “obesity or overweight or fat or obese or unhealthy weight or high BMI” NOT “children or adolescents or youth or child or teenager”), and (“waist circumference” AND “indicators or predictors” AND “obesity or overweight or fat or obese or unhealthy weight or high BMI” NOT “children or adolescents or youth or child or teenager”). Keywords to search PubMed’s Medical Subject Headings (MeSH) database were “obesity” and “waist circumference.” An exclusion keyword was “child.”

An attempt was made to keep all data and articles no earlier than 2015; however, a few sentinel articles within the last 16 years, referenced multiple times in the literature, were kept as primary sources of information. Exclusion criteria comprised articles and data explicitly focused on childhood obesity. The reference lists of articles were used as a reference source to find other potentially eligible literature. Web of Science allows the reader to view articles that cite the article selected. The co-investigator reviewed the articles listed to find potentially eligible literature.

Classification of Obesity

The NHLBI created a table that classifies overweight and obesity by BMI, WC, and associated disease risk (NHLBI, n.d.a). See Table 1 for the NHLBI table.

Table 1

Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks

	BMI (kg/m ²)	Obesity Class	Disease Risk * Relative to Normal Weight and Waist Circumference	
			Men 102 cm (40 in) or less Women 88 cm (35 in) or less	Men > 102 cm (40 in) Women > 88 cm (35 in)
Underweight	< 18.5		-	-
Normal	18.5-24.9		-	-
Overweight	25.0-29.9		Increased	High
Obesity	30.0-34.9	I	High	Very High
	35.0-39.9	II	Very High	Very High
Extreme Obesity	40.0 +	III	Extremely High	Extremely High

* Disease risk for type 2 diabetes, hypertension, and CVD.

Note: Increased waist circumference also can be a marker for increased risk, even in persons of normal weight

Source: National Heart, Lung, and Blood Institute; National Institutes of Health; U.S. Department of Health and Human Services. Reprinted with permission (Appendix A)

Cost of Obesity

The total healthcare expenditure related to overweight and obesity is substantial (Cecchini, 2018). The increasing prevalence of obesity, specifically class III obesity, could significantly impact healthcare services and associated expenditures. Individuals with class III obesity are more likely to need inpatient hospital, surgical, and home health services. The drug prescription rate is also 3.6 times higher in a patient with class III obesity than a normal-weight patient. Costs related to obesity are both direct and indirect. Direct costs are those “paid by individuals, families, insurance companies, and employers” (Waters & Graf, 2018, p.3). Indirect costs are those related to “work absences, lost wages, and reduced economic productivity for the individual suffering from the conditions and their family caregivers” (p.3). Obesity accounts for 47.1% of the total (direct and indirect) cost of chronic diseases in the United States. In 2016, the cost of chronic diseases attributed to obesity and overweight resulted in \$480.7 billion in direct health care costs and \$1.24 trillion in indirect costs (Waters & Graf, 2018). Cecchini (2018)

predicted that if current trends continue, by 2025, total healthcare costs per capita related to obesity could reach close to three times what they were in 2000. According to Waters and Graf (2018), individuals with obesity that achieve 5% weight reduction can reduce annual medical costs by \$2,137 for a BMI of 40 or greater, \$528 for a BMI of 35, and \$69 for a BMI of 30.

Barriers to Addressing Obesity in Primary Care

In a survey of health care providers by Petrin et al. (2017), 65% of participants believe that both the patient and the provider were responsible for ensuring obesity counseling. Thirty-two percent of participants felt the responsibility landed solely on the provider. Although providers accepted at least partial responsibility for counseling patients on obesity, several researchers spoke to obesity recognition and treatment barriers. Barriers included insufficient training, lack of time, unfamiliarity with guidelines, and attitudes towards patients with obesity (Hayes, 2019; Glauser et al., 2015; McGowan, 2016; Petrin et al., 2017; Phelan et al., 2015; Tronieri et al., 2019).

Obesity Education

According to multiple research studies, providers are insufficiently educated on the management and counseling of patients with obesity (Croghan et al., 2019; Petrin et al., 2017; Turner et al., 2018). A survey by Croghan et al. (2019) showed that out of the 82 primary care providers surveyed, 62 had no special education on weight management during their medical education. Only half of the primary care providers surveyed participated in continuing education on weight management after medical training. Another survey by Petrin et al. (2017) showed that 56% of the providers felt that education in obesity management could improve their ability to counsel patients with obesity. Historically, the view of obesity as a lifestyle choice has led to

minimal education and guidance in undergraduate or postgraduate programs for health care providers (McGowan, 2016).

Lack of Time

Lack of provider time to counsel patients about obesity during the clinic appointment is a common theme throughout the literature. In the survey by Petrin et al. (2017), 67% of health care providers responded that additional time with the patient during an office visit could improve the efficacy of patient counseling on obesity management and associated risk. However, providers admit that time is limited, and patients often present for reasons other than to address their obesity (Hayes, 2019). Other presenting reasons or patient conditions take priority during the visit, preventing the provider from exclusively discussing obesity management. The National Ambulatory Medical Care Survey (as cited in Croghan, 2019) found that the average length of time of a primary care visit was 21.77 minutes, and providers dedicated only 1.75 minutes to discussing overweight and obesity. When speaking specifically about WCM at clinic visits, Hayes (2019) found that providers and nurses felt there was a lack of time to measure WC or time was wasted trying to find the tape measure.

Familiarity With Guidelines

The classification of obesity as a chronic disease has led professional organizations to create clinical practice guidelines and algorithms for clinicians to use as guidance in assessing and treating obesity (Christensen, 2020). Examples of guidelines available to clinicians include the 2013 AHA/ACC/TOS Guidelines for the Management of Overweight and Obesity in Adults, the USPSTF guidelines, the American Association of Clinical Endocrinologists Treatment Algorithm for the Medical Care of Patients with Obesity, the Endocrine Society's Pharmacologic Management of Obesity, and the Obesity Medicine Association's Obesity Algorithm (Apovian et

al., 2016; Bays et al., 2019; Garvey et al., 2016; Jensen et al, 2014; USPSTF, 2018). However, researchers report that providers still have unfamiliarity with guidelines. A survey by Glauser et al. (2015) showed that cardiologists, endocrinologists, and primary care providers reported relatively low familiarity with obesity guidelines on a 10-point familiarity scale. Likewise, Turner et al. (2018) surveyed healthcare providers about familiarity with obesity treatment guidelines with 84% of the participants not able to correctly identify practices consistent with evidence-based guidelines for obesity treatment. In multiple studies, researchers found a lack of a standardized approach across an institution or the profession in treating obesity, leading to decreased adherence to obesity guidelines (Glauser et al., 2015; Hayes et al., 2017; Turner et al., 2018).

Attitudes Towards Obese Patients

Providing high-quality patient-centered care is among the responsibilities of primary care providers. Even with the best intentions, providing high-quality care can prove difficult if the provider maintains negative attitudes or stereotypes towards obesity and patients with obesity (Phelan et al., 2015a). Throughout the literature, researchers report long-standing stigma and bias towards obese individuals by providers. Obesity stigma and bias can begin even before the provider has completed education and training (Pearl et al., 2017; Phelan et al., 2015b). Researchers looked at medical students' attitudes and biases towards obese patients in two studies. In the study conducted by Phelan et al. (2015b), students completed a survey in their first semester of medical school and their final semester. The researcher assessed how medical school factors like curriculum content, instructor role-modeling, and student interactions with individuals who have obesity affected medical students' implicit and explicit weight bias. The researchers found an increase in implicit bias was associated with more hours of training focused

on dealing with patients identified as difficult ($p = 0.027$). An increase in both implicit and explicit weight bias was associated with more witnessed discrimination and negative comments about patients with obesity by faculty ($p = 0.029$; $p < 0.001$). A reduction in implicit bias was associated with positive interactions with patients with obesity and more frequent interaction with patients and peers with obesity ($p = 0.014$; $p = 0.052$). A reduction in explicit bias was associated with more skill in weight loss counseling of patients with obesity ($p = 0.005$). Pearl et al. (2017) found that medical students who had experienced successful weight loss expressed less compassion and more blame towards patients who did not lose weight. Both studies highlight the need for changes in medical school curriculum to improve attitudes and reduce bias towards obese patients.

Negative attitudes and beliefs about obesity are prominent among practicing providers (Obesity Action Coalition [OAC], n.d.). A questionnaire sent out to general practitioners and internists by Jung et al. (2016) found that when using the Fat Phobia Scale, the mean score was 3.4, which translates as a slightly negative attitude towards overweight and obese people. Additionally, 58.3% felt that the main reason for excess weight was due to the overweight or obese person having no willpower. At the 2013 national conference for the American Association for Nurse Practitioners (AANP), 358 nurse practitioners (NP) completed a survey about their attitudes and beliefs towards obese patients. The results indicated that “NPs have a negative attitude towards and beliefs about overweight and obese patients” (Ward-Smith & Peterson, 2016, p. 128).

Judgmental attitudes and beliefs have implications for practice. Patients who experience bias may feel unwelcome or disrespected and less willing to seek healthcare (MacInnis et al., 2019; Phelan et al., 2015; Ward-Smith & Peterson, 2016). Multiple researchers hypothesize that

patient outcomes could be significantly improved if primary care providers had more awareness of their own bias or attitudes towards obese patients, increased patient engagement in the treatment plan for weight loss, and recognized obesity as a chronic disease (Bloom et al., 2018; MacInnis et al., 2019; Ward-Smith & Peterson, 2016).

Waist Circumference and Chronic Disease States

As with other chronic diseases, early prevention and screening for overweight and obesity are crucial to combat lifelong illness. There are numerous reasons to include WC as a complementary measurement to BMI at clinic appointments (Bays et al., 2019; Ross et al., 2020). Reasons include the low cost of measuring WC, the accessibility of this measurement to providers and clinics, and the correlation between WC and the detection and management of obesity-related health risks. Several researchers spoke of the correlation between WC and health risks such as type 2 diabetes, metabolic disorder, cardiovascular disease, and certain cancers.

Waist Circumference and the Risk for Metabolic Syndrome and Type 2 Diabetes

Metabolic syndrome is diagnosed when at least three out of five metabolic risk factors are present (NHLBI, n.d.b). Risk factors include a WCM equal to or greater than 35 inches for women and 40 inches for men, a triglyceride level equal to or greater than 150mg/dL, a high-density lipoprotein (HDL) less than 50mg/dL for women, and 40mg/dL for men, blood pressure greater than 130/85 mmHg, and a fasting blood sugar level greater than 100mg/dL. According to the American Diabetes Association (n.d.), criteria for the diagnosis of type 2 diabetes includes a hemoglobin A1C greater than or equal to 6.5, a fasting plasma glucose greater than or equal to 126mg/dL, blood glucose greater than or equal to 200mg/dL after a 2-hour oral glucose tolerance test, or a random plasma glucose test that is greater than or equal to 200mg/dL. The provider may choose to diagnose diabetes based on one or more tests and require repeating once for

confirmation. Insulin resistance and hyperinsulinemia are key pathways by which obesity plays a role in the risk for metabolic syndrome and type 2 diabetes (Aleksandrova et al., 2018). Obesity, specifically abdominal obesity, is the main cause of insulin resistance.

Obesity prevalence among U.S. adults increased from 34.3% to 37.7% between 2005/2006 and 2013/2014, respectively (Flegal et al., 2016). The incidence of type 2 diabetes in the United States from 1980 to 2014 has increased from 3.5 to 6.6 per 1000 population. Body mass index and WC are two measurements to identify general and central obesity. In multiple articles in the literature, researchers link general and central obesity to metabolic syndrome and type 2 diabetes. Researchers suggest that WC may be a better indicator than BMI to assess risk, or at the very least, can be used in conjunction with BMI (Bosomworth, 2019; Caspard et al., 2017; Fan et al., 2020; Seo et al., 2017). Fan et al. (2020) followed 10,419 Chinese adults from 2008-2012 and assessed the independent and combined effects of BMI and WC on the risk for diabetes. At the mean follow-up of 2.8 years, 805 participants had developed type 2 diabetes. Participants with central obesity and general obesity had a higher risk of diabetes than normal-weight subjects. The participants without central obesity but with general obesity were not at higher risk for diabetes when compared to normal-weight subjects. A meta-analysis of 23 longitudinal observation studies by Seo et al. (2017) found that BMI and WC positively predicted the development of diabetes. In a subgroup analysis based on gender, the researchers found that WC was a better indicator for diabetes than BMI for women. Finally, National Health and Nutrition Examination Survey (NHANES) data analyzed by Caspard et al. (2017) found the increased prevalence of diabetes in the United States from 1999/2000 to 2013/2014 was limited to individuals with central obesity, whereas there was not a significant increase in prevalence among the non-obese. The three previously mentioned studies support the common theme that

BMI and WC are better indicators for risk of metabolic syndrome and type 2 diabetes than BMI alone.

Waist Circumference and Cardiovascular Disease Risk

Research has shown that obesity contributes to cardiovascular diseases such as hypertension, atherosclerosis, cardiomyopathy, and stroke (Bays et al., 2019; NIDDK, n.d.). Obesity adversely affects the heart and vascular anatomy and function both directly and indirectly, increasing cardiovascular disease risk (Bays et al., 2019). Historically, BMI has been the standard practice to measure obesity, but recent guidelines encourage the additional measurement of WC to account for central obesity (Bays, 2019; Jensen et al., 2014). Several articles reviewed established the predictive ability of BMI and WC in the development of cardiovascular disease.

BMI accounts for general obesity but does not specify fat distribution in the body (Bosomworth, 2019; Sun et al., 2019). Individuals may have the same BMI but significantly different body fat distribution, thereby different health risks. Thus, WC should also be measured in individuals classified as normal weight BMI (Bays, 2019; Cerhan et al., 2014). Sun et al. (2019) analyzed data from 156,624 postmenopausal women enrolled in the Women's Health Initiative (WHI) study and the WHI extension study and found that women with normal weight and central obesity were at higher risk of developing cardiovascular disease than women with normal weight without central obesity. The authors note a similar risk for cardiovascular disease in normal BMI centrally obese women and high BMI centrally obese women. Sun et al. (2019) findings support the recommendation to measure WC in addition to BMI to determine health risks.

Hypertension is common in patients with obesity. Momin et al.'s (2020) study of 1,927 Chinese participants conducted between May and July 2014 investigated the relationship between BMI, WC, and a combination of both indices with the incidence of hypertension. Participants were previously part of an atherosclerosis cohort survey between December 2011 and April 2012. The 2.3-year follow-up study by Momin et al. found that 19.1% of men and 13.6% of women developed incident hypertension. In both men and women, an increase in BMI and WC were independently and jointly linked to the development of hypertension. Wang et al. (2020) examined how an increase in central obesity relative to general obesity is associated with blood pressure change. The researchers studied 11,714 participants and found that for every annual 10-centimeter gain in WC, both systolic and diastolic blood pressure measurements increased in men and women, independent of BMI change.

Obesity contributes to the development of cardiovascular disease such as heart failure. However, the association between abdominal obesity and patient outcomes is not well established in patients with heart failure. Tsujimoto and Kajio (2017) investigated the relationship between central obesity and heart failure in a study of 3,310 patients with heart failure with preserved ejection fraction (HFpEF). Patients with HFpEF and abdominal obesity were at significantly higher risk for all-cause mortality than patients with HFpEF without abdominal obesity.

Waist Circumference and Cancer Risk

Second only to cigarette smoking, obesity is the most common preventable cause of cancer (Bays, 2019). Along with cardiovascular disease, cancer is the most common cause of mortality in obese patients. The pathophysiology of obesity and cancer risk includes the release

of pro-inflammatory cytokines, increased cancer-promoting hormones, adipocyte cell differentiation, unstable reactive oxygen species, and metabolic dysfunction.

In multiple articles, researchers uncovered an increased risk of cancer in patients with obesity. Two articles specifically addressed central obesity and cancer risk. The previously mentioned study by Sun et al. (2019), which linked central obesity with cardiovascular risk, also found an increased risk for cancer in the participants. Likewise, with cardiovascular risk, women with normal weight and central obesity were at higher risk for cancer than women with normal weight and no central obesity. Lu et al. (2016) compared individuals with central obesity and overall obesity to small intestinal cancer risk and found that WC was “statistically significantly associated with adenocarcinoma” of the small intestine (p. 923). The continued practice of measuring BMI, and adopting WCM, can help stratify cancer risk in patients with obesity.

Barriers to Measuring Waist Circumference

Barriers to measuring WC are not well documented in the literature searched. Gaynor et al.’s (2018) study to encourage the adoption of WCM in primary care identified the barriers to measuring WC. One barrier identified was the absence of a place to document WC in the EHR. Included in the study were two sites and while one site had a place to record WC, the other site did not. However, both sites automatically calculated BMI. Barriers included a lack of knowledge on how to correctly measure WC, an insufficient supply of stocked tape measures, and a perceived lack of time to complete WCM. Multiple providers felt that measuring WC may make the patient feel uncomfortable. Gaynor et al. (2018) concluded that overcoming provider barriers would foster the adoption of WCM into primary care practice.

Patient Perspectives on Obesity Management in Primary Care

Multiple articles found during the literature search addressed the attitudes and perspectives of the primary care providers in discussing obesity with patients. In other articles found, researchers attempted to understand the perspective of the patient. As stated previously, providers perceived that discussing the patient's obesity may cause patient discomfort. Johnstone et al. (2020) report that patient discomfort in discussing obesity exists; however, patient discomfort often results from feeling judged and stigmatized. Patients strongly desire to discuss obesity with a provider because the provider is viewed as the expert and the appropriate resource for knowledge and guidance. Patients expressed that one of the greatest needs from the provider is a realistic and patient-centered plan for weight reduction. Gaynor et al. (2019) surveyed 99 adults regarding their willingness to have their WC measured, "62.6% reported feeling 'very' comfortable and 82.8% were 'very willing' to have waist measurement" (p.13).

CHAPTER 3: METHODS

Project Design

The design of this project was practice improvement aimed at creating a workflow to measure WC at primary care appointments. The overall project goals were to create a process for obtaining a WCM at wellness visits and increase knowledge and awareness for providers, nurses, and patients about how WCM is important in stratifying health risks. The project utilized qualitative data.

Plan-Do-Study-Act

The PDSA model was used in project development and evaluation. The *Plan* stage involved identifying participants and stakeholders, obtaining an organizational sponsor, and approval from the North Dakota State University (NDSU) dissertation committee. The project received permission to move forward from the organization and the NDSU institutional review board (IRB). Another part of the *Plan* stage was developing an educational session for clinic nurses and providers, developing a process for nurses to measure WC, and developing patient educational materials on WC. The *Do* stage involved conducting a 30-minute educational session for clinic nurses and providers on WC, training nurses on correct WCM, and displaying patient educational materials on WC. The *Study* stage involved analyzing and categorizing feedback received from providers and nurses during the educational session and post-implementation questioning, analyzing data from environmental assessments of the patient exam rooms and central pod, accurate return demonstration of WCM by nursing staff, and analyzing data from data collection spreadsheets. The *Act* stage involved making recommendations for the adoption of WCM at primary care wellness visits.

Plan

The first phase of the project was to gain organizational support for the measurement of WC. A nurse practitioner practicing at EHFMC expressed interest in the project and agreed to be the organizational sponsor. The sponsor discussed the project with other primary care providers at this clinic to gain support in the project. The co-investigator discussed the project with the ambulatory care supervisor in charge of nursing staff for the clinic to get buy-in. After an executive summary about the project was written and submitted, permission to proceed with the project objectives came from the executive director for Essentia Health's Institute of Rural Health (Appendix C). Review by NDSU IRB regarding the human subjects research project resulted in a determination of exempt status according to federal regulations. See Appendix D for the IRB approval letter from NDSU.

Setting

The setting for this project was EHFMC, located on 51st Avenue South in Fargo, North Dakota. Fargo's population is 124,662 people, with 49.1% being female and 50.9% being male (United States Census Bureau [USCB], 2019). The majority of Fargo residents are white, 84.6%, 7% Black or African American, 3.5% Asian, 3.1% two or more races, 3% Hispanic or Latino, 1.2% Native American or Alaska Native, and 0% Pacific Islander. Between 2015 and 2019, 94.3% of adults ages 25 or older completed a high school or higher level of education, and 40% achieved a bachelor's degree or higher level of education. The adult obesity rate in North Dakota is 33.1% (Nagel & NDDoH, 2019).

EHFMC provides primary and specialty care to its residents of all ages and in the surrounding communities (Essentia Health, n.d.). The clinic offers diagnostic testing, including on-site lab services, imaging, and radiology. The clinic also provides walk-in services. The clinic

employs eight primary care providers in family medicine and long-term care. The providers include three physicians, three nurse practitioners, and two physician assistants. One of the physicians and one of the nurse practitioners are mobile medicine providers. Mobile medicine providers mean that in addition to seeing patients in the clinic, they travel to care for older adults who are short or long-term residents of a nursing home or assisted living. On average, each provider in the clinic sees 16 patients per day.

EHFMC employs Licensed Practical Nurses (LPN) and Registered Nurses (RNs). The responsibilities of the nurse include rooming the patient, collecting vital signs, reviewing the patient's medication list, determining the patient's preferred pharmacy, and briefly discussing with the patient the reason for presenting to the clinic. The nurse is also responsible for monitoring any incoming messages the provider receives from patients. The clinic has two RNs that work in a resource position. The RNs have additional responsibilities, including assisting with Medicare annual wellness visits and administering The Montreal Cognitive Assessment (MOCA) to designated patients.

The clinic environment is obesity-friendly. The lobby waiting room and patient exam rooms have bariatric chairs for patients. The patient exam tables are wide and adjustable. A scale used to collect the patient's height and weight is located in each exam room, allowing for patient privacy without the fear of other patients observing. The patients also have two sizes of paper exam gowns available, including large and extra-large. The exam rooms are large and conducive to the space needed to collect a WCM. The clinic's layout is set up with patient exam rooms surrounding a central pod in a rectangular pattern. The central pod is where the workstations for the providers and nurses are located. The central pod is only accessible to clinic staff, and patients are not allowed in this area.

Participants and Stakeholders

The project's participants included eight primary care providers and nurses at the clinic. Inclusion criteria were any primary care provider that performs wellness visits for adult patients and the nurses at the clinic. Recruitment of providers and nurses for this project took place through an email notification of the date of the educational session (Appendix E). The co-investigator offered providers and nurses a \$10 Amazon gift card as an incentive to attend. Qualifications for receiving the gift card were that participants had to attend the entire educational session. The co-investigator distributed the gift cards as the participants left the educational session. The project stakeholders included the co-investigator, the organization's project sponsor, the ambulatory care supervisor, eight primary care providers, and nurses currently practicing at EHFMC.

Objective One

The first objective was to provide an educational session on WCM to providers and nurses that highlight WCM as a determinant of obesity and an indicator for health risk. The educational session aimed to increase provider and nurse knowledge and awareness regarding WC. The intention was that providers could use that information to address obesity with patients in the primary care setting. As part of the *Plan* stage, the co-investigator developed educational content for this session. A thorough literature review was completed regarding WCM definition and the use of WCM to determine obesity and indication of health risk. The co-investigator included information from the literature review in the educational session. The co-investigator sought additional input and expert guidance from the organization's sponsor. After consultation with the organization's sponsor, the co-investigator selected two dates for the educational session. One session included only primary care providers, and the other included only nursing

staff. Separation of the groups was the decision of the organizational sponsor and the ambulatory care supervisor to prevent interruptions in patient care. The PowerPoint presentation used during the educational sessions is included in Appendix F.

Debriefing Questions. As part of the *Plan* stage, the co-investigator developed questions that were asked of the providers and nurses in attendance during a debriefing period at the end of the educational session. The questions addressed the effectiveness of the educational session, anticipated barriers to implementation of WCM, and anticipated patient response. The debriefing questions are listed below:

- How do you feel this educational session has improved your ability to measure waist circumference accurately?
- How do you feel this educational session has improved your awareness of the morbidity-associated risks of a waist circumference above the recommended standard?
- What are the anticipated barriers to implementing waist circumference measurements at wellness visits?
- What is the anticipated patient response to a waist circumference measurement?

Post-Implementation Questions. Additionally, the co-investigator developed questions that were posed to providers and nurses post-implementation. The questions addressed barriers encountered during the project, benefits encountered during the project, and the perceived sustainability of WCM at the clinic. The post-implementation questions are listed below:

- What barriers did you encounter during the project?
- What benefits did you encounter during the project?

- What is your perceived sustainability of waist circumference measurements at the clinic?

Objective Two and Three

The second project objective was to improve the frequency and consistency of adult WCM and documentation by developing a process for nurse measurement of WC. As part of the *Plan* step, the co-investigator observed nursing staff rooming patients for wellness visits to determine the current workflow. Once the current workflow was defined, the co-investigator created an addition to the workflow to facilitate WCM. Through consultation with the organization's sponsor, the co-investigator developed criteria for nurses that delineate which patients should receive a WCM. The inclusion criteria comprised any patient over the age of 18 years presenting for a complete physical or annual wellness visit. After consultation, the organizational sponsor made the decision for a two-week implementation period. On average, each provider has six to eight complete physicals or annual wellness visits per day. The anticipated number of patients receiving a WCM during the project was approximately 250.

The EHR has the functionality to mark patients on the clinic schedule with different colored dots. The providers use the dots to mean different things. Most providers use the dots to indicate events, such as whether a patient's clinic note is complete or whether or not the patient showed up for a visit. The co-investigator and the organization's sponsor determined that adult patients presenting for a complete physical or annual wellness visit would be marked by a red dot on each provider's clinic schedule. The task of marking patients on the providers' schedules was shared by the organization's sponsor and the ambulatory care supervisor. Each morning the organization's sponsor and the ambulatory care supervisor reviewed schedules to mark patients appropriately.

Environmental Assessment. As part of the *Plan* stage for objective two, the co-investigator purchased eighteen measuring tapes that measure up to 80 inches and two measuring tapes that measure up to 120 inches. The cubby above the computer in each patient exam room was the chosen storage place for the 80-inch measuring tapes, and a basket next to the printer in the central pod was the chosen storage place for the 120-inch measuring tapes. Each 80-inch measuring tape was labeled with the exam room number to prevent loss or misplacement. Included in the *Plan* stage, the co-investigator created an environmental assessment tool (Appendix G) to monitor the presence of the measuring tapes in the patient exam rooms and central pod.

The third objective for this project was to educate patients about the health risks associated with a WCM above the recommended standard by providing patients with readily accessible educational materials. As part of the *Plan* stage for objective three, the co-investigator developed a patient education flyer and an educational pamphlet on WCM (Appendix H). The flyer and pamphlet content was formulated from the previously mentioned literature review by the co-investigator. The educational materials covered the rationale for measuring WC and a few of the morbidity-associated risks of a WC above the recommended standard. The co-investigator instructed nurses to offer each patient a WC educational pamphlet regardless of WCM. The educational flyer also included verbiage instructing patients to take an educational pamphlet on WC freely. The environmental assessment tool also included the presence of the patient education flyer and pamphlet in the patient exam rooms.

Return Demonstration of WCM. Included in the educational session content was instruction on measuring a WC properly. The *Plan* stage for objective two included gaining permission to use the Waist Circumference Measurement Guidelines for Healthcare

Professionals produced by the International Chair on Cardiometabolic Risk, found at www.myhealthywaist.org. The co-investigator received permission to use these guidelines in the educational session (Appendix I). Included in the *Plan* stage was planning for nurses to perform return demonstration of proper WCM to the co-investigator. The co-investigator decided to have the nursing staff do a return demonstration of WCM at the end of the educational session and the end of weeks one and two of the implementation period.

Data Collection Spreadsheets. The *Plan* stage for objective two included identifying an existing flowsheet in the EHR where WCM could be documented by nursing staff. As an organization, Essentia Health has decided that any student project implemented at one of the organization's sites cannot include modifications or new build to the EHR. Therefore, the practice improvement project could not include any changes to the EHR relating to WCM. The co-investigator contacted a representative from the Essentia Health information services department and was informed of an existing flowsheet called "Neck/Waist" in the EHR where nursing staff could document WCM (Appendix J). Included in the educational session was guidance for providers and nurses on locating the Neck/Waist flowsheet. Also included in the *Plan* stage for objective two was creating a data collection spreadsheet that the nursing staff used to record demographic information and the patient's WCM. Demographic information included patient age and sex assigned at birth. Patients were allowed to refuse a WCM; therefore, the spreadsheet also included a place for the nurse to identify the patient's WCM refusal reason. The data collection spreadsheet also contained a place for nurses to identify whether the patient's WCM was documented in the Neck/Waist flowsheet and a place for the provider to identify if the WCM was discussed during the clinic visit or documented in the provider's clinic note.

As part of the *Plan* stage for objective three, the data collection spreadsheets included a place for the nurse to identify whether the patient received one of the patient education pamphlets. Establishing a safe storage location for the data collection spreadsheets was included in planning. After consultation with the organization's sponsor, the co-investigator decided to place the data collection spreadsheet in manilla envelopes labeled with each providers' name. The data collection spreadsheet appears in Appendix K.

Do

Objective One

Once the co-investigator developed the content, the *Do* stage involved implementing two separate educational sessions; one for the providers and one for the nurses. The co-investigator gave the educational sessions via a PowerPoint presentation. The session was video recorded with the permission of those in attendance. The educational session was scheduled for 30 minutes, followed by 15-20 minutes of debriefing and discussion. During the debriefing, the co-investigator posed the prepared questions developed in the *Plan* stage and elicited feedback from the participants. After the two-week project implementation was complete, the co-investigator posed the post-implementation questions developed in the *Plan* stage to providers and nurses. Responses to the post-implementation questions were manually recorded on paper by the co-investigator.

Objective Two and Three

As part of the *Do* stage for objectives two and three, the co-investigator placed the measuring tapes in the designated locations in the patient exam rooms and central pod chosen during the *Plan* stage. Placement of these items occurred immediately following the educational session for nurses. Likewise, the co-investigator placed the patient education flyers and

pamphlets in the exam rooms. The flyer was placed on the outside frame of the cabinet located above the computer. This location was optimal for patient viewing, as the flyer is visible from the patient chair in the exam room. Patient education pamphlets were placed in a plastic holder mounted to the exam room wall, next to the scale. The data collection spreadsheets were placed in the central pod at each provider's desk. The co-investigator showed nurses the location of the measuring tape and patient education materials in the exam rooms. In the central pod, the nurses were shown the location of the two extended length measuring tapes and the storage location of the data collection spreadsheets.

The *Do* stage for objective two included using the permitted guidelines to demonstrate the correct method for WCM at the educational session. The co-investigator facilitated a return demonstration of WCM by nursing staff at the end of the educational session. Nurses had the option to volunteer as a model for their colleagues or use the co-investigator as the model. The co-investigator also educated providers and nurses that measuring tapes had to be cleaned between each patient using a germicidal disposable wipe. Measuring tapes must completely dry before use on the next patient. All participants were instructed that patients had the option to refuse a WCM.

As part of the *Do* stage for objective two, the educational session included a review of the criteria and process for WCM developed in the *Plan* stage. Additionally, the co-investigator demonstrated where the providers and nurses could find the Neck/Waist flowsheet within their respective workflows within the EHR for documentation and review of WCM. The educational session also reviewed the data collection spreadsheet and expectations for each individual in filling out the spreadsheet. Providers and nurses were instructed to store completed spreadsheets in the manilla envelopes at the providers' desks.

Study

The *Study* phase of the PDSA cycle included data analysis and project evaluation. Project evaluation included qualitative feedback received from providers and nurses during the educational session and post-implementation questions, weekly environmental assessments, and analysis of the data collected via spreadsheets. The goal of the *Study* phase was to determine project effectiveness. Another goal was to record the number of WCM and educational pamphlets distributed during the implementation period.

Data Management

The educational sessions for providers and nurses took place in a private conference room used only by clinic staff. The sessions were video-recorded via a Zoom link and stored on the co-investigator's personal computer, which is password protected. The principal investigator and the co-investigator were the only individuals accessing the recordings. Responses to the educational session debriefing questions were included in the recordings. Responses to the post-implementation questions were manually recorded by the co-investigator and converted to a Word document stored on the co-investigator's personal computer.

The co-investigator completed environmental assessments at the end of weeks one and two of the implementation period. The data collected from the environmental assessments were converted to an Excel spreadsheet and stored on the co-investigator's personal computer. Nurses did a return demonstration of WCM with the co-investigator at the end of the educational session in the private conference room. At the end of weeks one and two of the implementation period, the central pod was the space the co-investigator and nurses used to do a return demonstration of WCM. Each day of the implementation period, providers and nurses used a new data collection spreadsheet. The data collection spreadsheet was carried in the nurse's pocket each day and

handed to the provider at the end of the day. After completion, the providers returned the spreadsheets to the manilla envelopes for storage. The co-investigator gathered data collection spreadsheets at the end of weeks one and two of the implementation period. Paper spreadsheets were immediately converted to Excel spreadsheets and stored on the co-investigator's personal computer in preparation for data analysis.

Data Analysis

The first objective involved an educational session for providers and nurses presenting information on WCM as an indicator of health risk in patients with obesity. Qualitative data collected during the post-education debriefing and post-implementation questions were the chosen method for evaluating educational effectiveness, perceived barriers, perceived benefits, and sustainability of WCM in primary care. Responses to questions were categorized by theme for analysis.

The second project objective involved improving the frequency and consistency of adult WCM and documentation by developing a process for nurse measurement of WC. Objective two was evaluated through return demonstration of proper WCM by nursing staff and analyzing data from environmental assessments and data collection spreadsheets. The co-investigator recorded the number of nurses that did a return demonstration correctly. Environmental assessments were used by the co-investigator to determine the presence of measuring tapes in the patient exam rooms and measuring tapes and data collection spreadsheets in the central pod. The final analysis of environmental assessment data was completed when the assessments were converted to an Excel spreadsheet at the end of the implementation period. The final analysis of data collection spreadsheets was also completed at the end of the implementation period. Data collected from the spreadsheets included the number of patients allowing a WCM, patients refusing WCM,

educational pamphlets given to patients, WCM documented in the EHR, and number of WCM discussed between patient and provider during the clinic visit. The co-investigator reviewed clinic schedules to determine how many patients had a wellness visit during the implementation period and compared that to the number of WCM recorded on the data collection spreadsheets.

The third and final objective was to educate patients about the health risks associated with WCM above the recommended standard by providing patients with educational materials. This objective was evaluated by analyzing data collected from environmental assessments and data collection spreadsheets. The environmental assessment was used to determine the presence of the patient education flyer and pamphlets in the patient examination room. Results from the data collection spreadsheet determined how many pamphlets patients took.

Act

The final phase of the PDSA cycle is the *Act* phase. The *Act* phase reflects on the project plan, process, and outcomes to determine if the project was successful and needed modifications (MNDH, n.d.). As part of the *Act* phase, the co-investigator developed recommendations for continued measurement of WC in the clinic. The PDSA cycle is ongoing and encourages continued examination of ways to keep the practice improvement project successful. Provider and nurse comments and suggestions obtained from post-implementation questions were used to develop recommendations for the next PDSA cycle. Recommendations to encourage the continued measurement of WC in primary care will be further described in Chapter 5.

Timeline of Project Phases

The following table (Table 2) outlines the timeline for each phase of the proposed project.

Table 2

Project Timeline

Project Component	Timeframe
Project Approval	October 2021
IRB Approval	October 2021
Project Implementation	November-December 2021
Evaluate Project	December 2021-January 2022
Complete Dissertation	February 2022
Defend Dissertation	March 2022
Submit Dissertation for Final Review	March 2022

Resources

The co-investigator needed resources in the various phases of project implementation. These resources include personnel, budget, and technology. Personnel played a key role in this project's development and implementation. Individuals involved included the principal investigator, the co-investigator, the organization's sponsor, the ambulatory care supervisor, clinic nurses, and providers. Correspondence with the organization's sponsor took place to provide input in developing the educational content and nursing process. The budget for implementing this project included the cost of tape measures, gift cards, and printing costs for educational materials, spreadsheets, and environmental checklists. Different forms of technology were necessary to facilitate the project. The co-investigator created the educational content and patient education materials using Microsoft Word and PowerPoint. Communication with the organization's sponsor took place over email, telephone, and video conferencing. An email was the method of communication to nurses and providers about the date, time, location, and details of the educational session. The required technology to present the educational session included internet access, a computer, and a projection monitor.

CHAPTER 4: RESULTS

The primary goal of the practice improvement project was to create a workflow to measure WC at primary care appointments at a mid-size primary care facility. Evaluation occurred from November 29, 2021, to January 18, 2022. The *Study* phase of the PDSA cycle incorporated data collection in preparation for analysis.

Objective One Results

The first objective of this project was: Increase awareness and knowledge about the morbidity-associated risks of a WCM greater than 35 inches for women and 40 inches for men through an educational session for providers and nursing staff at an urban family medicine clinic. The co-investigator gave an educational presentation to eight primary care providers and one nurse practitioner student on November 24, 2021, and six nurses on November 26, 2021. Each educational session lasted approximately 30 minutes, followed by 10 minutes of questions. This objective was met.

Debriefing Questions

A debriefing immediately followed each educational session. The co-investigator posed four questions to each of the groups. Not every person in attendance had a response to each question. The most frequent responses are listed below in Table 3. The responses are paraphrased, in some cases themes, and not considered direct quotes.

Table 3

Paraphrased Comments on Debriefing Questions (N=15)

Question	Responses
How do you feel this educational session has improved your ability to measure waist circumference accurately?	<ul style="list-style-type: none">• Helpful to know the proper placement of the measuring tape• Previously measured WC higher than iliac crest• Previously using the umbilicus as a landmark for measurement
How do you feel this educational session has improved your awareness of the morbidity-associated risks of a waist circumference above the recommended standard?	<ul style="list-style-type: none">• Yes• Improved understanding of the difference between central obesity and general obesity
What are the anticipated barriers to implementing waist circumference measurements at wellness visits?	<ul style="list-style-type: none">• Time• Lost tape measures• No WC measurement row in routine vital signs flowsheet• Remembering to perform the measurement
What is the anticipated patient response to a waist circumference measurement?	<ul style="list-style-type: none">• The patient will be indifferent• Patients will not want to be measured• Patients will not want to expose their skin for a measurement

Post-Implementation Questions

Four weeks after the implementation of the project was complete, the co-investigator attempted to gather providers and nurses over the lunch hour to present post-implementation questions. A group interview did not prove feasible due to scheduling issues, illnesses, and staffing. Therefore, seven providers and one nurse were individually asked in person three post-implementation questions by the co-investigator. The most common responses to each question were categorized into themes. These responses are listed below in Tables 4-6.

Table 4*Qualitative Themes on Barriers*

Theme	Responses
Nursing	Staff shortage Inconsistent nursing staff Team nursing Remembering to perform the measurement
Time	Time to perform the measurement Time to discuss measurement
Patient Response	Patient discomfort Patient refusal
Documentation	No WC measurement row in routine vital signs flowsheet The default for documentation in the Neck/Waist flowsheet is centimeters

Table 5*Qualitative Themes on Benefits*

Theme	Responses
Health	Risk identification Health assessment
Patient Interaction	Introduction to a conversation about weight
Patient Benefit	Patient education

Table 6*Qualitative Themes on Perceived Sustainability of Waist Circumference Measurements*

Theme	Responses
Sustainable	If WC measurement row added to routine vital signs flowsheet If the practice of measuring is standardized across the organization
Not Sustainable	Nursing staff shortage Lack of education for nurses on WC Not enough time

Objective Two Results

The second objective was: Improve the frequency and consistency of adult WCM and documentation of WC in the EHR at wellness visits by developing a process for nurse measurement of WC. Objective two involved the placement of measuring tapes in every patient exam room and the central pod and the placement of data collection spreadsheets at the desk of each provider. Objective two also involved the demonstration of proper WCM to nursing staff and return demonstration of WCM by nursing staff at the end of the educational session and weekly. Finally, objective two included documentation of WCM in the EHR by nurses and documentation and discussion of WCM by providers. Objective two was met.

Environmental Assessment

Immediately following the educational session to providers and nurses, the co-investigator placed an 80-inch measuring tape in each of the eighteen patient exam rooms and two 120-inch measuring tapes in the central pod in a basket by the printer. The co-investigator placed data collection spreadsheets in manila envelopes labeled with each provider's name and placed them at their respective desks for storage. The co-investigator completed an environmental assessment at the end of weeks one and two of the project, which included assessing the patient exam rooms and the central pod. The completed worksheets are included in Appendix L. At the end of week one, the co-investigator found the 80-inch measuring tapes in each patient exam room except for room 21. The measuring tape belonging to room 21 was found directly outside the room in the central pod and immediately placed back in the patient exam room by the co-investigator. At the end of week two, the co-investigator found the 80-inch measuring tapes in every patient exam room. During the central pod assessment, the co-investigator located the manila envelopes containing the data collection spreadsheets at each

provider's desk at the end of each week. Four providers had the envelopes stored in the top desk drawer as originally placed. Four of the providers had the envelopes on the desktop. At the end of each week, the 120-inch measuring tapes were present in the basket in the central pod.

Return Demonstration of WCM

Immediately following the educational session, the co-investigator demonstrated proper WCM using the Waist Circumference Measurement Guidelines for Healthcare Professionals (Appendix D). The co-investigator observed as each nurse did a return demonstration of WCM. The six nurses in attendance demonstrated correct WCM using the guidelines provided. The co-investigator placed laminated copies of the WCM guidelines in the central pod for reference by providers and nurses. During project implementation, all nurses working in the family medicine clinic were trained on proper WCM using the guidelines provided by the co-investigator. Training occurred either through the educational session or one-on-one training with a provider or nurse who attended the educational session. At the end of weeks one and two of implementation, the co-investigator approached a sample of nurses who had received WCM training for a return demonstration of WCM. At the conclusions of weeks one and two, all the nurses approached, demonstrated correct WCM.

Data Collection Spreadsheets

Completed data collection spreadsheets were collected at the end of weeks one and two of the project implementation and merged into one spreadsheet for analysis. The ambulatory care supervisor permitted the co-investigator to review clinic schedules and calculate how many patients presented during the two-week implementation period for wellness visits. Providers saw a total of 168 patients in the clinic for a wellness visit. The total number of patient interactions recorded was 128, with 125 patients allowing a WCM and three patients refusing the

measurement. The three patients that refused WCM were female. The reasons given for WCM refusal were “I do not want to know the measurement,” “I don’t feel comfortable being measured,” and “I don’t want to do it.” The average age for biologically male patients was 40.7 ± 12.6 years, and the average age for biologically female patients was 50.7 ± 18 years. The data collected from the spreadsheets are displayed in tables 7 and 8. Percentages were rounded to the nearest whole number.

Table 7

Waist Circumference Measurement (Inches) (N=125)

Sex Assigned at Birth	Average Inches	Minimum Inches	Maximum Inches	Standard Deviation	% Above Recommended
Male	41.5	28	86	10.4	WCM >40 40%
Female	38.5	29	50	5.3	WCM >35 71%

Table 8

Waist Circumference Measurement Documentation and Discussion (N=125)

WCM Documented in EHR Flowsheet Row	Number	%
Yes	118	95
No	3	2
Unknown	4	3
WCM Discussed During Clinic Visit		
Yes	104	83
No	16	13
Unknown	5	4
WCM Documented in Clinic Note		
Yes	95	76
No	25	20
Unknown	5	4

Objective Three Results

The third objective was: Educate patients about the health risks associated with WC measurements above the recommended standard by providing patients with educational materials that are readily assessable in the clinic examination rooms. Evaluation of objective three included data analysis of the environmental assessments and the data collection spreadsheets from the two-week implementation period. Objective three was met.

Immediately following the educational session to providers and nurses, the co-investigator placed an educational flyer and educational pamphlets in each of the eighteen patient exam rooms. The co-investigator completed a patient exam room assessment at the end of weeks one and two of the implementation period (Appendix L). At the end of week one, the educational flyer was present in its original location in each exam room. Likewise, the patient educational pamphlets were present in the holders in each exam room. At the end of week two, the educational flyer and the educational pamphlets were all found in the correct location in every patient exam room assessed. During the educational session, the co-investigator instructed nurses to offer an educational pamphlet on WCM to each patient presenting for a wellness visit regardless of whether the patient allowed a WCM. The educational flyer also contained verbiage instructing patients to take an educational pamphlet freely if they chose. The co-investigator analyzed data collection spreadsheets to determine how many patients received an educational pamphlet. The following table lists the number and percentage of patients that received an educational pamphlet.

Table 9*Waist Circumference Educational Pamphlet Distribution (N=128)*

Pamphlet Given to Patient	Number	%
Yes	71	56
No	27	21
Unknown	30	23

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

Summary

Obesity is considered a prevalent chronic disease in the United States, where more than one-third of adults are categorized as obese, and two-thirds are categorized as overweight (Bright et al., 2019). The financial costs to patients with obesity and society at large are substantial. The prevalence of obesity in adults in North Dakota is 33.1%, ranking the 22nd highest state in the nation for adults with obesity and 5th for adults with either obesity or overweight (Trust for America's Health, 2021). The AMA has recognized obesity as a chronic disease, and the USPSTF has recommended that clinicians screen all adults for obesity (AMA, 2013; USPSTF, 2018). Patients with obesity are at increased risk for comorbid conditions such as hypertension, type 2 diabetes, stroke, and cancer (CDC, n.d.a.). Health care providers have identified barriers to addressing obesity with patients, including a lack of training in obesity care, lack of time, and absent or limited referral resources (Kahan, 2018; McGowan, 2016; Tronieri et al., 2019).

While one of the most commonly used methods for measuring obesity, BMI depicts general obesity (Choi et al., 2019). Whereas WCM is a superior measurement of central obesity and enhances risk stratification in individuals. The purpose of this practice improvement project was to create a workflow for nurse measurement of WC at primary care wellness visits and documentation of WCM in the EHR. The *Study* phase of the PDSA cycle incorporates the analysis and discussion of results.

Discussion

Objective One

Objective one was designed to educate providers and nurses on the morbidity-associated risks of a WCM greater than 35 inches for women and 40 inches for men. The educational

session for providers was attended by three physicians, three nurse practitioners, two physician assistants, and one nurse practitioner student. Six nurses attended the educational session for nurses, including the ambulatory care supervisor. Both educational sessions took place over the lunch hour to allow optimal attendance. Providers and nurses were mindful of the time before the next patient appointment in both sessions. As such, attendants were quick to answer the debriefing questions and did not give thorough responses to hasten their return to patient care.

Debriefing Questions

Gaynor et al. (2018) identified barriers to adopting WC measurements in primary care, including the lack of knowledge on properly performing the measurement. The educational session presented to providers and nurses included guidance on measuring WC correctly. The first debriefing question addressed the capability of the educational session to improve the ability to measure WC accurately. Evaluation of the responses suggests that prior to the educational session, providers and nurses denied awareness of the landmarks for measuring tape placement. Provider comments endorsed the value of the educational session for WCM skill attainment.

The second debriefing question was written for the purpose of assessing the effectiveness of the educational session in improving awareness of the morbidity-associated risks of central obesity. Attendees overwhelmingly voiced a better understanding of central obesity risks and definition post-education. The second debriefing question had the least number of responses from attendees, with a common response being “Yes,” even though the question was open-ended. Since a “Yes” response is not the response anticipated for an open-ended question, the question could be reworded for a broader response in future research. One provider commented about being more aware of the value of WCM in assessing obesity risk and knows this to be a valuable tool.

The co-investigator addressed anticipated barriers to implementation of WCM in patients presenting for wellness visits. The responses given by providers and nurses to the third debriefing question were consistent with that of the literature review. In the Hayes (2019) study, responses from providers and nurses identified a lack of time to measure WC in every patient and an inability to locate tape measures. A lack of time was a theme echoed by the providers and nurses in this project's debriefing session as an anticipated barrier. Another common theme was lost tape measures. One provider shared that missing or lost tape measures are a current issue at the clinic. The provider suggested that the new tape measures purchased for the project be labeled with the patient exam room number to prevent loss. Gaynor et al. (2018) study recognized the absence of a place to document WCM in the EHR as a barrier to adopting routine WCM. Though a location to document WC within the EHR exists at the project site, it is not within the routine documentation workflow of the nurses. Providers and nurses identified this as an anticipated barrier to implementing WCM at the clinic. Remembering to perform the measurement was also identified as an anticipated barrier to WCM. This inspired conversation about the red dot identification process for nurses and providers to know which patients should receive WCM during clinic visits.

The last debriefing question was written for the purpose of addressing the anticipated patient response to a WCM. Participants identified BMI as the standard screening tool for patients with obesity at the clinic. Body mass index has been the long-standing screening tool for obesity in most healthcare organizations (Choi et al., 2019; Gaynor et al., 2018; Joseph et al., 2021). Providers and nurses agreed that the only patients who allowed a WCM previously needed the measurement for certain employer biometric screening forms. A common response by providers and nurses was that patients would not want to be measured or be uncomfortable

exposing their skin for the measurement. One provider commented that patients currently voice discomfort with having their abdomens exposed for a routine abdominal exam. One provider felt that patients would be indifferent to receiving a measurement.

Post-Implementation Questions

Barriers. Post-implementation questions posed to the providers and nurses addressed barriers encountered during the project, benefits encountered, and the perceived sustainability of WCM at the clinic. The first post-implementation question sought to determine if anticipated barriers of WCM became actual barriers encountered during the project. Two of the anticipated barriers were identified by respondents as actual barriers and included time and the documentation of WCM in the EHR. A lack of time is among the most commonly reported barrier in the literature to addressing obesity in the primary care setting (Gaynor, 2018; Hayes, 2019; Kahan, 2018). Out of all the individuals who responded to post-implementation questions, only one provider cited time as a barrier—the time needed to take the measurement and the time needed to discuss the measurement with the patient.

Two respondents commented that the location to document WCM in the EHR was outside the nurses' normal workflow, which created issues with nurses remembering to conduct the WCM. Three respondents acknowledged that having the red dot ahead of the patient's name on the schedule was a helpful reminder for all staff when a WCM was needed. Another identified barrier was the default unit of measure in the flowsheet used for documentation in the EHR. One provider commented that issues related to this discrepancy arose on the first day of implementation. Nurses measured patients' WC in inches, but the flowsheet in the EHR defaults to centimeters.

Participants discussed the patient's response to WCM during the debriefing session. Though not identified as an anticipated barrier in the debriefing session, three participants identified the patient response to WCM as a barrier during the post-implementation questions. One provider noted that a few patients were unsure why a WC was measured and discussed now after years of only discussing BMI with their health care provider. Another provider remarked that one patient was vocally dissatisfied with having her waist measured. Ultimately, three patients refused WC measurement during the two-week implementation period, citing discomfort with the measurement, not wanting to complete the measurement, or not wanting to know the result of the measurement. In a study by Gaynor et al. (2019), 82.8% of adults surveyed reported being “very willing” to have a WCM (p.13). Seventy-four percent of the patients presenting for wellness visits at EHFMC during the implementation period allowed a WCM. This finding suggests that most patients seen during the implementation period were willing to measure their WC.

The most commonly mentioned project barriers involved nurse staffing. Surprisingly, nurse staffing was not a common barrier found during the literature review. Four providers' responses about barriers were related to nurse staffing. Due to unforeseen resignations, illness, and circumstances related to the COVID-19 pandemic, the clinic providers did not have the same nurse assigned each day. In the time between IRB approval and project implementation, the clinic had shifted to a team nursing model. Team nursing meant that when staffing did not allow each nurse to work with one designated provider, chosen providers would be “teamed” by two or more nurses. One provider commented that team nursing created issues with nurses remembering to do the WCM since more than one nurse was responsible for rooming patients for a given provider. Another provider commented that there were days when one nurse was assigned to a

provider in the morning and a different nurse assigned in the afternoon. One provider noted that changes in nurse assignments meant that more nurses needed to review the guidelines for measuring WC properly before rooming patients. The inconsistency of nurse assignments allowed for miscommunication or misunderstanding about the expectations on measuring WC. While a shortage of nursing staff is not a new phenomenon in the world of healthcare, the COVID-19 global pandemic has exacerbated the problem (Turale & Nantsupawat, 2021). There is uncertainty on when and if the nursing shortage will improve, but governments have received a call-to-action by organizations such as the International Council for Nurses, the World Health Organization, and the American Nurses Association (American Nurses Association, 2021; Turale & Nantsupawat, 2021).

Benefits. The second post-implementation question pertained to what benefits the providers and nurses experienced during the project. A common theme found in the literature is that measurements of central obesity can have a predictive ability for the development of chronic disease conditions such as type 2 diabetes and cardiovascular disease (Choi et al., 2019; Joseph et al., 2021; Powell-Wiley et al., 2021). A nurse mentioned that the project generated a new perspective on health assessment and risk identification. Two providers noted that the project created more education opportunities for patients about the health risks associated with central obesity and put a new patient perspective on obesity management. The perception of providers was that patients had a positive response to the educational materials.

A national web-based survey by Petrin et al. (2017) found that 56% of health care providers wait for the patient to introduce the subject of weight before discussing treatment options. The most common theme among respondents about encountered benefits during post-implementation questioning was that it gave an entry point to introduce a conversation about

health problems associated with increased central obesity. Five providers revealed that having a WCM made it easier to approach the topic of weight. One provider specified that it helped frame obesity differently than using BMI has allowed for patients. Another provider responded that initiating a conversation about weight helped him learn more about what factors influenced his patient's health decisions. The lack of a standardized approach and the practice of waiting for the patient to introduce the topic of weight could contribute to the infrequent treatment of obesity (Tucker et al., 2021). A study by Phelan et al. (2015b) found that a reduction in explicit bias was associated with more skill in weight loss counseling of patients with obesity. Assessing implicit and explicit bias was not part of the project; however, it may have provided an opportunity for providers and nurses to examine personal biases and stigmatization towards patients with obesity.

Perceived Sustainability. The last post-implementation question addressed the sustainability of the practice improvement project. Five respondents expressed that they felt the project was sustainable if certain actions were taken. The most common remark by the respondents is that a flowsheet row for WCM should be added to the nurses' routine vital signs flowsheet. One respondent articulated that the measurement process was relatively quick, and if the practice of measurement was adopted across the organization, continued measuring would be very sustainable. Three respondents answered that the project was not sustainable. One provider voiced there is not enough time to complete the measurement on patients. One provider communicated that given the clinic's current situation with nurse staffing, the project was not sustainable right now but could be in the future if staffing issues improve.

Objective Two

The second objective was designed to improve the accuracy and frequency of WCM and documentation of WC in the EHR. As mentioned previously, the providers and nurses reported that the only instance nurses completed a WCM was if the patient needed it for employer biometric screening forms. Consistency in nurses measuring WC was made difficult by the changes in nurse staffing and assignments.

Environmental Assessment

Researchers from two separate studies identified the insufficient supply of stocked tape measures and the inability to locate tape measures as barriers to adopting WCM in primary care (Gaynor et al., 2018; Hayes, 2019). The practice improvement project sought to overcome these barriers by having a sufficient supply of tape measures in the patient exam rooms and a standard location for storage. The co-investigator accepted the suggestion of one of the providers to label each tape measure with the exam room number. At the end of each week, the co-investigator found the tape measures for each patient exam room, though one was not in the correct location after the first week. The misplacement of one tape measure indicates that perhaps more tape measures would have become misplaced if the implementation period were longer than two weeks. The 120-inch tape measures remained in the same location throughout the implementation period, suggesting that the central pod may be a better storage location for all tape measures. However, it is unknown whether the storage of tape measures in the central pod would have resulted in more nurses forgetting to complete a WCM as the tape measure would not have been readily accessible in the patient exam room. The data collection spreadsheets also remained within the central pod at the end of each week. Though certain providers moved the

spreadsheets from the desk drawer to the desktop, keeping the spreadsheets in a manilla envelope allowed recorded information to remain protected from the view of others.

Return Demonstration of WCM

Training the nursing staff on accurately measuring a WC was important to the project's success. The co-investigator distributed printed copies of the guidelines for proper measurement during the educational session and placed a few in the central pod for reference as needed. The organization's sponsor commented that nurses floating from other clinics that had not attended the educational session had to be taught how to measure WC by the provider they were working with or by a fellow nurse. The co-investigator also assisted with ongoing training of proper WCM by doing clinicals at the clinic during project implementation. At weeks one and two, the sample of nurses that demonstrated measurement were able to do so properly. The success on return demonstration indicates that the handout used for training was a useful tool to educate nurses.

Data Collection Spreadsheets

The co-investigator gathered data collection spreadsheets at the end of weeks one and two of the project. One hundred sixty-eight patients presented for a wellness visit during the implementation period. The total number of patient interactions recorded on the data collection spreadsheets was 128. Signifying that 76% of wellness visits included talking about WCM in some respect. According to the CDC, the average WCM for a male is 40.5 inches and 38.7 inches for a female (CDC, n.d.f). The average WCM for males presenting for wellness visits was 41.5, one inch above the national average. Removing the one high outlying measurement for males, which was 86, brings the average WCM for males during the project down to 40.3 ± 7.6 and more in line with the national average. The new average of 40.3 ± 7.6 might better represent

the male population during the project. The average WCM for females presenting for wellness visits was 38.5 ± 5.3 , similar to the national average.

According to the data collection spreadsheets, 125 patients allowed a WCM. Ninety-five percent had a WCM documented in the EHR. The high percentage of documented WCM suggests that although the flowsheet for documentation was outside the routine workflow for the nurses, documentation was not significantly impeded. On day one of implementation, the co-investigator was made aware that the Neck/Waist flowsheet used by nurses for documentation of WCM defaulted to centimeters instead of inches. The co-investigator understood that WC could be entered in the flowsheet by inches, as that was the communication from the information services department before project implementation. The discrepancy between how the co-investigator taught participants to document WC in the EHR and how the EHR allowed participants to document WC caused confusion on day one. The 80-inch tape measures purchased for project implementation only measured in inches, but the 120-inch tape measures measured in inches and centimeters. The co-investigator, the organization sponsor, and the ambulatory care supervisor immediately collaborated to determine a solution. The group decided that the measurement would be documented in inches using the comment section in the WC flowsheet row of the Neck/Waist flowsheet.

Eighty-three percent of the patients that allowed a WCM discussed that measurement with their provider during the clinic visit. Seventy-six percent of patients that allowed a WCM had it documented in the provider's clinic note. These results correlate with the results from objective one. Providers commented that one of the benefits encountered during the project was an easier time addressing the topic of weight with the patient. The high percentages of WCM discussed during the clinic visit and documented in the clinic note suggest that having a WCM

made these conversations easier and therefore more frequently done. According to Tucker et al. (2021), if providers take responsibility for discussing patients' weight and create a welcoming and comfortable environment using neutral terms, providers can reduce the stigma surrounding weight in healthcare settings. Incorporating evidence-based information on the morbidity-associated risks of a WC above the recommended standard could improve care for patients with obesity.

Objective Three

The third objective was designed to provide patients with readily accessible education materials about WCM in the patient exam room. Objective three was met, as patient education flyers and pamphlets remained present throughout the project. An essential component to improving outcomes for patients with obesity is that patients understand the effect obesity has on their health (Hooker et al., 2018; Paterick et al., 2017). Patient education needs to go beyond the provider-patient conversation. Providing robust patient education materials allows patients to make informed decisions and encourages shared decision-making. Educational materials can help patients take ownership of their care and identify what care they do and do not want to receive. The co-investigator completed environmental assessments of the patient exam rooms and was also able to monitor the presence of educational materials ongoing while completing clinicals at the clinic. Pamphlets were re-distributed among the exam rooms as needed to replenish rooms with a diminishing supply.

One hundred and twenty-eight patient interactions regarding WC occurred during the implementation period. Nurses recorded 71 patients receiving an educational pamphlet on WC, 27 patients not receiving a pamphlet, and 30 patients may or may not have received a pamphlet; status is unknown. The location for the educational flyer was ideal, in direct view of patients in

the exam room. The educational pamphlet holder was located on the wall of the patient exam room, next to the scale. The co-investigator chose this location due to its proximity to the scale; however, the holder is no longer within reach once the patient sits down. The co-investigator does not know if the location of the pamphlets affected how many pamphlets were taken by patients, and nurses were not asked to record reasons for not giving a pamphlet to the patient. The co-investigator could have identified barriers to patient acceptance or distribution of educational materials if a reason for not receiving an educational pamphlet was required information. Future research projects could add a column to the data collection spreadsheet for the purpose of identifying reasons patients did not accept educational pamphlets.

The co-investigator heard comments made by nurses, providers, and patients regarding the educational materials during her clinical rotation. One nurse commented that, at times, she did not feel prepared to answer questions the patient had about the educational materials. One provider freely commented that the pamphlet is helpful as a reference in the patient exam room to discuss the risks associated with an above-normal WC. One patient pointed to the educational flyer and remarked, “I didn’t know waist circumference is something I needed checked; this is interesting.”

Strengths

During project implementation, one recognized strength was the acceptance and participation of providers and nurses. The enthusiastic support shown by the organization’s sponsor, the ambulatory care supervisor, and most providers and nurses was instrumental in the project's success. Providers commented that the project was important and worthwhile. The participants' enthusiasm increases the likelihood that WCM will continue in the clinic. The project's strengths were most notable in the post-implementation question regarding encountered

benefits and results from the data collection spreadsheets. Providers commented that having a WCM made it easier to approach the topic of weight with the patient. The majority of patients with a WCM had the measurement discussed during the clinic visit. Initiating discussion about obesity in primary care was the foundation on which this project was developed. Encouraging conversations about weight can be a first step to decreasing the prevalence of obesity in the nation.

Limitations

Major limitations of the practice improvement project included restrictions on student projects, issues related to the current functionality of the EHR, factors related to the COVID-19 global pandemic, and a short timeline. As an organization, Essentia Health has decided that any student project implemented at one of the organization's sites cannot include modifications to the EHR. This includes any optimization requests that would change any existing build or requests for new build to the EHR. Although a documentation flowsheet was found that contained the needed flowsheet row for WC, it was outside of the nurses' routine workflow. Both providers and nurses expressed that if documentation existed in the routine workflow of the nurses, the project would be more sustainable. Additionally, the Neck/Waist flowsheet only allowed documentation of WCM in centimeters. A provider commented that this confused the nurses on day one of implementation.

Another limitation to the project was issues related to the COVID-19 global pandemic. These issues included resignations, illness, and staffing shortages among the nursing staff. Short staffing placed additional strain on nurses and providers as they attempted to meet the needs of the patients presenting to the clinic. Team nursing caused increased confusion between nurses on whether a WCM was completed. Nurses prioritized routine tasks to improve efficiency.

Sufficient staffing could have improved continuity of care with WCM if the clinic had the usual one nurse to one provider staffing.

Recommendations

The co-investigator developed recommendations based on the analysis of responses to the debriefing and post-implementation questions, the results from the data collection spreadsheets, environmental assessments, and literature review and presented the results to the organization's sponsor of the project. As part of the *Act* phase, developed recommendations help direct the next cycle of the PDSA. The co-investigator will not be present for the next cycle of the PDSA. Therefore, the co-investigator will present the following recommendations to the organization's sponsor.

- Providers and nurses should continue to measure WC at wellness visits. Obesity indices such as WC can aid in the risk assessment of morbidity and mortality (Jayedi et al., 2020). The AHA (n.d.) recommends measuring WC as needed to help evaluate cardiovascular risk. A more standardized approach may be to assess WCM yearly at wellness visits. A yearly WCM might be easier for healthcare organizations to adopt as a practice standard. Measurement could be considered more frequently for other visit types, such as weight management visits. Most providers acknowledged that having a WCM made it easier to approach the topic of weight with the patient. Incorporating evidence-based information on the risks of a WCM above the recommended standard could improve care for patients with obesity (Tucker et al., 2021).
- Providers should submit an optimization request to the organization's information services department responsible for making changes to the EHR. The optimization

request would ask for the addition of a flowsheet row for WC measurement into the routine vital signs flowsheet. Most providers stated that WCM would be sustainable if a flowsheet row for WCM were added. The flowsheet row should also allow whoever enters data to record the measurement in either centimeters or inches. The vital signs flowsheet is used by nurses organization-wide and would allow for standardization of documentation of WC. Providers should place an additional optimization request for the capability to pull the information documented in the WCM flowsheet row directly into clinic notes. This functionality exists in other aspects of the EHR, such as other vital signs and the patient's medical history. As a healthcare system, Essentia Health uses alerts within the EHR known as "Best Practice Alerts" (BPA) for various patient care needs. A BPA for WCM could trigger the nurse or provider to complete a WCM on patients annually. Adding a BPA for WCM could be included in the request to the information services department.

- Replication of this project should include education for providers and nurses on how to present the topic of WCM. Education for nurses should include scripting for when a patient has a question about WCM or the education materials provided, such as "That is a great question, and I encourage you to discuss it with your provider when they come in." Education for nurses and providers should include ways to prevent patients from feeling targeted, uncomfortable, or stigmatized when talking about weight. Tucker et al. (2021) suggest asking permission to address weight with the patient. The OAC (n.d.) recommends approaching the topic with sensitivity using language about weight patients prefer. Providers are often faced with the challenge of making potentially uncomfortable conversations about obesity more comfortable for

- patients. Since WCM is an objective measurement linked to risk identification and prevention for chronic conditions, using the measurement can be a good way to open a conversation about weight loss. Also recommended by the OAC is to identify a provider's personal implicit and explicit bias regarding weight. Replication of this project could include a survey on personal attitudes and assumptions about weight.
- Providers and nurses were mindful of time during the educational session. Replication of the project could shift the educational session from an in-person presentation to a webinar that providers and nurses could view at their convenience ahead of time. A scheduled in-person discussion could follow, allowing more time for discussion amongst participants resulting in more thorough responses.
 - Lastly, replication of the project should include a longer implementation period. The co-investigator was limited to the timeframe agreed upon by the organization's sponsor and the ambulatory care supervisor.

Theoretical Framework

The Chronic Care Model was an appropriate framework for this project since the AMA recognizes obesity as a chronic disease. Health system support is one of the six elements of the CCM that drives high-quality care (MCHCI, n.d.). During the project, support from the participants and stakeholders was crucial to fostering practice change and improving care in patients with obesity. During the educational session, the co-investigator used the CCM elements of clinical information systems and decision support by incorporating evidence-based content on the morbidity-associated risks of a WC above the recommended standard. The co-investigator also shared the current prevalence of obesity and future predictions of obesity prevalence. Participants responded that the educational session improved their understanding of general and

central obesity differences. Improved knowledge and understanding of central obesity can help promote the adoption of WCM in primary care. Throughout the project, optimizing the nurses' role helped the co-investigator incorporate the third element in the CCM: delivery system design. Optimizing the nurses' role and creating a process for WCM resulted in most patients presenting for wellness visits getting a WCM.

The CCM element of self-management support includes a collaboration between the patient and the provider to assist the patient in assuming an active role in their health (MCHCI, n.d.). Creating a process for WCM and providing the patients with education materials on WC opened the door for conversations between the patients and providers. Patients with chronic diseases need support and education to become effective managers of their health. The final element of the CCM is community resources. Though the project did not use specific community resources, the partnership between NDSU and EHFMC promoted efficiency in obesity management by incorporating evidence-based guidelines to create a process to measure WC in primary care.

Implications for Practice

Nurse practitioners increasingly play a key role in diagnosing and managing patients with acute and chronic conditions (AANP, n.d.; Rosenberg, 2018). More than 75% of actively practicing nurse practitioners provide primary care and are a vital part of the workforce. Patients with obesity are at risk for developing co-morbid and chronic conditions, including type 2 diabetes, hypertension, stroke, and certain forms of cancer (NIDDK, n.d.). The prevalence of obesity continues to increase, and an important setting to address it is in primary care (Bright et al., 2019; Croghan et al., 2019; McGowan, 2016; Durrer Schutz et al., 2019). Therefore, nurse practitioners are perfectly positioned to impact the outlook of obesity in the nation. There are

many reasons to include WCM at clinic appointments (Bays et al., 2019; Ross et al., 2020). One reason emphasized in this project is how measuring WC can open the door for discussion about obesity and the associated health risks.

Employers use biometric screening forms for multiple reasons, including identifying health risks, improving health, and reducing healthcare costs for employees (Fu et al., 2016). One of the biometric measurements often included is WC. Providers at EHFMC commented that when patients had a WCM taken before the project, the reason was that an employer biometric screening form required the measurement. In a study conducted by Fu et al. (2016), researchers found that participants had improved biometric measurements over a three to five-year period in one employer wellness program with routine biometric screening. The researchers suggest that an increasing number of employers will implement employee wellness programs that include biometric screening. Therefore, WCM could soon become more common in the clinic, and by establishing a standard practice of measuring WC now, providers and nurses may be ahead of the trend.

Dissemination

The results of this project were presented to the dissertation committee during the defense of this project. Results and recommendations will also be shared with the organization's sponsor of the project. The co-investigator will also present project results at the North Dakota State University Poster Presentation in May 2022. Upon completion and approval, the dissertation will be published and available on ProQuest Dissertations & Theses Global for review.

Conclusion

The purpose of this practice improvement project was to create a workflow to measure WC at primary care wellness visits and increase the frequency of WCM and documentation in

the EHR. Obesity prevalence continues to increase among adults, adolescents, and children (Bays et al., 2019; Ross et al., 2020). Along with other chronic diseases, early detection and prevention of obesity are vital to combat lifelong illness. WCM, in addition to BMI, can aid in the detection and management of obesity-related health risks. The high percentage of patients allowing a WCM along with the high percentages of WCM documentation and discussion indicate the project was a success. While the project was successful, future practice improvement projects that adopt the recommended modifications may allow WCM to expand within the healthcare organization beyond the clinic and contribute to the Healthy People 2030 objective of reducing the proportion of U.S. adults with obesity (USDHHS & ODPHP, n.d.).

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**APPENDIX A: PERMISSION TO USE NHLBI TABLE CLASSIFYING OVERWEIGHT
AND OBESITY BY BODY MASS INDEX**

NHLBI_INFO (NIH/NHLBI) <NHLBIINFO@nhlbi.nih.gov>

Tue 1/12/2021 9:32 AM

Dear Terryl Johnson:

Thank you for your inquiry to the National Heart, Lung, and Blood Institute (NHLBI) Center for Health Information asking for copyright permission to use an NHLBI table classifying overweight and obesity by body mass index.

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Your assistance in making our research and health-related information available to the largest number of people possible is greatly appreciated.

We hope this information is helpful.

If you would like more information about the NHLBI, visit www.nhlbi.nih.gov.

Sincerely,

NHLBI Center for Health Information
P.O. Box 30105
Bethesda, MD 20824
Toll-free: 1-877-NHLBI4U (1-877-645-2448)
Email: nhlbiinfo@nhlbi.nih.gov
Website: www.nhlbi.nih.gov

January is a great time to make changes that will benefit your health throughout the entire year. Food choices play an important part in keeping our body's heart and blood vessels strong and healthy. The [Dietary Approaches to Stop Hypertension \(DASH\) eating plan](#) offers an easy way to lower [high blood pressure](#), "bad" [cholesterol](#), and daily [sodium](#) intake. View the [DASH publications](#) for practical tips on [starting](#) and [following](#) this eating plan. Learn more about heart health by visiting the [NHLBI website](#) or calling the NHLBI Center for Health Information toll-free at 1-877-NHLBI4U (1-877-645-2448).

COVID-19 affects all of us, especially people who have or are at risk of developing heart, lung, or blood conditions. Visit the NHLBI's webpage [COVID-19 Guidance for the Public](#) for information about how COVID-19 could affect your heart, lungs, and blood; what the Institute is doing to address COVID-19; and resources to help you protect yourself.

Subscribe today to *The NHLBI Update* to receive periodic updates about the Institute's heart, lung, blood, and sleep research advances, health information, clinical trials, funding opportunities, and more! This newsletter highlights the latest Institute science and health-related news, information, and events. Sign up at <http://bit.ly/2SmxIRB>.

From: Johnson, Terryl
Sent: Saturday, January 9, 2021 2:02 PM
To: NHLBI_INFO (NIH/NHLBI) <NHLBIINFO@nhlbi.nih.gov>
Subject: Classification of Obesity

Dear NHLB representative,

My name is Terry Johnson and I am a Doctor of Nursing Practice student at North Dakota State University. I am currently working on my dissertation that focuses on addressing obesity in primary care. I would like to include the NHLB's table that identifies the classification of overweight and obesity by BMI, waist circumference, and associated disease risk. Can you please direct me as to how I get permission to use this table? I appreciate any information you have to offer me. Thank you.

Respectfully,

Terry Johnson
Doctor of Nursing Practice Student
North Dakota State University

APPENDIX B: PERMISSION TO USE PDSA MODEL GRAPHIC

From: Janine Stanley
Sent: Tuesday, August 24, 2021 2:22 PM
To: Johnson, Terry
Subject: Inquiry reply - PDSA

Hi Terry,

Thank you for your inquiry. You have permission to use the PDSA model graphic for your dissertation project.

If you plan to use the cycle graphic from our website <https://deming.org/explore/pdsa/>

OR

<https://deming.org/wp-content/uploads/2020/06/2019DemingGift-PDSApdf.pdf>

please indicate that the figure is reprinted courtesy of The W. Edwards Deming Institute® and was originally published in *Out of the Crisis* by W. Edwards Deming, published by The MIT Press.

Best regards,
Janine

Janine Stanley
Senior Administrative Specialist
The W. Edwards Deming Institute®
www.deming.org

**APPENDIX C: PERMISSION TO CONDUCT STUDENT PROJECT AT ESSENTIA
HEALTH FAMILY MEDICINE CLINIC**



October 26, 2021

To whom it may concern,

Re: Implementing Adult Waist Circumference Measurement in Primary Care

Thank you for submitting the Human Subject Research Determination Form and information for the project listed above. Based on a review of the documentation you provided, this project does not meet the definition of research with human subjects, according to the Office of Human Research Protections (OHRP) [guidance](#): "Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge."

Because the project does not meet the federal definition of human subjects research, it will not require further review by the Essentia Health Institutional Review Board or a scientific review committee. If during the process of data collection or analysis it becomes clear that findings could be generalizable or benefit others, please submit your project for IRB review at that time.

If you have any questions concerning this letter, please contact me at IRB@EssentiaHealth.org.

I wish you success with your project.

Sincerely,

A handwritten signature in cursive script that reads "Deneice Kramer".

Deneice Kramer, MBA, MA, CCRP
Compliance Manager, Human Research Protection Program

APPENDIX D: NDSU IRB APPROVAL LETTER



11/09/2021

Dr. Tina Marie Lundeen
Nursing

Re: IRB Determination of Exempt Human Subjects Research:
Protocol #IRB0003955, "Implementing Adult Waist Circumference Measurements in Primary Care"

NDSU Co-investigator(s) and research team:

- Tina Marie Lundeen
- Terryl Lynn Johnson

Approval Date: 11/09/2021
Expiration Date: 11/08/2024

Study site(s): The research will be conducted at Essentia Health Family Medicine Clinic located at 4110 51st Ave S, Fargo, ND 58104.

Funding Agency:

The above referenced human subjects research project has been determined exempt (category 1,2,4) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

RESEARCH INTEGRITY AND COMPLIANCE

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | ndsu.research@ndsu.edu

Shipping Address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

NDSU is an SOVA university.

**APPENDIX E: EMAIL NOTIFICATION OF PROJECT EDUCATIONAL SESSION
AND CONSENT**

Implementing adult waist circumference in primary care



Johnson, Terry
Tue 11/23/2021 8:27 PM

To:



Hello,

My name is Terry Johnson and I am a 3rd year DNP student at North Dakota State University. I would like to invite you to a presentation on my dissertation project which is *Implementing Adult Waist Circumference in Primary Care*. This presentation will take place at noon on November 24th, 2021 in the conference room at Essentia Health 52nd Ave Clinic. I hope you can join me. Please review the informed consent attached to this email. It discusses details about your participation in this practice improvement project. I would like to highlight that this presentation will be recorded for later evaluation. There will be no participant identifying information in the final dissertation. I want to thank you for your time and consideration.

Sincerely,

Terry Johnson
Doctor of Nursing Practice Student
North Dakota State University



North Dakota State University

School of Nursing
Aldevron Tower 540
NDSU Dept. 2670
PO Box 6050
Fargo, ND 58108-6050
701.231.7395

Implementing Adult Waist Circumference Measurements in Primary Care

Dear participant:

My name is Terry Johnson. I am a Doctor of Nursing Practice student at North Dakota State University. I am conducting a practice improvement project to create a workflow to measure waist circumference at primary care wellness appointments and increase the frequency of waist circumference measurement and electronic health record documentation. It is our hope that with this project, we will increase primary care providers' and nurses' awareness and knowledge about the morbidity-associated risks of a waist circumference measurement above the recommended standard.

Because you are an employee of Essentia Health Family Medicine 52nd Ave clinic as a primary care provider or nurse, you are invited to take part in this practice improvement project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research procedures, but we have taken reasonable safeguards to minimize any known risks. These known risks include loss of confidentiality.

An educational session is planned for primary care providers and nurses to increase awareness and knowledge of the morbidity-associated risks of a waist circumference measurement greater than 35 inches for women and 40 inches for men. Demonstration of proper measurement of waist circumference will be included in the educational session. The educational session will be done through a PowerPoint presentation at the clinic and is estimated to take 30 minutes. A discussion will immediately follow the educational session to answer participant questions and elicit feedback on anticipated barriers to measuring waist circumference. Following the educational session, waist circumference measurements will be taken on patients presenting for wellness visits over a two-week period.

By participating in this practice improvement project, you may benefit by having access to an educational experience about the morbidity-associated risks of an above-normal waist circumference and the proper steps to measure a waist circumference. This information can potentially assist the primary care provider in identifying patients at risk for current or future chronic disease conditions. All providers and nurses that attend the educational session will receive a \$10 Amazon gift card.

We will keep private all research records that identify you. Your information will be combined with information from other people taking part in the study; we will write about the combined information that we have gathered. You will not be identified in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

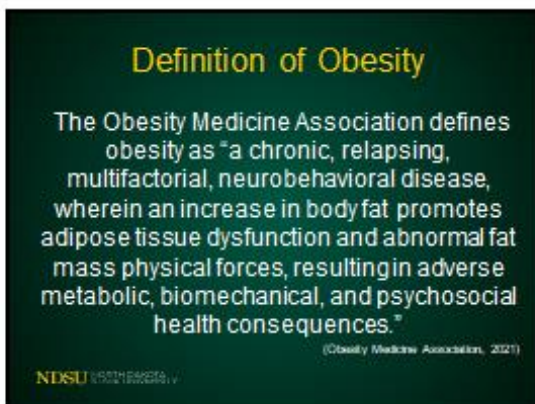
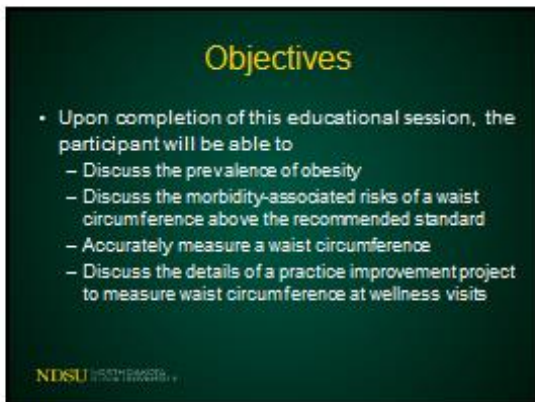
You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1.855.800.6717, or by email at ndsuirb@ndsu.edu.

Thank you for your time and taking part in the practice improvement project,

Sincerely,

Terry Johnson, BSN, RN, DNP-Student

APPENDIX F: EDUCATIONAL SESSION POWERPOINT PRESENTATION



What do we know?

- The prevalence of obesity in adults increased from 30.5% in 1999-2000 to 42.4% in 2017-2018
- By 2030:
 - About 50% of U.S. adults will have obesity
 - 25% will have severe obesity
- North Dakota prevalence of obesity in adults is 33.1%
- Measurements to screen and diagnose overweight and obesity:
 - Body mass index (BMI) and Waist circumference (WC)
- Predominant measurement of obesity is BMI alone
- WC can be a better indicator than BMI
- Lean body mass VS Fat mass
- Primary care setting

NDSU | 933.186.6266

Why is it important?

- Overweight and obesity are linked to multiple co-morbid and chronic disease conditions such as type 2 diabetes, metabolic disorder, heart disease, and certain forms of cancer
- Obesity accounts for 47.1% of the total (direct and indirect) cost of chronic diseases in the United States
- Total cost of obesity:
 - North Dakota is 5 Billion Dollars
 - Minnesota is 30.8 Billion Dollars
- WC measurements in addition to BMI can help stratify risk assessment
- Are we missing high risk populations?

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Central Obesity and Type 2 Diabetes

- Insulin Resistance + beta cell dysfunction and apoptosis = Type 2 Diabetes
- Adipokines play an essential role in the development, exacerbation, and maintenance of an insulin resistant state
- Jackson Heart Study published in the Journal of the American Heart Association
- National Health and Nutrition Examination Survey (NHANES)

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Central Obesity and Heart Disease, Lipid Abnormalities, and Hypertension

- Obesity predisposes people to heart problems, lipid abnormalities, and hypertension
 - Chronic inflammatory state
 - Increase cholesterol
 - Increased total blood volume
- Women's Health Initiative

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Central Obesity and Cancer

- Visceral adipocytes secrete
 - Growth Factors
 - Proinflammatory cytokines
 - Adipokines
 - Leptin
 - Adiponectin
- Colorectal Cancer
- Breast and Endometrial Cancer

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The Patient Perspective

- Barriers to Addressing Obesity
 - Attitudes
 - Beliefs
 - Bias
- The Voice of Patients
- WC Measurement

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WC Documentation

- Neck/Waist Flowsheet – Nurse View

NDSU | SOUTH DAKOTA STATE UNIVERSITY

WC Documentation

- Neck/Waist Flowsheet – Provider View

NDSU | SOUTH DAKOTA STATE UNIVERSITY

Exam Room Flyer

WAIST CIRCUMFERENCE:

WHY SHOULD WE MEASURE?

WHAT IS WAIST CIRCUMFERENCE?

Waist circumference is a simple, non-invasive way to measure abdominal obesity. It is a key indicator of cardiovascular risk, and is associated with an increased risk of heart disease, stroke, and type 2 diabetes. It is also a key indicator of metabolic syndrome, a cluster of conditions that increase the risk of heart disease, stroke, and type 2 diabetes.

WHAT VALUE DOES IT HAVE?

- The waist circumference measurement greater than 40 inches (102 cm) for men and 35 inches (89 cm) for women.
- The waist circumference measurement greater than 35 inches (89 cm) for men and 30 inches (76 cm) for women.

WHAT CONSIDERATIONS ARE THERE FOR HOW TO TAKE A WAIST CIRCUMFERENCE?

• Measure at the natural waistline, not at the hips or the narrowest part of the torso. The patient should stand upright with feet together and arms relaxed at their sides. The patient should breathe normally and hold their breath for a moment before the measurement is taken.

WHY DOES IT MATTER?

Abdominal obesity is a significant risk factor for cardiovascular disease, stroke, and type 2 diabetes. It is also a key indicator of metabolic syndrome, a cluster of conditions that increase the risk of heart disease, stroke, and type 2 diabetes.

WHAT CAN YOU DO IF YOU HAVE A WAIST THAT EXCEEDS THE WAIST CIRCUMFERENCE?

- Exercise regularly.
- Eat a healthy diet.
- Stop smoking.
- Limit alcohol consumption.
- Get regular medical checkups.

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Patient Education Pamphlet

NDSU | SOUTH DAKOTA STATE UNIVERSITY

Questions?

Thank you all for your time and attention. I greatly appreciate your role in the success of this practice improvement project.

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Post-Education Questions

How do you feel this educational session has improved your ability to measure waist circumference accurately?

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Post-Education Questions

How do you feel this educational session has improved your awareness of the morbidity-associated risks of a waist circumference above the recommended standard?

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Post-Education Questions

What are the anticipated barriers to implementing waist circumference measurements at wellness visits?

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Post-Education Questions

What is the anticipated patient response to a waist circumference measurement?

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APPENDIX G: ENVIRONMENTAL ASSESSMENT TOOL

Implementing Adult Waist Circumference in Primary Care

Environmental Assessment

Date: _____

Week: _____

Exam Room Assessment

	Exam Room 10	Exam Room 11	Exam Room 12	Exam Room 13	Exam Room 14	Exam Room 15	Exam Room 16	Exam Room 17	Exam Room 18
Educational Flyer Present in Exam Room									
Educational Pamphlets Present in Exam Room									
80-inch Measuring Tape Present in Exam Room									

	Exam Room 19	Exam Room 20	Exam Room 21	Exam Room 22	Exam Room 23	Exam Room 24	Exam Room 25	Exam Room 26	Exam Room 27
Educational Flyer Present in Exam Room									
Educational Pamphlets Present in Exam Room									
80-inch Measuring Tape Present in Exam Room									

Central Pod Assessment

	Yes	No
120-inch Measuring Tapes Present in Central Pod		
Data Collection Spreadsheets Stored Securely in Central Pod		

APPENDIX H: PATIENT EDUCATION FLYER AND PAMPHLET

WAIST CIRCUMFERENCE:

WHY SHOULD WE MEASURE?

WHAT IS WAIST CIRCUMFERENCE?

Waist circumference is a measurement taken with a flexible tape measure around the abdomen. Fat located in the abdominal cavity, known as *visceral fat*, may be more harmful due to its proximity to the major organs in your midsection. Visceral fat cells release harmful chemicals that can promote disease. A waist circumference measurement can tell you if you are at higher risk for developing obesity-related conditions.

What value puts you at risk?

- For Men: A waist circumference measurement greater than **40 inches (102cm)**
- For Non-Pregnant Women: A waist circumference measurement greater than **35 inches (88cm)**

WHAT CONDITIONS ARE YOU AT RISK FOR WITH A HIGH WAIST CIRCUMFERENCE?

TYPE 2 DIABETES

When a person has excess weight, the cells in the body become less responsive to insulin, known as *insulin resistance*. Insulin, produced by the pancreas, moves sugar in your blood to your cells, where it is used for energy. Insulin resistance means the body's cells are not responding effectively to the insulin. The pancreas tries to produce more insulin to make the cells respond. Eventually, the pancreas cannot keep up, and the blood sugar keeps rising. High blood sugar is damaging to the body and leads to Type 2 Diabetes.

HEART DISEASE

Fat tissue in our body releases chemicals that cause a chronic inflammatory state. Excess fat also increases cholesterol in the body. Damage from *inflammation* and *increased cholesterol* leads to plaque build-up in the blood vessels, causing narrowing. This narrowing can lead to increased blood pressure and vessel blockage leading to an increased risk for heart disease.

STROKE

Abdominal obesity is a significant risk factor for an *ischemic* stroke or a stroke caused by a lack of blood flow. Excess fatty tissue has also been shown to be a risk factor for *transient ischemic attacks*, otherwise known as a "mini-stroke." Some of the major risk factors for stroke include Type 2 Diabetes, high blood pressure, heart disease, and high cholesterol, all conditions that can be caused by excess fat.

CANCER

Fat cells may have direct and indirect effects on markers related to the growth of tumors. Fat cells increase inflammation and make extra hormones and growth factors. Hormones, growth factors, and inflammation cause cells in our body to divide more often. When *cells divide more often*, there is an increased chance of *cancer cells being made*. Excess fat has been linked to breast, endometrial, intestinal, colon, and esophageal cancer.

WHAT CAN YOU DO IF YOU HAVE A HIGHER THAN RECOMMENDED WAIST CIRCUMFERENCE?

- Maintain a healthy diet
- Incorporate regular exercise into your daily routine
- Talk with your provider about options to manage obesity

Take-home pamphlets of the information listed in this flyer are available for patients in this exam room. Please feel free to take one.

WAIST CIRCUMFERENCE: WHY SHOULD WE MEASURE?



WHY SHOULD WE MEASURE WAIST CIRCUMFERENCE?

Waist circumference is a measurement taken with a flexible tape measure around the abdomen. Fat located in the abdominal cavity, known as visceral fat, may be more harmful due to its proximity to the major organs in your midsection. Visceral fat cells release harmful chemicals that can promote disease. A waist circumference measurement can tell you if you are at higher risk for developing obesity-related conditions.

WHAT VALUE PUTS YOU AT RISK?

- **FOR MEN: A WAIST CIRCUMFERENCE MEASUREMENT GREATER THAN 40 INCHES (102CM)**
- **FOR NON-PREGNANT WOMEN: A WAIST CIRCUMFERENCE MEASUREMENT GREATER THAN 35 INCHES (88CM)**

WHAT CONDITIONS ARE YOU AT RISK FOR WITH A HIGH WAIST CIRCUMFERENCE?

TYPE 2 DIABETES

When a person has excess weight, the cells in the body become less responsive to insulin, known as **insulin resistance**. Insulin, produced by the pancreas, moves sugar in your blood to your cells, where it is used for energy. Insulin resistance means the body's cells are not responding effectively to the insulin. The pancreas tries to produce more insulin to make the cells respond. Eventually, the pancreas cannot keep up, and the blood sugar keeps rising. High blood sugar is damaging to the body and leads to Type 2 Diabetes.



HEART DISEASE

Fat tissue in our body releases chemicals that cause a chronic inflammatory state. Excess fat also increases cholesterol in the body. Damage from **inflammation and increased cholesterol** leads to plaque build-up in the blood vessels, causing narrowing. This narrowing can lead to increased blood pressure and vessel blockage leading to an increased risk for heart disease.

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WHAT CAN YOU DO IF YOU HAVE A HIGHER THAN RECOMMENDED WAIST CIRCUMFERENCE?

- Maintain a healthy diet
- Incorporate regular exercise into your daily routine
- Talk with your provider about options to manage obesity

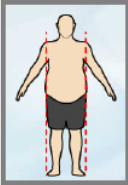
**APPENDIX I: WAIST CIRCUMFERENCE MEASUREMENT GUIDELINES FOR
HEALTHCARE PROFESSIONALS FROM THE INTERNATIONAL CHAIR ON
CARDIOMETABOLIC RISK**



Waist Circumference Measurement Guidelines - Healthcare Professional

Step 1

Ask the patient to place himself in the following manner:

- Clear the abdominal region
- Feet shoulder-width apart
- Arms crossed over the chest








Man Woman

Step 2

It is suggested to kneel down to the right of the patient in order to measure waist girth.

- Palpate the patient's hips to locate the top of the iliac crest.
- Draw a horizontal line halfway between the patient's back and abdomen.

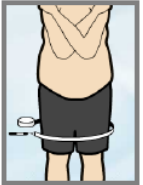




Iliac crest

Step 3

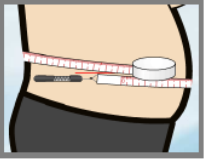
- Place the measuring tape horizontally around the patient's abdomen.

* To work comfortably, it is suggested to wrap the tape around the patient's legs and then move it up.

Step 4

- Align the bottom edge of the tape with your marked point.

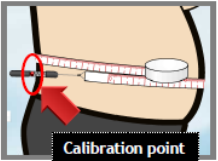


Step 5

It is recommended to use a measuring tape with a spring handle, such as the Gulick measuring tape, in order to control the pressure exerted on the patient's abdomen.

- Gently tighten the tape around the patient's abdomen without depressing the skin.

* When using a measuring tape with a spring handle, pull the end of the tensioning mechanism until the calibration point is just visible.

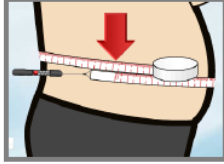



Calibration point

Step 6

It is suggested to request the patient to relax and breathe **NORMALLY** (abdominal muscles should not be contracted).

- Ask the patient to take 2 or 3 **NORMAL** breaths.
- Measure from the zero line of the tape (to the nearest millimetre) at the end of a **NORMAL** expiration.

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Date: 9 / 7 / 2021

**PERMISSION REQUEST FOR FIGURES AND TABLES
INTERNATIONAL CHAIR ON CARDIOMETABOLIC RISK (ICCR)**

REQUESTOR CONTACT INFORMATION

Name: Terryl
Last Name: Johnson
Institute/Company: North Dakota State University
Address: 1455 14 th Ave N
Postal/Zip Code: 58102
City: Fargo
Country: United States
E-mail: terryl.johnson@ndsu.edu
Telephone: 701-231-7456

DETAILED INFORMATION ON THE MATERIAL REQUESTED

Figure/Table Title: Waist Circumference Measurement: Guidelines for Healthcare Professionals		
Figure/Table Origin:	X-Website	CMReJournal
Intended Use: Dissertation Intervention		
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APPENDIX J: NECK/WAIST FLOWSHEET FROM EHR

The screenshot displays the 'Flowsheets' application interface. At the top, there is a menu bar with options: File, Add Rows, LDA Avatar, Add Col, Insert Col, Hide Device Data, Last Filed, and More. Below the menu, there are three tabs: 'Vital Signs Simple', 'Complex Assessment', and 'Neck/Waist'. The 'Neck/Waist' tab is active, and a search box contains 'Neck/Waist'. The main area shows a date and time '9/13/21 1100' and a section for 'Waist Circumference (cm)'. Below this, there is a 'Comments (Alt+M)' field. A 'Mins/Maxes' section shows a green progress bar and 'Min: 0 cm'. On the left, a search box contains '1100', and a table lists 'Neck/Waist' with sub-entries for 'Neck Circu...' and 'Waist Circu...'. A calendar pop-up shows 'Office Visit from 9/...' on '9/13/21' at '1100'.

Category	Value
Neck/Waist	
Neck Circu...	
Waist Circu...	

APPENDIX L: COMPLETED ENVIRONMENTAL ASSESSMENTS WEEK ONE AND TWO

Implementing Adult Waist Circumference in Primary Care

Environmental Assessment

Date: 12/6/2021

Week: 1

Exam Room Assessment

	Exam Room 10	Exam Room 11	Exam Room 12	Exam Room 13	Exam Room 14	Exam Room 15	Exam Room 16	Exam Room 17	Exam Room 18
Educational Flyer Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Pamphlets Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
80-inch Measuring Tape Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Exam Room 19	Exam Room 20	Exam Room 21	Exam Room 22	Exam Room 23	Exam Room 24	Exam Room 25	Exam Room 26	Exam Room 27
Educational Flyer Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Pamphlets Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
80-inch Measuring Tape Present in Exam Room	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

Central Pod Assessment

	Yes	No
120-inch Measuring Tapes Present in Central Pod	X	
Data Collection Spreadsheets Stored Securely in Central Pod	X	

Implementing Adult Waist Circumference in Primary Care

Environmental Assessment

Date: 12/13/2021

Week: 2

Exam Room Assessment

	Exam Room 10	Exam Room 11	Exam Room 12	Exam Room 13	Exam Room 14	Exam Room 15	Exam Room 16	Exam Room 17	Exam Room 18
Educational Flyer Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Pamphlets Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
80-inch Measuring Tape Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Exam Room 19	Exam Room 20	Exam Room 21	Exam Room 22	Exam Room 23	Exam Room 24	Exam Room 25	Exam Room 26	Exam Room 27
Educational Flyer Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Educational Pamphlets Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
80-inch Measuring Tape Present in Exam Room	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Central Pod Assessment

	Yes	No
120-inch Measuring Tapes Present in Central Pod	X	
Data Collection Spreadsheets Stored Securely in Central Pod	X	

APPENDIX M: EXECUTIVE SUMMARY

Executive Summary

Implementing Adult Waist Circumference in Primary Care

Introduction

The prevalence of obesity among adults, adolescents, and children in the United States continues to increase. Obesity is linked to multiple co-morbid and chronic disease conditions such as type 2 diabetes, metabolic disorder, heart disease, and certain forms of cancer. Chronic disease conditions can lead to reduced quality of life and reduced life expectancy. Obesity is a significant public health issue, and an important setting to address obesity is in primary care. Two of the most valid and reliable measurements of obesity are body mass index (BMI) and waist circumference measurement (WC). Despite evidence that waist circumference measurement (WCM) can aid in stratifying risk, the predominant measurement of obesity is BMI alone.

Purpose

The purpose of the project involved creating a workflow to measure adult WC at wellness visits, increase the frequency of adult WCM, and documentation of WCM in the electronic health record (EHR).

Project Design and Implementation

The design of the project was focused on practice improvement using the Plan-Do-Study-Act model as a framework. The project implementation plan included increasing provider and nursing awareness and knowledge about the morbidity-associated risks of a WCM greater than 35 inches for females and 40 inches for males through an educational session. Discussion following the educational session answered participant questions and elicited feedback on the effectiveness of the educational session, barriers to WCM, and anticipated patient response to WCM. Post-project questions posed to participants elicited feedback on encountered barriers, benefits, and perceived sustainability of WCM in the clinic. Following the educational session, adult WCMs were performed on patients presenting for wellness visits at the clinic. Patients also received information about the health risks associated with an elevated WCM through readily accessible educational materials in the clinic exam rooms.



Results

Data collected during the project included the number of patients allowing a WCM, patients refusing WCM, educational pamphlets given to patients, WCM documented in the EHR, and number of WCM discussed between patient and provider during the clinic visit. Responses to questions during the educational session and post-project questions were categorized into themes.

- Participant responses to debriefing questions suggested the educational session effectively increased knowledge and awareness of the morbidity-associated risks of an elevated WCM.
- Post-Project question responses identified challenges with nurse staffing and documentation of WCM in the EHR as the most common barriers encountered during the project.
- The most common benefit encountered was that having a WCM allowed an entry point for a conversation between patient and provider about health problems associated with increased central obesity.
- Nurses asked 128 patients for permission to perform a WCM during the patients' clinic visit; 125 patients allowed a WCM, and only three patients refused.
- 95% of patients that allowed a WCM had the measurement documented in the EHR.
- 83% of patients that allowed a WCM discussed the measurement with their provider during the clinic visit.
- 76% of patients that allowed a WCM had the measurement documented in the providers' clinic notes.
- Over half of patients received an educational pamphlet on WC during the project.

Recommendations

- Providers and nurses should continue to measure WC at wellness visits.
- Providers and nurses identified the current documentation workflow as a barrier; therefore, an update in the EHR would eliminate the documentation barrier and meet the staffs' needs.
- Future projects should include education for providers and nurses on how to present the topic of WCM, including scripting for when patients have questions about WCM.
- Future projects should include a survey on personal attitudes and assumptions about weight to identify an individual's personal implicit and explicit bias regarding weight.