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FACTORS ASSOCIATED WITH WEIGHT MANAGEMENT COUNSELING
DURING PRIMARY CARE CLERKSHIPS

A Dissertation Presented

By

Karen Marie Brennan Ashe, M.S., MNSP

Submitted to the Faculty of the
University of Massachusetts Graduate School of Biomedical Sciences, Worcester
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

January 23, 2019

CLINICAL AND POPULATION HEALTH RESEARCH

FACTORS ASSOCIATED WITH WEIGHT MANAGEMENT COUNSELING
DURING PRIMARY CARE CLERKSHIPS

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This work was undertaken in the Graduate School of Biomedical Sciences

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ABSTRACT

Background: The United States Preventive Services Task Force guidelines support screening and provision of intensive multi-component behavioral counseling for adults who have obesity. One barrier to providing such counseling is lack of training in medical school. Not much is known about factors associated with medical students' perceived weight management counseling (WMC) skills or whether preceptors model or teach WMC during primary care clerkships.

Methods: A mixed methods approach addressed factors affecting WMC training during primary care clerkships. A secondary analysis of 3rd year medical students (n=730) described students' perceived WMC skills, attitudes and frequency of engagement in 5As educational experiences. Linear mixed models were used to determine associations between educational experiences and perceived skills. Semi-structured interviews (n=12) and a survey were administered to primary care preceptors (n=77). Interviews described individual, inter-personal and institutional factors associated with preceptors' WMC. The survey described preceptors' frequency of modeling WMC behaviors, perceived WMC skills, and attitudes.

Results: Students perceived themselves to be moderately skilled (M=2.6, SD=0.05, range 1-4). Direct patient experiences and specific instruction were associated with higher perceived skill. Preceptors support WMC curricula but do not perceive themselves to be experts in WMC. Preceptors perceive themselves

to be moderately skilled ($M=2.8$, $SD=0.06$, range 1-4) but only sometimes model WMC ($M=3.3$, $SD=0.05$, range 1-5) to students during clerkships.

Conclusion: Preceptor modeling WMC may not be feasible or necessary during primary care clerkships. Providing specific WMC instruction and working with patients may provide more benefit as they were more strongly associated with students' perceived skills.

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LIST OF ABBREVIATIONS

5As – Ask, Advise, Assess, Assist, Arrange

ACA – The Patient Protection and Affordable Care Act of 2010

ACC – American College of Cardiology

AHA – American Heart Association

Alpha – Cronbach's alpha

CI – Confidence Interval

CMS – Centers for Medicare and Medicaid

DPP – Diabetes Prevention Program

ICC – Intraclass correlation coefficient

LCME – Liaison Committee on Medical Education

MME – Multi-modal Education

NAA – Nutrition Academic Award

NIM – Nutrition in Medicine

OMEC – Obesity Medicine Education Collaborative

OSCE – Objective Skills Clinical Exam

PCP – Primary Care Provider

POWER – Practice-Based Opportunities for Weight Reduction

SD – Standard deviation

TE – Traditional Education

TOC – The Obesity Society

US – United States

USPSTF – United States Preventive Services Task Force

WMC – Weight Management Counseling

PREFACE

Some of the work presented in this dissertation is prepared to be submitted for peer-reviewed publication.

Chapter II:

Ashe KM, Pbert L, Crawford SL, Clark MA, Frisard CF, Eno CA, Geller AC, Ockene, JK. Practice (and Instruction) make progress: The relationship between Medical School Weight Management Counseling educational experience and perceived skills. Manuscript prepared for submission.

Chapter III:

Ashe KM, Clark, MA, Pbert, L, Ockene, JK. Physician- delivered weight management counseling: a qualitative study of facilitators and barriers to teaching and modeling during core clerkships. Manuscript prepared for submission.

Chapter IV:

Ashe KM, Clark, MA, Crawford, SL, Pbert, L, Ockene, JK. Preceptors' perceived skills and frequency of modeling weight management counseling during core clerkships. Manuscript prepared for submission.

CHAPTER I:

INTRODUCTION

Obesity and chronic disease complicated by obesity is prevalent and is a public health problem. In the U.S. 70% of adults have overweight or obesity.¹ The latest statistics indicate that obesity ($\geq 30 \text{ kg/m}^2$) prevalence alone is almost 40%.² This represents an increase from 31% in 1999-2000.² Of major concern are the disparities by race, gender and socioeconomic status.¹⁻⁴ For Non-Hispanic black women and Hispanic women obesity prevalence is 54.5% and 50.4%, respectively.

Major contributing factors to obesity include poor diet and sedentary lifestyle.^{3,5-8} Population studies demonstrate that U.S. adults have low quality diets and do not follow the Dietary Guidelines for Americans.^{3,5,9,10} The 2018 Physical Activity Guidelines for Americans recommend adults should get between two and a half hours to five hours of moderate-intensity physical activity per week; it is estimated that only 20% of adults are physically active at least two and a half hours per week.¹¹

The National Ambulatory Medical Care Survey, a nationally representative survey, reveals 61% of physician office visits included one or more chronic diseases.¹² Lifestyle factors contribute to the most frequent conditions addressed in office visits, which were hypertension, hyperlipidemia, arthritis, diabetes,

obesity and cancer.¹² The majority of patients seen by physicians in an office setting may benefit from weight management counseling.

Clinical guidelines recommend intervention in the primary care setting. Twenty years ago the National Heart Lung and Blood Institute (NHLBI) in cooperation with the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) published the first evidence report and Clinical Guideline on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults.¹³ The United States Preventive Services Task Force (USPSTF) followed with their guidelines in 2003 for physicians to screen adult patients for obesity ($\geq 30 \text{ kg/m}^2$) and offer intensive counseling and behavioral intervention.¹⁴ The 2012 update changed the language to “Clinicians should offer or refer patients with a body mass index (BMI) of 30 kg/m^2 or higher to intensive, multicomponent behavioral interventions”.¹⁵ The 2003 and 2012 recommendations received a grade B, meaning that treatment is recommended. The USPSTF concluded that there was not enough evidence to apply recommendations to low-intensity or moderate intensity counseling or for adults with overweight.¹⁵

The 2018 updated statement for the USPSTF adult obesity guideline maintained a grade B for both screening and offer or referral to intensive, multicomponent behavioral interventions for adults with obesity.¹⁶ The USPSTF continues to highlight use of counseling that is consistent with a 5As framework (Ask, Advise, Assess, Assist, Arrange). The evidence review no longer included

literature on screening for BMI as it has become a regular part of practice. It did include review of pharmacotherapy, although no grade was provided.¹⁷

Guidelines also include recommendations for adults who have overweight. The 2018 update supported recommendations to provide intensive behavioral counseling for adults who are overweight (25-29.9 kg/m²) and have hypertension, dyslipidemia or both.¹⁶ The American Heart Association/American College of Cardiology/The Obesity Society published guidelines in 2013 that included recommendations for adults with overweight and presence of at least one cardiovascular risk factor and provided a treatment algorithm for the Chronic Disease Management Model for Primary Care of Patients with Overweight and Obesity.¹⁸

The Patient Protection and Affordable Care Act of 2010 (ACA) requires insurers to cover patient visits for preventive services, of which obesity management is included.¹⁹ To support implementation of clinical weight management guidelines, in 2011 the Centers for Medicare and Medicaid (CMS) produced a reimbursement guideline for intensive counseling in the primary care setting.²⁰ Treatment components include screening for BMI, dietary assessment, and intensive behavioral counseling that includes up to 14 in person sessions within the first 6 months for a total of 22 session in a year.²¹ The reimbursement applies to primary care physicians and other clinicians such as nurse

practitioners, physician assistants, and other healthcare professionals who are directly supervised by a physician.²¹

Despite recommendations physicians' counseling frequency is low.

In a nationally representative survey of physicians, when obesity was a listed diagnosis, only 40% of adult patient visits included a weight-related service.²² This nationally representative survey excludes reports of patients with overweight and may include underreporting obesity diagnoses as has been reported elsewhere.^{23,24} Additionally, the classification of weight-related services were limited to diet and nutrition education, exercise education, or weight-reduction education which does not shed light on the quality of counseling. The latter classification was inclusive of referrals to other health professionals but did not provide more detail.²² Previous research indicated physicians were more likely to provide physical activity counseling compared to diet or weight control.²⁵ Barriers to providing WMC in primary care include time, reimbursement, lack of confidence and lack of training.²⁶⁻³²

Systematic reviews consistently demonstrate interventions in the primary care setting have positive, modest effects.^{17,33-35} Well known intensive behavioral interventions such as the Diabetes Prevention Program^{36,37} and LOOK Ahead³⁸ provided evidence for behavioral interventions producing weight loss and reduced incidence of type 2 diabetes, however, they were conducted by trained interventionists outside of the primary care setting. The

challenge remains in how to implement an intensive multi-component intervention for weight management in the primary care setting, either with physicians providing the counseling or coordinating care and referring patients to specialists and intensive weight loss services.

Intervention in the primary care setting with physician involvement does result in weight loss. Trials with primary care physicians providing brief counseling categorized as low to moderate intensity have demonstrated a modest weight loss in patients that may not reach clinical relevance ($\geq 5\%$ of initial body weight).³⁹⁻⁴¹ To date, interventions conducted in the primary care setting that include primary care provider (pcp) counseling do not include all of the components listed in the USPSTF guidelines.^{16,21,33} The evidence does demonstrate that primary care physicians can address weight with patients and have positive effects.

A closer look at trials that include physician involvement in counseling patients for weight management reflects a wide variety in amount of time spent and strategies used to train physicians. A six month intervention of physician delivered counseling for black women yielded significant weight loss differences between usual care (0.61 +/- 3.37kg) vs tailored physician counseling (-1.52kg +/- 3.72 kg).⁴¹ All physicians received two hours of general obesity treatment information from the NHLBI 1998 guideline. Intervention physicians received an additional 7 hours of training that included stages of change and motivational

interviewing (MI) and specific nutrition education.^{41,42} Another study of a twelve month intervention focused on patients with type 2 diabetes compared usual care to pcpc counseling in primary care.⁴⁰ Pcpcs in the counseling group received three hours of training that included MI. As part of the intervention the pcpcs received personalized patient assessments that included information such as perceived barriers to change which reduced the amount of time pcpcs needed to spend on assessment, allowing physicians to discuss tailored patient goals. At twelve months 32% of patients who received physician counseling lost 6lbs or more compared to 18.9% in the control group; it is unclear what proportion reached a clinically significant weight loss.⁴⁰ In another study that did not elaborate on the intensity of physician training, patients in both study arms had quarterly visits with their physicians and intervention included additional lifestyle coaching sessions with trained interventionists. Both groups lost weight, 22.5% of intervention participants compared to 10.2% of participants in the control group lost $\geq 5\%$ initial weight.⁴³ It is difficult to compare these studies due to different primary outcomes, study populations and lengths of intervention. Limitations of these studies include lack of data on physician training and fidelity to protocol. Nevertheless, physician involvement was associated with weight loss.

Intervention in the primary care setting by trained interventionists results in modest weight loss. To address the question on how best to implement multi-component behavioral intervention in routine care, the National Heart, Lung, and Blood Institute (NHLBI) funded the Practice Based

Opportunities for Weight Reduction (POWER) Trials Collaborative Research Group.⁴⁴ The goal was to conduct weight loss trials with comparable primary outcomes (weight change at 24 months) and test multiple weight loss strategies when sufficient information to conduct single multi-center trials with one or two strategies is lacking.⁴⁴ Two of the POWER studies recruited from primary care but only included pcps in supportive roles.^{45,46} The third study recruited from community health centers and did not feature direct patient involvement with pcps.⁴⁷ The POWER practice based trials included a total of 15 clinics and about 1,100 participants.⁴⁵⁻⁴⁷ The three studies are described below.

The *Be Fit Be Well* study recruited patients from community health centers.⁴⁷ The study population was majority black women. Pcps played a minimum role through approving or excluding patients for eligibility and endorsing the study through providing at least one brief message to participants on the importance of the study and providing an electronic signature on a personalized behavior change prescription. Counseling was provided by trained interventionists (trained in MI techniques) via telephone with additional in-person group meetings. At 24 months 20% of participants in each group lost $\geq 5\%$ of their initial weight.

The POWER-UP study recruited from primary care practices and included three arms: usual care (quarterly visits with pcp with 5-7 minutes spent on weight and info from handout); usual care plus brief monthly behavioral counseling

sessions with a trained interventionist; and usual care plus brief behavioral counseling and either meal replacement or medication.⁴⁵ Again, 22% of participants in usual care lost $\geq 5\%$ of their initial weight, while 26% for those in the behavioral counseling group and 34.9% of patients in the most intensive group achieved weight loss $\geq 5\%$ of their initial weight. Pcps played the same role in all three intervention arms.

The POWER-Hopkins trial also recruited from primary care clinics and the strategy included targeted mailing, brochures and physician referrals.⁴⁶ There were three groups: control group met with a weight-loss coach at randomization and received brochures and a list of recommended websites; the first intervention group consisted of remote support through telephone sessions, a study specific website and email contact; the second intervention group received in-person one on one and group sessions in addition to the supports from the former intervention group. The proportion of participants achieving $\geq 5\%$ weight loss in the control group was 18.8%, remote intervention 38.2%, and most intensive intervention 41.4%. In this study the pcp received progress reports and provided guidance and motivation. Additionally, the pcps encouraged participation in those who were not actively participating through contact by research interventionists on behalf of the pcps.

Given the current evidence, it is unknown what the best approach is for intervention in the primary care setting. There are currently multiple

approaches that can be implemented in the primary care setting with modest effects. Demonstrated by RCTs, physicians can at minimum play an important supportive role in patient care for weight loss. Studies consistently demonstrate a relationship between increased frequency of counseling sessions with increased weight loss.

To further underscore the need for physician training in WMC, patients expect physicians to address weight management.⁴⁸⁻⁵¹ Patients indicate that they want physicians to address weight management, and expect them to initiate the conversation.⁴⁸ Use of 5As for WMC is shown to increase patient motivation.⁵¹ In the practice-based behavioral weight loss RCTs physicians' level of helpfulness, as perceived by the patient, was associated with increased weight loss.^{49,52} Of importance, there were differences by group related to physician helpfulness. Patients who rated involvement of the physician as more helpful included African Americans, older patients, women and those with less education.⁵² A mixed-methods study of African American women who had successful weight loss found that physicians explaining the link between obesity and their specific chronic health condition was important.⁵⁰ These data highlight the need for physician intervention, especially for the groups of patients who are most affected by obesity.

It should be noted that patient perception of stigma or judgement could have a detrimental effect on their relationship with their physician.^{53,54} Patients

who report attempts to change dietary or exercise behaviors may not have their attempts recognized by their physicians.⁵⁵ Conversely, patients may not perceive their provider has conveyed specific diet or physical activity information.⁵⁶ Patients who perceive negative attitudes from their providers may avoid treatment or lack trust in their providers.^{53,57} Patients' perspectives highlight the importance of physicians initiating conversations on weight in a non-judgmental, patient-centered approach.

Physicians can be effective as shown in clinical trials, but do not frequently counsel in practice. Surveys consistently report lack of training and self-efficacy in providing counseling as a contributing factor to the lack of provision of WMC in the primary care setting.^{26,28,58-61} Knowledge and self-efficacy are associated with physician counseling.^{25,59} In order to increase self-efficacy and frequency of counseling in practice, physician training may need to begin during the undergraduate medical school years.

Medical school curriculum for WMC is not well characterized. Medical school interventions that focused on obesity or behavior change do increase knowledge and self-efficacy.^{62,63} However, the studies are small and frequently lack control groups. The Nutrition Academic Award (NAA) funded 21 medical schools over a seven-year period (1998-2005).⁶⁴ The goal of the award was to develop nutrition training objectives and a curriculum to disseminate. The curriculum focused on nutrition education and clinical skills training to conduct

nutrition assessment.⁶⁵ This program succeeded in building nutrition curriculum and making it widely available by providing free online access.⁶⁴ In the 2015 State of Nutrition Education at U.S. Medical Schools, a periodic survey of all U.S. medical schools, only one third of medical schools required at least 25 hours of nutrition education.^{65,66} Medical schools reported that most nutrition content was integrated into pre-clinical science classes.⁶⁶ There is still a gap in curricula that addresses counseling skills for weight management, specifically during the clinical training years when medical students are in clerkships.

The overall goal of this dissertation is to obtain information to help address the gap in WMC training of medical students. This formative research will describe facilitators and barriers to WMC training during primary care core clerkships through self-reported data from medical students and preceptors. Medical students and preceptors were associated with MSWeight, the parent study (described in **Overview of study populations and data sources**). The USPSTF supports approaches that are consistent with the 5As framework (Ask, Advise, Assess, Assist, Arrange). Where appropriate, WMC behaviors are organized around the 5As in this dissertation.

Conceptual framework: Social Cognitive Theory (SCT) and Social Ecological Models (SEM)⁶⁷⁻⁶⁹ Obesity is a complex multi-modal disease that requires intervention on multiple levels to support individual patient outcomes. Social Ecological Models (SEM) have been used to describe and inform health

promotion interventions.⁷⁰ The SEM takes into account individual, inter-personal, institutional, community and public policy influences on behavior.⁷⁰ This study does not focus on individual patient behavior rather it focuses on individual, inter-personal and institutional factors involving physicians who work with patients and train medical students. In this model these influences ultimately will affect the patients' individual health outcomes.

SCT posits that cognitive and personal factors including attitudes and knowledge contribute to behavior as does ones' environmental cues. These constructs influence each other in a reciprocal direction.⁷¹ In this study SCT is used to describe influences on both preceptors' WMC behaviors and modeling of WMC behaviors to medical students, and medical students' uptake of WMC behaviors as measured by perceived skill. Important mediators of performing behaviors are self-efficacy and outcome expectations. Self-efficacy is the belief that one can accomplish a task with the skills they possess and outcome expectations are the belief that if one performs the task it will produce the intended outcome.⁷¹

This dissertation is a mixed methods study to obtain information to help address the gap in medical school training in WMC with specific focus on the clinical training years. For Aim 1 the study will describe associations of direct, observational, and instructional education experiences and student perceived WMC skills. We hypothesize that direct and observational experiences, including

those during the clerkship experience, will have stronger associations with students' perceived WMC skills compared to instructional experiences. For Aim 2 the study will describe individual, inter-personal and institutional contextual factors associated with preceptors' use of WMC. For Aim 3 the study will describe preceptors' behavior, attitudes, and self-perceived skills as they relate to performing WMC and modeling for medical students during primary care core clerkships.

Specific Aims

Aim 1: Examine associations between self-reported medical school WMC educational experiences and perceived skills in a population of 3rd year medical students at eight U.S. medical schools (n=730 students).

- Describe self-reported exposure to medical students' direct patient experiences, observational experiences and instructional experiences for WMC consistent with the 5As.
- Examine associations of direct patient experiences, observational experiences and instructional experiences with perceived WMC skills.

Aim 2: Conduct semi-structured interviews of primary care preceptors to describe individual, interpersonal and institutional contextual factors to providing WMC training (n=12 preceptors).

- Characterize preceptors' training experiences in nutrition and behavior change.
- Describe how preceptors define WMC in the primary care setting, organized around the 5As framework.
- Describe how preceptors incorporate WMC training opportunities into the clerkship experience.

Aim 3: Design and administer a survey to describe preceptors' WMC behaviors, attitudes and perceived skills as they relate to modeling WMC and working with students (n=77).

- Describe frequency of preceptors' modeling WMC to medical students.
- Describe frequency of preceptors' working with students (providing instruction and feedback).
- Characterize preceptors' attitudes towards importance of WMC.
- Describe preceptors' perceived skills for providing WMC to patients.
- Evaluate associations of preceptors' perceived WMC skills and attitudes with modeling WMC behaviors.

This project will have real world impact by describing associations between current medical school education experiences and students' perceived skills and providing information about how individual, interpersonal and institutional factors influence primary care preceptors' teaching of WMC. The

findings of this study will inform future implementation of WMC curricula in medical schools.

Overview of study populations and data sources

The parent study, Weight Management Counseling in Medical Schools (MSWeight): A Randomized Controlled Trial includes eight U.S. medical schools that represent geographically diverse locations and has previously been described in more detail.^{72,73} The schools include both private and public institutions. The parent study trial is ongoing and tests the effect of a multi-modal curriculum on WMC skills compared to a traditional curriculum. Schools were pair-matched and randomized to a multi-modal curriculum intervention (MME) or traditional curriculum (TE). The multi-modal curriculum includes a web-based course, practical role-play exercise, web-based simulated patient encounter and practice during their primary care clerkship. The primary outcome of the parent study will be measured by an Objective Structured Clinical Examination (OSCE) to evaluate observed WMC skills.

The data set used in AIM 1 comes from the MSWeight Matching and Randomization Survey from the parent study.⁷² The survey was administered to the Class of 2017 during their core clerkship rotation and were not part of the intervention cohorts.^{72,73} There were 1134 medical students eligible to participate in the survey and 796 students began the survey (70% response rate).

The data for AIM 2 came from semi-structured interviews of primary care preceptors from parent study school core clerkships. Preceptor interviews were conducted prior to the clerkship intervention activities. Parent study site investigators identified up to 3 core clerkship preceptors who were willing to participate in a 20-minute telephone interview. Contact information was sent to the study investigator to coordinate a telephone interview session. Interviews were conducted until no new themes emerged. There were 12 preceptors representing five parent study schools who participated in the interviews, with even distribution between multi-modal education (MME) and traditional education (TE) schools.

The data for AIM 3 came from a survey of primary care preceptors from six parent study core clerkships. Two schools were unable to participate due to timing of school level activities. Parent study site investigators or clerkship directors sent introductory email messages with the anonymous survey link included plus two additional reminders. There were 243 preceptors who were emailed the survey and 106 participated in the screener question (44% response rate).

CHAPTER II:

PRACTICE AND INSTRUCTION MAKE PROGRESS: THE RELATIONSHIP BETWEEN MEDICAL SCHOOL WEIGHT MANAGEMENT COUNSELING EDUCATIONAL EXPERIENCE AND PERCEIVED SKILLS

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Issue: In 2015, 61% of primary care office visits included patients with one or more chronic diseases. The majority of those conditions have a nutrition or weight-related component. Physicians and medical students can use the 5As framework (Ask, Advise, Assess, Assist, Arrange) which is an evidence-supported approach to deliver weight management counseling (WMC). However, medical school curricula vary across schools and the frequency with which medical students are provided WMC instruction, observation and direct patient experience consistent with a 5As approach is currently unknown. Also unknown is the relationship between the student's exposure to 5As WMC educational experiences and their perceived WMC skills.

Evidence: To address these questions, a sample of 730 3rd year medical students in eight U.S. medical schools completed a cross-sectional survey. The survey assessed students' perceived WMC skills, attitudes toward WMC and frequency of engagement in 5As educational experiences (direct patient, observational, and instructional). Linear mixed models were used to determine the association between educational experiences and the primary outcome of students' perceived WMC skills.

During the first two years of medical school, 61% of students reported a total of two hours or less of combined WMC instruction in the classroom, clinic, doctor's office or hospital. Students were asked to report the number of instructional, direct patient interaction and observational experiences. A summed score was

created with a possible score of 0-18. Overall, students reported having the least experience with instructional WMC, student score= 6.5, (SD=3.9), followed by direct patient experience score= 8.6 (SD=4.8) and observational experiences score=10.3 (SD=5.0). Students perceived themselves to be moderately skilled (M=2.6, SD= 0.5; 1=not at all skilled and 5=very skilled) in WMC. In the fully adjusted model, direct patient experiences (β : 0.04 95%CI: 0.03 - 0.05) and instructional experiences (β : 0.02 95%CI 0.01 - 0.03) were significantly associated with perceived WMC skills, treating school as random effects, adjusted for age, gender, weight bias, clerkship.

Implications: Students report infrequently receiving WMC training consistent with the evidence-supported 5As approach. Specific instruction and direct experience with patients are associated with higher perceived WMC skills, reinforcing the need for medical educators to incorporate skills-based WMC training into medical school curricula. Inclusion of 5As instruction with practical application to WMC could improve medical students' perceived skills. Further research is needed to determine if such curricula improves students' future use of weight management skills in practice, and ultimately helps patients improve lifestyle behaviors.

Introduction

In 2015, 61% of primary care office visits involved patients with one or more chronic diseases; hypertension, hyperlipidemia, arthritis, diabetes, obesity and cancer accounted for the majority of these conditions.¹² Poor diet and sedentary lifestyles contribute to these conditions, and population studies show that Americans consistently score low for good quality diets^{3,9} and do not attain recommended physical activity levels.⁷⁴ Obesity is a complex, multifactorial disease and of major concern are disparities by race/ethnicity, gender and socioeconomic status.^{1,3,75}

Primary care physicians can be an important point of contact for weight management care, particularly for patients with limited resources.⁷⁶ Primary care physicians who assist patients with their chronic disease management, including obesity, can help patients address lifestyle factors using the 5As framework (Ask, Advise, Assess, Assist, Arrange). This approach uses an evidence-supported model for physicians to deliver weight management counseling (WMC). Use of the 5As framework for counseling patients for screening and management of adults with obesity is supported by the U.S. Preventive Services Task Force guidelines.⁷⁷ The 5As framework has been used for counseling regarding other lifestyle behaviors such as tobacco cessation⁷⁸ and established research provides a simple framework for use of these techniques in a brief intervention.^{79,80} It also has been proposed as a straightforward approach for

delivery of counseling by primary care physicians compared to other counseling methods.⁸¹

Increases in weight management skill development during medical school years may help increase the likelihood that students will deliver WMC in their future work as physicians, which could lead to improved clinical outcomes for patients. Information on medical school WMC curricula is limited. Reviews of medical education interventions related to obesity demonstrate that curricula tested to date have used a variety of approaches and interventions that were limited in reach and scope.^{62,63} Only one study explicitly reported using the 5As approach and it did increase students' knowledge and self-efficacy.⁸² The State of Nutrition Education at US Medical Schools survey conducted in 2015 indicated that only one third of medical schools required at least 25 hours of nutrition education and most of it occurred during pre-clinical training where little hands-on clinical counseling would be provided.⁶⁶ Specific skills-based training in WMC is therefore still uncharacterized. A recent position statement by the American Heart Association endorses lifestyle counseling training in medical school but cautions against adhering to specific contact hours until more is known about what curricula is effective in improving counseling outcomes.⁸³

To better assess WMC training received by medical students, we surveyed 3rd year medical students to determine the frequency and type of educational experiences related to WMC in eight medical schools across the

country. The assessment included students' self-report of direct patient interactions, observation of physicians delivering WMC, and receipt of specific instruction for WMC using a 5As approach. It also is unknown to what extent these types of educational experiences are associated with perceived increased skill. Therefore, the aims of this study are to (1) describe self-reported exposure to 5As WMC educational experiences in a population of 3rd year medical students, and (2) examine associations of WMC-related educational experiences with students' perceived WMC skills. Identifying the specific types of educational experiences that are associated with greater perceived skills will help inform the prioritization of WMC training within busy undergraduate medical school curricula.

Methods

Study Design

The survey was administered as part of the matching and randomization process for a group-randomized controlled trial designed to test the effect of a multi-modal curriculum on WMC skills compared to a traditional curriculum, previously described in more detail.^{72,73} Medical students at eight U.S. medical schools from the Class of 2017 were surveyed during their 3rd year. The schools are located in the North, West, Midwest and South of the U.S.^{72,84} Students who participated in the survey were not exposed to the curriculum intervention and were not part of the randomized controlled trial. The survey was conducted using

a combination of online and paper-based administration. To be eligible for the present study, students must have answered questions on: WMC skills; direct, observational and instructional educational experiences; weight bias; age; gender; and most recent core clerkship. The study was determined to be exempt by the Institutional Review Boards of all participating schools.

Outcome Measure

Perceived WMC Skills. The Perceived WMC Skills scale consists of 16 items and was previously described in more detail.^{72,73} Students were asked to respond how skilled they were regarding WMC. Example items include, “Identifying and discussing with the patient their perceived barriers and concerns that make it hard to lose weight” and “Assisting the patient by identifying behavior change strategies that will help them achieve their goals”. Response options use a Likert scale of not at all skilled (1), somewhat skilled (2), moderately skilled (3) and very skilled (4). The mean, sd are reported. The Cronbach’s alpha for the scale in this sample was 0.93. The outcome was normally distributed.

Primary Determinants/Correlates

This study defined the 5As as Ask, Advise, Assess, Assist and Arrange. The survey included 3 sections (direct patient experiences, observational experiences, and specific instructional experiences), with each section consisting of 6 items: one Ask, one Advise, one Assess, two Assist and one Arrange items.

Item responses were developed from a previous trial on tobacco treatment counseling skills and adapted for weight management.⁸⁵

Direct patient experiences. Students were asked to report the number of patients with whom they had direct experience in conducting each of the 6 WMC items based on the 5As framework. Item responses were categorized as None, 1-3 patients, 4-9 patients, or 10+ patients. The mean summed score is reported. The score range was 0-18 (Cronbach's alpha = 0.91).

Observational experiences. Students were asked to report how many times they observed a physician or preceptor perform the 6 WMC items based on the 5As framework. Item responses were categorized as None, 1-3 times, 4-9 times, or 10+ times. The mean summed score is reported. The score range was 0-18 (Cronbach's alpha = 0.94).

Instructional experiences. Students were asked to report the number of times they were instructed on how to perform the 6 WMC items based on the 5As framework. Item responses were categorized as None, 1-3 times, 4-9 times, or 10+ times. The mean summed score is reported. The score range was 0-18 (Cronbach's alpha = 0.92).

Covariates

Demographics. Items self-reported by students included gender and age. Students reported their most recent core clerkship either begun or completed: family medicine, internal medicine-ambulatory, Obstetrics/Gynecology, or other.

Weight bias scale. This scale was previously reported in more detail.^{73,86} Briefly, we used the Anti-Fat sub-scale from the NEW (Nutrition, Exercise and Weight management) Attitudes Scale to measure weight bias.⁸⁶ The possible range of scores is -80 to 80 with positive scores reflecting favorable attitudes. The Cronbach's alpha was 0.78 in the sample.

Attitudes on curriculum. Students indicated level of agreement with four statements about sufficiency of information on topics related to WMC in their medical school training thus far: diet and nutrition; physical activity and exercise; how to provide behavioral counseling; and how to provide WMC. Item responses were on a Likert scale from strongly disagree (1) to strongly agree (4). Responses were collapsed to a dichotomous variable of agree or disagree due to small cell size of strongly disagree and strongly agree (Cronbach's alpha = 0.93).

Curriculum Characteristics

Students reported the number of hours of pre-clinical WMC specific instruction that they had received for the first two years. Students were asked to consider all instruction that occurred in the classroom, clinic, doctor's offices, or hospitals. Item response options were as follows: less than 30 min, 30-59 min, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours and 5+ hours. Pre-clinical responses

were collapsed into quantiles of one hour or less, 2 hours, 3 hours and 4 hours or more. Students were then asked how often they had been taught how to conduct WMC using any of the following methods: case-based, simulated patient encounter, clinical skills course, web-based/online course, classroom peer role play exercise, didactic lecture, one-on-one discussion with faculty/preceptor/mentor, or other. Item responses for teaching methods were none, one time or more than one time.

Statistical Analysis

Categorical variables are reported as frequency distributions and continuous variables are reported as means and standard deviations. Linear mixed modeling, with school as a random effect to account for within-school clustering, was used to analyze the relationship of medical school education experiences with perceived WMC skills. First, perceived WMC skills scores were regressed separately on direct experiences, observational experiences, and instructional experiences to examine unadjusted relationships. Based on characteristics anticipated to be associated with skills, models were adjusted for the following predictors: age, gender, weight bias and clerkship type.⁶¹ The three types of educational experiences were tested for collinearity. The fully adjusted model included direct experiences, observational experiences, instructional experiences, age, gender, weight bias and clerkship type.

Results

Of the 1134 third year medical students eligible to take the survey, 796 began the survey (70%) and 730 (64%) entered the information required to be eligible for these analyses. The average age of students was 26.5 years and 48% were female. The mean weight bias score was 19.6 (sd=18.2, range -56 to 63), indicating slightly positive attitudes. The majority of students reported having started or completed one of three core clerkships at the time of the survey. Students reported having had direct patient experience implementing WMC, summed score of 8.5 (sd=4.8) and having observed a physician or preceptor performing WMC, summed score of 10.3 (sd=5.0). Students reported the lowest summed score for receiving instruction on how to perform WMC, 6.4 (sd=3.9). Overall, students reported a mean of 2.6 (SD=0.5) for perceived WMC skills (Table 2.1).

During the first two pre-clinical years of medical school, 36% of students reported a total of one hour or less of combined WMC instruction in the classroom, clinic, doctor's office or hospital. The most frequently reported teaching methods were didactic lecture, one-on-one discussion with a faculty member, preceptor or mentor and case-based discussion. A large proportion of students (59-76%) never received skills-based instruction for WMC (Table 2.2.). Students indicated that sufficient information had not been provided on diet and nutrition, physical activity, behavior change and WMC (Table 2.3). Most students (87-96%) reported working with patients, observing preceptors or physicians and receiving specific instruction for Ask and Advise behaviors at least once. About

one third (30-37%) of students reported using Ask and Advise with 10 or more patients. Forty-one percent of students reported observing a physician or preceptor using Ask and Advise more than 10 times. About one quarter of students (22-26%) did not report any experience working directly with patients or receiving specific instruction on Assist behaviors. Students had the least experience with Arrange behaviors, with 46% reporting no experience working directly with patients on Arrange. Twenty one percent of students did not observe Arrange behaviors and 36% did not receive specific instruction for Arrange behaviors (Table 2.4).

Based on linear mixed models, direct, observational and instructional experiences each were significantly positively associated with students' perceived WMC skills. The significant relationship between each type of educational experience and weight management skills remained after accounting for age, gender, weight bias and core clerkship type. In each of these separate models, gender was independently associated with WMC skills. The fully adjusted model included all three types of educational experiences, age, gender, weight bias and clerkship. In this model, working directly with patients (direct patient experiences) and receiving specific instruction (instructional experiences) remained significantly associated with perceived WMC skills, while observational experiences was attenuated (Table 2.5). Although correlations between the three experiences were not strong enough to be collinear, correlation between direct experiences and observational experiences can explain the attenuation of

observational experiences in the fully adjusted model. In the fully adjusted model, gender was not associated with the outcome.

Discussion

Students reported minimal receipt of WMC training consistent with the 5As approach. The majority of students reported receiving two hours or less of any pre-clinical weight management curriculum by the spring of their third year. The most frequently reported type of educational experience was observing a physician or preceptor performing WMC. However, such observational experiences were not found to be as robustly associated with higher perceived skills as were direct patient experience and specific instruction.

Studies point to lack of training as a barrier to performing WMC in the clinic.^{61,66} This study demonstrates that increased exposure to WMC educational experiences are associated with higher student perceived skill. Increasing opportunities for students to receive training in the form of specific instruction and apply their knowledge when working with patients may help to increase their perceived WMC skills.

Clinical observations are part of training recommendations along with didactic sessions and practical work⁸³ with peers for lifestyle counseling.⁸³ In the full model, observational experiences were not significantly associated with perceived skill. This could be because it is correlated with direct experiences and does not provide additional benefit above these direct patient experiences.

However, associations were not strong enough to be collinear in the model. It is likely that many preceptors do not have WMC training, limiting the educational value of observation for students.^{66,87} Students report an overall lack of preceptor modeling during core clerkships.⁸⁸ Students more frequently observe preceptor modeling in family medicine compared to other core clerkships (internal medicine or obstetrics/gynecology).⁸⁸ It may be beneficial for faculty who precept during core clerkships to receive relevant faculty development materials so that they can incorporate relevant instruction, modeling and practice in their work with medical students.

Overall exposure to WMC is very low. In our study, the majority of students reported learning how to conduct WMC through didactic lecture, one-on-one discussions with faculty/preceptor/mentor, and case-based scenarios. The latter two are interactive methods which are considered to be the most effective teaching methods.⁸⁹ Previous research has shown that such discussion based learning has positive outcomes in the development of practical skills and self-efficacy compared to lecture only for skills-based learning.⁹⁰ In contrast, about two thirds of students reported no exposure to skills-based instruction such as skills clinics, simulated patients and to a lesser extent role-play. Incorporating use of these interactive methods may provide additional opportunities to practice WMC and use the 5As framework.

Training that includes the 5As for WMC may provide meaningful experience to help increase WMC competency. Our study supports previous medical education interventions using the 5As framework, which also found a positive correlation between a 5As curriculum and student self-efficacy.⁸² Of the 5As behaviors, the majority of students in our study had the most educational experience with the Ask/Advise behaviors. These data are consistent with other studies evaluating physician 5As behavior, where the first two As are the most frequently used.^{51,81} This also shows that while some 5As behaviors were frequently observed, the arguably more challenging skills of Assess/Assist/Arrange were not as frequently observed. Potential limitations to incorporating opportunities for medical students to observe these components of the 5As include faculty who are not trained in WMC, lack of resources to which physicians may refer patients for follow-up care, and not enough time during the scheduled appointment.

This study highlights deficits in WMC training consistent with a 5A approach, especially for Assess/Assist/Arrange behaviors. Specific instruction for using the 5As framework could be incorporated into pre-clinical curricula. A potential place to reinforce practical application could be prior to participation in primary care core clerkships. Voluntary clerkship preparation could be provided by peer-assisted learning^{91,92}, small group tutoring⁹³ or web-based simulations.⁹⁴ Given that students may not frequently observe or receive instruction for the latter 5A behaviors during their clerkships, this approach of pre-clerkship training

could prepare students to use all 5As when working with patients during core clerkships.

Learning WMC through a framework like the 5As encourages a patient-centered approach and addresses follow up as part of the counseling session. Chronic diseases and complications of obesity require lifestyle changes that are difficult for the patient to make. As seen in experimental trials and real world evaluations, patient engagement over time is critical to achieve increased weight loss and improved clinical outcomes.^{95,96} A patient-centered physician intervention may be particularly important to assist patients who are disproportionately affected by obesity.^{49,50,96} As anticipated from our previous research, weight bias scores were slightly positive and not associated with perceived skills.⁷³ Providing patient-centered WMC training during medical school may help students to maintain positive attitudes towards patients with obesity.⁷³

This study has several strengths. To the authors' knowledge, this is the largest sample of 3rd year medical students surveyed specifically on weight management counseling training consistent with the 5As framework, which is an approach supported by the USPSTF guidelines.⁷⁷ The survey was administered to students at eight medical schools during the spring of the students' third year and therefore they have recently completed pre-clinical training and are in or have completed at least one core clerkship. Surveying 3rd year students is

optimal because they have had time to practice skills through core clerkships and are still on campus as opposed to 4th year when students are more likely to be off campus. Scales used for this study had internal consistency, as demonstrated by high Cronbach's alpha scores. Students were asked to report on experiences from all sources: voluntary, required and elective. This allowed for a more complete picture of students' exposure to WMC during the first three years of medical school. This is in contrast to previous nutrition curriculum surveys⁶⁶, which covered only required curricula and was reported by institutional faculty or staff, not students.

There are several limitations to the current study. This is a cross-sectional observational study that limits interpretation beyond correlation. Another limitation is the self-reported outcome for WMC skill. A limitation of self-report data includes the potential for volunteer bias that may lead participants to answer affirmatively. However, we did not detect floor or ceiling effects of exposures. The outcome was normally distributed, indicating the students reported a range of response and did not rate all survey items favorably as one might anticipate with volunteer bias. Future work from this same cohort of eight schools will include longitudinal analysis to determine if strong perceived skill translates to WMC in the primary care setting. Due to school differences in schedules, it was difficult to administer the survey after completion of the same core clerkships (Family Medicine or Internal Medicine). Therefore, analyses were adjusted for clerkship.

Our study is promising in that participating students who reported more frequent educational experiences in WMC consistent with a 5As approach reported higher levels of perceived skills. Further longitudinal research is needed to determine if increasing specific 5As instruction and direct patient experience are effective for increasing students' skill in the clinic. WMC training using the 5As framework skills could improve students' future use in practice, and thereby improve patient outcomes.

Sample Characteristics (n=730)	
Table 2.1 Individual Characteristics	
Age: Mean (sd), Range	26.5 (3), 20- 46 years of age
Gender (%)	
Female	48%
Core Clerkship (%)*	
Family Medicine	28%
Internal Medicine	31%
OB/GYN	36%
Other	5%
Direct Experiences	
Summed score Mean (sd), Range	8.5 (4.8), 0-18
Observational Experiences	
Summed score Mean (sd), Range	10.3 (5.0), 0-18
Instructional Experiences	
Summed score Mean (sd), Range	6.4 (3.9), 0-18
Weight bias (NEW Attitudes)	
Mean (sd), Range	19.56 (18.19), -56 to 63
Weight Management Skills	
Mean (sd), range	2.6 (0.5), 1-4
*most recently completed core clerkship; NEW (Nutrition, Exercise and Weight management) Attitudes Scale, Anti-Fat sub-scale	

Table 2.2 Curriculum Characteristics			
Pre-clinical Weight Management Counseling	Hours % (n)*		
One hour or less	36% (264)		
Two hours	25% (185)		
Three hours	18% (129)		
Four or more hours	20% (148)		
Teaching method**	Never	Once	> Once
Didactic lecture	20% (143)	49% (354)	32% (230)
One-on-one discussion w/ faculty/preceptor/mentor	44% (317)	28% (200)	29% (209)
Case-based	47% (339)	33% (240)	20% (148)
Clinical skills course	59% (428)	30% (218)	11% (78)
Simulated patient encounter	61% (445)	28% (203)	11% (80)
Web-based/online course	68% (492)	22% (160)	10% (74)
Classroom peer role play exercise	76% (548)	17% (126)	7% (49)

*frequency based on 726 responses, **frequency based on 723-727 responses

Table 2.3 Student Agreement with Sufficiency of Training				
*N=729 students, **N=728 students, ***N=727 students, # percent may total 99-101% due to rounding				
To what extent do you agree with the following statement:	Strongly Disagree	Disagree	Agree	Strongly Agree
There has been sufficient information about diet and nutrition in my medical school training thus far*	21% (152)	51% (371)	24% (175)	4% (31)
There has been sufficient information about physical activity and exercise in my medical school training thus far**	18% (128)	48% (347)	30% (220)	5% (33)
There has been sufficient information about how to provide behavioral change counseling in my medical school training thus far***	17% (127)	42% (308)	34% (248)	6% (44)
There has been sufficient information on how to provide weight management counseling in my medical school thus far***	23% (166)	53% (386)	21% (151)	3% (24)

Table 2.4 Frequency of 5As Exposure by Type of Educational Experience	Direct experience: number of adult patients				Observational Experience: number of times observed				Instructional Experience: number of times instructed on how to provide WMC			
	(N=730) % (n)	None	1-3	4-9	10+	None	1-3	4-9	10+	None	1-3	4-9
Assessed for the patient's BMI and behavioral health risks and factors that contribute to weight gain willingness to change behavior	8 (57)	28 (205)	27 (198)	37 (270)	6 (41)	26 (187)	28 (205)	41 (297)	11 (83)	56 (410)	22 (158)	11 (79)
Advised that weight loss is recommended based on the patient's personal health information (e.g. BMI and risk factors)	10 (72)	30 (217)	30 (220)	30 (221)	4 (31)	25 (185)	30 (216)	41 (298)	13 (98)	56 (412)	20 (149)	10 (71)
Assessed the patient's level of readiness to make lifestyle changes to achieve weight loss	15 (109)	35 (257)	32 (231)	18 (134)	11 (78)	34 (249)	31 (226)	24 (177)	19 (141)	59 (428)	17 (123)	5 (38)
Partnered with the patient to select treatment goals and methods based on the patient's interests and willingness to change behavior	22 (160)	42 (305)	25 (180)	12 (85)	12 (91)	39 (282)	28 (205)	21 (152)	25 (177)	56 (412)	15 (109)	4 (32)
Assisted the patient to achieve their agreed-upon goals by identifying and addressing barriers to meet them	26 (192)	43 (315)	20 (143)	11 (80)	14 (102)	39 (285)	28 (203)	20 (140)	26 (187)	56 (412)	14 (103)	4 (28)
Arranged follow-up contact to provide ongoing assistance and support for the treatment plan and/or provided referral to more intensive specialized treatment	46 (332)	32 (235)	15 (109)	7 (54)	21 (153)	37 (270)	24 (178)	18 (129)	36 (265)	50 (361)	11 (78)	4 (26)

Table 2.5 Linear mixed models of educational experiences on outcome of perceived WMC skills, regression coefficients for direct experiences, observational experiences, and instructional experiences.

	Unadjusted β (95% CI)	Adjusted* β (95% CI)	Unadjusted β (95% CI)	Adjusted* β (95% CI)	Unadjusted β (95% CI)	Adjusted* β (95% CI)	Fully Adjusted* β (95% CI)
Direct Experiences	0.05 (0.04 - 0.05)**	0.05 (0.04 - 0.05)**	-	-	-	-	0.04 (0.03 - 0.05)**
Observational Experiences	-	-	0.03 (0.02 - 0.04)**	0.03 (0.02 - 0.04)**	-	-	-0.00 (-0.01 - 0.01)
Instructional Experiences	-	-	-	-	0.04 (0.04 - 0.05)**	0.04 (0.03 - 0.05)**	0.02 (0.01 - 0.03)**

*Adjusted for age, gender, weight bias and core clerkship

** $p < 0.001$

Linear mixed models school is treated as random effect to account for clustering, β =beta coefficient, 95%CI = 95% confidence intervals.

CHAPTER III:

**PHYSICIAN- DELIVERED WEIGHT MANAGEMENT COUNSELING: A
QUALITATIVE STUDY OF MEDICAL SCHOOL PRECEPTORS'
EXPERIENCES AND ATTITUDES TOWARDS TRAINING STUDENTS DURING
PRIMARY CARE CLERKSHIPS**

Background: Clinical guidelines and reimbursement models support physicians providing weight management counseling (WMC) in the primary care setting to address obesity. Training and time are traditional barriers to counseling patients. The goal of this study was to describe contextual factors for WMC training during primary care clerkships. Primary care preceptors described their WMC background, how they incorporate WMC into patient visits and student training.

Methods: Semi-structured interviews were administered to primary care physicians who precept medical students during 3rd year core clerkships in either family medicine or ambulatory internal medicine. Preceptors were recruited from 5 medical school core clerkships and interviewed between January and August 2018 (n=12).

Results: Themes important to training in the clerkship include preceptors' knowledge, definition of WMC, perceived role, and institutional supports. Preceptors believe WMC is important for students to learn during medical school, but students are with them for a limited period. Modeling of WMC was conducted within the context of patient visits for chronic conditions rather than stand-alone

visits. Preceptors do not perceive themselves as the experts. Preceptors with access to inter-professional team members report that it facilitates their provision of WMC. Preceptors vary in how they address WMC and resources are not consistently available across clinics.

Conclusion: Providing consistent WMC training during core clerkships is a challenge due to logistics, clinic resources, preceptors' varied approach, skills, and attitudes. However, the prevalence of obesity and its relation to chronic conditions at minimum provides opportunities for preceptors to raise awareness with students of the importance of WMC.

Introduction

Obesity and related chronic diseases are prevalent and are a public health concern.¹² Public health initiatives such as Healthy People 2020 support increasing weight status screening and counseling for patients who have cardiovascular disease, diabetes, or hyperlipidemia.⁹⁷ However, interim data for such initiatives indicate continued challenges to implementing screening and provision of nutrition or physical activity counseling during patient visits.⁹⁸

Clinical guidelines and reimbursement models support physicians providing weight management counseling (WMC) in the primary care setting to address obesity. The United States Preventive Services Task Force (USPSTF) continues to recommend intervention for obesity based on available evidence.⁷⁷ The Centers for Medicare and Medicaid provides guidance on reimbursement for clinicians to address weight management.^{20,99}

Nationally representative surveys suggest only 40% of patients with a diagnosis of obesity received education or counseling related to weight management.²² In addition to limited time and low reimbursement, lack of training is frequently cited as a reason for not providing counseling.^{26,28,61,100,101} Given physicians typically do not receive specific training for WMC, the quality of patient education or counseling in WMC being provided is unclear.

Core clerkships provide the opportunity for primary care preceptors to model and discuss WMC with medical students. This typically occurs during the student's third year of undergraduate medical training. Medical school accrediting

agencies require community-based outpatient experiences.^{102,103} These experiences are critical for students to practice basic clinical skills and gain an understanding of healthcare delivery systems in the outpatient setting.¹⁰² However, there is very little information about whether preceptors are able to model, discuss or provide opportunities for students to learn and practice WMC during these clerkship experiences.

National surveys on medical school curriculum demonstrate students overall do not receive much nutrition education and very little of that education is focused on clinical training.⁶⁶ Knowledge in nutrition is not enough to improve self-efficacy for WMC.³⁹ Incorporating a behavior change framework such as the evidence based 5As (Ask, Advise, Assess, Assist, Arrange)^{104,105} or motivational interviewing (MI) techniques into WMC has been found to improve self-efficacy^{106,107}

Third year medical students report observing preceptors performing WMC behaviors.⁸⁸ However, students do not frequently report receiving specific instructions and practicing weight management counseling during core clerkships.⁸⁸ Students do report being able to practice some behaviors such as screening for BMI status and advising about weight loss based on patients' personal health information.(Ashe, et al submitted, Chapter II)

There is a need to incorporate lifestyle counseling, including weight management, into the medical school curriculum. The primary care clerkships would provide important opportunities to practice skills learned from such

curricula. This study sought to describe contextual factors related to WMC training during family medicine and ambulatory internal medicine clerkships from the preceptors' perspective. A thematic analysis was performed to describe preceptors' concept of WMC in the primary care setting, preceptors' knowledge and background in nutrition and behavior change, and institutional factors that contribute to the training environment. We also sought to identify facilitators and barriers to weight management counseling training during primary care clerkships. Results from this qualitative study may inform implementation of future WMC curricula in medical schools.

Methods

Recruitment Strategy

A purposive sampling strategy was used to select preceptors from primary care clerkships (family medicine or ambulatory internal medicine) of schools participating in a cluster RCT WMC curriculum intervention (parent study).⁷² Curriculum components were delivered to students in intervention schools during the preclinical years. Students at intervention schools were then provided with an opportunity to practice WMC during their primary care core clerkship. Preceptors were located at the academic site or in community sites. Parent study contacts (principal investigators or clerkship directors) were asked to invite up to three preceptors from their participating clerkship. Preceptors were interviewed prior to the core clerkship training component of the parent study.

Design and Refinement

Semi-structured interviews were designed to describe facilitators and barriers to WMC training during family or ambulatory internal medicine clerkships. The interview guide and code book were designed using Social Cognitive Theory (SCT) as a framework to elicit and describe contextual factors for environmental, personal and behavioral constructs.⁶⁹ Personal factors included knowledge, experience and values; environmental factors included elements within the academic institution and the clinic where the preceptors worked. The behaviors we sought to describe were both how preceptors incorporated weight management counseling in their practice and how they interacted with students regarding WMC practices during the clerkship. The interview guide and codebook were pilot tested with a preceptor from an institution that was not part of the parent study.

Semi-Structured Interview Administration

Semi-structured interviews were conducted with preceptors between January and August of 2018 by K.A. No compensation was provided. The interviews were completed by telephone, recorded and transcribed verbatim.

Data Management and Analysis

After transcription of the audio recordings, the transcripts were verified against all recordings, and corrections were made as necessary. Transcripts were downloaded to Atlas.ti for analysis. Transcripts were independently coded by two coders (K.A., J.P.). The coders refined the code book definitions through an iterative process until full agreement on coding was reached. Interviews,

transcription and coding occurred on an ongoing basis as interviews were conducted. Themes important to preceptors providing WMC training to students were identified. Facilitators and barriers also were described.

Results

Preceptors from five schools agreed to participate in the semi-structured interviews. Twelve preceptors were interviewed at which time theme saturation was achieved. Participants were evenly distributed by gender (female/male) and core clerkship (family medicine and ambulatory internal medicine).

Preceptors' Training in Weight Management Curriculum

Preceptors were asked about their background in nutrition and behavior change. Preceptors reported limited curricula in these areas during their own medical school training. The majority of preceptors indicated they received some required nutrition education during medical school. However, characterization included terms such as '*very little*', '*one lecture*' or '*biochemistry lecture*'. In addition, two preceptors reported taking elective nutrition coursework. Four preceptors indicated that behavior change was a component of their own medical school curriculum either through required coursework or case-based discussions.

Nine preceptors reported some exposure to nutrition and/or behavior change during residency, but typically not both. Three preceptors reported some nutrition curriculum or reported having opportunities to interact with nutritionists or diabetes educators during residency. Four participants reported behavior change and MI curriculum during residency.

Preceptors reported a variety of ways in which they sought continuing education. When asked about continuing education for nutrition, they generally responded that it was part of an obesity or diabetes curriculum rather than CME specific to nutrition. Two preceptors with no exposure to behavior change during medical school or residency participated in MI and behavior change curriculum as part of on-the-job training. Four preceptors reported learning about behavior change and MI during national meetings or conferences. However, the cases they reported using to practice MI were for general behavior change or substance use, but not nutrition. Preceptors also described preparing or developing curricula for students and residents as another way that they learned about relevant topics.

Preceptors' Role in the Clerkship

Preceptors were asked a series of questions to elicit how they interacted with 3rd year medical students during the clerkship. Preceptors described clerkships that varied in structure and length from two weeks to one month. All preceptors reported working with clerkship students 1:1. Preceptors generally were unaware of any specific clerkship curriculum beyond competencies such as professionalism, communication, taking a patient history, and performing a physical exam. In addition to teaching 3rd year medical students, some preceptors had additional mentoring responsibilities for residents. In some cases, 3rd year medical students worked closely with residents when their clinic days overlapped.

Defining WMC in the Primary Care Setting

Preceptors were asked to define WMC in the primary care setting. The majority included advising patients about their weight or relating the patients' weight to a health condition. Assessing and partnering with the patient were the next most frequently mentioned concepts. Preceptors reported assessing where the patient is in terms of being motivated to change and then assisting them with their goals. The next most frequently mentioned concept in the definition was arranging resources for the patient. This most often included consultation with a nutritionist. Preceptors additionally mentioned referral to nutritionists outside of the requested definition of WMC, typically when discussing reimbursement processes or facilitators and barriers to training. Preceptors' definitions of WMC categorized into the 5A framework are noted in Table 3.1.

Preceptors' training of 3rd year clerkship students in WMC were categorized into three themes: their own knowledge and role perception in training medical students; their perceived role in providing WMC; and institutional factors of both the school with which they are affiliated and the clinic where they work. From these themes were also discussed facilitators and barriers to WMC training during core clerkships.

Preceptors' Knowledge and Role Perception in Training Medical Students

All preceptors indicated that WMC should be included in student training. However, preceptors have limited background in WMC and are not knowledgeable of the students' specific clerkship curriculum. They were unaware

of any obesity-specific clerkship competencies required for students but indicated that the prevalence of obesity provided opportunities for students to learn. *“I think one thing is just prevalence. We see obesity so commonly. We see chronic diseases like hypertension and diabetes so commonly that I think it could apply to at least every other patient and maybe more.” P11*

Preceptors reported that during the clerkship, students were evaluated on basic clinical skills or professionalism and communication. Preceptors indicated that students came to the clerkship with different levels of skill depending on the timing of the clerkship. The volume of material students needed to learn in the primary care clerkship made it very challenging to focus in depth on one topic such as obesity or WMC.

Regardless of their own training background preceptors who value WMC reported finding ways to incorporate it into the student experience. *“In fact, I pull students in if I, if they are in another room I’ll pull them out and say come, I’m going to give this talk with this patient and I want you to listen. So I don’t see that there is any barrier, I’m so motivated that I want them to listen and learn something.” P08* One preceptor highlighted how they incorporated the patient into the discussion by having the patient talk to the student about successes they experienced. *“Then we go see the patient and I say hey, can you take a few seconds to tell the student how, why did you come to this understanding that I need to lose weight. How did we help you and how did you manage the situation? And then also we talk about your diabetes, blood pressure, cholesterol,*

and how all that stuff improved with our conversation. Not only show them on the chart but I'll also have the patient take a few seconds and explain things to the student as to how they did things and how our clinic helped things out." P09

Despite varying levels of their own background or interest in WMC, all preceptors indicated WMC should be part of the medical school curriculum. When asked about where in physician training WMC should be taught the majority of preceptors stated that it should start with undergraduate medical education. *"I actually do think the undergraduate is the best timeframe to teach it because I think if you teach it later then maybe some specialists don't necessarily have that background when it really does affect a lot of things..."* P02. Some also felt that training should be included during residency. *"Because of what we just talked about which is it's really, really, common and it affects many or most problems in some way. I think it's part of the foundational training that students and residents ought to have."* P06

Preceptors' Perceived Role in WMC in the Primary Care Setting

Preceptors reported incorporating WMC concepts into their patient visits. WMC is typically incorporated into visits for other chronic diseases, most frequently cited were diabetes and hypertension. A variety of approaches emerged: referring a patient when they request it, advising patients how their condition relates to weight and providing referrals, assessing where the patient is in terms of motivation and assisting them with their goals. Preceptors used

language from both MI and the 5As framework. The reported behaviors are organized in the 5As framework for convenience in Table 3.1.

Preceptors viewed WMC as an important and relevant topic for their patients. However, they generally do not see themselves as the experts who should be delivering training for WMC. Preceptors who reported having access to specialists or other resources generally described those resources in favorable terms and as part of the definition of WMC in primary care (Table 3.1.).

The most frequent referral reported was to a nutritionist. Preceptors who have access to a nutritionist in their clinic described incorporating referrals into the weight management process at their clinic. Preceptors may follow up with the patient after they have had a consultation with a nutritionist, but no one discussed using a series of patient visits for WMC alone unless it was to discuss medications for obesity or referral to bariatric surgery.

Even those who incorporated a nutritionist into WMC experienced challenges. Preceptors described the referral to a nutritionist as a consultation. Patients generally had only one or two sessions with the nutritionist. The nutritionist's role was described as only providing information on diet to patients, rather than a series of counseling sessions to support behavior change. The other challenge raised was the inability to send patients to a referral if they did not already have a diagnosis, such as diabetes. *"...typically, with most patients they are either overweight or obese, and there are triggers about doing counseling, you know, in every visit. Which, you know, is great to remind you of it*

but yet if someone is truly overweight I can't even refer them to nutrition because insurance doesn't cover it. They have to have diabetes. And people with pre-diabetes who are overweight or obese you can't even send them to a nutritionist."

P10

While acknowledging the importance of WMC, some preceptors voiced concerns about addressing weight management in primary care. Preceptors recognized that social determinants of health and the ability to personalize advice in a meaningful way for patients were significant barriers to addressing weight within the context of the patient visit. This appreciation for the challenges patients face outside of clinical care were barriers for preceptors to incorporate WMC into their primary care visits with patients.

"I think the way our society has evolved is a big barrier because they have to go and live in the real world where they're bombarded with advertisements for food, and the pace of life encourages people to eat fast food which is difficult to make healthy choices from, for most people. So I think society is a big barrier. Obesity has increased and during my career (...). It's increased dramatically and not because people's genetic makeup has changed but because the way people live has changed. And I think that is a huge barrier for most people." P06

"I've also found that there is a big, there is a portion of this that really has to be applied to what the patient's reality is. Uh, many times I ask for a consult with nutrition for the family. And the next day I go in and say, how did it go with nutrition? And they'd all sort of give a noncommittal answer. And when I press

them for details, what I have often found is that they have a lot of general principals transferred to them, however, there was no real adjustment of those principals to the reality of patient, both socioeconomically, or culturally in terms of the foods that they eat.” P20

Institutional Factors Associated with WMC Training

Preceptors described deficits in delivering WMC curriculum at the academic-level. The preceptors, who work in family medicine or ambulatory internal medicine, also described needing experts to deliver WMC curriculum. *“We are in a state that could use an enormous amount of behavior change between smoking and obesity and everything and it takes just having some experts and having some emphasis within the overall curriculum.” P04*

Preceptors described a level of comfort in delivering didactics but emphasized the need for experts in models of behavior change. *“One would ask who would train the students to deliver that management. There would be a component of just knowledge, which I think would be reasonable for us to put into lectures and so forth and pass that information. But in terms of delivery for that vehicle of information, whether that be motivational interviewing or would that be some other behavioral model that we have underpinning it, I don’t think most internists are adept at that.” P20*

In addition to school-level factors, preceptors described clinic-level factors that may influence students’ exposure to WMC through the clerkship. Preceptors who have institutional supports such as trained nurse care coordinators and

nutritionists on staff, or access to a weight loss clinic incorporated these resources for the patient (Table 3.1). However, availability of these resources were not consistent across clinics and contributed to varying exposure to WMC for students.

At the clinic-level, structured time for patient visits and reimbursement were challenges to providing in depth WMC to patients, and thus limiting student opportunities. How patient visits were scheduled and reimbursed appeared to be the result of clinic norms. For example, preceptors did not report patient visits for obesity alone. They did describe incorporating obesity as a diagnostic code into the scheduled visit as needed. *“Obesity is not the diagnosis most of the time. Most of the time it is hypertension, hyperlipidemia plus obesity...” P07.* Preceptors reported being able to have more time with the patient for these complex visits. By incorporating discussion of weight management into a visit for multiple conditions, preceptors can increase visit length from a typical 15-minute visit to 25 minutes.

When asked about facilitators, preceptors focused on the need for more access to specialists. *“If our clinic had more nutrition counseling available that would be the biggest facilitator if we actually had more expanded nutrition services available for our patients and if we were connected with those nutritionists better and then could actually have our patients, or have our students see the nutritionist in action.” P11 “My initial thought was nutritionist then my second thought was perhaps even someone like a licensed clinical*

social worker. Somebody who has a lot of extensive training in behavior change and identifying barriers and that kind of stuff.” P05

Discussion

Primary care preceptors in the outpatient setting provide important opportunities for medical students to practice skills learned during preclinical years. This study highlighted current challenges in the primary care setting and in training medical students in WMC. It also elicited several important facilitators for providing WMC training during primary care clerkships.

There are many challenges to providing medical students with consistent WMC training experiences during primary care core clerkships. The short time that students are with preceptors and the large volume of material they need to learn limits the amount of in depth WMC training that can occur during the clerkship. The main academic-level institutional barrier to WMC training was preceptor lack of awareness of specific clerkship curriculum competencies. Preceptors were not aware if there were specific obesity related competencies for the 3rd year clerkship. Medical schools are required to provide faculty development to preceptors.¹⁰³ Incorporation of an obesity specific competency for the clerkship and communication of the competency and expectations for students could contribute to both student learning and preceptor engagement in faculty development.

Preceptors expressed that obesity is an underlying contribution to the many chronic conditions seen in the clinic, but that they do not actively seek out

formal CME on nutrition or behavior change. This may speak to their perception that they are not the primary provider of nutrition counseling. These findings are similar to perceptions of other primary care practitioners who do not perceive their role to be the primary provider of WMC.^{27,58,108} In relation to role perception, preceptors do not address WMC in stand-alone patient visits. This is in contrast to CMS guidelines that support obesity management reimbursement for stand-alone counseling sessions.²⁰ Because they are primary care clinicians, multiple patient issues are addressed in every visit.¹⁰⁹ Addressing multiple patient problems in every visit is consistent with how other physicians report their roles.^{110,111}

Preceptors addressed WMC with patients using a variety of approaches. Evidence suggests that a 5As framework^{105,112} or MI can motivate patients.^{106,107,113} Preceptors used 5As language when defining WMC, although no one included all 5As in their description. Most preceptors in our study had some exposure to MI techniques and behavior change and this is reflected in descriptions of assessing the patient's readiness to change and partnering with the patient to set goals.

Despite current challenges, preceptors report that there are several facilitators to providing WMC training during core clerkships. Having access to inter-professional team members, such as nutritionists, in the clinic where they practice was an important institutional facilitator.²⁷ Evidence suggests dietetic interventions in the primary care setting show favorable results on a variety of

outcomes including glycemic control and improved dietary patterns and weight loss.^{114,115} However, our study does shed light on some negative perceptions of nutrition referrals when social determinants of health are not addressed and personalization of advice is not achieved.

Prevalence of obesity and related chronic conditions was the greatest facilitator for providing students with exposure to obesity related patient care. Whether the clerkship was in family medicine or ambulatory internal medicine, students had exposure to patients who would benefit from WMC. While students may not be able to practice in depth WMC during primary care core clerkships, there is certainly opportunity to raise awareness of its importance in patient care.

This qualitative study has several strengths. Participants were recruited from primary care clerkships in five medical schools across the U.S. While the nature of qualitative research is not generalizable, we did reach theme saturation for preceptors' own training, perceived roles and institutional supports. Preceptors practiced several different approaches to WMC, but all supported the need for medical students to learn WMC as part of their foundational education.

Limitations include potential volunteer bias due to preceptors recruited from institutions who were participating in the parent study. However, participants' range of approaches to WMC from minimal involvement to champions of WMC in the primary care setting strengthened our confidence that bias was minimal.

Preceptors reported that training in WMC is important for medical students despite the current challenges to patient care in the primary care setting. Primary care clerkships provide opportunities for medical students to practice conversations with patients on addressing obesity. Supporting training by providing clear clerkship objectives may help prompt conversations with patients, engage preceptors and thus enhance student learning.

Table 3.1 Preceptors' Definition of WMC in the Primary Care Setting, categorized into 5A Framework (n=12)	
5As/#	Example Quote
Advise 8	<p>"I explain to them what BMI is, and what is an appropriate category of BMI and what are your numbers, where it needs to be and how we need to achieve that." P09</p> <p>"So I like to approach the patient depending on where they fit. If they do not have co-morbidity, I like to highlight the things that can happen with obesity. Um, so I go through that and if they do have a co-morbidity, then I want to <u>incentivize</u> them by saying that, you know, managing weight will help them get off of their medications and improve their health." P08</p>
Ask/Assess 6	<p>"Weight management counseling is assessing where the patient is in terms of their diet and readiness to change..." P02</p> <p>"So I think that we do a fair amount of weight management counseling as part of our care and it's mostly a matter of trying to evaluate whether people are ready and willing to talk about it?" P04</p>
Assist 5	<p>..."many times we don't necessarily have as much time to go into it as we would like but my technique has generally been kind of trying to use motivational interviewing techniques to identify smart goals and so, at least helping the patient to at least set one achievable, measurable goal and then having a very close follow-up. Be it a month, typically a month to give them time to make that behavior change and then check in on them to see how things are going." P05</p> <p>"I definitely kind of try and find out what they've tried to do in the past and what they think might work for them. To try and have them come up with ideas before I share maybe my own ideas or tips that we know can be helpful and ultimately when they are ready to make change try to get them to commit to one or 2 behavioral changes. But I try to have them chose what they think they can do and make sure it's realistic to with their life." P03</p>
Arrange 4	<p>"so we have nutrition and we also have a weight loss program here, a clinic called MOVE. So a lot of people go there if they are really overweight and motivated. And obviously that is all encompassing, their medications, exercise, diet counseling, all of that." P01</p> <p>"I do use a care coordinator which is actually a (Unit?) nurse and she's very well trained in nutrition plus we do have a free nutritionist available as well. (...) but the nutritionist is kind of an absolute thing, all of my patients whom I will be managing Obesity, I definitely like them to meet with her." P08</p>
Addtl Arrange 3	<p>"I almost always offer to have someone see a nutritionist. I find that some patients are really willing and interested in doing that. Others don't want to. I usually do pushbacks just to talk about having someone else helping to have more time to go into detail and that have more training than I do. And to also just have some extra accountability. I think one of the barriers there is reimbursement." P03</p> <p>"If our clinic had more nutrition counseling available that would be the biggest facilitator if we actually had more expanded nutrition services available for our patients and if we were connected with those nutritionists better and then could actually have our patients, or have our students see the nutritionist in action." P11</p> <p>"We put in a referral and tell the patient to make an appointment for nutrition at the front desk on their way out. And she can do anything from a couple sessions to; I have one patient that she saw, a lot of times it's a matter of getting them in to her then she can evaluate exactly what to do." P04</p>
<p>#=Number of preceptors who reported use of a 5A; Preceptors did not separately identify ASK behaviors defined as asking patient permission to discuss weight.</p>	

CHAPTER IV:
**WEIGHT MANAGEMENT COUNSELING (WMC) DURING PRIMARY CARE
CLERKSHIPS: PRECEPTORS' FREQUENCY OF MODELING WMC TO
STUDENTS, PERCEIVED SKILLS AND ATTITUDES.**

Abstract

Background: The United States Preventive Services Task Force (USPSTF) 2018 guideline for the management of adults with obesity continues to support screening and offering or referring patients with obesity to intensive multi-component behavioral intervention. Training the primary care work force is important for implementation of guidelines. It is unclear to what degree preceptors provide weight management counseling (WMC) training during primary care core clerkships. This study seeks to describe the frequency of preceptors modeling WMC to medical students and preceptors' perceived skills and attitudes towards providing WMC to patients.

Methods: Primary care preceptors from medical schools participating in a larger WMC curriculum RCT were recruited to participate in an anonymous 10-minute cross-sectional survey on modeling WMC to medical students, perceived skills and attitudes. Preceptors included family or community medicine and ambulatory internal medicine.

Results: The survey was completed by 77 eligible preceptors and represents a response rate of 33%. The modeling WMC behaviors for students mean was

3.26, sd 0.48 (range 1-5). Preceptor perceived WMC skills mean 2.8, sd 0.56 (range 1-4) and attitudes mean was 2.1, sd 0.5 (range 1-4). Preceptors in this study perceived themselves to be moderately skilled in WMC, and agreed they have a responsibility to provide WMC and can be effective with patients.

Preceptors only report sometimes modeling WMC to medical students.

Preceptors do not model referrals (43-68%) because resources are not available.

Conclusions: Preceptors do not consistently model WMC for medical students during primary care core clerkships. Skill perception and resource availability may contribute.

Introduction

U.S. adult obesity rates are increasing; current adult prevalence is at 40% compared to prevalence of 31% in 1999-2000.² Disparities by race and gender show Non-Hispanic black women and Hispanic women experience the highest rates of obesity at 54.5% and 50.4%, respectively.² Obesity is a complex disease that requires a multi-prong approach, including intervention through primary care. To address obesity in the primary care setting, the United States Preventive Services Task Force (USPSTF) has issued recommendations to screen and offer intensive counseling and behavioral interventions since 2003.¹⁴

The USPSTF periodically updates recommendations and recently reviewed evidence for intervention for adults who have obesity.¹⁷ The guideline supports physician intervention that is consistent with a 5As approach (Ask, Advise, Assess, Assist, Arrange). The 2018 USPSTF guideline maintains its previous designation of grade B for primary care physicians to offer or refer adult patients with obesity ($\geq 30 \text{ kg/m}^2$) to intensive, multicomponent behavioral interventions.¹⁶ This recommendation is important because evidence shows a moderate positive effect and no evidence of harm.¹⁶

Almost 70% of U.S. adults have overweight or obesity and may benefit from weight management counseling.¹ Professional societies recognize the importance of including lifestyle medicine and promotion of earlier intervention with patients. American Heart Association/The American College of

Cardiology/The Obesity Society endorse addressing weight with patients who have overweight (25 kg/m^2 - 29.9 kg/m^2) and one or more cardiovascular risk factors.¹⁸ Endocrinology professional societies also support promoting lifestyle medicine as a central piece of health promotion regardless of specific risk factors.¹¹⁶ The most updated USPSTF guideline now includes support for intervention with patients who are overweight and have dyslipidemia and/or hypertension.¹⁶

Despite evidence-based guidelines and expert opinion promoting lifestyle medicine to address weight in primary care, implementation challenges persist. Well known lifestyle intervention studies such as the Diabetes Prevention Program (DPP) and LOOK Ahead demonstrated weight loss and reduced incidence of type 2 diabetes.^{36,38,117} However, the interventions were not conducted by physicians in the primary care setting.^{36,38,117} Studies included in current evidence reviews are relevant to primary care but vary in adaptations (individual, group, technology-assisted) and type of health care professional delivering intervention, and target different populations.^{17,33}

In order for physicians to deliver lifestyle interventions adapted to primary care practice, they need to receive training in these interventions. Lack of physician training is associated with low self-efficacy for weight management counseling (WMC).^{26,28,59,61} Nationally representative surveys of primary care physicians found that physicians did feel a responsibility to provide weight related

care but did not have adequate strategies to deliver weight management counseling.⁵⁸ Primary care physicians supported increased training for obesity related care.⁵⁸

Various efforts to incorporate WMC into medical school curricula have been made in recent years, but it is unknown what components of such curricula are essential to increase students' WMC skills.^{62,63} The medical school core clerkship experience focuses on student skill development through opportunities to observe preceptors while also providing opportunities for students to practice skills and receive feedback. Learning through observing others demonstrating a behavior is an important part of social cognitive theory (SCT).⁶⁷ Preceptors can provide the critical observations through modeling WMC behaviors, as well as observing students and providing feedback.

Given that preceptors are unlikely to have had required WMC training themselves, it is unclear how frequently they model WMC behaviors consistent with the 5As approach. It also is unknown if preceptors have similar attitudes and perceptions of skill seen in nationally representative surveys of physicians.^{58,59} Preceptors for this survey were recruited from six U.S. medical schools who participated in a larger RCT evaluating a multi-modal WMC curriculum intervention.⁷² The goal of this study is to describe primary care preceptors' frequency of modeling WMC behaviors to medical students and their perceived skills and attitudes towards providing WMC to patients. Associations of their

perceived skills and attitudes with frequency of performing WMC modeling for students will also be explored.

Methods

Recruitment Strategy

Preceptors were recruited through primary care core clerkships associated with the parent study (MSWeight).⁷² Six of the eight schools agreed to participate in the survey. Two schools were unable to participate as their preceptor activities occurred outside the window of this survey administration. Preceptor inclusion criteria: primary care preceptors associated with one of the parent study clerkships located at the academic site or in the community; be part of an ambulatory internal medicine, family or community medicine clerkship. Exclusion criteria: preceptors who participate in Ob/Gyn clerkships or non-ambulatory internal medicine. Residents and resident fellows with precepting responsibilities were included in this study. Recruitment occurred prior to parent study delivery of clerkship intervention. Clerkship directors or site principal investigators forwarded an anonymous survey link to their list of eligible clerkship preceptors. Each preceptor received their initial contact and up to 3 reminders that included the link to the survey.

Survey Design

The survey items were adapted from the MSWeight medical student survey and refined to apply to preceptors. The survey content was designed to

measure preceptors' frequency of WMC behaviors with regard to WMC modeling, providing instruction and feedback to students; perceived WMC skills and attitudes. The content reflects the evidence based 5As framework with a focus on, Advise, Assess, Assist, Arrange; patient centered counseling; and the 2013 AHA/ACC/TOS Guideline for the Management of Overweight and Obesity in Adults.¹⁸

Expert Review

The expert review was an iterative process. The survey items were reviewed by subject matter experts for clarity and relevance.¹¹⁸ Subject matter experts included Judith K. Ockene, PhD, Lori Pbert, PhD, Barbara Olendzki, MPH, RD., and Melissa Clark, PhD. The revised survey was then reviewed by a subset of subject matter experts (J.K.O., M.C.) and approved for testing via cognitive interviewing.¹¹⁹

Cognitive Interviewing

Cognitive interviewing is an iterative process to determine how questions are interpreted and answered by the intended audience.¹¹⁹⁻¹²¹ The goal of cognitive interviewing is to improve validity and reliability of the measurement instrument.^{120,122,123} The intended audience for this survey was primary care physicians who are preceptors for undergraduate medical students. An interview guide was developed and tested with a research team member. The investigator then recruited and conducted a cognitive interview with five physicians at the University of Massachusetts Medical School who have experience serving as

preceptors and were not part of the study. The survey was revised based on these cognitive interviews and circulated to expert reviewers.

The final survey incorporated the feedback from both expert reviewers and the cognitive interviewing process. The final online survey was tested with a physician who was not part of the study to ensure survey estimation time of 10 minutes or less to complete to minimize participant burden.

Data Management

Baseline survey data was collected through Qualtrics and stored on a secured drive. The survey was anonymous, and participants were automatically assigned unique identifiers by the software. Data was downloaded to STATA v13 for analysis.

Measures

Preceptor Characteristics

All preceptor characteristics were self-reported and voluntary.

Respondents did not need to respond to a question in order to move to the next.

Gender was reported as female or male. Preceptors also were asked if they were Hispanic or Latinx.

Training and Experience

Preceptors reported whether or not their undergraduate medical school training was completed in the United States. Preceptors responded to two questions about required skills-based WMC training in undergraduate medical school and residency. Response options were yes/no/don't remember.

Preceptors were asked how many years since they completed residency and were presented with a drop-down menu that included response options from 0-20+. For data analyses, the variable was collapsed to tertiles, 0-3, 4-17 and 18+ years. Preceptors were then asked how many years they have been a preceptor with the same range of response options. This variable was collapsed to three evenly distributed groups, 0-3, 4-14, 15+ years.

Practice Characteristics

Preceptors indicated whether they worked in family or community medicine, ambulatory internal medicine, or other with text fill-in. Other included family medicine residents and internal medicine preceptors with specialties such as pulmonary, gastrointestinal, and geriatrics. For data analyses, the variable was collapsed to two clerkship categories: family or community medicine and ambulatory internal medicine.

Preceptors were asked to indicate whether their current practice setting was urban, suburban or rural. Preceptors could choose more than one option and a variable with all combinations of practice settings was created. For data analyses, the final variable was collapsed to four categories for urban, suburban, rural and combination. Preceptors also were asked to describe the distribution of patient visit characteristics between acute, chronic disease management and preventive/wellness visits as a percentage of time. The median and range were reported for each type of visit.

Preceptors were asked to choose the top three most frequent behavioral issues seen in the clinic/practice where they precept. They could choose from tobacco use, alcohol use, pain management, medication adherence, weight management and other with text fill-in. A variable was created to include each possible combination of the three most frequent behaviors and the variable was collapsed to six categories. The five most frequent combinations of behaviors were reported, and a sixth combination labeled 'other' included any combinations that only had one or two preceptor responses.

Preceptors' Behaviors and Skills

WMC Behaviors: Modeling for students – Preceptors were asked how frequently they performed 11 WMC items when a student observed them interacting with a patient who has overweight or obesity. The items consisted of Advise, Assess, Assist and Arrange behaviors. Item responses were on a 5-point Likert scale, ranging from 1-5. Response options were never, rarely, sometimes, frequently or always. Item examples included “Assess the patient’s level of readiness to make lifestyle changes to achieve weight loss” and “Assist the patient in identifying and addressing barriers to make lifestyle changes to achieve weight loss”. Cronbach’s alpha was 0.8. The mean, sd and range are reported. Higher numbers refer to higher frequency of performing behaviors.

The last four items of this scale included a skip pattern. Questions addressed referrals and included, “Arrange referral to a Registered Dietitian Nutritionist”. When preceptors answered these questions ‘never or rarely’, the

following prompt was included: “What is your main reason for choosing never/rarely refer to a Registered Dietitian Nutritionist?” The item responses were 1) Patient cost barriers, 2) Resources are not available for referral, 3) I do not believe this is a helpful resource, or 4) Other with text fill-in.

WMC Behaviors: Working with students – Preceptors were asked four items to address how frequently they provide instruction, feedback and patient education materials when working with students. Item responses were on a 5-point Likert scale ranging from 1-5: never, rarely, sometimes, frequently or always. Item examples included “Provide instructions to students on how to provide weight management counseling”. The Cronbach’s alpha is 0.8. The mean, sd and range are reported. Higher numbers refer to higher frequency of performing behaviors.

WMC Perceived Skills – Preceptors were asked to rate their skills for modeling to students on 14 items regarding counseling steps with patients. Response items were on a 4-point Likert scale, ranging from 1-4: not at all skilled, somewhat skilled, moderately skilled, very skilled. Example items included, “Assessing prior weight loss experiences” and “Identifying and discussing perceived barriers and concerns that make it hard to lose weight”. Items included Advise, Assess, Assist and Arrange behaviors. Cronbach’s alpha is 0.9.

Attitudes on WMC – Preceptors were asked to indicate their level of agreement with five statements on attitudes towards WMC. Response items

were on a 4-point Likert scale, ranging from 1-4: strongly disagree, disagree, agree, and strongly agree, reversed where appropriate. Example items included, “It is important for all physicians to have training in weight management counseling to help patients who are overweight and obese”. Cronbach’s alpha is 0.76

Attitudes on WMC Frameworks – Preceptors were asked which counseling approach they thought was effective in WMC for patients who are overweight/obese. The response options were: counseling following the 5As framework, motivational interviewing, mindfulness, other with option to provide text fill-in and none. More than one approach could be selected.

Statistical Analysis

Sample characteristics were summarized using mean, standard deviation or median and range for continuous variables and categorical variables were reported as frequencies. The Cronbach’s alpha was calculated as a measure of internal consistency for the survey scales: WMC behaviors, perceived WMC skills and attitudes. Linear mixed models were used to estimate unadjusted associations between perceived WMC skills, attitudes and the outcomes, WMC behaviors-modeling to students and WMC behaviors-working with students. To account for clustering school was treated as a random effect in the model.

Results

Of the 243 preceptors who were emailed the survey link, 111 accessed the survey. Of those, 106 responded to the screening question. Nine responded 'no' they did not plan to precept during the academic year and 97 responded 'yes' and continued with the survey. Five did not respond to the screening question and did not continue with the survey. Of the 97 who continued, 80 completed the survey. Of the 80 who completed the survey, 3 preceptors did not meet eligibility criteria (family medicine or ambulatory internal medicine). For this study 77 family medicine or ambulatory internal medicine preceptors completed the survey. Overall response rate for completed surveys was 33%.

Of preceptors who completed the survey 59% were male and 6% were Hispanic or Latinx. The majority completed medical school in the United States. The majority of preceptors did not have or did not remember taking required coursework in skills-based WMC during medical school or residency. Preceptors most frequently reported practicing in an urban setting (68%) for precepting medical students. The majority of patient visits were for chronic disease management (58%). The most frequent pattern of top three behavioral issues was tobacco use, medication adherence and weight management (Table 4.1.).

Preceptors were asked how often they model WMC behaviors to medical students. The WMC behaviors modeling for students mean was 3.26, sd 0.48, range 2-4.7. Corresponding to the response items, this means on average preceptors sometimes engaged in WMC behaviors. Individual item response

frequencies are listed in Table 4.2. The last five items of the scale prompted preceptors to answer an additional question if they responded never/rarely to arranging a referral or recommending a resource.

Preceptors indicated that they rarely/never referred patients to intensive weight loss programs (43%), Registered Dietitian Nutritionists (14%), behavioral psychologists (68%) or evidence-based community programs (43%). Of those preceptors who never/rarely referred patients, lack of availability was the most common reason cited. For evidence-based commercial resources 48% preceptors never/rarely referred patients. The most common reasons were patient cost barriers and belief that the resource was not effective (Table 4.3).

Preceptors were asked how frequently they work with students to provide instruction, feedback, emphasize a team approach and display patient materials. The mean was 2.8, sd 0.8, range 1-5. Corresponding to the response items this means on average preceptors sometimes engaged in working with medical students. Individual item response frequencies are listed in Table 4.4.

Preceptors were asked to rate their own skills for providing WMC when working with students. The mean was 2.8, sd 0.56, range 1.6-4. Corresponding to response items, on average preceptors rated themselves moderately skilled and responses ranged from somewhat skilled to very skilled. Individual item responses are listed in Table 4.5

Preceptors were asked about their attitudes towards providing WMC. The mean was 2.1, sd 0.5, range 1-3. While the Cronbach's alpha was 0.76, the first item was reversed. Preceptors were split on attitudes towards the importance of all physicians receiving WMC training, 46% disagreed/strongly disagreed while 54% agreed. Individual responses are listed in Table 4.6.

Preceptors were asked about attitudes on effective frameworks to use for counseling patients on weight management. Preceptors could choose all that applied. The most frequent response was motivational interviewing followed by the 5As framework and mindfulness. Ten percent of preceptors indicated none or other frameworks were effective. Generally, if a preceptor indicated a framework was effective, they also reported applying it in practice (Table 4.7.).

Relationships of perceived skills and attitudes on preceptor's WMC behaviors were explored using linear mixed models with school as the random effect to account for clustering. The first outcome was preceptors' behaviors for modeling WMC. In separate models perceived WMC skills and attitudes were positively associated with frequency of modeling WMC behaviors to medical students. The second outcome was preceptors' WMC behaviors for working with students. In separate models perceived WMC skills and attitudes were also positively associated with frequency of preceptors working with students on WMC (Table 4.8.).

Discussion

This cross-sectional study surveyed primary care preceptors at medical schools participating in a larger RCT evaluating a multi-modal curriculum intervention for WMC. Primary care preceptors in this study perceived themselves to be moderately skilled in WMC and agree that they have a responsibility to provide WMC and can be effective with patients. Despite these positive perceived skills and attitudes, preceptors, on average, only report sometimes modeling WMC behaviors to medical students during their clerkships.

Higher perceived skills and more positive attitudes are associated with more frequent modeling of WMC to medical students. Because this is cross-sectional it is unclear which factor is necessary to drive more frequent use of modeling WMC. SCT posits that outcome expectations and self-efficacy are important for behavior change. In relation to outcome expectations, the literature suggests physicians are more likely to screen and counsel patients when they believe that their patients are more likely to adopt lifestyle changes.⁵⁹ Self-efficacy is also associated with increased likelihood of screening BMI and providing specific guidance on diet, physical activity and weight management.⁵⁹ In a nutrition counseling survey for physicians, perception of high quality nutrition training was associated with perceived proficiency.¹²⁴

An important part of counseling patients in the primary care setting includes referring to specialists or recommending appropriate weight loss programs that support intensive behavior change. Preceptors were asked to

report the main reason for not providing services. Previous research with primary care physicians shows that personal beliefs were not associated with referral behavior.⁵⁹ If personal beliefs are not associated with referrals then limiting factors such as access to services may be the largest barrier to care.

Preceptors in our study did not tend to use community programs or intensive specialized weight loss programs largely due to the unavailability of resources or lack of knowledge of programs. In addition to lack of knowledge, preceptors who did not recommend commercial weight loss programs were not convinced of the evidence or had patients who tried and failed to lose or maintain weight loss with the programs. A large primary care RCT demonstrated that pcp referral to a commercial weight loss program can be more effective than brief counseling alone.^{125,126} The program was seen as endorsed by the pcp and was free for the duration of the trial, limiting generalizability for adoption in routine settings.¹²⁵ Similar to other studies, preceptors did not typically refer to behavioral psychologists.⁵⁹ In our study lack of referral to behavioral psychologists was due to lack of resources or not perceiving them as a resource for weight management. Preceptors in our study frequently referred patients to nutritionists, consistent with the view that they are the most qualified to help with nutrition and weight management.^{27,58,59,127}

The most popular counseling approach identified by preceptors was use of motivational interviewing (MI). MI has been successfully used in behavioral

interventions for smoking cessation.¹²⁸ MI also has demonstrated effectiveness for weight loss.¹⁰⁶ The 5As framework is an evidence-based approach for behavior change in the primary care setting for smoking cessation.⁷⁸ It is also highlighted by the USPSTF.⁷⁷ However, only 25% of preceptors in this study report using the 5As framework for WMC. Teaching physicians MI and 5As for weight loss in an adolescent population has shown promise for increasing physicians' use of such counseling frameworks.^{81,129}

Even though preceptors only sometimes model WMC behaviors, they do believe there are effective frameworks and only 10% report not using any approach for WMC with patients who have overweight or obesity. It could be that preceptors need to perceive themselves as very skilled in order to frequently model WMC behavior. Future analysis examining thresholds of skill may elicit the degree to which this is true.

This study has several strengths. Understanding the WMC behaviors and attitudes of faculty who are responsible for training medical students will inform future curriculum development for both students and faculty. This survey was implemented at a critical time for engaging stakeholders in nutrition and weight management counseling training. Professional society guidelines support primary care intervention for patients with overweight and obesity through addressing lifestyle factors. The Obesity Medicine Education Collaborative suggests there is great support for increasing training for medical professionals and efforts are underway to establish educational competencies for health care professionals.¹³⁰

Preceptors in this study confirm the importance of working with patients in weight management and highlight specific areas that need more support such as interprofessional team development to increase referrals to specialists and relevant weight loss programs.

Sample characteristics are similar to nationally representative studies. The distribution of reported gender and Latinx and preceptors practicing in an urban setting in this study reflects previous surveys of primary care physicians.^{12,58,59} The distributions also are representative of preceptors who were eligible to take the survey.

A limitation of our study is its cross-sectional design of a convenience sample. Preceptors are associated with a school that was part of a larger RCT testing a multi-modal curriculum intervention and that could potentially bias results toward the positive. However, the survey was administered prior to the parent study clerkship activities. This means the preceptors are unlikely to have any direct parent study contact.

The major limitation to this study was the survey response rate. Non-response bias is a concern when response rates are low. Our response rate for completed surveys was 33% and is within the 13%-65% range of response rates for physician surveys.^{12,26,28,58,61,87} A meta-analysis of non-response rates on non-response bias suggests that large non-response bias can still occur in surveys with high response rates.¹³¹ The authors suggest that causes for

participation in a survey matter.¹³¹ In this preceptor survey, eligible preceptors were able to determine what the survey was about from the email without clicking on the survey link. In theory, preceptors who were not interested in the subject matter may have looked at the email and decided not to participate. We were not able to capture this data. However, examination of the literature suggests that our response rate is not different from other physician surveys that address similar subject matter.^{28,58}

A 2011 survey of family medicine physicians in New York with a faculty association through SUNY reported similar response rates to our study.²⁸ In their survey they emailed and mailed a paper version to 204 eligible physicians. The study was conducted by SUNY faculty which is also similar to our study in that the survey was emailed from faculty inside their respective institutions. They had 75 partially complete surveys but only 67 complete surveys. This yields a response rate of 33% for completers. This suggests that were we to add an additional mode of survey administration to our study, it would likely not yield improved response rates.

A 2012 national survey of 500 primary care physicians reported a 25.6% response rate for physicians who completed the survey.⁵⁸ Physicians included family medicine and general internists recruited from a list that was verified by the American Medical Association (AMA). A proportional random sample was chosen from the full list. The proportion was chosen based on AMA master files

proportions for gender, age, and region.⁵⁸ Physicians were compensated \$25 for completing the survey. Results of this national survey suggest that adding proportional sampling methods or compensation would not increase response yields for our study.

Two primary care physician studies did reach higher participation rates but differed in survey administration and recruitment strategy. A 2015 nationally representative survey of primary care physicians that included family medicine, internal medicine, ob/gyn and pediatrics achieved a 64% response rate for completed surveys.⁵⁹ Surveys were mailed with a pre-paid honorarium of \$30 and survey responses were collected over a six month period, in contrast to a very short window of three weeks for the above-mentioned survey of 500.⁵⁸ It should be noted this 2015 survey also sampled from the AMA master file and employed a systematic stratified sampling frame for non-federal, office-based primary care physicians who worked a minimum of 20 hours.

The second survey focused on primary care residents and used markedly different strategy. They used a maximum variation sampling method and chose residency programs based on diversity of specialty, size, and regional Ohio location. Resident program directors were sent invitation letters for the program to participate and were offered an educational presentation on evidence-based WMC counseling.⁶¹ Surveys were administered in-person prior to the educational activity. Residents not in attendance were emailed an electronic version and

received a \$5 e-gift card. This strategy yielded a 62% response rate. The previous two studies employed significant effort to achieve higher response rates and it is not clear whether they achieved low non-response bias.^{58,61}

While our response rates are similar to other physician surveys on related subject matter the possibility for non-response bias remains. Those primary care physicians and preceptors who do not respond to such surveys may not be supportive of WMC in the primary care setting.

The survey in this study is uniquely framed around preceptors modeling WMC behaviors for medical students. Preceptors reported moderate skill for WMC but only sometimes modeling for students despite agreeing that they should provide WMC and it can be effective with patients. Higher perceived skill is associated with higher frequency of modeling WMC. This suggests preceptors may need to be proficient or highly skilled before they are comfortable with modeling best practices.

Table 4.1 Individual Characteristics (n=77)		
Individual		% (n)
Gender	Female	42 (32)
	Male	58 (45)
Hispanic or Latinx	Yes	92 (71)
	No/no ans	8 (6)
U.S. Medical School	Yes	86 (66)
	No/no ans	14 (11)
Required coursework in skills-based WMC Undergraduate Medical Training	Yes	20 (15)
	No/don't remember	80 (62)
Graduate Medical Training	Yes	26 (20)
	No/don't remember	74 (57)
Years since completing residency	0-3 years	30 (23)
	4-17 years	35 (27)
	18+ years	35 (27)
Practice		
Specialty	Internal Medicine	43 (33)
	Family Medicine	57 (44)
	Urban	66 (51)
	Suburban	20 (15)
	Rural	5 (4)
	Combination	9 (7)
Percent time spent by patient visit type (median, range)	Acute	20% (0-60%)
	Chronic disease	60% (0-100%)
	Preventive/wellness	20% (0-100%)
Top 3 most frequent behavioral issues seen in clinic		
Tobacco, medication adherence, weight management		29 (22)
Tobacco, pain management, weight management		21 (16)
Tobacco, pain management, medication adherence		10 (8)
Pain management, medication adherence, weight management		8 (7)
Tobacco, alcohol, medication adherence		7 (5)
Other combinations		25 (20)

WMC = weight management counseling

	Never	Rarely	Some	Freq	Always
Assess for the patient's BMI and behavioral health risk factors (that is diet, physical activity) that contribute to weight gain	0	1% (1)	20% (15)	47% (36)	32% (25)
Advise that weight loss is recommended based on the patient's personal health information (that is BMI and risk factors)	0	4% (3)	23% (18)	53% (41)	20% (15)
Assess the patient's level of readiness to make lifestyle changes to achieve weight loss	0	1% (1)	35% (27)	51% (39)	13% (10)
Partner with the patient to set treatment goals and specific plans based on the patient's interests and willingness to make lifestyle changes	0	6% (5)	23% (18)	56% (43)	14% (11)
Assist the patient in identifying and addressing barriers to make lifestyle changes to achieve weight loss	0	4% (3)	34% (26)	56% (43)	6% (5)
Arrange follow-up contact to provide ongoing assistance and support for the treatment plan	1% (1)	10% (8)	35% (27)	44% (34)	9% (7)
Arrange referral to intensive specialized weight loss programs	12% (9)	31% (24)	49% (38)	6% (5)	1% (1)
Arrange referral to a Registered Dietitian Nutritionist	0	14% (11)	47% (36)	36% (28)	3% (2)
Arrange referral to a Behavioral Psychologist	20% (15)	48% (37)	29% (22)	4% (3)	0
Recommend an evidence-based <u>community</u> weight loss program	9% (7)	34% (26)	28% (21)	28% (21)	3% (2)
Recommend an evidence-based <u>commercial</u> weight loss program	16% (13)	33% (25)	39% (30)	12% (9)	0

WMC = weight management counseling; Some=Sometimes; Freq=Frequently

	Intensive specialized WL program (33)	RDN (11)	Behavioral Psych (52)	Community WL program (33)	Commercial WL program (38)
Patient cost barriers	21 (7)	27 (3)	10 (5)	9 (3)	39 (15)
Resources are not available	40 (13)	55 (6)	67 (35)	58 (19)	16 (6)
I do not believe this is a helpful resource	9 (3)	0	12 (6)	6 (2)	24 (9)
Other	30 (10)	18 (2)	13 (6)	27 (9)	21 (8)

WL= weight loss, RDN=registered dietitian nutritionist, Psych=Psychologist, Other=respondents wrote in their specific reason for not referring resource.

	Never	Rarely	Some	Freq	Always
Provide instructions to students on how to provide weight management counseling	5%(4)	22%(17)	53%(41)	16%(12)	4%(3)
Provide feedback to students on weight management counseling skills	9%(7)	31%(24)	39%(30)	20%(15)	1%(1)
Emphasize to students the need for a team approach to help patients manage their weight	6%(5)	22%(17)	42%(32)	23%(18)	6%(5)
Display patient education materials about weight management in your office/waiting room/exam room	18%(14)	37%(28)	22%(17)	14%(11)	8%(6)

WMC = weight management counseling; Some = Sometimes; Freq = Frequently

(n=77) %(n)	Not at all skilled	Some. Skilled	Mod. Skilled	V Skilled
Sharing the BMI and BMI classification	1%(1)	25%(19)	42%(32)	32%(25)
Identifying obesity-related medical risk factors and co-morbidities of obesity	0	13%(10)	43%(33)	44%(34)
Assessing prior weight loss experiences	4%(3)	30%(23)	40%(31)	26%(20)
Assessing current dietary habits	1%(1)	33%(25)	52%(40)	14%(11)
Assessing current level of physical activity	0	21%(16)	52%(40)	27%(21)
Advising weight loss based on personal health information (such as BMI and risk factors)	0	29%(22)	47%(36)	25%(19)
Identifying and discussing perceived barriers and concerns that make it hard to lose weight	0	32%(25)	45%(35)	22%(17)
Partnering with the patient to encourage development of their own set of goals and specific plans based on their interests and willingness to change behavior	2%(2)	30%(23)	46%(35)	21%(16)
Assisting the patient by providing information regarding the relationship between weight, diet and physical activity	5%(4)	25%(19)	48%(37)	22%(17)
Assisting the patient by identifying behavior change strategies that will help achieve their goals	5%(4)	28%(21)	53%(41)	14%(11)
Referring the patient to specialists or weight management resources in the clinic	8%(6)	44%(34)	31%(24)	17%(13)
Recommending weight management resources in the community	26%(20)	42%(32)	24%(18)	8%(6)
Proposing that weight and weight management be discussed again at the next appointment	5%(4)	32%(25)	38%(29)	25%(19)

Demonstrating that you understand the patient's perspective on weight management	3%(2)	31%(24)	55%(42)	12%(9)
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WMC = weight management counseling; Some = Somewhat; Freq = Frequently

Table 4.6 Attitudes (n=77) %(n)	Strongly Disagree	Disagree	Agree	Strongly Agree
It is important for all physicians to have training in weight management counseling to help patients who are overweight and obese	40%(31)	5%(4)	55%(42)	0
Patients are receptive to having their physicians address their weight	1%(1)	21%(16)	64%(49)	14%(11)
A patient's physician should provide weight management counseling, not just nutritionists and psychologists	0	1%(1)	65%(50)	34%(26)
Weight management counseling by a physician can be effective in helping patients manage their weight	0	9%(7)	61%(47)	30%(23)
I feel confident in providing weight management counseling for my patients who are overweight and obese	1%(1)	18%(14)	62%(48)	18%(14)

Table 4.7 Attitudes on Effective Framework		
Counseling approaches preceptors think are effective in WMC for patients who are overweight/obese %(n)		
	Preceptors think approach is effective	Preceptors who use approach
5As Framework	36% (28)	25% (19)
Motivational Interviewing	78% (60)	74% (57)
Mindfulness	35% (27)	27% (21)
Other	6% (6)	1% (1)
None	1% (1)	10% (8)
*Could choose more than one answer		

Table 4.8 Linear mixed models of Perceived WMC Skills and Attitudes on outcomes of WMC Behaviors- Modeling to Students and WMC Behaviors - Working with Students, regression coefficients for Perceived WMC Skills and Attitudes.				
Predictors	Outcomes			
	WMC Behaviors-Modeling to Students		WMC Behaviors – Working with Students	
	β Coef. (95% CI) [#]		β Coef. (95% CI) [#]	
Perceived WMC Skills	0.5 (0.4 - 0.7)**	n/a	0.8 (0.5 -1.1)**	n/a
Attitudes	n/a	0.3 (0.1 - 0.5)*	n/a	0.6 (0.3 - 0.9)**

WMC = weight management counseling, *p=0.002, **p=0.000, # linear mixed models, school as random affect

CHAPTER V: DISCUSSION AND CONCLUSIONS

The overall purpose of this dissertation was to describe current medical school WMC training practices and contextual factors with the purpose to inform future implementation of WMC curricula in medical school, specifically during the clinical years. Clinical training is an important time for medical students to apply knowledge and practice skills. Specifically, this mixed methods study sought to describe factors associated with WMC training during primary care clerkships. This work sought to address the following questions.

Specific Aims

- 1) What are the associations between types of educational experience and students' perceived WMC skills?
 - a) What exposure do 3rd year medical students have to 5As-consistent WMC?
 - b) Are direct patient, observational and specific instructional experiences associated with students' perceived WMC skill?
- 2) How are individual, interpersonal and institutional factors associated with primary care preceptors' teaching of WMC?
 - a) What training do preceptors have in nutrition and behavior change?
 - b) How do preceptors define WMC in primary care practice?

- c) How do preceptors interact with students during the clerkship?
 - d) What institutional factors are associated with performing WMC and training students?
- 3) How frequently do preceptors model WMC behaviors to 3rd year medical students during primary care core clerkships?
- a) How frequently do preceptors report working with medical students during the clerkship?
 - b) What are preceptors' attitudes towards providing WMC in practice?
 - c) What are preceptors' perceived WMC skills?
 - d) Is there an association between perceived skills and modeling WMC behavior? Is there an association between attitudes and modeling WMC behavior?

Summary of Results

The major results of this study provide insights into WMC education and practice from the perspectives of medical students and preceptors.

Aim 1 was a cross-sectional study of 3rd medical students' self-report of WMC training experiences. Overall exposure to WMC during medical school was low. WMC scores were created for direct patient experiences, observational experiences and instructional experiences. Out of a possible score of 18 points for 5As WMC experiences, student mean summed scores were: 8.5, SD 4.8 for direct patient experiences, 10.3, SD 5.0 for observational experiences, and 6.4,

SD 3.9 for instructional experiences. Third year medical students perceive themselves to be moderately skilled in WMC ($M=2.6$, $SD=0.05$, range 1-4). In a fully adjusted linear mixed model, direct patient experiences and specific instructional experience were significantly associated with higher perceived skill; observational experiences were not associated with higher perceived skill.

Aim 2 was a qualitative study that involved primary data collection to understand contextual factors of preceptors who are responsible for providing clinical training experiences for medical students. Preceptors associated with the parent study were invited to participate. Preceptors were not linked to medical students in Aim 1 although it is possible they could have been serving as preceptors during the time of the medical student data collection. Preceptors supported inclusion of WMC in the medical school curriculum. Preceptors do not typically have training or see themselves as experts in WMC. However, preceptors in this study had some exposure to behavior change and MI either from medical school, residency, or continuing education. Preceptors model WMC in a variety of ways, and no preceptor described use of all 5As. They incorporate inter-professional team experts such as nutritionists when they are available.

Aim 3 involved primary data collection through survey design and administration to primary care preceptors associated with the parent study. Preceptors perceive themselves to be moderately skilled in WMC ($M=2.8$, $SD=0.06$, range 1-4). However, preceptors report only sometimes modeling

WMC to medical students ($M=3.3$, $SD=0.05$, range 1-5). Only 20-21% of preceptors reported frequently/always providing instruction or feedback to students. Preceptors do agree that a physician should provide WMC and they can be effective in helping patients manage their weight. In linear mixed models with school as the random effect, both perceived WMC skills and attitudes were positively correlated with outcomes of preceptors' modeling WMC behaviors.

Major conclusions and Implications

This mixed methods study triangulated qualitative and quantitative measures from a population of preceptors and medical students. Results demonstrate agreement between the major findings from preceptors and medical students. Findings are cross-sectional but SCT can be applied to support that increased practice of WMC influences perceived skill for medical students. And from preceptors' findings it was demonstrated that perceptions of moderate skill are associated with preceptors only modeling WMC sometimes. This could be in part because preceptors do not perceive themselves as the experts to deliver counseling. It could also be that preceptors must perceive themselves to be highly skilled in WMC before they feel confident to model to students. In SCT observation plays an important role, but complexity of the skill to be acquired may limit the magnitude of its effect.⁷¹

Preceptor modeling of WMC may not be necessary or feasible to increase students' perceived WMC skills. The Alliance for Academic Internal Medicine

and Clerkship Directors in Internal Medicine highlight that the clerkship experience requires student-directed learning and that most experiences will come from working with patients and interacting with their team.¹³² The emphasis is put on the student to solicit feedback from faculty rather than to observe faculty model behavior.¹³² In our study 3rd year medical students' higher perceived skill was associated with specific instruction and direct patient experience, not with observing faculty engage in WMC in the fully adjusted model.

Compared to direct patient experience and specific WMC instructions, observing WMC was not significantly associated with students' perceived skills. According to SCT, observational learning is an important concept in acquiring new skills.⁷¹ A major limitation of learning through observing modeled behavior is the complexity of the behavior.⁷¹ It may not be feasible for students to observe all aspects of WMC in one patient visit, or over the course of their clerkship where they may not benefit from observing follow-up visits.

Although our study is observational and includes medical students from eight schools, our findings are consistent with previous research that demonstrated increased self-efficacy in first year medical students who participated in nutrition counseling training^{82,133} Medical students representing a midwestern medical school reported that physicians who they shadow do not have nutrition knowledge and do not counsel patients. This supports our findings

that, although 3rd year medical students did observe WMC behaviors by their preceptors more than they received instruction or practice themselves, observing preceptor WMC was not associated with higher perceived skill in the students, perhaps because preceptors may not be able to model the whole range of WMC in one patient visit.

Significant progress has been made to incorporate weight management counseling in the primary care setting over the last twenty years. The first national clinical guidelines for screening and treatment of overweight and obesity in adults were published in 1998.¹³ Since then the USPSTF has periodically updated evidence reviews and supported screening and provision of intensive behavioral counseling in the primary care setting. The Patient Protection and Affordable Care Act of 2010 (ACA) helped to incorporate obesity care into primary care practice through requiring coverage of preventive services by both government and private health insurers.¹⁹ Even with the ACA, coverage for services is not uniformly implemented across health insurers.¹³⁴ The CMS issued guidance in 2011 to provide reimbursement for stand-alone obesity visits modeled off of the evidence-based DPP.²⁰ However, as seen in this dissertation, primary care providers do not typically see patients specifically for obesity treatment alone, instead they incorporate obesity management and counseling into visits for other diagnoses.¹⁰⁹⁻¹¹¹

The most recent USPSTF evidence review and statement highlights progress in some areas of counseling such as screening for BMI as demonstrated by their decision not to incorporate screening into the latest review.¹⁷ Findings from this dissertation from both student report of frequency of observing WMC behaviors and from preceptors' report of frequency of modeling WMC behaviors to medical students suggest that frequency of full WMC sessions for a patient in the clinical setting is low. Future analysis will analyze frequency of individual 5As behaviors, but the current data suggests the bulk of exposure is seen with the Ask/Advise steps of the 5As. Studies testing 5As interventions in the primary care setting also suggest that Ask/Advise behaviors are the most frequently performed by physicians in the clinic.⁸¹

To incorporate evidence-based recommendations into primary care practice research efforts also have focused on medical education. The Nutrition Academic Award (NAA) created nutrition curriculum for medical schools which is now available online for free.⁶⁴ In 2010 the curriculum was reported to have been used by 90 U.S. medical and osteopathic schools.⁶⁵ Inclusion of nutrition into medical school education is important but is only one component needed to be proficient in lifestyle medicine.¹³⁵ This dissertation focused specifically on skills based training related to counseling for weight management. Studies have used the 5As in trials and showed increased use of 5As.^{81,136} Ongoing RCTs testing the effectiveness of the 5As also will yield important information on methods of training and outcomes for practicing physicians.^{137,138}

Consistent WMC modeling by preceptors during primary care clerkships may not be feasible. Results from the qualitative interviews and preceptor survey demonstrate that preceptors do not frequently model WMC consistent with a full 5As approach. This supports results from the medical students' survey. Given the complexity of acquiring WMC skills, it may be more practical for students at this stage to receive specific instruction in the full 5As approach to understand the general rules of WMC when observing short or incomplete counseling interactions.

According to SCT observing modeled behavior is important for learning a given skill.⁷¹ However, “modeled activities are rate-limited by complexity of the activity”⁷¹ In this instance learners may take away general rules and not specifics from short interactions. Through receiving specific instruction during or prior to the clerkship a student could be made aware of the rules for WMC and engage their preceptors in discussions on the topic.

Preceptors perceive themselves to be moderately skilled but only sometimes model WMC. In part, this may be due to time constraints of the patient visit itself. Although not all 5As are frequently observed by students or reported to be modeled by preceptors, both most frequently report Ask/Advise behaviors. Within the context of a primary care core clerkship, this may be sufficient to increase students' use of the 5As. In an RCT focused on teaching practicing primary care physicians to use the 5As for WMC, physicians were

directed to focus on increasing one or two of the 5As.⁸¹ This approach did result in increased 5A usage.⁸¹ Within in the same RCT another arm of physicians were taught MI techniques.¹²⁹ While physicians did not achieve all MI techniques, demonstrated empathic behaviors were associated with increased patient motivation.¹²⁹ Increasing the use of 5As is an active area of research and future RCT results will help to guide teaching approaches.^{137,138}

Preceptors modeling or discussing WMC with students during clerkships is also limited by the short duration they are together. Outpatient clerkships are required by LCME for undergraduate medical education.¹³⁹ However the results of this dissertation demonstrate that, at least within these schools, preceptors infrequently provide specific instructions on WMC and only sometimes model WMC. Contextual reasons for this include the volume of material students need to learn during the clerkship such as taking a history and performing and physical exam.¹³²

Taking into account previous medical school research, providing specific instruction on the full 5As and WMC and focusing modeling on one or two 5As behaviors may result in increased counseling behaviors. Previous longitudinal research following medical students across 16 medical schools from 1999-2003 found that > 50% of students reported weight counseling was relevant to their intended practice over all three time points but only 25% reported using weight counseling by their 4th year.¹⁴⁰ In our previous analysis focusing on the 3rd year

medical students' most recent core clerkship we found that only 13-25% of students agreed that they received clear WMC objectives or feedback during their Ob/gyn, family medicine or internal medicine clerkships.⁸⁸ Importantly, in a longitudinal medical school RCT for tobacco cessation counseling skills a multi-modal curriculum intervention resulted in increased counseling self-efficacy.¹⁴¹ While it did not demonstrate overall differences in OSCE scores between interventions, students did perform better in Assist/Arrange behaviors.

Preceptors do not perceive themselves to be the experts for WMC.

This study is unique in that it describes practices of physicians as it relates to their role as educators and shows that this population is not different in attitudes and skills compared to what is reported in the literature for practicing primary care physicians.^{27,28,58,59,109,110}

Time constraints and variation in access to clinic resources were important limitations to providing students with a uniform WMC experience across clerkships. Preceptors most frequently reported referring patients to nutritionists; from the preceptor survey the main reason for not using this resource was lack of availability. Identifying nutritionists as the experts is consistent with how physicians identify nutritionists as the experts in other studies.^{27,114,115}

This research comes at a critical time because obesity rates are high and accumulating evidence continues to support multi-component behavioral intervention to improve health outcomes across patient populations. Professional

societies whose specialties are particularly affected by the burden of obesity are acknowledging the critical role lifestyle medicine plays in patient care.^{18,142} The momentum within physician groups may support changes to medical school training as it relates to WMC. Indeed, the Obesity Medicine Education Collaborative was formed in 2016 and is in the process of distributing a prepared set of competencies for health care professionals.¹³⁰ The collaborative is supported by 17 professional societies that include family medicine physicians, internists, endocrinologists, gastroenterologists, surgeons, nurse practitioners, physician assistants and dietitians.¹³⁰ The goal of the collaborative is to create a competency-based educational framework to guide obesity curricula that can be applied across institutions. Findings from this dissertation provide contextual information about current practices and challenges to WMC training during undergraduate medical training across 8 U.S. medical schools that can inform the development of future WMC curricula.

Limitations

This mixed methods study triangulates qualitative and quantitative results from two populations, medical students who receive training and preceptors who model training. The nature of qualitative work is to understand context and therefore is not generalizable. Data from the medical students represents eight medical schools across the U.S. and may be generalizable. Although the medical schools were participating in a larger curriculum intervention study, the

medical student cohort completing the survey did not participate in the intervention and the preceptors participated in interviews and the survey prior to intervention. Caution should still be taken when interpreting results.

Medical Students' perceived skills measure is a proxy for performing WMC behaviors. Understanding how medical students' perceived skill translates to performing WMC will help to clarify if it is a good proxy measure. Previous research suggests students' self-report of counseling correlates with objective evaluation of skills through the use of standardized patients.¹⁴³ This could be addressed in the ongoing longitudinal parent study by comparing perceived skills with the objective skills clinical exam (OSCE).⁷²

Preceptors do not frequently model WMC, but this study design did not enable causal inference of perceptions of role, time constraints or perception of skill level on frequency of behavior. Further characterization of preceptor perceived WMC skills and frequency of modeling may demonstrate a threshold of perceived skill associated with more consistent modeling of WMC behaviors.

This dissertation is a cross-sectional study of a convenience sample of medical students and preceptors. The convenience sample draws from eight medical schools who are participating in a larger RCT to test the efficacy of a WMC curriculum on medical students' skills. Therefore, the potential for volunteer bias with both the medical students and preceptors does exist. This would bias

responses towards the positive. Taking into consideration that volunteer bias exists, those who did participate still underscored significant gaps and challenges to providing WMC training during primary care core clerkships.

A major limitation of the preceptor survey is the potential for non-response bias. While there are studies in the literature that have higher response rates these higher rates were achieved through considerable investment of resources including the use of multiple strategies.^{59,61} This dissertation was limited to working within the schedules of the parent study to ensure activities did not interfere, and there was no additional funding to support recruitment efforts. Compared to nationally representative surveys on similar subject matter and similar administration methods, our response rates were comparable.^{28,58}

Future directions

The goal of this dissertation was to describe current practices and contextual information on WMC training during clinical years, specifically during primary care core clerkships to inform curricula development. Future directions for this work include disseminating these results to participating schools so that it can be used to inform WMC curricula at their institutions. Understanding the clerkship environment will provide context for the outcomes of the ongoing curriculum intervention trial.⁷²

Another direction to consider is a secondary analysis of the preceptor survey to evaluate thresholds for perceived WMC skills. It may be that preceptors

need to have competency in all WMC behaviors before feeling confident to model behaviors to students. Characterizing such thresholds may help to further elicit the relationship between preceptors' perceived WMC skills and frequency of modeling.

Preceptors are expected to participate in faculty development as part of their clerkship service.¹⁰³ Future research could determine whether the provision of clear WMC objectives for primary care clerkships increases preceptors' provision of WMC instructions and medical students' practice opportunities.

Ultimately, the goal of training medical students in WMC and implementation of WMC in primary care is to improve patient outcomes. Current research indicates that while physician involvement has a positive effect, interventions with physicians in the primary care setting have yet to reach the intensity recommended by the USPSTF and CMS guidelines. Effectiveness of WMC on patient outcomes will need to be tested with recommended intensity levels with physicians who have had training during undergraduate medical school years.

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