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Obesity Educational Interventions in U.S. Medical Schools: A Systematic Review and Identified Gaps

Mara Z. Vitolins,

Division of Public Health Sciences, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

Sonia Crandall,

Department of Family and Community Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

Davis Miller,

Department of Internal Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

Eddie Ip,

Division of Public Health Sciences, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

Gail Marion, and

Department of Family and Community Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

John G. Spangler

Department of Family and Community Medicine, Wake Forest School of Medicine, Winston-Salem, North Carolina, USA

Abstract

Objective—Obesity is the second leading cause of preventable death in the U.S. However, physicians feel poorly trained to address the obesity epidemic. This review examines effective training methods for overweight and obesity intervention in undergraduate medical education.

Data Sources—Using indexing terms related to overweight, obesity and medical student education, we conducted a literature searched PubMed PsychInfo, Cochrane and ERIC for relevant articles in English. References from articles identified were also reviewed to locate additional articles.

Review Methods—We included all studies that incorporated processor outcome evaluations of obesity educational interventions for US medical students. Of an initial 168 citations, 40 abstracts were retrieved; 11 studies were found to be pertinent to medical student obesity education, but only 5 included intervention and evaluation elements. Quality criteria for inclusion consisted of explicit evaluation of the educational methods used. Data extraction identified participants (e.g., year of medical students), interventions, evaluations and results.

Results—These five studies successfully used a variety of teaching methods including hands on training, didactic lectures, role playing and standardized patient interaction to increase medical

Corresponding Author: John G. Spangler, MD, MPH, Department of Family and Community Medicine, Wake Forest School of Medicine, Medical Center Boulevard, Winston-Salem, NC 27157-1084 (jspangle@wakehealth.edu).

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students' knowledge, attitudes and skills regarding overweight and obesity intervention. Two studies addressed medical student bias towards overweight and obese patients. No studies addressed health disparities in the epidemiology and bias of obesity.

Conclusions—Despite the commonly cited “obesity epidemic,” there are very few published studies that report the effectiveness of medical school obesity educational programs. Gaps still exist within undergraduate medical education including specific training that addresses obesity and long-term studies showing that such training is retained.

Obesity—defined by the National Heart Lung and Blood Institute as a body mass index (BMI) $>30 \text{ kg/m}^2$ —is the single most common risk factor for a host of severe health conditions, and is now considered a global epidemic.^{1–3}

The combined prevalence of overweight (BMI >25) and obesity for all U.S. adults 20 years of age is now 129.6 million.⁴ Estimated annual total economic costs of obesity are between \$78.5 billion and \$99.2 billion, or 6% to 9.1% of medical expenditures⁵ comparable to the economic costs associated with cigarette smoking. The U.S. Public Health Service's *Healthy People 2020* has set a goal of a 10% reduction in the prevalence of adult (from 34% to 30.6%) and childhood (from 17.4% to 15.7%) obesity.⁶

Despite public health goals, the prevalence of overweight and obesity has increased over the past two decades across racial/ethnic groups. In general, health care professionals assume obese patients are more likely to be lazy, less likely to adhere to weight loss recommendations, and more likely to have psychosomatic symptoms.^{7–9} Obese patients are also the subject of medical student derogatory humor.^{9–12}

Professional attitudes may be shaped by experiences with poor patient adherence, lack of success with prior interventions, poor long-term outcomes data^{13–15} or inadequate physician knowledge and training. Additionally, medical students are surrounded by the same environment that everyone in the U.S. is, a culture of idealized images of physical attractiveness and a culture that supports “obese is bad” “thin is good.” Greenberg et al (2003) reported that compared to thin characters on television, it is rare to see heavier characters portrayed in romantic relationships and noted that they never have romantic relationships with thin characters. In addition, heavier characters are more likely to be made fun of and ridiculed and engage in stereotypical eating behaviors.¹⁶ Unfortunately, this bias is introduced early in life as Herbozo et al. (2004) reported that with respect to entertainment targeted to children, overweight characters are rarely onscreen or are given minor stereotypical roles while thin characters are given central roles and desirable attributes.¹⁷

Physicians readily accept the link between weight-related factors and cardiovascular disease, but they are less aware of the connection between obesity and cancer.¹⁸ Obesity has been linked as a risk factor for over 10 different cancers, including uterine cancer for which it is the single greatest risk factor. Physicians also report that they feel ill-prepared to address their patients' weight management needs.¹⁹ Others have uncovered specific knowledge deficits among internal medicine residents and primary care physicians.^{20–24}

Medical students also feel that their training regarding obesity counseling is inadequate.²⁵ This might translate, for example, into inadequate primary care practice by medical school graduates. Primary care physicians often perceive barriers to weight management counseling.^{26–31} In one study, only one third of primary care providers felt that managing a patient's weight was their responsibility.^{26,27} Another study found that although many primary care physicians had “positive views” of weight management, they also found this intervention as “professionally unrewarding.”^{26,28} Negative primary care provider attitudes toward overweight were also common in one large survey (12,290 women and 1300

physicians),^{26,29} impeding both patient and primary care provider from offering this service. Two issues possibly contributing to this problem hesitancy to provide Pap smear services to overweight women^{26,30} and possible patient embarrassment of obtaining needed medical care.^{26,31}

Moreover, as the American Association of Medical Colleges (AAMC) notes the addition of new curriculum to a medical school's course content remains a challenge.³² This is not only because course content is already stretched thin. In regards to obesity, attitudes of health care providers as well as the lack of curricular models pose challenges as well.

The purpose of this paper is to provide a systematic review of the literature relating to educating medical students about obesity, and weight management and ways to intervene in these patients. The over-arching goal is to identify gaps in medical education about obesity so that these gaps can be addressed and that US medical students can become fully equipped to deal with the nation's second leading cause of preventable death.³³

Methods

With guidance from a librarian skilled in PubMed searches, we searched the PubMed database (1966 December 2010) using the following strategy: obesity [mesh] AND (education, medical, undergraduate [mesh] OR medical students [mesh] OR medical schools [mesh] OR curriculum [mesh] OR education, medical [mesh:noexp]). The "noexp" term signifies that we used articles indexed to the general idea of Medical Education, but did not pull articles indexed to the narrower terms associated with it for training of subgroups we were not interested in (resident education, CME, etc.). We identified the appropriate subgroup with education, medical, undergraduate [mesh]. This search resulted in 130 articles. We searched the PsycInfo database, which includes journal coverage "from the 1800's to the present." The following strategy was utilized: (DE medical students OR DE medical education OR DE curriculum) AND (DE obesity OR DE obesity (attitudes toward), limit to English. DE is the PsycInfo equivalent of [mesh] denoting subject headings. There was no equivalent subject heading for medical schools [mesh] or education, medical, undergraduate [mesh]. This search resulted in 22 articles. The search in Cochrane was structured as a simple search across titles, abstracts, and keywords on "obesity education." Four reviews were identified but none fit our predefined criteria. We searched ERIC, the education database, from 1966-December 2011, using the following strategy: (DE medical students OR DE medical schools OR DE medical education OR DE curriculum) AND DE obesity which resulted in 16 articles. Then abstract titles were independently reviewed by three of the study investigators (JS, SC, MV). At least two reviewers agreed that 40 abstracts fit our search criteria. All six investigators read the 40 abstracts to determine if the papers met inclusion criteria and reported outcomes. If at least three investigators agreed the abstracts were pertinent, the full paper was reviewed. This process yielded 11 papers that were reviewed by all investigators. Only five papers actually described the educational interventions and evaluation elements per our inclusion criteria. Six papers were excluded, 3 that were omitted described the results of surveys given to medical students to assess their knowledge of obesity but did not provide an intervention and 3 described interventions in health professionals that targeted nutrition and/or physical activity but were not formally evaluated. The references cited in the articles were also evaluated for papers that might fit our search criteria although none were identified that had not already been reviewed.

Results

Table 1 shows the five manuscripts that fit our search criteria. Bass et al.³⁴ developed an educational intervention based on behavior change and adult learning theory consisting of

interactive lectures and standardized patient experiences to give first-year medical students experience in physical activity and nutrition counseling. They reported increased knowledge scores, improved self-confidence scores for physical activity and nutrition counseling although overall attitude of the necessity and utility of counseling with specific diseases did not change.

Carson³⁵ gave fourth year medical students tape measures and instructed them in taking waist-hip measurements. Students who received the tape measure and instruction reported more often taking waist-hip measurements compared to students who received only a nutrition tutorial.³⁵ Another clerkship intervention was carried out by Banasiak and Murr.³⁶ These investigators found that 3rd year medical students rotating through bariatric surgery had increased knowledge regarding clinical management of obesity compared with students who did not rotate through bariatric surgery.

Rourke and Kavey³⁷ conducted a 1-hour class for second-year medical students and discussed the rationale for assessing total body composition educating them about six different body composition assessments techniques. Students were assigned to collect anthropometric measurements to calculate body mass index, perform measurement of bioelectrical impedance and submit photographs of themselves in a bathing suit (identity hidden). The students used the photos to rate the level of obesity in the class from 1 (very thin) to 5 (obese). Body fat values measured by bioelectrical impedance were also rated using the same 1–5 scale. Results of the obesity ratings by the two assessments were compared and reported to the class. Visual assessment ratings showed a tendency to exaggerate the degree of obesity for both sexes. Assignments of ratings based on percent body fat values were fairly normally distributed. The authors reported that this educational activity illustrates the importance of using quantitative total body composition assessment methods to determine obesity rather than visual assessment.

Only one study evaluated an educational intervention to address negative medical student bias toward obese patients. Wiese et al.³⁸ randomly assigned first-year medical students to seven groups and then assigned groups to either a control arm or an educational intervention consisting of video, audio and written documents. The intervention video was an interview with an obese nurse followed by a discussion. The second activity for the intervention group participants was a reading a transcript of a National Public Radio report about the causes of obesity. The third activity involved a role playing exercise and small group discussion about thoughts and feelings an obese female friend might have in specific situations including “going to the hospital or seeing a new physician.” The control group watched a clinical interviewing video focused on a problem not related to obesity. At baseline the students reported accurate beliefs about the causes of obesity but had negative stereotypes of the obese as being lazy and lacking self-control. When the students were assessed after five weeks of the course completion the students in the control group had more negative attitudes than the intervention group in six of the eight measures of attitudes toward obesity. Assessment after one year of the course completion showed the intervention group participants were less likely to rate genetic factors as important in obesity and were less likely to place blame on obese persons for their condition.

Discussion

To our knowledge, ours is the first systematic review examining medical school obesity educational interventions. Overall we found very few studies describing obesity-related educational programs, and only five studies included outcomes measures. The lack of published studies in this area is consistent with physicians’ reports of inadequate training in

managing weight among their patients.^{20,39–43} Accordingly, our systematic review confirms important gaps in the instruction of medical students.

Second, despite the known prevalence of medical student negative bias toward obese patients, we found only one study that attempted to change this bias.^{35,37} As noted previously, obesity bias is prevalent amongst health care providers. Given that obesity is more prevalent in minority populations, obesity bias represents another source of health disparities. We believe that bias is most effectively remedied when addressed early in training. This highlights the importance implementing medical school curricula to mitigate negative attitudes towards obese patients, attitudes that may impact the care delivered.

Finally, no study integrated obesity education over all four years of medical school education, including the basic science and clinical science years. One study, however, showed long term retention of knowledge and attitudes one year post-intervention.³⁵

To be sure, some medical schools require their students to teach in the community regarding prevention, including nutrition and weight management.^{44,45} Particularly if started early in their formative years, having medical students teach in the community can help them understand health disparities such as obesity better.⁴⁶ While such experiences do not cover the range of obesity counseling knowledge, attitudes and behaviors described herein, this may be one way to increase medical student skills in obesity education.

While this review provides an overview of recent research in U.S. medical school training in obesity, obesity bias, and weight management there are limitations that should be addressed. This review was conducted in PubMed, only articles written in English were included and international studies were not reviewed. Nonetheless, very important gaps were identified particularly in making the link between obesity and cancer. In addition, this review warrants the conduct of investigations to identify whether similar gaps exist in medical school training on an international level.

Undergraduate medical education must begin to address the national and international epidemic of obesity to decrease mortality and morbidity from chronic diseases related to excess weight. Intervention methods used in the studies reviewed here appeared to be effective and included a variety of approaches such as didactic lectures, standardized patient encounters, and hands on training. Utilizing multiple types of intervention approaches during multiple time points in the medical school curriculum appears warranted. Such training for medical students must be theory-based and include education in bias and stereotyping, as well as specifically addressing the obesity-bias relationship. Equally important, students need to be exposed to effective role models in the clinical setting. The AAMC “Report VII Contemporary issues in medicine; The prevention and treatment of overweight and obesity and the Medical School Objective Project, August 2007” contains essential concepts, skills and learning objectives that should be incorporated into the development of such a curriculum for medical students (Table 2).³² This includes basic, clinical and population science concepts for medical students to master. In addition, the American Academy of Pediatrics’ guidelines might also be a good starting point for pediatric obesity counseling. Nevertheless, despite the existence of many helpful guidelines, there remains a need for an integrated, longitudinal curriculum regarding weight management for medical schools.

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Table 1**Studies of Medical Student Education for Obesity Intervention Training**

Source	Participants	Intervention	Evaluation	Results
Bass et al., 2004 ³⁴	First-year medical students. (n = 115)	Two interactive lectures and two standardized patient activities focused on nutrition and physical activity counseling.	Pre-post questionnaire assessing knowledge of the material, attitudes, and confidence.	50% of students, (n = 57) completed the pre and post questionnaires. Increase noted in knowledge, confidence in nutrition counseling, and confidence in exercise prescription.
Carson, 2003 ³⁵	Fourth-year Medical students. N = unclear	Distribution of color-coded tape measure to 4 th year med students coupled with a pocket reference card about nutrition/exercise counseling and 2 computer-based cases	Students answered a multiple-choice questionnaire about their ability to interpret waist circumference before and after the clerkship. Students self-reported whether they had measured waist circumference in the clinic.	Correct response about interpreting waist circumference increased from 82% (pre-clerkship) to 98.5% (post-clerkship) n = 71 tested. Self-reported measurement n = 75 of waist circumference increased from 5% to 17%
Banasiak and Murr, 2001 ³⁶	Third-year students assigned to surgery clerkships (n = 201)	Rotation on a 3 rd year bariatric surgery clerkship (n = 24)	Knowledge of obesity and obesity management assessed by a 10-item questionnaire at both the end of 2 nd year and at end of 3 rd year	160 students completed the questionnaire. Students who rotated on the Bariatric Surgery clerkship had higher scores (90% vs. 79%). Higher scores were noted for clinical management and treatment efficacy subscales.
Rourke and Kavey, 1999 ³⁷	Second-year medical students attending an elective course N=69	1-hour class providing rationale for assessing total body composition and descriptions of 6 measurement techniques. Students in photographs. Students attended a follow-up session on the medical impact, diagnosis, and treatment of obesity rated body composition	15-item posttest on body composition and obesity	Students overestimated body fat visually compared to standard measurements. 84% of students rated "valuable" or "adequate" Knowledge: Mean post-test knowledge score was 74% (range 60%–100%)the session as
Wiese et al., 1992 ³⁸	First-year medical students. N = 75	Workshop including a video-taped obese nurse talking about life experiences, an article on genetic causes of obesity, and two role-playing exercises designed to imagine obese individuals feelings in different situations	19-item questionnaire assessing knowledge, attitudes, and stereotypes of obese individuals before the workshop, after it, and 1 year later	Compared to control group students (n = 43), educational workshop students (n = 32) had more accurate knowledge of the genetic influence of obesity and less negative attitudes about the obese

Table 2

Samples of suggested curricular elements by the American Association of Medical Colleges.³²

Conceptual Area	Sample Concepts:
Basic Science	
	Physiologic aspects of diet and hunger
	Physical activity and energy consumption
	Beneficial effects of physical activity
	Energy balance
	Metabolic and immunologic consequences of obesity
	Pharmacology of obesity therapy
Clinical Science	
	Calculation of Body Mass Index (BMI) and measurement of waist circumference
	Categorization of normal, overweight and obese based on BMI
	Addressing weight even when it is not the primary reason for the patient encounter
	Appreciation of the psychosocial and environmental contexts of weight
	Secondary causes of obesity
	Co-morbidities of obesity
Population Science	
	Epidemiology of overweight and obesity
	Social and environmental determinants of overweight and obesity at the population level
	Current dietary and physical activity guidelines
	Public policies affecting the incidence and prevalence of overweight and obesity