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## Obesity Coverage on Medical Licensing Examinations in the United States. What Is Being Tested?

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### ABSTRACT

**Phenomenon.** As one of the most common chronic disease affecting adults and children, obesity is a major contributor to noncommunicable diseases, both nationally and globally. Obesity adversely affects every organ system, and as such it is imperative that the United States Medical Licensing Examination (USMLE) adequately assesses students' knowledge about the science and practice of obesity management. The purpose of this study was to evaluate the coverage and distribution of obesity-related items on the three USMLE Step examinations. **Approach.** Examination items that included obesity-related keywords were identified by National Board of Medical Examiners (NBME) staff. A panel of 6 content experts evaluated all items and coded obesity-relevant items using the American Board of Obesity Medicine (ABOM) test outline rubric into 4 domains and 107 subdomains. **Findings.** There were 802 multiple-choice items containing obesity-related keywords identified by NBME, of which 289 (36%) were identified as being relevant to obesity and were coded into appropriate domains and subdomains. Among the individual domains, the Diagnosis & Evaluation domain comprised most of the items (174) for all 3 Step examinations. Fifty-eight percent of items were represented by 4 of 17 organ systems, and 80% of coded items were represented by 6 ABOM subdomains. The majority of obesity-coded items pertained to the diagnosis and management of obesity-related comorbid conditions rather than addressing the prevention, diagnosis, or management of obesity itself. **Insights.** The most important concepts of obesity prevention and treatment were not represented on the Step exams. Exam items primarily addressed the diagnosis and treatment of obesity-related comorbid conditions instead of obesity itself. The expert review panel identified numerous important obesity-related topics that were insufficiently addressed or entirely absent from the examinations. The reviewers recommend that the areas identified for improvement may promote a more balanced testing of knowledge in obesity.

### KEYWORDS

Obesity; medical education; licensure

## Introduction

A major challenge facing medical educators today is to adequately train current and future physicians in the prevention and treatment of chronic conditions. Under-scoring the urgency is the alarming increase in the number of adults and children with obesity. In 2007 the Association of American Medical Colleges (AAMC) published a Contemporary Issues in Medicine Report VIII report titled *The Prevention and Treatment of Overweight and Obesity*.<sup>1</sup> The report concluded by stating,

Medical education must assure that future physicians will be better prepared to provide respectful, effective care of overweight and obese patients and to appropriately participate in overweight/obesity prevention efforts. Education on assessing, preventing and

treating overweight and obesity should be included in basic sciences, clinical experiences, and population health sciences.<sup>1(p9)</sup>

The report directly addressed the need to develop a competent and knowledgeable physician workforce in the 21st century that can provide care to the 37.7% of the U.S. adults and 17.0% of U.S. children and adolescents who have obesity.<sup>2,3</sup>

In addition to U.S. medical schools creating curricula as described in the AAMC report, students must be assessed regarding their ability to apply knowledge, concepts, and principles related to the prevention and treatment of obesity. The United States Medical Licensing Examination (USMLE) is a three-step examination for medical licensure in the United States and is sponsored by the Federation of State Medical Boards and the

National Board of Medical Examiners (NBME). Examinees enrolled in medical schools in the United States typically take Step 1 and the two components of the Step 2 examination (Step 2 Clinical Knowledge [CK] and Step 2 Clinical Skills [CS]) in the 2nd and 4th year of medical school, respectively, whereas Step 3 is usually taken after internship. According to the USMLE website,<sup>4</sup> Step 1 assesses whether students understand and can apply important concepts of the sciences basic to the practice of medicine, with special emphasis on principles and mechanisms underlying health, disease, and modes of therapy. Step 2 CK and CS assess whether students can apply medical knowledge, skills, and understanding of clinical science essential for the provision of patient care under supervision and includes emphasis on health promotion and disease prevention. Step 3 assesses whether examinees can apply medical knowledge and understanding of biomedical and clinical science essential for the unsupervised practice of medicine, with emphasis on patient management in ambulatory settings.

The USMLE provides a common standard and state-of-the-art assessment of allopathic physicians. As such, it is important that the examination reflects, and sufficiently evaluates, examinees' knowledge of current principles and practice of obesity. Thus, the purpose of this study was to evaluate the coverage and distribution of obesity-related items on the three Step examinations.

## Methods

A panel of six content professionals representing The Obesity Society and the American Board of Obesity Medicine (ABOM) were selected to perform the review based on their expertise in obesity and interest in medical education. To assess representative coverage of obesity content across the 17 organ systems areas of the Step exams, examination items that included obesity-related keywords were identified by NBME staff. The panelists provided the following obesity-related keywords: “% above the 95th percentile, adiposity, LGA (large for gestational age), BMI (body mass index), obese, and weight loss.” Four of the reviewers had previously undergone extensive training by the NBME on item writing skills. The review took place at the NBME headquarters in Philadelphia under secure conditions over 1½ days, December 17–18, 2014. Although Step 2 CS and the computer-based case simulations component of Step 3 were reviewed at the meeting, they were not included in the analysis.

The ABOM test outline rubric was used to code items into four domains and 107 subdomains<sup>5</sup> (supplementary material). The rubric was previously developed by a job task analysis conducted among primary care physicians

in 2009 to identify core competency topics in obesity medicine. The four domains, along with associated number of subdomains (in parentheses), were Basic Concepts (26), Diagnosis & Evaluation (25), Treatment (40), and Practice Management (16). Items were “coded” only if the learning objective directly pertained to obesity science or management, that is, if the item included only body weight or BMI as a physical descriptor but was not pertinent to the learning objective, and thus was not directly evaluating obesity knowledge, it was not coded. The reviewers also rated the obesity-related items according to level of academic importance using a 5-point Likert scale: 1 (*not important*), 2 (*low importance*), 3 (*moderate importance*), 4 (*important*), and 5 (*very important*), as used by Hark et al.<sup>6</sup> Reviewers based their “importance” rating on its relevance to understanding the science, assessment, management, and/or treatment of obesity. Reviewers worked in pairs to increase interrater reliability; the pairs discussed the content to reach agreement prior to recording their ratings. Each reviewer pair was responsible for their own set of items. The collated data were aggregated by NBME staff and subsequently sent as secure files to the reviews for further analysis. The results and final preparation of the study were approved by the NBME.

## Results

There were 802 multiple-choice items identified for review. The items were identified by NBME staff from a larger pool of items available for scored use, and the closest matches that could be reviewed during the 1½-day meeting were selected. All questions were taken from recent live USMLE exam administrations. Overall, 289 (36%) of the reviewed items were coded as directly related to obesity and ranged from 63 (21.8%) for Step 1 to 152 (52.6%) for Step 2 CK. The distribution of reviewed items among the four major domains for the three Step examinations is shown in Table 1. Among the individual domains, the Diagnosis & Evaluation domain contributed the majority of items (174; 60%) for all three Step examinations, whereas Practice Management domain had very few items (6; 2%). Not unexpectedly, most of the items coded as Basic Concepts were found in Step 1, which focuses on basic science knowledge assessment, although these items accounted for only 14 of 63 (22%) of the total Step 1 obesity-related items. Similarly as anticipated, among the 75 items coded as Treatment, the Step 2 CK and Step 3 exams, which focus on clinical science knowledge assessment, contribute a higher percentage (52% and 33.3%, respectively) than Step 1 (14.6%).

**Table 1.** American Board of Obesity Medicine domain distribution among the three step examinations.

	Basic Concepts	Diagnosis & Evaluation	Treatment	Practice Management	Total Items
Step 1	14 (22%)	33 (52%)	11 (17%)	5 (8%)	63
Step 2 CK	14 (9%)	96 (63%)	39 (25%)	1 (1%)	152
Step 3	6 (8%)	45 (61%)	25 (34%)	0 (0%)	74
Total	34 (12%)	174 (60%)	75 (26%)	6 (2%)	289

Note. Values are *N* (%). % = percentage of coded items for each exam distributed among the four American Board of Obesity Medicine domains; CK = Clinical Knowledge.

Coverage of obesity-related items categorized by the 17 organ systems areas for all three Step exams combined is shown in Table 2. The last column shows the percentage distribution according to the organ systems. Although there was variability between the three Step exams, four organ systems accounted for 58% of the total coded items: Cardiovascular (14%), Endocrinology (17%), Female reproduction (14%), and Respiratory (13%). Because the group did not review complete forms, no conclusions can be drawn regarding the amount of obesity related material appearing on a single exam. Of the 107 subdomains in the ABOM rubric, six subdomains accounted for 80% of the total obesity coded items (Table 3). It is noteworthy that these subdomains primarily addressed the basic science, pathophysiology, physical findings, diagnostic testing, and treatment of comorbidities associated with obesity, rather than addressing obesity itself. The reviewers also noted that only a few specific comorbidities were repeatedly used to test very limited Diagnosis & Evaluation and Treatment concepts.

Thirty-eight of 63 (60%) Step 1 items, 88 of 152 (58%) Step 2 CK items, and 44 of 74 (60%) Step 3 items were deemed important or very important. Last, the panel noted that “people-first” language was not used in the patient scenarios. Items were phrased as “... an obese patient” rather than “... a patient with obesity.”

**Table 2.** Coverage of obesity-related items by 17 organ systems for all 3 Step examinations combined.

Organ System	No. of Items <sup>a</sup>	% of All Obesity Related Items
Biostatistics	1	<1%
Cardiovascular	41	14%
Endocrinology	49	17%
Dermatology	4	1%
Female Reproduction	41	14%
Gastroenterology	15	5%
General Principles	9	3%
Hematology	3	1%
Male Reproduction	1	<1%
Multisystem	10	3%
Musculoskeletal	24	8%
Neurology	25	8%
Pregnancy/Childbirth	12	4%
Psychiatry	11	4%
Renal	8	3%
Respiratory	37	13%
Social Sciences	7	2%

<sup>a</sup>*n* = 289.

## Discussion

Obesity is a multifactorial chronic disease with distinct genetic, physiological, behavioral, social, and economic determinants. As one of the most common chronic diseases affecting adults and children, obesity is a major contributor to the noncommunicable disease burden, both nationally and globally.<sup>7</sup> Although the impact of excess adiposity or having an elevated BMI may vary from one individual to another, obesity can adversely affect every organ system, and as such it is imperative that the USMLE adequately assesses students’ knowledge about the science and practice of obesity management.

We found that only 36% of the 802 multiple-choice items reviewed with obesity keywords were directly obesity related. This was not entirely surprising, as including the patients’ BMI, body weight, or obesity status descriptor (“obese”) in a patient history or item stem flagged the item, even though the vignette may not have been related to obesity. However, it was surprising to find that the majority of obesity coded items pertained to the obesity-related comorbidities (e.g., Type 2 diabetes, obstructive sleep apnea, metabolic syndrome, polycystic ovarian syndrome), rather than addressing the diagnosis and management of obesity itself. Although it is clearly important to acquire competence in the diagnosis and management of these and other obesity-related conditions, the relative emphasis on comorbidities tends

**Table 3.** Number of items and percentage contribution of the top six subdomains covered in the American Board of Obesity Medicine rubric.

Rubric	All Step Items <i>N</i> / %
Basic Concepts	
Secondary Causes of Obesity	12
Pathophysiology of Obesity-Related Comorbidities	18
Diagnosis & Evaluation	
Diagnosis & Evaluation of Obesity-Related Comorbidities	85
Physical findings of Obesity-Related Comorbidities	34
Diagnostic tests of Obesity-Related Comorbidities	39
Treatment	
Treatment of Obesity-Related Comorbidities	43
Contribution of the Six Subdomains to the Total Obesity Coded Items for All Three Step Exams	80%

Note. Items *n* = 231.

to diminish the interpretation of obesity as a distinct clinical entity that can be managed independently. In addition, our findings emphasized that the most important concepts of obesity prevention and treatment, ranging from current basic science to assessment to clinical management, were poorly represented. Because we did not review an entire examination, our results pertain to a sampling that was presented to the review panel. We also note that our review of the Step 2 CS examination cases or the computer-based case simulation format in Step 3 were not included in this analysis because the reviewers did not use a quantitative rubric for these exams and felt that we could not provide a definitive opinion that was representative of the entire examination.

We believe that there are several reasons for insufficient coverage of obesity on the USMLE Step examinations. Because the examinations are categorized into 17 organ systems, obesity does not traditionally “fit” into this organizational structure. Furthermore, the science and practice of obesity is relatively new, with major discoveries in the neurosciences and pathophysiology of adipocyte function occurring in the 1990s, greater understanding of the mechanisms of action of bariatric surgery since 2000, and approval of four new pharmacotherapies since 2012. Furthermore, because obesity medicine is not a recognized primary or specialty board at this time and very few fellowships exist, there is a paucity of obesity experts that serve on the USMLE examination writing committees.

Based on the major advances in the science and practice of obesity medicine over the past two decades, the expert reviewers identified multiple important obesity-related topics that were insufficiently addressed or entirely absent from the examinations. The recommended topics to be included in future examinations are listed in Table 4. For the Step 1 exam, these topic areas overlap with other traditionally defined disciplines, including genetics, physiology, behavioral sciences, epidemiology, pharmacology, and nutrition, among others. For the Step 2 CK and Step 3 exams, the recommended topics correspond with the physician competencies of scientific knowledge and concepts, patient care diagnosis and management, and communication and interpersonal skills. Thus, obesity items could be readily introduced into the Step exams within their traditional framework.

The competency of communication skills is particularly pertinent to obesity due to the attitudes, beliefs, and biases that many students hold toward patients who have obesity.<sup>8,9</sup> One unintentional way to convey bias is the manner in which patients are described. The reviewers noted that patient vignettes did

**Table 4.** Recommendations for the three step examinations.

Step 1
Basic Sciences of Obesity
• Genetics & epigenetics
• Epidemiology
• Neuroendocrine regulation of appetite and energy expenditure
• Gut hormone – brain neuropeptide axis
• Adipokines and inflammation
• Insulin resistance
• Socioeconomic and behavioral determinants of obesity
• The food environment
Step 2 CK and Step 3
Assessment, Diagnosis, and Treatment of Obesity
• Classification and evaluation of obesity
• Evidence-based obesity treatment
• The role of dietary and physical activity interventions
• Behavioral medicine
• Obesity pharmacotherapy
• Bariatric surgery
• Weight bias and discrimination

not use “people-first” language to identify the disease. For example, cases should refer to “a patient with obesity” rather than “obese patient.” People-first language is well-established, including explicit reference in the American Medical Association Manual of Style, which states to “avoid labeling (and thus equating) people with their disabilities or diseases.”<sup>10</sup>

Expanding the assessment of communication skills is an active area of development for both the multiple-choice question and clinical skills components of USMLE. Standardized patient cases in which examinees are expected to promote and support patient self-management have been included in developmental pilots of standardized patient assessments outside the Step 2 CS examination. If additional piloting is successful, these types of cases would be incorporated into Step 2 CS; it is likely that the topic of weight loss would be one of the content areas in which examinees would be expected to counsel patients. Although the USMLE program plans to increase the number of items that assess communication skills in the examinations, there are no plans to introduce a separate passing requirement for communication skills in the multiple-choice examinations.

In response to the advancements in the field of obesity and the impact of obesity on our patients’ health, the 2007 AAMC report<sup>1</sup> emphasized the need to incorporate obesity education into the medical curriculum. Others have voiced similar recommendations including residency training.<sup>11</sup> The American Academy of Pediatrics and the American Academy of Family Medicine have responded to the needs of their members and trainees with grant funding to residency programs to develop residency curriculum for obesity.<sup>12</sup> Progress has been slow, and few educational intervention studies have been conducted that assess the incorporation of knowledge, attitudes, or skills regarding obesity into the medical



curriculum. In a recent systematic review, Vitolins et al.<sup>13</sup> identified only five publications from a PubMed search conducted between 1966 and 2010 that included predefined obesity intervention and evaluation elements, concluding that there were very few published studies that report the effectiveness of medical school obesity educational programs. In another systematic review to investigate how effective educational interventions are in preparing medical students to facilitate lifestyle changes among patients with obesity, Chisholm et al.<sup>14</sup> conducted an extensive database search for articles published between 1990 and 2010 and identified 12 educational studies that met their predefined eligibility criteria. Only five studies were exclusively related to educational interventions on obesity itself. Due to lack of robust evaluations, transparency of methods, and presence of potential bias, the authors could not determine the efficacy of the interventions, concluding that “more work is needed to develop and identify evidence-based educational interventions about obesity-related lifestyle change.”<sup>(p. 918)</sup>

This is the third such review of a national licensing exam. The previous two reviews related to nutrition<sup>6</sup> and critical care content.<sup>15</sup> A recently published article reviewed nutrition-related information of the USMLE Step 1, 2, and 3 Content Description documents and two test preparation books.<sup>16</sup> We also recognize that other disciplines could benefit from reviewing the USMLE regarding their content area. Although it has long been debated in the literature whether licensure examinations reflect what *is* taught or what *should* be taught,<sup>17</sup> it is generally acknowledged that assessment drives learning<sup>18</sup> and underlies the rationale for a programmatic assessment approach. In this approach, a variety of informative assessment activities are used to affect learning before, during, and after the assessment activity.<sup>19</sup> The dominant role of an examination to guide student learning was most clearly demonstrated by the seminal paper by Newble and Jaeger,<sup>20</sup> in which they showed that deliberately changing a curriculum assessment strategy altered student behavior and learning. However, summative assessments that do not provide direct feedback to drive learning, that is, licensing examinations, may not influence learning in the same way. Although the USMLE does not have an official statement concerning other uses of the examinations, they are aware of secondary applications that include decisions about medical school curricula. Their guiding principle is that the USMLE should reflect the evolution of medical education, training, and curricula.<sup>21</sup> Indeed, significant changes in development of new curricula and assessment methods have recently occurred to improve the preparation of physicians for the 21st century that include an emphasis on a

competency-based curriculum, integrated learning, longitudinal clinical experiences, and implementation of new technology.<sup>22</sup> An increased focus on behavioral competencies such as communication skills and interprofessional collaboration is particularly pertinent to obesity care. Construction of new assessment instruments<sup>23,24</sup> and utilization of a portfolio assessment system<sup>25</sup> provide a more robust evaluation of the learners’ progress toward and achievement of competencies.

Regardless of the evolving role of the USMLE in driving learning, it is imperative that the assessment meet two objectives: It is rigorous and comprehensive, and it reflects the current science and practice of the content area. The evidence suggests that neither of these objectives is currently met by the USMLE Step exams regarding obesity despite the inclusion of “obesity” in the USMLE Content Outline.<sup>26</sup> At the request of the NBME, a comprehensive panel report was submitted for review by the USMLE Management Committee. In their written response, they agreed that the USMLE examinations should include assessment of examinees’ knowledge about the science and practice management of obesity, and they invited nominations for obesity medicine content experts to serve on USMLE test material development committees. The panel hopes that the identification of areas for improvement will promote a more balanced testing of knowledge in obesity, which in turn can drive an integrated and comprehensive obesity curriculum in U.S. medical school programs.

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## References

1. Association of American Medical Colleges. *Report VIII. Contemporary Issues in Medicine: The Prevention and Treatment of Overweight and Obesity. Medical School Objective Project*. August 2007. Available at: <https://members.aamc.org/eweb/upload/Contemporary%20Issues%20in%20Med%20The%20Prevention%20and%20Treatment%20Report%20VIII.pdf>. Accessed on October 11, 2016
2. Flegal KM, Kruszon-Morgan D, Carroll MD, Fryar CD, Ogden CL. Trends in obesity among adults in the United

- States, 2005 to 2014. *Journal of the American Medical Association* 2016;315:2284–91.
3. Ogden CL, Carroll MD, Lawman HG, Fryar CD, Kruszon-Morgan D, Kit BK, et al. Trends in Obesity prevalence among children and adolescents in the United States, 1988–1994 through 2013–2014. *Journal of the American Medical Association* 2016;315:2292–9.
  4. United States Medical Licensing Examination. Available at: <http://www.usmle.org/>. Accessed September 21, 2016
  5. American Board of Obesity Medicine. Available at: <http://www.abom.org>
  6. Hark LA, Iwamoto C, Melnick DE, Young EA, Morgan SL, Kushner RF, et al. Nutrition coverage on medical licensing examinations in the United States. *American Journal of Clinical Nutrition* 1997;65:568–71.
  7. Ng M, Flemming T, Robinson M, Thomas B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2014;384:766–81.
  8. Miller DP, Spangler JG, Vitolin Davis SW, Ip EH, Marion GS, et al. Are medical students aware of their anti-obesity bias? *Academic Medicine* 2013;88:978–82.
  9. Ip EH, Marshall S, Vitolins M, Crandall SJ, Davis S, Miller D, et al. Measuring medical student attitudes and beliefs regarding patients who are obese. *Academic Medicine* 2013;88:282–9.
  10. APA Manual of Style Committee. *AMA manual of style*. 10th ed. New York, NY: Oxford University Press, 2007, 416–7.
  11. Colbert JA, Jangi S. Training physicians to manage obesity—Back to the drawing board. *New England Journal of Medicine* 2013;369:1389–91.
  12. Residencies seek to boost training in obesity management, lifestyle issues. AAFP, AAP team up on ‘Fit for Residents’ pilot. Available at: <http://www.aafp.org/news/obesity/20100517residencies.html>. Accessed April 1, 2016.
  13. Vitolins MZ, Crandall S, Miller D, Ip E, Marion G, Spangler JG. Obesity educational interventions in U.S. medical schools: A systematic review and identified gaps. *Teaching and Learning in Medicine: An International Journal* 2012;24:267–72.
  14. Chisholm A, Hart J, Mann KV, Harkness E, Peters S. Preparing medical students to facilitate lifestyle changes with obese patients: A systematic review of the literature. *Academic Medicine* 2012;87:912–23.
  15. Frankel HL, Rogers PL, Gandhi RR, Freid EB, Kirton OC, Murray MJ. What is taught, what is tested: Findings and competency-based recommendations of the undergraduate medical education committee of the Society of Critical Care Medicine. *Critical Care Medicine* 2004;32:1949–56.
  16. Patel S, Taylor KH, Belrin B, Geib RW, Danek R, Waite GN. Nutrition education in U.S. medical schools: An assessment of nutrition content in USMLE STEP preparation materials. *Journal Curriculum and Teaching* 2015;4:108–13.
  17. Swanson DB, Case SM, Melnick DE, Volle RL. Impact of the USMLE Step 1 on teaching and learning of the basic biomedical sciences. *Academic Medicine* 1992;67:553–6.
  18. Epstein RM. Assessment in medical education. *New England Journal of Medicine* 2007;336:387–96.
  19. Heenenman S, Pool AO, Schuwirth LWT, van der Vlieten CPM, Driessen EW. The impact of programmatic assessment on student learning: Theory versus practice. *Medical Education* 2015;49:487–98.
  20. Newble DI, Jaeger K. The effect of assessment and examination on the learning of medical students. *Medical Education* 1983;17:165–71.
  21. Comprehensive review of USMLE. Committee to Evaluate the USMLE Program (CEUP). Summary of the final report and recommendation. Available at: <http://www.usmle.org/pdfs/cru/CEUP-Summary-Report-June2008.pdf>. Accessed August 7, 2016.
  22. Cooke M, Irby DM, O’Brien BD. *Educating physicians: A call for reform of medical school and residency. The Carnegie Foundation for the Advancement of Teaching. Preparation for the professions*. San Francisco, CA: Jossey-Bass, 2010.
  23. Havyer RD, Nelson DR, Wingo MT, Comfere NI, Halvorsen AJ, McDonald FS, et al. Addressing the interprofessional collaboration competencies of the Association of American Medical Colleges: A systematic review of assessment instruments in undergraduate medical education. *Academic Medicine* 2016;91:865–88.
  24. Carney PA, Palmer RT, Miller MF, Thayer EK, Estroff SE, Litzelman DK, et al. Tools to assess behavioral and social science competencies in medical education: A systematic review. *Academic Medicine* 2016;91:730–43.
  25. O’Brien CL, Sanguino SM, Thomas JX, Green MM. Feasibility and outcomes of implementing a portfolio assessment system alongside a traditional grading system. *Academic Medicine* 2016;91:1554–60.
  26. USMLE Content Outline. Available at: <http://www.usmle.org/pdfs/usmlecontentoutline.pdf>. Accessed April 1, 2016.