

Nutrition Related Learning Objectives and Entrustable Professional Activities in the Continuum of Medical Education and Training: Boston University Communities' Experiences

Carine M Lenders^{1*}, Megan V Alexander², Sarah M Gurney³ and Kate E Donovan³

¹*Pediatrics, Boston Medical Center and Boston University School of Medicine, USA*

²*Boston University School of Medicine, USA*

³*Pediatrics, Boston Medical Center, USA*

***Corresponding Author:** Carine M Lenders, Associate Professor of Pediatrics, Boston University School of Medicine- Director, Nutrition and Fitness for Life program and Pediatric Nutrition Support, Boston, MA, USA.

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Abstract

Objective: To aid curricula-developers in creating nutrition and lifestyle related learning objectives, competencies and Entrustable Professional Activities that are most relevant to their medical school context.

Methods: This study clarifies the definitions of terms used in competency-based educational models and provides lessons-learned and tools in medical nutrition related education developed at Boston Medical Center and Boston University School of Medicine. In addition, our team has reviewed recommendations from national working groups that focus on medical nutrition related education.

Results: Our team has compiled a comprehensive list of terms used in competency-based educational models to guide the development of learning objectives and competencies. We also provided tools to organize nutrition related learning objectives and competencies, and a nutrition related Entrusted Professional Activity developed at Boston Medical Center. Finally, we offered links and references to currently available curricular guides, learning objectives, competencies and EPAs in nutrition, metabolism, and lifestyle.

Conclusion: This study will facilitate the development of learning objectives, competencies and EPAs in nutrition, metabolism and lifestyle. This effort will allow for further collaborations on nutrition related education and research.

Keywords: *Learning Objectives; Competencies; Entrustable Professional Activities, Medical Education; Nutrition; Lifestyle*

Abbreviations

EPA: Entrusted Professional Activity; AAMC: American Academy of Medical Colleges; BUSM: Boston University School of Medicine; BU: Boston University; NIH: National Institutes of Health; ASN: American Society for Nutrition; NAA: National Academy Award; BMC: Boston Medical Center; KSA: Knowledge, Skills, Values, and Attitudes; SMART: Specific, Measurable, Attainable, Relevant, and Time-Bound; KSA: Knowledge, Skills and Attitudes; IAMSE: International Association for Medical Science Educators; PC: Patient Care; MK: Medical Knowledge; ICS: Interpersonal and Communication Skill; P: Professionalism; SBP: System-Based Practice; NIM: Nutrition in Medicine; TOS: The Obesity Society

Introduction

To meet the needs of an evolving health care landscape, medical education and training is continuously changing [1]. As education models have been shifting to competency-based models, competencies provide a clear idea of the desired outcome of training for students

and teachers and inform curricula, and assessment during training. In that framework, Entrustable Professional Activities (EPAs) offer information on essential professional activities a physician practicing in a specialty or subspecialty should be able to perform [2]. EPAs have been developed across various disciplines in graduate medical education, and the American Academy of Medical Colleges (AAMC) has established 13 core EPAs related to the completion of undergraduate medical education for those entering residency [3]. Although nutrition and lifestyle behaviors influence health and disease and contribute to the leading causes of death in the United States, and nutrition topics are streamlined on governmental sites [4], there is a lack of standardized medical nutrition education and training assessments available at the undergraduate or residency level in the U.S. educational context [5].

Given the increase focus on disease prevention, chronic disease, and inter-professional education, we developed a novel student-centered model of nutrition medicine education at the Boston University School of Medicine (BUSM) across BU communities [6,7]. With the National Institutes of Health (NIH) and the American Society for Nutrition (ASN) we published recommendations for remodeling nutrition education, training, and research [5,8-11]. More recently, a NIH workshop group reviewed lessons learned from nutrition education efforts in medical schools and health professional schools including inter-professional domains and competency-based nutrition education [11]. Our workshop group recommended to update the National Academy Award (NAA) curriculum guide in medical nutrition [12] and thus facilitate the development of education and training tools, including assessment tools [11]. The revision of the NAA learning objectives would therefore be key to informing the development of nutrition related EPAs [5].

Objective of the Study

The objective of this article is to aid curricula-developers in creating nutrition and lifestyle related learning objectives and EPAs that are most relevant to their medical school context. We aim to do this by 1) clarifying several definitions used in competency-based education models and informing the reader on currently available nutrition and lifestyle learning objectives or competencies and 2) describing a nutrition EPA for residents developed at Boston Medical Center (BMC) and lessons learned.

Materials and Methods

Definitions and available nutrition and lifestyle learning objectives or competencies

Learning goals and learning objectives can serve as a guide for course or curriculum development and evaluation (Table 1). A learning goal is a broad statement which describes an expected learning outcome of a course or curriculum [13]. Learning objectives are drawn from learning goals and typically are more specific and measurable. Given that learning goals and objectives are often used interchangeably [14], the most important aspect is that curricula-developers agree on the terms they use and that they are able to distinguish between what the educator expects from the curriculum and what the student needs to learn.

Terms	Definition
Learning goals [13]	Broad, general statements of what students should learn in a course or curriculum
Learning objectives [13]	Description of what students must be able to do upon completion of the course or curriculum
Domain of competency [15]	Broad areas of competence that constitute a general descriptive framework for a profession
Competency [15]	Observable ability of a student, integrating multiple components such as knowledge, skills, values and attitudes (KSVAs)
Competent [15]	Possesses the required abilities in all domains in a certain context at a defined stage of medical education or practice
Competence [15]	Entails more than the possession of knowledge, skills and attitudes; requires application in the clinical environment to achieve optimal results
KSVAs [16]	Considered as a means of operationalizing competencies in the competency model; they should be SMART (specific, measurable, attainable, relevant, and time bound)
Knowledge [16]	“A complex process of remembering, relating, or judging an idea or abstract phenomenon (cognitive abilities)”: remembering
Skills [16]	“The proficient manual, verbal or mental manipulation of data or things that allow for the execution of well-specified tasks (psycho-motor abilities)”: doing
Values [17]	Notions or ideas that are desirable: “worth”
Attitudes [16]	“Represent a state of mind, feelings, or beliefs about a particular matter (affective abilities)”: feeling

Table 1: Select competency-based models definitions.

Another term used interchangeably with learning objectives is competency. The term competency is best defined as an observable ability of a student that integrates knowledge, skills and attitudes (KSAs) [15]. KSAs in turn are considered a means for operationalizing competencies, where the learner knowledge is described as “remembering”, skills as “doing”, and attitudes as “feeling” [15]. More recently, “values” have been added to KSAs. Values are considered standards that guide our behaviors at an individual or societal level [18]. The learner values are notions or ideas that are desirable and described as “worth” [17]. As a result, new learning healthcare team roles have been identified to improve students’ participation in Health Systems Sciences and clinical skills, which are value-added opportunities expected to improve patient care and healthcare systems [19]. Using the definitions reviewed in this article, an organizational chart was drafted to provide a competency-based structure for the use of those terms (Figure 1). In addition, one may create a database to facilitate the development and organization of learning objectives, their classification in one or more characteristic of KSA (Knowledge, skills, values and attitudes), sub-competencies, competencies, and overarching goals. Other types of organizational charts are available elsewhere [16].

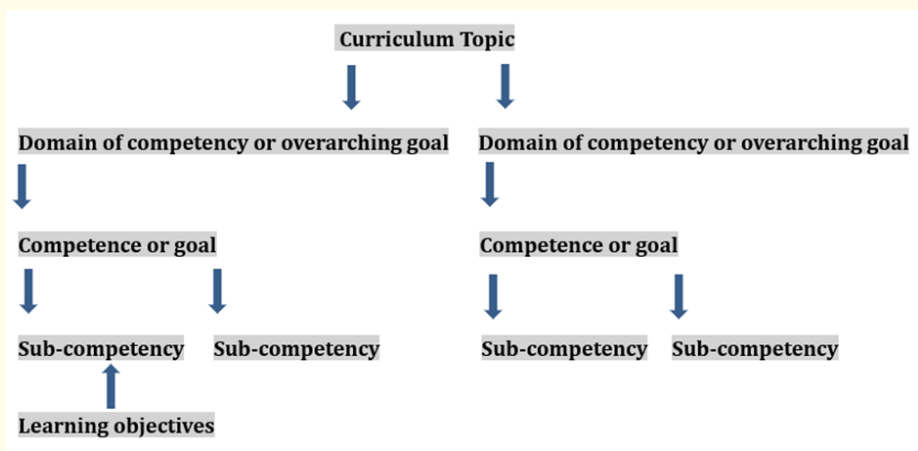


Figure 1: Organizational chart for competencies and learning objectives: an example.

Several societies and institutions have provided position statements and developed or updated learning objectives and competencies in medical nutrition and lifestyle. The Academy of Nutrition and Dietetics provides a position statement outlining the important role of dietitians in nutrition education for medical students and residents [20]. The NAA curriculum guide for medical nutrition education was developed a few decades ago [12,21]. In response to worsening survey findings of the curriculum of nutrition in U.S. medical school [22] and with guidance from a NIH workshop publication [9], the International Association for Medical Science Educators [23] updated the NAA learning objectives and conducted a survey among their membership before publishing a shorter updated list of learning objectives. ASN, in partnership with IAMSE, further updated and revised these learning objectives and conducted a survey in 53 accredited US medical schools of osteopathic medicine nutrition champions via the Nutrition in Medicine network including faculty and of medical students, in addition to a survey among members of the ASN’s Medical Nutrition Council [11].

There are several published competencies on obesity and lifestyle, such as those developed by the Obesity Society (TOS) [24] and that of an ad hoc activity associated with the Roundtable on Obesity Solutions at the National Academies of Sciences, Engineering and Medicine [25]. Workgroups from the American Heart Association recently published scientific statements including one on medical education and competencies with a focus on diet counseling for physicians [26] and more recently for Prevention and Treatment of Cardiovascular

Diseases and Other Chronic Medical Conditions [27]. Additional learning objectives and competencies are being developed in nutrition and lifestyle through education collaborative including professional societies, academic, and state.

As shown in a few examples that follow, learning objectives and competencies can also be found in nutrition courses. The Nutrition In Medicine program provides free online access to a module-based course in nutrition for medical students and residents [28] that contains learning objectives for each of the modules. The Lifestyle Medicine Course offered at the Harvard Extension School is an evidence-based, online course that provides competencies for primary care professionals [29]. These authors are also targeting other groups of students and trainees[30]. Finally, the first comprehensive open-source guide to support the implementation of culinary medicine at health professional training programs has been published by Hauser et al. in 2020 [31].

EPA in nutrition for residents

To the best of our knowledge, only one nutrition EPA was previously published for fellows in Gastroenterology and Nutrition [32,33] and none at entry to residency or for residency. After establishing the need for residency training in pediatric nutrition (2014), a meeting with educators was scheduled at Boston Medical Center to discuss the need for nutrition EPA. An award in medical nutrition education from the New Balance Foundation was obtained to develop a nutrition EPA for residency [34]. We assembled a multidisciplinary group of healthcare providers including registered dietitians, physician educators, pediatric residents, and a physician nutrition specialist. This group used guidelines for full EPA descriptors from Ten Cate [2] as a base to develop this nutrition EPAs. Given the availability of nutrition education expertise, existing national competencies, and recommendations in medical nutrition, a modified focus group approach was used for consensus meetings [35]. In-person meetings were organized, tasks assigned, and group reviews performed via weekly emails and monthly telephone or in-person meetings over a six-month period.

Results and Discussion

We identified a total of five major components that needed to be addressed before developing the EPA including: the target trainee population, the target patient population, the location of care, the structure of the EPA for presentation (one, two, or more EPAs) and the logistics. We identified multiple challenges during the development of the EPA such as: defining the scope of the EPA, balancing the content requirements within the limitations of the EPA structure, and identifying potential barriers to implementing an EPA in practice. It became clear that the development of a nutrition related EPA by nutrition champions would only be implemented when specifically requested at an academic leadership level.

The nutrition related EPA for residents developed at Boston Medical Center followed the recommendations of Ten Cate [2] and included: title, detailed description, behaviorally anchored objectives in knowledge, skills, and attitudes, a list of the Accreditation Council for Graduate Medical Education competencies related to the EPA, suggested assessments, the time expected to achieve a level of unsupervised practice, identification of who will make the entrustment decision, and finally, implications of entrustment. The process for this EPA development was presented at the Experimental Biology meetings in 2016. The complete EPA description was subsequently completed and presented at a NIH workshop in 2017 (Table 2).

1. Title	Manage pediatric nutrition in an ambulatory setting
2. Description	Residents should be able to manage patients without nutrition risk, patients at nutrition risk, and patients with poor nutrition; and should be able to communicate the nutrition status of their patient effectively. They should be able to conduct a patient history and exam, order and interpret clinically relevant tests, and use appropriate counseling techniques. They should be able to formulate a treatment plan using the information collected using the techniques outlined previously. Residents should understand when to refer their patients to medical, surgical, dietetic, physiotherapist, exercise physiologists, and mental health specialists, as well as multidisciplinary teams, and food and physical activity resources. They are expected to diagnose their patient’s stage of change and motivation to assist the patient in successfully completing their prescribed treatment plan.

<p>3. Required Knowledge, Skills, and Attitudes (KSAs)</p>	<p>Knowledge</p> <ul style="list-style-type: none"> • Demonstrate an adequate understanding of the necessary knowledge required to care for nutrition-related conditions in the pediatric patient • Demonstrate an adequate understanding of, and properly interpret growth charts and growth trends to better determine nutrition status • Understand and assess developmental feeding and motor skills and problems. Provide relevant information on introduction of foods based on the child's stage of development • Understand the role of other health professionals and refer the patient and/or family for further evaluation and counseling to specialists or multidisciplinary specialty clinics where appropriate <p>Skills</p> <ul style="list-style-type: none"> • Develop and implement a plan of care that includes assessment of nutrition status using growth charts, focused physical exam, laboratory tests according to guidelines, and the diagnosis of nutrition-related problems and conditions • Obtain developmentally, culturally, and socio-economically appropriate nutrition and feeding history that includes ADL and related behaviors, and physical activity assessment. Obtain additional necessary histories (e.g. medical, surgical, medication) and biochemical laboratory data • Conduct a focused physical assessment appropriate for age and weight status • Communicate effectively with patients and families • Identify patients' and families' readiness to change and utilize appropriate counseling techniques (e.g. motivational interviewing) <p>Attitudes</p> <ul style="list-style-type: none"> • Incorporate cultural and socio-economic factors into patient care • Encourage breastfeeding and additional, related supplementation per guidelines 										
<p>4. Mapping to competencies</p>	<p>Competencies</p> <table border="0"> <tr> <td>PC</td> <td>MK</td> <td>ICS</td> <td>P</td> <td>SBP</td> </tr> </table> <p>Sub-competencies</p> <table border="0"> <tr> <td>1,4,6,9</td> <td>2</td> <td>1,2,3</td> <td>5</td> <td>5</td> </tr> </table>	PC	MK	ICS	P	SBP	1,4,6,9	2	1,2,3	5	5
PC	MK	ICS	P	SBP							
1,4,6,9	2	1,2,3	5	5							
<p>5. Information to assess progress</p>	<p>This EPA should be taught, practiced, and assessed in the ambulatory care setting, including primary care and ambulatory specialty clinics.</p> <p>Critical review of nutrition care plans.</p> <p>Observation and evaluation of counseling.</p> <p>Documentation of relevant anthropometric data.</p> <p>Observation and evaluation of nutrition-focused physical exam.</p> <p>Critical review of appropriateness of nutrition-related referrals.</p>										
<p>6. When is unsupervised practice expected?</p>	<p>Entrustment for unsupervised practice: Level 3</p> <p>Entrustment to supervise others: Level 4</p>										
<p>7. Basis for formal entrustment decisions</p>	<p>The necessary times the EPA must be executed proficiently for unsupervised practice will vary with underlying conditions and diversity of patient population encountered.</p> <p>Proficient practice of the EPA will be evaluated by:</p> <ol style="list-style-type: none"> 1. Program director 2. Attending physicians 3. Allied health professionals (when applicable, and where available) <p>Entrustment will be communicated orally to resident and documented by attending physician for program director.</p>										

Table 2: Example of entrustable professional activities for residents in general pediatrics (June 2017).

Legend: Workgroup for this EPA, in alphabetic order: Aaron J Manders,¹ Carine M Lenders,¹ Catherine L Lister,¹ Daniel Schumaker,² Kathy A Ireland,¹ and Sharon Collier.³ ¹ Pediatrics, Boston University Medical Center, Boston, MA, ² Pediatrics, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, ³ Gastroenterology, Hepatology and Nutrition, Boston Children's Hospital, Boston, MA.

Data provided in this article will aid curricula-developers who are developing competencies and EPAs for entry to residency and for residency. In addition, a link to the Gastroenterology and Nutrition EPAs article and to their tool box is provided as it includes one nutrition EPA for fellows [33]. We have been tasked by our medical school to revamp the nutrition and lifestyle part of the curriculum as the medical school is changing their overall curriculum. For that educational effort, we are using lessons-learned from other teams at the medical school, who were asked previously to make proposals for curricular change (e.g. substance abuse, racism). In addition to clinicians and educators in nutrition, metabolism, and physical activity, we plan to invite educators in the field of wellness and resilience, sleep, and behavior change. We plan to use the revised NAA learning objectives as well as other competency sources to recommend key and desirable learning objectives that may be relevant to our medical school context and to facilitate the development of a Nutrition, Metabolism and Lifestyle EPA using lessons-learned from the two nutrition EPA sources. The target group for this EPA will be the students at the end of medical school. The target patient population will be that of our academic hospital and associated health centers catchment areas. The location of care will be a combination of inpatient, outpatient and community care. We will first develop a general Nutrition, Metabolism, and Lifestyle EPA and later address the needs for specific clerkships. We will include various populations such as children, adults, pregnant women, minorities, and elderly individuals. Finally, we plan to map the new KSVAs to our medical school core competency in compliance with the AAMC core competencies.

Conclusion

We have reviewed select terms used in competency-based educational models and have presented an approach to facilitate the development of learning objectives, competencies, and EPAs in nutrition, metabolism, and lifestyle. This approach may further lead to education research in nutrition, metabolism, and lifestyles in our medical school, a collaborative with other local communities, other medical schools, as well as national institutions.

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Conflict of Interest

The authors do not report any financial or conflict of interest.

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