Improving Learning Outcomes and Course Satisfaction of Nutrition Interns through Game-Based Learning

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Nutrition internships provide the opportunity for college students to work in the field of their choice and receive hands-on training from nutrition professionals, preparing them for a job in healthcare following graduation. Professional knowledge courses for nutrition interns have mostly been lecture-based. This has led to passive learning, making it difficult for students to pay attention and to retain knowledge. In response, one clinical nutrition course was modified to include Game-Based Learning (GBL). Through this modified course, interns acquired knowledge and developed problem-solving skills. The games, training process and effectiveness of this course are the focus of this article. Based on the results, introduction of GBL to this course increased interaction, effectiveness and fun. In addition, it is possible to extend GBL to other healthcare-related courses.

Key words: Game-Based Learning (GBL), nutrition, nutrition internships
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The Department of Medical Education of Chung Shan Medical University Hospital (CSH) offers a comprehensive teacher education program. Relevant training in gamification, the process of applying game-thinking and game mechanics to a non-game context,[1] inspired the planning of a professional knowledge course for nutrition interns. “Learning by doing” and “active learning” can be implemented through Game-Based Learning (GBL).[2,3] In this way, interns acquire and retain knowledge, develop problem-solving skills and have better motivation.[4,5]

Taiwanese nutrition students complete a 432-hour hospital internship between their junior and senior years. Clinical nutrition, dietetic service and community nutrition care are the three areas

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in which internships are offered. According to the Accreditation Council for Education in Nutrition and Dietetics (ACEND), at least 1200 hours of supervised pre-professional experience are required to take the Registration Examination for Dietitians in the US. In comparison, at 432 hours, it is very difficult to improve intern learning outcomes in Taiwan. In the first week of the internship, 10 training courses are offered to strengthen understanding of basic concepts. The largest gaps between school and clinic have been in enteral nutrition and the application of commercial formulas. Traditional lecture-based courses have led to passive learning, making it difficult for interns to pay attention and to retain information. In addition, they often do not reflect the levels of complexity of practical applications or clinical situations, resulting in poor learning outcomes which affect performances in subsequent clinical units.[6] Therefore, modifying a clinical nutrition course through the application of GBL is the focus of this article.

The Clinical Skills Center of CSH includes OSCE classrooms, video recording equipment and central control room.[7] It provides simulations of real-life situations and NG tube feeding training. The course entitled "Introduction to and Application of Tube Feeding" was modified to include practical skills training through gamification and use of OSCE classroom. There were three games, each linked to a subject, such as tube feeding skills and precautions, introduction to and application of commercial formulas, and common tube feeding complications and solutions.

Tube feeding

Before starting the game, interns were given a set of instructions. They fed a model water and different concentrations of formula and observed the feeding rates. During this process, interns understood the importance of health and safety in the feeding process, how to assess digestion status and how to recognize side effects of feeding.

Guessing the concentrations of nutritional products

Nutritional products are available in a variety of flavors and concentrations, each developed for a different type of patient and condition. Through game design, interns tasted and guessed the concentrations, as well as types of formulas, to learn how to apply them. In addition, through this game, interns could sympathize with patients receiving these nutritional products.

Preparing elemental formulas

Comprehending common tube feeding complications and solutions is most important for dietitians. Through this game, interns prepared elemental formulas of different amounts and densities, then weighed them and referred to their suggested usages to understand how to apply them. This allowed interns to provide appropriate nutritional intervention with elemental formulas, while avoiding side effects such as diarrhea and poor digestion.

From September to December 2018, 9 nutrition interns were enrolled in this GBL course. The satisfaction rate of this course was 98.9%. At the beginning and at the end of the internship, OSCE test was administered, which included 3 stations of 8 minutes each. The test was comprised of the standard operating procedures for tube feeding, commercial formulas, side effects of tube feeding and principles of nutrition therapy. The pre- and post-internship average scores were 48.8 points and 86.4 points, respectively. There were some restrictions to this course. For example, tube feeding is usually handled by nurses. Perhaps interdisciplinary teaching can increase

the comprehensiveness of the games. Another limitation is that GBL-based class size must be kept small. Despite these limitations, following changes to the curriculum, nutrition interns became more interested in the content of the course. This contributed to better learning outcomes and enhanced teacher-student interactions to increase overall satisfaction. The introduction of GBL can increase interaction, effectiveness, and fun. Games are beneficial pedagogical tools that can be extended to other healthcare-related courses.[8]

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