Community Based Review, Implementation, and Evaluation of Nutrition Course plan in the Doctorate of Medicine and Baccalaureate of Nursing by Nutritional Need Assessment

Mahshid Naghashpour (mnaghashpour@gmail.com)
Abadan Faculty of Medical sciences

Mitra Amini
Shiraz University of Medical Sciences

Armin Khaleghjoo
Abadan University of Medical Sciences

Abdollah Khanzadeh
Abadan University of Medical Sciences

Atefe Zahedi
Abadan University of Medical Sciences

Leila Fakharzadeh
Abadan University of Medical Sciences

Sahar Golabi
Abadan University of Medical Sciences

Samaneh Mansouri
Abadan University of Medical Sciences

Maryam Adelipour
Ahvaz Jondishapour University of Medical Sciences Faculty of Medicine

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Research article

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Abstract

Background: Training needs assessment is the process of identifying educational needs. The project aims to determine the priorities of nutrition-related health problems in the Southwest of Iran through training needs assessment. This process designed to review the nutrition course plan based on the community needs, implementation, and evaluation to identify the potential strengths and weaknesses of the considered course plan from the students' perspectives.

Methods: The study was designed in five phases: 1) needs assessment by using Nominal Group Technique, 2) review of nutrition course plan, 3) implementation of revised nutrition course plan, 4) qualitative evaluation of the new course plan by students, and 5) comparison of the grade of the students in the new course by students in the previous course. Behavioral and non-behavioral causes of the nutrition-related health problem priorities were determined using the nominal group technique. A review of the nutrition course plan was done. A revised course plan was implemented for medical and nursing students in two semesters. A conventional content analysis was applied to analyze the qualitative data obtained from the students' semi-structured interviews. The mean of semester exam scores was compared between the students trained with the revised course plan and the previous one by one-way ANOVA.

Results: The conventional content analysis identified three major themes: perfect educational content, shortcomings, and strategies. Medical students trained with the revised course plan in the first semester obtained a higher semester exam score compared to the students trained with a revised course plan in the second semester. Also, semester exam scores were higher among nursing students trained with the previous course plan compared to the students trained with the revised one ($p<0.05$).

Conclusions: Needs assessment provides an opportunity for a community-based review of the nutrition course plan. Evaluation of the implementation of the revised course plan allowed the students to state experiential learning that enables them to identify the educational needs as future employees and explore shortcomings and strategies to improve the medical education programs.

Background

Need is the "gap" between current and desired conditions or "wants." The disparity between the current and wanted conditions must be measured to identify the need appropriately [1]. A needs assessment is a part of planning processes, often used for improvement in education/training [2]. Training needs assessment (TNA) is the introduction of the educational objectives selection and an essential foundation for designing and setting a curriculum program and its elements. TNA is the process of identifying educational needs leading the training to help achieve the organizational goals. TNA is an essential part of a successful educational program. Moreover, TNA makes the necessary changes in the behavior of learners and creates critical abilities in the individual and society [3, 4]. Most organizations develop and implement education without studying and analyzing needs. These organizations are at risk of being over-trained, less trained, or wholly abandoned [3]. TNA results allow the administrator to set up educational goals based on the answers to two fundamental questions: who needs education and what training is needed [5].

One of the educational goals is to address everyday tasks and attempt to meet society's needs. On the other hand, learner needs and community needs overlap. Although TNA is done to determine educational goals based on learner and community resources, in many cases, the learner's need is considered to be the community's need. Also, community needs will be the learner's need. Research methods of social sciences such as observation, interview, questionnaire, and documentary review are used in the study of social needs. A needs assessment based on a survey is a way of asking the group or community members what their most important needs are [6]. This type of study is conducted using a written questionnaire or interview, and respondents are employees, managers, graduates, or specialist professionals of the desired field.

Also, to help in the design and implementation of training courses, it will also be helpful in revising and improving the curriculum for the students [4]. Studies show that the results of the TNA can be used to design students' educational curriculum, leading to the promotion of adequate health care by them in their future job [7]. Reports have emphasized the need to reform medical education to bring it into an agreement with society's needs and expectations [8]. Historically, less attention has been paid to nutrition sciences in the curriculums of many medical schools. In 1985, the National Academy of Sciences of the United States published an essential report on nutrition education in medical faculties [9]. The results showed that most medical schools in the United States did not provide proper nutrition education and did not produce graduates with the necessary nutritional skills in medicine. Studies focusing on undergraduate and graduate medical students in the United States found that they feel the nutrition counseling of their patients is unsatisfactory. The findings also show that physicians, especially early in their careers, do not have much confidence in the necessary knowledge or skills to counsel and motivate their patients to follow a healthy diet and lifestyle [10-12].

Moreover, undergraduate clinical level medical students in Ghana report inadequate nutrition education and preparation during their training at school [13]. However, the provision of nutrition recommendations and care to the patients by doctors is essential in promoting healthy dietary habits, and such interventions can lead to reductions in nutrition-related diseases morbidity, mortality, and medical costs [14, 15]. Therefore, physicians, residents, and medical students need more training in nutrition assessment and interventions. A community-based review of nutrition course plans may support and facilitate more robust medical and nursing nutrition education and training.

On the other hand, to be more successful in medical education and to detect the strengths and weaknesses of the curriculum in this field, assessment of the students' views is essential [16]. In a study, students believed that their nutrition educational experiences will be improved if review and revision of the curriculum is implemented to incorporate nutrition [13]. However, studies investigating the students' perspectives on the adequacy of nutrition education in medical sciences are insufficient.

In this study, the priorities of nutrition-related health problems in Abadan, Khoramshahr, and Shadegan in Southwest of Iran have been determined to review the nutrition course plan at the meso level based on the community needs. Moreover, students' views on the reviewed course plan, perceived shortcomings, and strategies to improve nutrition educational experiences are explored.

Methods

This study was conducted in Abadan Faculty of Medical Sciences in 2017-2019. Abadan Faculty of Medical Sciences covers the communication of three cities and their suburbs including Abadan, Khorramshahr, and Shadegan, in the Khuzestan province, in the Southwest of Iran in terms of medical education and health care. Moreover, this faculty is located in the fourth educational spatial region from the ten educational spatial areas of the Ministry of Health and Medical Education, the executive branch responsible for medical education and health within the Iranian government. Ten areas of spatial planning show the geographical breakdown of medical universities in Iran, which is approved in the form of a resolution by the Council of the Cultural Revolution as a macro-policy maker of Science and Technology in Iran [17].

The study was designed in five phases: 1) needs assessment by Nominal Group Technique (NGT), 2) review of nutrition course plan, 3) implementation of revised nutrition course plan, 4) evaluation by students and 5) comparison of the grade of the students in the new course by students in the previous course.

First phase: Using NGT to identify the causes of nutrition-related health problems

In the first phase, NGT was used to determine the required and essential priorities for nutrition education. This phase was completed in two steps:

In the first step, the participants, including 13 nutrition experts, declared five priorities of nutrition-related health problems in the community.

These experts were invited to participate in the study by sending an official invitation letter from the university's deputy educational director. They completed worksheets developed by high-level policymakers of Iran's Ministry of Health and Medical Education for the Iranian community-based assessment [18]. Each expert was asked to record the first ten nutrition-related health problems observed in the city of her/his workplace. A nutrition-related health problem was a nutrition problem that directly threatens people's health. The resources and examples used to identify the problem were also listed in front of each of the problems. Then, all nutrition experts scored the listed nutrition-related health problems from 1 to 5. This ranking based on the extent of the problem, the possibility of intervention, the effectiveness of education in solving the problem, the urgency of the problem, and the social and organizational acceptability of problem-solving. For the same scoring, the scores were selected according to the following qualitative criteria: very low = 1, low = 2, average = 3, high = 4, and very high = 5. The scores gave to each problem was summed up, and a total score was obtained for that problem. Finally, five problems with the most obtained score were declared as priorities for the needs assessed nutrition-related health problems.

In the second step, an expert panel was assembled that consisted of 9 experts in health, nutrition, medicine, and nursing. In this panel, the NGT [19] was used to identify a preliminary list of causes of each problem in the region and categorize them into "behavioral" and "non- behavioral" types. NGT in this project lasted approximately four hours and was facilitated by the first author. Following a description of the process, group purposes with a statement of the importance of participant's contribution, clarification of the members' roles, and an explanation about how the group's output would be used, the NGT session was conducted in five steps [20].

Step 1: Silent generation of causes priorities.

Participants were asked to take 15 minutes to consider the following question: “What are the priorities of the behavioral and non-behavioral cause of nutrition-related health problem X in our region?” and write down their responses in private.

Step 2: ‘Round robin’ recording of causes priorities.

Each contributor was requested to express one cause priority at a time, and his/her idea was written on the flip chart without evaluation. Then, the round repeated, and each time, the most critical comment expressed.

Step 3: Clarification of causes priorities.

Each idea discussed. Participants were encouraged to share their views and express their opinions about the pros and cons of each item. There was a further explanation about each item, so everyone in the group had a full understanding of the concept. Step 4: *Collapse of causes priorities.*

The facilitator organized all the listed causes priorities into “behavioral” and “non- behavioral” groups, simplified them, and duplications identified and removed. These were written on a new flip chart and discussed with the group, to ensure that all participants understood and approved of the assembled causes priorities.

Step 5: Ranking of causes priorities.

Each participant was asked to rank the items on a card and allocated a point between one and five to each cause with their first preference receiving five points and their fifth predilection earning one point based on two criteria including the importance of the reason and the possibility of changing the purpose. The average score was calculated for each item. At this stage, all items that had received a rank listed so that all participants could observe them. The items were then ranked according to the average point. Then, nine experts reviewed the rankings, and agreement reached on the final list of five priorities of “behavioral” and “non-behavioral” causes.

Second phase: Review of nutrition course plan

In the second phase, the "General Principles of Nutrition" course plan in medical doctorate, and the "Nutrition and Nutrition Therapy" course plan in the bachelor of the nursing program reviewed.

Third Phase: Implementation of revised nutrition course plan

In the third phase, the revised course plan presented to the medical (n=124) and nursing (n=128) students in two consecutive semesters (1st and 2nd semester of the academic year 2018-2019) through lecture, question and answer, group discussion, team-based learning (TBL), and virtual teaching in 17 sessions.

Fourth phase: evaluation by students

In the fourth phase of the study, evaluation of implemented lesson plans was carried out via a researcher-made written form that provided to the participants, including doctorate of medicine (n=65) and baccalaureate of nursing (n=46) students who trained with revised course plans at the end of each semester. The form included two open questions: 1) “How was the quality of educational content?”; 2) “Did the educational headings meet your educational needs as a physician/nurse who will work in this community in the future?”. The responses

recorded in written form without the mention of the name. The students assured about the confidentiality of the information. They were free to respond or not respond to all or part of the questions.

Method for the interpretation of the qualitative data was through a coding and systematic categorizing process [21]. The conventional content analysis was applied to analyze the qualitative data. The purpose of conventional content analysis is the description of a phenomenon. This type of project is most appropriate when the existing theories or research literature about the studied phenomenon are limited. In this study, the researchers avoided some preconceived categories. However, the primary and secondary categories were induced from data, instead. In this case, the researchers were floating themselves on the waves of the data until they reached a new understanding [22]. The information gathered through written form was analyzed using meaning association. That is, data analysis began by reading them repeatedly to find a thorough understanding of them. Based on her perception and understanding of the text, the researcher started to write the initial analysis to create the backgrounds for the development of codes. In other words, we determined the meaning unit and compressed it to specify the systems (Table 1). Then, the researcher categorized data by the combining, grouping primarily, and organizing of codes as context-based. Finally, secondary categorization was used based on the abstract thinking of the researcher induced from data while they were saturated in terms of classification [16]. In other words, the overall concept was the resulting sum of these categories (themes) obtained. Finally, three themes were formed, and the researcher compiled a report about the strengths and weaknesses of the nutrition course plan according to the obtained themes (Tables 3 and 4).

Fifth phase: comparison of the grade of the students in the new course by students in the previous course.

In the fifth phase, the semester exam scores compared between the students trained with the revised lesson plan in the 1st and 2nd semester of academic year 2018-2019 and the students trained with the previous lesson plan in the second semester of 2017-2018 by one-way ANOVA followed by Tukey HSD post hoc test using IBM SPSS statistics version 21. The mean difference was significant at the 0.05 level. The methods of teaching, educator, and teaching environment were similar in all three semesters.

Results

Nominal Group Technique (NGT)

The final ranking of each nutrition-related health problem's priority in Abadan, Khorramshahr, and Shadegan from the training need assessment was recognized based on the mean scores obtained by the survey. The top five priorities identified in Abadan were: obesity in adults, hypertension, overweight, obesity, and anemia in pregnant women; type 2 diabetes mellitus and vitamin D deficiency in adults; non-alcoholic fatty liver diseases; and overweight and obesity in children, respectively. Also, the top five priorities recognized in Khorramshahr were type 2 diabetes mellitus, increased consumption of high-carbohydrate and fast foods, vitamin D deficiency, overweight and obesity with an emphasis on abdominal obesity; and hypertension, respectively. Moreover, the top five priorities documented in Shadegan were anemia in pregnant women and type 2 diabetes mellitus in adults; incorrect dietary pattern and inappropriate food habits; severe wasting in children aged 5 to 12 years; overweight and obesity in pregnant women and hypertension; and osteoporosis. It is necessary to explain that the nutrition-related health problems with the same score obtained the same priority in the training needs assessment phase.

Identification of causes for nutrition-related health problems by NGT

Behavioral and non-behavioral causes for each nutrition-related health problem were determined using NGT and prioritized according to a scoring system by two criteria. Table 2 shows an example of the prioritization of behavioral and non-behavioral causes of “obesity in adults” as the first priority of nutrition-related health problems in Abadan. “Snacking” was the first behavioral and “using technology” was the first non-behavioral cause of obesity between adults in Abadan.

Review of nutrition course plan

The results of the first phase of the study was used for the review of medical and nursing nutrition course plans. In the doctorate of medicine's nutrition course plane: (1) adding the section "understanding the common nutrition-related health problems in the community and their behavioral and non-behavioral causes," (2) changing the "malnutrition induced disease" section to "the spectrum of malnutrition from underweight to overweight and obesity in children and adults, obesity-related complications such as diabetes and non-alcoholic fatty liver disease, nutritional anemia (with an emphasis on the gestational anemia), prevention, diagnosis, and treatment of vitamin D deficiency". In the baccalaureate of nursing's nutrition course plan: (1) adding sections "understanding the common nutrition-related health problems in the community and their behavioral and non-behavioral causes" and (2) adding the section "nutrition therapy for obesity in children and adults, non-alcoholic fatty liver disease, and kidney disease". Revised nutrition course plans were approved for implementation by nutrition and nursing departments, as well as the members of the Responsive and Justice-Oriented Training Package of Abadan Faculty of Medical Sciences, Abadan, Iran.

Evaluation by students: Qualitative content analysis

A total of 158 students, including 49 (31%) males, 47 (30%) females, and 96 (60.8%) undetermined gender participated in the “evaluation by the student” phase. The mean and standard deviation of the students' ages was 20.9±3.5, with a range of 18-32 years.

The results of the qualitative content analysis on the course plan implemented in two consecutive semesters are provided below, separately. Based on the initial coding, 81 codes were obtained from the answers to 2 study questions. The number of initial codes were 37 for answers to “How was the quality of educational content?” (27 for medical and 10 for nursing students) and 44 for answers to “Did the educational headings meet your educational needs as a physician/nurse who will work in this community in the future?” (28 for medical and 16 for nursing students). Then, coding treatment was done by removing the duplicate and similar codes and merging the overlapped ones. Final codes for each question were 27 (18 for medical and 9 for nursing students) and 31 (20 for medical and 11 for nursing students), respectively. These codes were classified based on the conceptual similarities and differences and then summarized. Finally, the students' comments on implementing the revised course plan emerged in three main themes, including entire educational content, shortcomings, and strategies. Answering the descriptive question no.1, 22 (52.9%) of the medical students considered the educational content as perfect and practical, 15 (29.4%) mentioned shortcomings, and 9 (17.6%) suggested strategies (Table 3).

Answering the descriptive question no. 2, 30 (50%) of the medical students stated that their educational needs as a physician who will be working in the community in the future had been fully met. However, 7 (11.7%)

reported shortcoming in their training as a future physician, and 23 (38.3%) described strategies to meet the nutritional education needs of a physician in the future.

Moreover, answering a question no 1, 22 (47.8%) of the nursing students left it unanswered, 5 (10.9%) considered the educational content as perfect and practical. In need of modification, 7 (15.2%) considered the educational content incomplete and 7 (15.2%) found the educational content excessive for the nursing student's educational needs. Also, 17 (60.7%) of the nursing students stated that their training needs as a nurse who will be working in the community in the future had been fully met, 3 (10.7%) declared shortcoming, and 8 (28.6%) stated strategies to meet the nutritional education needs of a nurse in the future (Table 4).

Sample question of written form: “How was the quality of educational content?” Part of the answers of students was: “*It would have been better if the students had done more practical work* (less attention to practical aspects of the course plan).”

It is necessary to mention that students who did not have any comment or information on the educational content or educational needs of a future physician/nurse based on their answers, were not included in the secondary categorization.

Comparison of the grade of the students trained with in the new course by group of students in the previous course

Based on a quantitative assessment, medical students trained with the revised course plan in the first semester of the academic year 2018-2019, obtained a higher semester exam score compared to the students trained with a revised course plan in the second semester of the same academic year ($p \leq 0.001$). However, there was no significant difference in semester exam scores between students studying in the first semester of the academic year 2019-2018 trained with the revised course plan and the ones in the second semester of the academic year 2018-2017 trained with the previous course plan ($p > 0.05$). Moreover, the mean and standard deviation of semester exam scores was significantly higher among nursing students trained with the last course plan compared to the students trained with the revised one in both the first and second semester of the academic year 2019-2018 (Table 5).

Discussion

The overall goal of this study was a community-based educational need assessment aimed to improve the nutrition course plan in the doctorate of medicine and baccalaureate of nursing and identify the strengths and weaknesses of the reviewed and implemented course plan from the students' views. The review was carried out by twenty –one expert in health, nutrition, medicine, and nursing. One hundred-eleven student commented about the elements of the reviewed course plan.

We used the extracted society's needs for the community-based review of nutrition course plans in the doctorate of medicine and the baccalaureate of nursing. The results illustrated the nutrition-related health problems observed in three cities covered by Abadan Faculty of Medical Sciences as the society's needs. Obesity in adults, type 2 diabetes mellitus, and gestational anemia were the first priorities in the community. Moreover, behavior and non-behavior causes were determined by NGT and snacking, wrong cooking method, and eating habits, as well as insufficient nutrition knowledge, were found the most critical behavioral causes of obesity in the

community. Many reports have emphasized the need to reform medical education to align it with society's needs [8]. We do know that obesity and diabetes are distressing medical conditions from which people suffer and die every day [23]. Primary care physicians (PCP) must be prepared to treat a variety of nutrition-related health problems, such as diabetes and obesity, with nutrition advice [24]. If the medical community is aware of social needs, it can be skilled at examining and treating the underlying determinants of disease, such as psychosocial and biological elements. Therefore, while many of the potential new topics may be valuable, the inclusion of new subjects in the course plans should be based, at least to some extent, on society's needs and impact on patients' health and quality of life. However, disadvantageously, lecture hours in which the medical training may emphasize behavioral, social, and epidemiological sciences have been reduced [25]. The aim of improving medical education is to train physicians and nurses to deliver better health care and, ultimately, to achieve better health and quality of life for the community [19]. Like every other science, improving the quality and vitality of medical education is dependent on applying the best evidence from health-related problems in priority areas [26]. The literature review showed that from 1996 to 2013 three articles published. Theses papers were in the field of geriatric nutrition training curriculum for nutrition/dietetics programs [7], essentials of nutrition education in medical schools [27], and the need to revise the nutrition curriculum for nutrition students [28]. Today, significant reforms in undergraduate medical education (UME) and graduate medical education (GME) curriculum provide a new impetus and novel opportunities to expand medical nutrition education and training nationwide [29].

The results also showed that more than fifty percent of medical and ten percent of nursing students found the educational content complete and practical. Moreover, training needs had been fully met among more than half of medical and nursing students as physicians/nurses who will work in the society in the future. However, the following course plan review in the field of nutrition from students' views was debatable in the Southwest of Iran. As our results showed, many factors contribute to shortcomings in medical nutrition education and training. Among these are incomplete and out of the chart educational content for future physician duties, compact educational content and inconsistency with the numbers of lesson units, lack of sustainability of educational content in mind, time constraints for student study, and educational system problems. Besides that, factors that contributed to shortcomings in nursing nutrition education and training were inappropriate, difficult, and excessive educational content for nursing students, insufficient English language skills to extract key points, as well as the lack of sustainability of educational content in mind. However, the strategies to improve medical nutrition education and training quality were focused on the more practical and clinical educational contents, non-community based nutrition education due to the presence of non-native students in the class, further focus of education on the medical nutrition therapy topics, and the assessment of the nutrition-related health problems in the community according to the specific service area of medical graduates. Also, strategies to improve nursing nutrition education and training quality were focused on the need for attention to practical and clinical aspects of the course plan. In a similar study on undergraduate medical students at the 5th to final year in Ghana, students' opinions on the role of physicians in nutrition care, perceived barriers, and strategies to improve nutrition educational experiences were explored. Students opined that physicians play an essential role in providing nutrition care to their patients. However, they felt their nutrition education was inadequate due to lack of priority for nutrition education, lack of faculty to provide nutrition education, poor application of nutrition science to clinical practice, and weak collaboration with nutrition professionals. Moreover, students also believed that their nutrition educational experiences would improved by using some strategies. These strategies are: implementation of innovation in teaching and learning process, full and initial insertion of nutrition as a

subject throughout the curriculum, increasing attentiveness to the importance of nutrition education, and review and revision of the curriculum to include nutrition [13]. For more attention to the practical and clinical aspects of the course plan, special skills should be declared, and applied reference should introduced. With the potent combination of theory and practice, medical and nursing students can achieve the expected practical and functional aspects of capabilities in the clinical setting in which they will work in the future. Educational policies are moved more toward the practical application of knowledge to transfer the realistic nature of the field in the real environment. However, teachers have paid less attention to practical aspects [16]. Some interventions in the community by medical and nutrition students are required.These students can hold a community nutrition cooking class for low-income population in some medical and nutrition schools such as Brown and Boston medical schools [30, 31]. This kind of activity may improve undergraduate and graduate medical nutrition education by integrating theoretical and practical learning along with community health management activities [29].

The comparison of the mean scores between the nursing students trained with and without the revised course plan showed that the groups trained with the revised course plan obtained a significantly lower semester exam score than the students trained with the previouse one. Also, the medical students studying in the second semester had a lower exam score than the students in the first semester taught with revised course plan. It seems that revising the course plan harms the mean scores of nursing students. On the other hand, for medical students, given the hardness and compactness of other courses effecting student learning quality and learning opportunity, the effectiveness of the revised course plan on student learning quality was undermined.

One of the limitations of the present study was that the quality assessment of the revised course plan with descriptive questions and determination of relevant themes were performed only on students whose training was based on the revised course plan. Descriptive questions did not assess students who trained with the previous course plan. The other limitation was that the data collected from Abadan Faculty of Medical Sciences may not be representative of all Iranian communities. However, we know that in a qualitative revision, we are not trying to reach external validity [32].

Conclusion

The results of this study showed that educational need assessment methods at the community level to determine the nutrition-related health problems could be used to review medical and nursing nutrition course plan. Also, the evaluation of trained medical/nursing students' views can be used to identify their educational needs as future employees, the shortcomings, and strategies to reinforce the reviewed course plan.

Declarations

Ethics approval and consent to participate

This project was approved for conduct by the Ethics Committee of Vice-Chancellor in Research Affairs, Abadan Faculty of Medical Sciences, Abadan, Iran (Code: IR.ABADANUMS.REC.1398.052). All participants received verbal and written information about the research project before formal acceptance to participate. Students participated in the study voluntarily and their names were not revealed in the written forms.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

MN contributed to the concept and design of the study. MN, LF, AK, AK, AZ, SM, SG, and MA conducted the acquisition of data. MN and LF analyzed and interpreted the data. MN and MA were major contributor in writing the manuscript. All authors read and approved the final manuscript.

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Abbreviations

GME (Graduate medical education); NGT (Nominal group technique); PCP (Primary care physicians); TBL (Team based learning); TNA (Training needs assessment); UME (Undergraduate medical; education)

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Tables

able 1 Example of the meaning units, compressed meaning, and the codes of ques

nswers by students

estion	Meaning unit	Compressed meaning unit	Code
y was the ity of cational ent?	There was no limitation in educational content. The topics were very good and practical	Practical and appropriateness of topics and educational content	Applicability and appropriateness of educational content
	The content was very memorable. It would have been more effective for the students if it was a little more practical.	Lack of fitness between practical and theoretical contents which would make it more effective	Inappropriatenes of practical contents
the cational lings meet educational ls as a sician/nurse will work in community e future?	The contents of the course plan can meet my educational needs partially, but I should observe the shortcomings in the actual position.	Course plan helps the person in the real environment, partially	Relatively community-oriented course plan
	The educational headings were more than a physician / nurse's educational need who will be working in the community	Educational content is not suitable for a nurse in the real environment	Inappropriateness of course plan for a nurse

Table 2 A sample of prioritization of behavioral and non-behavioral cause prioritized nutritional-related health problems*

Prioritized nutritional-related health problem	Type of cause	Rank	Cause
Obesity in adults	Behavioral	1	Snacking
		2	Wrong eating habits, low physical activity, irregular sleeping and waking hours
		3	Insufficient nutrition knowledge
		4	Wrong cooking method, advertising
		5	Nervous overeating
	Non-behavioral	1	Using technology
		2	Easy and convenient access to restaurants
		3	Secondary obesity caused by diseases
		4	Bad weather
		5	Residence in the apartment

* Two criteria including “importance of the cause” and “possibility of changing the cause” were used to prioritize the ca of problems.

Table 3 The themes extracted from answering the “How was the quality of educat content?” *

Themes	Primary categorization	Medical students (n=62) ▯	Nursing students (n=46) ▯
Perfect educational content		Complete and flawless educational content	
Shortcomings		Incomplete and out of the chart for future physician duties	Inappropriate and excessive educational content for nursing graduates
		Compactness and inconsistency with the numbers of lesson units	Difficult educational content and insufficient English language skills to extract key points
Strategies		Need to be more practical and include clinical educational contents	Need for attention to practical aspects of the course plan
		Need for the specific sources and booklets	

*Descriptive statistics was conducted to analyze data; ▯ Six (9.7%) medical and 22 (47.8%) nursing students did no answer this question.

Table 4 The themes extracted from answering the “Did the educational headings r your educational needs...?”

Themes	Primary categorization	Medical students (n=62) ▯	Nursing students (n=46) ▯
Fully meet the educational need		Meeting the nutritional education needs of a future physician/nurse working in the community	
Shortcomings		Student problems and lack of sustainability of educational content in mind Time constraints for student study Educational system problems Non-community based nutrition education due to the presence of non-native students in the class	Lack of sustainability of educational content in mind Importance of practical and clinical educational contents
Strategies		Further focus of education on the medical nutrition therapy topics Assessment of the nutrition-related health problems in the community according to the specific service area of medical graduates	

*Descriptive statistics was conducted to analyze data; ▯ One (1.5%) medical and 16 (34%) nursing students did no answer this question.

Table 5 Comparison of semester exam scores between students trained with revised and the previous course plan*

Academic year	Second semester of academic year 2019-2018 (trained with revised course plan)	First semester of academic year 2019-2018 (trained with revised course plan)	Second semester of academic year 2018-2017 (trained with the previous course plan)	*p*-value
Major				
Medicine	**n=20**	**n=56**	**n=48**	**≤0.001**
	11.9±2.1	14.2±1.9	13.8±2.1	
Nursing	**n=46**	**n=45**	**n=37**	**≤0.001**
	11±1.7	11.3±2	13.8±2	

*Data have been presented as mean and standard deviation (SD). One-way ANOVA followed by Tukey HSD test was conducted to analyzed data.