

Cooperative learning strategies to teach nutrition to geriatric nursing staff

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SUMMARY. The objective of this study was to test the hypothesis that cooperative learning strategies will help to increase nutrition knowledge of nurses and nursing assistants caring for the elderly in different institutional communities of the Basque Country, Spain. The target population was a sample of volunteers, 16 nurses and 28 nursing assistants. Training consisted of 12 nutrition education sessions using cooperative strategies conducted over a period of 3 consecutive weeks. The assessment instruments included two pretest and two posttest questionnaires with questions selected in multiple-choice format. The first questionnaire was about general knowledge of applied nutrition (0-88 point scale) and the second one on geriatric nutrition knowledge (0-18 point scale). Data were analyzed using SPSS vs. 11.0. The outcomes indicated a significant increase in general nutrition knowledge (difference between the pre- and post-test mean score: 14.5 ± 10.1 ; $P < 0.001$) and in geriatric nutrition knowledge for all participants (difference between the pre- and post-test mean score: 4.6 ± 4.6 ; $P < 0.001$). So the results indicated that cooperative learning strategies could improve the nutrition knowledge of nursing staff. Additionally, the results of this study provide direction to continuing nutrition education program planners regarding appropriate content and methodology for programs.

Key words: Cooperative learning, geriatric nutrition, education program, assessment of knowledge, nurses; nursing assistants.

RESUMEN. Estrategias de aprendizaje cooperativo para la enseñanza de nutrición en personal de enfermería geriátrica. El objetivo de este estudio fue comprobar que las estrategias de aprendizaje cooperativo pueden ayudar a incrementar los conocimientos en nutrición de un grupo de enfermeras y auxiliares de enfermería al cuidado de ancianos en diferentes residencias del País Vasco (España). La población objeto de estudio estuvo formada por 16 enfermeras y 28 auxiliares de enfermería que participaron voluntariamente. La formación consistió en 12 sesiones de educación nutricional en las que se utilizaron estrategias de aprendizaje cooperativo y se llevaron a cabo a lo largo de tres semanas consecutivas. Los instrumentos de evaluación incluyeron dos pretest y dos post-test con múltiples opciones de respuesta. El primer cuestionario fue sobre conocimientos generales (con una escala de 0 a 88 puntos) y el segundo sobre conocimientos de nutrición geriátrica (con una escala de 0 a 18 puntos). El análisis estadístico se llevó a cabo con el programa SPSS versión 11.0. Los resultados indicaron un incremento significativo en conocimientos generales sobre nutrición (diferencia entre el pre-test y el post-test: $14,5 \pm 10,1$; $P < 0,001$) y en conocimientos sobre nutrición geriátrica (diferencia entre el pre-test y el post-test: $4,6 \pm 4,6$; $P < 0,001$). Por lo que podemos concluir que las estrategias de aprendizaje cooperativo pueden mejorar los conocimientos sobre nutrición del personal de enfermería. Además, los resultados del presente trabajo proporcionan información útil sobre contenidos y metodología, para el diseño de nuevos programas de educación nutricional.

Palabras clave: Aprendizaje cooperativo, nutrición geriátrica, programas de educación, evaluación de conocimientos, enfermeros/as, auxiliares de enfermería.

INTRODUCTION

Malnutrition, low body mass index and unintentional weight loss are common problems among the elderly home residents (1,2), who typically have many illnesses and clinical problems associated with malnutrition, for example, dementia, depression, falls and hip fractures (3). Good nutritional status is essential for aged residents because of its importance in maintaining a functional status (4) and preventing illnesses such as infections and pressure ulcers (5).

Given the large number of patient contacts and emphasis on health promotion, geriatric nursing staff may play an important role in elderly resident health. An adequate working

knowledge of nutrition science to enhance health and prevent disease is essential for nurse practitioners and nursing assistants to prescribe appropriate dietary interventions and provide some counselling (6).

Nurses and nursing assistants, however, have traditionally received little nutrition training during their education, or time in actual practice (7,8). Nurses learn their nutrition as a small part of a larger overall curriculum and there is no set nutrition knowledge requirement for graduate nurses (9). Nutrition training is therefore narrow at undergraduate level, and some evidence suggests that update of nutrition knowledge by practising registered nurses is also limited (10-12).

Lindseth evaluated the general nutrition knowledge of a

sample of rural nurses (10), geriatric nurses (11) and graduating nurses (13) using the same validated knowledge instrument. Low knowledge scores were reported in all three of these studies (average 65%) with a small number of the nurses having attended nutrition based continuing education programs. Similarly, Crogan et al. (12) reported low knowledge scores (65%) for 44 geriatric nurses with few nurses having attended nutrition training since formal education.

Without proper nutrition education, it is unlikely that nursing staff will be able to be effective in helping reduce the high incidence of nutrition-related death and disease in the institutionalized elderly population (6). Hence, the problem of lack of nutrition education and knowledge among health professionals becomes an even greater concern.

As the need for appropriate nutrition knowledge and information among nursing staff increases, it is important to find a way to incorporate this information into the educational experience. Nutrition education programs need to be developed, implemented, and studied for their effectiveness in improving the nutrition knowledge of this staff. In some nutrition education programs the cooperative learning method has been used successfully (14). Cooperative learning is a structured, systematic instruction strategy in which small groups work together for a common goal (15).

We developed an educational program using cooperative strategies for nurses and nursing assistants caring for the elderly in different institutional communities. The aim of this study was to test the hypothesis that cooperative learning strategies will help to increase the basic and defining nutrition knowledge of this group of professionals.

METHODS

Subjects

The target population was a sample of volunteers with special interest in geriatric nutrition, 16 nurses and 28 nursing assistants caring for the elderly in different institutional communities that report to the regional Council of Alava and to the Getxo Council (Basque Country, Spain). All of them were adults, aged 20 to 55 years, with at least a secondary school education. The participants who took part in this study were fully informed regarding the purpose of the study and participated anonymously. Informed consent was obtained from all subjects. This study was reviewed and approved by the Institutional Review Board at the University of the Basque Country.

Design of the program

In the first phase of this study we determined the overall instructional goal based on needs of the target population. The needs were assessed using a mail survey. 40 volunteers of the total sample completed a questionnaire that included the fol-

lowing questions: A) What geriatric nutrition topics are you most interested in?; B) What motivates you to learn about geriatric nutrition?; C) What features would help you apply the information from the nutritional education program to your daily job?. Information was transcribed and common themes that emerged were identified. Results from the mail survey are shown in Table 1.

TABLE 1
Summary results mail survey respondents (n=40)^a

<i>Topic</i>	
Nutrition topics of interest	Meal planning Food links to disease Vitamins and minerals Nutrient requirements
Motivators ^b	Preventing and treating disease Fallacies on diet in the literature Quality of life To put the knowledge into practice To improve the competency in caring for patients
Learning transfer topics	Meal planning Menus References to obtain additional information

^aThis information was used to establish the needs of the population, which is then used to establish the goal of the instruction. ^bInformation on motivation was incorporated into the first step of the instructional analysis.

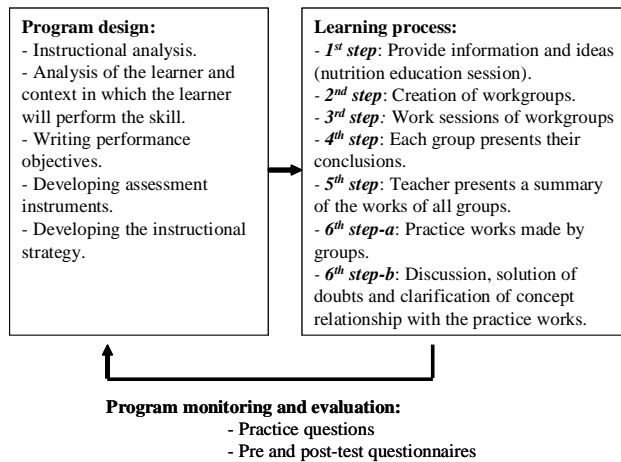
According to the information about the needs of the target population, the program resulted in two sections. The first section included introductory material about nutrition (nutrient digestion, absorption, metabolism, and functions) and dietetic (food sources of nutrients, dietary recommendations, and diet-disease associations). And the second part of the program covered: physiological, sociological and psychological changes associated with ageing, food habits and disease prevention, nutritional assessment, nutrient requirements, quality of diet, nutritional supplements, diet and nutrition myths; dietary treatment for diseases or conditions common in elders; and design and planning of diets for elderly patients.

The design of the program and the summary of the learning process are shown in Figure 1.

Skills included identification and screening of alterations to the nutritional status; dietary and nutritional management of common diseases or conditions in collaboration and consultation with an interdisciplinary team; counselling of geriatric patients about illness and its prevention; health promotion, maintenance, and management.

The last step in the design phase, developing the instructional strategy, consisted making decisions related to how much of information to present at each session, testing the information, selecting pre-instructional activities, writing content to be presented for each objective, and planning activities to aid in the transfer of learning.

FIGURE 1
Summary of the process



Pre-instructional activities involved informing learners of objectives and motivating them to continue the program. Before the beginning of the training, the educators gave information about learning objectives, the instruction process, rules of working in a cooperative group, roles and assessment strategies (16). To aid in the transfer of learning, a guide containing a script to follow while the learner taught the sessions was provided, thus improving the consistency and accuracy of information presented.

Teaching techniques

Training consisted of 12 nutrition education sessions conducted over a period of 3 consecutive weeks. Session time was 75 minutes. The educators were lecturers from the Department of Nutrition of the University of the Basque Country and dietitians with experience in nutrition education.

We used a cooperative learning method combining cooperative groups and problem solving (17). In the 6th step of the learning process, learners apply concepts from the program to the cooperative management of a problem-based case of a patient. Small group discussion, teamwork and discussions with the educators were used in learning. Additionally, examples and practice questions (case studies, games and simulations) were presented in a context where the learner would perform the skill.

To accomplish the objectives of this study, participants exchanged ideas, made plans and proposed solutions. It was the educator's job so encourage to exchange and structure the learner's work to their communication was productive. The sessions were carried out in a space where the participants could work together. Learners were able to sit in a circle or across the table from each other and work without disruption. This way we promoted the face-to-face interaction (second basic element of cooperative learning) (18).

We used a random method of assigning participants to teams and we also randomly assigned participants to new teams each time a cooperative learning exercise was to be done. The groups were mixed and were made up of nurses and nursing assistants. Group members shared the various roles and were interdependent in achieving the group learning goal. The educators observed each group and recorded the frequency with which each member contributed to the group's work (3rd basic element of cooperative learning: individual accountability and responsibility) (18).

While the cognitive process was of primary importance, participants also learnt the importance of maintaining group health and harmony and respecting individual views (4th basic element of cooperative learning: social skills) (18).

Materials used for this program were: A) Food Composition Table (19); B) the Recommended Dietary Allowances for Spanish population (20,21); C) Food replicas (Nasco's Life/form®); D) a Food Guide Pyramid adapted for people aged 70 years and over (22); E) tapes (Wander, Modard-1 model) and Holtain skinfold calipers (Holtain Ltd, Crosswell, Crymmych, Dyfed, Great Britain); F) Mini Nutritional Assessment (23); and G) a board game similar to Trivial pursuit with questions related to the program.

The learners were also able to study literature on nutrition available to them so that they could apply the information individually to the nursing home residents.

Following the training, participants and educators filled in a questionnaire after each session about the effectiveness of cooperative learning strategies. In this questionnaire they were asked about: a) the effects of working in a cooperative group on their behavior, interaction and learning achievement; b) the educator's role during the learning period; and c) their opinion about the activities used during the learning period. This way we tried to improve constantly the learning process (5th basic element of cooperative learning: group processing) (18).

Nutrition tests

The assessment instruments included two pretest and two posttest questionnaires (immediately after the program) with questions selected in multiple-choice format. A panel, comprising four experts in the fields of nutrition and geriatrics, designed both questionnaires.

The first questionnaire was about general knowledge of applied nutrition and the second one was about knowledge of geriatric nutrition. A copy of the questionnaires is available upon request.

Test items about general knowledge of applied nutrition were constructed with input from the expert panel and from the literature (24). And for the geriatric nutrition test some items were taken from existing questionnaire (25) while others were generated from the literature (26-29).

To establish criterion validity, the tests were administered to various subpopulations, selected on the basis of their training, education, and exposure to human nutrition and geriatric nutrition. The subpopulations consisted of lay-people (n= 17), nurses and nursing assistants (n= 22), students of human nutrition and dietetics (n= 18), and professional experts (n= 23) on geriatric nutrition. The differences in mean knowledge scores between the subpopulations were significant ($P<0.001$) and in the expected direction (experts > students > nurses and nursing assistants > lay people).

The two final validation tests consisted of a test comprising 88 items about general knowledge of applied nutrition and a test comprising 18 items about geriatric nutrition. Each knowledge item also carried a don't know response. Responses to knowledge items scored 1 point if correct or 0 point if incorrect. Thus, the possible scores ranged from 0 to 88 for the general knowledge of applied nutrition and from 0 to 18 for the geriatric nutrition test.

The test about general knowledge of applied nutrition was divided into three main sections: A) dietary recommendations (the understanding of terms, such as fiber and cholesterol, and the awareness of dietary recommendations); B) nutrition (nutrient digestion, absorption, metabolism, and functions), and sources of nutrients (knowledge of food sources related to advice, that is, which foods contain which nutrients, and use of the information to make dietary choices); and C) awareness of diet-disease associations.

The geriatric nutrition test included 18 questions of the different lecture areas: A) nutritional status; B) nutritional requirements and supplements; C) ageing factors affecting nutritional status (e.g., chewing/swallowing problems, poor appetite, modified diets, poor dentition); D) foods habits and disease prevention, quality of diet, diet and nutrition myths and nutrition related disorders; and E) interventions to improve nutritional status.

Statistical analysis

Data was analyzed using SPSS 11.0 (SPSS Inc., Chicago, IL, USA) and presented as mean values and standard deviations. In a preliminary analysis of the data, a Kolmogorov-Smirnov test was used to assess normality. The results of this test were taken into account in order to apply a parametric or a non parametric test of comparison among groups. The differences between independent samples (nurses and nursing assistant scores) were analyzed using Student's test and the Mann-Whitney U test. And the differences between related samples (individual scores) were analyzed using Student's test and the Wilcoxon test. Alpha level for all of these analyses was set at $P<0.05$ (two-tail test).

RESULTS

The analysis of the data indicated a significant increase in basic nutrition knowledge for all participants from a pre-test mean score of 64.57 ± 11.62 to a post-test mean score of 74.52 ± 5.31 . Table 2 shows that the post-tests scored consistently higher than the pre-test on all sections of the questionnaire about basic nutrition knowledge ($P<0.01$).

TABLE 2
Differences in general nutrition knowledge scores between pre- and post-test (mean \pm s.d.)

General knowledge section (max score)	Total (n=44)
A. Dietary recommendations (11)	2.55 \pm 1.74 ¹
B. Nutrition and sources of nutrients (57)	9.39 \pm 7.54 ¹
C. Diet-disease relationships (20)	2.82 \pm 3.42 ²
Total (88)	14.52 \pm 10.11 ¹

¹ $P<0.05$, ² $P<0.01$, ³ $P<0.001$

Additionally, the data also showed that nursing assistants differed significantly from the nurses as far as the increase in the basic nutrition knowledge (difference between the pre-test and post-test of the nursing assistants: 14.80 ± 10.28 ; of the nurses: 9.0 ± 7.4 ; $P<0.001$). The mean scores of nursing assistants indicated a significant increase in the basic nutrition knowledge from a pre-test mean of 64.37 ± 11.78 to a post-test mean score of 74.55 ± 5.44 ($P<0.001$). While the data show that there was an increase in the pre-test (69.5 ± 16.36) to post-test mean scores (74.0 ± 15.4) of the nurses, the results were not significant.

Improvement occurred in 84.1% of the learners in the nutrition knowledge, while the remainder (15.9%) has not improved. The results of the responses of the geriatric nutrition questionnaires can be found in Table 3. A significant increase in geriatric nutrition knowledge was found for all participants (difference between the pre-test and post-test: 4.61 ± 4.64 ; $P<0.001$). Differences in scores (between the pre and post-test) between two groups, nurses (2.38 ± 3.1) and nursing assistants (5.89 ± 4.92), were significant ($P<0.01$).

The data also showed that the nurses achieved lower differences between pre-and post-test scores in sections A, C and E of the geriatric nutrition questionnaires, than the nursing assistants ($P<0.05$). Although the nurses scored higher on the pre-test, and showed that they had higher knowledge about the A, C, D and E sections than the nursing assistants ($P<0.01$).

TABLE 3

Differences in geriatric nutrition knowledge scores between pre- and post-test (mean±s.d.)

Geriatric knowledge section (max score)	Total (n=44)	N (n=16)	NA (n=28)
A. Nutritional status (3)	0.84±0.91 [‡]	0.31±0.70	1.14±0.89 [‡]
B. Nutritional requirements and supplements (3)	0.57±0.93 [‡]	0.38±0.89	0.68±0.94 [‡]
C. Ageing factors affecting nutritional status (3)	0.61±1.06 [‡]	0.19±0.75	0.86±1.15 [‡]
D. Food habits and disease prevention, quality of diet, diet and nutrition myths and nutrition related disorders (6)	1.20±1.92	0.63±1.45	1.54±2.10 [‡]
E. Interventions to improve nutritional status (3)	1.39±1.32 [‡]	0.69±1.20 [*]	1.79±1.23 [‡]
Total (18)	4.61±4.64 [‡]	2.38±3.10 [‡]	5.89±4.92 [‡]

N, nurses; NA, nursing assistants; ^{*}P<0.05, [‡]P<0.01, [‡]P<0.001

Regarding the questionnaire about the effectiveness of cooperative learning strategies; the educators suggested that there is a need for some newly developed materials. They also expressed the idea that these strategies were very effective and helped participant's understanding concepts. Participant's learning capacity and ability for working in a group were also increased; they participated in the learning process expressing their opinions.

Learners generally liked the instruction linked to working in a group, believing especially that these strategies helped them to understand concepts. Most participants indicated that working in the group provided opportunities to listen to each other, share ideas and form new friendships. They were generally satisfied with the educators' behavior. They admitted that their motivation increased with increasing interaction with the educators.

DISCUSSION

The analysis of the data collected in the present study indicated that cooperative learning strategies could improve the nutrition knowledge of nursing staff, as was predicted in the hypothesis. Our results were consistent with other authors who have showed that active techniques can increase nurses' participation and as a result can lead to a higher level of learning (30,31). Twenty years ago other authors pointed out that nutrition education classes would more successfully fulfill their purposes when cooperative learning is primarily used (32).

Cooperative learning has been around a long time (33-35). Markedly different theoretical perspectives (social interdependence, cognitive-developmental, and behavioral learning) provide a clear rationale as to why cooperative efforts are essential for maximizing learning and ensuring healthy cog-

nitve and social development as well as many other important instructional outcomes. Hundreds of research studies demonstrate that cooperative efforts result in higher individual achievement than do competitive or individualistic efforts. The combination of theory, research, and practice makes cooperative learning one of the most distinguished of all instructional practices (36).

On the other hand, the nurses scored higher on the pre-tests and showed a marked superiority with regard to knowledge about nutrition. Additionally, the data also indicates that assistant participants differed significantly from the nurses as far as the increase in the nutrition knowledge, both general and specific knowledge. These differences between the nurse and nursing assistant scores may be due to the motivation and the interest. Since other authors found that experienced nursing assistants did not view the nurse as an active participant during mealtimes (6). Although the interaction and collaboration between nurses and nursing assistants during the development of the nutritional education program may enhance learning and program success (37).

We think that the collaborative nursing staff effort served to facilitate learning. Collaboration between nurses and nursing assistants may enhance learning and program success.

Some limitations in this study include: a small sample size and the method of sample selection. The size of the sample limited statistical power. Also, the sample was one of convenience; thus, the subjects may have been more knowledgeable in nutrition principles and intervention, which could skew the results to be more positive than they would be from a representative population sample of all nursing staff.

However this is a pilot study, the results provide direction to continuing nutrition education program planners regarding appropriate content and methodology for programs.

One suggestion for further research might deal with the effect of nutrition education of nursing staff on the health of their patients. It would be important to know if this education program is affecting the health of their patients. This type of study would provide a better understanding of the effectiveness of trying to improve public health by educating nursing staff in nutrition.

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