Int J Clin Exp Med 2019;12(11):13038-13043
www.ijcem.com /ISSN:1940-5901/IJCEM0098752

Original Article

Reform and the application of modularization of the fundamental curriculum of nursing science

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Received June 20, 2019; Accepted October 3, 2019; Epub November 15, 2019; Published November 30, 2019

Abstract: The aim of this study was to evaluate the application effect of the modularization of the fundamental nursing curriculum. In total, 38 nursing undergraduates were allocated to the experimental group. One course consisted of 5 modules according to the reformed fundamental nursing courses. The 5 modules included Module I, Perceptual cognitive nursing, Module II, Basic theory of nursing, Module III, General nursing knowledge, Module IV, Therapeutic nursing knowledge, and Module V, Nursing skill training. Another 49 nursing undergraduates served as the control group. They were taught with 4 independent courses before curriculum reform, including Professional ideology education: Understanding clinical practice, Nursing science introduction, Basic nursing science, Centralized apprenticeship, and Pre-service training. After the implementation of the modular reform of the fundamental nursing curriculum, the average score obtained in the experimental group was 86.50±5.02, the excellence rate was 49.4%, and the overall score of curriculum satisfaction was 98.4±0.71. Neither the average score nor the excellence rate significantly differed between the two groups (both $P>0.05$), but the degree of curriculum satisfaction in the experimental group was significantly higher compared with the degree of curriculum satisfaction in the control group ($P<0.01$). Due to the fact that the modular reform of the fundamental nursing curriculum can reduce the quantity of courses and shorten the total time of courses, after the modular reform, the learning effect is maintained and the students' degree of curriculum satisfaction is enhanced.

Keywords: Fundamental nursing science, modular curriculum, curriculum reform, learning effect

Introduction

The basics of nursing science are the fundamental and major nursing courses, which cover the advanced fundamental theories, fundamental knowledge, and fundamental skills in current nursing science [1-5]. Due to the complex content, long teaching time, and long academic year, this course is jointly implemented through four courses: professional ideology education, clinical practice, nursing introduction, basic nursing science, concentrated training and pre-service training [6-10]. Learning also takes more than one academic year to complete the course. This traditional curriculum has the problems of excessive courses, a long teaching time, overlapping contents, poor intrinsic logistics, and a heavy academic load on the nursing students [11].

In our research team, brainstorming, a literature review, and domestic and foreign surveys were adopted to integrate the above four courses into one fundamental nursing course, according to modular design principles, which consists of five teaching modules including Module I, Perceptual cognitive nursing, Module II, Fundamental nursing theory, Module III, General nursing knowledge, Module IV, Therapeutic nursing knowledge, and Module V, Comprehensive training in nursing skills.

Through the reorganization of the teaching content, the goal of reducing the number of courses from 4 to 1 and shortening the teaching time of the classes from 290 to 260 h can be accomplished. Since the fall semester of 2012, the undergraduates majoring in nursing science were recruited and received the novel nursing courses. The learning effect and the application value of this reformed course were evaluated and statistically compared with the conventional courses.

Materials and methods

Study subjects

According to the principle of convenient sampling, 38 undergraduates majoring in nursing admitted in 2012 were selected for the experimental group, and the reformed course consisting of 5 modules was implemented with its new instructional design and organization. Forty-nine nursing undergraduates receiving four-year undergraduate courses were enrolled in the control group. In accordance with the previous teaching plan of our university, a professional ideological education class was conducted for the understanding of clinical practice, introductory nursing, basic nursing, concentrated internship, and pre-post training. The nursing students in both groups were female.

Methods

Course design and module after reform: The curriculum reform highlights the principles of "three basics", including basic nursing theory, basic nursing knowledge, and basic nursing skills, focusing on training students to realize the concept of student-centered training, and to improve the sense of identity of the nursing profession. According to the teaching content, there are five teaching forms: lectures, seminars, self-study, practical training, and apprenticeship. In terms of the semester setting, the perceptual understanding of nursing-learning basic theory-learning basic technology (general technology to therapeutic technology) - the application of comprehensive skills were implemented.

Pre-reform assessment

The assessment is divided into the theory and practice sections. The theory section includes two mid-term examinations and a final examination. The practice part includes skills and operation and a clinical apprenticeship assessment. The skills and operation examination will be conducted in five mid-term sections and a final examination. The clinical apprenticeship part of the assessment report is based on the assessment report. The scores of three theory examinations accounted for 50% of the total score, of which the mid-term and final examinations accounted for 50%. The scores of the six skills and operation examinations accounted for 45% of the total score, of which the mid-term and final examinations accounted for 50%. The score of the clinical apprenticeships accounted for 5% of the total score.

Calculation formula: Total score = Theory (50%) + Practice (50%)

Theory: [2 mid-term exams (50%) + final exam (50%)] × 50%

Clinical practice: {practice training [5 mid-term exams (50%) + final exam (50%)] × 45% + apprenticeship report (5%)} × 50%.

Post-reform assessment

After the reform, the evaluation and assessment modules were implemented, and the corresponding scores are obtained through one module. The assessment methods consisted of the written knowledge of the theoretical knowledge, the assessment of operating skills, seminar performance, drafting of the apprenticeship report, and the writing of five types of reviews. The advantages after the reform include the fact that the assessment procedures are divided into different modules to deliver the assessment in a timely manner after the completion of the courses, which avoids the disadvantages of the conventional courses before the reform. Moreover, the apprenticeship report, the seminar performance, and the review writing were integrated into the evaluation process to guide the students to integrate knowledge acquisition, ability training, and quality improvement and to pay attention to their overall development.

Observation parameters

The main parameters include the average score of the basic nursing courses and the excellence rate of students with a score ≥ 85. The secondary parameter consists of the degree of satisfaction of the nursing students with the courses. The theory examinations in the two groups were based upon the question database and the number of questions remained unchanged. The contents and scoring standards of the operation assessment were unchanged, and the change rate of the teaching faculty was less than 10% to minimize the influence of the teaching faculty on the examination performance. The course satisfaction rate was

assessed by using the "Survey Form of Student Satisfaction with Courses" designed by the Third Military Medical University. The contents consist of teaching design, teaching content, teaching implementation, teaching effect, and teaching faculty. The total score is set at 100.

Statistical analysis

A statistical analysis using SPSS 20.0 was performed for each parameter. The results were presented as the mean ± standard deviation (SD). A Chi Square statistic was used for testing the relationships between categorical variables. $P<0.05$ was considered to be statistically significant.

Results

Baseline data

All enrolled students were qualified for the College English Test (CET) band-4 before their junior year. They were proficient in the use of computer software and in conducting a literature review. The average age in the control group was (19.16±1.12) years old and (19.13±1.14) years old in the experimental group (t=0.126, P>0.05). There were no significant differences between the two groups in terms of age, admission test scores, written and verbal English communication, and computer applications after enrollment.

Course design after curricular reform

In the first semester, Module I, Perceptual cognitive nursing was given with a total of 20 h of study (3 h of lecture time, 15 h of clinical practice, and 2 h of workshop). Nursing students received clinical nursing care and have a basic emotional understanding of the nursing discipline and work. Course contents: development and basic concepts of nursing science; Internship contents: hospitals, ward environment, characteristics of nursing work, and routine work content; Workshop: summarize the teaching effect and experience.

In the second semester, Module II, Basic nursing theory was delivered, including 36 h (27 h of lectures, 5 h of self-study, 1 h of workshop and 3 h of clinical apprenticeship). The course contents cover the basic concepts, basic theory, nursing ideology, and the basic working methods of nursing. Lecture contents: health and illness, needs and culture, growth and development, stress and adaptation, interpersonal relationships in nursing work, scientific thinking methods, and clinical nursing decisions, nursing procedures, nursing theories and models, hopeless disappointment, care and law. Self-study contents: cross-cultural nursing theory, system model framework, healthy behavior interaction model framework; apprentice content: nurse and patient roles, and interpersonal relationships.

In the fourth semester, Module III, General nursing knowledge, with a total of 75 h was administered (30 h of lectures, 12 h of workshops, 29 h of skill training and 4 h of clinical apprenticeship). The main course contents cover nursing knowledge and skills closely related to daily life and safety. Lecture contents: environment, nursing care on admission and discharge, prevention and control of nosocomial infections, comfort and safety, hygienic care, rest and activities, diet and nutritional care, assessment and nursing of vital signs; Workshop contents: occupational injury and the protection of nurses, prevention and nursing of bedsores; Clinical training contents: linens and bedding replacement, decubitus placement and handling, aseptic technique and isolation techniques; assisting patients with relaxation and activity training, nasal feeding, vital sign measurement, oxygen absorption, and suction; Apprenticeship contents: disinfection and isolation technology.

In the fifth semester, Module IV, Therapeutic nursing knowledge, was implemented with a total of 103 h including 34 h of lectures, 12 h of workshops, 49 h of skill training and 8 h of clinical apprenticeship. The courses primarily cover nursing knowledge and skills closely related to treatment and rescue. Lecture contents: hot and cold therapy, excretion, administration and doctor's advice, intravenous fluid and blood transfusion, observation of illnesses and the rescue of critically ill patients, terminal care, medical and nursing documents; Workshop contents: safe administration, management of critical patients; Training content: Enema, catheterization, injection, intravenous fluids and blood transfusion, basic life support techniques; Apprentice contents: medication and medical advice, medical and nursing documentation.

Table 1. Comparison of the mean scores and the degree of course satisfaction before and after reform

Groups (n)	Mean score	Maximal score	Minimal score	Excellent rate (%)	Degree of satisfaction
2012-grade (38) Experimental group	86.5±5.02	100	73	49.4	98.4±0.71*
2010-grade (49) Control group	84.4±3.14	89.6	76.5	48.9	95.6±0.82
Module I (n=38)	95	100	93	60.5	99.1
Module I (n=49)	93	89.6	90	60	97.1
Module II (n=38)	85	92	76	31.6	98.4
Module II (n=49)	84	87	78	30	95.1
Module III (n=38)	82	91	73	55.3	97.4
Module III (n=49)	80	87	78	56.6	95.0
Module IV (n=38)	84	92.7	76	50.0	98.6
Module IV (n=49)	80.6	88	76.5	49	95.2

*P=0.002 compared to the control group.

In the sixth semester, Module V, Comprehensive training of nursing skills, was implemented for 26 h (21 h for comprehensive skill training and 5 h of operation assessment). Basic nursing operating techniques were reviewed and consolidated. Training contents: bed preparation, measurement of vital signs, basic life support techniques, aseptic and isolation techniques, nasal feeding, oral care, oxygen absorption and suction, catheterization, various injections, and intravenous infusion.

Assessment scores and the satisfaction rate

After the implementation of the modular reform of the nursing basic courses, the average score of the first four modules of the 2012 nursing students was 86.5±5.02, the excellence rate (a score ≥ 85) was 49.4%, and the degree of course satisfaction was 98.4±0.71. There was no significant difference in terms of the average score and the excellence grade rate before and after the curricular reform (t=1.826, P=0.087). However, after the reform, the nursing students' degree of course satisfaction significantly enhanced (t=9.825, P=0.002). The detailed results are illustrated in **Table 1**.

Discussion

The research team made a field trip to the nursing specialty courses of three nursing colleges, including the University of Michigan, Flinders University in Australia, and Hong Kong Polytechnic University. We noted that the characteristics of the overseas nursing undergraduate courses are: the number of nursing courses available is small, and the curriculum is designed into multiple modules. Each module is implemented during a respective semester as the time limit. The characteristics of the modularization of the basic courses in international universities are as follows [12, 13]. First, each course module is designed as an independent unit and miniaturized curriculum, which can be completed in just a few weeks. During the process of course design, although each course module is closely correlated, they are also relatively independent. There is a starting point and an ending point for each course. Second, each course module has an independent scoring criterion and assessment methods. These assessment methods and standards require a clear explanation and a strong operability. Third, the curriculum module is not simply a module name. Instead, it is a novel course mode which is different from the conventional curriculum which should be completed in multiple semesters. To adopt such a course model, fusion, deletion, integration and modular analysis of the teaching content must be performed.

In 2007, Zhang *et al*. [14] from Capital Medical University proposed that the foundation of nursing science should be divided into different semesters by altering the conventional one-stage teaching mode into three-stage courses, including the introduction, life nursing care, and aseptic and therapeutic sections. In the first semester after enrollment, the teaching content of early contact with clinical practice has been supplemented. This reform highlights the system and level of the curriculum, which is easy for students to grasp in a step-by-step manner. In 2011, Zhang *et al*. from Beijing Peking Union Medical College [15] reported another three-stage curriculum reform, namely the basic nursing course from semester 2 of the 1st academic year to the 1st semester of the 2nd academic year, the clinical nursing and

apprenticeship course from the 2nd semester of the 2nd year to the 2nd semester of the 3rd year, and clinical practice in the 4th year. The course reform highlights that each stage is closely integrated with the clinical practice and encourages students to master the theoretical knowledge with the clinical practice. Referring to the above curriculum reform and combining it with the characteristics of our university, our research team has classified the nursing courses into 5 modules, including Module I, Perceptual cognitive nursing, Module II, Basic theory of nursing, Module III, General nursing knowledge, Module IV, Therapeutic nursing knowledge, and Module V, Nursing skills training.

Moreover, the nursing curriculum is divided into four independent courses to help students understand clinical practice, nursing introduction, fundamental nursing science, and concentrated apprenticeship. Clinical learning is an important part of nursing education. The students' experiences in the clinical learning environment is one of the most important factors affecting the teaching-learning process in clinical settings [16, 17]. An innovative clinical collaboration model has been developed that uses hospital-based clinical teachers to provide supervision and liaison between university teachers and students to promote clinical teaching and enhance the learning experience [18]. The best clinical teaching model allows students to gain positive and meaningful clinical experiences [19]. The role of the teacher is to communicate and liaise with clinical staff and the university to provide support to students [20].

In addition, the number of courses is decreased from 4 to 1, and the total course time is shortened from 290 h to 260 h through the reorganization of teaching content and the aggregation of similar teaching content into the same teaching module. Also, six seminars of 27 h have been supplemented into the curriculum design to discuss cutting-edge hot topics among nursing students. Feedback from nursing students includes the design of large courses and small modules is more conducive to reducing the burdens of nursing students. The modular curriculum for each semester has an explicit learning objective, specific learning content, and corresponding assessment methods. There is no need to worry about long learning cycles and high learning pressure. Therefore, the degree of course satisfaction from the nursing students with the reformed modular curriculum is significantly higher than it was before the reform. At present, the "Modularization of Basic Courses of Nursing Science" is the first report in China. The feasibility and application value of this curriculum reform remains to be validated by subsequent investigations.

Acknowledgements

This article was supported by the Medical Education Research Project of the Chinese Medical Association (2016B-HL081).

Disclosure of conflict of interest

None.

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