

Construction and Evaluation of a Nutrition Nurse Specialist Training Center Impact Statement

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Abstract

Background: To construct and evaluate the new Clinical Nutrition Nurse Practice Training Center in Guangdong Province. **Methods:** Seventy-four specialized nutrition nurses were trained from 2019-2020. Their core abilities and performance of duties were evaluated using the Clinical Nutrition Specialty Nurses Core Competence Self-evaluation Scale. This study adhered to the Revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) guidelines. This study was approved by the Ethics Committee of “The Third Affiliated Hospital of Sun Yat-sen University”. **Results:** The nurses obtained higher results one year after graduation compared with before training. Except for the areas of writing and participation, all training dimension differences were statistically significant ($p < 0.05$) for working nutritional nurses. **Conclusions:** The results indicate that the training provided in the Clinical Nutrition Nurse Practice Training Center is effective in improving the quality of specialist nursing as a whole.

Keywords

Nursing Practice, Training, Nutritional Care

1. Background

Recently, clinical nutrition has received increasing attention, and nutrition therapy has become an essential part of disease treatment. The “Healthy China 2030” Planning Outline [1] and the “National Nutrition Plan (2017-2030)” [2] have declared nutrition to be an important factor for building a healthy China at a national policy level, and emphasized the requirements for strengthening the

structure and regulation of clinical nutrition management systems, nutrition capacity, and the training of expert practitioners. Effective nutrition support interventions require multi-disciplinary cooperation. Nursing teams play a key role in this collaboration. The training of specialized nursing practices is a primary goal in specialist development [3]. Training an experienced specialized nutrition nursing team improves the quality of clinical nutrition treatment [4]. Establishing a qualified clinical training center is the foundation for ensuring the quality of nutrition specialist nurse training. There have been no reports on the process and results of developing clinical nutrition specialist nurse practice centers in China. Center evaluation criteria are not standardized, therefore limited constructive management strategies can be applied to the development of these practice centers [5]. To meet the needs of clinical nutrition specialist nurses training, our hospital explored a set of center construction plans with regional and specialist characteristics based on the current standards of specialist nurse education in Guangdong province [6] and took the leading position in practicing clinical nutrition specialist nursing in Guangdong Province. The training program received excellent feedback. This paper describes the practice center program results and their implications.

2. Methods

The Structure of the Program

The Third Affiliated Hospital of Sun Yat-sen University is a Grade III, Grade A general hospital with 2577 open beds, 1851 nursing staff, including the following credentials: 35 Master's degrees, 2 Doctoral degrees, 1272 bachelor's degrees, 529 college degrees and 13 technical secondary school degrees. Six chief nurses accounted for 0.32%, 61 3.30%, 366 19.77%, 717 caregivers 38.74%, and 701 nurses 38.87%. Annually, we undertake about 200 clinical undergraduate students, 130 advanced students, and 60 specialized nurse training teachers. The hospital is the center for 25 specialized nurses, encompassing swallowing nursing, stoma care, tumor care, liver disease care; in total, there are about 134 specialized nurses. The organization of the hospital includes a clinical nutrition department with two doctors, four nutrition technicians and two nurses, a clinical nutrition office, a nutrition clinic, intestinal nutrition preparation room, and a patient dietary preparation area with advanced, complete nutrition measurement equipment. The hospital provides technical, manpower and equipment and other hardware required for the operation of the clinical nutrition specialist nurse training center.

Establishing a Training Center Management System

Led by the nursing department, clinical teaching of specialized nurses was added into the "hospital nursing management committee-education and scientific research branch" division management. Meanwhile, we initiated the clinical nursing teaching management system including: the "clinical nursing teacher qualification plan"; the establishment of the clinical nursing teaching center; the

regulation of clinical teaching management and the standardization of how the specialized nurses practice training center would operate. In September 2014, the organization of the clinical nutrition nursing subproject began with the appointment of a clinical nutrition nursing team, and the study of this project has officially started. This team was composed of clinical nutrition nursing experts and nursing support from other areas such as intensive care, surgery, internal medicine, neurorehabilitation, infection, and obstetrics and gynecology. The team was responsible for the work organization and management of the whole project, formulating guidelines and norms for clinical nutrition nursing, developing practical training plans for clinical nutrition nurses, and supervising the development and implementation quality of each link. The gastrointestinal nursing clinic, swallowing nursing clinic, and chronic kidney nursing clinic worked with the nutrition nursing center to provide nutrition nursing outpatient service to their patients. This established the first nurse-led nutrition nursing center in Guangdong Province. Gradually a whole-process nutrition management mode of inpatient care emerged through collaboration by clinicians, nutritionists, pharmacists, nurses and other disciplines.

Selection of Clinical Nutrition Nursing Practice Training Wards

Based on the characteristics and demands associated with in-patient diseases, the prevalence of nutritional risks and malnutrition, the development of nutritional care, and the qualifications of specialist nursing teachers, six clinical nutritional nursing practice training departments were selected: the internal medicine/surgical intensive care unit; gastrointestinal surgery; departments of hematology, oncology, and infectious diseases; and deep venous catheterization clinic/day chemotherapy. Six clinical internship departments were also selected, including rehabilitation medicine, nutrition, venous configuration center, obstetrics and gynecology clinic, gastrointestinal nursing clinic, and neurology surgical clinic.

Forming the Teaching Team

The nursing department director supervised and managed the team. The nutrition nursing project leader was the general leader of the center, and three members of the core management team were selected to be responsible for clinical, management, and scientific research training, respectively. Eighteen clinical nutrition nurses trained previously were selected as clinical tutors, forming a specialized teaching talent level with clear goals, strong cohesion, and well-defined vision. The responsibility of training teachers at all levels was designated as providing a standardized training centered on specialized nursing operation skills. Experience with instrument use was required, in addition to the above-described training programs for clinical teaching trainers to ensure compliance with standards, and a uniform training in the center.

Developing a Training Program for Nutrition Specialist Nurses

We choose to be goal-oriented in designing the training program. The trainees were in training full-time. The time spent by groups of students in each

component was 4 - 8 weeks, with 3 - 5 departments in the rotation. The “one to one” and “dual tutor system” teaching mode was implemented. Dual tutor refers to a teaching team comprising a clinical tutor and a full tutor. The clinical tutor provides one-to-one clinical teaching, including specialized nursing knowledge and operation skills, practical activities, teaching skills and patient education. The full tutor is responsible for the consultation and guidance of the whole training process, especially scientific research topics. The full tutor’s guidance continues until one year has elapsed since graduation. Clinical practice is conducted through “theoretical strengthening combined with operational practice”. Therefore, students participate in tube bed, house visit, nursing workshop, teaching rounds, case discussion, case report, patient education, scientific research and design and opening. The training content is rich and practical, covering parenteral nutrition foundation, practical knowledge and skills. Nutrition support and nursing practice for common diseases is covered, including nutritional support care and management for preoperative patients, tumor patients, critical care patients, digestive tract diseases patients, patients with radiotherapy and chemotherapy patients, diabetes patients, kidney disease patients, patients with swallowing disorders, etc. **Table 1** provides details of the overall practice training program.

Design of Training Methods and Tools for Nutrition Specialist Nurses

Each rotating department develops a 1 - 2 week “Clinical Nutrition Specialty Nurses’ Homogeneous Teaching Path Table” according to the students’ scheduled practical time. It is divided into a teacher and a student version. It utilizes a phased approach to teaching, so that students can gain clear and specific knowledge from their experiences. Goals, skills, and assessment items are employed to foster practical learning, and students are urged to complete the learning tasks on time with the goal-oriented nature of their training in mind. **Table 2** presents the teaching path of the gastrointestinal surgery student version as an example of this training structure. The “Clinical Nutrition Specialty Nurse Teaching Manual” is compiled in accordance with the requirements of the host organization from which the trainees are sourced and the teaching resources and characteristics of the center for the preservation of uniform teaching guidelines and materials.

Establish an Evaluation System for the Practice Stage of Nutrition Specialist Nurses: Assessment of Professional Competence

The clinical practice stage assessment of the nutrition specialist nurse center is structured according to the requirements of the sponsoring institution where the trainees are enrolled. The assessment content primarily includes technical ability, nursing ward rounds, case nursing, patient education and scientific research ability. Each stage is based on the completion of different internships.

Specialized technical ability assessment: The clinical nurse trainer will select a test of one operational skill from the specialized technical skills specified in **Table 1** for evaluation, which will be completed in the first practice stage.

Table 1. Clinical practice training plan of nutrition specialist nurses.

Training phase	Time	Teaching theme and content	Specific requirements
The first stage (practical departments:)		Pre-employment education (first day of admission): training plans and programs, hospital nutrition care model construction and operation, basic nutrition knowledge, nutrition screening, assessment and intervention common tools and methods.	Completed in the process.
	Week 1, Weeks 1 - 2	Clinical practice: basic and practice of parenteral nutrition. Clinical probation: parenteral nutrition solution configuration (venous configuration center). Teaching activities: operation demonstration (intravenous infusion configuration, PICC maintenance technology, infusion pump operation technology), small nutrition lectures (common nutrition support approaches and methods), teaching rounds (nutrition support and nursing care of cancer patients). Assessment: none/small lecture.	Nursing evaluation: ※Nutrition risk screening (NRS2002) (≥10 times), ※Dietary survey evaluation (≥5 times), ※Anthropometric evaluation (≥5 times), *Body composition analysis and evaluation (≥3 times), ※Experiment Laboratory inspection and evaluation (≥5 times), ΔNutrition assessment (SGA/PG-SGA/MNA) (≥5 times), ΔOral cleanliness assessment (≥3 times);
	Week 2, Weeks 3 - 4	Clinical practice: basic and practice of enteral nutrition. Clinical probation: nursing of gastric/jejunum fistula, nasointestinal tube placement (intensive care unit). Teaching activities: operation demonstration (nasal feeding method, enteral nutrition pump infusion nursing operation, nasogastric/intestinal tube implantation technology and nursing, digestive juice reinfusion operation process), teaching rounds (nutrition support and nursing for patients with gastrointestinal diseases). Assessment: nursing rounds.	Specialty nursing: ※Nasogastric tube nursing (≥3 times), ※Nasojejunal tube nursing (≥3 times), ※Enteral nutrition nursing (≥5 times), ※Parenteral nutrition nursing (≥5 times), ΔNutrition nursing Follow-up (≥3 times), Δnutrition education/home nutrition rehabilitation guidance (≥3 times). Specialized technology: ※Nasogastric tube placement (≥1 time), ※Nasointestinal tube placement (≥1 time), ※BMI measurement and calculation (≥10 times), ※Energy calculation (≥5 times), ※Homogenate Meal configuration (≥3 times), ※Intestinal and parenteral nutrient solution preparation (≥3 times), ※Enteral nutrition pump use (≥3 times), ※Internal and parenteral nutrition infusion operation (≥3 times), ΔCentral venous catheterization Dressing change (≥3 times).
	Week 3, Weeks 5 - 6	Clinical practice: nutritional support and nursing for common diseases. Clinical probation: nutrition evaluation, nutrition consultation, body composition analysis, anthropological measurement (nutrition department), nutrition education (obstetric clinic). Teaching activities: operation demonstration (use of body composition analyzer, indirect energy measurement, grip strength measurement, nutrition configuration and recipe preparation), case discussion, patient education activities. Assessment: nutrition case/review report, patient education.	Acceptance assessment: complete case care ≥ 5 cases, one of them must be selected for PPT report, 1 nutrition nursing rounds, 1 patient education activity organized, 1 scientific research project designed, and specialty operation assessment completed.
The second stage (rotating departments:)	Week 4, Weeks 7 - 8	Clinical practice: nutritional support and specialty nursing practice and research. Clinical probation: oral cleanliness assessment, food preparation plus feeding, homogenized meal configuration (rehabilitation department). Teaching activities: nutritional nursing follow-up/home nutritional rehabilitation guidance (gastrointestinal surgery). Assessment: report on the opening of special subject technology and scientific research.	

Note. Adjust the teaching content and duration appropriately according to the practice plan, trainee training time, and manual content. “※” is the mastery content, Δ is the familiar content, and the trainee content is the understanding content.

Table 2. Homogeneous teaching path of clinical nutrition specialist nurses (Gastrointestinal Surgery Edition).

Practice week	Knowledge aims	Skill aims	Examination items
First week	1. Become familiar with relevant hospital systems, specialist environment, work procedures and guidelines.	1. Master the basic application of nutritional care module in HIS system and understand nutritional risk groups.	(Practice the first month) 1. Nutrition nursing operation assessment score () Examiner:
	2. Become familiar with the construction and operation of hospital nutrition nursing model.	2. Master the methods of nutritional risk screening, assessment, intervention and evaluation.	2. Nutrition case nursing report (word + ppt) Tutor:
	3. Master the basic knowledge of nutrition, nutrition screening, assessment and intervention common tools and methods.	3. Master the use of anthropometrics, NRS2002, PG-SGA and other tools.	(Practice the second month)
	4. Master the categories and selection of enteral and parenteral nutrition preparations in gastrointestinal surgery.	4. Master the use of diet diary.	1. Nutritional nursing operation assessment score () Examiner:
	5. Master the common nutritional nursing problems in gastrointestinal surgery.	5. Master the method of enteral nutrition configuration, infusion and precautions: nasal feeding method, gravity drip method, use of nutrition pump, etc.	2. Nursing ward round assessment score () Examiner:
	6. Become familiar with ERAS standard perioperative procedures for gastrointestinal tumor patients.	6. Master the methods and precautions of parenteral nutrition configuration and infusion: three-liter bag configuration, picc/cvc maintenance and use, etc.	Research report (word + ppt) Tutor:
	7. Master the entire nutritional management process for patients with gastrointestinal tumors.	7. Master the use and fill-in of the gastrointestinal nutrition nursing sheet	
Second week	1. Understand the formula, ratio and calorie count of parenteral and enteral nutrition.	1. Master the methods of dietary survey.	
	2. Become familiar with appetite quantitative assessment and application of appetite ruler.	2. Master the preparation and formulation of simple recipes.	
	3. Master the calorie and protein calculation of oral intake.	3. Master the guidance and application of oral nutritional supplements.	
	4. Master the categories and choices of oral nutritional supplements.	4. Guide the patient with pre-rehabilitation measures and early activities in ERAS.	
	5. Master the way of nutrition education in gastrointestinal surgery.	5. Master the nursing measures to promote the recovery of gastrointestinal function, such as Zusanli acupoint injection, evodia foot soaking, chewing gum, cycling in bed, early getting out of bed, etc.	
	6. Master the management of common complications related to enteral and external nutrition.	6. Observe and treat patients' nutritional-related complications (abdominal distension, diarrhea, nausea and vomiting, electrolyte imbalance, phlebitis, etc.).	
	7. Master the management methods of nutrition nursing cases in gastrointestinal specialty.	7. Complete nutrition case nursing assessment (PPT report).	
	8. Understand the quality management of the implementation rate of nutrition norms in gastrointestinal surgery.	8. Complete nutritional care (individual/group) patient education activities.	

Nursing ward round assessment: The trainees will preside over a nutritional nursing ward round before the end of the clinical training. This will be assessed by the nurse training team leader and clinical nurse trainer of the practice center, and will be completed in the first practice stage.

Case nursing assessment: Specialist nurses need to complete nursing care of at least five cases in the clinical practice stage. The trainee must provide follow up to at least one case involving nutritional problems, implement nutritional treatment measures, nursing interventions, summarize nursing experience, and write a case nursing medical record (including medical history summary, nursing plan, nursing measures implementation record, and effect evaluation). Finally, the nurse writes a report on the case in the form of a slide presentation, which will be completed in the second internship stage.

Assessment of scientific research ability: Based on the needs of clinical practice, trainees locate nursing research topics by reading literature and books on clinical nutrition nursing. Initially, they propose a research design, write the introductory report and share it in the form of a slide presentation. This will be completed in the second internship stage.

Evaluation of Personal Comprehensive Ability

Based on the core competence evaluation system of clinical nutrition specialist nurses established by the previous research [7] the project team compiled the “Clinical Nutrition Specialty Nurses Core Competence Self-evaluation Scale” (Table 2). This scale measures competencies according to the guidelines for the training of nutrition specialist nurses. The individual’s comprehensive ability is evaluated one year before and one year after graduation from the training. The scale includes 30 items, divided into five dimensions: clinical nutrition professional ability, professional humanistic traits, guidance and collaboration ability, leadership and management ability, and professional development ability. Each dimension is comprised of 19, 2, 3, 3, and 3 items respectively. The scoring scale ranges from “not demonstrated” to “fully demonstrated” (1 - 5 points) with final possible total score range of 30 to 150 points. The higher the score achieved, the stronger the ability possessed by the test-taker. The scoring table is highly reliable and has good structural validity. Cronbach’s α was 0.936, Kaiser-Meyer-Olkin’s measure of sampling adequacy (KMO) was 0.707, and Bartlett’s sphericity test was significant at $p \leq 0.001$.

All the assessment materials are reviewed by the relevant experts of the training center organization after the completion of the evaluation. After the trainees review and improve their skills in response to feedback from the experts, all the materials are consolidated into a report and submitted to the organizer for final review. Only trainees who pass the assessment can be awarded the “Clinical Nutrition Specialist Nurse” completion certificate. Those who earn the certificate are still required to report on the progress and results of their research topic one year after graduation, and to provide an account of their nutritional care experiences after returning to their assigned work unit.

Statistical Methods

Statistical analysis was performed using SPSS version 20.0. Descriptive measurement data were reported as mean \pm standard deviation, comparison between groups was examined and evaluated with t-tests, and data counts were expressed as frequencies and percentages. Additional comparisons between groups were made using the chi-square test, Fisher's exact test, and analysis of variance (ANOVA). Differences were considered statistically significant at $p < 0.05$.

3. Results

Our hospital became the first training center for clinical nutrition specialists in Guangdong Province in March 2019. It was declared to be qualified and designated as a training center for clinical nutrition treatment specialist nurses by the Guangdong Nursing Society and Health Management Society. In 2020, we were credentialed as nutrition support specialists by Chinese Nursing Society. From 2019 to 2020, a total of 74 clinical nutrition nurses were accepted to participate in clinical practice, and the core competencies of the nutrition nurses trained after the training were significantly improved, and they achieved better performance results after graduation.

Training of Nurses Specialized in Clinical Nutrition in the Center

Seventy-four clinical nutrition specialist nurses with an average age of (33.35 ± 4.565) years old. The cohort comprised 1 man and 73 women; 19 individuals from outside Guangdong Province, 55 residents of Guangdong; 4 junior college students, 66 undergraduates, 4 postgraduates; 29 junior titles, 37 intermediate titles, and 8 senior titles. All the trainees' practical results (taken from the average assessment score) were passing level. The satisfaction evaluation form was completed by each graduate. It included a total of 10 items with each worth 10 points, evaluated on a one hundred-point system. The students reported high satisfaction program at the center (see [Table 3](#)).

The Core Competency Status of Trained Clinical Nutrition Nurses

The "Clinical Nutrition Specialty Nurses' Core Competence Self-evaluation Scale" was used to investigate the self-reported core competence of the trainees before participating in the training and one year after graduating from the training program. Sixty-nine of 74 distributed questionnaires was collected, making the return rate 93.24%. The average age of respondents was 33.88 (± 5.835) years. The sample included 1 man and 68 women; 19 from outside Guangdong province, 50 from Guangdong; 4 junior colleges, 62 undergraduates, and 3 postgraduates; 29 junior titles, 33 intermediate titles, and 7 senior titles. The respondents rated the item "Do you have a five-step nutritional support model" most highly, with an average of 4.64 (± 0.593) points, and gave the lowest score to "Do you have literature retrieval and reading skills, and basic statistical knowledge, able to standardize design, research nutrition-related topics and write papers" (3.68 ± 0.653) points. For total core competency scores after training, clinical nutrition professional competence, guidance and collaboration

Table 3. Trainees participated in the nutrition specialist practical training in our hospital from 2019 to 2021.

Trainees source	Trainees number	Practice time (weeks)	Practice score (points)	Degree of satisfaction (%)
Health Management Society	37	4	90	98
Guangdong Nursing Association	22	4	92	85
Guangdong Provincial Nurses Association	7	8	95	92
Chinese Nursing Association	8	8	90.16	100

competence, leadership and management competence, professional development competence, the dimensional scores and mean values were significantly higher than those before the training. The difference was statistically significant ($t = -13.959, -14.089, -9.994, -11.092, -9.850, p < 0.01$). The occupational humanistic traits dimensional scores and mean values were higher before and after the training, but the difference was not statistically significant ($t = -0.805, p = 0.422$), as shown in **Table 4**. In the single-item ranking, the items with the lowest scores before and after the training were the scientific research ability evaluation items, with scores of ($2.52 \pm 0.551, 3.68 \pm 0.653$) points, but the difference between them was sufficiently large and achieved statistical significance ($p < 0.001, t = -8.981$).

The Job Performance of Trained Clinical Nutrition Nurses after Graduation

Our self-designed “Clinical Nutrition Specialty Nurses’ Duty Performance Survey Form after Graduation” was used to investigate the professional work progress of trainees pre- and one year post-training. The trainees were carrying out clinical nutrition nursing, management, teaching, and scientific research work. The most categories of training program ratings increased. Except for the writing or participating in the editing of written work, where there were no significant differences, the ratings’ differences for all other items were statistically significant ($p < 0.05$) The results are shown in **Table 5**.

4. Discussion

Analysis of Practical Training and Core Competence of Clinical Nutrition Specialist Nurses

With the rapid development and progress of nutritional preparation, infusion methods, and nutritional care, clinical demand for nutrition specialist nurses is increasing [8]. The results in **Table 3** show that nutrition specialist training for nurses successfully helps cultivate trainees regardless of where the training takes place. The 74 trainees had excellent practice scores (>90 points) and relatively satisfactory job satisfaction. The results in **Table 4** show that there was no statistical difference in the scores of the professional humanistic traits before and after training ($t = -0.805, p = 0.422$), but the scores after training (4.52 ± 1.181) were higher than the scores before training (4.44 ± 1.145). Moreover, the trainees reported good professional quality, healthy professional personality, three correct

Table 4. Comparison of core competencies of 74 clinical nutrition specialist nurses before and after training (points, $x \pm s$, $n = 69$).

Dimension	Number of entries	Before training (items are equally divided)	After training (items are equally divided)	T value	P value
Total score	30	93.54 ± 12.458 (3.12 ± 12.458)	124.86 ± 13.861 (4.16 ± 13.861)	-13.959	<0.01
Clinical nutrition expertise	19	57.03 ± 9.786 (3.00 ± 9.786)	79.58 ± 9.001 (4.19 ± 9.001)	-14.089	<0.01
Professional humanities	2	8.88 ± 1.145 (4.44 ± 1.145)	9.04 ± 1.181 (4.52 ± 1.181)	-0.805	0.422
Coaching and collaboration skills	3	10.29 ± 1.341 (3.43 ± 1.341)	12.81 ± 1.611 (4.27 ± 1.611)	-9.994	<0.01
Leadership and management skills	3	8.52 ± 1.521 (2.84 ± 1.521)	11.86 ± 1.980 (3.95 ± 1.980)	-11.092	<0.01
Professional development ability	3	8.83 ± 1.608 (2.94 ± 1.608)	11.57 ± 1.653 (3.86 ± 1.653)	-9.850	<0.01

Table 5. Comparison of work development and results before and after training of 74 clinical nutrition specialist nurses (% , $n = 74$).

project	Before training	After training	Statistics	P value
Clinical Nutrition Care Work				
Carry out nutrition screening and intervention	10 (13.5)	54 (73.0)	53.298 ¹⁾	<0.001
Nursing Clinic	8 (10.8)	19 (25.7)	5.481 ¹⁾	0.019
Nursing consultation	8 (10.8)	53 (71.6)	56.473 ¹⁾	<0.001
Follow up	20 (27.0)	38 (51.4)	9.186 ¹⁾	0.002
Nutritional Nursing Teaching Work				
Lectures in hospital	10 (13.5)	74 (100)	- ¹⁾	<0.001
Lectures outside the hospital	6 (8.1)	15 (20.3)	4.495 ¹⁾	0.034
Experience sharing/conference exchange	10 (13.5)	46 (62.2)	37.230 ¹⁾	<0.001
Clinical Teaching	15 (20.3)	64 (86.5)	65.190 ¹⁾	<0.001
Nutritional care management				
Formulate rules and regulations, procedures, guidelines, etc.	10 (13.5)	35 (47.3)	19.957 ¹⁾	<0.001
Conduct training/learning classes	3 (4.1)	36 (48.6)	- ²⁾	<0.001
Linking community activities	0 (0)	9 (12.2)	- ²⁾	0.002
Personal growth				
Participate in competitions at all levels	2 (2.7)	20 (27.3)	17.299 ²⁾	<0.001
Published papers	6 (8.1)	21 (28.4)	10.193 ¹⁾	0.001
apply for patent	0 (0)	4 (5.4)	- ²⁾	0.043
Host or participate in project research	2 (2.7)	9 (12.2)	- ²⁾	0.028
Publishing book	0 (0)	1 (1.4)	- ²⁾	0.316

1) χ^2 value; 2) Fisher's exact test.

outlooks, positive and optimistic, good self-adjustment ability and basic humanistic care ability, and the ability to quickly adapt to different working environments. The humanistic traits of nutritional support have improved. After training, the scores of nutritional nursing professional ability, guidance and collaboration ability, leadership and management ability, and professional development ability were significantly improved compared to pre-training ($t = -13.959, -14.089, -9.994, -11.092, -9.850, p < 0.01$). This indicates that specialist training can effectively help nurses improve many of their core abilities. With a solid base of professional knowledge and operational skills gained in specialist training, nurses can improve their interdisciplinary communication, team-building abilities, and continuous development.

In the single item score ranking, the item with the lowest score was the scientific research ability evaluation item. The score for this item was significantly higher after the training, which is similar to the situation among oncology nurses [9] and organ transplant nurses [10].

Analysis of the Job Performance of the Nutrition Specialist Nurses One Year after the Completion of the Training

According to the survey results pertaining to trainee progress after graduation, the trainees' clinical nutrition nursing work, nutrition nursing management work, nutrition nursing teaching work, and nutrition nursing scientific research work have increased at a statistically significant level in most areas excluding writing or editing an academic or scientific thesis. These results indicate achievement of qualifying levels of skill and knowledge at graduation and continual improvement of trainees' competence as they work in professional specialist nursing positions. After graduation, all trainees can use their professional expertise in their original units, and, share their skills and nutrition nursing-related knowledge, broadening the practice scope of nutrition specialist nurses; in fact, 73.0% of the trainees had already done so in the hospital or department where they were employed. In the nutrition risk screening and intervention work, 25.7%, 71.6%, and 37.4% of the trainees had conducted nutrition nursing clinics, nursing consultations, and follow-up work, respectively, consistent with the reports of Jing *et al.* [11]. As the current training model focuses on the organization and management ability of specialist nurses and the cultivation of nursing research ability, 47.3% of the trainees can now participate in the formulation and revision of nutrition-related nursing systems, guidelines, procedures, and norms after graduation; furthermore, 46% have conducted specialist nursing research projects.

The application and writing of relevant professional and scientific papers have become an important support for the hospital's nutrition and nursing work. Additionally, specialized nurses have begun to pay attention to community nutrition, taken the initiative to manage or participate in programs designed to promote community nutrition and health work, and further the development of community nutrition care. This demonstrates that specialist nurses play an important role in providing professional nursing services and improving the quali-

ty of nursing services [12] across many settings. The results indicate that specialty training for clinical nutrition specialist nurses improves their sense of responsibility, their ability to perform their duties, and the overall quality of specialist nursing.

The Construction Experience and Characteristics of Clinical Nutrition Specialist Nurse Practice Base

The training of specialist nurses in China is mainly conducted by hospitals alone or jointly by colleges and universities, where hospitals are used as practical skills training centers [13]. Clinical practice is critical in the training of clinical nutrition specialist nurses, and the quality of practical training is directly related to the success or failure of nurse nutrition training [14]. The hospital's clinical nutrition specialist nurse practice training center is high-quality in terms of equipment, technology, manpower, academic level, teachers' qualifications, and training programs.

Seventy-four qualified nurses have been trained as nutrition specialists inside and outside the province. Based on the current status of specialized nurse education in the province, the base has developed a thorough training program with the goal of cultivating core competency in the post, covering clinical nutritional nursing evaluation, decision-making, intervention, evaluation, management, teaching, research, and other practical content. Boldly innovated the training model of nutrition specialist nurses in Guangdong Province, combined internship and internship, rotated multiple departments, adopted the clinical path method to carry out practical training, designed the teacher version and the student version path table, set the mastery, familiarity and understanding goals, and expanded the recognition Know the scope and focus on key skills to make teaching and learning more active, targeted, standardized and purposeful [15]. Nursing research capabilities of specialist nurses are still insufficient and lack of confidence in nursing research [16]. In addition to theoretical courses, the training program also includes clinical practice. However, two months of practical training alone cannot achieve the goal of building core scientific research capabilities [17]. Therefore, after the students graduate, they must continue to take part in practical training. The qualification certificate of specialist nurses, to a certain extent, urges trainees to earnestly perform all of the duties of nutrition specialist nurses. The training program first establishes a core competency evaluation system for nutrition specialist nurses in China, and then conducts a multi-faceted and comprehensive evaluation of nutrition specialist nurses' specialized nursing, professional quality, guidance and collaboration, leadership and management, and self-development to promote further learning.

5. Limitations

The base has a systematic training system, but the teaching quality monitoring mechanism still needs to be improved. Only by monitoring and evaluating the teaching quality of the base, and continuously discovering the weaknesses and

bottlenecks in the clinical teaching process, can the teaching quality be continuously improved [18]. In addition, the quality of base teachers plays a key role in the training of specialist nurses [19]. In addition to excellent specialist nursing skills, teachers also need systematic teaching ability training and advanced teaching methods. However, domestic specialist nurses. The construction of the faculty and the evaluation standards for teachers are few, so it is necessary to further establish and improve the qualification certification system of base teachers.

6. Conclusion

Clinical nutrition specialist nurse training should be based on a strong organizational management structure, a complete training system, and a homogeneous training program. Moreover, the training should consist of innovative training models and tools that meet the actual needs of the trainees so they can develop multi-faceted abilities.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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