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Original Article

Application of hospital-community-family health education to family caregivers of nasal fed patients under the background of a regional medical association

Zhijing Shi[1*], Yangyi Zhao[4*], Luchen Jin[2], Xiaoe Chen[3], Jin Huang[1]

Departments of [1]Nursing, [2]Neurology, [3]Geriatric Care Ward, Putuo Hospital Affiliated to Shanghai University of Traditional Chinese Medicine, Shanghai 200062, China; [4]School of Nursing, Shanghai University of Traditional Chinese Medicine, Shanghai 201203, China. [*]Equal contributors.

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Abstract: Background: Patients with nasogastric tube (NTG) nutrition after discharge still need to be transferred to community hospitals for continued care. Effective health education is conducive to raising the level of knowledge of caregivers to promote the rehabilitation of patients. Methods: Clinical data of 65 caregivers of stroke patients in Putuo Hospital affiliated to Shanghai University of Traditional Chinese Medicine from June 2020 to December 2020 were retrospectively analyzed. These caregivers were divided into an observation group (33 cases, hospital-community-family education model) and a control group (32 cases, routine nursing health education). We used questionnaires to assess the knowledge, attitudes, and practice levels of caregivers before and after education, and recorded the occurrence of complications in patients within 12 weeks. Results: The scores of the knowledge questionnaire and practice questionnaire of caregivers in the observation group were higher than those in the control group at 2, 4 and 12 weeks after intervention ($P<0.05$). The scores of caregivers' attitudes questionnaire were higher in the observation group than in the control group at 4 and 12 weeks after intervention ($P<0.05$). But 2 weeks after intervention, there was no significant difference between the two groups ($P>0.05$). Within 12 weeks after intervention, the probability of complications in observation group was lower than that in the control group ($P<0.05$). Logistic regression analysis showed that the hospital-community-family health education helped the outcome. Conclusion: For the main caregivers of NTG nutrition patients, the implementation of a hospital-community-family health education model based on regional medical consortium can improve the level of knowledge, attitude and practice of caregivers' NTG nutrition skills and reduce complications in patients.

Keywords: Comprehensive geriatric assessment, diabetes with hypertension, nursing

Introduction

With the continuous changes of medical environment and the concept of rapid rehabilitation, the overall hospitalization time of patients has been shortened. However, there are still many patients with chronic diseases such as stroke dysphagia and head and neck tumors who still need long-term NTG nutrition after the acute phase [1]. Continuing hospitalization increases both the medical costs and the care burden on patients [2]. For this reason, such patients often choose to carry a nasogastric tube to discharge and transfer to a community health service center to continue nutritional support treatment. At this time, the patient's diet will be completely dependent on the care institutions or caregivers involved in the care [3]. If the care institutions or caregivers have insufficient knowledge of NTG nutrition, patients may get complications [4, 5].

The regional medical association (referred to as the medical association) is a medical consortium composed of tertiary hospitals, secondary hospitals, and community hospitals in a region. It tracks and feeds back the treatment and outcome of patients throughout the process, which is conducive to ensuring treatment effectiveness. Hospital-community-family health education is a new type of education model. It combines hospital, community and family education to provide comprehensive and continuous health education, which is conducive to improv-

ing the awareness of patients and their family caregivers and cultivating a healthy lifestyle [6]. In China, this education model has been applied to chronic diseases such as coronary heart disease, diabetes, and renal failure [7]. Our hospital is Shanghai Putuo District' Western Medical Association' lead unit. This study relied on the medical association chronic disease management team platform and 4 regional community health service centers to carry out hospital-community-family health education for caregivers of NTG nutrition patients.

Subjects and methods

Ethics statement

This study was approved by the Medical Ethics Committee of Putuo Hospital Affiliated to Shanghai University of Traditional Chinese Medicine.

Family caregivers

The clinical data of 68 caregivers of stroke patients in Putuo Hospital affiliated to Shanghai University of Traditional Chinese Medicine from June 2020 to December 2020 were retrospectively analyzed. The caregivers who implemented the hospital-community-family health education model were taken as the observation group, and the caregivers who implemented routine nursing health education were taken as the control group, with 34 cases in each group. Inclusion criteria: (I) family caregivers of patients with NTG nutrition for the first time and NTG nutrition time ≥2 weeks; (II) to undertake the patient's main care tasks, care for patients with the longest time (daily care ≥8 h); (III) have the corresponding learning willingness and learning ability. Exclusion criteria: (I) the caregiver was a medical worker or nursing worker; (II) the main caregivers changed frequently; (III) caregivers who were unable to complete all scheduled care owing to death of their patient, removal of the tube, but no re-catheterization. Finally, 32 cases in the control group and 33 cases in the observation group were completed.

Routine nursing health education

The day before the patient was discharged, the primary nurse sent the *Health Education Manual for NTG Nutrition Patients* to the caregivers. These introduced the purpose, importance, operation process, precautions and preparation methods of nasal feeding solution to caregivers in detail. At the same time, the nurse carried out NTG nutrition operation training, and the caregiver carried out exercises. If there were errors, the nurse corrected them in time.

Hospital-community-family health education model

Set up a health education group: This was composed of the general hospital and the medical staff of 4 community health service centers. The medical members of the general hospital included: 1 attending physician, 4 nurses, 1 nutritionist, and 1 pharmacist. They were responsible for formulating health education content, implementing intervention measures, follow-up of specialist nursing clinics, and professional guidance for medical staff in community health service centers. The community health service center personnel included 4 general practitioners and 8 nurses, who were responsible for answering questions about the implementation of health education for caregivers of patients referred in the region.

Construction of a health education program: We conducted a literature survey and found that patients' health education mainly focused on four aspects: NTG nutrition solution management, treatment and prevention of NTG nutrition complications, NTG nutrition medication guidance, and personal care of patients [8-10]. A preliminary draft of the health education program was developed. Five nursing experts (one head nurse, two deputy head nurses, and two supervisor nurses) were selected by Delphi expert consultation method. After two rounds of discussion, the final program was developed, including the content and form of health education (**Table 1**).

Hospital-community-family health education implementation: (I) General hospital health education. (1) 3 days before discharge, the primary nurse handed out the *Adult family NTG nutrition caregivers KAP questionnaire* to the caregivers to understand their mastery of nutrition skills, and developed individualized nutrition guidance plan according to the results. (2) The electronic files of patients were established 2 days before discharge, including the general

Table 1. Health education program contents

Item	Contents	Education forms
Diet	(1) To explain the NTG nutrition patient dietary requirements and common food nutrients table.	(1) PPT
	(2) Teaching Daily Calorie Calculator Use to enable caregivers to calculate daily energy requirements based on height/weight.	(2) PPT + WeChat SA
	(3) The use of teaching food calculator enables caregivers to obtain the nutrient content of the relevant food by entering the food name.	(3) PPT + WeChat SA
Drug application	Drug usage, indications, precautions, adverse reactions.	PPT + WeChat SA
Operation	(1) NTG nutrition preparation operation demonstration: including how to determine the stomach tube in the stomach, how to check the nasogastric tube scale.	(1) Operation demonstration + video playback + WeChat SA
	(2) Oral care operation demonstration: strengthen the importance of oral care, add oral assessment, oral care points and precautions.	(2) Operation demonstration + video playback + WeChat SA
	(3) Personal care operation demonstration: including skin care, turn over to pat back, how to observe the skin, how to replace NTG nutrition tape, how to clean the nasal cavity.	(3) Operation demonstration + video playback + WeChat SA
	(4) Strengthen the importance of disease observation to ensure the safety of NTG nutrition.	(4) PPT + WeChat SA
Complications	(1) Emphasize the importance of monitoring complications.	(1) PPT + WeChat SA
	(2) Provide the definition, prevention, and treatment of common NTG nutrition complications.	(2) PPT + WeChat SA
Nutrition	(1) Teaching BMI calculator use.	(1) PPT + WeChat SA
	(2) Provision of various nutritional indicators, including definitions, range of normal values, classification of malnutrition.	(2) PPT + WeChat SA

PPT: Power Point; WeChat SA: WeChat Subscription Account.

information of patients, diagnosis and treatment, medication, nutrition and catheterization, as well as the skills of caregivers and nutrition guidance plan. (3) Before the patients were discharged, the general hospital transferred the patient files to the community health service center through the chronic disease management platform for communication and coordination. (II) Community health service center health education. Before intervention, the medical staff of the community health service center learned in detail about the caregivers' mastery of NTG nutrition skills through electronic files. Combined with the guidance plan, they strengthened educational intervention for caregivers by watching videos related to NTG nutrition skills and demonstrating nutrition operations. The NTG nutrition operation of caregivers was supervised and educated every week to standardize the care behavior of caregivers. At the same time, relevant information was collected and reported to the electronic file feedback to the general hospital medical staff. When the patient's condition changes could not be resolved, the medical staff of the community health service center contacted the general hospital in a timely manner, and transferred the patient with the timely use of green channel . (III) Family health education. The family health education model pays more attention to the active participation of caregivers and the communication with doctors and nurses. The health education content in video, animation, PPT and other forms were distributed on the *Shanghai Putuo District Central Hospital* WeChat platform. Caregivers can learn on their own time. At the same time, a message board was set up, and the caregivers could ask questions on the message board, which would be answered by the platform administrator at 15:00-16:00 every day.

Evaluation indicators

Nasal feeding caregivers NTG nutrition skills KAP questionnaire. We set up the items based on the literatures, expert interviews, and clinical experience. Two rounds of Delphi expert consultation were completed, including three dimensions of NTG nutrition knowledge (6 items),

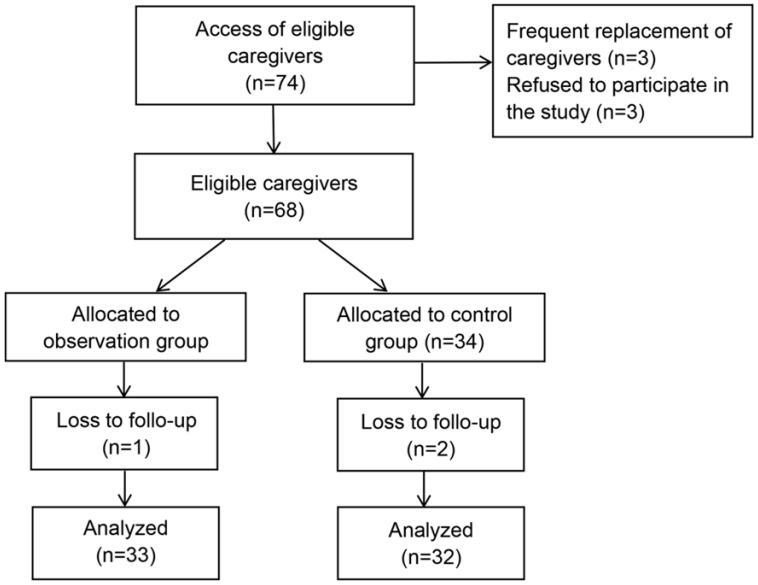

Figure 1. Study flowchart.

attitude (4 items), and practice (10 items), with a total of 20 items. The Likert-5 scoring method was used in the questionnaire, with a total score of 100 points. The total score of the knowledge questionnaire was 30 points, the total score of the attitude questionnaire was 20 points, and the total score of the practice questionnaire was 50 points. The higher the score, the better the knowledge, attitude, and practice level of the caregivers' NTG nutrition skills. The questionnaire was based on 2 rounds of consultation with 5 nursing experts. The content validity coefficient was 0.883, the test-retest reliability was 0.859, and the Cronbach's α coefficient was 0.768. The questionnaire was used to investigate the knowledge, attitude, and practice level of nasal feeding skills of caregivers in the two groups before intervention, 2 weeks, 4 weeks, and 12 weeks after intervention, and the intervention effect was compared.

The incidence of complications in the two groups of patients was recorded at the 12th week after intervention. (1) Removal: Nasogastric tube was not in the stomach; (2) Pipe blockage: After ineffective dredging, the gastric tube was pulled out, and food and secretions were visible at or near the end; (3) Accidental inhalation: During the nasal feeding process, the patient developed cough, asthma, increased respiratory rate, cyanosis of the lips, and nasal feeding fluid residues were found in the mouth or nasal cavity; (4) Mechanical injury of nasal mucosa: Nasopharyngeal mucosal injury, local infection; (5) Diarrhea: Loose stool >3 times a day; (6) Constipation: No bowl movements for three days.

Statistical methods

Microsoft Excel was used for data entry, and SPSS23.0 statistical software was used for statistical analysis. The caregiver's nursing ability score on nasal feeding skills related knowledge-attitude-practice questionnaire was expressed as mean ± standard deviation (SD) and analyzed using paired t test or repeated measurement analysis of variance. The incidence of nasal feeding complications in the two groups was expressed as a percentage (%) and analyzed using χ^2 test. Multifactorial logistic regression was applied to investigate independent factors that affect prognosis of patients. $P<0.05$ was considered significant.

Results

Basic characteristics of patients and caregivers

The exact number of patient's caregivers studied are shown in **Figure 1**. There was no significant difference in gender, age, course of disease or type of stroke as well as number of complications between the two groups (**Table 2**). There was no significant difference in gender, age, education level or care time between the patients' caregivers in the two groups (**Table 3**).

Comparison of caregivers' knowledge questionnaire scores

The inter-group effect of the knowledge questionnaire scores of the two groups of caregivers was (group) F=71.474, P<0.05, indicating that the knowledge scores of the two groups of caregivers with different intervention methods were statistically significant. The time effect of the

Table 2. Comparison of general data of patients

Group	*n*	Gender (n)		Age	Course	Stroke type (n)		No. of complications (n)	
		male	Female	(Years, $\bar{x} \pm s$)	(Days, $\bar{x} \pm s$)	Ischemic stroke	Hemorrhagic stroke	≤2	>2
Observation group	33	16	17	61.44±9.42	11.61±2.70	24	9	9	24
Control group	32	16	16	63.07±6.56	11.86±2.34	21	11	10	22
χ^2/t		0.015		0.807	0.398	0.385		0.124	
P		0.903		0.423	0.692	0.535		0.724	

Table 3. Comparison of general data of caregivers

Group	*n*	Gender (n)		Age	Daily care time	Education level (n)		Relationship with patients (n)	
		male	Female	(Years, $\bar{x} \pm s$)	(h, $\bar{x} \pm s$)	Primary school and below	Above primary school	Related	Unrelated
Observation group	33	12	21	55.94±6.45	15.03±4.79	9	24	25	8
Control group	32	14	18	56.61±6.47	14.84±4.95	7	25	27	5
χ^2/t		0.369		0.418	0.157	0.255		0.754	
P		0.543		0.677	0.876	0.614		0.385	

Table 4. Comparison of knowledge questionnaire scores of two groups of caregivers at each time (points, $x \pm s$)

Group	*n*	Pre-intervention	Post-intervention		
			2 weeks	4 weeks	12 weeks
Observation group	33	15.48±1.73	20.24±1.09	23.90±1.28	25.67±0.98
Control group	32	15.46±1.88	17.34±1.69	19.12±1.18	20.72±1.18
			(group) F=71.474, P<0.05		
			(time) F=130.562, P<0.05		
			(group × time interaction) F=28.372, P<0.05		

two groups of caregivers' knowledge questionnaire scores was (time) F=130.562, P<0.05, indicating that the knowledge scores of different evaluation time were different. There was an interaction between the intervention effect and the time effect (group × time interaction) F=28.372, P<0.05, indicating that the effect of the time factor varied with groups (**Table 4**).

Comparison of caregivers' attitude questionnaire scores

The inter-group effect of the two groups of caregivers' attitude questionnaire scores was (group) F=9.856, P<0.05, indicating that the difference in attitude scores between the two groups of caregivers with different intervention methods was significant. The time effect of the two groups of caregivers' attitude questionnaire scores was (time) F=57.493, P<0.05, indicating that the difference in attitude scores at different evaluation times was significant. There was an interaction between the intervention effect and the time effect (group × time interaction) F=28.572, P<0.05, indicating that the role of time factors changed with different groups (**Table 5**).

Comparison of two groups of caregivers practice questionnaire scores

The inter-group effect of the scores of the two groups of caregivers' practice questionnaire was (group) F=44.495, P<0.05, indicating that the difference in practice scores between the two groups of caregivers with different intervention methods was significant. The time effect of the two groups of caregivers' practice questionnaire scores was (time) F=758.834, P<0.05, indicating that the difference in practice scores at different evaluation times was significant. There was an interaction between the intervention effect and the time effect (group × time interaction) F=30.206, P<0.05,

Table 5. Comparison of attitude questionnaire scores of both groups of caregivers at each time (points, x ± s)

Group	*n*	Pre-intervention	Post-intervention		
			2 weeks	4 weeks	12 weeks
Observation group	33	12.30±1.35	14.15±1.20	15.57±1.00	17.33±1.20
Control group	32	12.03±1.06	13.96±0.93	14.59±0.79	15.96±0.93
			(group) F=9.856, P<0.05		
			(time) F=57.493, P<0.05		
			(group × time interaction) F=28.572, P<0.05		

Table 6. Comparison of practice questionnaire scores of both groups of caregivers at each time (points, x ± s)

Group	*n*	Pre-intervention	Post-intervention		
			2 weeks	4 weeks	12 weeks
Observation group	33	25.93±3.92	29.42±3.18	33.934±3.92	42.15±3.47
Control group	32	25.00±3.39	26.62±3.35	31.00±3.36	36.00±3.36
			(group) F=44.495, P<0.05		
			(time) F=758.834, P<0.05		
			(group × time interaction) F=30.206, P<0.05		

Table 7. Comparison of nasal feeding complications between the two groups [n (%)]

Group	n	Constipation	Diarrhea	Accidental inhalation	Pipe blockage	Removal	Mechanical injury of nasal mucosa
Observation group	33	2 (6.06)	2 (6.06)	1 (3.03)	0	0	2 (6.06)
Control group	32	9 (28.13)	10 (31.25)	6 (18.75)	5 (15.63)	2 (6.25)	8 (25.00)
t		5.626	6.484	4.178	5.586	1.047	4.477
P		0.018	0.009	0.041	0.018	0.306	0.034

indicating that the role of time factors changed with different groups (**Table 6**).

Comparison of complications in patients

The incidence of complications in the observation group was lower than that in the control group, P<0.05 (**Table 7**).

Analysis of factors affecting prognosis of patients

We grouped the patients according to their prognosis. Among the six complications (prolapse, obstruction, aspiration, nasal mucosal mechanical injury, diarrhea, constipation), patients with any one of those were included in the poor prognosis group, otherwise they were included in the good prognosis group. As univariate analysis shows in **Table 8**, the differences in APACHE II, number of comorbidities, and caregiver-accepted education patterns were significant between groups. Subsequent multivariate logistic analysis was performed and showed that the hospital-community-family health education model was conducive to the prognosis of patients (OR: 0.062, 95% CI: 0.017, 0.228) (**Table 9**).

Discussion

At present, the number of NTG nutrition patients who need home nursing is increasing [11]. The nursing of family NTG nutrition patients is mainly implemented by caregivers. The caregivers' knowledge, attitude and practice play a key role in the safety of NTG nutrition. In China, caregivers of NTG nutrition patients lack professional knowledge about nutrition. Most caregivers have not received professional knowledge and operational skills training, and caregivers have an urgent need for home nutrition-related knowledge [12]. Therefore, how to improve the

Table 8. Single factor analysis of factors affecting the patients' prognosis

Factor	Poor prognosis group (n=35)	Good prognosis group (n=30)	Test value	*P* value
Male/Female	18/17	14/16	0.095[b]	0.758
Age (Years, $\bar{x} \pm s$)	61.14±7.42	64.63±7.85	1.790[a]	0.078
Course (Days, $\bar{x} \pm s$)	12.36±2.01	10.45±1.89	0.819[a]	0.416
BMI (Kg/m^2, $\bar{x} \pm s$)	21.35±2.03	21.17±3.04	0.286[a]	0.776
APACHE II (Points, $\bar{x} \pm s$)	15.35±5.14	12.23±5.19	2.443[a]	0.017
No. of comorbidities (Kinds, $\bar{x} \pm s$)	1.37±0.91	0.90±0.80	2.197[a]	0.032
Hospitalization time (Days, $\bar{x} \pm s$)	20.31±3.49	19.50±3.06	0.466[a]	0.325
Stroke type, n (%)			0.172[b]	0.678
Ischemic stroke	25 (71.43)	20 (66.67)		
Hemorrhagic stroke	10 (28.57)	10 (33.33)		
Nutrient composition, n (%)			0.070[b]	0.791
Integral protein	30 (85.71)	25 (83.33)		
Oligopeptide	5 (14.29)	5 (16.67)		
Feeding method, n (%)			0.977[b]	0.614
Micro pump	12 (34.29)	8 (26.67)		
Perfusion	8 (22.86)	10 (33.33)		
Injector	15 (42.85)	12 (40.00)		
Health education model for caregivers, n (%)			23.638[b]	<0.001
Routine nursing health education	27 (77.14)	5 (16.67)		
Hospital-community-family education	8 (22.86)	25 (83.33)		

APACHE II: Acute Physiology and Chronic Health Evaluation II, [a]t value, [b]x^2 value.

Table 9. Multivariate logistic regression analysis of the factors affecting patients' prognosis

Factor	β	SE	Wald	P	OR (95% CI)
APACHE II	0.084	0.071	1.411	0.235	1.088 (0.947, 1.249)
No. of comorbidities	0.375	0.415	0.819	0.365	1.456 (0.645, 3.282)
Hospital-community-family education	-2.774	0.661	17.591	<0.001	0.062 (0.017, 0.228)

APACHE II: Acute Physiology and Chronic Health Evaluation II.

level of caregivers' knowledge and skills of NTG nutrition is our particular concern.

Hospital-Community-Family health education closely links hospitals, communities and families, and provides seamless and continuous care services for patients and their families. Our study successfully constructed a hospital-community-family health education model for caregivers of NTG nutrition patients. After 6 months of intervention, the scores of the KAP questionnaire in the observation group were significantly higher than those before intervention and better than those in the control group. This shows that the model is effective in improving the skill level of caregivers. In the past, the skill education received by caregivers was mostly completed by medical staff in the hospital. Health education was carried out in the hospital, with many contents and short time, mostly oral and one-way cramming education [13]. With the extension of time, the knowledge accepted by caregivers in a short period of time is forgotten, which can easily lead to the emergence of irregular behavior [14]. We think there are many reasons for the model achieved better results. First, the hospital-community-family education model training content we proposed is multifaceted, including the basic operation, daily care, drug management, NTG nutrition fluid management, NTG nutrition management, and NTG nutrition complications observed.

Second, the training methods are mutually cooperative. The medical association platform effectively links hospitals, communities and families together. Before the patient was discharged from the hospital, the hospital nurses used the questionnaire to evaluate the skills, attitude, and practice of the caregivers. According to the results, an individualized education plan was developed and included in the patients' electronic file and transferred to the community health service center. Medical staff of the community health service center carried out continuous service measures such as behavior supervision, telephone follow-up, and WeChat SA answering questions. This model enables caregivers to have long-term access to systematic, continuous and full-course skills education in hospitals, communities, and families. To a large extent, this promotes the understanding and mastery of the knowledge of NTG nutrition skills by caregivers, improves the awareness of relevant knowledge by caregivers, and helps them to establish effective and correct care behavior. Third, it stimulates the initiative of caregivers. After 4 weeks of intervention, the attitude score of the observation group increased, but there was no significant change in the first 2 weeks after intervention. In the traditional nursing mode, caregivers rely on medical staff, and believe that NTG nutrition patients should be hospitalized, and can be cared for by medical staff. Moreover, most caregivers rely on the arrangement of nursing staff and lack the subjective initiative for learning [15]. In our education model, caregivers' misperceptions are corrected, and they gradually realize the importance of mastering nursing knowledge. They hope to receive more help and guidance from medical staff, so as to further improve their ability to care for patients and the quality of care. In addition, the establishment of attitude can be affected by factors such as the age, occupation, education level, and family income of the caregiver, which needs to be achieved by a series of dynamic cycle stage changes [16]. Therefore, follow-up research on the establishment of caregivers' attitude needs to be further analyzed.

Patients with long-term NTG nutrition have an increased risk of oral infection and aspiration pneumonia [17]. Diarrhea is the most common complication of nasal feeding [18]. There are many reasons for these complications such as nutrient solution preparation and operation methods. How to effectively prevent and reduce the occurrence of complications is the key to nasal feeding. After intervention, the incidence of various complications in the observation group was lower than that in the control group. Multivariate analysis showed that caregivers receiving hospital-community-family health education was a protective factor for patient prognosis. On the one hand, the hospital-community-family health education model uses community service centers as a medium to extend nursing knowledge outside the hospital, and also uses new media tools such as video and PPT to connect hospitals, communities and families to let the caregivers master the nursing knowledge in a short time, and promote the establishment of health beliefs and correct care behavior, improve the overall ability of caregivers to manage care, and eventually lead to a reduction in complications. On the other hand, the establishment of WeChat SA provides the integration of online and offline medical services. In addition to pushing video teaching materials to caregivers, the software also builds a bridge of communication between doctors and patients as well as nurses and patients. Medical staff can grasp the current situation and existing problems of nasal feeding at any time, and make scientific and reasonable guidance. With the continuous improvement of caregivers' learning beliefs, caregivers' communication and sharing of NTG nutrition experience among WeChat groups is becoming more frequent. Caregivers have the opportunity to express their opinions, so as to obtain the best solution and ensure the correct maintenance of patients' gastric tubes [19].

At present, the hospital-community-family model has been applied in the continuous nursing of patients with hypertension [20], patients undergoing gastric cancer surgery [21], patients with epilepsy [22], and patients with chronic heart failure [23]. Unlike previous studies, we implemented health education training for patients' caregivers, so that patients can also receive professional care at home more as well. Through the regional medical association, we set up a hospital-community-family health education and nursing group to rationally allocate the medical resources of general hospitals and community health service centers and clarify the roles and responsibilities of personnel at all

levels. In the traditional continuous nursing, due to the limitation of conditions, the general hospital cannot share the patient's information with the community health service center, resulting in a lack of patient data [24]. Based on the regional medical consortium chronic disease management platform, this study established a patient-centered mutual cooperation management model. Through the docking of patients' electronic health records, the model achieves the interconnection of patients' health information, so that the personnel of the two hospitals can obtain the dynamic data and information of patients at the same time. Especially when the patient has ann emergency, the community's medical staff can directly contact the general hospital doctors to deal with patients, possibly saving lives.

Conclusions

Based on the platform of medical association, we established the hospital-community-family education model which expanded health education from hospital to community and family, helped caregivers to improve nursing knowledge, improved learning enthusiasm, and reduced the incidence of complications. This study also has some limitations: due to human and economic constraints, we did not evaluate the long-term nutritional status of patients' outcome, which will be conducted to make the comprehensive management of NTG nutrition more efficient and perfect.

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Disclosure of conflict of interest

None.

Address correspondence to: Jin Huang, Department of Nursing, Putuo Hospital Affiliated to Shanghai University of Traditional Chinese Medicine, No. 164 Lanxi Road, Shanghai 200062, China. Tel: +86-18627318830; E-mail: hj6857@126.com

References

[1] Doley J. Enteral nutrition overview. Nutrients 2022; 14: 2180.

[2] Tamura A, Kato K, Suzuki M, Sone M, Tanaka R, Nakasato T and Ehara S. CT-guided percutaneous radiologic gastrostomy for patients with head and neck cancer: a retrospective evaluation in 177 patients. Cardiovasc Intervent Radiol 2016; 39: 271-278.

[3] Coffey A, Mulcahy H, Savage E, Fitzgerald S, Bradley C, Benefield L and Leahy-Warren P. Transitional care interventions: relevance for nursing in the community. Public Health Nurs 2017; 34: 454-460.

[4] Bloom L and Seckel MA. Placement of nasogastric feeding tube and postinsertion care review. AACN Adv Crit Care 2022; 33: 68-84.

[5] Johnson TW, Seegmiller S, Epp L and Mundi MS. Addressing frequent issues of home enteral nutrition patients. Nutr Clin Pract 2019; 34: 186-195.

[6] Zhang W, Yang P, Wang H, Pan X and Wang Y. The effectiveness of a mHealth-based integrated hospital-community-home program for people with type 2 diabetes in transitional care: a protocol for a multicenter pragmatic randomized controlled trial. BMC Prim Care 2022; 23: 196.

[7] Gao Y, Tang X, Wen Y, Qian D, Pan X and Zhang L. Effects of the hospital-community-family ternary linkage continuous nursing model on compliance, cognitive function, resilience, and quality of life for children with epilepsy: a retrospective study. Transl Pediatr 2022; 11: 239-248.

[8] Bischoff SC, Austin P, Boeykens K, Chourdakis M, Cuerda C, Jonkers-Schuitema C, Lichota M, Nyulasi I, Schneider SM, Stanga Z and Pironi L. ESPEN practical guideline: home enteral nutrition. Clin Nutr 2022; 41: 468-488.

[9] Ojo O. Providing optimal enteral nutrition support in the community. Br J Community Nurs 2017; 22: 218-221.

[10] Roveron G, Antonini M, Barbierato M, Calandrino V, Canese G, Chiurazzi LF, Coniglio G, Gentini G, Marchetti M, Minucci A, Nembrini L, Neri V, Trovato P and Ferrara F. Clinical practice guidelines for the nursing management of percutaneous endoscopic gastrostomy and jejunostomy (PEG/PEJ) in adult patients: an executive summary. J Wound Ostomy Continence Nurs 2018; 45: 326-334.

[11] Gramlich L, Hurt RT, Jin J and Mundi MS. Home enteral nutrition: towards a standard of care. Nutrients 2018; 10: 1020.

[12] Silver HJ, Wellman NS, Galindo-Ciocon D and Johnson P. Family caregivers of older adults on home enteral nutrition have multiple unmet task-related training needs and low overall preparedness for caregiving. J Am Diet Assoc 2004; 104: 43-50.

[13] Moon M. The unprepared caregiver. Gerontologist 2017; 57: 26-31.

[14] Lutz BJ, Young ME, Cox KJ, Martz C and Creasy KR. The crisis of stroke: experiences of patients and their family caregivers. Top Stroke Rehabil 2011; 18: 786-797.
[15] Lutz BJ, Young ME, Creasy KR, Martz C, Eisenbrandt L, Brunny JN and Cook C. Improving stroke caregiver readiness for transition from inpatient rehabilitation to home. Gerontologist 2017; 57: 880-889.
[16] Kok G, Gottlieb NH, Peters GJ, Mullen PD, Parcel GS, Ruiter RA, Fernández ME, Markham C and Bartholomew LK. A taxonomy of behaviour change methods: an intervention mapping approach. Health Psychol Rev 2016; 10: 297-312.
[17] Ling C, Hu X, Chen C, Luo L, Cai M, Liang C, Wang H and Guo Y. Comparison of nutritional effectiveness and complication rate between early nasojejunal and nasogastric tube feeding in patients with an intracerebral hemorrhage. J Clin Neurosci 2022; 103: 107-111.
[18] Millozzi G, Borgarello R, Bugnoli G, D'Ambrosio F, Dal Canto G, Lastrucci D, Lopez Pollan RA, Mugnaini A, Pomi M, Rosati M, Senesi E, Valenti R and Ferretti F. The complications of enteral nutrition in medical wards. Assist Inferm Ric 2021; 40: 78-86.
[19] Fan Y, Ma Y, Zhang Y and Sun C. A retrospective analysis of internet-based sharing nursing service appointment data. Comput Math Methods Med 2022; 2022: 8735099.
[20] Shi W, Cheng L and Li Y. Influence of "hospital-community-family" integrated management on blood pressure, quality of life, anxiety and depression in hypertensive patients. Comput Math Methods Med 2022; 2022: 1962475.
[21] Pang Z, Li Y, Huang A, Li X, Liu Y and Meng Y. Effect of HCH nutrition management combined with early exercise nursing on nutrition status and postoperative rehabilitation of patients after gastric cancer surgery. Evid Based Complement Alternat Med 2022; 2022: 2813050.
[22] Gao Y, Tang X, Wen Y, Qian D, Pan X and Zhang L. Effects of the hospital-community-family ternary linkage continuous nursing model on compliance, cognitive function, resilience, and quality of life for children with epilepsy: a retrospective study. Transl Pediatr 2022; 11: 239-248.
[23] Guo X, Gu X, Jiang J, Li H, Duan R, Zhang Y, Sun L, Bao Z, Shen J and Chen F. A hospital-community-family-based telehealth program for patients with chronic heart failure: single-arm, prospective feasibility study. JMIR Mhealth Uhealth 2019; 7: e13229.
[24] Yin X, Wu J, Zhou L, Ni C, Xiao M, Meng X, Zhu X, Cao Q and Li H. The pattern of hospital-community-home (HCH) nursing in tracheostomy patients with severe traumatic brain injury: is it feasible? Int J Clin Pract 2021; 75: e13881.