

HOSTED BY



Contents lists available at ScienceDirect

## International Journal of Nursing Sciences

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

## Original Article

## Analysis on nursing competence and training needs of dementia caregivers in long-term care institutions

Yaxing Wang<sup>a</sup>, Yuqi Liu<sup>a</sup>, Junxiang Tian<sup>a</sup>, Mengya Jing<sup>a</sup>, Kesen Zhang<sup>b,\*</sup><sup>a</sup> School of Nursing, Tianjin University of Traditional Chinese Medicine, Tianjin, China<sup>b</sup> Tianjin Nursing Society, Tianjin, China

## ARTICLE INFO

## Article history:

Received 29 July 2019

Received in revised form

21 January 2020

Accepted 6 March 2020

Available online 9 March 2020

## Keywords:

Caregivers

Dementia

Nursing homes

Professional competence

Training

## ABSTRACT

**Objective:** It is aimed to investigate the nursing competence and corresponding influence factors of dementia caregivers in long-term care institutions of Tianjin and identify the training needs of caregivers.

**Methods:** In the cross-section survey of this study, 246 dementia caregivers were selected from 6 long-term care institutions in Tianjin as objects of study through convenient sampling.

**Results:** The scores for nursing competence of dementia caregivers were  $140.28 \pm 7.73$ , at a moderate level. Study findings that nursing competence of dementia caregivers were positively associated with the work experience ( $\beta = 0.115, P = 0.005$ ), educational level ( $\beta = 0.333, P < 0.01$ ), perceived health status ( $\beta = 0.108, P = 0.003$ ) and training times within 1 year ( $\beta = 0.371, P < 0.01$ ). Through the analysis, it is found that the training needs of dementia caregivers are inconsistent with the current situation in terms of content, methods and teachers. There are some problems in the training, such as unreasonable time, single mode and not deepening the understanding of the elderly with dementia.

**Conclusion:** Long term care institutions shall arrange training no less than 12 times a year and evaluate training needs regularly to improve training effect. Providing online and offline training and adding more specialized contents like case analysis, employing experts in the field of dementia to teach courses.

© 2020 Chinese Nursing Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## What is known?

- Care for the elderly with dementia requires higher nursing ability of caregivers in long-term care institutions.
- The analysis on training needs is the first step and also the most crucial step of standardized training.
- Little is known about the nursing competence and its influencing factors of dementia caregivers in long-term care institutions.

- The factors that influenced the nursing competence of dementia caregivers included work experience, educational level, perceived health status and training times within 1 year.
- Increase the nursing competence of the elderly with dementia, coping skills of behavioral and psychological symptoms (BPSD), case analysis and interactive discussion, and engage nursing experts or experts in the field of dementia to teach courses.

## What is new?

- The nursing competence of dementia caregivers in long-term care institutions were at a moderate level.

## 1. Introduction

The latest statistics issued by National Bureau of Statistics showed that there had been more than 249 million people aged 60 years old or above in China by 2018, accounting for 17.9% of the total population [1]. There are 2,460,600 people aged 60 years old or above in Tianjin, accounting for 23.43% of the total population. This means that the elderly approximately account for a quarter and the society has entered an advanced stage of ageing in Tianjin [2]. With the acceleration of aging, the number and growth rate of dementia patients are also increasing. The team research of Professor Jia

\* Corresponding author.

E-mail address: [915634423@qq.com](mailto:915634423@qq.com) (K. Zhang).

Peer review under responsibility of Chinese Nursing Association.

showed that there are more than 10 million dementia patients in China [3].

Generally, dementia patients have three primary signs, i.e. behavioral and psychological symptoms of dementia, cognitive impairment and decline of self-care ability. Besides, they are often complicated with various complications in advanced stage [4]. Dementia usually causes disability and dependence of the elderly who will need the long-term care consequently. But due to the gradual reduction of family structure and the particularity of dementia, more and more families choose the nursing institution for the aged [5]. The long-term care institutions, mainly including nursing home, retirement home, rehabilitation agency and community health service center, play an essential role in alleviating the social burden and improving the quality of life of dementia patients [6]. There are nearly 30,000 long-term care institutions in China and 279 ones in Tianjin, with such common problems as deficiency of beds, shortage of nursing staff, incongruity of nursing competence and low service level of elderly care, etc [7].

Due to the particularity and complexity of dementia in comparison with other chronic diseases, the caregivers in long-term care institutions shall be qualified with higher nursing competence in the nursing of dementia patients. The caregivers shall not only meet the daily nursing needs of dementia patients, but also deal with the behavioral and psychological symptoms that may occur at any time. Proper nursing can delay the progression of disease and reduce complications, or the disease will deteriorate [8,9]. However, most caregivers of long-term care institutions in China are laid-off workers, rural women and even the elderly, with limited educational level, they have a lot of misunderstandings in the process of care, which affects their nursing competence. At present, there is no unified definition of caregiver's nursing competence. According to the competence elements of Farran's skill model of dementia caregivers, the nursing competence of dementia caregivers is defined as the comprehensive competence of caregivers to master knowledge of dementia, care skills, have good personal qualities, maintain good interpersonal relationships, and manage their physical and mental health in the process of care [10]. Research showed [11] that only 17.7% caregivers were familiar with the daily nursing of patients and 21.9% caregivers had a partial knowledge of dementia. It is urgent for long-term care institutions to strengthen the nursing competence of dementia caregivers so as to provide the care and concern that can meet the demands of dementia patients in different stages and eventually improve their quality of life.

WHO proposed in Global Plan of Action that "75% countries will have provided support and training scheme for dementia caregivers and families and helped caregivers obtain evidence-based resources by 2025 so as to enhance the knowledge, skills and person-centered approach in the progression of dementia, identify and reduce the stress and job burnout and improve the nursing competence and self-efficacy of caregivers" [12]. Therefore, it is necessary to strengthen the cultivation intensity of caregivers and adopt multi-mode and targeted training, which are effective approaches to stabilize the team of caregivers in long-term care institutions and enhance the relation quality and care quality. But compared with America, Australia and other countries, the caregiver training on dementia is not implemented fully in China and the training effects are not consistent, so the imperious needs of dementia caregivers cannot be addressed effectively, which affects their enthusiasm for participation and improvement of nursing competence. At present, little is known about the nursing competence and its influencing factors of dementia caregivers in long-term care institutions, so it is necessary to fill the gap and provide a basis for the government and long-term care institutions to formulate training schemes for dementia caregivers and intervene

in the nursing competence of caregivers.

## 2. Methods

### 2.1. Participants and settings

This cross-sectional survey was conducted in the only public long-term care institution and five private long-term care institutions of different scales in Tianjin, China. 250 dementia caregivers were selected from 6 long-term care institutions in Tianjin as the objects of study through convenient sampling. Inclusion criteria: (a) Their nursing objects accorded with the diagnostic criteria stipulated in Chinese Classification and Diagnosis of Mental Disorders-3rd Edition (CCMD-3) [13] or International Classification of Disease, 10th revision (ICD-10) issued by WHO and were diagnosed with dementia, including Alzheimer's disease, vascular dementia and all other types; (b) They were the direct and primary long-term caregivers of dementia patients; (c) With informed consent, they were willing to cooperate and could understand the contents of questionnaire. Exclusion criteria: (a) Non-employed caregivers such as family members, friends, social workers; (b) Non-professionals such as nannies.

### 2.2. Sample size

According to the requirement of establishing sample size of multivariate linear regression equation, the sample size should be at least 5–10 times of the number of independent variables in the equation. This study intends to introduce 13 independent variables into the equation. Therefore, the sample size should be at least 65–130 cases. Considering the possibility of incomplete or invalid questionnaires, the sample size should be expanded by 20%, and the sample size should be 82–163 cases. Taking into account the representativeness of the sample, the final sample size was 250 cases.

### 2.3. Instruments

The measurement tools used in this research include three parts: (a) demographic information, (b) the nursing competence assessment scale for dementia caregivers, and (c) questionnaire for training status and needs of dementia caregivers. The developers permitted usage of all questionnaires in this study.

#### 2.3.1. Demographic information

Demographic data included gender, age, educational level, marital status, registered residence, previous employment, work experience, monthly salary and training times within 1 year, etc.

#### 2.3.2. Nursing competence for dementia caregivers

Nursing Ability Assessment Scale for Dementia Caregivers [14], developed by Xie Shutang, was used to assess family dementia caregivers, nursing aids and caregivers of institutions. It contains 5 dimensions (disease knowledge, care skills, personal qualities, caregiver's health and interpersonal relationship) and 36 items. All the items were measured with a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The total scores of this scale were 36–180. The higher the scores, the higher the nursing competence of dementia caregivers. Because different dimensions had different numbers of items, the Item average (mean of dimensions/number of items) was used for the comparison among different dimensions. In this scale, the Cronbach's  $\alpha$  was 0.936, the test-retest reliability coefficient was 0.980, the accumulated variance contribution rate of 5 common factors was 79.44%, I-CVI was between 0.857 and 1, S-CVI was 0.985. This scale had good

reliability and validity.

### 2.3.3. Questionnaire for training status and needs of dementia caregivers

This questionnaire was developed by researchers on the basis of literature review [15–17], including training status and training needs. There are 22 items in the questionnaire and the items and options for training status and training needs were basically the same, including training frequency, work experience, methods, contents and teachers, etc. Items are answered by single or multiple choice. Among them, the training type, contents, methods, teachers, defects and expected training effects, etc. are multiple choices. 5 experts were invited to measure the content validity and propose suggestions on revision. The content validity was 0.93, which meant that this questionnaire had good content validity.

### 2.4. Data collection

The data were collected from April to May in 2019. After receiving approval from the ethics committees and the Department of nursing in the six long-term care institutions, the researchers sent out questionnaires at meetings or training sessions. Before the study, the researchers explained survey objectives and contents to respondents and informed them that it was anonymous. With the permission, the respondents filled out the questionnaire by themselves. If the respondents could not fill out the questionnaire by themselves due to low educational level or other reasons, they completed it under the help of researchers. The questionnaire was checked, verified and recalled by researchers on the spot. With the permission of caregivers, they supplemented the questionnaire by themselves in case of any missed item. There were a total of 250 questionnaires in this survey, of which 246 valid questionnaires were recalled, with the effective rate of 98.4%.

### 2.5. Data analysis

The SPSS21.0 software was used for statistical analysis of data. In the descriptive analysis, the enumeration data were described through frequency and percentage and the measurement data were represented by *Mean ± SD*. The statistical inference was conducted through *t*-test, variance analysis and multivariate linear regression analysis. Thereinto,  $P < 0.05$  meant that the difference had statistical significance.

### 2.6. Quality control

The questionnaire was issued by a researcher alone, which can ensure that the meaning, content, methods and requirements of the questionnaire were explained to the respondents with unified guidance. If the caregiver had questions, the neutral guidance was used to explain, so as to ensure that the caregiver can understand the meaning of each item properly and avoid the influence of the researcher's personal opinion on the judgment of the research object. Data entry was done by two researchers alone and checked the original questionnaire data after input to guarantee the accuracy of the data.

### 2.7. Ethical considerations

Ethical approval for the present study was obtained from the ethics committee of relevant long-term care institutions. The participation was voluntary and anonymous.

## 3. Results

### 3.1. Descriptive statistics

A total of 246 dementia caregivers from six different long-term care institutions participated in this survey, with the gender distribution was 1:5. The number of people in all age brackets are distributed evenly, of which the number of people aged 40–50 years old was the most (27.2%) and that aged below 30 years old was the least (7.3%) (Table 1).

In general, participants showed a moderate level of nursing competence ( $140.28 \pm 7.73$ ). Thereinto, the scores for interpersonal relationship ( $12.96 \pm 1.82$ ) were the highest and those for caregiver's health ( $10.20 \pm 1.32$ ) were the lowest (Table 2).

There are 28 dementia caregivers had not been trained. The dementia caregivers in long-term care institutions mostly received the training once per week/month (29.7%/30.5%), with the training hours of  $\leq 1$  hour/1–2 hours (29.3%/28.5%), which was basically consistent with the training needs of caregivers. Over half of dementia caregivers not only received pre-employment training but also received on-the-job training (52.0%). Most of them thought that the training could meet their job demands basically/

**Table 1**  
Characteristics of participants ( $n = 246$ ).

Characteristics		<i>n</i> (%)
Gender	Male	40 (16.3)
	Female	206 (83.7)
Age (years)	$\leq 30$	18 (7.3)
	31–40	51 (20.7)
	41–50	67 (27.2)
	51–60	53 (21.5)
	$\geq 61$	57 (23.2)
Educational level	Primary school or below	30 (12.2)
	Middle school	104 (42.3)
	Vocational school	81 (32.9)
	Diploma school or above	31 (12.6)
Marital status	Single	18 (7.3)
	Married	207 (84.1)
	Divorced	10 (4.1)
	Widowed	11 (4.5)
Registered residence	Rural	160 (65.0)
	Urban	86 (35.0)
Previous employment	Unemployed	30 (12.2)
	Non-medical	155 (63.0)
Work experience(years)	Medical	61 (24.8)
	$< 0.3$	33 (13.4)
	0.3–1.0	26 (10.6)
	1.1–3.0	56 (22.8)
	3.1–5.0	31 (12.6)
	$> 5.0$	100 (40.7)
Employment method	Permanent	98 (39.8)
	Temporary	148 (60.2)
Qualification situation	Yes	142 (57.7)
	No	104 (42.3)
Monthly salary (CNY)	1500–2500	8 (3.3)
	2501–3500	22 (8.9)
	3501–4500	80 (32.5)
	4501–5500	99 (40.2)
	$\geq 5501$	37 (15.0)
Work shift	24 hours	70 (28.5)
	Working in shifts	137 (55.7)
	Daytime	39 (15.9)
Perceived health status	Poor	2 (0.8)
	General	121 (49.2)
	Good	116 (47.2)
	Excellent	7 (2.8)
Training times within 1 year	None	28 (11.4)
	1–6 times	57 (23.2)
	7–11 times	69 (28.0)
	12 times or above	92 (37.4)

**Table 2**  
Descriptive statistics of nursing competence of dementia caregivers ( $n = 246$ ).

Nursing competence	Scores range	Mean $\pm$ SD	Item average	Sequencing
Dementia knowledge	35–64	50.25 $\pm$ 4.48	3.86 $\pm$ 1.32	3
Care skills	39–61	52.12 $\pm$ 3.78	4.01 $\pm$ 1.24	2
Personal qualities	10–19	14.75 $\pm$ 1.50	3.69 $\pm$ 1.16	4
Caregiver's health	7–14	10.20 $\pm$ 1.32	3.40 $\pm$ 1.20	5
Relationship	8–30	12.96 $\pm$ 1.82	4.32 $\pm$ 1.24	1
Total scores	110–160	140.28 $\pm$ 7.73		

completely (52.8%/32.9%). 88.6% of dementia caregivers were willing/very willing to participate in institutional training (45.5%/43.1%) and a majority of them thought it necessary/very necessary (47.2%/45.5%). More than half of dementia caregivers expected to receive skill training rather than theoretical training (58.0%) and the key problems faced by them in daily care included communication barriers (79.6%), repeated words and deeds (66.9%), dysphoria (56.3%) and sleep disorders (46.5%) (Table 3).

### 3.2. Single factor analysis on nursing competence of dementia caregivers

The single factor analysis was conducted with the total scores for nursing competence of dementia caregivers as dependent variable and the demographic data as independent variables. The results showed that there was a statistical difference in scores for nursing competence of dementia caregivers in respect of educational level, previous employment, work experience, way of employment, qualification situation, monthly salary, perceived health status and training times within 1 year ( $P < 0.05$ ) and there was no statistical difference in scores for nursing competence of dementia caregivers in respect of gender, age, marital status, work shift and registered residence ( $P > 0.05$ ) (Table 4).

### 3.3. Regression analysis

The multivariate linear regression analysis was conducted with the total scores for nursing competence of dementia caregivers as

dependent variable and the variables with statistical significance in single factor analysis as independent variables. The Variance Inflation Factor of this study is between 1.12 and 3.26, which indicates that the problem of collinearity among the variables entering the regression equation is not obvious. As results showed, when the independent variables of work experience, educational level, perceived health status and training times within 1 year were substituted into the regression equation with nursing competence of dementia caregivers as the dependent variable, the multiple correlation coefficient between the dependent variable and 4 predictor variables was 0.854, the determination coefficient ( $R^2$ ) was 0.729 and the  $F$  value for integrity inspection of regression model was 162.279 ( $P < 0.05$ ). Therefore, these 4 predictor variables could effectively explain 72.9% variations for the nursing competence of dementia caregivers. According to the standardized regression coefficient, the  $\beta$  values of 4 predictor variables were 0.115, 0.333, 0.108 and 0.371 respectively, which were all positive numbers. This meant that these 4 predictor variables had positive influence on nursing competence of dementia caregivers. The influence degree of each predictor was training times within 1 year, education level, work experience and perceived health status (Tables 5 and 6).

## 4. Discussion

This study showed that the nursing competence of dementia caregivers in long-term care institutions of Tianjin was at a moderate level (140.28  $\pm$  7.73). Thereinto, the scores for interpersonal relationship were the highest, which was followed by the scores for

**Table 3**  
Descriptive statistics of training status and training needs of dementia caregivers.

Items		$n$ (%)
<b>Training status (<math>n = 218</math>)</b>		
Training contents	Nursing knowledge about daily life	197 (90.4)
	Nursing practice skills	195 (89.4)
	Safety management	170 (78.0)
	Emergency response to sudden events	163 (74.8)
	Face-to-face courses	218 (100)
Training methods	Simulation drilling	155 (71.1)
	Watching teaching videos	124 (56.9)
	Administrators of institutions	193 (88.5)
Teachers	Nurses	147 (67.4)
	Unreasonable training time	56 (25.7)
Training defects	Less understanding about demented elderly	53 (24.3)
	<b>Training needs (<math>n=246</math>)</b>	
Expected training contents	Caring skills applicable to demented elderly	199 (80.9)
	Coping skills of BPSD	184 (74.8)
	Nursing knowledge about daily life	183 (74.4)
	Nursing practice skills	176 (71.5)
Expected training methods	Face-to-face courses	227 (92.3)
	Case analysis	180 (73.2)
	Interactive discussion and exchange	167 (67.9)
	Nursing specialists	208 (84.6)
Expected teachers	Specialists in the field of dementia	157 (63.8)
	Expected training effects	Enhancement of nursing skills
	Increase of nursing knowledge	187 (76.0)

Note: BPSD, behavioral and psychological symptoms.

**Table 4**  
Nursing competence scores of caregivers with different characteristics ( $n = 246$ ).

Characteristics		Mean $\pm$ SD	t/F	P
Educational level	Primary school	136.57 $\pm$ 7.44	3.92 <sup>a</sup>	0.009
	Middle school	139.99 $\pm$ 6.87		
	Vocational school	141.01 $\pm$ 8.17		
	Diploma school or above	142.90 $\pm$ 8.51		
Previous employment	Unemployed	136.50 $\pm$ 6.66	14.22 <sup>a</sup>	<0.001
	Non-medical	139.42 $\pm$ 7.61		
	Medical	144.31 $\pm$ 6.96		
Work experience(years)	<0.3	136.24 $\pm$ 11.07	5.66 <sup>a</sup>	<0.001
	0.3–1.0	137.71 $\pm$ 7.39		
	1.1–3.0	140.30 $\pm$ 5.86		
	3.1–5.0	140.82 $\pm$ 6.19		
	>5.0	142.67 $\pm$ 7.73		
Employment method	Permanent	141.87 $\pm$ 6.53	2.66 <sup>b</sup>	0.008
	Temporary	139.22 $\pm$ 8.29		
Qualification situation	Yes	141.52 $\pm$ 7.33	3.00 <sup>b</sup>	0.003
	No	138.58 $\pm$ 7.98		
Monthly salary(CNY)	1500–2500	135.30 $\pm$ 12.34	3.71 <sup>a</sup>	0.006
	2501–3500	137.25 $\pm$ 9.21		
	3501–4500	139.51 $\pm$ 7.51		
	4501–5500	141.27 $\pm$ 7.18		
	$\geq$ 5501	142.97 $\pm$ 5.49		
Perceived health status	Poor	124.71 $\pm$ 10.00	20.05 <sup>a</sup>	<0.001
	General	138.93 $\pm$ 7.11		
	Good	142.13 $\pm$ 6.64		
	Excellent	147.91 $\pm$ 6.11		
Training times within 1 year	None	135.25 $\pm$ 10.58	20.65 <sup>a</sup>	<0.001
	1–6 times	136.87 $\pm$ 6.55		
	7–11 times	138.53 $\pm$ 7.75		
	12 times or above	144.06 $\pm$ 5.24		

Note: <sup>a</sup> F ANOVA; <sup>b</sup> t Independent t-test.

disease knowledge and care skills. And the scores for caregiver's health were the lowest. This not only reflected that the dementia caregivers got along well with dementia patients, family members and colleagues, but also reflected from the side that the institutions and dementia caregivers paid great attention to interpersonal communication and service attitude. Comparatively speaking, they paid less attention to the caregiver's health and most caregivers failed to relieve physical fatigue and psychological weariness in a proper manner in the process of care [18].

The disease knowledge and care skills were at middle or higher levels, which may be related to the attention paid by long-term care institutions to the professional quality and service level of dementia caregivers and the training on dementia. Enhancing caregiver's nursing competence is very important to delay the course of dementia and lighten the burden of caregivers. According to Farran caregiver's skill model, Wei Wenjing constructed the intervention program of dementia caregiver's nursing competence. Through one-to-one explanation, Handbook issuance and uploading teaching videos by Wechat, caregivers can gradually master dementia knowledge, management of behavioral and psychological

**Table 5**  
Assignment method of independent variable.

Independent variable	Assignment method
Educational level	Primary school or below = 1; Middle school = 2; vocational school = 3; diploma school or above = 4
Previous employment	Unemployed = 0,0; Non-medical = 1,0; Medical = 0,1
Work experience(year)	<0.3 = 1; 0.3–1.0 = 2; 1.1–3.0 = 3; 3.1–5.0 = 4; >5.0 = 5
Employment method	Temporary = 0,Permanent = 1
Qualification situation	No = 0,Yes = 1
Monthly salary(CNY)	1500–2500 = 1; 2501–3500 = 2; 3501–4500 = 3; 4501–5500 = 4; $\geq$ 5501 = 5
Perceived health status	Poor = 1,General = 2,Good = 3,Excellent = 4
Training times within 1 year year	None = 1,1–6 times = 2,7–11 times = 3,12 times or above = 4

**Table 6**  
Multiple linear regression of factors of nursing competence ( $n = 246$ ).

Independent variable	B	SE	$\beta$	t	P
Constant	115.335	1.520	–	75.876	<0.001
Work experience	0.862	0.302	0.115	2.853	0.005
Educational level	2.821	0.393	0.333	7.176	<0.001
Perceived health status	1.330	0.442	0.108	3.012	0.003
Training times within 1 year	2.153	0.326	0.371	5.164	<0.001

Note:  $R^2 = 0.55$ ,  $F = 659.89$ ,  $P < 0.01$ .

symptoms, safety management and other skills, as well as methods of burden relief, interpersonal relationship and resource utilization. After one month, the nursing competence of dementia caregivers improved significantly compared with the baseline ( $P < 0.01$ ) [19].

As shown in this study, the dementia caregivers with different previous employments, way of employment, qualification situations and monthly salary had different nursing competences. The possible reasons are as follows. Firstly, the dementia caregivers engaging in medical profession in the past have basic medical knowledge, more abundant medical and nursing experience, thus



have higher nursing competence [20]. Secondly, compared with temporary workers, the permanent workers usually have higher educational level, higher salary, stronger sense of belonging and higher participation rate of social security, so they have higher working enthusiasm and nursing competence [21]. Thirdly, the dementia caregivers with qualification certificates often have received formal training and assessment, so they have higher nursing competence in comparison with those who are not qualified [22]. Fourthly, the long-term care institutions usually have the problems of long work hours and low salaries and the non-equivalence between efforts and rewards is a negative incentive for dementia caregivers, which leads to the mentality unbalance and thus hinders the working enthusiasm and improvement of nursing competence [23]. In view of this, the long-term care institutions shall fully consider the previous employment when they employed caregivers and give preference to those with medical work experience. Strictly set the entry threshold, achieve hold certificate to work and no certificate layoff. Besides, institutions shall formulate more reasonable remuneration package based on work intensity, technicality, training and assessment, nursing competence and other composite indicators. Regular assessment of nursing knowledge and skills of dementia caregivers, the higher the score, the more rewards. Those who fail to pass the examination shall reduce their workload appropriately, arrange for them to participate in the training and deduct their salary. When the examination passes, it will be returned. Enhance the participation rate of social security of temporary workers, adopt a combination of spiritual and material incentives, definite promotion space, so that it has better career planning and career prospects.

It was found that the work experience was the factor that influenced the nursing competence of dementia caregivers. With the increase of working years, the dementia caregivers had more abundant experience in caring for dementia patients. They could trust and understand each other in a better way, so the dementia caregivers with over 5 years of work experience had higher nursing competence [24]. And the proportion of these dementia caregivers was also the highest accordingly (40.7%). Some dementia caregivers even had more than 15 years of work experience, which was not consistent with the serious staff turnover of nursing team in long-term care institutions as indicated in other studies. This may be related to the favorable organizational climate and reasonable remuneration package provided by these long-term care institutions as well as the low turnover intention of caregivers [25]. Furthermore, the perceived health status also affected nursing competence. The dementia caregivers with better physical condition had more energy and stronger nursing motility. It may also be those with higher health literacy had better physical condition, applying disease knowledge to nursing practice at the same time will result in higher nursing competence [26].

It can be seen from the above that the administrators of long-term care institutions shall emphasize the creation of favorable organizational climate and provide more supports for the dementia caregivers with experience in economy, emotion. Providing more promotional opportunities and increase seniority pay for employees with strong professional ability so as to enhance their work satisfaction. According to statistics, the nursing staff in long-term care institutions were in a state of work overload. Thereinto, 42.7% of nursing staff worked for 9–10 hours every day and 13.1% of them worked 11–12 hours every day [27]. The administrators shall keep a watchful eye on the physical condition of dementia caregivers, provide the welfare of physical examination for them, arrange the labour intensity reasonably, improve the health literacy of dementia caregivers through training, tell them how to relieve stress and thus maintain the stability and vitality of nursing team [28].

It was proved that the educational level was also the factor that influenced the nursing competence of dementia caregivers. In this study, the educational level of dementia caregivers was primarily middle school, which was consistent with the investigation conducted by Tian Hongmei [29] et al. Due to the limits of educational level and knowledge structure, the dementia caregivers with lower educational level had such shortcomings as poor comprehension, poor receptivity, poor ability to analyze and solve problems and lower nursing competence. Only a minority of dementia caregivers had an educational level of junior college or above and most of them were new employers aged below 30 years old. They had advantages in theoretical knowledge and personal qualities and disadvantages in inadequate experience and poor operation ability. Therefore, institutions should attract more highly educated personnel by improving welfare benefits, defining promotion space, and carry out stratified training according to caregivers' educational level, working years, qualifications, etc. Selecting more suitable training content and methods according to their characteristics, so as to improve the training effect. At the same time, it should create conditions for caregivers to improve their educational level and learning ability, such as paid continuing education, joint cultivation of colleges and universities.

What's more, this study showed that the training times within 1 year also affected the nursing competence of dementia caregivers. The dementia caregivers could improve their nursing competence through continuing education in the course of work. The caregivers who received training for more than 12 times within 1 year had higher nursing competence than those in other three groups. In this study, most dementia caregivers received the training for more than 12 times within 1 year, but the proportion was still small (37.4%). So the long-term care institutions should strengthen the training intensity of dementia caregivers and provide them with more opportunities of continuing education and career development [30]. It was seen from survey results that 88.6% of long-term care institutions offered training, but 42.3% of caregivers still had no qualification certificate, which was consistent with the situation that the nursing staff had a low rate of employment with certificates in China [31]. The reason may be that some dementia caregivers were nursing assistants who received training but obtained no qualification certificate. In Britain, Australia and other countries, the nursing assistants must have corresponding qualifications and all the staff must take up the post with certificates [32,33]. By contrast, it is necessary for long-term care institutions in China to intensify the concept of employment with certificates, acquiring qualification through pre-job training.

The analysis on training needs is the first step and also the most crucial step of standardized training, because the correct analysis on needs will lead to high-quality training effects [34]. Most dementia caregivers thought that the training was necessary. They were willing to participate in training and wanted to obtain more opportunities of continuing education to improve their own professional quality and combine theory with practice. From the perspective of training contents, most of institutions focused on the foundation to reduce the safety risk of dementia patients, while the dementia caregivers expected to know more about care skills applicable to dementia patients and coping skills of BPSD. The survey results indicated that the dementia caregivers often faced such difficult problems as communication barriers, repeated words and deeds, dysphoria and sleep disorders, etc. in the process of daily care, which increased their nursing difficulty and disturbance so they had more imperious needs for training [35,36]. It was worth noting that institutions and caregivers paid less attention to relevant laws and regulations. With the normalized development of nursing teams for the elderly in China, the caregivers shall restrain and protect themselves through laws and regulations and the long-

term care institutions shall add the laws and regulations related to caregivers to training contents [37].

In terms of training methods, a lot of training courses about dementia have been set up online at abroad and these countries have achieved good effects in enhancing the self-efficacy and improving the attitudes of dementia caregivers [38,39]. In this study, half of dementia caregivers were over 50 years old, so they felt hard to receive the method of online learning and failed to understand the contents of training manual completely. And the video teaching was also not accepted due to the lack of interaction [40]. Dementia caregivers expected to receive the training through case analysis in addition to the regular face-to-face teaching, which was conducive to understanding and application. Meanwhile, the dementia caregivers could share experience and learn from each other through interactive discussion. The training teachers of long-term care institutions were mostly administrators and nurses, who failed to explain the specialized knowledge of dementia thoroughly, so the dementia caregivers expected to attend the course given by nursing specialists and specialists in the field of dementia to deepen their understanding and thus care for the dementia patients in a better way.

Moreover, in view of unreasonable training time, less understanding about dementia patients, single training method and other problems, the long-term care institutions should refine the curriculum and time, allow caregivers to choose training courses purposefully according to their knowledge deficiencies, provide online and offline training methods, allow caregivers to choose training methods independently and flexibly choose learning time [40,41]. Carry out specialized nursing training to deepen the understanding of diseases, increase the care skills of dementia elderly, BPSD coping skills and other more practical content [42], timely incorporate the training content into daily care, in order to maintain the long-term effect of training [43].

## 5. Limitation

There are some limitations in this study. Firstly, with regard to the self-assessment scale used in this study, the subjective bias can not be avoided while evaluating the nursing competence of dementia caregivers in long-term care institutions. At the same time, there are some other influence factors not involved in this study. At last, the implementation effect of training needs in this survey shall be demonstrated through intervention study.

## 6. Conclusion

The nursing competence of dementia caregivers were at a moderate level. Institutions should pay attention to the comprehensive improvement of nursing competence of dementia caregivers, and adopt one-to-one, centralized training and other ways to improve nursing competence and verify the effectiveness of various intervention modes. Considering its influencing factors, long-term care institutions should strictly hold certificates, rationally arrange labor intensity, attract more highly educated nursing talents by improving welfare benefits, defining promotion space. Emphasis should be placed on experienced caregivers for dementia, providing sufficient learning opportunities for employees. Guarantee no less than 12 training times in a year. Although most caregivers thought it necessary and willing to participate in training, Layered training should be carried out according to caregivers' educational level, working years and other factors. Provide online and offline training to allow the caregiver choose their own training methods and time. At the same time, the training needs of dementia caregivers should be regularly assessed, and more specialized and practical contents should be added, such as care

skills for dementia elderly and BPSD coping skills. Teaching caregivers how to deal with communication barriers, repeated words and deeds, dysphoria and sleep disorders. Adding the laws and regulations related to caregivers to training contents. In addition to face-to-face courses, innovative training methods such as case analysis and interactive seminars should be carried out. In addition, Institutions can employ nursing experts or experts in the field of dementia to teach courses, so as to improve the cognitive level of dementia and nursing skills of caregivers.

## Funding

None.

## Declaration of competing interest

No conflicts of interest declared.

## CRediT authorship contribution statement

**Yaxing Wang:** Conceptualization, Formal analysis, Investigation, Writing - original draft. **Yuqi Liu:** Writing - review & editing. **Junxiang Tian:** Visualization, Software. **Mengya Jing:** Software, Resources. **Kesen Zhang:** Methodology, Data curation, Supervision, Project administration.

## Acknowledgments

The authors gratefully acknowledge the 250 dementia caregivers who participated in this study for their assistance as well as all the experts and members of our group for their help and advices.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijnss.2020.03.003>.

## References

- [1] National Bureau of Statistics of the People's Republic of China. Statistical bulletin for national economy and social development of the people's Republic of China in 2018. 2-28[2019-07-07], [http://www.stats.gov.cn/tjsj/zxfb/201902/t2-0190228\\_1651265.html](http://www.stats.gov.cn/tjsj/zxfb/201902/t2-0190228_1651265.html); 2019.
- [2] Teng QY. Serious aging in Tianjin, with more than 2.46 million people aged over 60. Tianjin daily. 4-10(TJ51)[2019-07-08], [http://epaper.tianjinwe.com/tjrb/html/2019-10/14/node\\_1.htm?v=1#](http://epaper.tianjinwe.com/tjrb/html/2019-10/14/node_1.htm?v=1#); 2018.
- [3] Jia L, Quan M, Fu Y, Zhao T, Li Y, Wei CB, et al. Dementia in China: epidemiology, clinical management, and research advances. *Lancet Neurol* 2020;19(1):81–92. [https://doi.org/10.1016/S1474-4422\(19\)30290-X](https://doi.org/10.1016/S1474-4422(19)30290-X).
- [4] Todd S, Barr S, Roberts M, Passmore AP. Survival in dementia and predictors of mortality: a review. *Int J Geriatr Psychiatr* 2013;28(11):1109–24. <https://doi.org/10.1002/gps.3946>.
- [5] Comas-Herrera A, Wittenberg R, Pickard L, Knapp M. Cognitive impairment in older people: future demand for long-term care services and the associated costs. *Int J Geriatr Psychiatr* 2010;22(10):1037–45. <https://doi.org/10.1002/gps.1830>.
- [6] Wei WJ, Chen Y, Zhang GJ, Xie ST. Application progress of network technology in nursing competence intervention of caregivers for patients with senile dementia. *Nurs Res* 2019;33(12):2082–4. <https://doi.org/10.12102/j.issn.1009-6493.2019.12.019>.
- [7] Ministry of Civil Affairs of the People's Republic of China. Situation of institutions in the first quarter of 2019. 4-30[2019-07-07], <http://www.mca.gov.cn/article/sj/tjyb/sysj/2019/201904301049.html>; 2019.
- [8] Haibo X, Shifu X, Pin NT, Chao C, Guorong M, Xuejue L, et al. Prevalence and severity of behavioral and psychological symptoms of dementia(BPSD) in community dwelling Chinese: findings from the Shanghai three districts study. *Aging Ment Health* 2013;17(6):748–52. <https://doi.org/10.1080/13607863.2013.781116>.
- [9] van dB M, van SI, Ramakers IHGB, Aalten P, Koek HL, Olde Rikkert MGM, et al. Trajectories and determinants of quality of life in dementia with lewy bodies and alzheimer's disease. *J Alzheimers Dis* 2019;70(2):389–97. <https://doi.org/10.3233/JAD-190041>.
- [10] Farran CJ, Mccann JJ, Fogg LG, Etkin CT. Developing a measurement strategy

- for assessing family caregiver skills: conceptual issues. *Alzheim Care Today* 2009;10(3):129–39. <https://doi.org/10.1097/ACQ.0b013e3181b15d82>.
- [11] Wu SY, Dong BR, Ding GM, Chen JH, Pang W. Status of reception and care for patients with senile dementia in elderly-care institutions of chengdu city. *Mod Prev Med* 2011;38(3):482–4.
- [12] World Health Organization. Global action plan on the public health response to dementia 2017–2025. 09-12[2019-07-07], [https://www.who.int/mental\\_health/neurology/dementia/action\\_plan\\_2017\\_2025/en/](https://www.who.int/mental_health/neurology/dementia/action_plan_2017_2025/en/); 2017.
- [13] Psychiatric Association of Chinese Medical Association. *Chinese Classification and Diagnosis of mental Disorders*. 3rd ed. Jinan. Shandong Science & Technology Press; 2001. p. 184–8.
- [14] Xie ST. Compilation of the questionnaire on nursing competence of dementia caregivers. Zhengzhou University; 2018. <https://doi.org/10.3969/j.issn.1006-9771.2018.11.010>.
- [15] Smythe A, Jenkins C, Galant-Miecznikowska M. A qualitative study investigating training requirements of nurses working with people with dementia in nursing homes. *Nurse Educ Today* 2017;50(3):119–23. <https://doi.org/10.1016/j.nedt.2016.12.015>.
- [16] Zauszniewski JA, Lekhak N, Napoleon B. Resourcefulness training for women dementia caregivers: acceptability and feasibility of two methods. *Issues Ment Health Nurs* 2016;37(4):249–56. <https://doi.org/10.3109/01612840.2015.1119222>.
- [17] da Silva Serelli Larissa, Reis Ramon Castro, Jerson Laks. Effects of the Staff Training for Assisted Living Residences protocol for caregivers of older adults with dementia: a pilot study in the Brazilian population. *Geriatr Gerontol Int* 2017;17(3):449–55. <https://doi.org/10.1111/ggi.12742>.
- [18] Chen WC, Zeng LJ, Chen Y, Xu MZ, Yang WJ, Gao YM, et al. Relationship between fatigue status and abusive tendency among caregivers of elder people with dementia in long-term care facilities and its influencing factors. *Chongqing Med* 2019;48(3):460–5. <https://doi.org/10.3969/j.issn.1671-8348.2019.03.025>.
- [19] Wei WJ. The effect of a nursing skills program for caregivers of people with dementia: a Pilot study. Zhengzhou University; 2019. <https://doi.org/10.1202/j.issn.1009-6493.2019.12.019>.
- [20] Chen FJ, Li JP, Ma F, Fang JB, Liu SZ. Investigation on nursing ability status and influencing factors of junior nurses with standardized training. *Chin J Nurs* 2012;47(12):1099–102. <https://doi.org/10.3761/j.issn.0254-1769.2012.12.017>.
- [21] (a) Wang LY, Wu WH, Feng P. Application and exploration of psychological contract in contract nurse management. *J Nurs Train* 2013;28(12):1076–8. <https://doi.org/10.16821/j.cnki.hsxx.2013.12.008>. (b) Gao P, Qin YX, Chen X, Ye Q, Cao JY, Wei Y, et al. Observation on the effect of nursing post qualification certification training for cardiovascular professional nurses in hospita. *J Nurs* 2015;22(20):6–9. <https://doi.org/10.16460/j.issn1008-9969.2015.20.006>.
- [22] Wu GL, Yang MY, Yang J, Yang QR, Li DN, Ma E, et al. Status quo of nursing personnel qualification and training in pension agencies in China. *Nurs Res* 2017;31(7):789–91. <https://doi.org/10.3969/j.issn.1009-6493.2017.07.006>.
- [23] Li L, Ji YR, Chen YP, Xing Li, Wang CC. Analysis of ICU Nurses' Basic nursing ability in intensive care and its influencing factors. *J Nurs* 2016;23(15):46–50. <https://doi.org/10.16460/j.issn1008-9969.2016.15.046>.
- [24] Jia H. *Nursing service and management of pension institutions in China*. *Chin Nurs Manag* 2014;14(S1):65–6. in Chinese.
- [25] Liu YB, Dou XZ, Wang SX, Chen YL, Zhu QQ, Yao H, et al. Canonical correlation analysis on health literacy and self-care ability of the elderly in elderly-care institutions. *Chin J Gerontol* 2014;34(5):1349–52. <https://doi.org/10.3969/j.issn.1005-9202.2014.05.088>.
- [26] Wei YP, Li H, Chen P, Li J, Chen HY. Survey on quality of life of caregivers of Alzheimer's disease patients in old-age institutions in Fujian Province. *J Nurs Training* 2016;31(8):743–5. <https://doi.org/10.16821/j.cnki.hsxx.2016.08.024>.
- [27] Yang S. Analysis on status of nursing staff in aging service agencies and countermeasures. *Chin Nurs Manag* 2014;14(1):6–9. <https://doi.org/10.3969/j.issn.1672-1756.2014.001.001>.
- [28] He P, Wei YP, Li H. Survey on social support status of caregivers of dementia patients in old-age institutions in Fujian Province. *Nurs Res* 2016;30(33):4176–8. <https://doi.org/10.3969/j.issn.1009-6493.2016.33.026>.
- [29] Wang F, Ye GY, Xu P, ShenKZ, Zhao CY. Current situation and needs of training nurses for the aged in ningbo old-age institutions. *Chin J Gerontol* 2018;38(18):4555–7. <https://doi.org/10.3969/j.issn.1005-9202.2018.18.072>.
- [30] Xin Y, Liu YX, Zhang H, Wang XL, Hu X. Analysis on training status of nursing staff for the elderly in some elderly-care institutions of jiangsu province. *Nurs Res* 2017;31(31):3992–4. <https://doi.org/10.3969/j.issn.1009-6493.2017.31.027>.
- [31] Ministry of Health. Staffing regulations for aged residential care facilities. 12-04[2019-07-08], <http://www.moh.govt.nz/notebook/nbbooks.nsf/0/b9019d55a6d7079ecc257702007ee13c&dollar;FILE/staffingregulations.pdf>; 2012.
- [32] United Kingdom Department Of Health. Care homes for older people-national minimum standards and the care homes regulations 2003. 06-07[2019-07-08], <https://www.thenbs.com>; 2003.
- [33] Kong LL, Hu Y, Zhao MX, Gong Y, Luo JY. Survey on training status and needs of nursing staff in elderly-care institutions of xianning city. *J Nurs* 2016;23(1):42–5. <https://doi.org/10.16460/j.issn1008-9969.2016.01.042>.
- [34] Wang JJ, Hsieh PF, Wang CJ. Long-term care nurses' communication difficulties with people living with dementia in taiwan. *Asian Nurs Res* 2013;7(3):99–103. <https://doi.org/10.1016/j.anr.2013.06.001>.
- [35] Zhang P, Xiang WE. Analysis on status of nursing staff in elderly-care institutions at home and abroad. *Chin J Gerontol* 2015;35(19):5662–5. <https://doi.org/10.3969/j.issn.1005-9202.2015.19.140>.
- [36] Naughton C, Beard C, Tzouvara V, Pegram A, Verity R, Eley R, et al. A feasibility study of dementia communication training based on the VERA framework for pre-registration nurses: Part I developing the intervention. *Nurse Educ Today* 2018;63(4):94–100. <https://doi.org/10.1016/j.nedt.2018.01.024>.
- [37] Larissa DSS, Reis RC, Laks J, Bottino CM, Caramelli P. Effects of the Staff Training for Assisted Living Residences protocol for caregivers of older adults with dementia: A pilot study in the Brazilian population. *Geriatr Gerontol Int* 2016;17(2):449–55. <https://doi.org/10.1111/ggi.12742>.
- [38] Jackson M, Pelone F, Reeves S, Hassenkamp AM, Emery C, Titmarsh K, et al. Interprofessional education in the care of people diagnosed with dementia and their carers: a systematic review. *BMJ Open* 2016;6(8):e010948. <https://doi.org/10.1136/bmiopen-2015-010948>.
- [39] Dobbs D, Hobday J, Roker R, Kaas MJ, Molinari V. Certified nursing assistants' perspectives of the CARES® activities of daily living dementia care program. *Appl Nurs Res* 2018;39(2):244–8. <https://doi.org/10.1016/j.apnr.2017.11.016>.
- [40] Abley C, Dickinson C, Andrews Z, Prato L, Lindley L, Ronbinson L. Training interventions to improve general hospital care for older people with cognitive impairment: systematic review. *Br J Psychiatry* 2019;214(4):201–12. <https://doi.org/10.1192/bjp.2019.29>.
- [41] Eccleston C, Doherty K, Bindoff A, Ronbinson A, Vickers J, McInerney F. Building dementia knowledge globally through the understanding dementia massive open online course (MOOC). *NPJ Sci Learn* 2019;4:3. <https://doi.org/10.1038/s41539-019-0042-4>.
- [42] Sampaio FMC, Sequeira C. Nurses' knowledge and practices in cases of acute and chronic confusion: a questionnaire survey. *Psychiatr Care* 2014;51(2):98–105. <https://doi.org/10.1111/ppc.12069>.
- [43] Surr CA, Gates C, Irving D, Oyeboode J, Jane S, Parveen S, et al. Effective dementia education and training for the health and social care workforce: a systematic review of the literature. *Rev Educ Res* 2017;87(5):966–1002. <https://doi.org/10.3102/0034654317723305>.