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ORIGINAL RESEARCH

Difference of Physical Restraint Knowledge, Attitudes and Practice Between Nurses and Nursing Assistants in Long-Term Care Facilities: A Cross-Sectional Study

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Background: Physical restraint (PR) is widespread use among older adults in long-term care (LTC) facilities, which has negative effects on older adults' health and quality of care. Considering that research on PR use in Chinese LTC facilities is rare, assessment of nursing staff's knowledge, attitude, and practice (KAP) is a prerequisite before minimized PR program and staff training project development.

Purpose: This study aimed at determining the differentiation of levels and factors of KAP toward PR use between nurses and nursing assistants in LTC facilities.

Methods: A cross-sectional study was conducted in six Chinese LTC facilities from November to December in 2019 and May to June in 2020. A total of 316 nursing staff, comprising 69 nurses and 247 nursing assistants were investigated using the Chinese version of the Staff Knowledge, Attitudes and Practices Questionnaire regarding PR. One-way analysis of variance, chi-squared test, Welch test, the Mann–Whitney *U*-test, and multiple linear regression were performed for data analysis.

Results: Mean scores of overall knowledge, attitude, and practice were 5.90±2.27, 31.97±3.01, 30.89±4.82, respectively. PR knowledge and practice of nurses were significantly higher than that of nursing assistants (all $P<0.001$), whereas PR attitude with no significant difference ($P=0.084$). In-school training, in-job training, and knowledge on PR significantly affected PR practice of nurses and nursing assistants. Further, nursing assistants' practice was also significantly predicted by education ($\beta=0.131$, $P=0.019$), age ($\beta=-0.140$, $P=0.034$), monthly income ($\beta=-0.184$, $P=0.002$), and attitude ($\beta=0.130$, $P=0.030$). In-job training ($\beta=0.283$, $P<0.001$), age ($\beta=-0.164$, $P=0.021$), and knowledge ($\beta=0.292$, $P<0.001$) significantly affected nursing assistants' attitude, while their knowledge was influenced by monthly income ($\beta=0.153$, $P=0.019$) and work years in LTC ($\beta=0.343$, $P<0.001$).

Conclusion: Specific knowledge deficits, negative fields of attitude, and practice were dissimilar between nurses and nursing assistants. The targeted and stratified PR education approaches were suggested to prompt their KAP.

Keywords: physical restraint, long-term care, nursing, knowledge, attitudes, practice, nursing homes, nursing staff

Introduction

According to an international consensus of a research definition, the concept of physical restraint (PR) is

> any action or procedure that prevents a person's free body movement to a position of choice and/or normal access to their body by using any method that is attached or adjacent to a person's body and that they cannot control or remove easily.[1]

The use is restricted by the National Mental Health Law when applied for patients with mental disorders in China mainland and recommended as medical quality control indicator in a standard of care.[2] Restraint is regarded as

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a protective medical measure used temporarily to prevent accidents when other alternative measures are useless.[2] The latest definition of PR for inpatients from Chinese Nursing Association is

> attached to or close to the patient's body with physical or mechanical devices, materials, and tools, restricting the patient's free movement or preventing the patient from getting close to their body normally.[3]

Nevertheless, the definition of PR in Chinese LTC facilities is not clarified, and most facilities follow the definition in acute hospitals to implement. Extensive evidence has indicated the associations between PR use and poor outcomes of health. For instance, PR use is related to numerous physical adverse effects, including mobility limitation, the ability of daily living decline, infection, pressure injury, etc.[4–6] Negative psychological (eg, anger, restlessness, depression, loss of trust, etc)[7,8] and social effects (eg, social isolation, low sense of social worth and self-esteem)[9] have also been addressed. More seriously, improper use of PR could result in accidental deaths. Apart from that, PR is considered as an indicator of maltreatment and an infringement of the rights and freedoms of autonomy.[10] Thus, PR is regarded as a significant problem worldwide impacting the quality of care services, which has aroused wide concern.[11]

Some authorities, such as Joanna Briggs Institute (JBI) and Registered Nurses' Association of Ontario (RNAO), have issued restraints standards and guidelines applied to the hospitals and/or in long-term care (LTC) facilities to promote normative use of PR.[12–14] Nevertheless, the use of PR does not seem to have improved significantly, the prevalence of PR is still widespread. Due to the decline in the ability of daily living, cognitive dysfunction, and behavior disorder of older adults, the use of PR is particularly acute in LTC facilities. The wide variation of PR rate in LTC facilities has been reported in various countries, ranging from 6% to 84.9%.[15,16] In China, a community-based epidemiological survey in the Taiwan district demonstrated the highest use of PR (62%) in residential aged facilities.[17] Another 11-year (2005 to 2015) observational study in Hong Kong showed that PR use increased from 52.7% to 70.2% in LTC facilities.[18] Previously, we investigated that the prevalence of PR from six LTC facilities in this present study location was 25.83%, meanwhile, PR use among older adults was lacking standardized and regulated management.[19] We found that nursing staff's purpose of PR use was to prevent falls from a bed or a chair (71.70%), followed by hurt prevention (33.58%) and extubation prevention (23.02%).[19] However, these are not the necessary reasons for the use of PR. On the contrary, restraint use may increase the occurrence of these adverse events. Thus, these startling numbers and worrying practices urged us to explore perspectives and practices on PR of nursing staff and think about the development of effective measures to minimize the use of PR.

Numerous studies[8,16,20] have identified the risk factors of PR use among older adults in LTC facilities and developed various interventions, including behavioral and psychiatric symptoms management,[21] quality improvement project,[22] alternatives of PR,[23] staff education programs,[23] multicomponent interventions.[24,25] Therein, nursing staff education on PR is the most commonly used strategy because nursing staff plays a vital role in the process of PR use in LTC. They engaged in the whole process of PR use, such as evaluation, decision-making, implementation, removal, and care of restrained older adults.[26] In China, based on our previous study,[19] only 14.72% of restrained older adults had doctor's order of PR, and 77.74% of PR were determined by nurses or nursing assistants without the involvement of a doctor. Thus, considering that nursing staffs are primary performers and decision-makers of PR use on older adults, relevant education projects are essential. Before developing a PR education program, it is necessary to evaluate nursing staff's knowledge, attitude, and practice (KAP) toward PR to ensure the effectiveness of training.

In many developed countries, such as Germany, Austria, etc, a series of studies comprising PR use in LTC facilities, nursing staff's KAP toward PR, and educational interventions have been identified in detail.[27–29] Although educational interventions have been developed based on the identified KAP of nursing staff, the level and leading factors also vary across cultural backgrounds and PR use environments. A large number of Chinese studies have focused on hospitalized patients, such as intensive care unit (ICU) patients, psychiatric patients, etc,[30–32] whereas PR use among older adults in LTC facilities attracted little attention. Only in Hong Kong, one study (1999) investigated nursing staff's KAP toward PR in nursing homes, as well as another study in 2018 compared the changes with this previous study.[33,34] The Hong Kong Social Welfare Department required aged care homes to develop staff training for restraint use and adopt the principle of "minimized restraint".[34] In China mainland, although patients with mental disorders in a mental hospital could be restricted under the order of a psychiatrist by specific protection measures, the implementation process must meet the

norms, such as informed consent, regular assessment, and shall not exceed the necessary time, etc. PR for patients with mental disorders is to restrict movement for the safety of the patient, such as preventing emergency violent accidents, suicide, self-injury, and other reasons.[32] Other than psychiatric medical departments, PR in LTC is used to protect older adults from harm even if principles of "no restraint and/or minimized PR" are recommended internationally. These principles provide references for PR use among older adults in LTC facilities. Nevertheless, no specific principles or regulations, as well as staff training on PR use were developed for PR use in LTC facilities in mainland China, most nursing staff practiced PR generally per their subjective clinical experience and estimation.[35] The practice of nursing staff performing PR is lacking standards, especially in the recording and decision-making. Unfortunately, to our knowledge, nursing staff's KAP toward PR in LTC facilities has not been clarified in the Chinese mainland. Therefore, it is urgent to explore the KAP toward PR among nursing staff in LTC facilities and formulate educational programs accordingly.

Previous systematic reviews in 2012 and 2017 have identified the effectiveness of education programs on reducing PR.[36,37] Given that educational demands were associated with staff's KAP and a descriptive score of nurses' practice toward PR was higher than that of nursing assistants in our previous study.[38] The present study aimed at determining the level and difference of KAP among nurses and nursing assistants in LTC facilities. Further, we would explore factors associated with KAP toward PR by nurses and nursing assistants. Thereby, the findings could be serving as significant references to guide educational interventions for PR minimization.

Materials and Methods

Study Design

A cross-sectional survey was conducted from November to December in 2019 and May to June in 2020. The time gap was due to the COVID-19 epidemic.

Sampling and Setting

A total of 316 nursing staff, including 69 nurses and 247 nursing assistants were selected from six LTC facilities in Chongqing, China. Of these LTC facilities, four were nursing homes with beds ranging from 100 to 200, one social welfare with 350 beds, and one aged care center with 250 beds. All nurses and nursing assistants who practiced the closest care to older adults in the facilities were included in this study. Nursing staff who had the following situations were excluded: 1) not engaged in clinical practice (eg, only with managerial position), 2) informal staff such as interns and rotations staff, and 3) hired as regular staff with less than 12 months of clinical practice. Linear multiple regression prior to power analysis in the G* Power 3.1 software was performed to calculate the sample size.[39] The required sample size was 63 based on an alpha error of 0.05, a power of 0.90, a large effect size of 0.35 (assumed based on Cohen's conventional values for the effect size f^2),[40] and an assumed number of tested predictors of 8. Thus, even the sample size of nurses (n=69) in the subgroup analysis met the requirements of the analysis.

Instrument

Demographic information contained age, sex, education, marriage, work years in LTC, in-job training on PR, etc. The Chinese version of the Staff Knowledge, Attitudes and Practices Questionnaire regarding PR was used to assess KAP toward PR of nursing staff. The questionnaire was developed by Janelli et al[41] and validated in Hong Kong nursing homes by Suen.[33] The questionnaire consists of three parts: knowledge (11 items), attitude (12 items), and practice (14 items). The score of knowledge items is 1 point for a correct answer, 0 points for uncertainty or error answer, and the total score is from 0 to 11 points. Higher scores indicated a greater level of knowledge. The attitude was scored using a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with a total score of 12 to 48. Item 4, 9, 10, and 12 of attitude were scored reversely. The higher score indicated a more positive attitude toward PR use, that is, a lower possibility to restraint older adults. The practice subscale consists of topics about the use of alternatives before restraining, informed consent, removal of restraint, the care of restrained older adults, etc. Each item was scored ranging from 1 (never) to 3 (always), with a total score of 14 to 42. Item 10 adopted reverse scoring. Higher scores indicated the more standard practice of PR.

The questionnaire obtained from Dr Suen[33] in Hong Kong is in traditional Chinese. To accord with the language and cultural habits of mainland China, we translated it to simplified Chinese. Then, the questionnaire was piloted with 30 randomly selected nursing staff for testing the clarity, readability, and intelligibility of the items. Minor language descriptions were modified in this process. Additionally, the Pearson's correlation coefficients for test–retest reliability (n=30) for knowledge, attitude, and practice subscale were 0.967, 0.892, and 0.915, respectively, which indicated acceptable stability ($r > 0.70$) over a 2-week period.[42] Cronbach's alpha coefficient was performed to measure the internal consistency reliability of this instrument. Cronbach's alpha coefficients of knowledge, attitude, and practice subscale were 0.756, 0.689, and 0.800, respectively. The questionnaire reported appropriate reliability according to the suggested level of a coefficient's alpha ≥0.70 of the total questionnaire and ≥0.60 of subscales.[42]

Data Collection

Data collection was performed by two postgraduate students and two undergraduate students. Training on investigation approaches and procedures was conducted for data collectors, as well as simulation training was also carried out for the uniform process. The investigation was conducted after a prior connection and permission of managers in the facilities. In the process of investigation, the nursing staff was required to sign an informed consent and then the paper questionnaires were distributed one-on-one, filled out, and returned on the spot. Those nursing assistants with less education experience were interviewed face to face, without any hint and guidance. All the questionnaires were reviewed and confirmed on the spot to ensure quality control.

Ethical Approval

The study procedures were approved by the Ethics Committee of the First Affiliated Hospital of Chongqing Medical University (Approval No.2019-104). Participants in this study were completely voluntary to complete the questionnaires and write an informed consent form.

Data Analysis

Data were analyzed using SPSS version 25.0 software. The number of samples in the nursing assistant group is three times that of the number of nurses. For comparison, means (*M*) and standard deviation (*SD*) were calculated for continuous variables, meanwhile after verification of normality, appropriate analysis methods were applied. A descriptive analysis of the variables was using percentages for categorical variables, *M* and *SD* for continuous variables with a normal distribution (ie, age, total scores of knowledge, attitude, and practice), interquartile range (*IQR*) for skewed data (ie, work years in LTC). Descriptive analyses of knowledge items were presented as percentages for correct answers. Items of attitude and practice were described using means and *SD*. Comparison of demographic information between nurses and nursing assistants were analyzed using the chi-squared test, Welch test, and the Mann–Whitney *U*-test. The difference of knowledge between nurses and nursing assistants was analyzed by one-way analysis of variance (*ANOVA*), while attitude and practice were using Welch test due to heterogeneity of variance. Knowledge items among two groups were compared by chi-squared test. Differences in attitude and practice items between two groups were analyzed by the Mann–Whitney *U*-test due to the data not following this distribution. Multiple linear regression analysis was performed to determine which demographic variables predicted the knowledge, attitude, and practice toward PR among nurses and nursing assistants. Model-residual and normal-probability graphs were performed to assess the multiple linear regression analysis model fit.

Results

Demographic Information of Participants

In total, 350 nursing staff in six LTC facilities were eligible for enrolment in this study, 316 nursing staff completed all questionnaires, which comprised 69 nurses and 247 nursing assistants. The effective response rate of questionnaires was 90.28%. Nursing assistants who worked on the 12-hr shift and had a workload of 6–10 older adults, were mainly responsible for direct daily life-related services. Nurses who worked on the 8-hr and had a workload of 20–30 older

Table 1 Demographic Information of Participants

Variables	Total (n=316)	Nurses (n=69)	Nursing Assistants (n=247)	*P*
Sex				<0.001[a]
Male	100 (31.6)	4 (5.8)	96 (38.9)	
Female	216 (68.4)	65 (94.2)	151 (61.1)	
Age (M±SD)	43.52±10.06	29.67±6.47	47.39±7.01	<0.001[b]
Marriage				<0.001[a]
Married	262 (82.9)	43 (63.2)	219 (88.7)	
Unmarried	54 (17.1)	26 (37.7)	28 (11.3)	
Education				<0.001[a]
Middle school and below	215 (68.0)	0 (0.0)	215 (87.0)	
Middle school above	101 (32.0)	69 (100.0)	32 (13.0)	
Monthly income (RMB, Yuan)				<0.001[c]
<3000	38 (12.0)	4 (5.8)	34 (13.8)	
3001–4000	174 (55.1)	25 (36.2)	149 (60.3)	
4001–5000	93 (29.4)	33 (47.8)	60 (24.3)	
≥5001	11 (3.5)	7 (10.1)	4 (1.6)	
Work years in long-term care [median (IQR)]	3 (2, 5)	3 (2,6)	3 (2,5)	0.941[d]
Receive in-school training on physical restraint				<0.001[a]
Yes	58 (18.4)	33 (47.8)	25 (10.1)	
No	258 (81.6)	36 (52.2)	222 (89.9)	
Receive in-job training on physical restraint				<0.001[a]
Yes	203 (64.2)	57 (82.6)	146 (59.1)	
No	113 (35.8)	12 (17.4)	101 (40.9)	

Note: [a]Chi-square test, [b]Welch test, [c]Likelihood-ratio test, [d]Mann–Whitney *U*-test.
Abbreviations: M, mean; SD, standard deviation; RMB, renminbi; IQR, interquartile range.

adults, were mainly responsible for nursing-related services. Table 1 presents the demographic information of participants. Nursing assistants were significantly older, received less education, and earned lower monthly income than the nurses ($P<0.001$). 4 of 69 nurses were male, as well as 38.9% of male nursing assistants. Both nurses and nursing assistants worked a short period of time in LTC, no significant difference was observed between the two groups ($P=0.941$). A majority of nurses (82.6%) received in-job training on PR while accounting for only 59.1% of nursing assistants. In-job training for both nurses and nursing assistants in these facilities is informal, 1–2 times/year, 10–20 minutes/time. The main content of the training is to share practical experience on how to implement PR. Nurses additionally participate in group-based case discussions for PR decision-making and quality improvement. Nearly 90% of nursing assistants experienced no in-school training on PR. In-school training is mainly about the theoretical knowledge of PR for 2 class hours (ie, 80 minutes), including basic principles, influencing factors, and adverse consequences of PR, etc.

Knowledge, Attitude, and Practice Toward PR Among Participants

Table 2 presents the total scores of KAP toward PR of participants. The mean score PR knowledge of nurses and nursing assistants were 5.58±1.84 and 4.66±1.66, respectively, with a significant difference ($P<0.001$). Nurses and nursing assistants displayed equivalent attitudes toward PR use, with total scores of 32.46±2.56 and 31.83±3.11, respectively ($P=0.084$). The mean scores of attitude items toward PR in the two groups were nearly 2.70, which was less than 3, indicating a negative attitude toward PR use. The mean score of practice toward PR use of nursing assistants (29.86 ±4.58) was significantly lower than in the nurses (34.59±3.75).

Table 2 Total Scores of Knowledge, Attitude, and Practice Toward Physical Restraint of Participants

Variables	All Participants	Nurses	Nursing Assistants	*P*
Knowledge (M±SD)	4.86±1.74	5.58±1.84	4.66±1.66	<0.001
Attitude (M±SD)	31.97±3.01	32.46±2.56	31.83±3.11	0.084[a]
Practice (M±SD)	30.89±4.82	34.59±3.75	29.86±4.58	<0.001[a]

Note: [a]Welch test.
Abbreviations: M, mean; SD, standard deviation.

In terms of participants' response of knowledge items toward PR, the lowest correct rate was on the item of "PR definition" (7.9%), followed by those of "alternatives of PR" (9.2%), and "PR-caused death" (24.4%), and no difference was observed in these items between nurses and nursing assistants (P=0.215, P=0.116, and P=0.953, respectively). Nursing assistants reported a lower correct rate on the item of "situation of PR use" (P=0.001), "space between restraints and older adults' skin" (P<0.001), "fixed method of PR" (P=0.038), and "no restraint while lying flat" (P<0.001) than the nurses. Regarding attitude items toward PR, nurses and nursing assistants had the lowest score on the item "PR could prevent fall", with no significant difference (P=0.774). Compared with nurses, attitude items of "feel bad if restrained older adults gets more upset" (P=0.038), and "restraints increase the risk of strangulation" (P<0.001) were reported more negative attitudes in the nursing assistants. Nevertheless, item "restrained older adults suffers a loss of dignity" (P=0.003), "restraints use can assure legal protection for myself and my facility" (P=0.009) demonstrated contrary results, nursing assistants reported better attitude than nurses. For practice items toward PR, the lowest score was on the item of "evaluate and record the effect of PR", followed by "record the type, reason, time of PR use", and "attempt to conduct alternatives". Practice items of "answer restrained patients' calls as soon as possible" "inspect restrained patients' skin" were the top 2 items with the highest score. In the two-group comparison, these items had no significant difference, as well as the item of "more PR use when short of staff". All other items in the nursing assistants were significantly displayed worse practice than in the nurses.

Predictors of Knowledge, Attitude, and Practice Toward PR Use Among Participants

The multiple regression analyses were conducted to examine the influencing factors associated with knowledge, attitude, and practice toward PR use. All demographic information included in this study was entered into the regression model. Nursing assistants' knowledge was influenced by monthly income (β=0.153, P=0.019) and work years in LTC (β=0.343, P<0.001) (Table 3). In-job training (β=0.283, P<0.001), age (β=−0.164, P=0.021), and knowledge (β=0.292, P<0.001) significantly

Table 3 The Multiple Regression Analysis for the Correlation Between Physical Restraint Knowledge and the Demographic Variables

Variables	Nurses		Nursing Assistants	
	β	*P*	*β*	*P*
Sex (ref: Male)	0.053	0.671	−0.004	0.952
Marriage (ref: Married)	−0.020	0.875	−0.001	0.985
Education (ref: Middle school and below)[#]	–	–	0.083	0.184
Monthly income	0.182	0.161	0.153	0.019
In-school PR training	−0.116	0.345	−0.012	0.848
In-job PR training	−0.216	0.105	0.114	0.067
Age	−0.022	0.861	−0.120	0.099
Work years in long-term care	−0.205	0.099	0.343	<0.001

Note: [#]The education level of the nurses was middle school above, which was excluded from the analysis in the model of nurses.
Abbreviation: PR, physical restraint.

Table 4 The Multiple Regression Analysis for the Correlation Between Physical Restraint Attitude and the Demographic Variable

Variables	Nurses		Nursing Assistants	
	β	*P*	*β*	*P*
Sex (ref: Male)	−0.085	0.502	−0.003	0.964
Marriage (ref: Married)	−0.165	0.217	−0.059	0.337
Education (ref: Middle school and below)[#]	–	–	−0.007	0.906
Monthly income	−0.015	0.912	−0.042	0.512
In-school PR training	−0.026	0.838	0.018	0.766
In-job PR training	−0.119	0.385	0.283	<0.001
Age	−0.045	0.723	−0.164	0.021
Work years in long-term care	−0.186	0.149	0.082	0.236
Knowledge	0.258	0.052	0.292	<0.001

Note: [#]The education level of the nurses was middle school above, which was excluded from the analysis in the model of nurses.
Abbreviation: PR, physical restraint.

affected nursing assistants' PR attitude (Table 4). In-school training, in-job training, and knowledge on PR were significantly influenced the PR practice of nurses and nursing assistants (Table 5). Further, Nursing assistants' practice was also significantly predicted by education (β=0.131, P=0.019), age (β=−0.140, P=0.034), monthly income (β=−0.184, P=0.002), and attitude (β=0.130, P=0.030) (Table 5). No significant variables were associated with attitude, and knowledge toward PR in the nurses.

Discussion

To our knowledge, this is the first study comparing the levels and influencing factors of KAP toward PR on the part of nurses and nursing assistants in Chinese LTC facilities. Previous studies on KAP toward PR mostly focused on nurses

Table 5 The Multiple Regression Analysis for the Correlation Between Physical Restraint Practice and the Demographic Variables

Variables	Nurses		Nursing Assistants	
	β	*P*	*β*	*P*
Sex (ref: Male)	0.117	0.316	0.034	0.524
Marriage (ref: Married)	0.050	0.684	−0.040	0.477
Education (ref: Middle school and below)[#]	–	–	0.131	0.019
Monthly income	−0.243	0.051	−0.184	0.002
In-school PR training	0.351	0.003	0.137	0.016
In-job PR training	0.283	0.028	0.256	<0.001
Age	0.162	0.172	−0.140	0.034
Work years in long-term care	0.045	0.707	0.077	0.221
Knowledge	0.247	0.050	0.216	<0.001
Attitude	−0.045	0.703	0.130	0.030

Note: [#]The education level of the nurses was middle school above, which was excluded from the analysis in the model of nurses.
Abbreviation: PR, physical restraint.

who worked in acute hospitals or mixed samples in nursing homes without stratified analysis.[30,34,43] The present study demonstrated that nurses had greater knowledge, equivalent attitudes, and better practice compared to nursing assistants. Education, age, monthly income, attitude, in-school training, in-job training, knowledge were associated with nursing assistants' practice toward PR, therein, the last three factors were related to nurses' practice. Additionally, nursing assistants' attitude was affected by in-job training, age, and knowledge, whereas their knowledge deficits toward PR were found in lower monthly income and shorter work years in LTC. The findings afford novel perspectives on developing targeted educational programs for different characteristic staff in LTC facilities based on the demands of KAP.

Knowledge Toward PR of Nurses and Nursing Assistants

The findings illustrated that nursing staff in Chinese LTC facilities performed inadequate knowledge toward PR, with a mean score of 4.86 (*SD*=1.74), which was lower than nursing staff in Hong Kong nursing homes using the same survey instrument.[34] The Hong Kong Social Welfare Department has adopted the "minimized restraint" principles and required regular staff training on PR use in residential care homes.[34] Nevertheless, no PR use principles or guidelines were issued for LTC facilities in mainland China. Furthermore, in-job training on PR in this study was informal, less frequent, and incomprehensive. Nursing staff did not obtain sufficient knowledge from this kind of training, which was verified in another qualitative study of ours.[26] Surprisingly, over 90% of the nurses and nursing assistants displayed misunderstanding on "conception of PR", "alternatives of PR", and "consequences of PR". These proportions were significantly higher than the study of Eskandari et al in Malaysia,[43] as well as a study in Chinese acute hospitals.[30] Nurses who worked in hospitals grasped better knowledge toward PR than those who worked in LTC facilities even though they had similar education levels and work hours. PR as a vital medical quality indicator in Chinese hospitals arouses enough concerns of nursing managers, a series of quality improvement projects and formal training on PR were carried out for nurses as a system. It suggests that PR reduction should be listed as quality improvement projects in LTC facilities, thereby improving the quality of care. Despite the latest global principles of "no restraints and/or minimized restraints",[44] PR has still been seen as a protective measure to prevent older adults from injuries, which has become an ingrained ideology and culture that is difficult to change in a short time.[45] These findings suggested that (a) these misunderstood topics are necessarily focused on during PR educational programs, and (b) educational content must be based on the latest evidence and perspectives and with regular updates. Of note, nursing assistants, as direct carers of older adults in LTC facilities, their PR knowledge was even more lacking than nurses, especially knowledge concerning implementation of PR. Due to the rapid aging and large aging population in China, the shortage of aged care teams with adequate care abilities was one of the facing challenges.[46] Currently, nursing assistants in LTC facilities are older, less educated, responsible for overload care tasks, and insufficient training received. Strengthening training of this group personnel is a footstone for promoting healthy aging in China. As a vital quality indicator, training on PR is indispensable.

Nursing assistants who worked the longer time in LTC had better knowledge of PR, which was insignificant in nurses of the present study. Working years are commonly a symbol of experience, namely, knowledge grows through experience. However, the accumulation of experience takes a long time, and experience is not necessarily the right approach. Thus, it indicated that PR training as early as possible, such as included in the content of orientation education, would help staff gain sufficient knowledge. Furthermore, our findings implied that nursing assistants' knowledge of PR was positively associated with monthly income, which was rarely reported in previous studies. In this study, most nursing assistants were paid similar salaries, personnel with a higher monthly income had adequate working experience and higher education levels. It could be the underlying reason for this finding. Several studies[30,47] have identified that nurses' knowledge of PR was related to in-job training and other sociodemographic characteristics such as education level, age, which were not supported adequately in this study. No significant factors were found associated with nurses' knowledge. From statistical interpretation, probably because nurses in LTC facilities had similar personal backgrounds and training experience, which decreased its influence on knowledge.

Attitude Toward PR of Nurses and Nursing Assistants

In this study, nursing staff held a negative attitude toward PR, with a mean item score of 2.7, which indicated more tendency to support PR use. This finding was in accordance with the previous study in nursing homes,[34] and nurses'

attitude in hospitals.[30,48] It indicated that nursing staff both in LTC facilities and hospitals appeared to maintain a supportive attitude toward PR. This may be due to the rare involvement of ethical and attitude issues regarding PR use in nursing education programs. Nursing assistants had lower scores of attitude toward PR than nurses, but no significant difference was found between the two groups. Nevertheless, a Spanish study revealed that nursing assistants held a more supported attitude on PR use than nurses ($P<0.05$).[49] Both nurses and nursing assistants in the present study held an agreeable attitude that PR could prevent falls, however, which was an outdated viewpoint. This result must draw our attention. A previous study we conducted demonstrated that fall prevention was the primary reason why nursing staff restricted older adults.[19] A systematic review evidenced that PR was ineffective in reducing falls and injuries, on the contrary, PR use increased the risk of falls.[50] This indicated the importance of evidence-based educational content and dissemination of the latest perspectives. Compared to nursing assistants, nurses considered PR use more supportive in some situations, such as consideration of a loss of dignity and legal protection. By contrast, some circumstances where less support was given by nurses were "restraints increase the risk of strangulation" and "bad feelings in the process of PR use". These findings revealed an ambivalent attitude toward PR use in nursing staff. Consistent with findings in two qualitative studies,[26,51] positive and negative attitudes of nursing staff coexist in the actual application of PR, especially consideration on ethical issues and personal rights. The decision to use PR was complicated and not an amused procedure for nursing staff, they were usually facing with a dilemma.[45] This contributes to mixed emotions and attitudes toward PR use.

The present study demonstrated that nursing assistants' attitude toward PR was negatively associated with age. Older nursing assistants had less opportunity to receive education and were graduated with lower education levels, thereby lacking corrected awareness of PR. This was contrary to the findings of Hamers et al that age and gender were related to attitudes of nursing staff in nursing homes.[52] A study by Ferrão et al[53] in Portugal displayed that longer professional experience was related to a positive attitude about appropriate restraint use in clinical practice, whereas no significant relationship was found in our study. Nursing assistants who received in-job training on PR performed more positive attitudes toward PR use, although the training was sporadic and not systematic. Training on PR was one of the core factors influencing attitudes.[54] Nevertheless, studies on the effect of educational interventions on attitudinal change have not been reached an agreement. For instance, a quasi-experimental study demonstrated that attitude significantly improved after intervention in the experimental group, whereas no significant changes between control and experimental groups in the post-test.[55] The findings of Pellfolk et al[56] and Eskandaria et al[43] indicated significant effects of educational interventions on nurses' attitudes toward PR. The reasons for these contrary results may result from the discrepancy in the content, time of duration, and teaching modes of training on PR. A systematic review recommended that longer periods and more times of education contributed to PR reduction.[36] In the present study, nursing assistants' knowledge toward PR was a vital element influencing the attitude, which corresponded with the knowledge, attitude, and practice theory that adequate knowledge is a prerequisite for attitude change.

Practice Toward PR of Nurses and Nursing Assistants

With regard to nursing staff's practice toward PR, the finding reported a moderate score, indicating that further improvements were needed. The levels of practice toward PR varied in a few studies, such as the study of Kor et al[34] in Hong Kong and Karagozoglu et al[57] in Turkey reported better practice than that in the present study, whereas a study of Eskandari et al[43] in Malaysia displayed lower level. Differentiation in the context of culture, practice guidelines, characteristics of facilities, and so on could be taken into consideration for these variations. Further, we compared the difference of practice between nurses and nursing assistants. As expected, nursing assistants' performed worse practice toward PR than nurses, specifically, the gap almost runs through the entire process of restraint implementation, including the use of alternatives before restraining, informed consent, removal of restraint, the care of restrained older adults, and recording of nursing care. Importantly, care of older adults was mostly performed by nursing assistants, which stressed the importance of their training on PR. In line with the previous study, practice on records of PR, alternative measures of restraint, and timely evaluation to release PR were performed worst.[34] Severe caregiving burden was one of the potential reasons, one nursing assistant is directly responsible for 6–10 older adults with almost daily life-related demands. Although nurses had a workload of 20–30 older adults, they only need to provide nursing-related services when

necessary.[58,59] Nursing assistants in the present study location worked on the 12-hr shift, while nurses worked on the 8-hr shift, which may affect practice toward PR. Additionally, no standard principles to comply with, and no mandatory institutional rules were barriers to better practice toward PR.

The present study demonstrated that in-school training, in-job training, and knowledge were common components affecting the PR practice of both nurses and nursing assistants. A qualitative meta-synthesis revealed that insufficient resources and education were some of the barriers to PR reduction.[60] Several studies have identified that educational interventions could improve nursing staff's self-reported practice toward PR, but the actual PR rate of older adults has not observed a significant decrease.[56,61,62] Nonetheless, educational interventions are still located in a critical position. As Brugnolli et al[63] illustrated, educational intervention is a starting step and the basis for other interventions. In recent randomized controlled trials,[24,25] educational interventions combined with policy legislation, organizational interventions, that is, multicomponent interventions could not only promote nursing staff's knowledge, attitude, and practice but also decrease the rate of PR. Moreover, nursing assistants' practice was significantly associated with demographic characteristics comprising education, age, monthly income, these significant associations were not observed in the nurses. In the light of the background of nursing assistants, it suggested that personalized education projects were quite necessary instead of directly copying the training content of nurses to nursing assistants. Both nurses and nursing assistants in these six facilities received fragmented training, content, and methods of education were similar. Besides, nurses participated in group-based case discussions for PR decision-making and quality improvement. We found that nursing assistants need more improvement on PR use but have received less training. Therefore, strengthening the training of nursing assistants must attract attention. In the present study, attitudes of nursing assistants were positively related to the practice, which was similar to the result of Suen et al [64] Our previous study found that the attitude construct of the theory of planned behavior affected practice through the intention of nursing staff.[38] All these findings provided targeted direction and support for our next step to formulate PR interventions in Chinese LTC facilities.

Strengths and Limitations

This study provided detailed knowledge, attitudes, and practice toward PR of nurses and nursing assistants, in the context of nursing staff in LTC facilities in mainland China and previously unexplored. Meanwhile, the differentiation on levels and influencing factors of knowledge, attitude, and practice toward PR between nurses and nursing assistants were further explored. It is worthy to compare the knowledge, attitudes, and practice of different types of employees to determine whether the areas of knowledge deficiency are similar. Some limitations should be considered in this study. First, practice toward PR was measured using a self-reported questionnaire, which may limit the consistency of measurements with actual behavior. Although data collection is anonymous, nursing staff may intend to report better practices to please the facilities. Additionally, this was a cross-sectional study conducted among six LTC facilities in Chongqing, which might limit the generalization of findings. Nevertheless, to some extent, the findings reflect the situation of LTC facilities in western China. Chongqing is a municipality with the largest aged population in western China,[65] with economic backwardness compared to central and eastern China, it would also be meaningful to find out the level of KAP toward PR among these populations. A national survey and analysis of the differences between regions with different economic levels require further research. Lastly, despite the sample selection was not random, six facilities including four nursing homes, one social welfare facility, and one aged care center highly represented the characteristics of Chinese LTC facilities; moreover, the high response rate enhanced the worth of the findings.

Conclusion

This study demonstrated the significant difference between nurses and nursing assistants concerning knowledge, and practice toward PR. Since nursing assistants were involved in knowledge and practice defects toward PR, as well as they perform most of the direct care in LTC facilities, nursing assistants' training on PR is a cornerstone of high-quality care. The findings will contribute to the development of tailored educational programs for nurses and nursing assistants, such as key nurses training workshops and support, comprehensive evidence-based education comprising knowledge and skills on PR use for nursing assistants, group-based case discussion, etc, possibly helping to promote PR care and quality of care services in the long term. PR definition, alternatives of PR, as well as assessment and records of PR use, are

among the topics definitively deserving emphasizing because these topics were most commonly the knowledge deficits among nursing staff. In addition, PR should also be more heavily focused on competencies-oriented education, not only emphasizing the strategies in-school and continuing in-job education for both nurses and nursing assistants. Ultimately, it is essential to train the nominated key nurses as trainers and encourage them to deliver education to their colleagues (ie, nursing assistants and/or other nurses) whenever and wherever possible.

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Disclosure

The authors had no competing interests.

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