Nursing assistant's knowledge, attitude and training demands toward urinary incontinence in nursing homes: A mixed methods study

Lulu Liao
Xiangya school of nursing, Central South University
Jingjing Jiao
Xiangya school of nursing, Central South University
Yinan Zhao
Xiangya school of nursing, Central South University
Hongting Ning
Xiangya school of nursing, Central South University
Hui Feng (fenghui0365@163.com)
Xiangya school of nursing, Central South University

Research Article

Keywords: Urinary incontinence, Training, Nursing assistants, Nursing homes, Mixed methods

Posted Date: April 5th, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1421258/v1

Abstract

Background: Urinary incontinence is an increasingly common problem, especially the older people. Nursing assistants are the main force in nursing homes. Their knowledge and attitude about urinary incontinence is attracting considerable critical attention. However, most previous studies have focused on nurses in hospital. This study set out to figure out the nursing assistants' training needs concerning urinary incontinence.

Methods We conducted a two-part mixed-methods study. A survey on the knowledge and attitude of nursing assistants about urinary incontinence was undertaken (n=509). Then, semi-structured interviews were used to elicit detail training demands (n=40).

Results In general, urinary incontinence knowledge was poor (14±4.18), while attitudes were mostly positive (35.51±3.19). The nursing assistants are very interested in learning more about urinary incontinence. The variety of preferred learning methods emphasizes the need for diversified educational materials.

Conclusions Urinary incontinence is an effective indicator of care quality in nursing homes. The managers should formulate targeted training courses and preferred training forms suitable for the nursing homes.

1 Background

Urinary incontinence (UI) is an increasingly common problem[1]. The prevalence of UI was around 65.8% among the older people in Chinese nursing homes (NHs)[2]. Previous study indicated that UI may contribute to several adverse consequences for older people (e.g., depression, anxiety, low socialization and cost)[3, 4]. Thus, prevention of UI and its complications have been identified as priority as quality improvement (QI)[5].

Nursing assistants (NAs) are the main force to take care of the older people in NHs[6]. However, there is a general shortage of NAs in Chinese NHs, with low educational quality and no professional caring education for the elderly, which makes it difficult to meet the demand for elderly care[7]. Several studies suggest that their knowledge, attitude and practice is not sufficient to identify, manage, and treat UI[8]. Although many NAs acknowledged that expanding UI knowledge and skills related is important, seldom of them received systematic UI training and education[9]. Moreover, owing to the lack of adequate knowledge concerning risk factors, prevention, and management, many of the NAs have difficult providing high quality of UI care[10]. Differences in the attitude and knowledge of UI exist between nurses and NAs[11]. Specially, nurses' UI knowledge level was higher than that of NAs, however, nurses' positive attitudes were lower than that of NAs[12].

Most previous studies have focused on nurses' UI knowledge and attitude in hospitals, rather than in NHs[13, 14]. And the research in NHs also focused on nurses and older women, which of NAs is relatively less[10, 15]. Some quantitative studies explored the changes of nursing staff's knowledge and attitude about UI before and after training intervention[16]. Some were cross-sectional studies on NAs' knowledge, attitude and belief of UI[10]. Or to explore nursing staff's expectations about "continence care" for residents by qualitative research[17]. However, current research on the knowledge, attitude, and learning demands about UI of NAs in NHs is very limited in China. Figuring out these might be a pivotal step in providing evidence for the need to enhance UI-training, further to improve quality of life among older adults with UI[18].

The mixed methods design would provide a deeper, wider and more balanced understanding of the results and reduce the limitation in every method[19]. Therefore, we used mixed methods to figure out the NAs' training needs concerning UI by (1) understanding the NAs' current knowledge and attitudes of UI and (2) exploring NAs' viewpoint on UI training.

2 Methods

2.1 Design

A sequential, explanatory, mixed methods design that consisted of two phases was conducted (see Fig. 1)[20]. The two data sources (qualitative or quantitative) were grouped together and given equivalent weight in data interpretation[21].

2.2 Quantitative Survey (Phase I): Questionnaire for nursing assistants

In the Phase I (from June 2020 to September 2020), questionnaires were conducted to assess the NAs' knowledge and attitude in Chinese NHs by the researchers who had been trained uniformly. This study was a part of a cluster randomized controlled trial to

implement the aged care clinical mentoring model of change in nursing homes in China. More detailed information (eg., inclusion criteria and exclusion criteria, sampling method) can be found in our earlier publication[3].

2.2.1 Measurements

The survey questionnaire consisted of three sections: demographic, Urinary Incontinence Knowledge Scale (UIKS) and the Urinary Incontinence Attitude scale (UIAS). The demographic information included gender, age, educational level, year of work, experience of UI, informal UI caregiving experience, training on UI, and interest in learning more about UI. The instruments (UIKA and UIKS) were described in Table 1[22–24].

Table 1
Description of quantitative instruments.

Instrument	Description and internal consistency (Cronbach's α)
Urinary Incontinence Knowledge Scale (UIKS)	The UIKS was developed by Yuan and Williams, for health care professionals (HCP), and the general public. There are 30 items reflecting six subscales: (a) risk factors, (b) symptoms, (c) impacts, (d) prevention, (e) treatment and (f) management with dichotomous choices (correct = 1; false or do not know = 0).
(H. Yuan & Williams, 2010)	• Cronbach's alpha of UIKS = 0.72 (H. Yuan & Williams, 2010)
	• Cronbach's alpha of UIKS = 0.69(De Gagne et al., 2015)
Urinary Incontinence Attitudes Scale (UIAS)	The UIAS was developed by Yuan, Williams and Liu. There are 15 items with a 4-point Likert scale to rank the degree of agreement as strongly disagree, disagree, agree, and strongly agree. The score ranged from 15 to 60; positive attitudes were associated with higher scores.
(H. B. Yuan, Williams, & Liu, 2011)	• Cronbach's alpha of UIAS = 0.65(H. B. Yuan et al., 2011)
	• Cronbach's alpha of UIAS = 0.79(De Gagne et al., 2015)

2.2.2 Statistical analysis

Data were analyzed using IBM SPSS Statistics 22.0. Descriptive statistics were used to describe categorical variables and continuous variables. The knowledge of the study population was compared among the four groups of career year for statistical significance using the one-way analysis of variance and t-test. And one-way analysis of variance (ANOVA) and t-test were used to compare the knowledge and attitude of UI among different socio-demographic characteristics.

2.3 Qualitative Survey (Phase Ⅱ): Focus group

In the Phase Ⅱ(from September 2020 to November 2020), the focus groups were also used to explore NAs' learning motivations and demands. The findings of Phase Ⅰ were shown to the NAs by using a straightforward table which illustrated the score of each item of UIKS and UIAS in order to elicit their interpretation of the findings.

2.3.1 The focus group

Approximately, eight subjects in every NHs were selected by random number generator. The Institutional Review Board (IRB) of XX University approved this study. Written informed consent was obtained by each participant before interview.

According to the nature of the NHs (public and private), the interviewed NHs were selected stratified randomly. We randomly contacted one from public or private nursing home, and the data reached saturation when we interviewed the fourth nursing home. We interviewed in a fifth nursing home to make sure we identified all the important themes. Forty NAs from the different five NHs were included in the semi-structured interviews.

The focus groups lasting 40–60 minutes. From the perspective of the knowledge, attitude and practice (KAP) model and Adult Learning Theories, semi-structured interviews were conducted to explore the NAs' viewpoint on the training of UI. According to the KAP model, the individual's practices (behaviors) are determined by his knowledge and attitude[25]. Adult learning theories play an important role in the design of training and education programs[26], which of motivation model imply that learning is related to motivation and reflection[27]. Before the formal interview, a pilot study was conducted in a nursing home, and the outline and prompts were modified based on the

pilot results. The interview questions were guided by five main topics about knowledge, skills, attitude, resources and motivation (Table 2). Participants' demographic information was collected before the formal interview. All participants received a small token of appreciation such as mirror or a hat, for completing the interview.

Table 2
Interview questions and the corresponding main topics.

Main topics	Interview questions
Knowledge	• Can you describe about urinary incontinence care in the nursing home? • What knowledge do you think the nursing assistants need about urinary incontinence care?
Skills	• What special skills do you need to promote urinary incontinence care quality? • What are the difficulties in urinary incontinence care and is there anything that would make it easier?
Attitude	• How do you experience about urinary incontinence care? • What role do you think nursing assistants play in urinary incontinence care?
Resources	• What resources are available in the nursing home to perform urinary incontinence care? • What other resources do you need to perform urinary incontinence care?
Motivation	• What is the main motivation for you to participate the training about urinary incontinence? Or why do you attend urinary incontinence training in the nursing home, are you willing to attend?

2.3.2 Statistical analysis

Interviews were audio-taped, and the recordings were transcribed for analysis. The researchers used a thematic analysis[28]. Any dilemma and predicament during the data coding were resolved through discussion and negotiation. The researchers coded original data firstly, then the codes were grouped and summarized based on their meaning into themes during the repeat process.

2.4 Ethical considerations

The study has been approved by the local ethics committee and the Ministry of Health. Before the implementation of the study, the details of the project are presented to the participants. The Research Ethics Committee approval was acquired from the University Institutional Review Board (project No. 2017035).

3 Results

3.1 Phase 1: quantitative survey

3.1.1 the NAs' knowledge concerning UI

Five hundred and nine NAs were investigated about the knowledge and attitudes of UI. Their demographic information showed in Table 3. In addition, Table 4 shows that mean score of UIKS according to career year in the NHs. Overall, UIKS score was low (mean = 14.00, SD = 4.18). Among the six dimensions of UIKS, the scores of risk factors (mean = 1.48, SD = 1.04) and treatment (mean = 1.33, SD = 1.00) were lower than other four dimensions. And one-way ANOVA displayed significant differences in knowledge across career year ($F = 52.96$, $P < 0.01$). Bonferroni post hoc comparisons was applied, NAs at least five years of work had better knowledge than NAs at less than a year (mean difference = 5.52, $P < 0.01$), at one to three year (mean difference = 3.25, $P < 0.01$), and at three to five year (mean difference = 2.53, $P < 0.01$). No nursing assistant achieved 100% correct responses (Fig. 2). In addition, different educational level was found to be significant related to knowledge scores ($F = 11.061$, $P < 0.01$) (Table 5). The score of UIKS of NAs from high school was higher than primary school and junior middle school.

Table 3
The demographic information of quantitative survey(N = 509).

Variable	N	%
Gender		
male	40	7.9
female	469	92.1
Age		
Mean (SD)	50.62(4.73)	
Range	37–65	
Educational level		
Primary school	85	16.7
Junior middle school	365	71.7
high school	59	11.6
junior college and others	0	0.0
Year of work		
< 1years	139	27.3
1-2years	132	25.9
3-5years	102	20.0
> 5 year	136	26.7
Experience of UI		
YES	76	14.9
NO	433	85.1
Informal UI caregiving experience for UI		
YES	402	79.0
NO	107	21.0
Training on urinary incontinence before this		
often	90	17.7
sometimes	220	43.2
Only one	193	37.9
No chance	6	1.2
Would you like to know more about urinary incontinence?		
YES	478	93.9
NO	31	6.1

Table 4
Mean UIKS score according to career year in nursing home.

Mean scores (SD)	Career year				F	P	All participant	% correct answer	level
	< 1year	1-2year	3-5year	> 5year					
Overall score	11.34(4.06)	13.62(3.57)	14.33(3.00)	16.86(3.74)	52.957	0.000*	14.00(4.18)	46.70	Poor
Risk factors	1.02(0.98)	1.43(0.95)	1.42(0.93)	2.05(1.02)	25.419	0.000*	1.48(1.04)	29.70	Poor
Symptom	2.61(1.31)	3.45(1.21)	3.59(1.10)	4.00(1.04)	33.138	0.000*	3.40(1.28)	68.01	Moderate
Impact	2.61(1.16)	2.79(1.25)	2.99(1.14)	3.30(1.25)	8.112	0.000*	2.92(1.23)	58.39	Poor
Prevalence	1.10(1.34)	1.52(1.49)	1.81(1.30)	2.41(1.46)	20.839	0.000*	1.70(1.49)	34.07	Poor
Treatment	0.98(1.07)	1.31(0.94)	1.47(0.87)	1.59(1.00)	9.700	0.000*	1.33(1.00)	26.60	Poor
Management	3.00(0.90)	3.10(0.92)	3.03(0.84)	3.50(0.95)	8.763	0.000*	3.17(0.93)	63.42	Moderate

UIKS: Urinary Incontinence Knowledge Scale; SD: standard deviation;

a Sum scores<60% indicated poor knowledge, sum scores 60–80% indicated moderate knowledge, and sum scores>80% indicated good knowledge.

Table 5
Relationship among Knowledge, Attitudes and Socio-demographic Characteristics.

Characteristics	Knowledge			Attitudes		
	Mean (SD)	T/F	p	Mean/SD	T/F	p
Overall score	14.00(4.18)			35.51(3.18)		
Gender						
male	13.87(4.34)	-0.212	0.832	35.25(2.29)	53.362	0.468
female	14.02(4.17)			35.53(3.25)		
Educational level		11.061	0.000*		7.073	0.001*
Primary school	14.74(3.71)			35.49(3.89)		
Junior middle school	13.51(4.21)			35.28(2.76)		
high school	16.01(3.90)			36.95(4.05)		
Year of work						
< 1years	11.34(4.06)	52.957	0.000*	35.55(3.06)	2.185	0.089
1-2years	13.62(3.57)			35.14(2.74)		
3-5years	14.33(3.00)			35.23(3.40)		
> 5 year	16.86(3.74)			36.05(3.48)		
Informal UI caregiving experience for UI		0.131	0.896		0.665	0.507
YES	14.02(4.09)			35.56(3.21)		
NO	13.96(4.51)			35.34(3.09)		
Training on urinary incontinence before this		1.817	0.143		3.498	0.015*
often	14.27(4.13)			35.61(3.43)		
sometimes	14.05(4.47)			35.81(3.34)		
Only one	13.73(3.85)			35.04(2.77)		
No chance	17.50(2.88)			38.16(3.81)		
Would you like to know more about urinary incontinence?		5.048	0.000*		36.548	0.002*
YES	14.24(4.02)			35.61(3.20)		
NO	10.42(4.99)			34.00(2.54)		

*p < 0.05.

3.1.2 the NAs' attitude concerning UI

Commonly, most NAs had positive attitudes toward UI (Mean = 35.51, SD = 3.19) (Fig. 3). About 91.9% (n = 468) of NAs thought UI was hard to talk about because it is an embarrassing problem. And only 16.9% (n = 86) thought UI may be prevented.

There were significant differences in NAs attitudes in different educational level (F = 7.073, P < 0.01) (Table 5). Different training frequency on UI before this investigation was found to be significant related to attitude scores (F = 3.498, P P < 0.05), but not with knowledge scores (F = 1.817, P = 0.143). And the interest in learning more about UI was also found to be significant related to attitude scores (mean difference = 1.61, t = 36.548, P < 0.01), and with knowledge scores (mean difference = 3.82, t = 5.048, P < 0.01).

3.2 Phase 2: qualitative survey

3.2.1 The NAs' interviews sample characteristics

A total of 40 NAs agreed to be interviewed. Their age ranged from 40 to 60 with the length of working time of 1 to 6 years in the nursing home. Both men and women were recruited, among those most of the interviewed NAs were female (95%). Three themes were identified from the data. First, participants described their learning needs in UI. They also came up with preferred training approaches and identified barriers to learning in working space. These themes are covered in detail below.

3.2.2 NAs' learning needs concerning UI

Some participants said that the current training provided by the nursing managers was mainly related to daily care, and there were few specialized skills trainings related to UI.

They (nursing managers) teach us the common content of the training program for nursing staffs (issued by the department of civil affairs), mainly including diet care, excretion care, sleep care and so on… Urinary incontinence related training focuses on excretion care, such as how to replace diapers and how to help bed-ridden older people used urinals. Training content mainly focused on the operation; the theory is rarely involved. (A2)

Many NAs attached great importance to UI because of the difficulties they often faced in caring for older people with UI. Some participants said they should learn more about UI to provide better care for the older people.

… If the organization is willing to provide us with relevant training (related with urinary incontinence), then of course we are willing to participate in the training programmers, ha-ha. I sometimes leak urine, to learn more knowledge and skills is still good. In addition, the chart you show us (the results of the phase 1 quantitative study), the treatment score in UIKS is the lowest, because we haven't attended any training about this, we haven't heard about the pelvic floor muscle. We also know little about relevant risk factors, because after all, this is a nursing home, which mainly focuses on life care, so we have little training in this field. (A11)

In addition, you mention in the previous investigation of urinary tract infection, dermatitis… what we can do, we do not know. The nursing home do not provide us with related training. Although I do want to know something about it. (A13)

But some participants said they only needed to know the basics of daily care for the older people with UI, not to learn more.

… Because if we have any difficulties in the work, we could tell the doctor and the clinical nurses directly. For example, sometimes some older people do not urinate, then I would go to touch his stomach, gee, his stomach is bulging. I would tell the doctor, the doctor would give her a massage, if there was no urine out, then the clinical nurses would insert a urinary catheter for her. (A16)

Some participants emphasized the importance of considering the actual situation of the NHs, and they though managers should provide the tailored curriculum based on this.

The nursing home likes a long-term care institution, mainly focus on life care, and which is different from hospital short-term care. In my opinion, when carrying out UI training, we should also consider the actual situation of the nursing home and implement targeted UI training courses. (A37)

3.2.3 Preferred training styles

Three sub-themes were identified and described as face-to-face guidance from the mentor, training combines theory with practice, video training.

(1) Face-to-face guidance from the mentor

Some nursing assistants presented that they preferred face-to-face guidance from the mentor to improve their professional skills.

I like the face-to-face training method, but now we are too busy that we may only take face-to-face guidance when we have operating training. When I'm working, you tell me what I'm doing wrong, which I think is more useful than what you tell me in front of the computer. In this way, I can apply what they taught me directly to clinical work. (A20)

(2) Training combines theory with practice

Some participants advocated for training methods which combined theory with practice.

If you just teach us relevant theoretical knowledge, we won't understand. I think it's easier to understand by the training method of combining theory with practice. In addition, I think clinical practice skills can be taught for more times than theoretical knowledge

because we as NAs learn more clinical practices that are more practical. (A25)

… the basic theory still needs to understand, for example, the previous research mentioned that drinking less water can reduce urinary incontinence, then I really don't know, ha-ha, now you tell us this is wrong, so we know, then we will also tell the older people related knowledge… (A27)

(3) Video training

Many participants presented that they enjoyed learning by watching videos. They regarded online video as a more convenient option.

We can download the video into our mobile phone, in our free time, can take out at any time to watch the video. And what the teacher said orally may not be remembered in a flash. But if we learn by video, we can watch it again and again at any time, and we will be more impressed. (A33)

3.2.4 Factors that facilitate and hinder urinary incontinence learning

Two main sub-themes were identified and described as learning motivation and low educational background.

(1) Learning motivation

Participants showed that they were willing to take an active part if given the opportunity to learn.

The leaders of the organization are very supportive of our learning and education. I am *willing to participate in the UI training if given the opportunity to learn. For us, most frequent UI care was to replace UI residents' wet pants, diapers, and bed sheets. For so long, our enthusiasm to provide active UI care will be severely weakened. At the same time, I also hope that the managers can provide strong support for implementing a comprehensive UI training program.* (A1)

(2) Low educational education

Many participants indicated that they generally had low educational backgrounds, which could affect the absorption of knowledge.

We are all so old and have low level of education. If you speak too profound knowledge, it is difficult for us to understand. I really hope you to simplify the complexity so that we can understand it. Moreover, the words in the textbooks sent to us before were very small, so I could not see them clearly, and I did not know some words of them. (A40)

(3) Time constraint

Some participants presented that time constraint was an important factor in impeding their learning.

It would be nice to learn more, and we'd all love to, but hopefully not take up too much of our downtime. As you know, we are really busy. We have to take care of 7–8 old people alone, which is very hard. If you still want to take up our rest time, we will not be happy…(A7)

4 Discussion

As a vital health problem, UI is a valid indicator of the care quality in nursing homes[29]. Effective management of UI could result in significant health benefits in residents with UI, however, current management of UI is sub-optimal, especially in older people[30]. To improve care quality of UI in the NHs, developing reasonable UI training program is a crucial for the first-line NAs.

In our study, we aimed to understand the NAs' training demands about UI management through a mixed methods approach. We collected survey data on NAs' knowledge, and attitude regarding UI as well as interview data on their perspectives of UI training, to explore this study by different perspectives[31]. The results showed that the Chinese NAs have low UI knowledge, but positive attitude towards UI management. These results were congruent to findings in Norway and Taiwan[12, 32]. NAs may be considered the first-line staff to take care of residents with UI. However, nurses may be more responsible for developing UI care plan for residents. What matters is that we should be clear that UI care is not just the responsibility of the NA or clinical nurse. Carrying out appropriate team collaboration between nurses and NAs in daily work may be necessary to overcome barriers of deficient knowledge and negative attitudes of nursing staff[33].

There are urgent needs for more time and resources devoted to the development of the targeted UI training and education materials. A many-sided educational program must be cleverly designed to accommodate a wide range of training methods to suit the learning opportunities offered by the nursing homes[34]. Studies have also shown that increased education can help nursing staff maintain the most appropriate UI management[35].

Themes about learning needs to provide high quality UI care included understanding risk factors and prevalence of UI, and greater knowledge of care management[36]. Nurses and senior nursing assistants can be very helpful in this respect. It is clear that nurses find it easier to identify the care needs of residents with UI, because they possess better knowledge and skills. Many senior nursing assistants also showed strong understanding of UI care and shared their experience with other young nursing assistants. Thus, nurses could be selected as mentors to train NAs about UI from each care unit, and a nursing assistant could be selected as site champion to guide and supervise other NAs from each floor[37]. Studies have shown that appointing mentor is an effective training measure[38].

There is no comprehensive preferred method of learning about UI care. Some researchers have argued that nursing assistants wouldn't participate in a learning and education program, no matter how meaningful, unless it provided an explicit reward or compensation. Given these qualifications, diversified training methods should be adopted, including the development of online video teaching[39], face-to-face mentoring, peer learning and the use of easy and understandable brochures in the workplace [40]. Brochures based on pictures, and with case studies and exercises, are useful in different conditions. Based on our results, the researchers plan to develop a multidimensional training model with the five education modules in NHs, with the focus on classification and consequences of UI, causes of UI, relevant assessment of UI, care for residents with UI, and common complications of UI. This multidimensional strategy advances a research-based training model in the nursing homes. In addition, courses and training should be designed for the long term, as short-term training may temporarily improve the staff's knowledge, but the practical behavior may not change.

Our findings support building a more suitable and targeted training program about UI by identifying the training demands in NHs, and which also are valuable for education materials development as theses may help dissemination of active practices.

5 Limitations

This study used a mixed-methods approach, the researchers adopted targeted instruments to measure quantitative results, and qualitative data were also used to increase information on the demands for UI training among nursing staffs. However, this study also had some limitations. The size of our sample was selected from 14 nursing homes in Hunan province; therefore, it does not represent the entire nursing population of nursing homes in China, which may limit the generalizability of our results. Moreover, all of the focus group participants were from 5 of the 14 nursing homes included in this study, which also limits the generalizability of our results. While the interview had been conducted to the observed data saturation, our results can well represent the situation of the involved NHs, and explore the UI training in more detail for the future and larger sample research laid a good foundation. In this study, we didn't get additional qualitative information from the nurse, in the future, researchers should consider that, in order to have richer descriptions.

6 Conclusions

It was necessary and meaningful to construct a targeted training program of UI to improve not only the quality of life for the residents with UI, but also the awareness and facilitation of effective UI management. Based on the research results, the researchers will formulate targeted training courses and preferred training forms suitable for the nursing homes.

Abbreviations

UI: Urinary incontinence

NHs: Nursing homes

NAs: Nursing assistants

UIKS: Urinary Incontinence Knowledge Scale

UIAS: Urinary Incontinence Attitude scale

Declarations

Ethics approval and consent to participate

This research was approved by the Ethical Committee of Central South University (project No. 2017035). Informed consent was obtained from each participant. All methods were carried out in accordance with relevant guidelines and regulations. All of the participants were given detailed information about the goals, purpose and reasons for the research. The participants signed an informed consent and were given the option of withdrawing from the research at any time without any reason or consequence. However, no participants refused or dropped out from the research during the interviews.

Consent for publication

Not applicable

Availability of data and materials' statement

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

No conflict of competing interest has been declared by the authors.

Funding

This study is granted by the National Key Research and Development Program of China (2020YFC2008602).

Authors' contributions

Study design: LLL, JJJ and NHT. Data collection: LLL, JJJ, ZYN and NHT. Data analysis: LLL, FH and JJJ. Manuscript writing: LLL. Manuscript revisions: all authors

Acknowledgement

We acknowledge the residents and staff of the nursing homes in this survey, we also thank to the Department of Civil Affairs of Hunan Province for the help and support.

References

1. Luo Y, Parry M, Huang YJ, Wang XH, He GP: **Nursing students' knowledge and attitudes toward urinary incontinence: A cross-sectional survey**. *Nurse education today* 2016, **40**:134-139.
2. Xu D, Kane RL: **Effect of urinary incontinence on older nursing home residents' self-reported quality of life**. *Journal of the American Geriatrics Society* 2013, **61**(9):1473-1481.
3. Feng H, Li H, Xiao LD, Ullah S, Mao P, Yang Y, Hu H, Zhao Y: **Aged care clinical mentoring model of change in nursing homes in China: study protocol for a cluster randomized controlled trial**. *BMC health services research* 2018, **18**(1):816.
4. Xu D, Liu N, Qu H, Chen L, Wang K: **Relationships among symptom severity, coping styles, and quality of life in community-dwelling women with urinary incontinence: a multiple mediator model**. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation* 2016, **25**(1):223-232.
5. Kampstra NA, Zipfel N, van der Nat PB, Westert GP, van der Wees PJ, Groenewoud AS: **Health outcomes measurement and organizational readiness support quality improvement: a systematic review**. *BMC health services research* 2018, **18**(1):1005.
6. Lindh Falk A, Hult H, Hammar M, Hopwood N, Abrandt Dahlgren M: **Nursing assistants matters-An ethnographic study of knowledge sharing in interprofessional practice**. *Nursing inquiry* 2018, **25**(2):e12216.
7. Liu M, Lam B, Fong P, Yuan HB: **Nursing shortage: the facts and strategies in Macao society**. *Online journal of issues in nursing* 2012, **18**(1).
8. Davis NJ, Wyman JF, Gubitosa S, Pretty L: **Urinary Incontinence in Older Adults**. *The American journal of nursing* 2020, **120**(1):57-62.
9. Palmer MH: **Urinary incontinence quality improvement in nursing homes: where have we been? Where are we going?** *Urologic nursing* 2008, **28**(6):439-444, 453.

10. Park S, De Gagne JC, So A, Palmer MH: **Knowledge, attitudes, beliefs, and practices in registered nurses and care aids about urinary incontinence in Korean nursing homes: a cross-sectional survey**. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society* 2015, **42**(2):183-189.
11. Ehlman K, Wilson A, Dugger R, Eggleston B, Coudret N, Mathis S: **Nursing home staff members' attitudes and knowledge about urinary incontinence: the impact of technology and training**. *Urologic nursing* 2012, **32**(4):205-213.
12. Lin SY, Wang RH, Lin CC, Chiang HY: **Competence to provide urinary incontinence care in Taiwan's nursing homes: perceptions of nurses and nurse assistants**. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society* 2012, **39**(2):187-193.
13. Barakat-Johnson M, Barnett C, Lai M, Wand T, White K: **Incontinence, Incontinence-Associated Dermatitis, and Pressure Injuries in a Health District in Australia: A Mixed-Methods Study**. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society* 2018, **45**(4):349-355.
14. Colborne M, Dahlke S: **Nurses' Perceptions and Management of Urinary Incontinence in Hospitalized Older Adults: An Integrative Review**. *Journal of gerontological nursing* 2017, **43**(10):46-55.
15. Saga S, Vinsnes AG, Mørkved S, Norton C, Seim A: **Prevalence and correlates of fecal incontinence among nursing home residents: a population-based cross-sectional study**. *BMC geriatrics* 2013, **13**:87.
16. Mathis S, Ehlman K, Dugger BR, Harrawood A, Kraft CM: **Bladder buzz: the effect of a 6-week evidence-based staff education program on knowledge and attitudes regarding urinary incontinence in a nursing home**. *Journal of continuing education in nursing* 2013, **44**(11):498-506.
17. Ostaszkiewicz J, Tomlinson E, Hutchinson AM: **"Dignity": A central construct in nursing home staff understandings of quality continence care**. *Journal of clinical nursing* 2018, **27**(11-12):2425-2437.
18. Göral Türkcü S, Kukulu K: **Urinary incontinence and quality of life of women living in nursing homes in the Mediterranean region of Turkey**. *Psychogeriatrics : the official journal of the Japanese Psychogeriatric Society* 2017, **17**(6):446-452.
19. Simonovich S: **The Value of Developing a Mixed-Methods Program of Research**. *Nursing science quarterly* 2017, **30**(3):201-204.
20. Schoonenboom J, Johnson RB: **How to Construct a Mixed Methods Research Design**. *Kolner Zeitschrift fur Soziologie und Sozialpsychologie* 2017, **69**(Suppl 2):107-131.
21. Ford-Gilboe M, Campbell J, Berman H: **Stories and numbers: coexistence without compromise**. *ANS Advances in nursing science* 1995, **18**(1):14-26.
22. De Gagne JC, Park S, So A, Wu B, Palmer MH, McConnell ES: **A urinary incontinence continuing education online course for community health nurses in South Korea**. *Journal of continuing education in nursing* 2015, **46**(4):171-178.
23. Yuan H, Williams BA: **Knowledge of urinary incontinence among Chinese community nurses and community-dwelling older people**. *Health & social care in the community* 2010, **18**(1):82-90.
24. Yuan HB, Williams BA, Liu M: **Attitudes toward urinary incontinence among community nurses and community-dwelling older people**. *Journal of wound, ostomy, and continence nursing : official publication of The Wound, Ostomy and Continence Nurses Society* 2011, **38**(2):184-189.
25. Alzghoul BI, Abdullah NA: **Pain Management Practices by Nurses: An Application of the Knowledge, Attitude and Practices (KAP) Model**. *Global journal of health science* 2015, **8**(6):154-160.
26. Mukhalalati BA, Taylor A: **Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators**. *Journal of medical education and curricular development* 2019, **6**:2382120519840332.
27. Ryan RM, Deci EL: **Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being**. *The American psychologist* 2000, **55**(1):68-78.
28. Braun V, Clarke V: **What can "thematic analysis" offer health and wellbeing researchers?** *International journal of qualitative studies on health and well-being* 2014, **9**:26152.
29. Burke RE, Werner RM: **Quality measurement and nursing homes: measuring what matters**. *BMJ quality & safety* 2019, **28**(7):520-523.
30. Holtzer-Goor KM, Gaultney JG, van Houten P, Wagg AS, Huygens SA, Nielen MM, Albers-Heitner CP, Redekop WK, Rutten-van Mölken MP, Al MJ: **Cost-Effectiveness of Including a Nurse Specialist in the Treatment of Urinary Incontinence in Primary Care in the Netherlands**. *PloS one* 2015, **10**(10):e0138225.
31. Younas A, Pedersen M, Tayaben JL: **Review of Mixed-Methods Research in Nursing**. *Nursing research* 2019, **68**(6):464-472.

32. Vinsnes AG, Harkless GE, Haltbakk J, Bohm J, Hunskaar S: **Healthcare personnel's attitudes towards patients with urinary incontinence**. *Journal of clinical nursing* 2001, **10**(4):455-462.
33. Driskell JE, Salas E, Driskell T: **Foundations of teamwork and collaboration**. *The American psychologist* 2018, **73**(4):334-348.
34. Fu Y, Nelson EA, McGowan L: **An evidence-based self-management package for urinary incontinence in older women: a mixed methods feasibility study**. *BMC urology* 2020, **20**(1):43.
35. Zhang N: **Behavioural and pharmacological interventions are more effective than no treatment for urinary incontinence outcomes in women**. *Evidence-based nursing* 2020, **23**(2):55.
36. Xie X, Chen Y, Khan A, Long T, Li S, Xie M: **Risk Factors for Urinary Incontinence in Chinese Women: A Cross-sectional Survey**. *Female pelvic medicine & reconstructive surgery* 2021, **27**(6):377-381.
37. Davila H, Abrahamson K, Mueller C, Inui TS, Black AG, Arling G: **Nursing Assistant Perceptions of Their Role in Quality Improvement Processes in Nursing Homes**. *Journal of nursing care quality* 2016, **31**(3):282-289.
38. Joo JH, Hwang S, Abu H, Gallo JJ: **An Innovative Model of Depression Care Delivery: Peer Mentors in Collaboration with a Mental Health Professional to Relieve Depression in Older Adults**. *The American journal of geriatric psychiatry : official journal of the American Association for Geriatric Psychiatry* 2016, **24**(5):407-416.
39. Parker-Autry CY, Shen E, Nance A, Butler T, Covarrubias JB, Varner RE, Richter HE: **Validation and Testing of an E-Learning Module Teaching Core Urinary Incontinence Objectives in a Randomized Controlled Trial**. *Female pelvic medicine & reconstructive surgery* 2019, **25**(2):188-192.
40. Chen AT, Huang MH, Chen CC, Wang IT, Chen LC: **[Using Teamwork to Reduce the Incidence of Incontinence-Associated Dermatitis]**. *Hu li za zhi The journal of nursing* 2020, **67**(1):89-97.

Figures

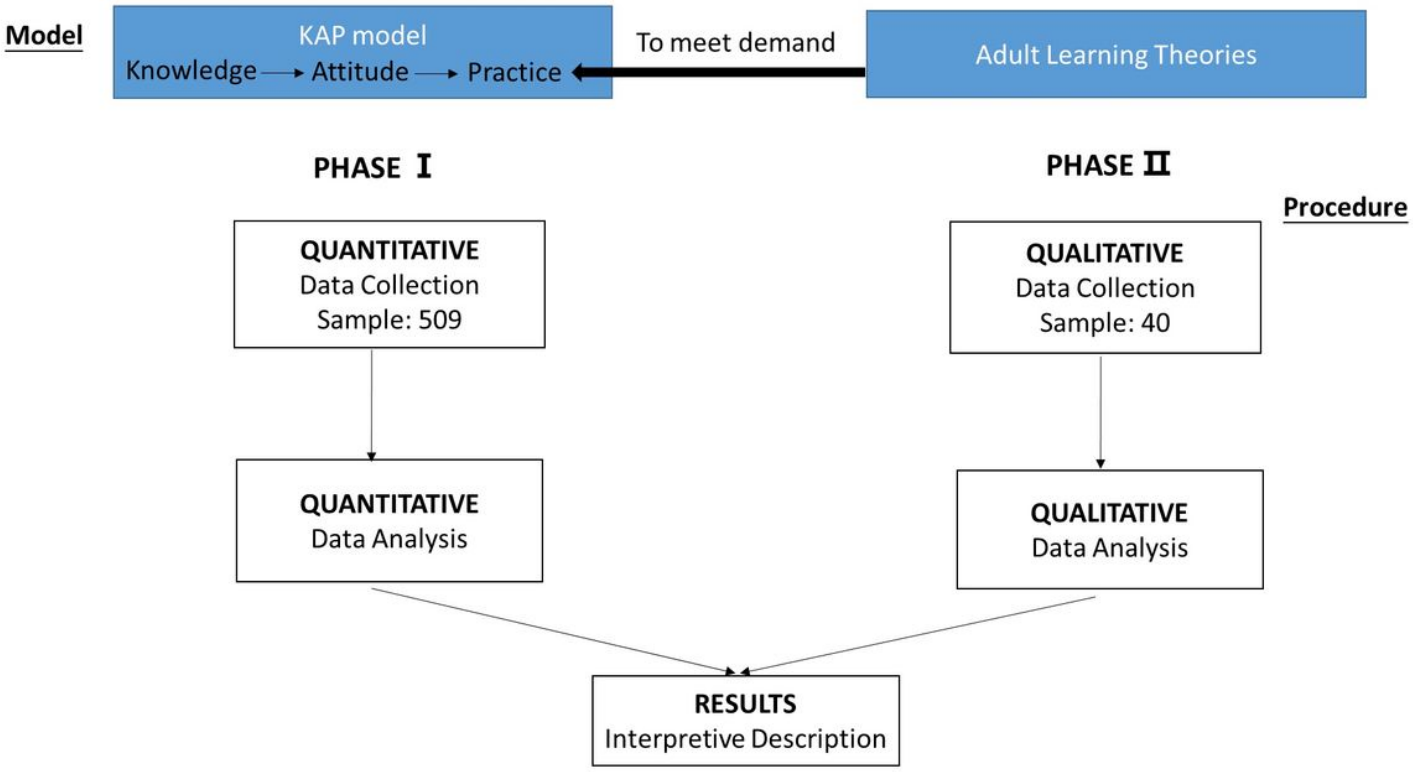

FIGURE 1 Explanatory sequential study design

Figure 1

See image above for figure legend.

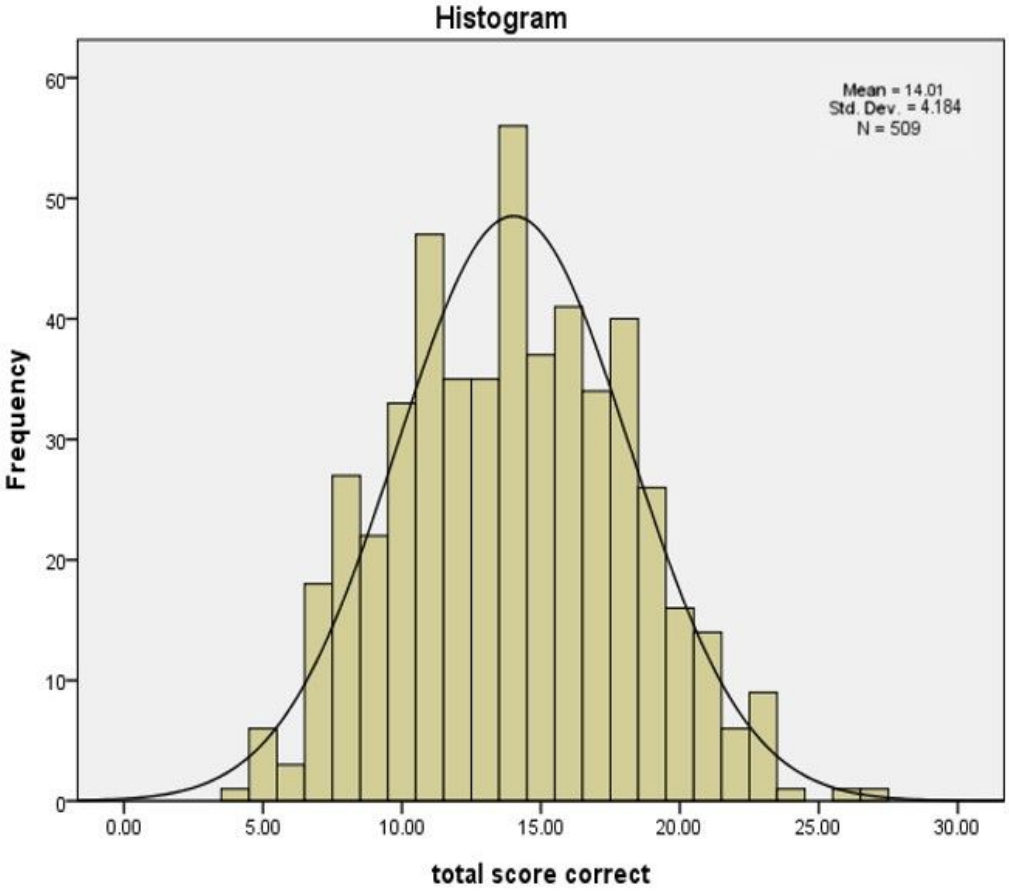

FIGURE 2 Frequency distribution of nursing assistants' scores on urinary incontinence knowledge scale.

Figure 2

See image above for figure legend.

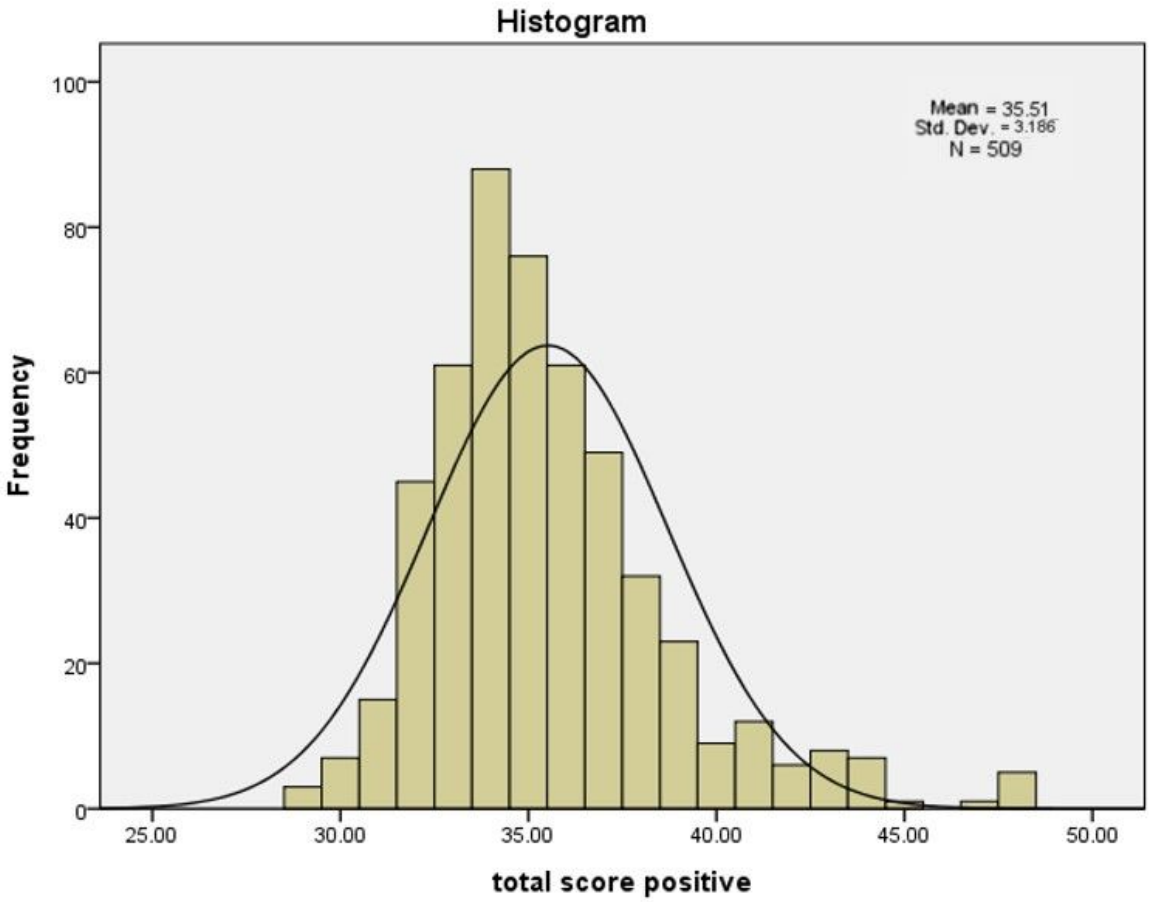

Figure 3

Frequency distribution of nursing assistants' scores on urinary incontinence attitude scales