

# The effectiveness of multimedia combined with teach-back method on the level of knowledge, confidence and behavior of professional caregivers in preventing falls in elderly patients

## A randomized non-blind controlled clinical study

Qinqin Wang<sup>a,\*</sup> , Huixiang Zou<sup>a</sup>, Qin Wang<sup>a</sup>

### Abstract

**Background:** Teach-back is a teaching method that can quickly improve the acknowledge of target audience and change their behaviors effectively. However, this approach has not been reported in previous studies that were dedicated to reducing the incidence of falls in elderly inpatients. Therefore, we aimed to evaluate the effectiveness of the teach-back method for improving the knowledge, confidence, and behaviors (KCB) of professional caregivers on the fall prevention in elderly inpatients and to provide practical evidence for reducing the incidence of falls.

**Methods:** This is a prospective study. At the recruitment, the demographic data of the professional caregivers were completely collected. Questionnaire about KCB of professional caregivers on fall prevention in elderly inpatients was used as an assessment scale, and the differences between the scores were analyzed. At the end of the study, the fall rate of the patients cared by different groups was counted and analyzed.

**Results:** A total of 100 professional caregivers were recruited, all of which participated in the whole study process. There was no statistical differences in demographic data. Three or six months after the courses, the knowledge scores, confidence scores, and behavior scores of the two groups were significantly improved, and the observation group scores were significantly higher than it was in the control group ( $P < .05$ ). During the study period, the incidence of falls in the observation group was 1.32%, while it was 0.30% in the control group ( $P < .05$ ).

**Conclusion:** Teach-back method can rapidly improve KCB of professional caregivers about fall prevention in elderly inpatients, which is worthy of clinical practice.

**Abbreviation:** KCB = knowledge, confidence, and behaviors,

**Keywords:** caregiver, elderly inpatient, fall, KCB, teach-back

## 1. Introduction

Falls are the most common adverse events in hospitals, accounting for 20% to 30% of all adverse events.<sup>[1]</sup> Approximately 3% of inpatients will fall and 25% of them will cause injury.<sup>[2]</sup> Elderly inpatients have a particularly high risk of fall owing to many comorbidities as well as decreased physical function and activity ability.<sup>[3]</sup> Falls of inpatients not only bring pains to patients and economic burden to families and society, but also prolong the hospital stay. Moreover, inpatients' fall may become the fuse of medical contradictions.<sup>[4]</sup> Clinically, varieties of nurse-led interventions have been used to reduce the incidence of falls in hospitalized patients.<sup>[5]</sup> There are also plenty of

patient-involved studies in regard to fall prevention.<sup>[6]</sup> But most researches ignored that the elderly are less active, and expected too much of senile inpatients, therefore, the effectiveness of interventions on falls prevention is not ideal. For older patients, the active involvement of caregivers in fall prevention is still needed to reduce the incidence of falls. It has been reported that patients cared for by trained caregivers are less prone to fall.<sup>[7]</sup> Though playing an important role in the prevention of falls, many professional caregivers are not familiar with knowledge regarding falls in elderly patients.<sup>[8]</sup> To ensure the safety of patients, it is necessary to conduct fall-related interventions for professional caregivers. The traditional way of preaching is boring, so it's difficult for caregivers to understand, memorize and apply the

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The datasets generated during and/or analyzed during the current study are publicly available.

<sup>a</sup>Outpatient department of People's Hospital of Deyang City, Deyang, China.

\*Correspondence: Qinqin Wang, Outpatient Department, People's Hospital of Deyang City, No. 173 of Sec. 1, Taishan North Road, Jingyang District, Deyang, 618000, China (e-mail: 451697898@qq.com).

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content they learn. The teach-back method is a two-way mode of information transmission. This means that after receiving health education, professional caregivers are allowed to express their understandings of relevant information in their own language and they will be given guidance on the information they misunderstand or do not understand again until completely mastering relevant knowledge.<sup>[9]</sup> This approach has been endorsed by several institutions, including the Joint Commission in The United States, and is widely used in the healthcare communities.<sup>[10,11]</sup> In present study, teach-back method combined with multimedia was used to train professional caregivers about the knowledge of preventing falls in elderly inpatients, and certain effects were achieved, which are reported as follows.

## 2. Methods

### 2.1. Study population

Using convenience sampling, 100 professional caregivers were selected as the research subjects in a 3A grade hospital, and 50 caregivers in each group were randomly assigned to the control group and the observation group. Inclusion criteria: physical and mental health; >65 years old; attendants of the professional caregiver company connected to the hospital; informed consent and voluntary participation in this study. Exclusion criteria: cognitive dysfunction, inability to complete the training and investigations; those who refuse to participate or withdraw voluntarily after reasonable explanation. This study was approved by the medical ethics committee of the right hospital and all participants provided informed consent. The authors have declared that no competing interests exist.

### 2.2. Study design

The study lasted for 6 months from March to August, 2021. The control group were educated by conventional educational methods, while the observation group by teach-back method. The interventions were implemented at the beginning of the study and 3 months later. Before, in the middle, and at the late stage of the study, questionnaires were completed on the knowledge, confidence, and behaviors (KCB) of fall prevention in elderly inpatients, and the occurrence of falls in all elderly patients cared by the caregivers within 6 months were collected. All relevant data are within the paper and its supporting information files. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The specific methods are as follows:

The nursing department organized and established a fall prevention and management group for the elderly inpatients. The head nurse of the rehabilitation is the team leader, with six charge nurses as members and the director of the rehabilitation as consultants.

In the control group, caregivers were randomly assigned to clinical departments, and charge nurses taught them about fall prevention using conventional methods, that is, informing them of the high-risk factors of falling in elderly inpatients and distributing fall prevention guidance manual.

In the observation group, the teach-back method combined with multimedia was adopted for centralized training. Training content: PPT courseware, scene simulation video, and use of WeChat group. PPT courseware content takes about 10 minutes, including the incidence of falls, varieties of factors related to fall, the harm of fall in elderly patients, treatment measures after the fall, meanings of fall prevention and specific methods, such as for long-term bedridden patients, lifting the head of a bed for 3 to 5 minutes, and then informing to sit by the bed for a few minutes, finally asking to walk slowly without abnormal response standing in situ. The scene simulation video lasted six minutes, showing a variety of causes by which elderly patients fall in the hospital (such as dizziness, sliding, etc.), showing the seriousness of patients fall (such as fractures needing for surgical treatment),

as well as advocating some effective measures to prevent falls. A nurse is responsible for the establishment of a wechat group to share the knowledge and experience on fall prevention from time to time and analyze the causes of falling events within the group so that everyone can learn lessons. Implementation of teach-back method: After the training, charge nurses ask the caregivers questions one by one using a gentle and open way such as “Do you think what kind of inpatients are prone to fall? “What should we do when a patient complains of dizziness while moving”. The caregivers are encouraged to provide positive answers based on their own understanding. If the answers are incorrect, the nurses will correct them immediately, such as “Let’s strengthen the memory again, it should be...” “When the patient complains of dizziness in the activity, we should immediately ask the patient to stop the activity, sit down or lie down to rest, and inform the medical staff,” etc., and ask for retelling until the retelling is correct.

### 2.3. Survey tools and evaluation indicators

A self-designed questionnaire (including name, gender, age, education level, fall-related training experience, and length of service) was used to collect demographic information of the caregivers and evaluate whether there was a statistical difference in two groups.

With experiences based on the characteristics of clinical nursing work, and after widely searching relevant literatures and referring to “Morse fall assessment scale” and so on, we designed “the questionnaire about the KCB of professional caregivers on fall prevention in elderly inpatients.” The questionnaire was reviewed and modified by five nursing specialists, the content validity is more than 80%. The questionnaire is composed of 33 items, including three dimensions KCB. The knowledge dimension, with a total of 15 items, covering disease factors, environmental factors, prevention measures and emergency response, etc., used the Likert 5 scoring method. Each entry got 1 point for “I don’t know”, 2 points for “heard”, 3 points for “understanding”, 4 points for “clear”, and 5 points for “very clear”. There were 9 items in the confidence dimension, which reflected the positivity and stance of fall prevention. Alike Likert rating method was adopted and each entry got 1 point for “very reluctant”, 2 points for “unwilling”, 3 points for “uncertain”, 4 points for “willing”, and 5 points for “very willing”, with a total score of 45 points. There were 9 items in the behavioral dimension, and Likert 5 scoring method was also adopted when each entry got 1 point for “Never”, 2 points for “occasionally”, 3 points for “some time”, 4 points for “often”, and 5 points for “always”, with a total score of 45 points. Higher the score is, better the cognition and confidence of the caregivers regarding fall prevention is, and higher the credibility of the normative behavior is. The questionnaire has good reliability and validity. The content validity indices of KCB were 0.812, 0.875, and 0.838, respectively. The total Cronbach’s  $\alpha$  coefficient was 0.868, and the Cronbach’s  $\alpha$  coefficient for each dimension ranged from 0.808 to 0.865.

We used two ways to describe the incidence of falls. One is the proportion of all fallers and the other is the person-daily rate which means the ratio of the number of all falls occurred to the total days of stay for all inpatients taken care of during the study period. The control and observation groups were calculated separately.

### 2.4. Statistical methods

Microsoft Office 2010 Excel was used for data entry and double verification was performed. SPSS23.0 statistical software was used for data analysis. Counting data are expressed as frequencies or percentages, and the chi-square test was used for comparison between groups. The measured data were first tested for normality. If a normal distribution was satisfied, the

mean ± standard deviation was used to represent the data and *t* test was performed between groups, while if not, the rank sum test was used. *P* < .05 indicates a statistically significant difference.

**2.5. Sample size**

The sample size was calculated using G\*Power© software version 3.1.9.7 (Heinrich Heine University, Dusseldorf, Germany). Depending on the results of a pilot trial with 2-sided (two tails) Type-I error 0.05 and power of 80% (1-β = 0.8), effect size (d) factor 0.60, and considering a dropout rate of approximately 10%, the minimum sample size was 100.

**3. Results**

All 100 caregivers participated in the study and completed the questionnaire survey, with recovery rate 100%. There was no significant difference in the general data between two groups (*P* > .05). The demographic details are presented in Table 1.

At the beginning of the study, the KCB scores on falls in elderly inpatients in both groups were low, and there was no statistical difference. After different interventions, the scores of KCB of the two groups on fall prevention in elderly inpatients were improved. After once or twice training, the average scores of the three dimensions in the observation group were higher than those in the control group, and the difference was statistically significant (*P* < .05). The details are presented in Tables 2, 3, and 4.

During the study period, all the caregivers in the control group took care of 684 elderly inpatients, 9 of whom fell down so that the incidence of falls was 1.32%, and the person-daily rate was 1.34%. In the observation group, all caregivers took care of 658 elderly inpatients, 2 of whom fell down, so the incidence of falls

**Table 1**  
Comparison of general data of two groups.

	Control group (n = 50)	Observation group (n = 50)	χ <sup>2</sup> / <i>t</i>	<i>P</i>
Gender, n (%)			0.162	.687
Male	21 (42.0)	23 (46.0)		
Female	29 (58.0)	27 (54.0)		
Level of education, n (%)			0.372	.542
Primary education and below	28 (56.0)	31 (62.0)		
Junior high school and above	22 (44.0)	19 (38.0)		
Age (yr)	51 ± 2.821	52 ± 2.740	1.832	.073
Years of working (yr)	8.5 ± 3.228	8.0 ± 2.673	1.115	.270
Whether there is fall-related training, n (%)			0.585	.444
Yes	39(78.0)	42(84.0)		
No	11(22.0)	8(16.0)		

**Table 2**  
Comparisons of scores of knowledge dimension.

	Number of participants	Before the interventions	3 mo after the interventions	6 mo after the interventions
Control group	50	39.78 ± 2.27	52.58 ± 2.87	60.06 ± 3.62
Observation group	50	39.56 ± 2.65	56.92 ± 2.38	65.86 ± 2.45
<i>t</i>		0.460	-8.410	-9.623
<i>P</i>		.670	<.001	<.001

**Table 3**  
Comparisons of scores of confidence dimension.

	Number of participants	Before the interventions	3 mo after the interventions	6 mo after the interventions
Control group	50	34.12 ± 1.88	38.76 ± 2.26	40.48 ± 1.97
Observation group	50	34.32 ± 1.71	41.08 ± 1.78	43.14 ± 1.14
<i>t</i>		-0.552	-5.457	-9.835
<i>P</i>		.584	<.001	<.001

**Table 4**  
Comparisons of scores of behavior dimension.

	Number of participants	Before the interventions	3 mo after the interventions	6 mo after the interventions
Control group	50	30.72 ± 1.63	38.76 ± 2.26	40.48 ± 1.97
Observation group	50	34.32 ± 1.71	41.08 ± 1.78	43.14 ± 1.14
<i>t</i>		-0.552	-5.457	-9.835
<i>P</i>		.584	<.001	<.001

**Table 5**  
Comparisons of the incidence of falls.

	Fallers	Non-fallers	χ <sup>2</sup>	<i>P</i>
Control group, n (%)	9 (1.32)	675 (98.68)	2.115	.040
Observation group, n (%)	2 (0.30)	656 (99.70)		

was 0.30%, and then the person-daily rate was 0.33%. There was a statistically difference in the incidence of falls between two groups (*P* < .05; Table 5).

**4. Discussion**

Inpatients fall is a permanent topic we need to pay attention to, particularly for elderly inpatients. There are many ways to prevent falls, which have been proven to work.<sup>[12,13]</sup> Through the review of relevant studies, this study is the first to use the teach-back method to intervene professional caregivers so as to reduce inpatients fall incidence. With the aging of the population in my country and the establishment of the “one patient, one accompany” system after the epidemic of COVID-19, there are more and more professional caregivers, who has become an irreplaceable part. At the same time, compared with medical staff, professional caregivers, spending the most time with their patients, play a vital role in the prevention of fall. In the present study, we adopt teach-back method to improve the KCB of professional caregivers, and the incidence of falls was 1.32% in the control group and 0.30% in the observation group. Study results showed that using teach-back method to intervene professional caregivers is an effective measure to prevent falls.

The teach-back method can significantly improve the level of KCB of professional caregivers on the fall prevention in elderly inpatients. The results showed that before the interventions, the average knowledge scores in the two groups was <40 at a failing level. On one hand, it was because of the low education level of caregivers. In this study, 56% of the control group just had a primary school education or below, and it was 62% in the observation group, which was similar to the results of Cho MY.<sup>[14]</sup> On the other hand, it may be that the caregivers had not received professional trainings about how to prevent fall. Gu YY<sup>[15]</sup> pointed out that the main way for

caregivers to acquire fall-related knowledge is through personal life experience and hospital training. Without professional training, caregivers tend to view falls according to their own experience, which not only is easy to lead negligence, but also not positive enough in fall prevention, and even at a loss when facing high-risk situations such as dizziness. For the nation, the contradiction of the low degree of the caregiver groups will continue for a long time, so it is of great importance to strengthen professional training to reduce the incidence of falls. According to the theoretical model of “KCB”, cognition determines confidence and finally changes behavior. Through training, caregivers can calculate their knowledge about falls in elderly inpatients and fundamentally realize the harm and severity of falls, and voluntarily participate in the management of fall prevention. According to the characteristics of the professional caregiver group, the present study took advantage of multimedia which is full of diversified forms, rich content, specific images, and repeatability to conduct professional training for the observation group and obtained obvious effects.

The teach-back method has several advantages over traditional propaganda. From the research results we find that the average scores of KCB of two groups increased after different nursing interventions. The average scores of the observation group was higher than that of the control group, and the difference was statistically significant, indicating that the teach-back method combined with multimedia was more effective than the routine health education. This is consistent with Wu Qiuxiang's<sup>[7]</sup> view that the incidence of falls in elderly patients who have been professionally trained is lower than those who have not been trained. Traditional propaganda is characterized by passive acceptance of the inculcated knowledge, which is inefficient and the contents are easy to forget for professional caregivers. Multimedia can fully display the related contents, also be three-dimensional and imaginable, so it is more easily accepted by the caregivers. Videos in Wechat plays a role of continuous health education, so that the caregivers can review the previous knowledge and learn the new, which can strengthen their memories. Finally, through the method of teach-back, the caregivers will feel in the role of active participators, profoundly understand the significance of fall prevention, and understand when the occurrence is likely to appear, and finally achieve the purpose of falling prevention. The results showed that the overall level after the second training was relatively higher than that after the first training, suggesting the need for persistent interventions. In this regard, the nursing department can set up a special group to conduct fall prevention training regularly.

Multimedia combined with teach-back method can reduce the incidence of falls in elderly inpatients. In this study, the incidence of falls was 1.32% in the control group and 0.30% in the observation group, which was statistically significant. Previous studies have used different intervention methods, therefore, the reported incidence of falls was very different. The incidence of falls in this study was roughly the same as that in Hill AM's research.<sup>[16]</sup> In view of the growing number of elderly patients in hospital, professional care is becoming increasingly important. It is of great significance to train professional caregivers through a teach-back method to reduce the incidence of falls among elderly inpatients. And multimedia combined with teach-back method can quickly make caregivers master the basic knowledge and skills about fall prevention and nursing.

Overall, with global aging and restrictive visit after COVID-19 pandemic, professional caregivers are in great demand. How to quickly and efficiently improve caregivers' KCB on fall prevention is particularly important. In our study, the training mode of teach-back method had achieved a certain effect, and it is worth more clinical research and applications.

This study had some limitations. For example, elderly patients cared for by the control group and the observation group came

from different departments, and the incidence of falls among inpatients in different departments is differential, so there might be some bias.

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## Author contributions

**Conceptualization:** Qin Wang.

**Data curation:** Qin Wang.

**Investigation:** Huixiang Zou.

**Resources:** Huixiang Zou.

**Software:** Qin Wang.

**Writing – original draft:** Qinqin Wang.

**Writing – review & editing:** Qinqin Wang.

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