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The Perceived Knowledge of Fall Prevention in Nurses Working in Acute Care Hospitals in China and the United States

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Objective: The aim of the study was to investigate the perceived knowledge of fall prevention in nurses working in hospitals in China and the United States.

Methods: A cross-sectional survey with 17 items was used to measure perceived knowledge of fall prevention of nurses working in hospitals in China and the United States.

Results: A total of 1442 nurses at 2 hospitals completed the survey in China (90% return rate), and 260 nurses in 2 hospitals in the United States (42% return rate) for a total sample size of 1702. Six items had means less than 4, indicating less familiarity with these factors. These items included assessment of vertigo and vestibular dysfunction, vision, foot problems, balance and activity, cognitive changes, and medications. In both countries, there was a difference in 2 units worked, with those working in maternal-child having a lower perception of knowledge of fall prevention than those employed on medical-surgical units. Of the 17 items, 11 were significantly different between China and the United States, all with the United States having higher perceived knowledge.

Conclusions: For both the United States and China, the perception of knowledge of fall prevention was high. However, nurses from both countries were less familiar with the items not commonly included on fall risk tools, such as vertigo and vestibular dysfunction, vision, foot problems, balance, and cognitive changes. The findings have implications for practice and education and suggest a need to include important factors related to falls in education and intervention in both countries.

Key Words: status of perceived knowledge, fall prevention, acute care hospitals, in-hospital fall

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Falls are a serious international public health issue affecting individuals of any age. The World Health Organization defines a fall as “an event which results in a person coming to rest inadvertently on the ground or floor or other lower level.”¹ According to the study on the global burden of disease, 696,000 people died from falls in 2017.²

In China, falls are the second leading cause of injury and disease burden after road traffic injuries³ with deaths and the burden of disease from falls primarily associated with older age (older than 70 y).⁴ Furthermore, in China, the incidence of falls in hospitalized elderly patients is more than twice that of the general

elderly population.⁵ In Chinese hospitals, falls are the main safety problem in elderly inpatients, and the incidence of falls in elderly patients in hospital can be as high as 30%, accounting for approximately 40% of hospital adverse events.⁶

In the United States, more than 1 of 4 older people fall each year.⁷ In addition, hundreds of thousands of patients fall in U.S. hospitals annually with 30% to 50% of these falls resulting in injury.⁸ Statistics from 1263 hospitals in the United States indicates that adults on medical and surgical units fall 3.56 times per 1000 patient days with 26.1% of falls resulting in patient injuries.⁹ Falls are also a concern for younger patients. A study in 1 large multihospital health-care system in the United States found that there were 1.6 newborn infant falls per 10,000 births.¹⁰ A survey of 26 hospitals in the United States reported that within a 6-month period, pediatric inpatient fall rates ranged from 0.4 to 3.8 cases per 1000 patients.¹¹ The consequences of falls are manifold, including physical, psychological, social, economic, and sometimes even fatal sequelae.¹²

In addition to causing significant health problems, falls are extremely costly. In China, the 25 million falls experienced annually by 20 million of the elderly population exact direct medical costs of approximately ¥5 billion (approximately U.S. \$0.8 billion) and social costs of ¥60 to 80 billion (U.S. \$9.51–\$12.68 billion).⁵ In 2015, the Centers for Disease Control and Prevention estimated the cost of fall-related injuries in the United States at a total of more than 50 billion dollars annually; the average hospital cost for a fall injury is approximately U.S. \$34,000, with Medicare paying approximately 78% of the costs of falling.¹³ Falls in hospitals not only threaten patients' health but also present care, quality, and safety issues. Preventing hospitalized patients from falling is an urgent and lasting problem in countries all over the world. Every medical organization internationally considers the incidence of falls as an important safety indicator. In China, the Chinese Hospital Association has been making prevention and reduction of falls, one of its patient safety goals since 2008. Other recommendations include special fall prevention committees to study how to prevent the patient from falling in China.¹⁴ In the United States, the Joint Commission recommends a series of actions to help each health-care organization prevent falls and fall injuries.⁷ Since October 2008, Medicare no longer reimburses acute care hospitals for the costs of additional care required because of hospital-acquired injuries, such as falls.

Fall prevention in clinical practice is a complex undertaking that requires the collaboration of multiple disciplines with nurses as the leaders in this initiative. In clinical practice, nurses are on the frontline and are mainly responsible for the assessment of the risk of falls and health education of the patients.¹⁵ This requires nurses to be equipped with knowledge and skills of fall prevention to perform these roles effectively.

This study investigated and compared the status of perceived knowledge of fall prevention in nurses working in acute care hospitals in China and the United States. The World Health Organization reported that China has the largest fall-related disease burden

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in the world. China has begun to study fall-related issues in the past 2 decades. However, the United States has been focusing on the problem of falls and engaging in research programs about fall prevention since the 1970s. Although there has been a lot of research on this topic in the United States, falls, especially in the acute care setting, are still an issue. The results of this study provide important information for nurses in both China and the United States.

METHODS

Study Design

This was part of a larger study examining perception of safety culture of nurses in China and the United States. After approval by the institutional review boards of the participating university and hospitals in the United States and China, packets were prepared that contained the following: (1) cover letter; (2) demographic information; (3) Safety Attitude Questionnaire; (4) fall prevention knowledge questionnaire; and (5) adverse event reporting scenario. This article describes the results of the fall prevention knowledge questionnaire.

Study Tools

Demographic Information

Demographic data that were collected included years of experience, education level, and unit worked.

Fall Prevention Knowledge

Fall prevention knowledge was measured by a questionnaire designed by Gong and Chen.¹⁶ The Fall Prevention Knowledge Questionnaire was originally written in Chinese and translated into English and then back translated by 2 different Chinese authors. This questionnaire was developed by the Chinese authors based on a review of literature and common components in fall risk assessments to measure the knowledge, attitudes, and behaviors of clinical nurses on fall prevention in hospitalized patients. The original questionnaire consisted of 3 parts with 42 items regarding knowledge, attitudes, and behaviors. The 17 items that measured self-perceived knowledge were used in this study. The items were rated on a 5-point Likert scale from strongly unfamiliar to strongly familiar with a higher score indicating more familiarity. During development of the tool, a presurvey was conducted with 35 clinical nurses to establish content validity and test-retest reliability. The content validity of the questionnaire was confirmed by 10 experts. One week later, 20 nurses of the previously mentioned 35 clinical nurses were surveyed using the same

questionnaire for repeated measurements, and the results were obtained from the 2 surveys. The results showed that the retest reliability of the questionnaire was $r = 0.840$ ($P < 0.01$). It showed that the stability of the entire questionnaire was good with an internal consistency coefficient of a Cronbach α level of $r = 0.87$.

Data Collection

Packets of the questionnaires were distributed by nurse managers at the participating agencies via the nurse’s mailbox on the unit. In China, 1600 packets were distributed to the 2 acute care hospitals, and in the United States, 612 packets were distributed at the 2 agencies. A poster was displayed in the unit break rooms asking for participation. The nurses were instructed via the cover letter to complete the survey on their own time and place it in the locked box located in each unit break room; the boxes were emptied every other day for 2 weeks by one of the coinvestigators.

RESULTS

A total of 1442 nurses at 2 different hospitals completed the survey in China (90% return rate) and 260 in 2 different hospitals in the United States (42% return rate). Overall, regarding education, the most common educational level was Bachelor of Science in Nursing (57.9% overall; 58.5% in China and 48.9% in the United States; no significant difference between the United States and China). The second most common educational level was diploma with more nurses in China (34.4%) with a diploma degree than in the United States (8%). There were more nurses educated at the associate degree level in the United States (44.7%) than in China (3.7%). Overall, related to work area, the most common unit worked was medical-surgical (55.8% overall; 58.3% in China; 38% in the United States), followed by maternal-child (13% overall; 12.5% in China; 15% in the United States). For both countries, the mean year of work experience was 9.05 years, which was similar in China (9.59 y) and the United States (9.65 y). The participants’ demographic characteristics are presented in Table 1.

The questionnaire demonstrated adequate reliability with a Cronbach α level of $r = 0.937$ for combined data ($r = 0.934$ for China and $r = 0.949$ for the United States). For the combined data, the question with the highest mean was “Do you know which people are at high risk of falls?” (mean = 4.54, SD = 0.61). The item with the highest mean in the United States was “Do you know the definition of a fall?” (mean = 4.67, SD = 0.53), which was ranked fourth in China (mean = 4.34, SD = 0.68). The item with the highest mean in China was “Do you know which people are at high risk of

TABLE 1. Demographic Characteristics

Items	China, n (%)	United States, n (%)	Total, n (%)
Educational background			
Associates degree	54 (3.7)	106 (44.7)	160 (9.6)
Diploma	500 (34.4)	2 (0.8)	502 (30.2)
Bachelor of Science in Nursing	854 (58.5)	116 (48.9)	970 (57.9)
Master of Science in Nursing	15 (1)	8 (3.3)	26 (1.5)
Working area			
Medical-surgical	846 (58.3)	91 (38)	108 (6.4)
Critical care	121 (8.3)	53 (22.1)	174 (10.3)
Emergency department	56 (3.9)	31 (12.9)	87 (5.1)
Operating room	87 (6)	21 (8.7)	108 (6.4)
Maternal-child	181 (12.5)	36 (15)	217 (13)
Other	149 (10.3)	7 (2.9)	156 (9.2)

falls?" (mean = 4.52, SD = 0.61), which was ranked second in the United States (mean = 4.66, SD = 0.60).

Overall, there were 6 items with means less than 4 (indicating a lower perceived knowledge): "Are you familiar with the assessment of patients' vertigo and vestibular dysfunction?" (mean = 3.38, SD = 1.02); "Are you familiar with the assessment of patient's vision?" (mean = 3.57, SD = 0.97); "Are you familiar with the assessment of patient's foot problems?" (mean = 3.61, SD = 0.95); "Are you familiar with the assessment of patient's balance and activity?" (mean = 3.83, SD = 0.93); "Are you familiar with the assessment of cognitive changes in patient?" (mean = 3.91, SD = 0.88); and "Do you know any medications that easily cause patients to fall?" (mean = 3.97, SD = 0.84). The descriptive statistics for individual items are shown in Table 2.

Of the 17 items, the means of 11 were significantly different between the United States and China, all with the United States having higher means (see Table 2 for differences between the 2 countries). In addition, there was a significant difference between the United States and China with the total mean. Item differences between the United States and China are seen in Table 2.

Overall, there were many similarities between the perceived knowledge of the nurses in China and the United States; the items with the lowest and highest means were alike. To examine differences in the perception of fall knowledge and demographic variables, the total score/mean was used. The only significant difference was between perception of fall knowledge and unit worked. There was a significant difference between the nurses working on medical-surgical units and maternal-child units with the former indicating that they are more familiar with the items listed in the fall knowledge questionnaire ($F(5,1664) = 24.67, P = 0.000$).

CONCLUSIONS

The findings of the study have several important implications for clinical practice both in China and the United States. Although, overall, the perception of knowledge was high (most items scored

as familiar or extremely familiar), there were 6 items that scored less than a mean of 4 in both countries, which would indicate that the nurses' perception was less than familiar and revealing areas that need further education. A recent systematic review of strategies to prevent falls in older adults concluded that staff education is an important part of an effective fall prevention program.¹⁷ A meta-analysis of fall prevention interventions only found small effects on fall rates.¹⁸ Self-assessed knowledge of nurses in fall risk assessments is an important first step and will vary by the specific needs of individual patients in the hospital that take into account the differences in Asian and Western populations. Overall, the perceived knowledge of the nurses was higher in the United States when compared with China. This may be because of the long-term emphasis on fall prevention in the United States, which often includes mandatory continued education. In the United States, fall prevention is often included in periodic education competencies; this is not common in China. In this study, most areas that the nurses indicated that they were familiar with were those frequently included on standard fall risk assessment scales in both countries. Although 2 of the items that they felt more familiar with are commonly associated with fall risk assessment tools for adults, such as the Morse Fall Scale¹⁹ (assessment of medications and cognitive status), the other 4 items were known risk factors for falls but not included in standard fall assessments (assessment of vertigo and vestibular dysfunction, vision, foot problems, and balance and activity). This is consistent with research from China,¹⁶ which indicated that nursing staff lacked the relevant knowledge of assessments on drugs, diseases that easily cause patients to fall, patient's vision, and vertigo and vestibular function. Dizziness and vertigo are symptoms common to many health conditions and are often difficult to manage.²⁰ Research in Korea found that the probability of falls was increased by dizziness/vertigo.²¹ A review of literature identified the need to provide a multidisciplinary approach to assess vertigo in the risk for falls.²² This provides implications for education regarding additional risk factors for falling that may not be included in traditional fall assessments. Although

TABLE 2. Item Means and Differences Between China and the United States

Items	Overall Mean (SD)	China, Mean (SD)	United States, Mean (SD)	P
1. Do you know the definition of a fall?	4.39 (0.67)	4.34 (0.68)	4.67 (0.53)	0.000*
2. Are you familiar with the fall prevention assessment tool currently used?	4.24 (0.83)	4.21 (0.80)	4.43 (0.95)	0.001*
3. Do you know which people are at high risk of falls?	4.54 (0.61)	4.52 (0.61)	4.66 (0.60)	0.001*
4. Do you know when the risk factors of falls should be assessed?	4.35 (0.74)	4.32 (0.74)	4.56 (0.72)	0.000*
5. Do you know what the risk factors of falls in the environment are?	4.36 (0.67)	4.32 (0.67)	4.59 (0.66)	0.000*
6. Are you familiar with the assessment of patient's balance and activity?	3.83 (0.93)	3.78 (0.91)	4.15 (0.96)	0.000*
7. Do you know any medications that cause patients to fall?	3.97 (0.84)	3.90 (0.83)	4.44 (0.76)	0.000*
8. Do you know any diseases that easily cause patients to fall?	4.05 (0.74)	4.01 (0.73)	4.36 (0.76)	0.000*
9. Are you familiar with the assessment of patient's foot problems?	3.61 (0.95)	3.6 (0.91)	3.68 (1.1)	0.252
10. Are you familiar with the assessment of patient's vision?	3.57 (0.97)	3.52 (0.95)	3.92 (0.99)	0.000*
11. Are you familiar with the assessment of patients' vertigo and vestibular dysfunction?	3.38 (1.02)	3.34 (0.99)	3.65 (1.1)	0.000*
12. Are you familiar with the assessments of the patient's clothing and footwear suitability?	4.10 (1.51)	4.12 (1.5)	4.05 (1.0)	0.510
13. Are you familiar with the assessment of cognitive changes in patient?	3.91 (0.88)	3.83 (0.87)	4.4 (0.78)	0.000*
14. Are you familiar with the intervention of fall prevention?	4.38 (0.70)	4.37 (0.69)	4.46 (0.77)	0.08
15. Do you know how to deal with patients after falls?	4.38 (0.74)	4.39 (0.72)	4.38 (0.87)	0.87
16. Are you familiar with the reporting system of falls?	4.28 (0.85)	4.29 (0.84)	4.29 (0.92)	0.97
17. Are you familiar with the reporting process of falls?	4.25 (0.89)	4.26 (0.88)	4.24 (0.96)	0.66
Total mean	4.09 (0.62)	4.06 (0.61)	4.28 (0.64)	0.00*

*Statistical differences at $P < 0.05$.

these additional risk factors may be less applicable for the newborn and pediatric populations, inpatient falls are significant in these populations, and it is important that risks for falls are assessed. Findings from a study in the United States concluded that fall risk assessment tools and prevention protocols in 26 major pediatric hospitals have not been standardized.²³ An integrative review of pediatric fall risk assessments found that the tools used are not reliable across institutions and diverse populations.²⁴ Further research on fall prevention and risk assessment is needed in this population.

In addition, although there were not significant differences in the self-reported perception of knowledge and the demographic characteristics of education and years of experience, there was a difference in 2 of the units worked—medical-surgical and maternal-child with those employed on maternal-child having a lower perception of knowledge. Gong and Chen¹⁶ found in their research conducted in China that scores of knowledge, attitudes, and behaviors of clinical nurses in the departments of medical and surgical were significantly higher than those of the clinical nurses in the departments of gynecology, pediatrics, and neonates. Furthermore, research in the United States has found that although falls may be prevalent on maternal-child units, knowledge of the factors that put one at risk for falls may be different in these areas. One group of researchers associated falls with maternal fatigue, rooming in, and encouraging breastfeeding as potential risk factors.²⁵ The Joint Commission in an advisory on safety called “Preventing Newborn Falls and Drops” identified cesarean birth, use of pain medication, second or third postpartum night (especially around midnight to early morning hours), and breastfeeding as potential risk factors.²⁶ They recommended strategies, such as developing an assessment tool, education, rounding, promoting maternal rest, and developing signage as safety actions to consider. Although falls do occur on these units, the knowledge of the nurses on the factors presented in the questionnaire is reported as lower. This provides an area for further research and education.

It is also important to note that as research about fall prevention grows in Asian countries, it is imperative that local issues are considered to ensure that research and programs implemented in these countries are effective and relevant to the local context, people, and the health system.²⁷ Although falls in the hospital are serious issues in both China and the United States, differences in the healthcare system and culture are relevant when considering strategies to increase the knowledge of nurses regarding falls and decreasing the risk for falls. Although not apparent in the routine fall risk assessments in the United States, the tool developed in China identified vertigo and vestibular dysfunction, vision, foot problems, and balance, and activity as important to the knowledge of falls, and these may want to be further tested in the United States. Other differences in fall protocols may provide further areas of research including frequency of fall assessments, strategies for fall education, and interventions to reduce falls.

There were several limitations to this study. The response rate was lower in the United States than in China, which may be partially due to cultural differences but does make it difficult to compare the results of the 2 countries. Furthermore, the questionnaire was used because it was applicable in both countries, and although the reliability was adequate in this study, there is limited documentation of previous reliability and validity. An additional limitation to this study is that actual knowledge was not measured. Further research is needed regarding the actual knowledge of fall risk, especially related to factors not normally associated with traditional fall risk assessment. However, a second piece to this study not reported in this article included a fall scenario where nurses selected the interventions that they would implement, which may more directly reflect knowledge of fall protocol.

Based on the perceived knowledge of fall prevention in nurses in China and the United States, further investigation and discussion of the attitudes and behaviors of fall prevention, education, and interventions should be conducted internationally. This cooperation could provide unique perspectives across populations and opportunities for nurses to learn from each other. It is important that education regarding fall prevention be provided to nurses on an ongoing basis, starting in initial nursing education. In the hospitals where this study took place, further education focused on the areas not traditionally included in fall risk assessment scales is ongoing as a result of this study.

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