RESEARCH ARTICLE

# Application of knowledge, belief and action model in ICU stress injury nursing training: A pre-post controlled study

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## Abstract

**Objective:** To explore the application effect of the knowledge, belief and action model in intensive care unit stress injury nursing training.

**Method:** The pre-post study was conducted at the First Affiliated Hospital of Sun Yat-sen University, China, from January 1, 2020, to December 31, 2022, and comprised nurses associated with intensive care unit. The stress-related knowledge of the nurses was assessed using a questionnaire adapted from literature in the light of the knowledge, belief and action model. Data was collected at baseline, followed by stress injury training for the nurses, including theoretical and practical sessions. The same questionnaire was used to collect post-training data. Data was analysed using SPSS 22.

**Results:** Of the 110 nurses, 98(89%) were females and 12(11%) were males. The overall mean age was 23.59±2.66 years (range: 19-26 years). Of the total, 86(78.2%) were without licence, 20(18.2%) were nurses, and 4(3.6%) were senior nurses. Compared to baseline, stress injury knowledge, stress injury attitude and stress injury practice behaviour scores were significantly higher post-training ($p<0.05$). Compared to baseline, the dressing change scores of the nurses post-training were significantly improved ($p<0.05$).

**Conclusion:** The application of the knowledge, belief and action model improved the ability of intensive care unit nurses to recognise stressful injuries, and enabled them to correctly assess the patients with high risk of stressful injuries and pressure injuries related to medical devices.

**Keywords:** Stress injury, Nursing, Knowledge, belief and action model, training, intensive care unit.

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## Introduction

A stress injury is a local injury caused by sustained pressure on the skin or underlying tissue, usually located in the bone process, or involving medical or other instruments.[1] Due to long-term pressure of local tissues, ulceration and necrosis are easy to cause blood circulation disorders and nutritional deficiency, which has become a common problem faced by global healthcare institutions, seriously affecting the quality of life (QOL) of patients.[2] At present, there are gaps in the theoretical knowledge and the latest knowledge gained in clinical practice about stress injuries.[3]

Intensive care unit (ICU) patients are seriously ill who use a variety of medical devices, and are, therefore, susceptible to medical device-related pressure injury (MDRPI). Studies in China have reported that MDRPI in ICU patients accounts for 43.5% of hospital stress injuries. MDRPI not only directly causes pain in patients, but also causes infections, prolongs patients' length of hospital stay (LOS), increases additional medical expenses, and even leads to medical lawsuits.[4] Studies have pointed out[5] that MDRPI is related to nurses' improper use and fixation of medical devices, lack of protective awareness, and lack of knowledge. In recent years, there have been many studies on stress injury in China,[6,7] mainly focussing on the causes of MDRPI and the formulation and application of risk assessment table.[8,9] However, there is little research on training in ICU stress injury nursing.

The knowledge, belief and action model includes three processes of changing human behaviour, including knowledge, attitude and behaviour. The model has been widely used in the nursing profession. Knowledge is the basis of nursing behaviour, and positive attitude is the driving force to change nursing behaviour. Educational intervention based on the model promotes nurses' compliance with standard precautions in preventing needle stick injuries.[10]

The current study was planned to investigate the effect of knowledge belief and action model application in ICU stress injury nursing training.

## Subjects and Methods

The pre-post study was conducted at the First Affiliated Hospital of Sun Yat-sen University, China, from January 1, 2020, to December 31, 2022, and comprised ICU nurses. The sample was raised using convenience sampling

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technique. Informed consent was obtained from all the participating nurses. This study was approved by the Ethics Committee of the First Affiliated Hospital of Sun Yat-sen University. Inclusion criteria: (1) Nurses had been in the ICU for more than 3 months. Exclusion criteria: (1) Nurses had participated in ICU stress injury nursing training; (2) Withdrawal from the study.

Data was collected using a stress-related knowledge questionnaire that was adapted[11] by combining with the actual situation at the study site. The questionnaire included two aspects. The first part explored general characteristics, including gender, age, hospital department, and title. The other part explored knowledge, belief and action of the nurses regarding stress injury. It had 25 items spread over 3 dimensions; 9 items in knowledge dimension, 5 items in attitude dimension; and 11 items in practice behaviour dimension. Correct responses were scored 5 points, while wrong responses were not scored. Higher scores indicated higher competence.

Data was collected at baseline and post-training. The questionnaires were filled out on the spot.

The assessement was also included Objective Structured Clinical Examination (OSCE) of stress injury cases by setting up 5~9 different sites, with a total of 3 sessions, including assessment objectives, case profiles, new data of standardised patient (SP), site background and task, score sheet, and preparation of materials. The test time at each site was 6min. Further, a standardised assessment of patients with stress injury was designed, with a total score of 100, with higher scores indicating better training. The assessment was conducted at baseline and post-training.

Two weeks before the assessment, stress injury training was carried out for nurses. The specific content of the training included theoretical and practical teaching. Theoretical teaching included stress injury assessment, MDRPI prevention measures, turning skills and methods, and dressing selection.

The method of combining handouts and bedside teaching was used to train nurses on the related knowledge and preventive measures of stress injury. To simulate the clinical situation of high-simulation stress injury, several hidden or prominent clinical nursing problems were designed on the basis of real cases of the plan, and the training subjects were required to use knowledge and operational skills comprehensively, make clinical decisions through critical thinking, and take nursing measures.

Baseline scores of stress-related knowledge, attitude, practice behaviour, and dressing change of stress injury were compared with those obtained post-training.

Data was analysed using SPSS 22. Measurement data was expressed as mean±standard deviation, and t-test was used for comparison. P<0.05 was considered statistically significant.

## Results

All the 110(100%) nurses approached completed the study. There were 98(89%) females and 12(11%) males with overall mean age 23.59±2.66 years (range: 19-26 years). Of the total, 86(78.2%) were without licence, 20(18.2%) were nurses, and 4(3.6%) were senior nurses.

Compared to baseline, the knowledge scores of the nurses significantly improved post-training ($p$<0.05) (Table 1).

Compared to baseline, the attitude scores of the nurses significantly improved post-training ($p$<0.001) (Table 2).

**Table-1:** Comparison of knowledge scores of stress injury among nurses before and after training.

| Items | Before training (n=110) | Before training (n=110) | *t*-test | *p*-value |
|---|---|---|---|---|
| Latest definition of stress injury | 1.59±0.42 | 2.80±0.65 | 11.595 | <0.001 |
| Latest stage of stress injury | 2.51±0.70 | 4.74±0.46 | 19.744 | <0.001 |
| Mechanical causes of stress injury | 4.21±0.32 | 4.90±0.74 | 6.347 | <0.001 |
| Skin damage caused by medical devices is a medical device-related stress injury | 1.82±0.48 | 4.53±0.57 | 26.970 | <0.001 |
| The skin injury caused by medical devices such as nasogastric tube, tracheal intubation tube, blood oxygen saturation probe and restraint band are MDRPI | 1.97±0.90 | 4.68±0.73 | 17.343 | <0.001 |
| Whether the size, model and specification of the device are suitable for the patient | 3.50±0.81 | 4.90±1.09 | 7.645 | <0.001 |
| Whether the size, model and specification of the device are suitable for the patient | 3.50±0.81 | 4.90±1.09 | 7.645 | <0.001 |
| Whether the device fixation method is appropriate | 4.11±0.46 | 4.81±0.64 | 6.586 | <0.001 |
| What are the current skin protection measures for the use of instrument contact sites | 4.40±0.62 | 4.90±1.03 | 3.084 | 0.002 |
| The degree of device injury was determined according to the classification of stress injury by NPUAP in 2016: detailed classification of skin injury and no classification of mucosal injury | 1.63±0.52 | 2.45±0.45 | 8.843 | <0.001 |
| **Total scores** | 25.74±0.72 | 25.74±0.72 | 95.786 | <0.001 |

MDRPI: Medical device-related pressure injury, NPUAP: National pressure ulcer advisory panel.

**Table-2:** Comparison of nurses' stress injury-related attitude scores before and after training.

| Items | Before training (n=110) | Before training (n=110) | *t*-test | *p*-value |
|---|---|---|---|---|
| If the skin under the instrument is not loosened after using protective measures, the skin condition can be checked without checking | 4.40±0.41 | 4.90±0.05 | 8.977 | <0.001 |
| The most effective way to prevent medical device stress injury is to disengage from using the device as soon as possible | 2.53±0.52 | 3.27±1.03 | 4.756 | <0.001 |
| Whether to use the high lift method can reduce the contact surface between the pipe and the skin and prevent MDRPI | 2.13±0.36 | 4.90±0.05 | 56.521 | <0.001 |
| A foam dressing, gauze protector does not need to release BiPAP for decompression | 2.74±0.73 | 4.09±0.88 | 8.756 | <0.001 |
| Pre-spraying the skin on areas that are prone to rubbing or where the tape is attached prevents pressure injury | 3.20±0.52 | 4.63±0.34 | 17.069 | <0.001 |
| **Total scores** | 15.00±0.51 | 21.79±0.47 | 72.607 | <0.001 |

MDRPI: Medical device-related pressure injury, BiPAP: Bi-level positive airway pressure.

**Table-3:** Comparison of practical behaviour scores of nurses before and after training.

| Items | Before training (n=110) | Before training (n=110) | *t*-test | *p*-value |
|---|---|---|---|---|
| Common risk assessment tools for stress injuries | 2.92±0.31 | 4.81±0.51 | 23.485 | <0.001 |
| Braden pressure ulcer risk assessment quantity content | 3.95±0.51 | 4.93±0.02 | 14.239 | <0.001 |
| Frequency of nursing the patient to change positions | 3.01±0.32 | 4.63±0.65 | 16.582 | <0.001 |
| Whole body decompression device for patient use | 3.92±0.71 | 4.94±0.03 | 10.644 | <0.001 |
| A local decompression device for patients | 3.53±0.70 | 4.90±0.05 | 14.477 | <0.001 |
| Skin care products for patients | 2.31±0.72 | 4.54±0.40 | 20.079 | <0.001 |
| Special care products/measures for patients with faecal incontinence | 3.32±0.65 | 4.36±0.53 | 9.196 | <0.001 |
| Examination of the skin under and around the medical device | 3.94±0.40 | 4.90±0.09 | 17.364 | <0.001 |
| Whether the patient has direct contact with the device | 2.15±0.61 | 2.46±0.55 | 2.799 | 0.006 |
| Assessment of the frequency of skin use at the site of instrument contact | 1.54±0.45 | 3.18±0.63 | 15.709 | <0.001 |
| Frequency of skin cleaning at instrument site | 4.01±0.13 | 4.96±0.02 | 53.565 | <0.001 |
| **Total scores** | 34.52±0.47 | 48.61±0.31 | 185.593 | <0.001 |

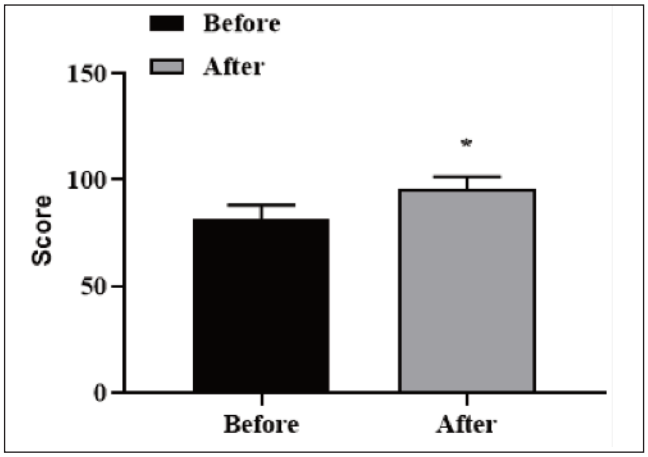


**Figure:** Comparison of dressing change scores of nurses before and after training. **p<0.05.*

Compared to baseline, the practice behaviour scores of the nurses significantly improved post-training ($p$<0.05) (Table 3).

Compared to baseline, the dressing change scores of the nurses significantly improved post-training ($p$<0.05) (Figure).

## Discussion

The nursing of stress injury and MDRPI has always been the focus of and challenge in nursing work. The current study used a questionnaire-based survey of nurses to understand their nursing knowledge, attitude and behaviour related to stress injury.

In general, the effects of skin care and nutritional support care have been reported to be better for patients with stress injury, while the effects of turning over and wound nursing have been worse.[12] The main reason is that nurses lack a deep understanding of nursing behaviour, and generally believe that cleaning the patient's skin and ensuring adequate nutritional support are enough, and they do not pay enough attention to the turning over and wound nursing elements.[2] Moreover, turning over and wound nursing are two kinds of nursing behaviours with high technical requirements, and it is relatively difficult for the nurses to master and skilfully complete them.[13] Evidence[14] has suggested that patients who are bedridden for a long time and cannot turn over independently should be assisted in turning over regularly every 2 hours. Also, soft pillows should be placed between the knees and ankles to avoid compression. Therefore, it is necessary to strengthen the correct guidance for the nursing behaviour of stress injury, especially related to the two skills of turning over and wound nursing. It is necessary to explain wound nursing methods and precautions in detail, guide the correct movements of the nurses when turning over a patient, and how to effectively optimise physical strength.[15]

OSCE is often used in the assessment of clinical ability, and it has strong objectivity and other characteristics.[16] Before the assessment, the site is set up, the candidates complete the tasks within the specified time, and the examiner scores them as per the rules.[17] The fairness of OSCE is high, the site can be reused, and it can accurately evaluate the practical ability of the candidates. With such characteristics, OSCE has become one of the main evaluation tools for the ability examination of medical students.[18]

The knowledge, belief and action model is a new model to change human cognition and behaviour, which divides behaviour change into three dimensions: knowledge, belief and action.[19] In recent years, this theory has been gradually applied to nursing training with good results.[20,21]

The results of the current study showed that after the implementation of nursing training based on the knowledge, belief and action model, the stress injury knowledge score, stress injury attitude score, stress injury practice behaviour score, and dressing change scores of ICU nurses significantly improved, suggesting that nursing training based on the model combined with OSCE assessment could improve nurses' cognition level of stress injury, improve their nursing attitude, and encourage them to maintain correct nursing behaviour. The main reason is that, while providing health education to nurses taking care of patients with stress injury, the cognition of the severity of stress injury should be strengthened, such as explaining the complications of stress injury and watching videos and pictures of severe stress injury, so as to enhance the alertness of the risk of stress injury, and promote the awareness of the importance of correct nursing behaviour.[22] Consistently, Elgzar et al. indicated that educational intervention based on the health belief model

increased nursing students' perceived susceptibility and self-efficacy to overcome perceived barriers to taking protective and preventive measures in response to coronavirus disease-2019 (COVID-19).[23]

The current study has limitations as the sample size was not calculated which could have influenced the power of the study, and the generalisability of the findings.

## Conclusion

The application of the knowledge, belief and action model in combination with OSCE assessment improved the ability of the ICU nurses to identify stress injuries, and enabled them to correctly assess high-risk patients with stress injuries and MDRPI.

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**Conflict of Interest:** None.

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