International Journal of Nursing and Health Care Research

OPEN ACCESS

Liu J, et al. Int J Nurs Health Care Res 7: 1579

www.doi.org/10.29011/2688-9501.101579

www.gavinpublishers.com

GAVIN PUBLISHERS

Research Article

Prevention of Medical Device-Related Pressure Injury in The Operating Room: Nurses' Knowledge and Training Imperatives

Jianmei Liu, Mengya Nan, Cheng Yu, Dianye Yao*

The First Affiliated Hospital of Sun Yat-sen University, Guangzhou City, Guangdong Province, China

***Corresponding author:** Dianye Yao, The First Affiliated Hospital of Sun Yat-sen University, Guangzhou City, Guangdong Province, China.

Citation: Liu J, Nan M, Yu C, Yao D (2024) Prevention of Medical Device-Related Pressure Injury in The Operating Room: Nurses' Knowledge and Training Imperatives. Int J Nurs Health Care Res 7:1579. DOI: https://doi.org/10.29011/2688-951.101579

Received Date: 14 September, 2024; **Accepted Date:** 26 September, 2024; **Published Date**: 30 September, 2024

Abstract

Objective: This study aimed to assess the current knowledge and training needs of operating room nurses regarding the prevention of MDRPIs. By identifying gaps in knowledge and influential factors, the study sought to provide a basis for targeted educational interventions to reduce the occurrence of these injuries. **Methods:** A convenient sampling method was employed to survey 108 nurses from five hospitals in Guangdong Province. Data was collected using a questionnaire that assessed nurses' knowledge and training needs related to MDRPI prevention. The questionnaire included sections on general information, knowledge assessment, and training demand. Statistical analysis was performed using SPSS 22.0, with multivariate linear regression to identify influential factors. **Results:** The mean knowledge score was 30.63 out of a possible 39, indicating a need for improvement. The mean training demand score was 45.23 out of 55, reflecting a high demand for training. Regression analysis identified hospital grade, gender, and age as significant factors influencing knowledge scores, while hospital grade and professional title were related to training demand. **Conclusion:** Operating room nurses demonstrate a moderate level of understanding regarding the prevention of medical device-related pressure injuries (MDRPIs), yet there is room for improvement. The high scores in training needs reflect a proactive learning attitude. Hospital grade, gender, age, and professional title are identified as the primary factors influencing knowledge scores and training demands.

Keywords: Operating room nurse; Medical device-related stress injury; Knowledge assessment; Training needs; Influencing factors

Introduction

Pressure injuries are localized lesions affecting the skin and/or underlying subcutaneous soft tissues, typically manifesting over bony prominences or at sites where the skin is in contact with medical equipment [1]. A specific type, termed medical device-related pressure injury (MDRPI), arises from the use of medical devices for diagnostic or therapeutic purposes, with the injury's shape often mirroring that of the device [2]. This classification was introduced by the American Pressure Ulcer Advisory Panel in 2016. As medical technology progresses and the use of equipment in operating rooms becomes more prevalent, the incidence of MDRPIs has surpassed that in other hospital departments. Current clinical research predominantly concentrates on intensive care units (ICUs) [3-5], while the operating room environment has received comparatively less attention.

Prevention of MDRPIs is paramount, as they can cause significant physical and psychological harm to patients, potentially leading to infections and permanent damage, thereby extending hospital stays and consuming valuable healthcare resources. There is a

critical need for enhanced training among nursing staff. Studies report that the incidence of device-related pressure injuries (DRPIs) in Chinese operating rooms ranges from 0.56% to 12.00% [6,7], with MDRPIs constituting 45% of all hospital-acquired pressure injuries sustained during surgery [8]. Surgical patients are particularly susceptible to these injuries due to their underlying conditions, the administration of various medications, the use of auxiliary therapeutic devices, preoperative fasting, and the effects of anesthesia [9].

Research indicates that, beyond the material and design of medical devices, a lack of preventive theoretical knowledge among operating room nurses, an insufficient understanding of device-related risk factors, and a deficiency in preventive measures significantly contribute to the occurrence of MDRPIs in surgical patients [10-13]. This study, therefore, aims to assess the current state of knowledge and training needs among operating room nurses. The findings will inform the development of targeted educational programs to enhance nurses' competencies and mitigate the risk of MDRPIs in surgical settings.

Methods

Study Population

The study employed a convenient sampling technique to examine a cohort of operating room nurses across two secondary and three tertiary hospitals in Guangdong Province between July and August 2024. Participants were included based on their employment in the operating room and possession of a valid nursing qualification certificate, in addition to being officially registered nurses. Nurses were excluded from the study if they had been absent from duty for more than three months during the study period due to reasons such as sick leave, maternity leave, or educational leave. The final sample comprised 108 operating room nurses who provided their informed consent and voluntarily agreed to participate in the survey.

Research Methods

Survey Instruments

The survey utilized two principal instruments. Firstly, a general information questionnaire was employed to collect data on demographic and professional characteristics, including age, gender, years of service, professional title, position, educational background, hospital level, marital status, and employment type.

Secondly, the Knowledge and Training Needs Questionnaire for ICU Nurses Regarding Medical Device-Related Pressure Injuries (MDRPI), developed by Hu Yilan [14] in 2019, was utilized. This instrument assesses knowledge through a three-point Likert scale, ranging from "disagree" (1 point) to "agree" (3 points), with a possible total score of 13 to 39 points. A higher score indicates a more comprehensive grasp of the knowledge. The questionnaire also evaluates the demand for knowledge training using a five-point Likert scale, where responses from "very needed" (5 points) to "very unnecessary" (1 point) are recorded, yielding a total score between 11 and 55 points. A higher score in this section signifies a greater need for knowledge, which should be considered a priority in training program development.

The questionnaire's psychometric properties were robust, with a Cronbach's α coefficient of 0.918 for the overall questionnaire, 0.822 for the knowledge section, and 0.977 for the knowledge training demand section. The split-half reliability was 0.966, with coefficients of 0.863 and 0.982 for the two respective dimensions. The content validity index (CVI) for individual items ranged from 0.80 to 1.00, and the scale-level CVI was 0.910. Scores from both dimensions were categorized into three tiers-low, medium, and high-to facilitate stratified analysis.

Data Collection Procedures

Data for this study were gathered via an electronic questionnaire, designed to ensure anonymity by omitting fields for personal and hospital names. Each question was mandatory, and the survey employed standardized instructions to elucidate its purpose and importance. Participants were instructed to complete the questionnaire independently, ensuring confidentiality. The survey system was programmed to accept submissions only upon completion. Responses with an implausibly short completion time of less than 100 seconds or containing evident errors were deemed invalid. Ultimately, 108 valid questionnaires were collected and utilized for analysis.

Statistical Analysis

Statistical analysis of the collected data was conducted using SPSS version 22.0. Descriptive statistics, including frequencies and percentages, were employed to summarize the data. The data were assessed for normality, and appropriate statistical tests were applied accordingly. For comparing two groups, the independent samples t-test was utilized, while analysis of variance (ANOVA) was selected for multiple group comparisons. Multivariate linear regression analysis was conducted to identify factors influencing the knowledge and training needs related to MDRPI prevention among operating room nurses. A p-value of less than 0.05 was considered to indicate statistical significance.

Results

Demographic and Professional Characteristics of Participants

The study's respondent pool included 108 operating room nurses who completed the survey. A comprehensive set of demographic

and professional data was collected from the participants, which has been detailed in Table 1, offering an in-depth profile of the sample cohort.

project	Number of cases	Percentage (%)
Age (years) ≤27	55	50.9
28~	53	49.1
Gender: male	17	15.7
woman	91	84.3
Hospital grade two and below.	9	8.3
three-level	99	91.7
Length of service (year) < 5	48	44.4
45570	50	46.3
44105	7	6.5
>20	3	2.8
Position nurse	104	96.3
head nurse	4	3.7
educational background	2	1.9
College degree or below		
Bachelor degree or above	106	98.1
Marital status unmarried	69	63.9
married	39	36.1
employment status on the establishment	7	6.5
outside the establishment	101	93.5
Professional title nurse	4	3.7
primary nurse	87	80.6
Nurse-in-charge	17	15.7

Table 1: General information of the respondents.

Analysis of the Current Status of Knowledge and Training Needs for Preventing Medical Device-Related Pressure Injuries Among Operating Room Nurses

A total of 108 operating room nurses participated in the assessment of their knowledge and training needs concerning the prevention of medical device-related pressure injuries (MDRPIs). The mean knowledge score was (30.63 ±3.95), equating to a scoring rate of 78.5%. For training demand, the mean score was (45.23 ±8.45), with a scoring rate of 82.2%. Utilizing basic nurse data as independent variables, we conducted an analysis to compare knowledge and training needs across different nurse characteristics. The results revealed statistically significant differences ($P < 0.05$) among groups. Notably, there were significant variations in training needs scores among nurses with differing years of experience, professional titles, positions, and hospital grades ($P < 0.05$). For a detailed breakdown of the knowledge and training needs analysis according to various nurse characteristics, refer to Table 2.

project	knowledge			Training demand		
	score	T/F value	P value	score	T/F value	P value
Age (years) ≤27	29.38±4.25	t=-3.538	0.001	46.95±8.50	t=2.186	0.031
28~	31.94±3.18			43.45±8.09		
Gender: male	28.29±4.03	t=-2.74	0.007	42.82±12.45	t=-1.284	0.202
woman	31.08±3.81			45.68±7.48		
Marital status unmarried	30.41±4.11	t=-0.813	0.418	46.36±8.32	t=1.872	0.064
married	31.05±3.70			43.23±8.41		
Length of service (year) < 5	29.77±3.95	F=3.305	0.023	47.15±8.09	F=3.851	0.012
5~10	31.26±3.93			44.92±8.38		
10~20	29.86±2.26			37.57±7.23		
>20	36.00±2.00			37.67±4.16		
Professional title nurse	27.00±6.22	F=2.23	0.113	41.25±11.15	F=8.256	0.001
primary nurse	30.62±3.92			46.74±7.99		
Nurse-in-charge	31.59±3.28			38.47±6.78		
Position nurse	30.72±3.97	t=0.905	0.368	45.67±8.22	t=2.862	0.005
head nurse	28.50±3.31			33.75±6.50		
Educational background	29.50±7.78	t=-0.409	0.683	45.50±3.54	t=0.045	0.964
College degree or below						
Bachelor degree or above	30.66±3.92			45.23±8.52		
Hospital grade two and below	25.11±2.47	t=-4.806	0.001	32.44±9.26	t=-5.313	0.001
three-level	31.14±3.68			46.39±7.38		
employment status	30.14±4.98	t=-0.341	0.733	39.29±8.28	t=-1.951	0.054
on the establishment						
outside the establishment	30.67±3.91			45.64±8.34		

Table 2: Comparison of the scores of MDRPI prevention knowledge and training needs of nurses in operating room (n=108, min, s) $\bar{x}$.

Multifactor Analysis of Nurses' Knowledge and Training Demand Scores for Preventing Medical Device-Related Pressure Injuries in the Operating Room

Following the completion of univariate analyses, a multivariate linear regression analysis was performed to assess the influence of various factors on the knowledge and training demand scores related to the prevention of medical device-related pressure injuries (MDRPIs) among operating room nurses. Gender, age, and hospital grade were selected as independent variables, with the knowledge dimension score of MDRPI prevention being the dependent variable. Additionally, the professional title and hospital level were considered independent variables, while the training demand dimension score of MDRPI prevention served as the dependent variable.

The categorical variables were assigned numerical values for the regression analysis as follows: age was dichotomized with ≤27 years as 1 and ≥28 years as 2; gender was coded with 1 for male and 2 for female; hospital grade was categorized with 1 for secondary (Grade II and below) and 2 for tertiary (Grade III); and professional titles were assigned values of 1 for staff nurse, 2 for registered nurse, and 3 for head nurse. The outcomes of the stepwise multiple linear regression analysis are presented in Table 3.

dependent variable	independent variable	B value	Standard error	β value	T value	P value
Knowledge score[1)]	constant	11.744	2.786	—	4.216	0.001
	gender	1.964	0.885	0.182	2.221	0.029
	Hospital grade	6.065	1.149	0.425	5.276	<0.001
	age	2.449	0.644	0.311	3.804	<0.001
Training needs[2)]	constant	9.095	11.902	—	0.764	0.447
	professional title	-4.973	1.993	-0.251	-2.495	0.014
	Hospital grade	16.565	2.879	0.545	5.755	<0.001

Notes: [1)] R2=0.328, after adjustment R2=0.308, F=16.890, P < 0.001; [2)] R2=0.364, after adjustment R2=0.319, F=8.169, P<0.0013.

Table 3: Multivariate analysis results of nurses' knowledge of MDRPI prevention and training demand scores in operating room.

Discussion

Knowledge and Training Needs Assessment for MDRPI Prevention Among Operating Room Nurses

Analysis of Knowledge Dimension Scores

The knowledge dimension score for preventing medical device-related pressure injuries (MDRPIs) among operating room nurses slightly exceeds the midpoint, suggesting a moderate level of understanding with potential for enhancement. This knowledge encompasses the nurses' comprehension of MDRPI concepts, stages, risk factors, assessment methods, and preventative and treatment strategies [15]. Proficiency in this area is indicative of a nurse's ability to identify, prevent, treat, and provide care for MDRPIs. The current study's findings indicate an average knowledge dimension score of (30.63 ±3.95), translating to a 78.5% score rate, which surpasses the findings of Shen Zhuping et al. [16-18]. This suggests that the surveyed nurses possess a foundational understanding of MDRPI prevention, likely due to the emphasis placed by China's Health and Wellness Committee on reducing the incidence of stage 2 and higher-pressure injuries as an annual quality improvement target for nursing care [19].

However, the component with the lowest score in this study was the definition and staging of pressure injuries, highlighting a significant area of uncertainty. This indicates that while operating room nurses may employ clinical experience to implement preventive measures for stress injuries, their grasp of the fundamental concepts is inadequate. Consequently, it is imperative for nursing administrators to establish platforms for knowledge enhancement, organize specialized training sessions, and offer educational opportunities aimed at reinforcing theoretical knowledge. Strengthening nurses' understanding of MDRPIs is essential for improving patient care. Additionally, research [20] indicates that nurses' knowledge regarding stress injuries is often confined to non-medical device-related contexts, revealing a need to update their conceptual framework to encompass MDRPI-specific knowledge.

High Training Demand and Positive Learning Attitude Among Operating Room Nurses

The findings of this study reveal that operating room nurses exhibit a substantial demand for training in the prevention of medical device-related pressure injuries (MDRPIs), as indicated by a high training needs score of (45.23 ±8.45) and a scoring rate of 82.2%. This level of demand is notably higher than that reported by Gu Suli and colleagues [21], underscoring the nurses' recognition of the significance of MDRPI prevention and their proactive engagement in furthering their knowledge in this area.

To address this demand effectively, nursing administrators should design and implement targeted training programs that align with the clinical nurses' needs. The survey identified age, professional title, years of experience, hospital grade, and position as significant factors influencing the training demand scores. Consequently, it is essential to tailor training initiatives to accommodate the diverse needs and levels of expertise among the nursing staff.

By considering the personnel characteristics, knowledge structures, working capabilities, and technical proficiency at each level, targeted training can facilitate early identification and prevention strategies, thereby reducing the incidence of stress injuries [22]. This approach not only optimizes the utilization of human resources but also enhances the effectiveness of training, ensuring that nurses are well-equipped to provide quality care and reduce the risk of MDRPIs in the operating room setting.

Influential Factors on Knowledge and Training Needs for MDRPI Prevention Among Operating Room Nurses

The Impact of Hospital Grade on Knowledge and Training Needs

The findings from the multiple linear regression analysis indicate a correlation between hospital grade and the knowledge and training needs scores related to the prevention of medical device-related pressure injuries (MDRPIs). Specifically, nurses in tertiary hospitals demonstrated higher scores in both knowledge and training needs compared to their counterparts in secondary hospitals. This disparity suggests a relative deficiency in MDRPI prevention knowledge among operating room nurses in secondary hospitals, a finding that corroborates the survey outcomes reported by Wei Xiaojing and colleagues [4,20].

The higher scores in tertiary hospitals may be attributed to the concentration of superior educational and human resources, which affords these institutions greater opportunities for external communication and knowledge acquisition. Concurrently, the heightened training needs in tertiary hospitals reflect a proactive stance by nursing management in stress injury management, underscored by robust systems and organized educational initiatives.

In contrast, secondary hospitals often lag in information dissemination, lacking structured reporting mechanisms for stress injuries and exhibiting a weaker preventive consciousness. A survey cited [23] reveals that the prevalence of stress injuries among inpatients in secondary hospitals stands at 2.25%, surpassing the rate in tertiary hospitals. This statistic underscores the urgent need to enhance nursing management standards in secondary hospitals, with a focus on bolstering theoretical knowledge training for operating room nurses. Elevating their cognitive understanding of MDRPI prevention is essential to instill effective preventive practices.

Tertiary hospitals should leverage their resources to support secondary hospitals by establishing collaborative assistance mechanisms, facilitating knowledge transfer from centralized to peripheral healthcare settings. Additionally, governmental support is crucial in augmenting educational resources, diversifying learning channels, and emphasizing the importance of online and broadcast-based training for operating room nurses in secondary hospitals. Such measures are pivotal in advancing the overall preparedness and competence of nursing staff in the prevention of MDRPIs.

The Influence of Age on MDRPI Prevention Knowledge Among Operating Room Nurses

The multiple linear regression analysis conducted in this study indicates a positive correlation between age and knowledge scores in MDRPI prevention, suggesting that increased age is associated with higher knowledge levels. This relationship can be attributed to the accumulation of clinical experience and knowledge that comes with time, enabling more experienced nurses to anticipate and preemptively address stress injuries [18]. In contrast, younger nurses, transitioning from academic to clinical settings, often grapple with the challenges of independent practice and the disparity between theoretical knowledge and its application. The swift evolution of medical knowledge can also leave them feeling unprepared, contributing to a relatively lower awareness and knowledge base in MDRPI prevention. Jin Lihong et al. [24] have demonstrated that targeted education and training can significantly enhance the professional knowledge of nursing staff, consequently reducing the prevalence of stress injuries.

The Impact of Professional Title on Training Demand for MDRPI Prevention

The regression analysis further revealed an inverse relationship between the professional title of nurses and their training demand scores for MDRPI prevention, with higher professional titles correlating to lower training needs. The hierarchical management system classifies nurses based on diverse criteria, including educational background, experience, competencies, certifications, academic qualifications, professional training, and performance, establishing a structured framework for advancement [25]. This system, through promotion and incentives such as salary increases or academic recognition, fosters greater work engagement and core competencies among nurses, thereby elevating the quality and satisfaction of nursing care.

Nurses with advanced professional titles typically possess extensive work experience and a wealth of knowledge, which enhances their ability to assimilate new information. Conversely, nurses at lower professional levels, with limited clinical exposure and experience, often seek intensive training to refine their technical skills and adapt to the dynamic healthcare environment. These nurses require comprehensive skill development to effectively manage the challenges associated with their evolving professional roles [22]. Consequently, tailored training programs are essential to equip nurses at all levels with the necessary knowledge and skills to prevent MDRPIs effectively.

Analysis of Clinical Practices for Preventing Medical Device-Related Pressure Injuries (MDRPI) Among Operating Room Nurses

The questionnaire analysis revealed that the knowledge base of operating room nurses concerning medical equipment-related stress injuries is predominantly derived from practical experience and peer-to-peer communication. The most beneficial modes

of learning identified were on-site mentorship and immersive educational programs or training sessions. Key barriers to engaging in continuous professional education included staffing shortages within the unit, heavy workloads, insufficient financial support for educational pursuits, and a dearth of comprehensive training materials and courses.

Currently, the principal obstacles to effective nursing practice in the prevention of MDRPIs are identified as a scarcity of pertinent knowledge and training, coupled with a general shortage of nursing staff. This clinical practice analysis indicates that the primary impediment to nurses acquiring MDRPI prevention knowledge is the lack of targeted training. The majority of nurses rely on routine stress injury prevention methods rather than adhering strictly to evidence-based guidelines and recommended procedures, highlighting a disconnect between the best available evidence for DRPI prevention and actual clinical practice.

Enhancing education and training is crucial to bridge this gap and can significantly bolster nurses' understanding and preventive capabilities [26]. It is recommended that leaders in operating rooms diversify training content and methodologies, ensuring that medical knowledge is updated promptly. Practical workshops, in-person lectures, video tutorials, and courseware sharing should be employed to deliver training that is directly applicable to clinical scenarios. By integrating training with real-world practice, analyzing clinical case studies, and drawing on collective experience, nurses can be better equipped to perform their duties and reduce the occurrence of MDRPIs.

Study Limitations

The present study utilized a convenient sampling technique, which, while practical, may have resulted in a limited sample size and is subject to regional constraints. This approach could potentially introduce biases that are inherent to the specific demographics and settings of the sampled hospitals. Future research endeavors should aim to broaden the scope of the study population to encompass a more diverse and representative sample. By doing so, a more comprehensive understanding of the various factors influencing MDRPI prevention knowledge and training needs among operating room nurses can be achieved, thereby enhancing the generalizability of the findings.

Conclusion

The study reveals that while operating room nurses possess a moderate level of understanding regarding the prevention of medical device-related pressure injuries (MDRPIs), there is clear room for enhancement. The knowledge scores, averaging at 30.63, suggest a need for more comprehensive educational programs to bolster nurses' theoretical grasp of MDRPI prevention. The high training demand scores, with an average of 45.23, indicate a strong willingness among nurses to engage in learning opportunities that could equip them with the necessary skills to mitigate the risk of MDRPIs.

The findings also underscore the influence of hospital grade, gender, and age on the nurses' knowledge levels, suggesting that these factors should be considered when designing training programs. Notably, the higher training demand among nurses in higher-grade hospitals and those with lower professional titles points to the importance of targeted educational initiatives that address the specific needs of different groups.

In conclusion, this study advocates for a more nuanced approach to nurse education, where training is tailored to the unique circumstances and requirements of operating room nurses. By doing so, it is anticipated that the implementation of such targeted training will lead to a significant reduction in the incidence of MDRPIs, thereby improving patient outcomes and optimizing the utilization of healthcare resources. The study's findings serve as a call to action for nursing management to prioritize education and training in the prevention of MDRPIs, ensuring that nurses are well-equipped to safeguard patient health and contribute to the overall quality of care in operating room settings.

Acknowledgments

The author extends heartfelt gratitude to all individuals who have offered support and assistance throughout the development of this thesis. Particular recognition is due to colleagues and fellow researchers for fostering an environment that is both intellectually engaging and collaborative. Their spirit of camaraderie and unwavering support have been instrumental in transforming the research journey into a profoundly enjoyable and enriching experience.

Declaration

The author hereby declares that there are no conflicts of interest, financial or otherwise, related to the research presented in this thesis.

References

1. Deng Xin, Lv Juan, Chen Jiali, et al. (2016) Interpretation of the latest guidelines for pressure ulcers in 2016 [J]. West China Medicine. 31: 1496-1498.
2. The National Pressure Ulcer Advisory Panel-NPUAP (2016) National Pressure Ulcer Advisory Panel (NPUAP) announces a change in terminology from pressure ulcer to pressure injury and updates the stages of pressure injury.
3. Mai Miao, Huang Yuyuan, Lu Yu feng (2023) Research progress of ICU nurses' knowledge, attitude and practice about medical device-related stress injury [J]. Evidence-based Nursing. 9: 4253-4257.

4. Wei Xiaojing, Yan Fan, Jing Mengjuan, et al. (2020) Investigation on knowledge, attitude and practice of ICU nurses to prevent medical device-related stress injury [J]. Chinese Journal of Nursing. 55: 45-50.

5. Deng Meijie, Gu Ying, Li Weiren (2020) Status and influencing factors of ICU nurses' knowledge, attitude and practice about medical device-related stress injury [J]. Journal of Nurse Training. 35: 1073-1079.

6. Zhao Xiurong, Yang Yufen (2021) The influence of individualized preventive nursing program on pressure injury related to medical devices in operating room [J]. Journal of Nursing Science International, 40: 4334-4337.

7. Cheng Caihong (2020) Application effect of predictive nursing in preventing pressure injury related to medical devices in operating room [D]. Jinzhong: Shanxi University of Traditional Chinese Medicine.

8. Cuaycong MG, Flynn Makic MB (2023) Preventing medical device-related pressure injuries[J]. J Perianesth Nurs 38: 664-666.

9. Pittman J, Gillespie C (2020) Medical device-related pressure injuries [J]. Crit Care Nurs Clin North Am, 32: 533-542.

10. Li Jia (2016) Cause analysis and countermeasures of 2 cases of pressure ulcers related to medical devices in neurosurgery [J]. World's Latest Medical Information Abstracts. 16: 306-307.

11. Zou aiguo (2020) Analysis of the causes of pressure injuries related to medical devices in neurosurgery and its countermeasures [J]. Contemporary Nurses. 27: 150-152.

12. Yao Sha, Tang Xurong, Zhou Rong, et al. (2020) Analysis of characteristics and influencing factors of medical device-related pressure injury in children during operation [J]. Nursing of Integrated Traditional Chinese and Western Medicine. 6: 124-126.

13. Peng Shunping, Xie Yanli, Zhang Li, et al. (2016) Cause analysis and nursing countermeasures of medical device-related pressure sore in gynecological endoscopic surgery [J]. General Nursing.14: 2015-2017.

14. Hu Yilan (2019) Investigation and analysis on the knowledge and training needs of nurses in comprehensive ICU about medical device-related stress injuries [D]. Yangtze University.

15. Mai Miao, Huang Yuyuan, Lu Yufeng (2023) Research progress of ICU nurses' knowledge, attitude and practice on medical device-related stress injury [J]. Evidence-based Nursing. 9: 4253-4257.

16. Shen Zhuping, Qian Qingqing, Lareina C, et al. (2024) Status quo and influencing factors of knowledge, attitude and practice of nurses in operating room to prevent pressure injuries related to medical devices [J]. Zhejiang Medical. 46: 957-960.

17. Cheng Shouzhen, Gao Yingxue, Guo Zhidong, et al. (2018) Investigation on nurses' nursing knowledge and attitude towards pressure injury in bed patients [J]. Chinese Journal of Nursing. 53: 837-840.

18. Zhang Juanjuan, Chen Xiaojing, Yang Yuanping (2022) Investigation on the status quo of knowledge, attitude and practice of nurses in operating room to prevent medical device-related stress injury [J]. Evidence-based Nursing. 8: 2391-2394.

19. National Health and Wellness Commission (2022) Notice of the General Office of the National Health and Wellness Commission on Printing and Distributing the National Medical Quality and Safety Improvement Target in 2022 [EB/OL].

20. Wang Xiangxiang, Song Haizhen, Sun Xiumei (2018) Qualitative research on ICU nurses' cognition of medical device-related stress injury [J]. Qilu Nursing Journal. 24: 45-47.

21. Gu Suli, Zhang Lingling, Li Lili, et al. (2024) Investigation and analysis of ICU nurses' knowledge and training needs on preventing pressure injuries related to medical devices [J]. Evidence-based Nursing. 10: 2588-2592.

22. Lin Haiyan, He Moli, Yang Ke, et al. (2017) Early identification and nursing of acute thrombosis after coronary stenting [J]. Journal of Wenzhou Medical University. 47: 538-540.

23. Hui Lin, Liu Yilan, Wang Wei (2014) Cross-sectional survey on the prevalence rate of pressure ulcers among inpatients in secondary hospitals and analysis of related factors [J]. Contemporary Nurses (Journal of the Middle School). 2014: 104-106.

24. Jin Lihong, Chen Yuanyuan, Zou Jihua, et al. (2022) Homogenization training of stress injury nursing for contact nurses in primary hospitals of medical association [J]. Journal of Nursing Science. 37: 65-68.

25. Li Mingzi (2022) Mirror of hierarchical management of nurses [J]. China Health Talents. 2022:53-56.

26. Li Bei, Chen Hong, Yuan Ding, et al. (2024) Summary of the best evidence for the prevention of equipment-related stress injury in operating room [J]. journal of nursing science. 39: 56-60.