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Enhance Staff Nurses' Proficiency And Knowledge In Wound Assessment And Management Using The NERDS & Stones Technique

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Abstract:
Aim: *This study aims to enhance the knowledge and proficiency of staff nurses in wound assessment and management using the NERDS & STONES technique through targeted educational interventions and hands-on training.*
Methods: *A quasi-experimental, one-group pre-and post-test design was used. A total of 89 registered nurses from one hospital in Saudi Arabia participated in the study. The intervention consisted of lectures, hands-on workshops, and case study discussions. Pre- and post-intervention data were collected using the Wound Care Knowledge Assessment Tool, which measured nurses' knowledge of wound assessment and infection identification. Paired-sample t-tests were conducted to compare pre-and post-intervention scores.*
Results: *The results showed a significant improvement in nurses' wound care knowledge after the educational intervention using the NERDS & STONES technique. The pre-intervention mean score was 4.44 (SD = 1.74), which increased to 5.98 (SD = 2.13) post-intervention, with a mean difference of -1.54 (SD = 3.12). A paired t-test revealed a statistically significant increase in knowledge ($t = -4.66$, $p < 0.001$). The effect size, as measured by Cohen's d, was 0.494, indicating a medium effect of the intervention.*
Conclusion: *The educational intervention using the NERDS & STONES technique significantly improved nurses' wound care knowledge, demonstrating the effectiveness of targeted training. These findings highlight the importance of structured educational programs in enhancing clinical skills and promoting better patient care outcomes.*
Keywords: *Educational intervention, NERDS & STONES technique, Staff nurses, Wound care knowledge.*

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I. Introduction

Wound care is a critical aspect of nursing practice that requires a high level of proficiency and knowledge (Obilor et al., 2021). Effective wound assessment and management are essential for promoting healing, preventing complications, and ensuring optimal patient outcomes (Oliveira et al., 2022). Despite the availability of various wound care guidelines, many nurses face challenges in accurately assessing and managing wounds, particularly when distinguishing between infection and inflammation (Hampton et al., 2023). The NERDS & STONES technique, a clinical tool for identifying superficial and deep wound infections, has emerged as a valuable resource for enhancing nurses' ability to recognize infection-related symptoms and guide appropriate management strategies (Swanson et al., 2022). However, there is a gap in the proficiency and knowledge of staff nurses in applying this technique in clinical settings (Curtis, 2020).

The purpose of this study is to enhance staff nurses' proficiency and knowledge in wound assessment and management using the NERDS & STONES technique. By implementing targeted educational interventions and practical training, this study aims to improve nurses' wound care skills, reduce the occurrence of wound-related complications, and ultimately improve patient care outcomes.

Background

Despite advancements in wound care technologies, infection control protocols, and clinical guidelines, the accurate assessment and management of wounds remain critical challenges in healthcare settings (Falcone et al., 2021). Wound infections, whether surgical or chronic, are associated with prolonged hospital stays, increased healthcare costs, and decreased patient quality of life (Barakat-Johnson et al., 2022). The integration of specialized wound assessment techniques, such as the NERDS & STONES framework, has proven essential in distinguishing

between superficial and deep wound infections, allowing for timely interventions and optimized healing outcomes (Curtis, 2020).

Nurses play a pivotal role in wound management; however, many lack the training and proficiency required for effective wound assessment, especially in detecting early signs of infection (Gillespie, Chaboyer, Kang, et al., 2014). The NERDS (Non-healing, Exudate, Red and bleeding, Debris, and Smell) and STONES (Size increasing, Temperature, Os probe to bone, New satellite areas, and Exudate) techniques provide a systematic approach for nurses to identify superficial and deep infections (Swanson & Angel, 2022).

Wound infections are a significant concern in healthcare, contributing to morbidity, extended hospital stays, and an increase in healthcare expenditure. Surgical site infections (SSI) alone affect between 2% to 5% of surgeries in the United States, accounting for hospital costs exceeding $1 billion annually. In Europe, the incidence ranges from 1.5% to 20%, with an estimated economic burden of €1.5–19 billion (Gillespie, Chaboyer, Kang, et al., 2014). These statistics highlight the critical need for effective wound management strategies to reduce infection rates and improve patient outcomes.

Wound care involves both clinical expertise and adherence to evidence-based guidelines. Numerous international guidelines, such as those from the Centers for Disease Control and Prevention (CDC) and the National Institute for Health and Care Excellence (NICE), provide recommendations for managing wounds in the pre-, intra-, and postoperative phases. Despite these guidelines, variability in wound care practices remains prevalent, particularly in wound assessment and documentation (Gillespie, Chaboyer, Allen, et al., 2014). Research indicates that wound care practices often deviate from established protocols, leading to delayed interventions and increased risks of complications (Gillespie et al., 2020).

The NERDS & STONES technique is designed to provide a standardized method for assessing wound infections. NERDS criteria focus on superficial wound infections, while STONES targets deep infections. By applying this structured approach, nurses can more accurately assess wounds, leading to better decision-making and patient care (Olutoye et al., 2024). However, knowledge gaps exist among staff nurses regarding the use of these techniques, necessitating focused educational interventions.

Effective wound management requires not only the identification of infections but also an understanding of various risk factors associated with wound healing (Tayyib & Ramaiah, 2021). These include patient-related factors, such as age, obesity, malnutrition, and comorbidities, as well as surgery-related factors, such as the complexity of the procedure, duration, and presence of surgical drains (Kanakaris et al., 2022). The NERDS & STONES technique is particularly useful in addressing these risk factors by offering a clear framework for wound assessment (Parrish & Barrett, 2020).

Given the crucial role of nurses in wound care, educational interventions that focus on enhancing their knowledge and proficiency are essential. Training programs that integrate theoretical knowledge with practical skills, such as hands-on workshops and case study discussions, have been shown to improve clinical competencies in wound care (Kielo-Viljamaa et al., 2022). By equipping nurses with the tools to apply the NERDS & STONES technique, healthcare organizations can reduce the incidence of wound infections, improve patient outcomes, and ensure more efficient use of resources (Curtis, 2020).

Clinical guidelines for preventing wound infections emphasize a comprehensive approach across the preoperative, intraoperative, and postoperative phases of patient care. In the preoperative phase, it is recommended that hair removal should be performed using clippers or depilatory creams rather than razors, as this reduces the risk of micro-abrasions that can lead to infections (Peden et al., 2021). Antibiotic prophylaxis is critical, with a single intravenous dose administered during the induction phase, particularly for clean surgeries involving implants or contaminated procedures. A holistic patient assessment, including their medical history and current condition, should be conducted, ensuring both the patient and caregivers are informed about wound management strategies (Gillespie, Chaboyer, Kang, et al., 2014).

Postoperatively, wound assessment should be tailored to the patient's individual risk factors, using either aseptic or clean techniques. If an is suspected, such as in the presence of cellulitis, appropriate antibiotics should be administered. Incision management is also crucial—dressings should be left intact for at least 48 hours, during which sterile saline should be used to cleanse the wound, with tap water becoming appropriate after the initial 48 hours (Schwartzman & Khachemoune, 2021). Additionally, interactive dressings, rather than traditional methods like saline-soaked gauze, are recommended for wound debridement to promote healing. Furthermore, documentation of wound care, including regular assessments, environmental conditions, and a care plan, is vital for ensuring a collaborative, multidisciplinary approach to patient care and effective wound management (Kielo-Viljamaa et al., 2022).

In addition to these general guidelines, the NERDS & STONES technique offers a more targeted approach for assessing wound infections. NERDS is used to identify signs of superficial wound infection, including Non-healing, Exudate, Red and bleeding tissue, Debris, and Smell (Olutoye et al., 2024). These indicators guide nurses in recognizing early infection and implementing appropriate treatments. STONES, on the other hand, helps assess deep tissue infections, focusing on Size increase, Temperature elevation, Os probe to

bone, New satellite areas, and Exudate. This approach provides a structured framework for nurses to accurately assess wound conditions and intervene early to prevent further complications (Swanson et al., 2022).

By incorporating NERDS & STONES into routine wound care practices, nurses can improve their ability to identify infection risks and apply evidence-based interventions (Swanson & Angel, 2022). Educational interventions, such as hands-on workshops and case-based learning, can further enhance staff nurses' knowledge and confidence in using this technique, leading to improved patient outcomes (Sapri et al., 2022).

Research aim

The aim of this study is to evaluate the effectiveness of an educational intervention in enhancing the knowledge and proficiency of staff nurses in wound assessment and management using the NERDS & STONES technique.

Research Questions

1- Does an educational intervention improve staff nurses' knowledge and proficiency in wound assessment and management using the NERDS & STONES technique?

II. Methods

Study Design

This study utilized a quasi-experimental, one-group pre- and post-test design to evaluate the effect of an educational intervention on the knowledge and proficiency of staff nurses in wound assessment and management using the NERDS & STONES technique. A structured questionnaire was distributed among nurses from one hospital. The intervention aimed to enhance the participants' wound care skills, particularly in identifying superficial and deep infections.

Sampling and Setting of the Study

The study was conducted in one hospital: King's College Hospital London-Jeddah in Saudi Arabia. The participants included all 89 registered staff nurses, aged 18 to 60, working in the inpatient departments of these hospitals. The inclusion criteria required participants to be currently employed as staff nurses in inpatient departments, aged between 18 and 60, and willing to participate in the educational intervention by providing informed consent. Nurses who met these criteria were included in the study.

Instrument

1-The demographic characteristics form: this form collected from the participants included gender, age, educational background, previous wound care training, and years of experience in wound management.

2-The Wound Care Knowledge Assessment Tool (WCKAT): this tool was developed by researchers based on an extensive review of the literature. It covered topics related to wound assessment, infection identification, and the NERDS & STONES technique, drawing on research from various sources (Barakat-Johnson et al., 2022; Curtis, 2020; Falcone et al., 2021; Gillespie et al., 2020; Kanakaris et al., 2022; Obilor et al., 2021). The tool consists of 17 items, with total scores ranging from 0 to 17. Higher scores indicate greater knowledge of wound care among nurses.

Procedure

At the beginning of the study, all participants were thoroughly briefed on the purpose of the research, and their participation was entirely voluntary. They were assured that they could withdraw at any time, and data confidentiality was emphasized. Informed consent was obtained before the distribution of the pre-intervention questionnaire. The pre-intervention phase involved gathering demographic data, and evaluating nurses' baseline knowledge of wound care.

The educational intervention, designed based on the participants' needs, was implemented over a two-week period. The intervention included lectures, hands-on workshops, and case study discussions on the NERDS & STONES technique. After completing the training, participants were administered the same tools to evaluate any improvement in their knowledge. Baseline data were compared to post-intervention data to assess the impact of the training.

Intervention

The educational intervention was designed to improve nurses' wound care knowledge and skills, with a particular focus on the NERDS & STONES technique for identifying wound infections. The intervention consisted of:

Lecture Sessions: Covering wound assessment, classification of infections, and the application of the NERDS & STONES technique.

Hands-on Workshops: Practical sessions where nurses practiced wound assessment, dressing, and infection management on simulated cases.
Case Study Discussions: Real-world case scenarios were discussed to apply theoretical knowledge to clinical practice.

The intervention was facilitated by the researcher who is a clinical educator in the participating hospital. Training sessions were conducted twice a week, each lasting two hours, over a two-week period.

Ethical consideration

This study was conducted in accordance with ethical guidelines for research involving human participants. Prior to the commencement of the study, approval was obtained from the hospital participating. All participants were provided with detailed information about the study's purpose, procedures, and potential risks and benefits.

Participation in the study was voluntary, and all participants gave informed consent before enrolling. They were assured that their participation was confidential and that they could withdraw from the study at any time without any repercussions. Data collected from participants was anonymized to ensure confidentiality, and no identifying information was included in the analysis or reporting of the results.

Furthermore, the educational intervention posed minimal risk to participants, as it consisted of standard training in wound assessment and management. The rights and dignity of all participants were upheld throughout the study, and any concerns raised by the participants during the process were addressed promptly.

III. Data Analysis And Statistical Consideration

SPSS version 27.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. A p-value of less than 0.05 was considered statistically significant. Descriptive statistics, such as means, standard deviations, and percentages, were used to summarize the demographic characteristics of the participants. Paired-samples t-tests were performed to compare pre- and post-intervention scores on the WCKAT and WMSPS. Additionally, categorical variables were expressed as numbers and percentages, and the effects of the intervention were analyzed using these pre- and post-training scores. The effect size, represented by Cohen's d, measures the magnitude of the difference between the pre-and post-intervention scores in the study (small: 0.2, medium: 0.5, large: 0.8; Cohen, 1988).

IV. Result Of The Study

Participants characteristics

Table 1 presents the demographic characteristics of the 89 nurses included in the study. The average age of the participants was 37.69 years (SD = 8.84). The majority of the participants were female, comprising 70.8% (n = 63) of the sample, while 29.2% (n = 26) were male. In terms of academic qualifications, most of the nurses (94.4%, n = 84) held a bachelor's degree, while only 5.6% (n = 5) had a master's degree. The mean years of experience in wound management was 5.23 years (SD = 3.22). Regarding previous wound care training, only 9% (n = 8) of the participants reported having received such training, while 91% (n = 81) indicated they had not received any prior wound care training.

Table 1. Thee demographic distribution of the nurses included in the study *(N= 89)*

Items	N	%
Age (years)		
Mean ±SD (37.69 ±8.84)		
Gender		
Male	26	29.2
Female	63	70.8
Academic qualification		
Bachelor's degree	84	94.4
Master's degree	5	5.6
Years of experience in wound management (years)		
Mean ±SD (5.23 9 ± 3.22)		
Previous wound care training		
Yes	8	9
No	81	91.0

SD: standard deviation

Wound Care Knowledge Scores Pre- and Post-Intervention Using NERDS & STONES Technique

Table (2) presents the pre-and post-intervention wound care knowledge scores among 89 staff nurses using the NERDS & STONES technique. The pre-intervention mean score was 4.44 (SD = 1.74), with a 95% confidence interval (CI) of 4.07 to 4.80. Following the intervention, the post-intervention mean score increased

to 5.98 (SD = 2.13), with a 95% CI of 5.53 to 6.42. The mean difference between the pre- and post-intervention scores was -1.54 (SD = 3.12), with a 95% CI ranging from -2.20 to -0.88.

The t-test results indicated a significant improvement in wound care knowledge following the intervention ($t = -4.66$, $p < 0.001$). The effect size, measured using Cohen's d, was 0.494, indicating a medium effect of the educational intervention on nurses' knowledge.

Table (2). Wound Care Knowledge Scores Pre- and Post-Intervention Using NERDS & STONES Technique *(N= 89)*

Wound Care Knowledge Scores	Mean (SD)	95% CI	t	P value	Effect size
Pre, mean (SD)	4.44 (1.74)	(4.07, 4.80)	-4.66	<0.001	0.494
Post, mean (SD)	5.98 (2.13)	(5.53, 6.42)			
Pre–post difference, mean (SD)	-1.54 (3.12)	(-2.20, -0.88)			

V. Disscussion

This study aims to enhance the knowledge and proficiency of staff nurses in wound assessment and management using the NERDS & STONES technique through targeted educational interventions and hands-on training. This study demonstrated that the knowledge of wound care among staff nurses significantly improved following an educational intervention based on the NERDS & STONES technique. The results showed that the mean wound care knowledge score increased from 4.44 (SD = 1.74) pre-intervention to 5.98 (SD = 2.13) post-intervention, indicating a meaningful improvement in knowledge.

This study highlights the effectiveness of structured educational interventions in improving nurses' wound care knowledge. It demonstrates that using evidence-based techniques such as the NERDS & STONES framework can significantly enhance nurses' ability to identify and manage wound infections. The study also provides a foundation for future educational programs in wound care, emphasizing the need for ongoing training and assessment to ensure sustained proficiency among nursing staff.

The significant increase in post-intervention scores compared to pre-intervention scores aligns with findings from Dung and Tung (2020), which showed that nurses' wound care-related knowledge improved even 12 months after training. Additionally, this is in congruence with previous studies, such as El-Gazar et al. (2023)., that emphasized the effectiveness of targeted educational interventions in enhancing nurses' clinical knowledge. These consistent findings across various studies support the value of structured, evidence-based training programs in improving clinical competencies, particularly in specialized areas like wound care.

The findings suggest that integrating similar educational interventions into routine staff development programs may help bridge knowledge gaps in wound care and improve overall patient care outcomes. Additionally, the study underscores the importance of tailoring educational programs to the specific needs of healthcare staff, ensuring that training content is relevant and applicable to clinical practice.

VI. Conclusion

In conclusion, the educational intervention based on the NERDS & STONES technique significantly improved the wound care knowledge of nurses in this study. The medium effect size suggests that the intervention was effective, although further improvements may be achieved with additional training elements. This study provides evidence that targeted educational interventions can enhance clinical knowledge in key areas of patient care, such as wound assessment and management, contributing to better healthcare outcomes.

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