

In Hospitalized Patients, How Effective Is a Foam Dressing in Reducing the Risk of Pressure Ulcers Compared with Standard Preventative Care

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Abstract: *Background:* Pressure ulcers (PU) are to point to the necrosis or ulcer that local skin or organization causes because of various reasons. This is the last thing a health care worker wants to happen in a medical setting. The occurrence of pressure ulcers would cause the patients' body infection, affect recovery, and then prolong the hospital stay, increase the national medical investment. If patients do not intervene in time, serious consequences such as death may result. Since pressure ulcers occur mainly in prominent areas of the body, studies have recommended prophylactic use of dressings to reduce the incidence of PU. Current prevention measures for PU include assessing factors associated with avoiding skin damage, regulating nutrient intake and using pressure relief pads. *Objective:* As one of the main materials of pressure relief pad, foam dressing has been gradually applied and promoted. Whether foam dressing is effective in preventing pressure ulcers is a very important issue for patients and medical staff. Finding effective measures to prevent PU can not only improve the quality of care, reduce patients' suffering, but also reduce medical costs. Therefore, guided by evidence-based theory, it is important for caregivers to use the most effective clinical decisions to prevent pressure ulcers and improve patient outcomes. *Method:* In this paper, 5 studies related to foam dressing were conducted to confirm whether it is safe and effective for the prevention of pressure ulcers, which can further promote the rational selection of clinical prevention measures. *Result:* All five studies included in the analysis showed that foam dressings had a positive effect on the prevention of stress injuries. *Conclusion:* Foam dressings are effective in preventing pressure ulcers. It is suggested that the relevant personnel should strictly choose the materials that meet the requirements when using dressings and train the users on the key points of the application process in advance.

Keywords: Foam Dressing, Pressure Ulcers, Standard Preventative Care

1. Introduction

In medical activities, pressure ulcers are widely considered as the least desirable event [1]. At the same time, in the latest skin disease research, pressure ulcers have been listed as the highest disability factor [2]. Pressure ulcers (PU) refer to local tissue, skin or subcutaneous soft tissue long-term compression, continuous ischemia and hypoxia, malnutrition caused by tissue ulceration and necrosis [3, 4]. PU usually occurs in places where the bones protrude, such as the sacrococcygeal region or the heel. PU may cause

infection of patients' body parts, prolong hospitalization time and increase national medical investment. If people did not intervene in time, serious cases may cause death. Many factors can promote the occurrence of PU, for example, age [5], skin aging and malnutrition [5]. PU is characterized by pain, difficult to cure, great impact on patients, serious cases will cause death. The protruding part of the bone is often affected by friction and shear force, which makes it a common site for PU. Therefore, some studies suggest the preventive use of dressings to reduce the incidence of PU [6].

The current preventive measures for PU include assessing skin conditions, assessing relevant risk factors, regulating nutrition and water intake, protecting skin and using decompression pads [7]. The wound care products such as foam dressing are also gradually applied and promoted [8, 9]. To explore effective measures to prevent PU could not only improve the quality of life of patients, but also improve the quality of care and reduce medical costs [4]. Therefore, it is particularly important for nurses to make correct and effective clinical decisions to prevent pressure sores and improve patient outcomes under the guidance of evidence-based theory.

Initially, evidence-based medicine was seen as a clear and serious attempt to find the best available research evidence to help health professionals make the best decisions for their patients [10]. According to the latest concept, evidence-based practice not only needs professional knowledge, but also integrates the information obtained from patients and their families and makes wise clinical decisions in combination with the practice environment of medical workers [10]. The way to prevent PU in our country is to keep the skin dry, turn over regularly, use decompression pad and foam dressing [1]. Effective measures to prevent PU could be replicated and applied in daily nursing activities, but the preventive measures based on the best evidence are not clear. Therefore, the author searched the related literature of foam accessories to reduce the risk of PU. Through literature quality evaluation and the best evidence summary and learned lessons from those projects, so as to provide references for medical staff to prevent PU effectively.

2. Materials and Methods

2.1. Problem Establishment

This study applied PICO model to construct evidence-based problem: In hospitalized patients how effective is a foam dressing in reducing the risk of pressure ulcers compared with standard preventative care? In this study, the population was defined as patients in the hospital who at risk of pressure ulcers. The intervention is using foam dressing. The comparison was patients with standard preventive care. The author found that the outcome was effective in preventing pressure ulcers using foam dressing.

2.2. Search Strategy

A search strategy was established with the limitation of PubMed, Up to Date, CINAHL and Web of Science database. The date was limited to 2015-2020 and the key words were foam dressings, preventing and pressure ulcer. Search results were also limited to English language and peer reviewed. Boolean search terms were built and used by PubMed to search for studies that meet Pico issues and date constraints.

2.3. Evidence Criteria

Inclusion criteria: the contents of the study were pre- and

post-intervention studies, randomized controlled design studies, cross-sectional studies and quasi experimental studies on the effect of foam accessories on pressure ulcers. The types of evidence were evidence summary, clinical decision-making, systematic review and clinical practice guidelines in recent five years.

Exclusion criteria: studies with unclear target population and research measures.

3. Result

3.1. Results of Literature Inclusion

By searching four databases, 268 articles were obtained. After eliminating the repetitive articles and screening through the title, after reading the abstract, the author studied the full text of the remaining articles in detail, and finally included five articles for research [11-15]. The five selected studies were RCTs. Through literature review, the author comprehensively evaluated the effect of foam accessories on reducing the risk of pressure ulcer. To measure its effectiveness, the author used two outcome variables: the incidence of pressure ulcers and the total number of pressure ulcers. The standard use of foam dressings includes the use of skin conditions. At the same time, it also includes regular observation and intervention. The best evidence is summarized as early identification and evaluation, selection of appropriate dressings, timely measures and regular management and maintenance. The results show that in patients with high risk of pressure sores, timely use of foam dressing for skin protection could effectively reduce the incidence of pressure ulcers.

3.2. Selection of Evaluation Scale

The author used Critical Appraisal Skills Programme (CASP, 2020) by Oxford Centre for Triple Value Healthcare to evaluate the selected studies. All the five studies are RCT, so the CASP sub scale, Randomized Controlled Trial Standard Checklist (2020) is selected for systematic evaluation. There are 11 items in the evaluation tool, including the validity evaluation of basic research, the rationality of research methods, the evaluation of results and applicability of results. In the evaluation, it is necessary to think and confirm the record "Yes" "No" "Can't tell" in sequence.

3.3. Summary of Evidence

Two of the five articles included in the analysis were from Australia [11, 12]. The other three articles are from Germany [13], Italy [14] and Japan [15]. These five studies were based on the PICO model, and RCT was used to explore the effect of foam dressing on the prevention of pressure ulcers in a specific population. Finally, all studies got a positive answer. Several key points were found in this evidence-based study. Firstly, the target population was high-risk group of pressure ulcer, such as the elderly and vulnerable skin. Secondly, we need to choose the dressing with effective material and

structure. Finally, the use process needs timely maintenance and intervention.

4. Discussion

These studies clearly pointed out that the intervention to participants was random and introduced the process of randomization in detail. Forni, et al. [14] used website www.randomization.com while the other four studies [11–13, 15]. The numbers were put in an opaque envelope, and the staff and participants were not aware of the contents. Keep the process rigorous to avoid the systematic deviation caused by the grouping problem of participants and lay the foundation for the success of the research.

In the study of Forni, et al. [14], two patients developed rashes due to dressing allergy but did not ask to withdraw. One patient asked to remove the dressing because it was intolerable, but the author did not report the follow-up results. In the [13] study, 17 participants in the intervention group and 13 participants in the control group were excluded because they could not seek informed consent. The other three studies [11, 12, 15] reported that there was no accident.

Forni, et al. [14] clearly showed that the use of foam dressings was the only difference between the two groups in the study, and none of the other factors would have a significant impact on the results of the experiment. The remaining four studies showed that the only intervention measures used were foam dressing for the experimental group, while standard prevention was used in the control group. However, no other unknown factors were reported if they could affect the results of the experiment. Especially in the study of Hahnel, et al. [13], the requirement of follow-up time is "at least once daily". This unclear follow-up time may lead to deviation of experimental results due to different intervention frequency.

The intervention effects of the 5 studies were clearly reported as positive, that is, the use of foam dressings can effectively reduce the incidence of pressure ulcers. The results were compared with the number and incidence of pressure ulcers. Because the sample size is between 288 and 600, it is impossible to report each result in detail, but the researchers used scientific statistical methods to test, and the report of P value represents that the study has statistical significance.

Through the comparison between the experimental group and the control group, the results of the 5 studies showed the positive effect of using foam dressing to prevent bedsore. Forni, et al. [14] in the study, three patients developed pressure sores, two of whom were in the experimental group. The researchers believe that the results may be due to its contingency, or it may be because the study population has young people and affect the results of the study. Therefore, Forni, et al. [14] called for more studies using rigorous methods to confirm the results.

The included studies have included several kinds of high-risk groups of pressure ulcer, such as elderly patients [12, 14], ICU patients [12, 13], patients with fragile skin [15], the

results of them are applicable to most kinds of patients most of the time. This could also be directly promoted and applied in the place where I work because the patients who may need this intervention are similar to those participants. The elder patients are prone to hip fracture due to fragile bone. Hip fracture has many complications, of which 8.8% - 55% patients will have pressure ulcer [12]. ICU patients are usually bedridden for a long time, unconscious and unable to turn over, so they are easy to form pressure sores. Patients with diarrheal and fragile skin are prone to pressure ulcer due to infection. At the same time, five studies focused on the pressure ulcer prone sites, namely sacral and heel. Forni, et al. [14] only studied sacral, while the other four studies included sacral and heel [11–13, 15].

Foam dressings used in the study are all multi-layered. The outer part is a layer of impermeable membrane, which can effectively avoid the entry of water and bacteria. The inner part is the material with absorption function, which can dissolve the exudate in time and keep the protected part dry. The thickness of the foam dressings can effectively prevent the skin from being hit by collisions. Therefore, it is necessary to choose the dressing with this characteristic when protecting the wound of patients. But the dressing needs extra cost, so we need to discuss the cost and benefit ratio. However, Forni, et al. [14] mentioned that this will be the next research topic.

Before using foam dressings, users should be trained to make clear their points for attention. It includes keeping skin clean and dry before use, regular follow-up during use, and timely replacement in case of moisture. The five studies included in the analysis mentioned that the interveners had received formal training before the experiment. The difference is that Forni, et al. [14] mentioned that the conventional period of validity of the dressing used is 7 days, and it can be repeatedly raised to assess the skin condition. It should be replaced in time before losing its stickiness to avoid affecting the skin condition of patients. In contrast, Hahnel, et al. [13], Santamaria, et al. [11], Santamaria, et al. [12] required the dressing to be changed every three days and no skin care products should be used in the study area. And, in case of any contamination or shedding, replace immediately. In the study of Oe, et al. [15], the period of validity of the dressing was not specified, but his requirement was daily evaluation and timely replacement in case of contamination or shedding.

The limitation of this study is that neither the researcher nor the participants are blind in the process of intervention because of the way of experiment. Whether in the intervention group, the control group or the researchers the use of foam dressing is visible to the naked eye. However, the project will not have an impact on the research results because the results are objective facts and will not be controlled by the participants or researchers' ideas.

5. Conclusion

In general, this study explored the best evidence that foam

foam dressing is effective in the prevention of pressure ulcers. To provide evidence for clinical use of foam dressing. It is suggested that the relevant personnel should strictly select the materials that meet the requirements when using the dressings and train the nursing staff on the key points of the use process in advance. Improve the quality of nursing and promote the health of patients. The current research focuses on the effectiveness of foam dressings and how to use them in a more standardized way but have not paid attention on its cost-effectiveness. In the future, it is suggested that the cost-benefit ratio should be defined while discussing the effectiveness of dressings.

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