



Original research article

# Nurses' knowledge of incontinence-associated dermatitis: the influence of a planned educational programme

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## Abstract

**Background:** The aim of the present study was to improve the knowledge of incontinence-associated dermatitis (IAD) among nurses who take care of hospitalised patients with faecal incontinence (FI).

**Methods:** This is a descriptive cross-sectional research study in which a design of one group before and after the testing was used to evaluate knowledge about IAD. The study included 60 nurses, and the IAD educational sessions lasted for about 60 minutes. They included topics that referred to the definition, prevention, and treatment of IAD. The McNemar test and Wilcoxon's matched-pairs test were used to test the differences in IAD knowledge among nurses.

**Results:** After the education sessions, nurses showed highly statistically significant better knowledge about FI and its influence on the occurrence of IAD, as well as the possibilities of prevention and treatment ( $p < 0.001$ ). The mean value of the total score on the knowledge test was significantly higher after the education ( $8.66 \pm 1.50$ ) than the mean value of the total score on the test before the education ( $6.82 \pm 1.50$ ).

**Conclusion:** It was found that nurses showed better knowledge in classification, risk factors, prevention, and treatment of IAD after education. It is necessary to continuously evaluate the knowledge of IAD among nurses to plan educational programmes, with the aim of providing better outcomes in patient treatment.

**Keywords:** Education; Faecal Incontinence; Incontinence-Associated Dermatitis; Nursing Care

## Introduction

The term faecal incontinence (FI) refers to the involuntary passing of liquid or solid stool, representing both a social and hygienic problem. Possible consequences of FI include: mild skin irritation, perianal dermatitis, reduced absorption of water in the digestive tract, infection spreading (*Clostridium difficile*, *Norovirus*), and sepsis. FI represents a major professional challenge for nurses and caregivers (Brown et al., 2020; Norton et al., 2010). Incontinence-Associated Dermatitis (IAD) is a specific type of irritant contact dermatitis. This type of dermatitis can cause pain, sleep disturbance, and discomfort in the patient. It also has a significant deteriorative effect on life quality, prolonged hospital stays, and the psychological well-being of patients (Beeckman, 2017). The IAD will develop in one to five out of 10 people with incontinence, representing a risk factor for pressure ulcers. Estimates of the prevalence of IAD vary depending on the type of health care facilities and patients – ranging from 6% to 50%. Some researchers point out that these variations are the result of insufficient reporting of IAD, since there is no code for IAD in the International

Classification of Diseases, Tenth revision (Kayser et al., 2021; Kottner et al., 2014).

Evidence-based practice helps the nurses to maintain patients' skin integrity. However, low knowledge level, negative attitudes, and inappropriate practice may seriously prevent the application of such practice in everyday work. The lack of timely application of adequate nursing interventions for the prevention or treatment of IAD often has a negative effect on the physical and psychological health of the patient (Tay et al., 2020).

The Ghent Global IAD Monitoring Tool (GLOBIAD) categorises IAD severity based on visual inspection of the affected skin areas. This scale classifies IAD based on the severity of the skin lesion and the difference in the presence of persistent redness (category 1) and the presence of skin loss (category 2). Both categories are further divided based on the absence (category A) and presence (category B) of clinical signs of infection (Beeckman et al., 2017; Van den Bussche et al., 2018).

Recognising the risk of hospital-acquired IAD can prevent complications, such as pressure ulcers and cross-infections, and also help to avoid the increased costs of treating these patients. Timely measures for the prevention of IAD improve the

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life quality of patients and reduce the length of hospital stay. Therefore, prevention and treatment of IAD are important nursing interventions (Şahin et al., 2019). If incorrectly classified by the nurses, IAD can seriously compromise the treatment outcome and the care of the patient. Therefore, it is necessary to evaluate the nurses' knowledge of IAD and address knowledge gaps to ensure optimal treatment of IAD (Tay et al., 2020). It is important to distinguish IAD from pressure ulcers and other dermatoses in the genital region. The differential diagnosis between pressure ulcers and IAD is complicated. However, all studies agree that education in this field brings good results (Kószó et al., 2019).

New medical devices can significantly help reduce the risk of IAD and pressure ulcers – and prevent the spread of hospital-acquired infections. Research has shown that the use of innovative devices in the care of patients with FI reduces the number of linen changes, wound dressing contamination, and the costs of personnel in charge of care (Ousey et al., 2010; Whiteley and Sinclair, 2014).

The aim of the present study was to improve knowledge of IAD among nurses taking care of hospitalised patients with FI.

## Materials and methods

### Design and sample

This is a descriptive cross-sectional research study in which a design of one group before and after the testing was used to evaluate knowledge about IAD. The study included 60 nurses employed at clinics for internal medicine, surgery, oncology, infectious diseases, and at intensive care units for treatment of adult patients at one university hospital in Banja Luka, Bosnia and Herzegovina. The data was collected in September and October 2020. Before the research began, the researchers informed the nurses about the primary study aim and the nurses signed the informed consent. The educational sessions about IAD lasted about 60 minutes. They were organised in the afternoon and on weekends to prevent obstructing the nurses' work assignments.

### Instrument

Each didactic session began with a pre-prepared PowerPoint presentation and a presentation of a case study. The IAD data collection instrument was designed after a literature review to provide scientific information. It was divided in two parts: the first part included sociodemographic information about the subjects, and the second part contained 20 statements with topics related to the definition and etiology of IAD (4), risk factors (6), classification and evaluation (4), and prevention and treatment (6). During the training, nurses were introduced to the medical device for temporary management of faeces (Faecal Management System – FMS) in patients with involuntary diarrhoea, Flexi-Seal™ SIGNAL™ (Convatec Inc, USA) (Convatec, 2012). The training of nurses for acquiring the skills of placing and removing Flexi-Seal™ SIGNAL™ was performed on the enema application model (Enema Administration Simulator LF00957U Instruction Manual, Life form®, Nasco, USA).

Before and after the training, the nurses completed tests to evaluate their level of knowledge about IAD. This required a maximum of 10 minutes. Nurses answered the questions by marking them: "true", "false", or "I do not know". All tests were encrypted to ensure data confidentiality and allow for the connection of the instrument during processing. The nurses received the test results on the same day to clarify any doubts about the content of the educational module.

### Statistical analysis

The data collected in the research were processed statistically in the software package IBM SPSS (Version 21; IBM Chicago, IL, USA). The method of descriptive statistics was used for the data processing. Data were presented as frequency and percentage for categorical variables, and mean value and standard deviation for continuous variables – depending on the distribution. The McNemar test and the Wilcoxon's matched-pairs test were used to test the differences in knowledge about IAD among nurses.  $\alpha$  level of 0.05 was considered statistically significant.

### Ethical considerations

The study was approved by the Ethics Committee for Research on Humans and Biological Material of the Faculty of Medicine of the University of Banja Luka (18/4/2020). Written consent was obtained from all the participants who took part in the study. All data collected were confidential and used only for this study.

## Results

This study was based on 60 professionals from the field of nursing who participated in the research. The age range of the subjects was from 19 to 60 years, and the average age was  $31.06 \pm 10.74$  years. The ratio of male to female subjects was 1 : 5.7. The subjects were employed as nurses/technicians. The average length of service of the subjects was  $9.00 \pm 10.63$  years. 70% of the subjects had a secondary vocational education, 23.3% had a bachelor's degree in nursing, and 6.7% had a master's degree in nursing. All of the subjects stated that they had not participated in any educational programs on the evaluation and prevention of IAD after graduation.

Before and after the education, there was no significant difference in knowledge about whether IAD was the name for skin damage caused by contact with urine or faeces. However, the percentage of correct answers to the questions related to the mechanisms for IAD occurrence was 58.3% and 68.3% on the pre-test and 90.0% and 96.7% on the post-test after the educational intervention, which was statistically significant ( $p < 0.001$ ) (Table 1).

Subjects showed statistically significantly higher knowledge about there being no necrotic tissue at the site of skin damage in IAD ( $p < 0.001$ ). 46.7% of the subjects knew this before the education, and that number increased to 86.7% after the education. In the pre-test, only 23.3% of the subjects knew that IAD is not often confused with stages 3 and 4 of pressure ulcers, and in the post-test that number significantly increased to 58.3% ( $p < 0.001$ ) (Table 2).

Table 3 shows that before the education, only 61.7% of the subjects knew that the risk factors for the occurrence of IAD included inadequate nutrition, poor personal hygiene, and insufficient physical activity. After the education, this number increased significantly ( $p < 0.001$ ) to 98.3%. In the pre-test, the percentage of correct answers to the question of whether the frequency of IAD was higher in FI than in urinary incontinence was 81.7%, and in the post-test that number was significantly ( $p < 0.001$ ) higher. Before and after the education, there was no difference in knowledge about steroid and chemotherapeutic agents being excreted in urine and faeces do not affect the occurrence of IAD.

Before the education, only 49 (81.7%) subjects knew that the treatment of incontinence required a patient assessment to determine the causes and treatment plan. After the educa-

**Table 1. Differences in nurses' knowledge pre-test and post-test about the definition and etiology of IAD**

Questions	Number of correct answers (%)		<i>p</i> -value (MN)
	Pre-test	Post-test	
IAD represents skin damage due to contact with urine or faeces	53 (88.3)	59 (98.3)	0.07
The most important reason for the occurrence of IAD is excessive moisture on the skin	35 (58.3)	54 (90.0)	<0.001
The bacteria in the skin contribute to IAD, the skin becomes more permeable	41 (68.3)	58 (96.7)	<0.001
The faeces contain enzymes that can damage the stratum corneum	41 (68.3)	58 (96.7)	<0.001

Notes: IAD – incontinence-associated dermatitis; MN – McNemar Test.

**Table 2. Differences in nurses' knowledge pre-test and post-test about IAD diagnostics**

Questions	Number of correct answers (%)		<i>p</i> -value (MN)
	Pre-test	Post-test	
There is no necrotic tissue at the site of skin damage in IAD	28 (46.7)	52 (86.7)	<0.001
IAD is often confused with stage 3 and 4 pressure ulcers	14 (23.3)	35 (58.3)	<0.001
Once IAD develops, the lesions do not have papules or pustules	37 (61.7)	42 (70.7)	0.001
Secondary skin infections such as candidiasis are common in IAD	49 (81.7)	59 (98.3)	0.002

Notes: IAD – incontinence-associated dermatitis; MN – McNemar Test.

**Table 3. Differences in nurses' knowledge pre-test and post-test about the risk factors for the occurrence of IAD**

Questions	Number of correct answers (%)		<i>p</i> -value (MN)
	Pre-test	Post-test	
Risk factors for the occurrence of IAD include: inadequate diet, poor personal hygiene, and insufficient physical activity	37 (61.7)	59 (98.3)	<0.001
Older age is an independent risk factor for the occurrence of IAD	31 (51.7)	57 (95.0)	<0.001
Steroid and chemotherapeutic drugs that are excreted through urine and faeces have no influence on the occurrence of IAD	28 (46.7)	40 (66.7)	0.129
Inadequate treatment of urinary and faecal incontinence contributes to the development of IAD	45 (75.0)	60 (100.0)	1.000
The frequency of IAD is higher in faecal incontinence than in urinary incontinence	49 (81.7)	59 (98.3)	0.002
Uncontrolled diarrhoea increases the risk of cross-contamination with <i>C. difficile</i>	49 (81.7)	59 (100.0)	1.000

Notes: IAD – incontinence-associated dermatitis; *C. difficile* – *Clostridium difficile*; MN – McNemar test.

tion, a significantly ( $p = 0.002$ ) higher number of subjects had knowledge of this information: 59 (98.3%) of them. Before and after the education, there was a difference in knowledge about the treatment of sensitive skin in the perianal area, the use of catheters for collecting urine and faeces preventing the

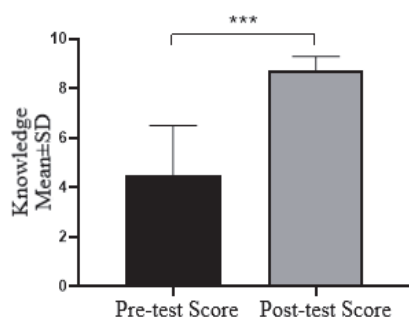
occurrence of IAD, and the medical device Flexi-Seal® FMS being used in patients with the inability to control bowel discharge and/or in those who have more liquid stools ( $p < 0.001$ ) (Table 4).

**Table 4. Differences in nurses' knowledge pre-test and post-test about the prevention and treatment of IAD**

Questions	Number of correct answers (%)		<i>p</i> -value (MN)
	Pre-test	Post-test	
Treatment of incontinence requires patient evaluation to determine the causes and establish a care plan	49 (81.7)	59 (98.3)	0.002
Sensitive skin is treated with silicone-based products and with a protective component (vaseline, zinc oxide, cyanoacrylates, etc.)	38 (63.3)	58 (96.7)	<0.001
The use of catheters for collection of urine and faeces prevents the development of IAD	31 (51.7)	57 (95.0)	<0.001
FMS is used in immobile patients with bowel incontinence and/or multiple loose stools	15 (25.0)	56 (93.3)	<0.001
The FMS is a closed system, designed to minimise the spread of CDI by holding faeces	39 (65.0)	59 (98.3)	<0.001
FMS may be used in patients who have had surgery of the lower part of the digestive tract ≤12 months	7 (11.7)	40 (66.7)	<0.001

Notes: FMS – Faecal Management System; IAD – incontinence-associated dermatitis; CDI – *Clostridium difficile* infection; MN – McNemar test.

Nurses showed highly statistically significant ( $p < 0.001$ ) better knowledge about FI and its impact on the occurrence of IAD, as well as the possibility of prevention by using an intrarectal catheter. The mean value of the total score on the knowledge test was significantly higher after the education ( $8.66 \pm 1.50$ ) compared to the mean value of the total score on the test before the education ( $6.82 \pm 1.50$ ) (Fig. 1).



Notes: SD – standard deviation; \*\*\*  $p < 0.001$ ; Wilcoxon's matched-pairs test

**Fig. 1.** Mean values of the total score before and after the education

## Discussion

The present study evaluated nurses' knowledge level about risk factors, prevention, and IAD treatment before and after education. The results showed that a planned, targeted educational programme was successful in improving the subjects' knowledge about recognising and categorising IAD using the GLOBIAD scale. Most subjects knew that IAD was the name for skin damage caused by contact with urine or faeces. However, there was a significant difference in the differential diagnostic ability to classify IAD and pressure ulcers before and after education.

Similarly, other studies have shown that educational programmes designed for nurses successfully increase knowledge about IAD. During the education about IAD, they can change their attitudes and experience, so that early identification can be made of skin changes (Beeckman et al., 2017). The results of research conducted among Korean nurses on differentiating between IAD and pressure ulcers showed a statistically significantly higher number of correct answers on the post-test (75.7%) than the pre-test (51.3%) (Lee and Kim, 2016). In the research of Şahin et al. (2019), 84.92% of nurses stated that proper assessment and diagnosis of IAD is necessary to distinguish it from pressure ulcers. However, the majority had difficulty categorising IAD using the GLOBIAD scale. The research results of Alcoforado et al. (2019) showed that despite exhibiting good knowledge of the definition of IAD, nurses still had difficulties in the clinical identification of skin changes in the perianal and genital region. In the existing literature, there are studies that assess nurses' knowledge and opinions about pressure ulcers and their correlation with appropriate prevention (Cukljek et al., 2022; Sengul and Karadag, 2020). However, the results of these studies cannot be compared with the assessment of knowledge about IAD due to differences in etiology, prevention, and treatment (Tay et al., 2020). Incorrect classification and differentiation of IAD and pressure ulcers lead to inadequate prevention and treatment. Education of health professionals is important to disseminate evi-

dence-based knowledge about this problem and to improve classification skills (Beeckman et al., 2010).

Understanding the protective role of the skin and the negative impact of incontinence can assist nurses in the prevention of IAD. Urine changes the composition of the normal skin flora and increases the surface layer permeability (*stratum corneum*), and enzymes from faeces add to skin damage. This creates favourable conditions for the faecal bacteria to penetrate the skin, increasing the risk of secondary infection (Lefèvre-Utile et al., 2021). Our results on the subjects' knowledge about the influence of bacteria on the occurrence of IAD are consistent with this information from the literature.

Research on IAD is important to ensure safe, evidence-based and quality healthcare, especially for critically endangered patients (Menezes et al., 2022). Daily assessment of the patients' skin, especially those who have been hospitalised for a long time, by well-trained nurses helps to improve the life quality of patients (Lee and Kim, 2016). Due to the lack of quality clinical research, current recommendations on the prevention and treatment of IAD are based on expert opinion and evidence from practice. Gentle cleansing, moisturising creams, and protection products are mostly used in the prevention and treatment of IAD (Beele et al., 2018; El Genedy-Kalyoncu et al., 2022). In specific situations, in high-risk patients with severe forms of urinary or faecal incontinence, indwelling urinary catheters or faecal management systems can be used as a temporary solution (Coyer and Campbell, 2018; Van Damme et al., 2018). Evidence from the literature suggests that new medical devices such as intrarectal catheters (large-lumen soft silicone catheters) can reduce the incidence of IAD and cross-infections (Benoit and Watts, 2007; Zhang et al., 2021). The study of Whiteley et al. (2014) evaluated the reasons for FMS insertion, and the duration and complications associated with the use of FMS in patients who were not hospitalised in ICUs but in acute care units. There were no significant complications in this research population, but the results indicate that ongoing education and supervision of medical staff by experienced nurses is important for patient safety, especially when inflating the retention balloon. The presence of IAD in patients with intrarectal catheters may indicate that they were inserted after the onset of this type of dermatitis (Johansen et al., 2020). Although intrarectal catheters are used in medical practice, most of our nurses were not aware of the fact that the use of a faecal collection catheter prevents the development of IAD, and that the medical device FMS is used in patients with bowel incontinence and/or in those who have multiple loose stools. Similar results were obtained by Qiang et al. (2020), where the low knowledge of nurses about the early use of medical devices for faecal collection could be related to the lack of such devices or lack of knowledge about them.

Continuous education about IAD allows nurses to learn the latest trends in the prevention and treatment of IAD. Managers of health care institutions should bring experts from this field to give lectures, and also send nurses for additional education in hospital centres that successfully deal with the prevention and treatment of IAD. Additionally, modern electronic technology can help nurses to renew and improve their knowledge and skills about IAD. The results of this research can help in educational programmes for nurses, as well as in the development of institutional guidelines for the prevention and treatment of IAD.

## Limitations

We only recruited nurses from a few clinics in one hospital. Specific findings may only be generalized to settings with si-



milar IAD prevention practices and a similar workflow. A related limitation was the low number of respondents, which was partly due to the COVID-19 epidemiological situation. Consequently, repeated studies using this education program with nurses from other hospitals and with a wider sample are needed.

## Conclusion

After the education, nurses' post-test scores about IAD were significantly higher. The subjects showed better knowledge about the classification, risk factors, prevention, and treatment of IAD. Before education, the nurses showed less knowledge about the differential diagnostic ability to classify IAD and pressure ulcers. It is necessary to assess the condition of the skin on a daily basis to prevent IAD and pressure ulcers in time. Nurses can use the results of this study when planning nursing care. They have an obligation to provide evidence-based care and are professionally responsible for their practice to provide quality patient care. Implementation of the

continuing education of nurses and the introduction of a section in the nursing student curriculum on the prevention and treatment of IAD can be useful. It is necessary to continuously assess the knowledge of IAD among nurses so that educational programs can be planned, with the aim of producing better patient treatment outcomes. The nurse's role in the prevention of IAD includes moisture management, so hospital administration should provide innovative medical devices for the management of FI. It is very important that the managers establish regular evaluation and management of IAD to adequately monitor the incidence rate. Future research is needed to identify how continuing education for nurses can help reduce the incidence of IAD in hospitals.

## Ethical aspects and conflict of interests

The authors have no conflict of interests to declare.

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## Znalosti sester o dermatitidě spojené s inkontinencí: vliv plánovaného vzdělávacího programu

### Souhrn

**Cíl:** Cílem této studie bylo zlepšit znalosti o dermatitidě spojené s inkontinencí (IAD) u sester, které pečují o hospitalizované pacienty s fekální inkontinencí (FI).

**Metodika:** Jedná se o deskriptivní průřezovou výzkumnou studii, ve které byl k vyhodnocení znalostí o IAD použit design jedné skupiny před a po testování. Studie zahrnovala 60 sester a edukační sezení o IAD trvalo přibližně 60 minut. Byla zahrnuta témata, která odkazovala na definici, prevenci a léčbu IAD. K testování rozdílů ve znalostech o IAD mezi sestrami byly použity McNemarův test a Wilcoxonův párový test.

**Výsledky:** Sestry po edukačních sezeních prokázaly vysoce statisticky významně lepší znalosti o FI a jejím vlivu na výskyt IAD a také o možnostech prevence a léčby ( $p < 0,001$ ). Průměrná hodnota celkového skóre ve znalostním testu byla po edukaci významně vyšší ( $8,66 \pm 1,50$ ) než průměrná hodnota celkového skóre v testu před edukací ( $6,82 \pm 1,50$ ).

**Závěr:** Bylo zjištěno, že sestry po edukaci vykazovaly lepší znalosti v klasifikaci, rizikových faktorech, prevenci a léčbě IAD. Znalosti o IAD u sester je nutné průběžně vyhodnocovat pro plánování vzdělávacích programů s cílem zajistit lepší výsledky v léčbě pacientů.

**Klíčová slova:** dermatitida spojená s inkontinencí; fekální inkontinence; ošetrovatelská péče; vzdělání

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