Development of a Need-based Interventional Skin Care Protocol on Incontinence-associated Dermatitis among Critically Ill Patients

Prashant Sharma¹, Latha Sambatra², Rajesh K Sharma³

ABSTRACT

Background: Incontinence-associated dermatitis (IAD) is a potentially serious skin injury that can lead to pressure ulcers (PU). Many studies have indicated the need for evidence to find the most effective skin care protocol to reduce the incidence and severity of IAD in critically ill patients.

Aim and objective: To develop a need-based interventional skin care protocol on IAD after identifying the risk of developing IAD in critically ill patients and by assessing the nurse’s knowledge and practice on IAD.

Materials and methods: Quantitative research approach with an exploratory research design was adopted in the study. A total of 40 staff nurses and 100 patients were included. To assess the knowledge of staff nurses regarding IAD, a knowledge questionnaire was administered and the IAD prevention practice among staff nurses was assessed with the help of an observation checklist. The risk of IAD among 100 critically ill patients was observed by the investigator, using a perineal risk assessment tool. The obtained data were analyzed by using descriptive and inferential statistics. The protocol was developed by the researcher and it was validated by 5 experts.

Results: The results revealed that most of patients (60%) had a high risk for development of IAD. Most of the nurses had poor knowledge (40%) and had poor practice in assessment, perineal area, and prevention of infection area. Hence considering all these aspects, a protocol was developed.

Conclusion: The researchers developed a need-based skin care protocol to decrease the development of IAD.

Keywords: Critically ill patients, Incontinence-associated dermatitis (IAD), Need-based interventional skin care protocol.

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INTRODUCTION

Incontinence is characterized by an uncontrolled loss of urine as well as stool/feces at an inappropriate time or in an inappropriate place. Incontinence is not an illness; however, it may be a side effect of a hidden disorder.¹

Incontinence can range from a steady or discontinuous spilling of a small amount of urine to an infrequent and uncontrolled release of vast volumes of body waste. Although incontinence is not thought to be part of a typical maturing process, age-related changes are the predisposing factors and do make incontinence more probable in older people. Different conditions that can cause incontinence are spinal cord injuries, dementia, birth defects, and childbearing.¹

Incontinence-associated dermatitis (IAD) is an inflammatory skin condition that happens when the skin is presented to urine or stool and leads to a secondary infection, pain, and skin sores. IAD incidence rates fluctuate from 5.6 to 50%, and the prevalence rates differ from 3.4 to 25%. Incontinence usually has many causes, is not completely understood, and includes psychological and physiological components.²

Recent evidence indicates that approximately 20% of acute care patients are incontinent and that 42.5% of incontinent patients have some type of a skin injury. Although the pathophysiology of IAD is not completely understood, disturbance of the skin’s acid mantle as a protective barrier is thought to play a key role. It is a daily challenge for the health professionals in hospitals, nursing homes, and community care to maintain a healthy skin in patients with incontinence.²

Urinary incontinence is a worldwide medical issue influencing 8.2% of the 2008 total population (4.3 billion).²

Fecal incontinence (Fi) is thought to be very common, but much under-reported due to embarrassment.¹² It affects people of all ages, but is more common in older adults (but it should not be considered a normal part of aging).¹¹ Females are more likely to develop it than males (63% of those with Fi aged 30 may be females).¹³ In 2014, the National Center for Health Statistics reported that one of every six seniors in the United States who lived in their own home or apartment...
had FI. Men and women were equally affected. And 45–50% of people with FI had severe physical and/or mental disabilities.

**Materials and Methods**

In this study, a quantitative research approach was adopted. Research design was an exploratory research design. The study was conducted in KS Hegde Hospital, Mangaluru. One hundred critically ill patients and 40 staff nurses of KS Hegde Hospital, Mangaluru, were included. Purposive sampling technique was used. For data collection, three tools were used. Perineal risk assessment tool was used to assess the risk of IAD among critically ill patients. Knowledge questionnaire and observation checklist were used to assess the knowledge and practice about IAD among staff nurses. Tool validity was done by 11 experts. To check the reliability, Cronbach's alpha method was used.

**Results**

**Section-1: Assessment of Risk of IAD among Patients**

In this study, the risk of IAD was assessed for all of the 100 patients. The results revealed that 91% had soft stool with or without urine, followed by formed stool 7% and liquid stool with or without urine 2%. Most of the subjects (89%) had changed linen/pad at least every eight hours, 10% four hourly, and 1% two hourly. Of the study population, 48% had clear and intact skin; among the rest of the subjects, 40% had erythema/dermatitis with or without candidiasis and 12% had denuded/eroded skin with or without dermatitis, and 49% had three or more contributing factors (Table 1).

In this study, Figure 1 shows that among the 100 subjects, 60% had high risk and 40% had low risk of IAD.

**Section-2: Assessment of Knowledge and Practice about IAD among Staff Nurses**

In this study, among the 40 staff nurses, 80% was aware that the top layer of the epidermis is stratum corneum, 72.5% had knowledge that the pH of the skin is normally acidic, 67.5% had knowledge that IAD is caused due to exposure to friction, and 67.5% had knowledge that IAD associated with FI tends to occur in the anal region and buttocks (Table 2A).

The knowledge score ranged between 3 and 17 with a mean of 9.05 ± 1.43. All the 20 knowledge questions were assigned a value of either one for the correct answer or zero for the wrong answer. Then the total score had been obtained, and the scores were divided into three subgroups according to the level of perceived knowledge of the subjects. In this, concept of percentile method was used.

- P<sub>1</sub>–P<sub>33</sub> as poor knowledge (3–8),
- P<sub>34</sub>–P<sub>67</sub> as average knowledge (9–11),
- P<sub>68</sub>–P<sub>100</sub> as good knowledge (12–17) (Fig. 2).

Figure 2 shows that among the 40 staff nurses, 40% had poor level of knowledge about IAD followed by 32.5% with average knowledge and 27.5% with good knowledge.

In this study, Table 2B shows that among the 40 staff nurses in the assessment area, majority performed handwashing, provided privacy to the patient, and maintained input–output chart. In the perineal area, majority were separating the legs of the patient and

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**Table 1: Assessment of risk of IAD among patients**

| IAD risk (n = 100)                                                                 | Frequency |
|----------------------------------------------------------------------------------|-----------|
| The intensity of irritant and type and consistency of irritant                    |           |
| Formed stool and/or urine                                                        | 7         |
| Soft stool with or without urine                                                 | 91        |
| Liquid stool with or without urine                                               | 2         |
| Duration of irritant and amount of time that skin is exposed to the irritant     |           |
| Linen/pad changes at least every 8 hours                                         | 89        |
| Linen/pad changes at least every 4 hours                                         | 10        |
| Linen/pad changes at least every 2 hours                                         | 1         |
| Perineal skin condition and skin integrity                                       |           |
| Clear and intact                                                                 | 48        |
| Erythema/dermatitis with or without candidiasis                                  | 40        |
| Denuded/eroded skin with or without dermatitis                                  | 12        |
| Contributing factors: low albumin, antibiotics, tube feeding, or other           |           |
| 0–1 contributing factors                                                        | 15        |
| 2 contributing factors                                                          | 36        |
| 3 or more contributing factors                                                  | 49        |
Table 2A: Assessment of knowledge about IAD among staff nurses

| Knowledge (n = 40)                                                                 | Frequency | Percentage |
|----------------------------------------------------------------------------------|-----------|------------|
| The top layer of the epidermis is the stratum corneum                            | 32        | 80         |
| The pH of the skin normally is acidic                                             | 29        | 72.5       |
| The primary layer that serves as a protective barrier to shield internal tissues from exposure to toxins and bacteria is the stratum corneum | 11        | 27.5       |
| Which of the following is particularly harmful to the skin’s barrier function? Fecal enzymes | 14        | 35         |
| Reported prevalence rates of IAD vary from 5.6 to 50%                             | 19        | 47.5       |
| Skin damage from incontinence is dependent on all of the above                    | 19        | 47.5       |
| Which of the following statements about urinary incontinence is not true? Men are more susceptible to IAD due to their anatomical structure | 18        | 45         |
| Which of the following is the most important risk factor for IAD in a patient with incontinence? Liquid stools | 21        | 52.5       |
| Incontinent women are more likely than men to develop IAD during bed rest because in females, urethra is short and much less supported than in males | 20        | 50         |
| Factors associated with the development of IAD include all except the use of tight clothing | 8         | 20         |
| IAD is caused due to exposure to friction                                           | 25        | 67.5       |
| The major etiologic factors for IAD are exposure to urine and stool               | 20        | 50         |
| IAD lesions are characterized as a wet-macerated appearance of skin along with superficial erosion | 17        | 42.5       |
| IAD that is associated with fecal incontinence tends to occur in the anal region and buttocks | 27        | 67.5       |
| The typical pattern of IAD lesions are. bottom-up injuries                        | 11        | 27.5       |
| Which IAD assessment tool allows the clinician to match a patient’s clinical presentation with the photographs for appropriate interventions? IAD intervention tool | 9         | 22.5       |
| The first line of defense for preventing IAD in an incontinent patient is identify and treat the causes of incontinence | 16        | 40         |
| Which of the following is not an effective prevention or management measure of IAD? Use of cotton clothes | 12        | 30         |
| Following an episode of incontinence, a structured skin-cleansing regimen should include gentle cleansing, moisturizing, and use of skin protectant | 20        | 50         |
| Which is a common complication of IAD? All of the above                           | 13        | 32.5       |

![Fig. 2: Level of knowledge about IAD among staff nurses](image)

provided privacy to the patient; in the prevention of infection area, majority were changing indwelling catheters within seven days.

**Section-3: Association between Baseline Knowledge and Practice with Selected Variables**

In this study, to find the association between baseline knowledge score and demographic characteristics among staff nurses, Fisher exact and chi-square tests were used. The obtained ‘p’ values were >0.05 and hence there was no association between the demographic characteristics and the knowledge score at the 5% level of significance (Table 3A).

In this study, Table 3B revealed that Fisher exact test was used to find the association between the reported practices and the educational status of the staff nurses. The obtained ‘p’ value was <0.05 only for “item no. 12, 13, and 14.” Hence, these practices were associated with the level of educational status, and for all other comparisons, the ‘p’ values were >0.05 and hence there was no association between those practices and the educational status.
Table 2B: Assessment of practice about IAD among nurses

| Practice (n = 40) | Frequency | Percentage |
|------------------|-----------|------------|
| **Assessment**   |           |            |
| 1 Performs handwashing | 40 | 100 |
| 2 Assesses the risk of IAD within four hours of admission (as evidenced by records) | 27 | 67.5 |
| 3 Assesses the skin and risk of IAD thrice daily (as evidenced by records) | 11 | 27.5 |
| 4 Maintains intake–output chart | 40 | 100 |
| 5 Monitors weight daily (as evidenced by records) | 4 | 10 |
| 6 Notes the volume and character of urine and records observations carefully | 40 | 100 |
| **Perineal care** |           |            |
| 1 Washes hands before and after procedure | 40 | 100 |
| 2 Provides privacy to the patient | 40 | 100 |
| 3 Separates the legs of the patient | 40 | 100 |
| 4 Observes the perineal area | 39 | 97.5 |
| 5 Cleanses the perineal area thoroughly | 17 | 42.5 |
| 6 Cleanses the skin with a washcloth | 20 | 50 |
| 7 Uses normal saline to clean the perineal area | 14 | 35 |
| 8 Wipes from upside to downwards | 5 | 12.5 |
| 9 Dries the skin properly | 17 | 42.5 |
| 10 Documents the procedure | 36 | 90 |
| **Prevention of infection** |           |            |
| 1 Washes hands before and after procedure | 40 | 100 |
| 2 Avoids skin wetness by keeping the area dry and clean | 23 | 57.5 |
| 3 Replaces the dirty linens with clean ones | 35 | 87.5 |
| 4 Uses clean washcloth every time | 16 | 40 |
| 4 Changes diaper frequently as necessary | 25 | 62.5 |
| 5 Reports any signs of infection promptly | 39 | 97.5 |
| 6 Documents the procedure | 37 | 92.5 |
| 7 Changes indwelling catheters within seven days | 40 | 100 |

Table 3A: Association between baseline knowledge and demographic characteristics among staff nurses

| Knowledge (n = 40) | ≤10 | >10 | Statistical test | ‘p’ value |
|-------------------|-----|-----|------------------|----------|
| Gender            |     |     |                  |          |
| Male              | 0   | 1   | 0.4 (Fisher exact) | 0.4      |
| Female            | 24  | 15  |                  |          |
| Educational status|     |     |                  |          |
| Diploma           | 8   | 6   | 0.073 (Chi-square) | 0.787    |
| Graduate          | 16  | 10  |                  |          |

Section 4: Association between Risk of IAD and Selected Variables
In this study, to find the association between the risk of IAD and the demographic characteristics among critically ill patients, likelihood ratio and chi-square test were used. If the obtained ‘p’ values were <0.05, then there was an association of age and educational status with risk of IAD, and there was no association of gender, religion, and marital status with risk of IAD (Table 4)

Discussion
Section 1: Assessment of Risk of IAD among Patients
In this study, the results revealed that most of the patients are at high risk of IAD. Ninety-one percent of them had a soft stool with or without urine. Majority of the subjects (89%) had changed linen/pad at least eight hourly. Forty-eight percent of the subjects had a clear and intact skin; 40% had erythema/dermatitis with or without candidiasis and the rest of the subjects (12%) had denuded/eroded skin with or without dermatitis, and 49% had three or more contributing factors.

According to the article published by “Mikel Gray,” it explores that the risk of IAD or perineal skin damage is the greatest when the absorptive product becomes saturated with urine or when the skin remains occluded under a wet-absorptive product over an extended period of time.³
Table 3B: Association between practice and educational status among staff nurses

| Practice                                      | Diploma f | %   | Graduate F | % | Fisher exact test | 'p' value |
|-----------------------------------------------|-----------|-----|------------|---|-------------------|-----------|
| Q3. Assesses the risk of IAD within four hours of admission (as evidenced by records) | 9          | 22.5| 18         | 45 | 0.0201            | 0.751     |
| Q4. Assesses the skin and risk of IAD thrice daily (as evidenced by records)       | 3          | 7.5 | 8          | 20 | 0.0725            | 0.523     |
| Q5. Avoids skin wetness by keeping the area dry and clean                          | 11         | 27.5| 12         | 30 | 0.189             | 0.48      |
| Q7. Monitors weight daily (as evidenced by records)                                | 2          | 5   | 2          | 5  | 0.3847            | 0.516     |
| Q10. Observes the perineal area                                                      | 14         | 35  | 25         | 62.5| 0.0089            | 0.349     |
| Q11. Cleanses the skin with a washcloth                                             | 7          | 17.5| 13         | 32.5| 0.0635            | 1.000     |
| Q12. Wipes from upside to downside                                                  | 4          | 10  | 1          | 2.5 | 0.1521            | 0.027*    |
| Q13. Dries the skin properly                                                        | 10         | 25  | 7          | 17.5| 0.1557            | 0.007*    |
| Q14. Uses clean washcloth every time                                                | 2          | 5   | 14         | 35  | 0.0007            | 0.015*    |
| Q15. Replaces the dirty linens with clean ones                                      | 12         | 30  | 23         | 57.5| 0.0533            | 0.804     |
| Q16. Documents the procedure                                                        | 14         | 35  | 22         | 55  | 0.0364            | 0.055     |
| Q17. Changes diaper frequently as necessary                                         | 10         | 25  | 15         | 37.5| 0.0938            | 0.392     |
| Q19. Cleanses the perineal area thoroughly                                           | 6          | 15  | 11         | 27.5| 0.087             | 0.973     |
| Q20 Uses normal saline to clean the perineal area                                     | 5          | 12.5| 9          | 22.5| 0.1993            | 0.945     |
| Q22. Reports any signs of infection promptly                                        | 14         | 35  | 25         | 62.5| 0.0089            | 0.349     |
| Q23. Documents the procedure                                                        | 14         | 35  | 23         | 57.5| 0.0239            | 0.099     |

*Indicates significantly

Table 4: Association between risk of IAD and demographic characteristics

| Risk                        | IAD risk (n = 100) | 4–6 | 7–12 | Statistical test | 'p' value |
|-----------------------------|--------------------|-----|------|------------------|-----------|
| Age (in years)              | 21–40              | 10  | 6    | 14.231           | 0.003*    |
|                             | 41–60              | 24  | 25   |                  |           |
|                             | 61–80              | 6   | 27   |                  |           |
|                             | >80                | 0   | 2    |                  |           |
| Gender                      | Male               | 22  | 36   | 0.246            | 0.620     |
|                             | Female             | 18  | 24   |                  |           |
| Educational status          | No formal education| 6   | 21   | 8.393            | 0.039*    |
|                             | Primary education  | 14  | 24   |                  |           |
|                             | High school        | 16  | 11   |                  |           |
|                             | PUC                | 4   | 4    |                  |           |
| Religion                    | Hindu              | 35  | 44   | 3.619            | 0.164     |
|                             | Christian          | 1   | 6    |                  |           |
|                             | Muslim             | 4   | 10   |                  |           |
| Marital status              | Married            | 34  | 43   | 4.75             | 0.093     |
|                             | Unmarried          | 3   | 3    |                  |           |
|                             | Widow              | 3   | 14   |                  |           |

*Indicates significantly
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Results revealed that among the 40 participants, majority followed handwashing, provided privacy to the patient, maintained input-output chart, separated the legs of the patient, noted the volume and character of urine, recorded observations carefully, and changed indwelling catheters within seven days.

A supportive cohort study conducted from the year 2011–2015 by “Almunzer Zakaria” et al. taking more than 2000 hospital staff revealed that majority of the participants (94%) followed the handwashing techniques.

Section-2: Assessment of Knowledge and Practice about IAD among Staff Nurses

This study stated that among the 40 staff nurses, 40% had a poor level of knowledge about IAD followed by 32.5% with average knowledge, and 27.5% with good knowledge.

A similar cross-sectional study was conducted in the year 2015 by “Abede and Daniel” taking 217 nurses, and this study revealed that majority (61%) of them had above-average level of knowledge about skin integrity maintenance practice.

Fig. 3: Protocol on prevention and management of IAD.
Assess and document the perineal area skin daily in high risk/category 1 and incontinent individuals with help of PAT & IADS tools.

**Category-2**
(Skin Condition-Redness with moderate to severe skin breakdown)

Erythema, Edema, Vesicles/Bullae/Skin erosions, Skin denudation, infection

Treatment, management & Prevention will be as per Category — 0 & 1 along with following:
- Antifungal products should be used only when a cutaneous fungal rash is present.
- Apply a zinc oxide-based powder for weepy or bleeding areas 3 times a day and whenever stooling occurs.
- Do not scrub the zinc oxide paste completely off with the next cleaning.
- Gently wipe stool, then apply new paste covered dressing to area
- Position the person semi prone to expose affected skin to air.
- Consider treatments that reduce moisture
- Turning, astringents (calamine lotion).
- If condition is very critical consult concern physician.
- If there is Skin infection then take a microbiological sample.
- Use that sample result to decide on appropriate therapy (e.g. antifungal cream, topical antibiotic, anti-inflammatory product)

**Fig. 4:** Protocol on prevention and management of IAD.

**Flowchart 1:** Algorithm of prevention and management of IAD.

Patient with urinary and/or faecal incontinence

- Assess and document the perineal area skin daily in high risk and incontinent individuals with help of Perineal Risk Assessment Tool (PAT) and Incontinence-associated dermatitis severity (LADS) instrument scoring to identify irreversible causes and other risk factors.
- Inspect the skin for signs of IAD

If no signs of IAD

- At risk*: No redness and skin intact
- Skin care—cleanse, moisturize and protect:
  - Select a pH-balanced skin cleanser.
  - Gentle cleansing with soft cloth.
  - Avoid using diapers in bed.
  - Do not use anti-inflammatory products.
  - Do not use anti-microbial products.

If signs of IAD, categorize according to

- Category 1: Red but Skin intact
- Category 2Red with skin breakdown+/skin infection

- Treatment, management and prevention will be as per category 0 and 1 along with following:
  - Should be kept on semi prone position
  - Use antifungal products if cutaneous fungal rash is present

- Treatment, management and prevention will be as per category 0 along with following:
  - Use antifungal products;
  - A zinc oxide powder can be used 3 times a day.
  - Gently wipe stool then apply new paste covered dressing to area
  - Consider treatments that reduce moisture.
  - If condition is very critical consult concern physician.

**DOCUMENT AND REASSESSMENT**
Section-3: Association between Baseline Knowledge and Practice with Selected Variables

In this study to find the association between the baseline knowledge score and demographic characteristics, Fisher exact and Chi-square tests were used. The obtained ‘p’ values were >0.05 and hence there was no association between the demographic characteristics and the knowledge score at the 5% level of significance.

A contradictory cross-sectional study is conducted by “Heidari and Shahbazi” taking 85 staff nurses. The study results explore that there is a significant association between knowledge and gender of nurses (p < 0.05).6

The Fisher exact test was used to find the association between the reported practices and educational status of the staff nurses. The obtained ‘p’ value was <0.05 only for items 12, 13, and 14. Hence, these practices were associated with the level of educational status; for all other comparisons, the ‘p’ values were >0.05 and hence there was no association between those practices and educational status.

According to a similar study which is conducted by “Lien et al.” taking 339 hospital staff, it revealed that most of the study participants had good or adequate knowledge though the level of practice is not completely satisfactory.7

Section-4: Association between the Risk of IAD and Selected Variables

In this study to find the association between the risk of IAD and demographic characteristics, likelihood ratio and chi-square test were used. The obtained ‘p’ values were <0.05 and hence there was an association of age and educational status with risk of IAD, and there was no association of gender, religion, and marital status with risk of IAD.

A similar cohort study conducted by “Chianca et al.” taking 157 critically ill patients has revealed that there is an association between age and the risk of IAD (p < 0.015). In this study, most of the IAD patients are males (85–54.1%) and age between 43 and 77 years.8

Conclusion

Based on literature review and study findings, a need-based protocol was developed as described in Figures 3 and 4 and Flowchart 1 which will help to prevent IAD and can be applied in intensive care units for patient care.

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