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# Incontinence-associated Dermatitis – Current Knowledge on Etiology, Diagnosis and Prevention

## Inkontinenční dermatitida – současné poznatky o etiologii, diagnóze a prevenci


### Abstract

Incontinence-Associated Dermatitis (IAD) is a type of irritant contact dermatitis related to chemical and physical irritation of the skin barrier, triggering inflammation and subsequent skin damage. The lack of an ICD-10 coding contributes to the variation in prevalence and incidence figures. Clinicians experience difficulties to correctly identify IAD and to distinguish it from pressure ulcers. In healthcare systems where pressure ulcers are used to assess the quality of care and are linked with reimbursement and litigation, misdiagnosis has potentially serious implications. Management of IAD should focus on skin cleansing to remove dirt, debris and microorganisms; skin moisturization to repair the skin's barrier, retain and/or increase its water content, reduce transepidermal water loss and restore the intercellular lipid structure; and the application of a skin barrier product by providing an impermeable or semi-permeable barrier on the skin.

### Souhrn

Dermatitida související s inkontinencí (IAD) je typem iritační kontaktní dermatitidy, která vzniká v důsledku chemického a fyzického dráždění kůže, což vyvolává zánět a následné poškození kůže. Fakt, že v současné Mezinárodní klasifikaci nemocí (MKN verze 10) nelze provést kódování tohoto poškození kůže, je příčinou odlišných informací o prevalenci a incidenci IAD. Zdravotníci v klinické praxi obtížně identifikují příznaky IAD a mají problém s jejich odlišením od dekubitů. Ve zdravotnických systémech, v nichž je výskyt dekubitů užíván jako ukazatel/indikátor posouzení kvality péče a jejichž výskyt pak souvisí s úhradou péče, může mít nesprávně stanovená diagnóza potenciálně vážné důsledky. Management péče o IAD by se měl zaměřit na čištění kůže, odstranění nečistot, odpovídající debridement a snížení mikrobiální zátěže. Důležitá je dostatečná hydratace pokožky, její zvláčnění, které napomáhá k úpravě bariérových schopností kůže. Vhodné postupy péče musí být zaměřeny na udržení a zvýšení obsahu vody v pokožce, snížení ztráty transepidermální vody a obnovení mezibuněčné lipidové struktury. Vhodná je také aplikace produktů ovlivňujících odolnost kůže a podporujících bariérovou funkci kůže tím, že vytváří ochrannou nepropustnou nebo částečně propustnou vrstvu jako bariéru na kůži.


http://dx.doi.org/10.14735/amcsnn2016S28

**The authors declare they have no potential conflicts of interest concerning drugs, products, or services used in the study.**
Autoři deklarují, že v souvislosti s předmětem studie nemají žádné komerční zájmy.
**The Editorial Board declares that the manuscript met the ICMJE "uniform requirements" for biomedical papers.**
Redakční rada potvrzuje, že rukopis práce splnil ICMJE kritéria pro publikace zasílané do biomedicínských časopisů.

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Accepted for review: 27. 5. 2016
Accepted for print: 20. 6. 2016

**Key words**
incontinence-associated dermatitis – knowledge – management – diagnosis

**Klíčová slova**
inkontinenční dermatitida – znalosti – management – diagnostika

## Introduction

Incontinence is a debilitating disorder (physically, emotionally, socially and psychologically) and can lead to numerous complications [1]. One of the most common complications is incontinence-associated dermatitis (IAD) [2]. IAD is a type of irritant contact dermatitis related to chemical and physical irritation of the skin barrier, triggering inflammation and subsequent skin damage. It is often associated with skin redness, rash, or vesiculation [3]. Patients with IAD can experience discomfort, pain, burning, itching or tingling in the affected areas [4].

IAD is considered a part of a broader group of skin conditions that are referred to as moisture-associated skin damage (MASD). MASD is used as an umbrella to cover damage of the skin caused by different types of moisture sources, including urine or faeces, perspiration, wound exudate, mucus, and saliva [5]. The term IAD is preferred over the more general term MASD as it distinguishes the skin problem directly with the urine and/or faecal incontinence and not with other conditions such as perspiration or wound exudate.

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Other widely used terms are perineal, diaper, or napkin dermatitis/rash [4]. Interestingly, the current version of the International Classification of Diseases (ICD-10, WHO) contains coding for diaper dermatitis but does not contain separate coding for IAD [6].

## IAD epidemiology

There is a wide variation in prevalence and incidence figures concerning IAD. The prevalence varies between 5.6 and 50%, and incidence between 3.4 and 25%, depending on the type of setting and population studied. This variation could be partly due to the lack of an internationally validated and standardized method for IAD data collection on the one hand [4] and on the other hand not having commonly agreed terminology to indicate the presence of incontinence associated skin problems [7]. Variation may also happen due to the complexity of recognizing the condition and distinguishing it from other skin lesions, such as superficial pressure ulcers [2].

## Aetiology and pathophysiology of IAD

Several factors increase the risk of IAD development: stratum corneum damage, skin pH changes and other external factors.

### Stratum corneum damage

The outermost layer of the epidermis, the stratum corneum (SC), is responsible for the biomechanical barrier function of the skin. The SC is continuously renewed and comprises between 15–20 layers of flattened skin cells (corneocytes). Corneocytes comprise keratinocytes in the epidermis and contain a variety of components, such as proteins, sugars and other substances that together are known as natural moisturising factor (NMF). The NMF supports skin hydration and leads to an effective and flexible barrier [8]. Hyperhydration of the keratinocytes and disruptions of the intercellular lipid bilayers are caused by excessive skin surface moisture [9]. As a result, the corneocytes swell and the thickness of the SC increases.

### Changes in skin pH

The pH plays a fundamental role in the barrier function of the skin, the SC cohesion and in regulating the resident bacteria on the skin [8]. The healthy skin surface is acidic with a pH of 4–6 [10]. The chemical process of urease transforms the urea in the urine into ammonium; eventually increasing the skin surface pH [11]. An increased skin pH leads to swelling of the SC, a more permeable skin, an increased risk of bacterial colonization, alterated lipid rigidity and reduced skin barrier function [10].

### External factors

Occlusive skin conditions, caused by the use of diapers and/or incontinence pads may further facilitate the degeneration of the SC. In addition, frequent incontinence episodes (requiring frequent skin cleansing) lead to the chemical irritation because of the repeated use of water and skin cleansing agents. Furthermore, the use of washcloths for skin washing and towels for drying lead to physical irritation. Reduced mobility and limited ability to move independently in bed and chairs causes friction and shear loads in the SC and the epidermis diminishing the strength of the epidermal barrier further. Also poor skin condition, diminished cognitive awareness, inability to perform personal hygiene, pain, increased body temperature, certain medications, poor nutritional status and critical illness are risk factors for the development of IAD [8].

## IAD observation and classification

IAD only occurs in skin areas being exposed to urine and/or faeces, however the distribution of affected skin in IAD is variable and may extend well beyond the perineum [4]. The diagnosis of IAD is based on visual inspection of the skin. Typical locations for IAD to occur are the perianal and sacrococcygeal areas, the thighs and the buttocks [6]. Early signs of IAD are erythema (ranging from pink to red) and a whitened appearance and slight swelling of the surrounding skin (indicating maceration). The affected area has poorly demarcated edges and may be patchy or continuous over large areas. Lesions including vesicles or bullae, papules or pustules may be observed. The epidermis may be damaged to varying depths; in some cases the entire epidermis may be eroded exposing moist, weeping dermis [4].

Clinicians often experience difficulties to correctly identify IAD and to distinguish it from pressure ulcers (mainly erythema or up to the level of partial thickness skin loss) and other (moisture related) skin conditions [7]. Misclassification has significant implications for prevention, treatment, and for reporting and benchmarking on quality of care. Since 2005, important efforts are being made internationally to support clinicians to learn and to improve their knowledge about the distinction between IAD and pressure ulcers. This resulted in the PuClas3, a world-wide e-learning education tool developed by the European Pressure Ulcer Advisory Panel (EPUAP) (http://www.PuClas3.UCVVGent.be). The clinical characteristics, which are helpful to make a differentiation between IAD and pressure ulcers are: cause, location, shape, depth, necrosis, edges and color of the wound bed.

## Prevention and treatment of IAD

Management of IAD is a significant challenge for healthcare professionals. Although the number of studies about prevention and treatment of IAD is increasing, the current evidence is still limited. One reason is the use of many different and sometimes ill-defined outcome parameters in clinical studies [4]. Prevention and treatment of IAD include incontinence management and the implementation of an appropriate skin care regimen.

### Management of incontinence

Incontinence management includes an assessment of the patient to identify the aetiology of incontinence and establish a comprehensive plan of care. For reversible causes non-invasive interventions can be applied, such as toileting techniques or nutritional and fluid management [12]. Invasive interventions include the use of an indwelling catheter, faecal management systems and faecal pouches [13]. Incontinence management products with good fluid handling properties should be considered to help avoid occlusion and overhydration of the stratum corneum [14].

### Structured skin care regimen

A structured skin care regimen consists of the following interventions.

#### Skin cleansing

Gentle perineal skin cleansing involves the use of a product whose pH range reflects the acid mantle of healthy skin. The use of a emollient-based skin cleanser with acidic pH is recommended. If water and soap is needed to remove dirt or irritants, alkaline soaps should be avoided [15]. Gentle cleansing is preferred over scrubbing techniques and a soft cloth is recommended to minimize friction damage [16]. Skin cleansing should take place daily and after each

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episode of incontinence to reduce exposure to urine and/or stool [15].

### Skin protecting

Skin protectants, also called 'moisture barriers', form a barrier between the stratum corneum and any moisture or irritant. The provided protection from moisture and irritants is variable and depends on the skin protectant ingredients (petrolatum, zinc oxide, dimethicone, acrylate terpolymer) and overall formulation (creams, ointments, pastes, lotions, films) [4]. Skin protectants should be applied after and before exposures to moisture to protect the skin [15].

Some patients may benefit from an additional restore step to support and maintain skin barrier function using a suitable leave-on skin care product, often termed 'moisturisers'. Moisturisers contain varying combinations of emollients (substances that smooth the skin and supplement its lipid content), humectants (substances that attract water to the skin) and occlusives (substances that leave a barrier that protects the skin from additional exposure to urine or faeces) to achieve their effects. As a result, not all moisturisers are capable of skin barrier repair. In particular, a humectant is not indicated for use on skin that is overhydrated or where maceration is present as it will attract further moisture to the area [4].

In case the patient is at risk but is still having an intact skin (cat. 0), the skin should be cleansed gently and an acrylate terpolymer film or petrolatum-based product or dimethicone containing product should be applied to protect the skin [4]. For patients with mild IAD (red but intact skin; cat. 1), an acrylate terpolymer film or petrolatum-based product or dimethicone containing product is recommended besides gentle cleansing [4]. For Cat. 2 IAD (red with skin breakdown), a skin protectant (e. g. acrylate terpolymer barrier film, dimethicone-containing product or zinc oxide based ointment or paste) should be applied. In case signs of infection are observed, a microbiological sample should be taken and the result should be used to decide about on appropriate therapy (e. g. antifungal cream, topical antibiotic, anti-inflammatory product) [4].

Numerous studies have shown that a single-step intervention has the potential to maximize time efficiency and to encourage adherence to the skin care regimen. These single-step products include disposable washcloths that incorporate cleansing, protecting and skin restoring into a single product [17].

## Conclusions

Despite the growing body of evidence providing insight into the definition, epidemiology, aetiology, pathophysiology and management of IAD, there are still deficits. In current practice, often problems arise in observation, differentiation and appropriate management of IAD. The IAD classification tool, developed in 2015, may be useful useful for documentation, clinical decision making and research purposes but needs further validation so it can be used in everyday practice. Further education is needed to differentiate pressure ulcers from IAD. Besides, additional research is needed on the pathophysiological and histopathological differences between pressure ulcers and IAD. To date, only one study was conducted with the focus on this topic [18]. Therefore, a study showing this difference is currently ongoing.

A wide variety of products and formulas with both moisturizing and barrier capacity exists. However, there is a deficit in evidence to rank these products based on their barrier function and to determine the effect of the concentration of active ingredients [7]. Because of these deficits in knowledge and clinical evidence, it is not surprising that product selection remains a challenge for clinicians when preventing and managing IAD. There is a need for well-designed randomized controlled clinical trials testing the efficacy and effectiveness of skin care products. Therefore, standardization in outcome definition and methods in epidemiological and clinical IAD research are urgently needed. At this moment, a core outcome set (COS) for clinical IAD research is being developed. It aims at making results comparable between populations, settings and increasing the power of systematic review (http://www.comet-initiative.org/studies/details/383). Also cost-effectiveness analysis is essential when performing clinical trials. Further research is needed to quantify the clinical and economic benefits of different protocols of care in different clinical settings.

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