Moisture-associated skin damage (MASD) describes a group of skin conditions caused by contact between the skin and excessive moisture including wound exudate, perspiration, and urine and faeces. Common types of MASD are:

- **Incontinence-associated dermatitis** – chemical irritation caused by contact between the skin and urine and/or faeces;
- **Intertriginous dermatitis** – skin damage associated with sweat trapped in skin folds in areas with minimal air circulation;
- **Peri-wound moisture-associated dermatitis** – skin maceration and breakdown caused by excessive wound exudate;
- **Peristomal moisture-associated dermatitis** – inflammation and erosion of skin caused by moisture at the stoma/skin junction and extending outward (Dowsett and Allen, 2013).

The precise pathophysiology of incontinence-associated dermatitis is not fully understood.

Patients with suspected incontinence-associated dermatitis require a comprehensive continence and skin assessment.

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The pathophysiology of MASD is not fully understood but multiple factors including moisture, skin-care regimens, changes in skin pH, presence of microorganisms, and skin damage associated with pressure and friction all play a role. More research is needed to establish how these factors combine to result in skin damage and to inform prevention and treatment strategies.

Incontinence-associated dermatitis (IAD) has been described as a type of “irritant contact dermatitis” (Beeckman et al, 2015). It may be associated with infection and can occur on intact or damaged skin (Iblasi et al, 2019; Beeckman, 2017). IAD occurs in people who are incontinent of urine and/or faeces (Beeckman et al, 2015) and is one of the most common skin problems in this group (Iblasi et al, 2019; Van Damme et al, 2017; Van den Bussche et al, 2017). IAD is also known as perineal dermatitis, diaper rash, diaper/nappy rash, nappy rash, irritant dermatitis, moisture lesions, or perineal rash (Beeckman et al, 2015).

**Extent of the problem**

Continence problems are the main cause of IAD; NHS England (2018) estimates that:

- 14 million adults in the UK are affected by urinary incontinence;
- >6.5 million adults experience problems with bowel control.

It also identified that one in ten of the UK population experience faecal incontinence, with over half a million adults affected (NHS England, 2018). Nearly two-thirds of
people with faecal incontinence also have urinary incontinence – this is known as ‘double incontinence’ (National Institute for Health and Care Excellence, 2007).

Faecal incontinence is closely associated with age, and is more prevalent in residential or nursing homes: one in three individuals in residential homes and two in three in nursing homes are affected (NHS England, 2007; NICE, 2015). However, these statistics are likely to be underestimates given the stigma associated with the condition and its consequent under-reporting (Bedoya-Ronga and Currie, 2014).

Patients with a urinary catheter are not classified as incontinent, but leakage and the bypassing of urine can lead to them experiencing the symptoms of IAD.

Exact figures of individuals who experience IAD are unknown but estimated prevalence rates range from around 6-50% across different healthcare settings, patient populations and age ranges (Woo et al, 2017; Beeckman, 2017) estimated that 20-25% of people with continence problems in hospital will experience IAD, while Nix and Haugen (2010) suggested that IAD affects as many as 41% of adults in long-term care.

IAD can cause pain, considerable discomfort and distress (Yates, 2018); it can be difficult to diagnose, and time consuming and expensive to treat.

Why does IAD occur?

The skin is the largest organ in the human body and provides a semi-permeable barrier that protects the body against mechanical damage, harmful irritants, infectious pathogens and excessive fluids (Woo et al, 2017). Other functions of the skin are detailed in Table 1. It is made up of three main layers: the epidermis, dermis and hypodermis (subcutaneous fatty tissue) (Fig 1). The outer layer of the epidermis, the stratum corneum, contains the protective building blocks often described as the ‘bricks and mortar’ of the skin. The bricks are protein-rich corneocytes, held together by lipid-rich matrix (mortar) and protein structures called desmosomes, which act as rivets (Voegeli, 2016) (Fig 2). The corneocytes are dead cells that start life as keratinocytes. These cells are formed in the basal epidermal layer of the skin; they migrate through the epidermis and differentiate before they degenerate and die.

The corneocytes keep the skin hydrated, enhancing flexibility and elasticity. When incontinence occurs, excess water from urine and/or faeces is pulled into, and held within, the corneocytes (Beeckman et al, 2015), causing the skin to become overhydrated, macerated and waterlogged.

At 4.6-5.5, the pH level of the skin is usually acidic (Voegeli, 2016); this creates an acid mantle that helps to protect the body against infection. Exposure to urine makes the skin more alkaline. Urea, which is found in urine, is converted by skin bacteria to ammonia – this is alkaline breaking down the acid mantle, making the skin more susceptible to infection and/or IAD. Fig 3 outlines the skin changes caused by incontinence.

### Table 1. Functions of the skin

<table>
<thead>
<tr>
<th>Function</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protection</td>
<td>Acts as a protective barrier, preventing internal tissues being damaged by trauma, ultraviolet light, temperature changes, toxins, pathogenic microbes and chemical agents</td>
</tr>
<tr>
<td>Barrier to infection</td>
<td>Intact skin creates a physical barrier to infection</td>
</tr>
<tr>
<td></td>
<td>The skin produces sebum, which is antibacterial and has an acidic pH of 4.6-5.5 (Voegeli, 2016); this is known as the ‘acid mantle’</td>
</tr>
<tr>
<td></td>
<td>Corneocytes found in the stratum corneum – the outer layer of the epidermis – contain substances that actively attract and hold water; this keeps the skin hydrated so it can function as a flexible barrier (Voegeli, 2016)</td>
</tr>
<tr>
<td>Production of vitamin D</td>
<td>This is produced by the skin in response to sunlight and is important for bone health</td>
</tr>
<tr>
<td>Maintenance of body temperature</td>
<td>Heat is retained and lost from the body by vasoconstriction and vasodilation of blood vessels in the skin</td>
</tr>
<tr>
<td>Pain receptor</td>
<td>Nerve endings respond to painful stimuli and act as a protective mechanism to prompt the individual to move away from pain or discomfort</td>
</tr>
<tr>
<td>Production of melanin</td>
<td>This is responsible for skin colouring and protects against radiation damage from sunlight</td>
</tr>
<tr>
<td>Communication</td>
<td>The physical appearance of the skin can give us information about a patient’s health and wellbeing – for example, a yellow tinge can indicate jaundice</td>
</tr>
</tbody>
</table>

Source: Adapted from Yates (2018), Wounds UK (2012)
Patients with faecal incontinence are more likely to develop IAD compared with those who have urinary incontinence (Gray and Giuliano, 2018). This is because faeces contain biolytic (lipid-digesting) and proteolytic (protein-digesting) enzymes that are damaging to the skin. Liquid faeces contain higher levels of digestive enzymes than formed stools, so patients with diarrhoea and faecal overflow are at increased risk of IAD (Beeckman et al, 2015). Those with double incontinence are at greatest risk of IAD (Gray and Giuliano, 2018); Fig 4 illustrates how urine/faeces affects the skin.

Associated risk factors
Although the key risk factor for IAD is incontinence, the factors determining risk of incontinence are multiple and complex. These can include:
- Immobility;
- Cognitive impairment;
- Age.

The ageing process also affects the skin, bowel and bladder function. As the skin ages, several physiological changes make it more prone to damage (Table 2).

Age-associated changes to bladder function include decreased urinary flow as a result of conditions such as prostate enlargement, prolapse, poor detrusor contraction and recurrent urinary tract infections. Bowel function is affected by increased susceptibility to diverticular disease or constipation with faecal impaction/overflow. These risks, while associated with ageing, are not exclusive to older people.

Continence issues can manifest at any time of life making anyone who is incontinent at risk of IAD (NHS England, 2018). The risks factors associated with IAD are summarised in Table 3.

Confusion between IAD and pressure ulcers
Although the anatomical sites and general appearance of pressure ulcers and IAD are similar, the aetiology and treatments are different. In practice, IAD is often misdiagnosed as pressure damage, which can lead to inappropriate management (Iblasi et al, 2019) (see case study in Box 1). This year, NHS England and NHS Improvement (2020) published their patient safety CQUIN indicator for 2020-2021, one of which addresses the assessment and documentation of pressure ulcer risk in community hospitals and NHS-funded residents in care homes. It aims to ensure that 60% of residents have a pressure ulcer risk assessment that meets NICE guidance with evidence of actions being taken to address identified risks. To ensure correct reporting,
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Table 3. Contributory risks factors for the development of incontinence-associated dermatitis

<table>
<thead>
<tr>
<th>Incontinence</th>
<th>Urinary – incontinence or leakage from a device, such as an indwelling urinary catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequent incontinence episodes</td>
<td>Risks are higher in people who have faecal or double incontinence</td>
</tr>
<tr>
<td>Prolonged exposure to urine and faeces</td>
<td>This may be due to:</td>
</tr>
<tr>
<td></td>
<td>Infrequent change of incontinence products</td>
</tr>
<tr>
<td></td>
<td>Poor skin cleansing</td>
</tr>
<tr>
<td></td>
<td>Ineffective equipment/appliance, such as an indwelling catheter or faecal-management system that regularly leaks</td>
</tr>
<tr>
<td>Poor initial continence assessment</td>
<td>This leads to:</td>
</tr>
<tr>
<td></td>
<td>Mismangement of symptoms</td>
</tr>
<tr>
<td></td>
<td>Inappropriate interventions</td>
</tr>
<tr>
<td></td>
<td>Over-reliance on containment products</td>
</tr>
<tr>
<td>Inappropriate assessment for pad products</td>
<td>Problems include selecting the wrong absorbency; absorbency that is too high can be just as damaging as absorbency that is too low</td>
</tr>
<tr>
<td>Inappropriate use of pad products</td>
<td>This includes practices such as:</td>
</tr>
<tr>
<td></td>
<td>Double padding</td>
</tr>
<tr>
<td></td>
<td>Infrequent changes of pad products</td>
</tr>
<tr>
<td></td>
<td>Absorbent products or incontinence-containment devices (especially if plastic-backed) may cause over-hydration by holding moisture against the skin surface</td>
</tr>
<tr>
<td>Use of incorrect products on skin</td>
<td>Thick, occlusive skin protectants (such as petroleum jelly and zinc oxide) may inhibit urine/ faeces uptake by absorbent incontinence products, causing over-hydration of the stratum corneum</td>
</tr>
<tr>
<td>Frequent skin cleansing with water and soap</td>
<td>This damages the corneocytes, removing lipids, increasing dryness and creating friction, which leads to damage in the skin barrier function</td>
</tr>
<tr>
<td>Inability to perform personal hygiene</td>
<td>This is a particular issue if patients are reliant on carers to cleanse their skin and change pad products after incontinence episodes</td>
</tr>
<tr>
<td>Compromised mobility</td>
<td>Patients who are immobile are significantly more likely to experience IAD than those who are mobile (Iblasi et al, 2019)</td>
</tr>
<tr>
<td>Diminished cognitive awareness</td>
<td>Patients with dementia may no longer recognise the need to go to the toilet or be able to identify the toilet, leading to a potential risk of continence problems</td>
</tr>
<tr>
<td>Medication</td>
<td>Antibiotics can cause diarrhoea, which can increase risk of IAD. Immunosuppressants and steroids can cause skin fragility, skin thinning and increased risk of bruising</td>
</tr>
<tr>
<td>Poor nutritional status</td>
<td>This has a negative effect on skin health, hydration and healing</td>
</tr>
<tr>
<td>Critical illness</td>
<td>This can lead to increased risk of incontinence and poor overall skin condition</td>
</tr>
</tbody>
</table>

Box 1. Case study

Wendy Simmonds is community team leader; tissue viability nurse, Cardiff and Vale University Health Board

Grace Simpson, aged 82, lives alone and is confined to a wheelchair or bed as a result of spina bifida. She has a urostomy, type 2 diabetes and has had an above-ankle amputation. Management of her bowels comprises daily manual evacuations and use of an anal plug to prevent faecal leakage. Formation of a stoma is not possible due to Ms Simpson’s condition and she was reluctant to have surgery. Poor mobility and other comorbidities have also resulted in a history of pressure ulcers to her labia and left ischial tuberosity.

Following a recent hospital admission, Ms Simpson’s bowel-care regimen was changed: use of the anal plug was discontinued and care reduced to alternate days as she had developed an anal fissure. This resulted in an increase in faeces leaking onto the surrounding skin, with subsequent moisture damage, increased skin maceration and contamination of the pressure ulcer on the left ischial tuberosity. The skin surrounding the pressure ulcers, anal fissure and labia showed evidence of moderate-to-severe moisture damage: the pressure ulcers became clinically infected and leaked copious amounts of exudate, which added to the moisture-associated skin damage. Following our local pathway for incontinence-associated dermatitis (IAD), the aim of treatment was to repair and restore the integrity of the skin using a foam incontinence cleanser and skin-protectant ointment after each episode of incontinence. We protected the skin around the wounds with barrier film and, once skin hydration was restored to normal, we aimed to maintain this with a barrier cream or ointment, depending on further risks of exposing the skin to moisture. Additional actions included:
- Treating the pressure ulcers with topical antimicrobial of flazamide and hydrofibre dressing twice daily to manage the exudate. Bed rest was advised, with frequent repositioning and limited time sitting in a chair.
- Reviewing the bowel-management regimen with the local continence service, and reinstating daily bowel care and use of an anal plug.
- Reviewing pressure redistribution equipment and seating.
- Arranging a referral to the nutrition and diabetic teams to review Ms Simpson’s diet intake and diabetic management, especially as her dietary intake had significantly reduced in the community and her blood-glucose control was poor. Reverting back to Ms Simpson’s daily manual evacuations and use of the anal plug resulted in an improvement in her skin. The moisture damage was resolved and her skin is now managed with a skin cleanser and barrier film. The pressure ulcers are still present but are no longer infected or at risk of contamination from faeces.

The patient’s name has been changed.

Points for reflection
- What was the direct cause of IAD in this case study?
- Using the information in Table 2 and Table 3 explain the contributing factors for IAD
- What steps would you take to avoid this situation occurring?

References

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Wounds UK (2012) Best Practice Statement: Care of the Older Person’s Skin. London: Wounds UK.

Staff must be able to distinguish between IAD and pressure ulcer damage as part of a routine skin assessment and provide an appropriate individualised plan of care.

It is important to be aware that those who experience IAD are also prone to pressure damage, especially in the sacral and perineum areas. This will be covered in detail in part 3 of this series.

Conclusion
IAD is caused by continence problems but many factors contribute to its development, such as poor mobility and cognitive impairment. The nature of normal skin ageing and the potential problems associated with that, along with additional risk factors, means IAD is often misdiagnosed and mismanaged as the underlying continence problem is often not addressed. Education in the fields of IAD and continence is lacking but needs to be improved. NT