

# Medical adhesive-related skin injury (MARSI): Preventing patient harm

Skin health is integral to both physical and psychosocial health (International Skin Tear Advisory Panel [ISTAP], 2018) and, therefore, maintaining skin integrity, defined as the skin being 'whole, intact and undamaged' (Department of Health Australia, 2015), is essential. This article discusses the preventable harm of medical adhesive-related skin injury (MARSI), which can have a profound impact on patients' quality of life, as well as adding to the considerable burden of wound care for clinicians and healthcare systems. The cases in this article illustrate the use of appropriate dressings on patients with extremely fragile skin, who are at the highest risk of damage. However, appropriate dressing selection and technique should be considered in all patients as skin damage/MARSI can occur in any patient group or setting (McNichol and Bianchi, 2016).

Compromised skin integrity can have a significant impact on the quality of life of patients, their family, friends and carers (Wounds UK, 2018), and can increase the risk of many complications related to the skin. These may include pressure ulcers, infection, moisture-associated skin damage (MASD), medical adhesive-related skin injury (MARSI, **Box 1**) and skin tears (**Box 2**; ISTAP, 2018), which can lead to pain, reduced mobility, poor quality of life, further health complications and increased healthcare costs (Wounds UK, 2018; Fletcher et al, 2020).

A MARSI includes any form of skin damage, such as skin tears, blistering or other forms of skin damage, that is caused by a medical adhesive.

While skin damage can occur in any patient group, those with fragile skin (e.g. in aged or very young skin) are particularly at risk. As a result, the incidence of skin damage is often increased (**Box 3**; Wounds UK, 2018).

## What is happening with MARSI?

MARSI is often overlooked, and there is currently no internationally agreed, standardised and systematic approach to record and monitor its incidence and prevalence. At present, there is very little international data on MARSI [**Box 4**]. However, MARSI are known to have a significant impact on a patient's quality of life, resulting in pain, an increased risk of infection and delayed healing, as well as to clinicians and healthcare systems as care and management can be costly in terms of nursing time and money (McNichol and Bianchi, 2016; Fumarola et al, 2020; Downie and Collier, 2021).

To improve care in the area of MARSI, it is important to explore and learn from key

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## Key words

- MARSI
- Harm prevention
- Skin health
- Skin integrity

### Box 1. Definition and types of MARSI (adapted from McNichol and Bianchi, 2016).

MARSI are defined as skin damage related to the use of medical adhesive products or devices such as tapes, wound dressings, stoma products, electrodes, medication patches and wound closure strips (Fumarola et al, 2020). Types include:

- Mechanical: skin (epidermal) stripping, tension injury or blistering, skin tears
- Dermatitis: irritant contact dermatitis or allergic dermatitis
- Other: including maceration (damage due to trapped moisture) and folliculitis (inflammatory reaction in the hair follicle).

### Box 2. Skin tears - one type of MARSI (ISTAP, 2018).

Skin tears are traumatic wounds that may result from a variety of mechanical forces (e.g. shearing or frictional), including the removal of adhesives, and can be painful wounds, affecting quality of life and causing distress to the patient. Skin tears may increase the likelihood of hospitalisation and prolong hospitalisation time (ISTAP, 2018).

### Box 3. Patient groups at particular risk of skin damage (adapted from Wounds UK, 2018).

- Patients at extremes of age (very young or old skin); particularly elderly patients or critically ill or injured children
- Patients experiencing spinal cord injury/paralysis
- Patients with cerebral palsy or spina bifida
- Bariatric and oncology patients
- Patients with comorbidities (e.g. diabetes, infection, and immunosuppression)
- Patients on certain medications (e.g. long-term use of corticosteroids, anti-inflammatory agents, and anticoagulants)
- Patients with dermatological conditions.

## Declarations

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drivers that led to pressure ulcer prevention becoming a major focus for NHS organisations. This analysis highlights what must be undertaken in the area of MARSIs prevention for it to receive similar attention in the UK, to that of pressure ulcer prevention.

On review, the campaign to address pressure ulcer prevention evolved over time, with the key influencing factor being the availability of accurate, consistent and high-quality prevalence and incidence data. Awareness of this data resulted in impressive and sustained national campaigns driven towards implementing effective strategies for pressure ulcer prevention (Fletcher et al, 2021).

From this review, it is clear that the need to capture impactful data on MARSIs (e.g. through Datix, reporting and root cause analysis) is paramount. To implement this into practice, there needs to be key stakeholder buy-in and inclusion in patient safety frameworks, such as the Patient Safety Incidence Response Framework (PSIRF; NHS England, 2022).

MARSIs should be considered a preventable injury, but it is currently overlooked and underestimated (Hitchcock et al, 2021). This contributes further to under-reporting and compounds the problem. It must be emphasised that preventable injuries may constitute patient harm and, as such, should be taken seriously.

### Learnings from South Australia

In South Australia, it is a requirement of the Health Patient Incident Management and Open Disclosure Policy Directive to report incidents and near misses into a Safety Learning System (SLS).

It is policy that all skin tears should be reported to the SLS as soon as practicable by the staff member who discovered the skin tear. Detailed guidance exists to help clinicians understand how and why to report a skin tear (Government of South Australia, 2023).

### Interventions to prevent MARSIs

#### Maintaining skin integrity

Maintaining skin integrity is everybody's responsibility. Every clinician should take a holistic approach that includes a thorough holistic skin assessment, including a detailed medical history on presentation to aid in the prevention of a MARSIs occurring (Wounds UK, 2018). Skin health correlates strongly with overall health – e.g. nutrition and lifestyle factors – and so working with patients to improve their awareness of the importance of skin health can have a positive effect on the patient's risk for developing skin damage. Implementing good skin care is a crucial

#### Box 4. MARSIs incidence and prevalence.

- 27.0%: MARSIs was estimated to affect over a quarter of individuals with postoperative wounds in Australia within 12 months (Upton et al, 2019)
- 15.5%: the cumulative incidence rate in 155 patients aged 65 or older in a nursing home in Japan over 8 weeks (Konya et al, 2010)
- 13.0%: a 4-week study in a non-intensive care unit for adult patients in the US showed a daily prevalence of 3.4–25% (median 13.0%; Farris et al, 2015)
- 37.2%: a 2-week study in 232 patients in a paediatric intensive care unit in China showed a daily prevalence of 23.5–54.2% (median 37.1%; Wang et al, 2019)
- 29.8%: MARSIs prevalence in a 2-week study in 419 oncology patients with peripherally inserted central catheters in China (Zhao et al, 2018).

part and involves daily moisturising, avoiding excessive washing and using pH-balanced soap substitutes. Skin should be handled carefully and environmental hazards and clothing that may irritate should be avoided (Carville et al, 2014; Fumarola et al, 2020).

#### Risk assessment

All patients should be considered to be at risk of skin damage/MARSIs, as it can occur in any patient group or setting (McNichol and Bianchi, 2016). However, there are risk factors that can increase the patient's likelihood of developing skin damage – therefore, risk should always be assessed and mitigated whenever possible.

Risk factors generally fall into two categories: intrinsic (relating to the patient and their health) and extrinsic (relating to outside influences). For example, intrinsic risk factors may include the patient's age or any underlying medical or dermatological conditions, while extrinsic risk factors may include the use of dressings or adhesives on the patient's skin.

Figure 1 shows a suggested two-part risk assessment for MARSIs that addresses both intrinsic and extrinsic factors. Identifying these risk factors means that the clinician can establish whether they can be modified and thus reduce the patient's risk (e.g. improved nutrition, choice of dressings).

#### Skin assessment

A full skin assessment should be carried out for every patient before each application and removal of an adhesive, such as a dressing or medical device (McNichol et al, 2013; Fumarola et al, 2020):

1. Look for local signs of irritation or damage where the dressing is being applied and assess the skin based on temperature, colour, moisture, turgor, integrity and fragility
2. Conduct a visual inspection
3. Ensure proper documentation.

Consideration of the patient's skin tone should also be included, as different skin

**Figure 1.** Two-part risk assessment (adapted from McNichol and Bianchi, 2016).

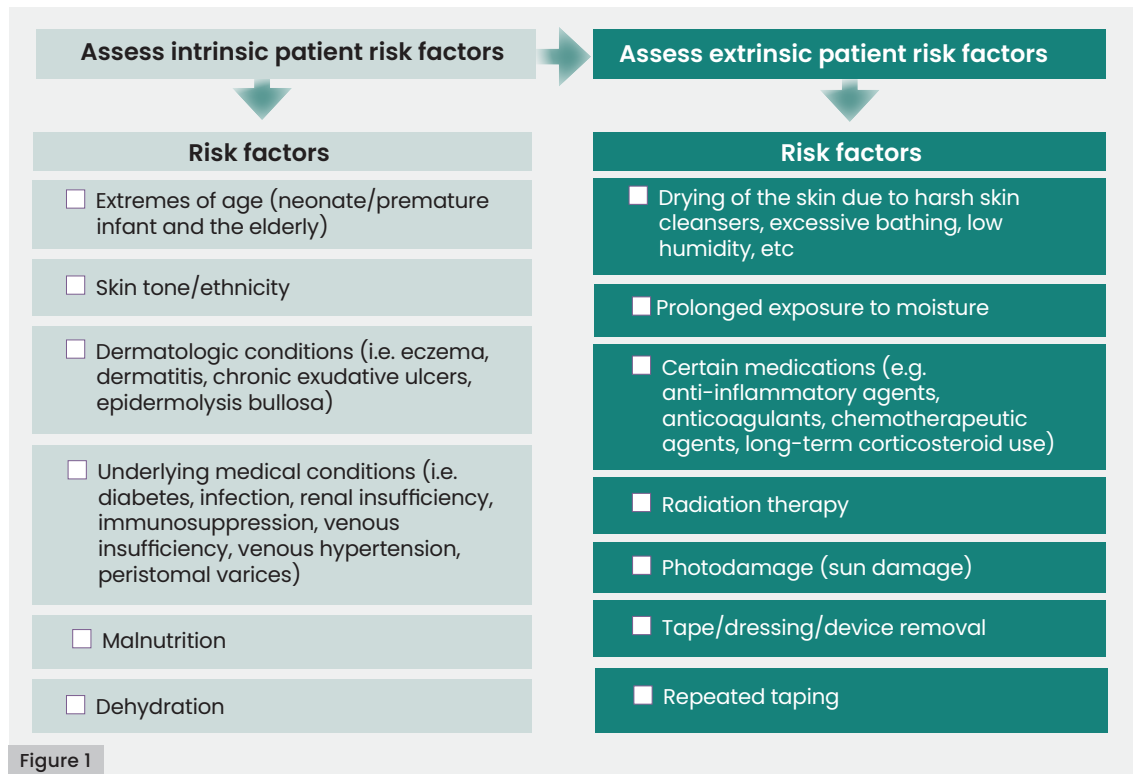


Figure 1

**Practical experience from Louise Savine, Tissue Viability Lead Nurse, Imperial College Healthcare NHS Trust**

MARSI occurs in all patient groups, but especially in those with fragile skin. The elderly or young can be affected, but it's these patients seen every day that we are trying to help, as they are often left out of the research.

Post-operative patients with fragile skin are particularly prone to developing MARSI when the wrong post-operative dressing is chosen, but very little is reported about this. As the skin is the largest organ in the body, more support and evidence are required to care for it. Therefore, further research is necessary to reduce the painful effects of MARSI and alleviate this burden for patients.

In order to address the issue of MARSI, a change in practice was needed; as such, silicone adhesive dressings and tapes were implemented. Prior to this change, patients often complained of blistering, skin stripping, erythema and pruritus post-surgery. Patients may also have experienced pain and discomfort not related to the pain

of surgery. From experience, all these signs and symptoms can often be overlooked by surgeons and nurses as 'just part of the post-operative phase'. It is felt that without an in-depth skin assessment, the use of acrylic dressings may not be appropriate and can result in these symptoms.

The use of silicone island dressings was introduced, and the outcome evaluated by conducting a small internal survey. Responses were positive – pain, erythema, blistering, and other issues associated with acrylic dressings reduced.

Following the positive results, the protocol was changed to the silicone island dressing for all post-operative patients to prevent MARSI. MARSI is well documented in the literature concerning vascular access, it is not as well documented in wound care. The call now is to start recording this as a harm and ensure that MARSI is on the national agenda in wound care.

tones respond differently to injury and treatment (Dhoonmoon and Harikrishna, 2023). These considerations should include, for example, changes in skin colour and texture, touch, temperature, swelling/inflammation, and the overall condition/integrity of the skin (Dhoonmoon and Harikrishna, 2023).

**Dressing selection**

Dressing selection plays an important role in

reducing the risk of damage to the skin. Using dressings and secondary fixation products that provide gentle, atraumatic removal can help to reduce the risk of skin damage and MARSI.

It has been stated that there is a need to consider the use of silicone adhesive in place of acrylic adhesive in at-risk or fragile skin (LeBlanc et al, 2021). Acrylic-based adhesives are very common in dressings but can be traumatic to fragile skin, whereas silicone adhesives provide

minimal risk of trauma (LeBlanc et al, 2021).

Also, the ISTAP advocates for special attention to be paid to dressing selection in relation to the management of skin tears, which are classified as a type of MARSIs when caused by the removal of medical adhesives (LeBlanc and Woo, 2022).

It has been proposed that the ideal dressing for skin tears is easy to remove and apply; does not cause trauma on removal; is non-toxic; provides a protective anti-shear barrier; creates an optimal environment for healing; is flexible and moulds to contours; manages exudate and infection; and can afford extended wear time (Wounds UK, 2022).

Soft silicone dressings have been also proven to provide a gentler option for patients with fragile skin at risk of damage, as they have been found to be less frequently associated with tearing or pain (Kim and Shin, 2021). With a silicone dressing, there is no need to use additional products such as adhesive removers; therefore, the overall dressing process is both simpler and more cost-effective.

### Call to action

In patients with fragile skin, MARSIs is potentially a significant challenge. These injuries are often preventable and can have a profound impact on patients' quality of life, as well as adding to the considerable burden of wound care for clinicians and healthcare systems.

Appropriate dressing selection should help to prevent damage to patients at dressing change, particularly those with fragile or at-risk skin. The case studies in this article demonstrate the use of the Leukoplast skin sensitive range as a component of care in the prevention for MARSIs in patients with extremely fragile skin. However, all patient groups can be at risk of skin damage and appropriate dressing selection and technique should be considered in all patients. In at-risk patients with fragile skin, taking measures to reduce the risk of damage should be considered paramount. **Achieving significant standardisation in MARSIs prevention takes years to achieve – the first step to change is to start acknowledgment of the issue and begin data collection by recording MARSIs as a patient harm.** ●

### Practical experience from the Epidermolysis Bullosa Clinical Nurse Specialist Team\* using soft silicone adhesive in the prevention of MARSIs

The following case studies of Epidermolysis Bullosa (EB) illustrate the use of the Leukoplast skin sensitive range (BSN medical GmbH, Essity group), which features gentle silicone adhesive to support atraumatic removal, in patients with EB.

EB is a rare, complex group of inherited skin fragility disorders that causes extreme skin fragility and puts patients at the highest risk of skin

damage during dressing change.

As there is currently no cure for EB, the management approach to caring for people with EB focuses on symptom control to minimise complications and improve quality of life. A key factor in management is to apply an atraumatic dressing to prevent damage, pain, bleeding and reduce the risk of MARSIs on removal.

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### Case 1

This patient was a 47-year-old female with recessive dystrophic EB inversa (RDEB-I), who had been admitted for treatment of dysphagia and associated malnourishment. She presented with multiple chronic and acute wounds. The patient's dressing regimen was changed to include Hypafix skin sensitive as a new alternative for secondary dressing fixation to secure the primary dressing under her armpit [Figure 2].

At dressing removal, the EB team adhered to their local protocol to remove Hypafix skin sensitive in line with best practice guidelines for EB (Denyer et al, 2017).

The patient 'really liked' Hypafix skin sensitive, which was important as it was being used in areas that were difficult to dress and had caused problems for the patient.

The patient said: 'Previous dressings were painful to remove and would stick to my skin, causing me anxiety during the removal process. I was worried it would cause blistering. With Hypafix Skin Sensitive,

I've found it much more comfortable, and it's far less painful to remove.'

The EB team said that they would choose to use the Leukoplast skin sensitive range in some of their patients to minimise any further trauma.



Figure 2

Figure 2. Hypafix skin sensitive *in situ*

## Case 2

This patient was a 56-year-old male with recessive dystrophic EB (generalised severe). He was admitted following orthopaedic surgery for a fractured neck of femur sustained after a fall. He had underlying EB-related osteoporosis and malnutrition. Low bone density is common in patients with EB. He also presented with multiple wounds surrounding the surgical site, with high levels of exudate.

The EB nurse noted that the most important factor for this patient was to seal the wound and ensure the dressing stayed in place without causing further damage. Leukomed T plus skin sensitive was selected with this aim in mind [Figure 3].

The patient said 'Leukomed T plus skin sensitive was very comfortable.'

The EB team said: 'Leukomed T plus skin sensitive is preferred to standard treatment, as you can see

strikerthrough easily, therefore not having to disturb the wound. Also, the edges do not roll up. Despite the dressing changes and exuding surrounding wounds, Leukomed T plus skin sensitive stayed in place for around a week without moving or curling up at the edges.'



Figure 3. Leukomed T plus skin sensitive *in situ*.

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