

Foundations of Best Practice for Skin and Wound Management

BEST PRACTICE RECOMMENDATIONS FOR THE Prevention and Management of Moisture-associated Skin Damage

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Introduction



Introduction

Moisture-associated skin damage (MASD) is an often overlooked yet potentially troublesome health concern. MASD occurs when skin is exposed to moisture for prolonged periods of time, resulting in over-hydrated or eroded skin. This leads to transepidermal water loss (TEWL) and an elevated skin pH that reduces the skin's ability to maintain its barrier function.¹⁻² The end result is separation of the skin layers, also known as maceration. Prolonged exposure to any type of moisture, such as water, perspiration, urine and/or feces, wound exudate, saliva or mucous, may contribute to MASD.³⁻⁵ The length of time moisture is in contact with the skin, combined with previous skin injury and mechanical and/or chemical factors such as friction, shear and composition of fluid, are key factors in MASD development.^{2,4}

In addition, known skin irritants are found in the various types of fluid, including inflammatory substances, digestive enzymes such as proteases and lipases, and microorganisms. MASD is further linked with increased skin flora—such as coagulase-negative *staphylococci* and *Candida albicans*—that create an opportunistic environment for secondary infection.⁴ As the onset of MASD often goes undetected, it may first present as basic inflammation of the skin with or without skin breakdown.^{4,6} It is often only when significant inflammation, maceration and/or skin breakdown emerges that clinicians take notice and intervene.⁴

Although the term *MASD* can be applied to any of the etiologies provided, five specific types of MASD are reported in the literature. Throughout this document MASD may refer to any one of the following:

- Incontinence-associated dermatitis (IAD)
- Intertriginous dermatitis (intertrigo or ITD)
- Periwound (including peri-tube/drain and peri-fistula) MASD
- Peristomal MASD
- Immersion foot (trench foot) (IF)

The burden of MASD is significantly under-researched, with few recent studies and no known best practice guidelines. In the acute care setting, a recent prevalence study conducted in the United States found 4.34% of admitted patients had MASD (incontinence-associated dermatitis [1.54%], intertriginous dermatitis [2.66%], peristomal MASD [0.14%]).⁷ Another large-scale study addressing IAD, conducted in 448 nursing homes across 28 states in the United States, demonstrated an MASD incidence of 5.4%. Of these individuals, 89% went on to develop IAD within 14 days of their first episode of onset of incontinence.⁸ These studies highlight a need for further study and attention to this issue.

In the clinical setting, *MASD* is an overarching term often used to describe a wide array of skin damage caused by moisture. Many risk and etiological factors for MASD overlap with those related to skin tears and pressure injuries. This best practice recommendation document (BPR) will not address prevention and management strategies for skin tears or pressure injuries, but both can be found through Wounds Canada at www.woundscanada.ca/health-care-professional/resources-health-care-pros/wcc-magazine/12-healthcare-professional/110-supplements.

This BPR is intended to aid clinicians in their ability to identify and differentiate the types of MASD, to identify those at risk for the various types of MASD and to become familiar with strategies to prevent and manage all forms of MASD.

Types of MASD

Incontinence-associated dermatitis (IAD): Incontinence-associated dermatitis is a type of irritant contact dermatitis (inflammation of the skin) found in patients with fecal and/or urinary incontinence.⁴ The urea present in urine is transformed into ammonia by urease present on human skin. This reaction results in an elevation of pH that compromises the skin's acid mantle, thus reducing the chemical barrier effect of the skin.⁹ Feces contains proteolytic and lipolytic enzymes highly corrosive to the epidermis, with liquid feces having a higher concentration of these enzymes than formed feces. These cofactors in combination with excessive exposure to moisture increase the risk of epidermal injury.¹⁰ Earlier literature supports a prevalence range of 5.6–50%, with the higher being related to fecal or dual incontinence (both fecal and urinary).^{2,11} The reporting of MASD is often inconsistent, as many clinicians mistakenly document IAD as Stage 1 or 2 pressure injuries (PIs).⁴ This may also account for variances in reported prevalence. As IAD often coexists with PIs and is suggested to increase the risk of damage associated with pressure, it is imperative that clinicians are able to differentiate between the two. Friction, shear and pressure are contributing elements, often increasing the complexity of being able to accurately assess the etiology of the presenting MASD.²

Intertriginous dermatitis (intertrigo or ITD): Intertrigo is the result of friction in the presence of moisture. Areas of the body most susceptible to intertrigo are those where the skin is warm, where moisture can accumulate, and where the skin is prone to friction.⁴ These areas include, but may not be limited to, the axilla, inframammary, abdominal and inguinal folds.¹¹⁻¹² For patients dealing with incontinence-related issues, the presence of lower body folds in the lower pelvic region may also contribute significantly to morbidity.¹¹ Obesity and diabetes are two conditions considered to be related to an increased risk for ITD as they are both prone to physiological skin changes, including higher rates of TEWL and increased sweat gland activity,⁴ and a higher surface pH in prone areas.¹¹ Although ITD has no race or gender predilection, it does tend to be more prevalent in geographic regions with hot and humid climates. ITD may be seen as a moisture-related issue independent of complicating factors; however, it is more commonly seen in combination with overgrowth of microorganisms such as *Candida* species¹¹ or, less commonly, pathogenic bacteria.¹³ In one acute care setting, ITD was prevalent in 2.66% of all reported cases of MASD.⁷ The prevalence of ITD falls across a variety of sectors, with 20% of patients living in community dwellings, 17% in long-term care homes and only 6% in acute care settings.¹⁴

Periwound MASD: Periwound skin damage is multifactorial and often associated with irritant or allergenic contact dermatitis of the surrounding wound skin secondary to moisture. Literature pertaining to the prevalence of periwound MASD is scarce, and the exact burden remains elusive.¹⁴ Woo et al. hypothesized the impact of periwound skin MASD to be substantial.¹⁴

Wound exudate is created during the natural process of the inflammatory phase of wound healing due to infection, inflammation or systemic edema.¹⁵ When a wound is stalled, the concentration of metalloproteinases (a proteolytic enzyme) present in wound exudate increases, resulting in periwound skin damage and increasing the opportunity for maceration to occur.¹⁵ When factors such as inadequate compression or inappropriate selection of wound dressings are present, wound exudate may not be well contained and can accumulate on the surface of the skin. When moisture becomes trapped under a dressing there are two factors to consider: the length of time between cleansing the periwound skin and applying the dressing may not be sufficient, or the dressing selected may not have adequate capacity to handle the amount of exudate present. Inadequate cover dressings may cause the wound exudate to seep back out of the dressing, especially as the level of compression over the dressing increases. The resultant dermatitis may exhibit mild damage in the form of erythema or may escalate to denudation of the epidermis with erosions, skin necrosis and blisters.²

Peristomal MASD: The major determinant of skin damage around a stoma is the enzymatic-containing effluent, although other contributory factors can also play a major role. These include mechanical trauma or medical-adhesive-related skin injury (MARS) from appliances, bacteria, underlying skin disorders such as psoriasis or eczema, and the possibility of allergies to chemicals or fabrics.¹⁶ A multifactorial etiology is common, with mechanical trauma, moisture and stomal effluent all working in tandem to break down the epidermal barrier.¹⁷

Peristomal MASD affects 17.4% of people with colostomies and 34% with ileostomies, as appliance leakage occurs in more than 50% of the ostomates.¹⁴ A more recent study out of Japan concurs that those living with an ileostomy were more likely to experience peristomal MASD than those with a colostomy.¹⁸

Immersion Foot (IF): Immersion foot, or trench foot as it is also known, is a syndrome secondary to prolonged foot exposure to moisture¹⁹ and was first described in soldiers practising trench warfare in the early part of the 20th century.²⁰ More recently, a rise in



incidence has been noted among individuals who are homeless and those living with untreated serious mental health issues.²¹⁻²²

In IF, moisture damage to the stratum corneum, the outermost layer of skin, compromises barrier function. Prolonged exposure to wet conditions at temperatures above freezing results in peripheral neuropathy and microvascular damage.²³

IF may be further subdivided into that occurring only with prolonged exposure to water or in conjunction with severe cold injury. When occurring as a result of prolonged exposure to water alone, this pattern of damage is known as non-freezing cold injury (NFCI), as any prolonged exposure to water lower than normal body temperature can lead to localized hypothermia. Where temperatures are low enough to induce ice crystal formation in affected tissues, the term freezing injury (FI) is used.²⁴ Frostbite is FI in the absence of prolonged exposure to water. Early symptoms of both types of IF are burning or stinging of the distal extremities. Progression to severe pain is most often associated with tissue ischemia. In more severe injury, cyanosis with significant swelling of the extremities has been well documented in published literature.²⁰ For the purposes of this paper, frostbite injury will not be discussed, as it has no relationship to MASD, and both NFCI and FI will be referred to as IF.

The Wound Prevention and Management Cycle

This BPR is built on evidence-based recommendations and intended to direct users in the prevention, care and management of moisture-associated skin damage by using the Wound Prevention and Management Cycle: assessment, goal setting, assembling the team, establishing and implementing a plan of care, and re-evaluation of the patient condition within an integrated interprofessional team (see Figure 1). This process ensures that appropriate diagnosis is made and any factors affecting the skin's ability to heal (e.g., patient, environmental, system) are addressed as they become apparent via the initial assessment.²⁵

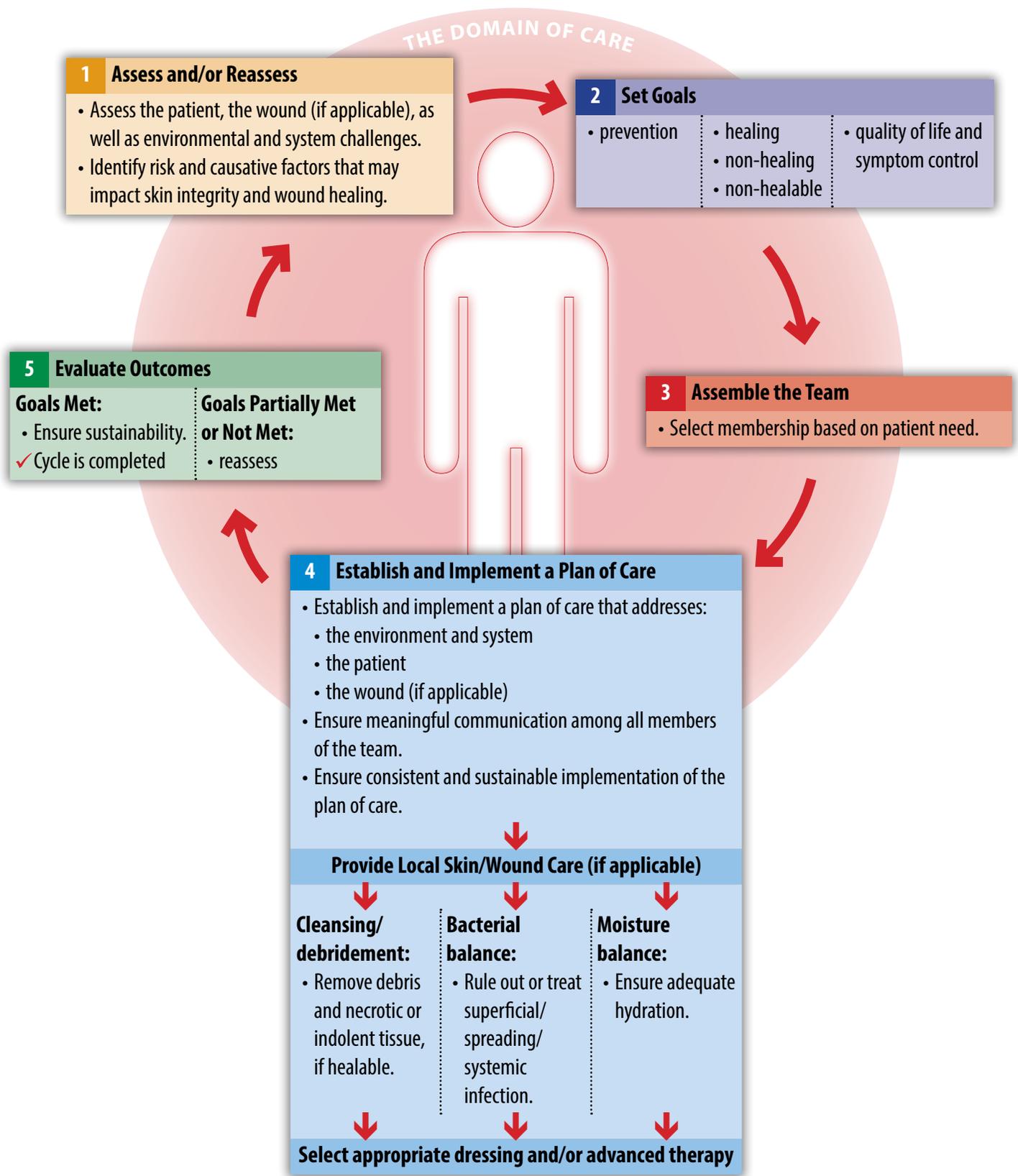
The Wound Prevention and Management Cycle uses five detailed, consecutive steps to provide the clinician with a logical and systematic method for developing a customized plan for the prevention and management of skin and wound complications from initial assessment through to sustainable management and prevention strategies.

The recommendations provided in this document are based on best available evidence and are intended to support the patient, the patient's family, the clinician, and the health-care team in planning and delivering evidence-based quality care. Two foundational papers supplement this document with additional empirical information and recommendations generalized to all wound types: "Skin: Anatomy, Physiology and Wound Healing," and "Best Practice Recommendations for the Prevention and Management of Wounds."

Three guiding principles, within the best practice recommendation papers, support effective prevention and management strategies for skin breakdown:

1. Utilization of the Wound Prevention and Management Cycle regardless of the specifics to prevent and manage skin breakdown
2. Consistent, accurate and multidirectional flow of pertinent information within the health-care team and across settings
3. Ensuring the patient remains the core of all decision making

Figure 1: The Wound Prevention and Management Cycle



Quick Reference Guide

The quick reference guide (see Table 1) provides the actionable steps and recommendations detailed within the Wound Prevention and Management Cycle. These recommendations are further broken down to provide the supporting level of evidence for each statement.

Each recommendation is supported using the Registered Nurses' Association of Ontario's (RNAO) level of evidence as outlined by the guideline's development panel (see Table 2). For more detailed information refer to the designated references.

Table 1: Wound Prevention and Management Quick Reference Guide

Step	Recommendation	Evidence	
1	Assess and/or Reassess	1.1 Select and use validated patient assessment tools.	la-IV
		1.2 Identify risk and causative factors that may impact skin integrity and wound healing.	la-IV
		1.2.1 Patient: Physical, emotional and lifestyle	
		1.2.2 Environmental: Socio-economic, care setting, potential for self-management	
		1.2.3 Systems: Health-care support and communication	
		1.3 Complete a wound assessment, if applicable.	la-IV
2	Set Goals	2.1 Set goals for prevention, healing, non-healing and non-healable wounds.	la-IV
		2.1.1 Identify goals based on prevention or healability of wounds.	
		2.1.2 Identify quality-of-life and symptom-control goals.	
3	Assemble the Team	3.1 Identify appropriate health-care professionals and service providers.	IV
		3.2 Enlist the patient and their family and caregivers as part of the team.	IV
		3.3 Ensure organizational and system support.	IV
4	Establish and Implement a Plan of Care	4.1 Identify and implement an evidence-informed plan to correct the causes or co-factors that affect skin integrity, including patient needs (physical, emotional and social), the wound (if applicable) and environmental/system challenges.	IV
		4.2 Optimize the local wound environment aided through	la-IV
		4.2.1 Cleansing	
		4.2.2 Debriding	
		4.2.3 Managing bacterial balance	
		4.2.4 Managing moisture balance	
		4.3 Select the appropriate dressings and/or advanced therapy.	la-IV
		4.4 Engage the team to ensure consistent implementation of the plan of care.	la-IV
5	Evaluate Outcomes	5.1 Determine if the outcomes have met the goals of care.	IV
		5.2 Reassess patient, wound, environment and system if goals are partially met or unmet.	Ib-IV
		5.3 Ensure sustainability to support prevention and reduce risk of recurrence.	IV

Table 2: Level of Evidence

Ia	▪ Evidence obtained from meta-analysis or systematic review of randomized controlled trials
Ib	▪ Evidence obtained from at least one randomized controlled trial
IIa	▪ Evidence obtained from at least one well-designed controlled study without randomization
IIb	▪ Evidence obtained from at least one other type of well-designed quasi-experimental study
III	▪ Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies
IV	▪ Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities

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Step 1: Assess and/or Reassess



Step 1: Assess and/or Reassess

The following section provides information for each of the five types of MASD: IAD, ITD, peristomal MASD, periwound MASD and immersion foot. Each type of MASD will be treated separately according to the best available evidence for each type.

Recommendations

1.1 Select and use validated patient assessment tools.

The literature has identified validated assessment tools pertaining to MASD. While beyond the scope of this paper, pain, nutrition and quality of life (QoL) assessments should be performed with each type of MASD (refer to [Best Practice Recommendations for the Prevention and Management of Wounds](#)). Woo et al. suggest pain is present in 25% of those with periwound MASD, likely as a direct result of periwound skin damage and consequent local inflammatory reactions.¹⁴ Increased pain can drastically reduce QoL and overall patient and clinician experience, negatively impacting participation in the plan of care. Given the strong link between malnutrition and delayed wound healing, and the fact that MASD is a form of altered skin integrity, clinicians should assess the nutritional status of individuals with MASD.²⁶

Staging and categorization tools are as important as validated assessment tools, as each stage or categorization works to standardize the language used when documenting, defines the state of a wound and may help to guide interventions. Where available, both staging or categorization and assessment tools should be used. Table 3 provides a list of evidence-based validated tools.

Table 3: Categorization and Assessment Tools for the Different Types of MASD

	Categorization Tool	Assessment Tool	Tool Validation
IAD	Ghent Global IAD Tool	Ghent Global IAD Monitoring Tool	Yes
	Perineal Assessment Tool		No
ITD	None available	None available	
Periwound MASD	None available	None available	
Peristomal MASD	The SACS™ Instrument	The SACS™ Instrument	Yes
	AIM (Ostomy Skin Tool)	DET (Ostomy Skin Tool)	Yes
IF	None available	None available	

Incontinence-associated dermatitis (IAD): A variety of tools are available to aid the clinician in identifying IAD or risk factors for the prevention of IAD. Implementing a validated assessment tool into practice may prevent unnecessary delays in identifying the correct etiology. This is important, as IAD is often misdiagnosed as a PI and/or skin tear.²⁷ One small prospective clinical study demonstrated predictive validity for risk factors, including loose or liquid stool, showing a sensitivity and specificity of 92% and 85.7%, respectively.²⁸ In a recent study, Gray and Giuliano report the presence of IAD as an independent risk factor for the development of sacral PIs.²⁹

The Perineal Assessment Tool (PAT) was developed to assess the risk of IAD using four main criteria: 1) type and severity of irritant, 2) length of exposure, 3) existing condition of the skin and 4) other factors such as the use of antibiotics, presence of

Clostridium difficile diarrhea, low serum albumin and tube feeding.^{4,27} The PAT demonstrated content validity and adequate interrater reliability; however, opinions differed on the frequency of use, and information was not reported to support the tool's predictive validity.³⁰

The Perineal Dermatitis Grading Scale is a descriptive tool used to evaluate four parameters of IAD: erythema, skin integrity, measurement (cm) of the affected area(s), and symptoms experienced by the patient.⁶ Another description tool reported in the literature is the IAD Skin Condition Assessment Tool. Designed to measure the severity of IAD, this tool includes three of the four parameters included in the Perineal Dermatitis Grading Scale: erythema, affected area(s) and presence of skin damage. There do not appear to be validation studies for either of these tools.⁶

The validated Ghent Global IAD Categorisation Tool (GLOBIAD), currently available in 19 languages, suggests any patient with any form of incontinence and intact skin should be considered Category 0, placing them automatically at risk of IAD.⁹ Category 1 and 2 are based on the duration of erythema and damaged skin, respectively, with both categories further subdivided based on the presence of clinical signs of infection. Using this tool to differentiate between categories demonstrated a sensitivity and specificity of 90% and 84%, respectively.³¹ Overall, interrater reliability was 0.41, intrarater reliability 0.61 and agreement was 0.86.³¹

The Skin Integrity Research Group (SKINT) based out of Ghent University took the GLOBIAD, combined it with a core outcome set, and developed the GLOBIAD-M, an outcome assessment tool to measure change,³² providing clinicians with a standardized way to monitor their interventions when treating IAD. The GLOBIAD-M demonstrated good interrater agreement and reliability when photographs were assessed by experts,³² providing an innovative assessment tool that can be used virtually in regions without immediate access to expert clinicians.

The Incontinence Associated Dermatitis and Its Severity tool is used to generate a score between 0 and 52 using 13 locations on the body and assessing for redness, skin loss and presence of rash.¹⁴ Face validity and content validity were determined.³³ Interrater reliability was also tested; however, the method used for statistical analysis was not provided. Criterion validity was determined using four case scenarios; agreement was 0.98.³³

Intertriginous Dermatitis (ITD): To date, there are no validated risk assessment tools for ITD, but common risk factors include hyperhidrosis, large skin folds, obesity, diabetes mellitus, poor hygiene and malnutrition. Hot, humid climates also increase the chances of developing ITD and increase the risk for those with the above-mentioned conditions.³⁴

Periwound MASD: There are various valid and reliable wound documentation tools that include parameters such as the periwound skin, wound edges and exudate characteristics. Tools such as the Revised Photographic Wound Assessment Tool (PWAT),³⁵ Bates-Jensen Wound Assessment Tool (BWAT)³⁶ and the Pressure Ulcer Scale for Healing (PUSH)³⁷ are available. However, none of these have been validated for outcome measures for MASD.

Peristomal MASD: The Ostomy Skin Tool (OST)³⁸ comprises two parts: 1) a discolouration, erosion and tissue overgrowth (DET) score (assessment tool), and 2) an assessment intervention and monitoring (AIM) guide that aids in categorization. The OST is

intended to measure the extent and severity of peristomal skin damage as a real-time assessment and was developed by an international group of 12 stoma care specialty nurses.³⁹ Martins et al. reported that the tool was reliable and valid, but provided no statistical analysis.³⁸

The Peristomal Skin Assessment Guide (PSAG) for clinicians is available on the [WOCN website](#). This guide has been developed to help standardize assessment, identify probable reasons for the complications and provide simple management options.

Another validated classification system is the studio alterazioni, cutanee, peristomali (SACS) study on peristomal skin lesions.⁴⁰ Criterion validity was determined, and its ability to accurately categorize was measured and evaluated to be very good.⁴¹ This tool enables clinicians to assess and classify peristomal skin lesions from urine or fecal sources.

Woo et al. developed a mnemonic teaching tool (MINDS) that categorizes peristomal skin injury into classifications of tissue injury (mechanical, infection, noxious, chemical irritants, diseases and skin allergens).⁴² The MINDS framework is limited in that it restricts mechanical peristomal skin injury to skin stripping, with no focus on medical-adhesive-related skin injury. Though frequently used in practice, the MINDS framework has not been validated.

To date, there are no validated assessment or categorization tools available for gastrostomies, tracheostomies, drains, tubes or fistulas.

Immersion foot (IF): Currently there are no risk assessment tools for immersion foot. Certain populations are known to be at higher risk, such as the homeless and those with poorly managed mental illness such as schizophrenia.²² For frostbite injuries, a classification system is available to identify grades of injury (see Table 4).

Table 4: Frostbite Injuries of the Extremity – Grades⁴³

Frostbite injuries of the extremity	Grade 1	Grade 2	Grade 3	Grade 4
Extent of initial lesion at day 0 after rewarming	<ul style="list-style-type: none"> Absence of initial lesion 	<ul style="list-style-type: none"> Initial lesion on distal phalanx 	<ul style="list-style-type: none"> Initial lesion on intermediary (and) proximal phalanx 	<ul style="list-style-type: none"> Initial lesion on carpal/tarsal
Bone scanning at day 2	<ul style="list-style-type: none"> Useless 	<ul style="list-style-type: none"> Hypofixation of radiotracer uptake area 	<ul style="list-style-type: none"> Absence of radiotracer uptake on the digit 	<ul style="list-style-type: none"> Absence of radiotracer uptake area on the carpal/tarsal region
Blisters at day 2	<ul style="list-style-type: none"> Absence of blisters 	<ul style="list-style-type: none"> Clear blisters 	<ul style="list-style-type: none"> Hemorrhagic blisters on the digit 	<ul style="list-style-type: none"> Hemorrhagic blisters over carpal/tarsal region
Prognosis at day 2	<ul style="list-style-type: none"> No amputation No sequelae 	<ul style="list-style-type: none"> Tissue amputation Fingernail sequelae 	<ul style="list-style-type: none"> Bone amputation of digit Functional sequelae 	<ul style="list-style-type: none"> Bone amputation of the limb ± systemic involvement ± sepsis functional sequelae

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1.2 Identify risk and causative factors that may impact skin integrity and wound healing.

Obtaining a detailed history in all areas of the biopsychosocial spectrum, in combination with a comprehensive physical examination, is essential in discovering all intrinsic and extrinsic causative factors. Only when these underlying factors are identified can a plan of care geared towards evidence-based prevention and treatment be developed. For risk and causative factors associated with the healing process, please see [Best Practice Recommendations for the Prevention and Management of Wounds](#).

1.2.1. Patient: Physical, emotional and lifestyle

Physical Assessment

Begin with a focused patient history and physical assessment to identify any risk factors for MASD. A physical assessment should include a skin assessment that takes into consideration the level of hydration (e.g., dryness, flaking, maceration), redness, areas of denudement, number of lesions, symmetry, location of changes, odour, peri-wound skin and skin colour changes, and the patient's ability to perform head-to-toe skin care.⁴⁴ Assess and identify the source of moisture to determine the type of MASD, as the plan of care to treat and prevent MASD depends on the moisture's origin. For those experiencing peristomal or periwound MASD, removal of any dressings or appliance and thorough cleansing of the area is required before inspecting the skin. Once the origin has been identified, implement steps to reduce the presence of moisture to protect skin integrity, and begin the wound healing process.⁴⁵

A comprehensive assessment must differentiate MASD from other underlying etiologies such as PIs. MASD is a major contributing factor known to increase the effects of pressure, and many expert clinicians report the average bedside clinician is not able to differentiate between the two.⁴⁶

Incontinence-associated dermatitis (IAD)

According to Beeckman et al., any individual with urinary and/or fecal incontinence is considered Category 0 (at risk for IAD);⁴⁵ therefore, performing a regular focused genitourinary assessment may be warranted to identify any variation in skin condition and avoid ensuing skin damage. Common locations for skin damage secondary to IAD are the sacrum, perineum, thighs and buttocks. Broken skin is at higher risk for secondary bacterial infection.⁴ During the physical assessment, the category of breakdown should be documented according to the GLOBIAD Categorisation Tool. Physical assessment should also include mobility and range of motion to determine the level of functional incontinence.⁴⁵ Obtain any previous urodynamic testing and imaging, and conduct a pelvic floor assessment to determine any factors contributing to incontinence.

Intertriginous Dermatitis (ITD)

The diagnosis of ITD begins with a review of the patient's medical history and a thorough physical examination with a focused skin assessment. During the skin assessment it is essential to include careful visual examination of axillae, groin, gluteal cleft, inframammary and abdominal folds as well as labiocrural folds (where the labia majora and the inner thighs meet).⁴⁶ Ruling out other various skin disorders is important, as many mimic the appearance of intertrigo but may require urgent intervention. Misdiagnosis can result in a significant adverse event.

A comprehensive skin assessment and the ability to differentiate between IAD and ITD is imperative, especially as these conditions may overlap. Friction, the force of two surfaces moving across one another (such as the mechanical force exerted when the body is dragged across another surface), can place a patient at increased risk of MASD secondary to ITD.⁴⁶ Friction in the presence of moisture creates an optimal environment for *Candida* to grow. Clinically, a cutaneous superficial *Candida* infection would appear as an erythematous patch, often shiny, with satellite vesicopustules prone to easy rupture.¹³ In contrast, IAD spares creases and folds, except when superimposed with a *Candida* infection. Although clinical assessment is typically sufficient to provide a diagnosis, a scraping for microscopic examination may be required to confirm the organism as *Candida sp.*¹³ During assessment for ITD the patient should lie in supine position to allow for all skin folds to be visualized.⁴ It is always safer to enlist the help of another clinician, where feasible, to help lift any folds and avoid further friction-related trauma.⁴

Periwound MASD

A comprehensive skin assessment should include inspection and documentation of the periwound skin and wound edges. Skin breakdown and excess moisture can lead to periwound inflammation and erythema, as wound exudate contains proteolytic enzymes that can break down intact skin.¹⁵ Include in the focused wound assessment the amount and type of drainage and attempt to identify and reduce the causative factor(s).

Periwound skin changes may also occur from using dressings that do not support the level of drainage or do not allow the skin adequate drying time prior to the application of an adhesive or silicone-bordered dressing.

Macerated skin is more permeable to microorganisms and prone to damage from friction and irritants than intact skin.¹⁵

Periwound skin damage from moisture leads to inflammation and denudation of the skin adjacent to the wound edge (within up to 10 cm of the wound edge) and secondary to exposure of wound exudate. Periwound skin damage is evident from the varying degree of skin maceration, erythema, edema, inflammation, denudation and destruction.⁴⁷ Currently there is no standardized tool to measure or assess periwound skin damage; however, such an assessment is similar to a wound assessment.



For instance, non-advancing wound edges are a common sign indicating excessive moisture. Erythema will present differently in those with darker skin pigmentation, so it may be more useful to consider hyper- or hypo-pigmentation when performing a periwound skin assessment.¹⁵ Assessment characteristics in the PWAT and BWAT both include those directly related to edge effect and appearance.³⁵⁻³⁶ The BWAT also includes assessment of wound exudate including exudate type and amount.³⁶ Although the BWAT is a great descriptive tool, the PWAT score provides the clinician with an objective score indicating whether the wound is improving or deteriorating.

Peristomal MASD

Peristomal skin damage must be assessed by performing a physical assessment. Peristomal skin damage is routinely assessed as part of ostomy (colostomy, ileostomy, urostomy, gastrostomy or tracheostomy), tube, drain and fistula care. MASD in a peristomal location incorporates the skin surface area that may extend out from the base of the stoma, in a circumferential manner.³⁸ Assessment of the peristomal skin includes inspection and palpation. Complications can be related to several etiological factors. Maceration is secondary to prolonged exposure to moisture, which is secondary to effluent from the stoma.⁴⁸ This can be related to inadequate application of the containment product or medical device. Caustic changes can occur to the peristomal skin when in contact with urine or feces, since the effluent contains chemicals and a high volume of enzymes and bacteria.⁴⁸

In addition to stomal effluent, perspiration is a source of moisture contributing to peristomal MASD. Begin the assessment with visual inspection of the skin and stoma, including skin colour and integrity and stoma location, size and shape.¹⁵ A primary factor to assess is the ability of the chosen appliance to contain the effluent and ensure the peristomal skin remains dry and intact.²⁵

Immersion Foot (IF)

An important part of the overall assessment of patients with this type of complication is to identify additional potential life-threatening injury prior to focusing on the extremities.¹⁹ Begin with a comprehensive physical, mental status and social assessment. Signs of neglect such as poor hygiene, broken nails and poor skin quality should trigger an assessment for malnutrition and other risk factors for IF.⁴⁹ Other identified factors for IF are tight and poor-quality clothing and footwear, clothing and footwear inappropriate for ambient weather conditions, obesity, inability to provide good foot inspection and hygiene, excessive foot sweating (extrinsic and intrinsic), living alone, poor mental health status and low socioeconomic status.^{23,49}

Clinicians should follow this with assessment for skin quality, pain and vascular status of the affected limb.⁵⁰ Reduced pulse quality or capillary refill should prompt referrals for vascular assessment. Evaluate severe injury with angiography, ultrasound and bone scan.⁵⁰

Emotional and Lifestyle Assessment

All forms of MASD are linked to diminished quality of life, so clinicians should assess for this as well: IAD can result in significant discomfort or pain, increasing the reliance on health-care



staff and facilities;⁵¹ ITD, with its associated itching, can lead to high rates of secondary fungal infections;¹³ peristomal MASD causes pain and discomfort requiring more frequent appliance changes;³⁹ immersion foot may lead to chronic pain and cold hypersensitivity seen in those affected by NFCI.⁵²

The psychosocial effects on an individual with MASD, regardless of type or etiology, need to be sensitively explored as early as possible.⁵³ Perform a psychological assessment to assess the level of impact of MASD on QoL of the patient, the family and the care partners.⁵³⁻⁵⁴ MASD can result in severe limitations on the activities of daily living as well as various other social activities such as dining out, travelling or engaging in intimate and/or sexual activity.⁵⁴ Barrow (2013) points out that detrimental psychological effects are far less common in people who feel like they have an influence on their situation and can participate in planning the next steps.⁵⁵

Modifiable risk factors can be defined as those within an individual's ability to change by making lifestyle adjustments. These may include weight, activities deemed harmful such as smoking, and diet. Non-modifiable risk factors would include those that cannot be controlled through lifestyle changes such as congenital conditions and non-reversible physiological impairments. See Table 5 for a summary of risk and causative factors for MASD.

1.2.2. Environmental: Socio-economic, care setting, potential for self-management

Evolving evidence shows individuals with predisposing dermatological issues, such as previous PI, dermatitis, and cutaneous fungal and bacterial infections, may be more prone to developing some forms of MASD.¹⁴ In Canada, populations at higher risk are those who have limited access to the health-care system (e.g., accessing home care in remote and rural regions). Fortunately, there is an increasing recognition related to diversity in health care. Culturally sensitive care has become the standard in many regions and health-care facilities throughout the world.⁵⁹ Those new to Canada, undocumented immigrants, individuals with low income, those who are uninsured or under-insured and those with low literacy are associated with poor health outcomes and the



Table 5: Modifiable, Non-modifiable and Causative Factors for MASD

Type of MASD	Modifiable Risk/Causative Factors
IAD	<ul style="list-style-type: none"> ▪ Urine and feces are the two primary sources of moisture. ▪ Urinary and/or fecal incontinence combined with friction between the skin and an absorbent product¹ ▪ Urinary incontinence ▪ Fecal incontinence provides greater risk of exposure to digestive enzymes present in feces that accelerates skin breakdown. ▪ Aged skin, altered skin oxygenation, fever, air flow restriction, decreased mobility²⁷ ▪ Prolonged use of steroids, antibiotics or promotility agents²⁷ ▪ Impaired functional, emotional or cognitive status and/or mobility⁸
ITD	<ul style="list-style-type: none"> ▪ Perspiration is the most associated source of moisture⁶ ▪ Often the result of moisture combined with areas of high friction ▪ Risk factors include high body mass index, lymphedema, multiple skin folds, pendulous breasts. ▪ Those who are malnourished, immobile, have poor hygiene habits or have diabetes mellitus.^{34,56} ▪ Hyperhidrosis, or profuse perspiration⁵⁶ ▪ Hot and humid climates⁵⁶
Periwound MASD	<ul style="list-style-type: none"> ▪ Wound exudate is the most common source⁶ ▪ Chronic wounds contain higher amounts of proteolytic enzymes.² ▪ Occlusive wound care dressings or products that increase the level of moisture to an excessive amount ▪ Individuals at higher risk include the elderly, the immunocompromised, or those with previous environmental skin damage (radiation, sun exposure), skin disorders (eczema, psoriasis), underlying pathology and congenital disorders (epidermolysis bullosa).¹⁵
Peristomal MASD	<ul style="list-style-type: none"> ▪ Primary source of moisture is stomal effluent: urine, feces or mucus⁶ ▪ Pulmonary secretions in those with tracheostomies⁵⁷ ▪ Ill-fitting or leaking appliance ▪ Stoma placement embedded within skin folds, flat or retracted stomas⁶ ▪ Fluctuation in weight, change in abdominal circumference⁶ ▪ Untrained clinicians and new ostomates applying appliances⁶ ▪ Gastric leakage from gastrostomies^{14,58} ▪ Peri-drain/tube drainage¹⁵
IF	<ul style="list-style-type: none"> ▪ Wearing wet footwear/socks for prolonged periods of time ▪ Obesity ▪ Inability or lack of assistance to perform foot hygiene ▪ Excessive foot perspiration ▪ Homelessness ▪ Plaster casts²² ▪ Long wear time of combat, construction or rubber boot

ability to provide self-managed care.⁶⁰ These factors compound for those considered to be of low socioeconomic status and directly impact the ability to fund the required items to aid in preventing MASD.

With health care shifting into the community sector, an aging population and a consistent lack of qualified clinicians in the community sector, it is increasingly necessary for patients to participate in self-managed care.⁶¹ For those with MASD, a precipitating factor is the ability to perform self-managed personal hygiene.

Table 6: Comparison of MASD Clinical Subtypes

MASD Type	Appearance	Clinical Features
IAD ⁴⁵	 *	<ul style="list-style-type: none"> Location: perineum, labial folds in women, scrotum in men, buttocks, gluteal fold, medial and posterior aspects of upper thigh, lower back^{4,6} Erythema and inflammation of the affected area(s) with or without skin breakdown⁶ Discomfort, pain, itching, burning⁸ Prone to secondary infections⁸ Extreme cases: swelling and blister formation may occur²
ITD ³⁴	 *	<ul style="list-style-type: none"> Location: axilla, inframammary, abdominal and inguinal folds, pubic panniculus, gluteal cleft and areas prone to harbour moisture Less common locations include interdigital, eyelids, antecubital, retroauricular¹³ Starts as mild erythema and can progress to severe swelling with maceration, denudation, weeping and crusting with potential secondary infection² Centralized erythema with satellite lesions often associated with <i>Candida albicans</i> Itchy, burning, pain and odour Chronic subtle onset of pruritis, burning, tingling and pain in the skin folds¹¹
Periwound MASD ⁶⁴	 *	<ul style="list-style-type: none"> Erythema and inflammation of the skin surrounding the wound up to 4 cm from the wound edge⁶ Maceration appears as reversible pallor secondary to excessive moisture and wrinkled skin⁶⁵ Edge migration may be diminished Hypergranulation tissue may be present within the wound edges Hyper- or hypo-pigmentation of the surrounding intact skin¹⁵
Peristomal MASD ¹⁵	 *	<ul style="list-style-type: none"> Location begins at the stoma-skin junction and may extend outward by up to 10 cm around the stoma¹⁵ Includes urinary and fecal diversions, tracheostomies and other stomas Erythema and inflammation of the peristomal skin with or without skin breakdown⁶
IF ⁶⁶	 **	<ul style="list-style-type: none"> Begins as tingling, itching and/or numbing feeling²⁰ Erythema or cyanosis with appearance²⁰ Feet may appear doubled in size as a result of edema Burning, pain Mild blistering Petechiae Numbness²²

*Photo courtesy of Kimberly LeBlanc

**Photo courtesy of Laurie Parsons

1.2.3. Systems: Health-care support and communication

Support from all levels of a health-care system is imperative for effective prevention and management strategies related to all forms of MASD. Currently provincial legislation mandates that organizations report on the incidence and prevalence of PIs but not for other nosocomial injuries such as skin tears or MASD. Although guidelines exist in some provinces, it is not mandated that organizations report metrics. Standardized language is a critical component of effective communication between clinicians. Clinicians require education and tools to be able to differentiate not only among PIs, skin tears and MASD, but also among the types of MASD. Standardized language and descriptions result in accurate and consistent documentation, increasing the opportunity to perform more accurate data collection and, where a clear description of a problem is reported, for a clinician to provide evidence-based interventions.⁶²

1.3 Complete a skin/wound assessment, if applicable.

Complete a comprehensive and focused skin assessment to determine the specific subtype of MASD and etiology (see Table 6). This should include, but may not be limited to, maceration, erythema and level of erosion.¹⁴ Where validated staging or categorization tools exist (GLOBIAD for IAD, or OST or SACS for ostomies), documenting the stage or category is essential to accurately collect data and to enhance communication through standardized language. Thorough cleansing of the area prior to a focused wound assessment will improve accuracy in identifying the level of tissue involvement and drainage type. Note the wound edges and appearance or breakdown of surrounding skin. These areas of breakdown are difficult to measure, as they often have no depth and are quite large and irregular in shape, spanning both sides of an area. Location of the affected area(s) will enable identification of the type of MASD



present. A skin biopsy can be an important diagnostic tool in the diagnosis of a wide array of inflammatory skin conditions and irritant dermatitis such as IAD and ITD; however, it cannot reliably discriminate between the two. Diagnosis should be based on clinical features with judicious use of percutaneous skin testing for contact dermatitis related to irritants and allergies.⁶³

Severity of MASD

MASD may be categorized as mild, moderate or severe and can occur in any age group, though it is more common in the extremes of age. Mild MASD presents with red, irritated and inflamed intact skin. Moderate and severe MASD are more complex and present with blistering and erosion and/or denudation of the epidermal to dermal layers of skin.²⁹ Once the damage has compromised the protective barrier function of the skin, secondary fungal or bacterial infection can occur. The challenge with classifying MASD as mild, moderate or severe is that this is based on a subjective assessment by the clinician; one clinician may interpret the signs as mild while another may interpret them as moderate. The negative impact MASD has on human life includes mild pain to severe discomfort, loss of dignity and reduced quality of life. The economic burden associated with the care and management of MASD is considered by many to be high; yet, to date, the full complexity and scope of this problem is not fully understood.⁶⁷

Step 2: Set Goals



Step 2: Set Goals

2.1 Set goals for prevention, healing, non-healing and non-healable wounds.

Please see [Best Practice Recommendations for the Prevention and Management of Wounds](#) for the definition of healable, non-healing and non-healable wounds. Although patients experiencing any subtype of MASD may face intrinsic and extrinsic barriers to healing, clinicians should always recognize the opportunity to promote healing, despite these factors, with adequate barrier protection and further skin barrier maintenance. Goals should include prevention, such as a distinct skin care routine in conjunction with methods of reducing friction and moisture within the affected areas.⁴ Bliss and colleagues were able to demonstrate this for IAD in a nursing home population, where results showed that participants following regular skin care regimens as a method of prevention were 46% less likely to develop IAD.⁸ In cases complicated by opposing skin surfaces and increased friction, such as ITD, donning products designed to reduce friction and wick away moisture may reduce the risk of developing complications;² reported outcomes on the use of moisture-wicking fabrics, however, has not been reported in the literature.¹⁴ Voegeli also supports the adoption of a regular skin care protocol, controlling the cause of moisture and treating and preventing any secondary infection.² For IAD, continence control is the key to successful management and prevention. Referral to a pelvic floor physiotherapist may allow for strengthening of the pelvic floor muscles. In some instances, a urinary or fecal diversion may be necessary. See Table 7 for a breakdown of examples of goals to be considered for each subtype of MASD.



Table 7: Potential SMART* Goals for MASD

Type of MASD	Goals
IAD	<ul style="list-style-type: none">▪ Prevent skin breakdown related to IAD.▪ Manage incontinence within 1 week.▪ Restore skin integrity within 2 weeks.
ITD	<ul style="list-style-type: none">▪ Prevent skin breakdown related to ITD.▪ Keep skin folds dry within 1 day.▪ Reduce the amount of friction in intertriginous areas within 1 day.▪ Resolve secondary infection if appropriate within 5 days.
Periwound MASD	<ul style="list-style-type: none">▪ Prevent periwound skin maceration.▪ Manage periwound skin maceration.▪ Resolve secondary infection if appropriate within 5 days.
Peristomal MASD	<ul style="list-style-type: none">▪ Prevent peristomal skin maceration.▪ Restore a healthy peristomal skin.▪ Resolve secondary infection if appropriate within 5 days.
IF	<ul style="list-style-type: none">▪ Prevention of further damage related to IF.▪ Restore skin barrier function.▪ Appropriate footwear within 2 days.

*SMART stands for *specific, measurable, achievable, realistic and timely*.

2.1.1 Identify goals based on prevention or healability of wounds.

All types of MASD should be considered healable, as the underlying factor is moisture secondary to a variety of mainly controllable factors, and the primary goal should be the prevention of future episodes of skin breakdown through methods of moisture control. In settings where licensed health-care professionals are present, all new cases



of MASD should be given independent consideration and be considered a nosocomial injury to the patient. Most institutions are mandated to audit for PIs on an annual basis; however, clinicians generally do not use this opportunity to document other prevalent skin injuries such as MASD or skin tears. Prevention of all categories of incontinence-associated dermatitis begins with a continence assessment including a functional assessment of the patient's ability to toilet and to regain or maintain their ability to toilet.^{47,68}

2.1.2 Identify quality-of-life and symptom-control goals.

The Wound Prevention and Management Cycle includes the patient in the planning of care by ensuring their goals are the primary focus. Clinicians must work with the patient and develop an individualized plan of care, always considering the patient's quality of life, values and wishes for treatment. Organizations investing in evidence-based skin care protocols are more likely to improve patient experience, increase the number of positive clinical outcomes and drastically increase the quality of life for those living with MASD.⁶⁹

Step 3: Assemble the Team



Step 3: Assemble the Team

3.1 Identify appropriate health-care professionals and service providers.

The World Health Organization (WHO) maintains that professionals who actively bring skills from different disciplines together, with the aim of clearly addressing the health-care needs of patients and the community, will strengthen health systems and lead to enhanced clinical and health-related outcomes.⁷⁰ Moore et al. define *multidisciplinary team* as a group of clinicians who independently assess, treat and provide recommendations for a given patient (what is currently seen in many scenarios), whereas an interdisciplinary (or interprofessional) team includes the patient and family in developing the plan of care and goal-setting process (where we need to be).⁷¹ The term *integrated team* might be the most appropriate, given that some members of the team will not be “professional” or represent a “discipline.”

The Wound Prevention and Management Cycle guides clinicians to consider all available team members when developing an individualized plan of care. Table 8 summarizes the role of each team member as it pertains specifically to MASD. Respectful and trusting partnerships among patients and health-care professionals is crucial in obtaining patient buy-in and agreement to engage in self-care strategies.⁷¹

Clinicians must know their community and the resources available within their catchment area to better facilitate seamless transition across sectors (e.g., from hospital to home, or home to respite). Establishing a culture of respect is the responsibility of all stakeholders, including every member of the interprofessional team, the patient and the patient’s support network, which may include the family or caregiver/care partner.⁷²

3.2 Enlist the patient and their family and caregivers as part of the team.

Patient participation is shown to increase positive patient outcomes and experience within health-care systems.⁷² As well, including the patient in their own plan of care can empower them, resulting in better overall health.⁵⁵ Clinicians must therefore initiate the conversation about self-managed care at the initial interaction to promote independence and encourage patients to actively participate in their care. All patients, care partners and health professionals should be equipped with information regarding the prevention and management of MASD. For this to occur, the team must first include the patient and define roles for the team. Next, the team should collaboratively establish expectations from each member to ensure full alignment. To be a contributing member and to optimize outcomes, the patient must fully understand their health-related conditions and all components of the plan of care. A well-functioning team with the patient at the centre increases the likelihood of successful engagement. This can result in higher patient satisfaction and QoL, greater comprehension of personal requirements, more informed decision-making ability, reduced anxiety and emotional turmoil, a stronger bond among members of the team and higher rates of healing.⁷⁵



Table 8: Professional Members of the Team

Discipline	Roles and Responsibilities for Wound Healing
Nurse Specialized in Wound, Ostomy and Continence (NSWOC) or nurse with advanced wound education	<ul style="list-style-type: none"> ▪ Performs comprehensive assessment to determine the source of moisture and optimize care planning to manage and prevent complications ▪ Acts as an advocate for the patient with publicly funding sources, when required
Physician or nurse practitioner (NP)	<ul style="list-style-type: none"> ▪ Co-ordinates care, including management of existing health conditions ▪ Provides necessary prescriptions to alleviate symptoms of MASD such as fungal infections, restoration of skin barrier function and inflammation ▪ Treats coexisting skin conditions such as eczema or psoriasis
Registered dietitian	<ul style="list-style-type: none"> ▪ Provides a nutrition assessment to ensure patients are consuming adequate amounts of micro and macro nutrients to support skin integrity and synthesis of healthy tissue ▪ Supports optimal nutrition for those at risk of dehydration and malnutrition, such as high output ileostomies and those losing excess fluid (e.g., diarrhea, vomiting) ▪ Maximizes nutrient intake for those with poor appetite or intake to meet increased nutrient needs required for wound healing ▪ Provides nutritional counselling to people with obesity, malnutrition, diabetes and other chronic diseases that impact skin integrity ▪ <i>For more information about the role of a dietitian, see Best Practice Recommendations for the Prevention and Management of Wounds.</i>
Personal support worker/care aid	<ul style="list-style-type: none"> ▪ Provides day-to-day care of the patient ▪ Identifies MASD at onset⁷³
Physical therapist	<ul style="list-style-type: none"> ▪ Teaches strength-building exercises to avoid muscle wasting, as patients may limit their mobility to avoid episodes of leakage or incontinence ▪ Assesses the strength and ability to contract and relax the pelvic floor muscles. This is performed by physiotherapists with additional education in pelvic floor management. ▪ Validates if pelvic floor exercises are correctly executed to determine effectiveness
Occupational therapist	<ul style="list-style-type: none"> ▪ Performs a surface assessment as certain mattresses increase moisture (e.g., low air loss when a fitted sheet is used). This example can also increase the risk of dehydration, demonstrating the importance of having the whole team assess and plan together. ▪ Assesses ability to self-care and provide tools to help maintain autonomy and activities of daily living within the home ▪ Performs cognitive and psychosocial assessment and provides interventions
Pharmacist	<ul style="list-style-type: none"> ▪ Reviews all medications to avoid possible interactions with any topical products being used, identify any drugs that may impact the ability to heal and/or provides alternative medication choices to increase adherence⁷⁴ ▪ Provides recommendations on a variety of continence-related medications such as diuretics, stool softeners and laxatives ▪ Collaborates with dietitian, as needed, when recommending vitamins, minerals and/or supplements
Social worker	<ul style="list-style-type: none"> ▪ Provides a psychosocial assessment ▪ Determines any financial or social supports needed (e.g., devices, funding for products)
Psychologist	<ul style="list-style-type: none"> ▪ Provides psychological and emotional support, since underlying factors that cause MASD may be associated with decreased quality of life ▪ Provides coping strategies, as needed

3.3 Ensure organizational and system support.

Individuals with MASD experience a significant decrease in QoL and are more prone to PIs and secondary skin infections, which may in turn be associated with increased financial costs to the health-care system.⁶

Organizational acknowledgement of risk factors and implementation of prevention strategies for the various types of MASD are crucial to prevent occurrence. Awareness, access and appropriate, evidence-based implementation of products among all members of the team are necessary to control the various sources of moisture for any type of MASD and reduce negative outcomes in any health organization; public or private.

A 2002 study demonstrated 21% of elderly women post hip fracture developed urinary incontinence while admitted to a hospital. One major finding was limited mobility as a key risk factor for incontinence.⁷⁶ In this instance, the organization, in collaboration with the health-care team, can include a toileting schedule for those admitted with mobility issues to reduce the likelihood of complications associated with incontinence. Costs associated with prevention strategies are likely to be far less than those associated with managing the resulting skin damage. With the increasing complexity of patients combined with ongoing staff shortages, it is no wonder the proportion of nurses reporting that they miss skin care in their regular routine of patient care is as high as 39.5%.⁷⁷ System support requires organizations to provide adequate staffing to ensure such vital prevention strategies are not missed.



Step 4: Establish and Implement a Plan of Care



Step 4: Establish and Implement a Plan of Care

4.1 Identify and implement an evidence-based plan to correct the causes or cofactors that affect skin integrity, including patient needs (physical, emotional and social), the wounds (if applicable) and environmental/system challenges.

Correcting the cause for all types of MASD includes removing the moisture source or, at a minimum, reducing the length of exposure time of the epidermis to the moisture source. Repairing the epidermal barrier with emollients and humectants and using appropriate products such as skin barriers and dressings to manage the moisture source are essential evidence-based strategies to include in each plan of care.^{10,15,78}

In cases of recalcitrant MASD, percutaneous testing may be necessary to look for potential allergic contact dermatitis.⁷⁸ Sources of contact allergens include topical antibiotics, preservatives, antioxidants and fragrances in skin cleansers, emollients and barrier creams. Components of the dressings themselves may act as allergens.⁸⁰⁻⁸¹ Testing for contact allergy may require a referral to a specialized centre.⁸²

Clinicians should always assess and manage emotional, social and psychological factors associated with MASD.

Peristomal skin complications are very specific and require the advice of experts. Consultation by an NSWOC is often required to reduce the risk of complications.

Table 9: Prevention and Treatment Strategies

Type of MASD	Prevention and Treatment Strategies
IAD	<ul style="list-style-type: none"> ▪ Assess and treat reversible causes of incontinence. ▪ Put in place a skin care regimen and ensure all team members are diligent with it. ▪ Optimize nutrition and fluid management. ▪ Provide appropriate containment products. ▪ Check containment products on a regular basis. ▪ Change products as soon as soiled. ▪ Introduce toileting techniques as able.
ITD	<ul style="list-style-type: none"> ▪ Apply moisture-wicking product impregnated with silver³⁴ or PHMB-impregnated gauze between the folds to wick away or absorb moisture. ▪ Select clothing that is loose-fitting and breathable, such as cotton. ▪ Make sure antifungal cream or oral antifungal treatment is continued for 7 days after the disappearance of clinical signs to prevent recurrence. ▪ Administer pain and antihistamine medication according to pain and discomfort assessment. ▪ Reduce or eliminate skin-on-skin contact.³⁴ ▪ Encourage, where able, weight reduction in case of obesity. ▪ Instruct patient and care partners on the importance of bathing, showering (especially after exercise) and carefully drying skin folds.
Periwound MASD	<ul style="list-style-type: none"> ▪ Use appropriate dressing types to manage moisture balance (See Wounds Canada's Wound Dressing Selection Guide) ▪ Apply a skin protectant (no-sting film barrier, petrolatum-based or zinc-based skin protectant) to the periwound skin to reduce the risk of periwound skin maceration.⁶⁵

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Peristomal MASD	<ul style="list-style-type: none"> ▪ Ostomy: <ul style="list-style-type: none"> ▪ Maintaining skin integrity relies on proper application and function of medical devices and skin barrier appliances, for adequate protection. ▪ Use appropriate technique and ostomy device to provide a good seal. ▪ Use hydrophilic barrier to ensure a good seal. ▪ Tracheostomy: <ul style="list-style-type: none"> ▪ Keep peristomal skin dry, and apply absorbent products that will keep the humidity away from the skin and absorb any leakage.⁵⁸ ▪ Apply moisture-wicking product impregnated with silver³⁴ or PHMB-impregnated gauze. ▪ Consider referral to a respiratory therapist and consider non-product-based treatment such as increasing frequency of upper airway suction. ▪ Gastrostomy: <ul style="list-style-type: none"> ▪ Identify and correct the cause of leakage. ▪ Keep peristomal skin dry and apply absorbent products that will keep the humidity away from the skin and to absorb any leakage.⁵⁸ ▪ Consider referral to NSWOC, stoma or gastroenterology nurse.
IF	<ul style="list-style-type: none"> ▪ Address physical and mental status and consider social assessment during acute events. ▪ Provide first aid to severely affected individuals by following the same treatment protocols for frost-bite.¹⁹⁻²⁰ ▪ Warm the affected area and keep dry. Dispose of wet footwear and provide warm, dry clothing. ▪ Once the initial treatment phase has passed in severely affected or symptomatic individuals or those at risk for re-injury, consider an assessment of quantitative peripheral sensory testing, using a tool such as Semmes-Weinstein monofilament. ▪ FI, like other cold injuries, should be treated as an acute traumatic injury: <ul style="list-style-type: none"> ▪ Rewarm actively and rapidly in a water bath (40–42°C). ▪ Passive rewarming is only acceptable when the first option is unavailable. ▪ Have the patient avoid nicotine or other vasoconstrictors during the period of rewarming. ▪ Provide thrombolytic therapy to identified candidate patients but only in an appropriate medical setting. ▪ Debride necrotic tissue if necessary at a later stage and only after completion of the rewarming cycle. ▪ Provide supportive care of post-injury nerve and skin damage. ▪ Educate patients to prevent repeat injury.¹⁹

Health-care professionals and individuals can contact Nurses Specialized in Wound, Ostomy and Continence Canada (NSWOC) to find a stoma care specialist in their area.

For a comprehensive overview of managing moisture of intact skin as well as skin exposed to all forms of MASD, see Table 7 in [Best Practice Recommendations for the Prevention and Management of Pressure Injuries](#), on pages 34–35.

4.2 Optimize the local wound environment.

The first step in treating any form of MASD is to control the moisture on the affected skin and prevent the moisture from accumulating and lingering. Management strategies are outlined in Table 10.

4.3 Select the appropriate dressings and/or advanced therapy.

IAD: Liquid film-forming acrylate sprays or wipes can provide an adequate barrier in instances with occasional incontinence. Ointments with a petrolatum, zinc oxide or dimethicone base are commonly reported to be effective and inexpensive barriers; cream-based products, however, are more likely to promote hydration in addition to

Table 10: Skin and Wound Management for MASD

	IAD	ITD	Periwound MASD	Peristomal MASD	IF
4.2.1 Cleansing	<ul style="list-style-type: none"> ▪ Wash with a gentle cleanser* (avoid soap or alkaline products).¹⁴ ▪ Cleanse the surrounding intact skin well.¹⁴ ▪ Pat dry; do not rub.⁹ ▪ Single-use washcloths are preferred.⁹ ▪ Use no-rinse skin cleansers. 	<ul style="list-style-type: none"> ▪ Use a noncytotoxic agent* (typically potable water, normal saline irrigating solution or an appropriate wound-cleaning agent).¹⁴ ▪ Cleanse the surrounding intact skin well.¹⁴ ▪ Pat dry; do not rub.⁹ 	<ul style="list-style-type: none"> ▪ Use a noncytotoxic agent* (typically potable water, normal saline irrigating solution or an appropriate wound-cleaning agent).¹⁴ ▪ Cleanse the surrounding intact skin well.¹⁴ ▪ Pat dry; do not rub.⁹ 	<ul style="list-style-type: none"> ▪ Wash with potable water. ▪ Use a soft or disposable cloth. ▪ Gently but thoroughly pat dry. ▪ Avoid soaps (especially oily soaps) and other alkaline products. 	<ul style="list-style-type: none"> ▪ Use a noncytotoxic agent* (typically potable water, normal saline irrigating solution or an appropriate wound-cleaning agent).¹⁴ ▪ Cleanse the surrounding intact skin well.¹⁴ ▪ Pat dry, do not rub.⁹
4.2.2 Debriding	<ul style="list-style-type: none"> ▪ No 	<ul style="list-style-type: none"> ▪ No 	<ul style="list-style-type: none"> ▪ No 	<ul style="list-style-type: none"> ▪ No 	<ul style="list-style-type: none"> ▪ Yes, if indicated by the presence of necrotic tissue and adequate blood flow
4.2.3 Managing bacterial balance	<ul style="list-style-type: none"> ▪ Category 1B where fungal infection is evident, apply a miconazole containing paste 1 to 2 times daily.⁹ ▪ Category 2B, where signs for increased bioburden is evident, apply a povidone-iodine lotion.⁹ 	<ul style="list-style-type: none"> ▪ Place silver-impregnated fabric between the folds to wick away moisture.⁸³ ▪ Use PHMB-impregnated gauze. 	<ul style="list-style-type: none"> ▪ Ensure periwound hygiene and protection.²⁵ 	<ul style="list-style-type: none"> ▪ Apply antifungal cream or powder in case of fungal infection. When applying cream, ensure the cream is well penetrated before applying the ostomy pouching system.⁸⁴ 	<ul style="list-style-type: none"> ▪ Prophylactic antibiotics have no benefit; however, if infection is suspected, target <i>streptococcal</i>, <i>staphylococcal</i> and <i>Pseudomonas aeruginosa</i>.¹⁹

cont'd...

providing a barrier. Containment devices may be required when severe incontinence is not well-managed using barrier films. Ensure that any barrier products used are compatible with the selected containment device. Successful prevention and treatment of IAD are dependent upon three strategies: the removal of feces and/or urine from the affected skin; the application of a moisturizer to repair skin barrier function; and the use of a barrier, usually in the form of cream, to prevent further damage to the epidermis from feces and urine.⁴⁵

Ayello and Sibbald's ACT (assess, cleanse, treat) Approach to Preventing and Treating the Cause of IAD includes, as a method of prevention, assessing those not yet experiencing skin breakdown:

<p>4.2.4 Managing moisture balance</p>	<ul style="list-style-type: none"> ▪ Use polymer-based incontinence products or underpads instead of non-polymer.⁸⁵ ▪ In the case of extensive diarrhea, it is preferable to apply pads instead of diapers. ▪ When applied, diapers should not be closed tightly. ▪ Use containment devices when appropriate.⁴ 	<ul style="list-style-type: none"> ▪ Place silver-impregnated fabric between the folds to wick away moisture.⁸² ▪ PHMB impregnated gauze. ▪ Antiperspirant, loose clothing, good airflow⁸⁶ 	<ul style="list-style-type: none"> ▪ Use a cover dressing** designed to absorb the exudate vertically to protect the periwound skin or absorbent enough to avoid any leaking on intact skin. ▪ Use absorbent dressings such as alginate, gelling fibre, polymers and foam.¹⁴ ▪ Protect the skin with no-sting barrier film or ointment-based skin protectant.⁶⁵ ▪ Explore the form and function of various products to ensure maximal absorption and skin protection (e.g., not all foam dressings will absorb and lock exudate away from periwound skin) 	<ul style="list-style-type: none"> ▪ Ensure the ostomy skin barrier is protecting the peristomal skin ▪ Assess pouching device to ensure proper fit and prevention of leakage.⁸⁴ 	<ul style="list-style-type: none"> ▪ N/A
<p>4.3 Select appropriate care or therapy</p>	<ul style="list-style-type: none"> ▪ Hydrophillic paste dressings. ▪ Petrolatum, zinc or dimethicone-based barrier ointments or creams. ▪ No-sting film barrier or ointment.⁸⁵ ▪ In the case of fungal infection, avoid the use of no-sting film barrier until the infection is resolved. ▪ Implement a personalized toileting schedule. ▪ If using containment products, ensure that barrier products are compatible with the containment device. 	<ul style="list-style-type: none"> ▪ Moisture-reduction products (4.2.3). ▪ Treat infection by lightly dusting with antifungal powder. ▪ Use of anti-inflammatory topical steroids when needed, for a limited period. Consider referral to a dermatologist for recalcitrant dermatitis. 	<ul style="list-style-type: none"> ▪ Apply a non-alcohol-based (or no sting) liquid skin protectant to the periwound skin. ▪ Apply barrier creams. ▪ Control moisture with appropriate absorptive dressings, ideally providing vertical absorption. In some cases, excessive moisture may be due to edema, which must be controlled (such as using compression in venous leg ulcers). 	<ul style="list-style-type: none"> ▪ Refer to an NSWOC or a stoma care nurse.⁸⁴ ▪ Consider referral to a dermatologist for recalcitrant dermatitis. 	<ul style="list-style-type: none"> ▪ Provide adequate oral analgesia (e.g., amitriptyline; however, this is still not well supported). ▪ Elevate affected extremity. ▪ Hypothermic Cooling. ▪ Slow rewarming. ▪ Pain relief.

*See product picker for skin and wound cleanup

**See product picker for dressing selection

Step 1: Assess the skin after each episode of incontinence to determine the irritant and note the condition of skin.

Step 2: Cleanse using pH-balanced solution, correct the cause and contain the effluent.

Step 3: Treat vulnerable, damaged, traumatized skin.⁸⁷ There is a role for using short-term topical corticosteroids to reduce inflammation until moisture balance is achieved. Care is required, however, to avoid epidermal atrophy from inappropriate topical corticosteroid use, especially if the steroid is used under occlusive products such as dressings and barriers.⁸⁸

ITD: Initial treatment must always include managing underlying factors. It is crucial to rule out any secondary infection prior to proceeding with a plan of care. It is also imperative that other skin conditions be ruled out.^{11,56} Methods of preventing moisture build-up include the use of antiperspirants, wearing loose clothing to avoid overheating, and trying to remain in air-conditioned places.¹¹

Treatment of intertrigo is dependent on reducing or removing the predisposing cofactors of heat, humidity and infection where present. Dressing choice is often difficult, as affected areas are frequently compounded by hard-to-dress locations and, in ambulatory patients, physical movement. Barrier creams, zinc or talc solutions and powders are of limited value; however, these products may be considered for recalcitrant cases.¹³ Other successful management strategies include placing a piece of textile with imbedded wicking fabrics in the skin fold to draw moisture away from the apex of the fold, thereby reducing the amount of moisture within the area; the effectiveness of this intervention remains unknown.¹⁴

There is often a role for targeting the overgrowth of yeast organisms with topical antifungal therapy. A variety of topical antifungal agents are used to combat fungal infections of the skin, including polyene antifungals, such as nystatin; azole-type antifungals, such as clotrimazole, econazole and ketoconazole; and allylamine antifungals, such as terbinafine, most of which can be applied twice daily for 10 to 14 days. Low-dose topical corticosteroids may also be used in combination with an antifungal to reduce epidermal inflammation and speed restoration of normal skin barrier function.⁸⁹



Periwound MASD: Effective treatment uses a two-pronged approach aimed at reducing the moisture on the skin and repairing skin barrier function.⁶⁵ Gray and Weir systematically reviewed the literature in an attempt to find the most evidence-based methods of managing excessive moisture. Their findings suggest the most effective method is to protect the skin using a no-sting film barrier or ointment-based skin protectant.⁶⁵

Peristomal MASD: Treatment and management of peristomal MASD can be difficult, because any investigation of dermatitis under an appliance must first consider etiologic factors. Treatment should always involve a nurse specialized in ostomy care such as, in Canada, an NSWOC.⁹⁰ Film skin protectants may not be appropriate for appli-

cation under an ostomy appliance, because many of the barriers are intended to adhere to dry intact skin. Therefore, it is essential to determine the source of moisture, most often leakage, and find a method to control it. For extreme inflammation, consult a dermatologist for additional steroid therapy. Overuse of a corticosteroid, however, can be damaging to the skin long-term, and follow-up skin assessment by a specialist in this area is recommended.

The selection of barrier to be applied around a tracheostomy site should be based on the ability of the barrier to keep the surrounding skin intact. This includes ease of application and removal, but any barrier should be used with caution to prevent obstruction.⁵⁷

IF: Less severe forms of IF (uncomplicated by ischemic injury or infection) should be managed with conservative measures of drying feet, applying a barrier cream and the use of appropriate analgesics.⁹¹ Evidence suggests, however, that some patients may experience a persistent vaso-neuropathy, even after resolution of the cutaneous findings, resulting in pain and/or persistent sensory abnormalities as demonstrated on Semmes-Weinstein and thermal testing.⁹² Prevention of reinjury can be accomplished by keeping the feet warm and dry with daily application of a barrier cream, ensuring the wearing of adequate footwear and use of appropriate analgesics if required.²⁰ Treatment



of severe injury is best achieved by slow rewarming of the affected limb(s) to prevent reperfusion injury.

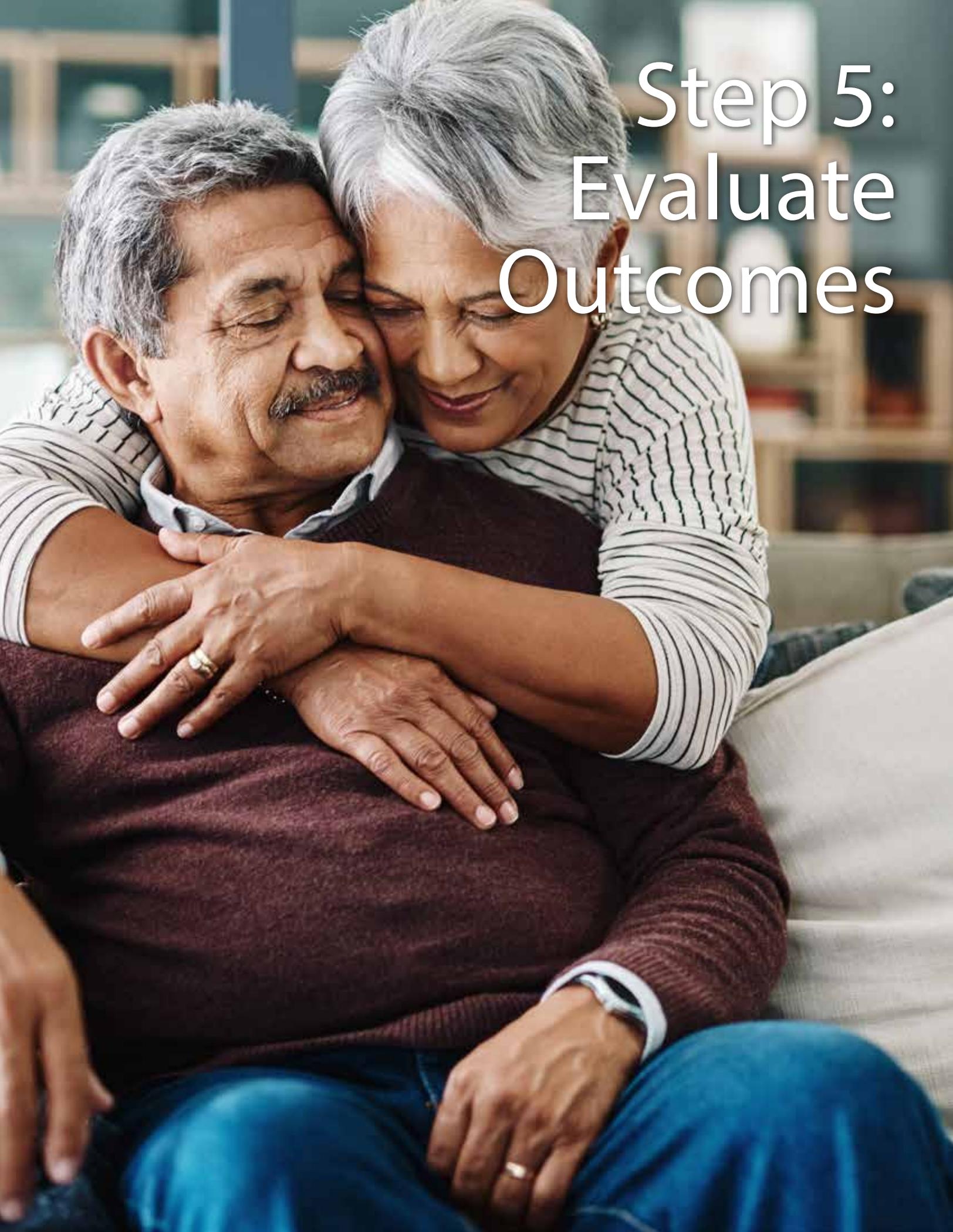
As well, persons living without adequate shelter or housing need support to obtain and maintain adequate foot hygiene practices and properly fitting shoes for various weather conditions.⁹³

Products *not* recommended for MASD are those that donate moisture to the area such as hydrogels or dressings promoting an occlusive environment, thereby restricting moisture evaporation.

4.4 Engage the team to ensure consistent implementation of the plan of care.

To optimize the outcome, it is essential to engage all members of the team in care planning. For nursing staff, education and awareness campaigns reporting the outcomes of prevention strategies for MASD can help to change practice. One study found the outcomes expected by the nurse directly influenced implementation of prevention strategies.⁷⁷

Keeping the patient engaged is crucial, as the patient will ultimately control many of the underlying factors that caused the MASD.

An elderly couple is shown in a close embrace on a light-colored sofa. The man, on the left, has grey hair and a mustache, and is wearing a dark red sweater over a light-colored collared shirt. The woman, on the right, has short grey hair and is wearing a white and black striped long-sleeved shirt. She has her arms around the man's shoulders and chest. Both are looking down with soft, affectionate expressions. The background is a blurred indoor setting, possibly a living room with bookshelves.

Step 5: Evaluate Outcomes

Step 5: Evaluate Outcomes

5.1 Determine if the outcomes have met the goals of care.

Reassessment of MASD helps clinicians determine if prevention and treatment plans have achieved the established goals. If a clinician implements a routine skin care regimen, an improvement should be noted within a two-week period.⁹⁴ If subtypes of MASD are not resolving and skin integrity is not maintained, it is necessary to reassess causative factors, barriers to healing and revise the care plan.

5.2 Reassess patient, wound, environment and system if goals partially met or unmet.

If the goals are only partially met or unmet, complete a systematic assessment to re-evaluate the goals and determine the reasons for unsuccessful management of MASD. Including team members is important in reassessing and exploring modifiable factors, patient involvement and patient ability to support the care plan.

A study by Woo et al. indicates erythema, maceration, erosion, related pain and patient satisfaction are crucial factors in considering outcomes for MASD secondary to IAD.¹⁴ (Other important outcomes for consideration are colonization and infection of MASD and MASD-related QoL.) Less-experienced clinicians should confer with the appropriate team members or other mentors to confirm the subtype of MASD. Other skin conditions, such as cutaneous fungal infections, dermatitis, bacterial infection and PI, should be ruled out in the assessment process.¹⁴

Timely referral and continued use of categorization and assessment tools can provide a foundation for development of validated assessment tools able to reliably detect change.

Patient Reassessment

The literature indicates that individuals with bladder and bowel incontinence are more likely to develop a PI than those who are not incontinent.⁸⁵ Pressure injury should be assessed in unresolved MASD, by appropriate clinicians, and prevention strategies implemented. Frequent skin assessments are required, and a bundled approach to care should be implemented if it is deemed that an individual is at risk of MASD and PIs.⁸⁵ Clinicians should also reassess mobility, overall nutrition, continence status and possible allergies.⁹⁵



5.3 Ensure sustainability to support prevention and reduce risk of recurrence.

Identifying and managing the cause of the MASD, type of MASD and patient barriers to healing are vital in reducing risk of recurrence. Incorporating prevention strategies into the plan of care can promote preventative behaviour throughout the management process.

Routine and Structured Skin Care Regimen

Implementation of a consistent and structured skin care regimen is essential for managing and preventing MASD. Education for patients, families and care partners regarding the skin care regimen is important in sustaining and reducing recurrence rates.

Social Isolation and Depression

The impact of MASD on the patient's psychological and social functioning is also an important consideration. Social isolation and loss of independence can lead to depression, something clinicians should be prepared to assess and manage. This includes ongoing evaluation and education of patients and families, including care partner education.^{32,96}

Environment

Assessment of an individual's environment is crucial to determine whether there is appropriate equipment, capacity to participate in self-care, and if the home is conducive to good hygiene practices. Knowledge of community resources (e.g., pharmacies within close proximity, access to food and medical supply stores, community supports) is helpful in supporting the patient to remain at home.

Cost Effectiveness

If risk factors for MASD are not well managed, individuals, care partners and health-care systems will experience increased costs. Health-care professionals and individuals need to be aware of the various products available.¹⁴ Guides, such as the Wound,



Ostomy and Continence Nurses' (WOCN) "[Body Worn Absorbent Product Guide](#)," are valuable in assisting health-care professionals with such decision-making. The greater health-care system should consider the entire cost of care and clinical outcomes when making decisions about publicly funded formularies and compendiums. Often the focus is on the hard cost of products versus the larger picture. For nosocomial-related MASD, organizations should not hold the patient accountable for funding their own products to manage situations caused by inadequate health-care resources. This is often the case post discharge, when the patient returns home.

Conclusion

The Wound Prevention and Management Cycle ensures the patient remains the focus of care and helps the clinician navigate through a comprehensive assessment and plan of care. It is critical to promptly recognize any emerging clinical signs of MASD and understand the differences among these types in order to make the right diagnosis. Taking the time to complete a holistic head-to-toe patient assessment will help to unveil underlying factors and aid in determining the type of MASD. This in turn enables the clinician to develop an appropriate health-care team and put in place an effective plan for prevention or care.

It's crucial for all team members to adhere to a standardized approach to ensure the continuity of care that is the key to obtain positive outcomes. Regular, ongoing education about MASD is strongly recommended.

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