Severity	0	1	2	3	4	5	6	Score
HEAT (Ref: Gauer, 2019)	No heat stress related symptoms or discomfort	Heat discomfort	Heat rash	Heat-induced muscle spasms/ heat cramps	Heat syncope (fainting, dizziness, light- headedness, brief loss of consciousness)	Heat exhaustion (headache, nausea, vomiting, exhaustion, weakness, dizziness, fainting, mental confusion etc.)	Heatstroke (body temperature > 40°C) Or Heat-induced seizures	
MOISTURE/ SKIN INTEGRITY (Ref: Beeckman, 2007 & Parnham, 2020)	Intact healthy skin without sweat buildup	Sweat buildup	Skin redness and irritation	Stage 1 pressure injury/ moisture lesion: Non-blanchable erythema of intact skin Or excessive sweat buildup	Stage 2 pressure injury/ moisture lesion: Partial-thickness skin loss with exposed dermis	Stage 3 pressure injury/ moisture lesion: Full-thickness skin loss	Stage 4 pressure injury: Full-thickness skin loss and tissue loss	
NEED FOR POSTURAL SUPPORT	Occasional wheelchair use	Standard canvas backrest & standard cushion	Contoured backrest or contoured cushion	Contoured backrest and contoured cushion	N/A	Full postural support system	Full postural support system with incontinence cover/coating	
MOBILITY IN CHAIR	No limitations in mobility	Almost no limitations in mobility	Slightly limited mobility	Moderately limited mobility	Very limited mobility	Mostly immobile	Completely immobile, sling required which remains between seat & client	
MEDICATION USE (Ref: Leon, 2015)	No relevant medication use	N/A	Antihistamine & anticholinergic drugs (impaired sweating) & spasmolytics (excessive sweating)	Antipsychotic & antidepressants (increased heat production)	Beta-blockers, calcium channel blockers (reduced blood pressure, reduced skin blood flow) & diuretics (dehydration & salt, potassium and calcium depletion)	Ephedrine & amphetamines (increased activity, heat production, impaired sweating or excess sweating, inability to regulate temperature)	N/A	

© LCS Ltd.

Heat & Moisture risk factor scale for wheelchair users

Using the Matrix:

Wheelchair users who have suffered from heat and/or moisture related symptoms **in the last twelve months** are encouraged to consult the risk factor scale overleaf to assess the severity of their symptoms. Research shows that certain conditions - **Spinal cord injuries, Multiple Sclerosis, Muscular Dystrophy, Cerebral palsy, Epilepsy, Ehlers Danlos syndrome, Hyperhidrosis, Fibromyalgia, Autoimmune disorder, Autonomic neuropathy, CNS disorder, Obesitas** among others - are particularly susceptible to health complications associated with heat and moisture, however, the attached risk matrix should be used by any wheelchair users concerned with heat and moisture risks. The matrix is designed to show the extent to which a patient is adversely affected by heat and/or moisture, which is measured in the first 2 rows of the matrix. When filling in those 2 rows, **keep in mind the hottest period of the last year or the period in which the symptoms were most prevalent.** If a patient scores at least 3 points on either row, heat and moisture management is advised.

Besides heat and moisture, other factors have also been included, such as **medication use** - which can influence one's ability to **thermoregulate, sweat, or vasodilate** - and those relating to seating and wheelchair use. For instance, if the user needs extra postural support, this requires a more **enclosed seating structure** which can limit airflow and increases contact with the seat area, **resulting in a higher chance of heat and moisture build-up.** Similarly, users who are **immobile** are likely to have greater difficulty changing their seating position. This can restrict airflow movement and **generally increases the risk of pressure sore formation**. Controlling heat and moisture can therefore be an important consideration in these situations. These risks are measured in rows 3 to 5.

In general, **heat and moisture related symptoms are more common in people who are living/working in an environment with a high temperature and/or high relative humidity.** These people could benefit more from heat and moisture management.

Good to know:

When assessing wheelchair users who struggle to, or are unable to, communicate, check for heat and/or moisture related symptoms, such as **scratching, agitation, visible sweat on skin and daily clothing changes**, which may be indicators of poor heat and moisture management.

How often?

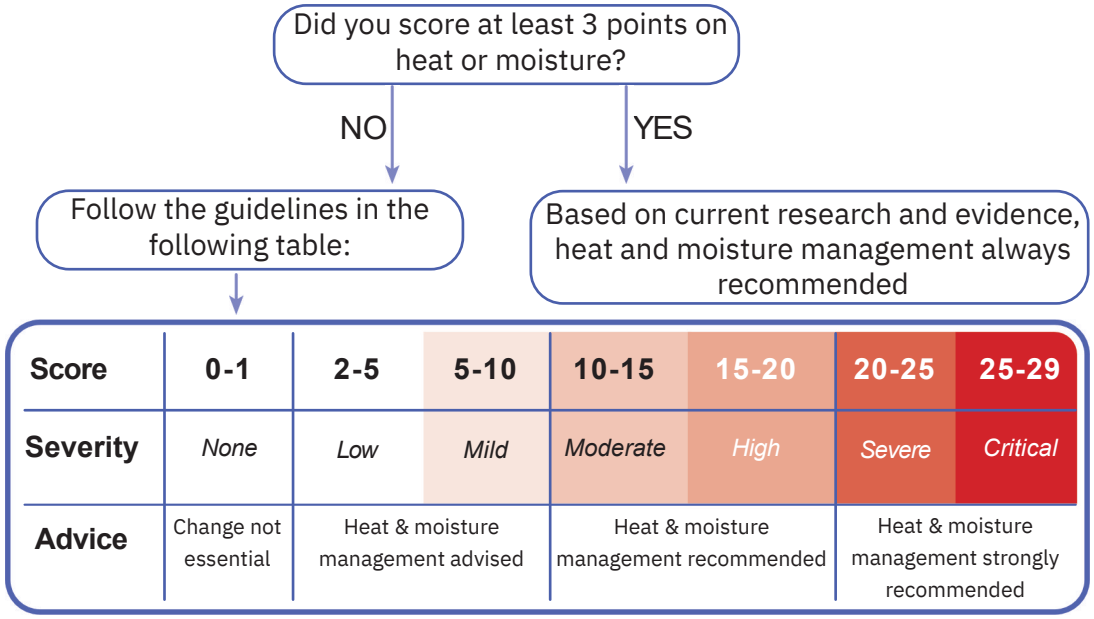
We advise revisiting the matrix if the clients' symptoms change. Newly injured wheelchair users, for instance those with an SCI, are at risk of developing an increased amount of body heat in the first two years post injury. In these instances it is advised to re-evaluate the client every six months. For those with stable symptoms it is advised to consult the matrix every time a new wheelchair or seating system is needed, to evaluate the current heat and moisture related symptoms. It is most cost effective and least time consuming to implement the management tools from the outset.

Scoring the Matrix:

The matrix plots the severity of symptoms against the level of risk associated with overheating and over-sweating. In other words, the higher the severity, the more a patient could benefit from better heat and moisture management.

If a patient scores at least 3 points on heat or moisture (rows 1 and 2 of the matrix), regardless of their total points tally, heat and moisture management is recommended to prevent medical complications, based on current medical evidence.

As with every tool that measures symptoms, the patient can value some symptoms more than others. This tool is indicative for patients who could benefit from better heat and moisture management.



Score	0-1	2-5	5-10	10-15	15-20	20-25	25-29
Severity	*None*	*Low*	*Mild*	*Moderate*	*High*	*Severe*	*Critical*
Advice	Change not essential	Heat & moisture management advised		Heat & moisture management recommended		Heat & moisture management strongly recommended	

References:
1. GauerR, Meyers BK. Heat-Related Illnesses. Am Fam Physician. 2019 Apr 15;99(8):482-489. PMID: 30990296.
2. Beeckman D, Schoonhoven L, Fletcher J, Furtado K, Gunningberg L, Heyman H, Lindholm C, Paquay L, Verdú J, Defloor T. EPUAP classification system for pressure ulcers: European reliability study. J Adv Nurs. 2007 Dec;60(6):682-91. doi: 10.1111/j.1365-2648.2007.04474.x. PMID: 18039255.
3. Parnham A, Copson D, Loban T. Moisture-associated skin damage: causes and an overview of assessment, classification and management. Br J Nurs. 2020 Jun 25;29(12):S30-S37. doi: 10.12968/bjon.2020.29.12.S30. PMID: 32579457
4. Leon LR, and Bouchema A. Heat Stroke. . Compr Physiol 5:611-647, 2015. DOI: 10.1002/cphy.c140017.

For more information, or if you have questions or suggestions, please contact info@wheelair.eu or visit wheelair.eu

© LCS Ltd.

WheelAir by LCS