

rehab@work!

Issue One | 2009

**work lesson hits
home for OT**

**pressure ulcer
prevention &
treatment**



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wheelchair
seating

**managing temperature
& moisture**

Publisher's Note

Welcome to *rehab@work!* While rehabilitation encompasses many areas of practice, there is one thing shared by all of those providing solutions—the desire to improve the quality of life for those affected by disease, disability and injury.

I hope you find the stories and information inspirational and motivating as you continue your quest to finding the best possible solutions for your clients. As always, we will continue to do our part, and provide you with educational information, and innovative, reliable and effective products to facilitate better living solutions.

Sincerely,

Alan Kline, HPU Rehab

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All products mentioned in this supplement are available through HPU Rehab.

Did you know...



the quickest way to damage or kill a cell is to deprive it of sufficient supplies of

O₂

In 2007
there were a total of
12,296

active registered
OTs in Canada
or 8,507, not
including Quebec

Source: Canadian Institute for Health Information, Workforce Trends of Occupational Therapists in Canada, 2007 (Ottawa, Ont.: CIHI, 2008).

skin surface
perspiration
threshold is
32 °C – 33 °C

65%–70%
of body weight
is supported by
the buttocks
and posterior
thighs



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for contest
details



solutions@work by Lisa Masters

Work lessons hit home

In my second year of practice I had the opportunity to work with a young client who would teach me many things about myself and about being a good occupational therapist. She was 18 years old at the time that she was admitted to hospital with what doctors believed was a rare, and aggressive form of multiple sclerosis. As a young woman myself, on the verge of starting my own life I remember my sadness at the realization of all that she would not experience. In an effort to try to help other team members understand some of her anger, I specifically remember saying “she will probably never dance at her wedding”.

Little did I know at the time, that one year later, in a much less serious manner, I would face that exact situation. A week before our wedding, I broke my foot. Naturally, I was devastated at the thought that I would not walk down the aisle on my dad's arm, I would not stand in front of family and friends to say my vows, and I would not dance at my wedding. My friends and family were very supportive, trying to come up with all kinds of ideas to make the day special, but I thought nothing could make the day what I had always dreamed it would be. The day of my wedding came and my devastation lifted. I was still a bride and I was still marrying the man of my dreams. I walked down the aisle on crutches beside my very proud father, I perched on a stool to say my vows in front of my loving family and friends, and when the ceremony was over, my new husband scooped me up in his arms and carried me out. And as for the dancing, my husband held me in his arms for our first dance and then I

spun around the dance floor all night in a wheelchair and Action Xact® cushion, which I was lucky enough to borrow!

Although it was not the fairy-tale wedding you dream of as a child, it was the most perfect wedding I could have ever imagined! As I reflect back on my experience, in no means do I mean to compare my situation to that of my client. What I learned though and what I hope we as therapists can learn, is the importance of trying to understand what is important to our clients, to develop empathy and understanding, and to find a way to help them live their life, their way.

The biggest complaint you often hear about gel cushions is their temperature. What amazed me was how I did not find the cushion too cold outside (it was a January wedding) or too hot after sitting and dancing for over 8 hours, even in a wedding dress! I was also very impressed with how comfortable it was, I didn't feel any pressure points or the need to weight shift all night.

Lisa Masters, Occupational Therapist,
Hamilton Health Sciences

What I learned though and what I hope we as therapists can learn, is the importance of trying to understand what is important to our clients, to develop empathy and understanding, and to find a way to help them live their life, their way.



Managing **temperature** & **moisture** in wheelchair seating

Background

Manufacturers from around the world produce wheelchair cushions that provide comfort, skin protection and also help with postural support and stability. Some cushions are made of foam, others use air while others use liquid or gel materials. Many cushions use a combination of several of these materials. The control of temperature and moisture has not been a major consideration in cushion selection since cushions that are designed to control temperature and moisture did not really exist until 2006.

One of the key cushion characteristics is the ability of a cushion to minimize the risk of skin ulcer formation. Historically, high interface pressures and long sitting times have been identified as the two major contributing factors in skin ulcer development for wheelchair riders. As a result, cushion designs have been focused on managing the overall and peak pressures during sitting.

Other factors such as shear, heat and moisture have also been shown to contribute to skin breakdown. High interface pressures and extended sitting times are factors that should not be ignored, but recent research shows that skin temperature and moisture may be equally as important.

How are skin ulcers formed?

There are books written on this subject with more information than the average person can really take in. To bring the understanding down to the most basic level we need to think about the skin and soft tissue underneath as a group of living cells. These basic building blocks of the body need nutrition and oxygen to survive. The cells get this nutrition and oxygen from the blood supply and can die if the blood supply is cut off for even a short period of time. After a group of cells die, they start to decompose, resulting in the formation of an ulcer.

All of the tissues in the body require a constant re-supply of nutrients and oxygen. The body regulates blood flow to meet the needs of the tissue, increasing the flow when there is a higher requirement such and decreasing blood flow when the requirements are lower. A good example of this is found when you exercise or do hard physical labour. As the muscles work harder, they require a greater supply of oxygen and other nutrients so the heart beats faster and harder to supply a greater flow of blood to the tissues. Increasing the temperature of the tissues also increases metabolic demand. The body does a very good job of matching the flow of blood to meet changing metabolic needs.

When we discuss skin ulcer formation, we are really talking about the end result from an imbalance in blood supply and demand. This metabolic imbalance is caused in two ways. When a person sits on a cushion several things happen. The first thing is a decrease in blood flow due to compression of the skin and muscle tissue. The second thing is that the skin temperature starts to increase. As the skin temperature increases, the demand for blood flow also increases. This creates a problem where the blood flow may stay the same but the demand for blood is increased by the rise in temperature.

Temperature and metabolism

Research has proven that increasing skin temperature by one-degree (C) results in a 10% increase in demand for blood flow. Researchers have demonstrated the link between temperature and pressure with studies where a series of temperature controlled discs were used to apply high pressure to the soft tissue on the backs of swine for a period of 5 hours. At the end of the test, it was found that there was no skin ulcer formation at any site for the 25 °C temperature, while the sites at 35 °C and above showed significant tissue damage. This information is extremely important due to the fact that skin interface temperatures on most wheelchair cushions will increase to 35 – 37 °C in two hours or less on sitting.

Moisture and skin integrity

The control of moisture is also an important aspect of skin care. When a person sits on a cushion the temperature of the skin begins to increase. This rise in skin temperature can raise the demand for oxygen and nutrients but it also can increase the humidity at the skin surface. Normal skin temperature is around 27 °C but will rise to 37 °C or higher at the seat cushion contact area within 60 to 90 minutes on most cushions. Sweating is triggered when the skin reaches 32 – 33 °C.

Moisture at the skin will soften the connective tissue structure and make the skin less able to resist physical damage from sitting or sliding on the wheelchair cushion. The second problem is that in combination with heat, the moistened skin is a very good environment for the growth of bacteria. This dramatically increases the risk of cracking and skin infection.

Controlling heat and moisture in the wheelchair

The importance of controlling heat and moisture in cushions and backs is stimulating product development from manufacturers. At this writing, there are several wheelchair cushions that include temperature or moisture control as part of their design. As we continue to learn more there will undoubtedly be even more products to choose from.

The first manufacturer that seriously addressed the heat and moisture issue developed a line of cushions that use airflow across the seat contact area to minimize the normal heat build-up common to other products. The cushions use a firm molded foam base that is pre-contoured and transfers load to the hips and away from the areas of high heat and moisture build-up.



These cushions have a special mesh inner and outer cover and have air channels molded into the cushion surface. This combination of air exchange fabrics, contoured foam and air pathways allows for airflow across the center of the seat cushion surface. It is the airflow that prevents the skin temperature from increasing. The cushion does not create cool air, but instead provides airflow between the cushion and the person and limits the normal increase in skin temperature and also has been shown to reduce moisture at the skin surface.

The cushions come in two models, one that uses passive airflow and one that includes a small but efficient built-in fan to circulate the air. The fan runs on rechargeable batteries and can be charged just like a cell phone. The battery pack will run the fan for a minimum of 18 hours on a charge.

Backrests

Recent research has shown that heat build-up is not restricted to the seat cushion but is also a problem with both standard and full-contoured backrests. In one study the temperature at the skin increased to 35.8 °C after only 60 minutes in a full-contoured backrest and increased to 36.2 °C in a standard off-the-shelf back, again in just 60 minutes. Following the same general methods for positive airflow that is used in the cushions mentioned earlier, the temperature in the full-contoured back were held to 27.7 °C. Temperature in the off-the-shelf back was also much lower with the addition of positive airflow, keeping the temperature rise to 26.1 °C.

Controlling temperature and moisture is extremely important for many clients especially people with a diagnosis of MS or people with other temperature control difficulties.

Summary

Temperature and moisture have a significant impact on comfort, and the development of skin ulcers. Methods to control or manage the increase in skin temperature in seated individuals should be considered as part of the evaluation and provision of equipment for persons at risk of tissue trauma development.

Allen Siekman has over 30 years of clinical experience as a seating specialist, designer and educator specializing in the design and provision of seating equipment for children and adults with moderate to severe physical challenges.

Pressure ulcer prevention & treatment

As an Occupational Therapist working in community private practice with a clinical focus in seating and mobility, I am presented with a high volume of clients at high risk of pressure ulcers. The primary causes of pressure ulcer formation are constant pressure and/or friction or shear, but these factors are not present in isolation. Temperature, moisture and nutrition also play a critical role in pressure ulcer formation.

In a 2004 Canadian Association of Wound Care study, it was found that the prevalence of pressure ulcers was 30% in non-acute care settings (e.g. long term care) and 15% in community care (Woodbury & Houghton, 2004). In Canada, it has been demonstrated that the cost of one month of treatment for a pressure ulcer in the community is \$9000.00 (Houghton, 2004).

It is therefore critical that we, as health care professionals and caregivers, identify and implement solutions to prevent pressure ulcer formation and to aid in their treatment if present. The information below is based on my own client population:

High-risk clients receiving OT interventions:

- elderly clients with dementia residing in LTC; and
- clients with significant physical impairments living in their own homes (e.g. spinal cord injuries or Multiple Sclerosis).

Factors making these clients high risk include:

- decreased ROM and strength and/or impaired cognitive or sensory capabilities which limit their ability to or awareness of the need to reposition themselves;
- postural anomalies (e.g. pelvis, back) affecting seated position and contact points;
- lack of normal temperature regulation and/or significant physical reaction to an increased body temperature
- impaired communication
- long periods of sitting in their wheelchairs;
- inadequate nutritional intake; and
- incontinence.

Also important, is that these clients frequently have multiple caregivers, and therefore seating and mobility solutions must be easy to implement, use and maintain.



To aid in the prevention and/or treatment of pressure ulcers, for my high risk clients living in the community or LTC settings, I have found the AireRx™ cushion, newly introduced to the Canadian marketplace, to be an effective cushion. As a cushion's design and materials can dramatically impact pressure distribution and stability, as well as heat and moisture, the AireRx™ has shown favourable results for those at high-risk.

With its multi-density foam construction and anatomically designed contours, the AireRx™ shifts the pressure laterally to the greater trochanters and down along the femurs/thighs. This construction stabilizes the pelvis laterally leaving the ischials and coccyx with decreased pressure, almost as if "floating" over the cushion, while at the time, providing excellent pelvic stability and pressure distribution.



It's important to remember though, that a seat cushion cannot work in isolation. As a therapist it is critical to assess the pelvis (in sitting), the musculature (e.g. shortening of the hamstrings) and the curvatures of the spine/back (kyphosis, scoliosis, and lordosis).

To achieve proper positioning with the AireRx™, or any off-the-shelf cushion, the pelvis needs to be in relatively neutral alignment with a slight fixed rotation and/or obliquity; the centre of the trunk mass must be positioned over the pelvis or inevitably, the client will slide forward or their trunk will flex forward.

Other important benefits that I look for when considering a cushion for use with my high-risk community clients are the cushion's ability to minimize heat and moisture build-up, and whether there is any ongoing maintenance.

Based on my clinical findings as noted, I have found the AireRx™ cushion line to be an effective seating solution to consider for treating high-risk clients living in LTC or the community.

I would recommend trialling it with your clients to assess its effectiveness with the high risk client populations that you serve, and to gain your own professional opinion.

Debbie Taylor is a registered Occupational Therapist in private practice.

Sources:
Allen J., Houghton PE. *Electrical Stimulation: A Case Study for a Stage 3 Pressure Ulcer. Wound Care Canada. 2004;2(1):34-36.*

Woodbury MG, Houghton PE. *Prevalence of pressure ulcers in Canadian health-care settings. Ostomy/Wound Management. 2004;50(10)22-38.*

Understanding cushion features

Cushions address a range of support, stability and pressure management issues. Ultimately, seating choices should be based on the most important functional requirements of the user, taking into consideration anatomical features, movement patterns, risk of tissue trauma and desired outcome.

Below is a sampling of Xact® and AireRx™ cushion features, and the benefits and applications each feature has to offer. **TIP:** If you are not familiar with a cushion's performance, ask the dealer, distributor or manufacturer to trial the cushion.

XACT® Features	Clinical Benefits	Clinical Applications
Lightweight (XACT® Lite)	Simplifies handling and transfers Minimizes overall weight of the chair to ease propulsion Easy to self-reposition	Active users Clients with low level spinal cord injuries, early stages of multiple sclerosis, lower extremity trauma (e.g. amputation) Transfer to multiple surfaces
Akton® Polymer (XACT® Lite & Soft)	Increases immersion to optimize pressure distribution Reduces shear	
Cover (XACT® Lite & Soft)	Anterior panel "grips" the clients thighs, stabilizing the pelvis and assists in preventing sliding Multi layer posterior panel to minimize ischial shear	
Vacuum sealed cushion (XACT® Lite & Soft)	Incontinent proof Easy to clean/maintain Promotes durability & longevity	
Pre-contoured cushion (XACT® Soft) Multi-density foam base with pre-ischial ridge and leg channeling	Stabilizes the pelvis and improves positioning Optimizes pressure distribution over the widest possible surface area Provides comfort Does not interfere with transfers Facilitates positioning for foot propulsion	Clients at mid to high risk for skin breakdown Clients with limited ability (physical or cognitive) to reposition themselves Clients who are elderly or who have neurological impairment (CVAs, ABIs, Cerebral Palsy)
AireRx™ Features	Clinical Benefits	Clinical Applications
Highly contoured cushion Multi-density foam construction with contours that resemble natural anatomy	Optimizes pelvic stability Distributes pressure so that it is reduced in high risk areas and transferred laterally out and along the thighs Provides firm support to optimize transfers and balance	Clients who are at high risk or who already have skin breakdown at ischials or coccyx Clients unable to reposition themselves in the chair (cognitively or physically) Clients who have impaired temperature control
Front to rear contours	Allows air to flow and prevents heat and moisture build-up Channels fluid/moisture down and away from user	Clients with multiple caregivers (e.g. residing in a LTC home or in a group home) Clients with high level spinal cord injuries, neurodegenerative conditions such as MS or ALS, elderly individuals with significant cognitive impairment (e.g. Dementia, Multiple CVAs)

XACT and Akton are registered trademarks of Action Products Limited, USA

product profile

Transfer bench/ swivel slider



This product is available from HPU Rehab. Call 416.739.1267 or visit us online at www.hpurehab.com

Features	Clinical Benefits	Clinical Applications
Swivel seat enables clients to turn 90 degrees	Will facilitate a number of transfer directions/positions to accommodate client need or the environment	Clients with significantly impaired upper and/or lower extremity strength
Sliding seat	Allows for clients or caregivers to easily move in/out of the tub with ease when they have limited strength or ability to physically move/slide across the bench. Prevents the friction/shear of the client physically sliding across the bench	Clients who have a skin ulcer or who are at high risk of skin breakdown Clients with impaired dynamic sitting balance
Double safety locks on each side of the bench	Allows for the bench to be stabilized and secure for clients to transfer onto the bench safely before sliding to the other side. It also locks securely while client is positioned inside the tub, showering	Caregivers who are experiencing difficulty with facilitating client transfer due to client physical needs, size of the environmental barriers
Height adjusts in 1/2 inch increments from 18.75" to 23"	Will accommodate a wide range of seat-to-floor heights to optimize stability for client and/or caregiver during transfer, and while in tub	Possible client populations would include those with spinal cord injuries and neurological deficits (e.g. clients who have had a CVA with hemiparesis; with MS, Cerebral Palsy, etc), and who are bariatric
Heavy duty weight capacity (400 lbs)	Can be used for clients who weigh up to 400 lbs	



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