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Evaluation of Pressure Reducing Support Surfaces for the Treatment and Prevention of Pressure Ulcers and Promoting Comfort

Summary of 2009 study by:
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Executive Summary

Invacare® microAIR® products, MA51, MA55, MA60, MA65, MA80 and MA85 were used with 32 patients in a 228-bed skilled nursing facility. The study results demonstrated that the microAIR pressure relieving surfaces help in achieving desired outcomes, whether they be preventative, healing or palliative, depending on the patient's current medical status.

Background

Wounds: Different Types, Different Causes, Common Goals

Wounds and pressure ulcers are painful and potentially life-threatening complications in persons of altered states of health. Wounds can be surgical, complicating (pressure ulcers), or traumatic. Their effects are well-known and documented throughout the world. They cause discomfort and slow or prevent a patient in returning to his or her baseline state of health.

Wound treatments are as varied as the wound causes. Utilization of a Pressure Reducing Support Surface (PRSS) should reduce pressure, friction, and shearing while promoting comfort, dryness, and cooling. Pressure ulcer prevention was one of the Joint Commission's 2008 National Patient Safety Goals and continues as a prominent focus among healthcare organizations.

All healthcare facilities and providers are faced with the same challenge: provide the best possible outcome for their clients at the best economic value. A quality PRSS, along with knowledgeable application and timely service, can be a major contributor in wound prevention, wound healing, and patient comfort.

Purpose of Study

Did the Invacare microAIR Power Therapeutic Support Surface utilized on the patient promote the desired outcomes of wound healing, wound prevention, and patient comfort?

Data collection and analysis can be easily biased or skewed based upon inadequate measurements that are not individualized for a patient's unique situation. Many case studies of this type measure few parameters or report data that may not always be relevant in light of individual patient circumstances. Therefore, the studies are not necessarily reflective of the effectiveness of a product in achieving a particular outcome. Utilizing more pertinent parameters, along with more detailed, individualized assessments, allows for a more realistic evaluation of Invacare microAIR Therapeutic Pressure Reducing Support Surfaces in this study.

Relevancy of Data

Often data noted in case studies, when analyzed without the benefit of a patient's individual context, can be misinterpreted and therefore be misleading in either a positive or negative way.

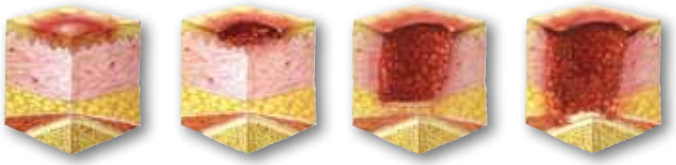
Outcomes are often derived from absolute numbers which can be significant in some patients and insignificant in others. For example, whether or not weight loss is significant depends on evaluating multiple pieces of data, involving several disciplines, within the medical record. Weight loss in an obese patient, due to increased physical activity and food intake control while in the facility can be beneficial to their overall health. In other words, a "10% wt. loss indicator over the previous 60 days" from a facility's MDS sheet can be misinterpreted to be a negative nutritional outcome, when actually it is a positive one.

Another example may be the development of a Stage II wound to the leg while in the facility. The patient may have obtained the wound while trying to push their own wheelchair, an activity they now have the strength to do since their sleep, nutrition and protein intake improved once placed on the Pressure Reducing Support Surface. The wound development was not as a result of the ineffectiveness of the Pressure Reducing Support Surface, but rather a consequence and accident due to the effectiveness of it.

Correctly collecting and interpreting the data involves assessing the patient as a whole. One must analyze the patient's individual health status and their responses to interventions in order to determine the effectiveness of the product toward wound prevention, healing, and patient comfort.

Pre Stage I

Suspected Deep Tissue Injury – Localized area of discolored (purple or maroon) intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The tissue may be painful, firm, mushy, warmer or cooler compared to adjacent tissue.



Stage I

Non-blanchable erythema of intact skin. (Skin that does not turn white when depressed.)

Stage II

Partial thickness skin loss involving epidermis, dermis or both.

Stage III

Full thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.

Stage IV

Full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures.

Risk Factors in Pressure Ulcer Healing

Risk factors for skin breakdown are commonly described using a Braden Scale Score. This scale measures impairment in mobility, elimination, nutrition, sensory perception, skin moisture, activity level, and the potential for friction and shear. (See back cover for the Braden Scale chart). Even mild impairment in any of these areas usually indicates the need for a Pressure Reducing Support Surface to assist in the prevention of skin breakdown or to facilitate wound healing and to promote comfort.

Abnormal lab values are significant components in determining impaired nutrition which increases the likelihood of skin breakdown and delays wound healing. Low protein status is a major factor and indicates malnutrition. It is sometimes a very difficult factor to correct. A patient may not be capable of sufficient protein intake to promote new cell growth for healing. Insufficient intake is frequently seen in patients with swallowing problems, refusal to eat or very poor intake. The higher the Stage (Pressure Ulcer Stages III and IV, for example), the more protein per kilogram of weight is required. This can mean almost double the normal protein requirements are needed. Elevated blood glucose, a sign of poorly-controlled diabetes, is another culprit in the delayed healing or non-healing scenario. Bacteria feed off the extra sugar and circulation to all parts of the body is decreased due to blood vessel damage caused by elevated blood sugars.

To correct the myriad patient conditions that complicate healing takes time. Sometimes, the conditions can only be partially corrected, and sometimes, not at all. A Pressure Relieving Support Surface is an easy and economical intervention in promoting comfort in the patient with high risk for skin breakdown. The costs of treating a wound or other complication caused by increased friction, pressure, or discomfort is easily outweighed by the cost of prevention.

Influencing Clinical Factors

Challenges in today's skilled nursing facilities are complex, diverse, and a direct result of the level of care and intervention desired by the patient and/or family. A patient's care plan is developed, implemented, and evaluated by a team comprised of the patient (if capable), and the family (if able and interested), as well as healthcare providers involved in the patient's care.

Hospice Environment

The patient and/or family may elect to limit or discontinue any interventions at anytime. The most influential of these interventions to this case study were discontinuation of laboratory monitoring, antibiotic therapies, surgical wound debridements, and dietary supplementations. Mostly, these changes were made as patients or their families decided to move the plan of care to "comfort measures only" as medical interventions became progressively unsuccessful in light of patients' deteriorating conditions. Numerous complicating factors from multiple disease processes combine to produce unrecoverable states of health. Under these circumstances, it may no longer be realistic to prevent skin breakdown or heal a wound. Importantly in this situation, the pressure relieving support surface can still achieve a desirable purpose in promoting comfort at the end of life.

Specific Nursing Home Concerns

Speed of healing can also be a misleading comparison. Not all patients heal at a predictable or steady rate. This is especially prevalent in the population of a nursing home. Nursing home patient health varies widely. There are those that are in relatively good health for their age or condition, but need short-term rehab for recovery from a fracture, major acute illness, or surgery. There are other patients who have been very debilitated for quite some time, or were residents of another facility, or are being discharged from the hospital for further treatment to the nursing home or rehab facility.

A patient's slow rate of healing may be perfectly acceptable given their particular low protein levels, infection, or high blood sugar levels.

Methodology

Study Duration: Six months

Study Setting: 228-bed skilled nursing facility with onsite ARNP under physician supervision providing and directing all wound care.

Population

All patients placed on an Invacare microAIR pressure reducing support surfaces during the study time period were included.

36 patients (13% of facility residents) were evaluated for inclusion in this case study. 32 (89%) out of the 36 patients were included; 4 were not included due to re-hospitalization or death shortly after admission.

The case study included 11 males and 21 females, ranging in age from 62 years to 102 years. Major diagnoses included cardiovascular disease, CHF (congestive heart failure), HTN (hypertension), cerebral vascular accidents (stroke), dysphagia (swallowing difficulties), diabetes, pneumonia, COPD, anemia, peripheral vascular disease, pressure ulcers, amputations, MRSA, cellulitis, advanced dementia or Alzheimer's disease, psychosis, osteoporosis, degenerative joint disease, hip fractures, Parkinson's disease, cataracts, blindness, kidney disease, and bladder or bowel incontinence.

All wounds Stages I-IV were included since Stage I wounds have a significant likelihood of progression to a higher stage in the compromised, debilitated patient.

Utilization of pressure relieving support surface therapy early in wound management can speed wound healing and minimize wound progression. Therefore, assessing all wounds is a more useful indication of the effectiveness of the pressure relieving support surface. In a 2004 Resident Survey for Nursing Home Abuse and Neglect Report, 14% of this facility's population experienced pressure ulcers.

Equipment Tested:

Invacare microAIR Pressure Reducing Support Surfaces utilized were:

- 25 (79%) MA80, 10" True Low Air Loss and MA85, 10" True Low Air Loss with Alternating Pressure mattress replacement systems
- 2 (6%) MA51, 8" depth Alternating Pressure mattress replacement systems, MA55 8" Alternating Pressure with On-Demand Low Air Loss systems
- 3 (9%) MA65 10" mattress Alternating Pressure with On-Demand Low Air Loss mattress replacement systems
- 2 (6%) MA60 10" mattress Alternating Pressure mattress replacement systems

The length of time on the Invacare microAIR products ranged from 7 days to 6 months. Some patients had been on the same brand medical support surface before the study time period.

Control Group

Traditional control groups (patients identified as high risk for skin breakdown that were not placed on a pressure reducing support surface) were also not practical for the purpose of this study since all patients in this facility that were identified as a high risk for skin breakdown were placed on a pressure relieving support surface by the nurse practitioner.

Patients who had been on a pressure relieving support surface, but were no longer using the surface and remained in the facility were followed for the duration of the study to monitor for wound re-emergence or development of new wounds.

Data Acquisition

Complete facility medical records reviewed on all study patients including: all H&Ps (History & Physical), physician orders and progress notes, nurses notes, aide notes, Physical, Occupational, & Speech Therapy notes, Dietician assessments and notes, laboratory reports, wound care notes, and recent medical records from other facilities (hospitals, wound care centers, etc.), MDS (Material Data Set) and RAP (Resident Assessment Profile) sheets, MARs (Medication Administration Records), and weight flowsheets.

Parameters Measured and Assessed

A higher number of parameters were measured in this study in order to gain a more realistic, individualized measurement of Invacare microAIR support surface effectiveness

- Patient age, sex
- Major diagnoses, secondary diagnoses
- All physician orders, changes in levels of care, initiation of comfort measures only care, hospice care, withdrawals of care, ineligibility for additional wound care treatment due to co-morbidities
- Wound(s) absence/presence, hospital/outside current facility acquired, facility acquired, wound (s) type, location, stage, description
- Wound treatments, changes in wound treatments
- Wound healing progression or deterioration
- Medications relevant to wound healing or impacting Braden Scale risk factors
- Medication allergies (relevant to wound healing/risk factor treatments)
- Weight gain/loss amount, %, positive or negative influence to wound healing, diet, and average % intake.
- Vital signs as monitored
- Laboratory results relevant to wound healing or impacting Braden Scale risk factors; monitoring frequency of key laboratory studies relevant to wounds
- Date of Invacare microAIR initiation, make and model used, initial settings, and dates of setting adjustments
- Documentation of patient comfort/discomfort/pain, either verbal and/or non-verbal
- Hospital readmission dates, diagnoses
- DNR status

Documentation

Medical record reviews demonstrated 96% completeness in documentation of study parameters. Some documentation such as patient comfort levels frequently required verification from a variety of sources.

Diagnoses, both major and secondary, were identified in all records. Wound identification, assessment, treatment, and progression documentation were determined to be timely and appropriate for the needs of the patient in all reviewed records. The ARNP wound care documentation was thorough and contained sufficient information to determine if a wound was improving or deteriorating.

Medications and med allergies were documented and antibiotics, supplements, and meds impacting Braden Scale criteria met standards of care and were adjusted as the patients' needs changed.

Weights were measured on admission and then on a monthly basis. Weight flowsheets were occasionally marked as "resident refused". Nutritional evaluations were made by Registered Dieticians, and diet adjustments according to patients' needs, wishes, and tolerances were well documented. Dietary supplements of protein, vitamins,
and minerals were addressed as well.

Laboratory values relevant to protein status, infection, and healing, such as serum albumin levels, serum protein levels, Vitamin B levels, CBC (complete blood cell count reflective of infection, anemia, etc.), and glucose levels were timely and consistently measured in accordance with the level of care ordered or intervention desired by the patient and/or family.

Additional diagnostic testing such as chest x-rays, and Doppler blood flow studies in affected extremities were also performed on a timely basis, with appropriate interventions ordered based upon those results.

Admission mental states and reassessments were documented in accordance with Medicaid/Medicare guidelines. Mild confusion, various levels of dementia, including disruptive behavior, memory deficits, self-care deficits, and poor safety awareness often contributed to a breakdown in skin integrity and contributed to or complicated wound care in this study population as well.

Medical records documentation demonstrated medical and nursing efforts to mediate or diminish the impact of the varied mental states to the extent possible and reflected realistic goals for the patients' evolving states of health. Sometimes these goals were not to return to baseline health, but to return to an increased level of participation in their care.

Some patients opted for comfort measures only. They refused advanced treatments, re-hospitalizations, and sometimes refused antibiotic therapies. However, these patients still needed and desired skilled nursing and comfort measures in their end-of-life care.

Results

32 patients were placed on Invacare microAIR Pressure Relieving Support Surface mattresses due to their high risk for skin breakdown.

Patient Profiles

- 11 patients of the study group (34%) had Stage I-IV wounds.
- 21 were at high risk, but did not have skin breakdown.
- 3 of the 11 patients (27%) experienced study facility acquired wounds (9% of study population), 1 of which was not pressure related.

Of the 11 patients with wounds on the Invacare microAIR pressure relieving support surfaces,

- 8 (73 %) maintained at a Stage I-II level with no wound progression and subsequently healed without re-emergence.
- 3 (27%) had Stage III-IV ulcers. Patient Results (Stage III & IV)
- One of the 3 had his wound reduced to a minimal size and was discharged home.
- Two of the 3 had ongoing ulcers at the end of the study time period.
- They also had significant and multiple co-morbities such as advanced dementia, resistance to care, bowel and bladder incontinence,very low protein levels, and ineligibility for surgical wound debridement due to cardiac conditions.
- Of these 11 study patients with resolved wounds, 8 or 73% healed within a 7 day to 40 day time frame, the average length of wound healing time being 18 days.
- 30 out of the 32 study patients had documentation of patient comfort and no pain indicators. During the 6 month study timeframe, 29 (90%) of the study group experienced no weight loss or reached actual (desired) weight gain. The other 3 residents lost no more than 5 lbs. while on an Invacare microAIR Pressure Relieving Support Surface.
- Only 2 patients (6%) of the study group on an Invacare microAIR Pressure Relieving Support Surface showed no wound resolution at the end of the study.

In conclusion, wound care involving the use of an Invacare microAIR Pressure Relieving Support Surface can be preventative, healing, and palliative. An effective Pressure Relieving Support Surface can promote healing and a return to baseline health status. For some, it can support the needs of the dying by focusing on alleviating symptoms.

Braden Scale for Predicting Pressure Sore Risk

Patient's Name _____ **Evaluator's Name** _____ **Date of Evaluation** _____

SENSORY PERCEPTION: Ability to respond meaningfully to pressure-related discomfort							
1. Completely Limited	**2. Very Limited**	**3. Slightly Limited**	**4. No Impairment**				
Unresponsive (does not moan, flinch, or grasp) to painful stimuli due to diminished level of consciousness or sedation OR limited ability to feel pain over most of body.	Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.	Responds to verbal commands, but cannot always communicate discomfort or the need to be turned OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities	Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
MOISTURE: Degree to which skin is exposed to moisture							
1. Completely Moist	**2. Very Moist**	**3. Occasionally Moist**	**4. Rarely Moist**				
Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	Skin is often, but not always moist. Linen must be changed at least once a shift.	Skin is occasionally moist, requiring an extra linen change approximately once a day.	Skin is usually dry, linen only requires changing at routine intervals.				
ACTIVITY: Degree of physical activity							
1. Bedfast	**2. Chairfast**	**3. Walks Occasionally**	**4. Walks Frequently**				
Confined to bed.	Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.	Walks outside room at least twice a day and inside room at least once every two hours during waking hours.				
MOBILITY: Ability to change and control body position							
1. Completely Immobile	**2. Very Limited**	**3. Slightly Limited**	**4. No Limitation**				
Does not make even slight changes in body or extremity position without assistance.	Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	Makes frequent though slight changes in body or extremity position independently.	Makes major and frequent changes in position without assistance.				
NUTRITION: Usual food intake pattern							
1. Very Poor	**2. Probably Inadequate**	**3. Adequate**	**4. Excellent**				
Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	Rarely eats a complete meal and generally eats only about 1/2 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement OR receives less than optimum amount of liquid diet or tube feeding.	Eats over half of most meals. Eats a total of 4 servngs of protein (meat, dairy products per day.) Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs.	Eats most of every meal. Never refuses a meal. usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
FRICTION & SHEAR							
1. Problem	**2. Very Limited**	**3. No Apparent Problem**					
Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.	Moves feebly or requires minimum assistance. During a move, skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
			Total Score				

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