Using Technology in Occupational Therapy Intervention to Prevent Sitting Acquired Pressure Ulcers

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All of you work with occupational therapists – take the info I give you today and please share it with the occupational therapists with whom you work.

SAPU – Sitting Acquired Pressure Ulcers

Those at risk:

- Spinal cord injury victims
- Elderly
- Those in orthopedic settings

In sitting, pressure is concentrated in the sacrum (small bony region).

Over a prolonged period, it can result in tissue damage.

Individuals with spinal cord injury are at an increased risk for tissue damage because of lack of sensation and reduced mobility.

Only 4 studies highlight the role of the occupational therapist in the area of prevention of SAPU:

- Geisbrecht (2006)
  - Cross sectional self-report study of 37 Canadian OTs
  - Seating, equipment and positioning key role
  - Staff and client education common intervention for prevention but least common for treatment intervention
- Guihan et al (2009)
  - Cross sectional study of 15 OTs and 24 physiotherapists in a SCI setting
  - Seating evaluation, pressure relief maneuvers, transfers
  - 75% OTs identified their key role to include patient education
- Macens et al (2011)
  - 277 Australian OTs surveyed online
  - 93.9% seating and equipment

  - 89.9% education on weight shifting; 88.4% skin care
  - 85.2% transfers
- Rose and Mackenzie (2010)
  - 9 Australian OTs interviewed, grounded theory study
  - Knowledge of equipment
  - Education re: skin care, pressure care and skin integrity highlighted as an important role

Occupational therapists play a key role in preventing pressure ulcers through:

- Seating evaluation
- Provision of equipment
- Positioning
- Education of clients and their caretakers
- Transfers and repositioning maneuvers

Repositioning is one of the most effective methods for reducing duration and magnitude of pressure on vulnerable tissues.

Healthy, able-bodied individuals automatically change position 6-9 times per hour.

Each posture change increases oxygen saturation by 2.2%.

We need to mimic this with our sitting patients.

We try to teach our clients to weight shift every 15 minutes – in a lean forward, side to side lean or complete lift off the chair.

We know the effectiveness and frequency that patients actually do these moves (outside the therapy sessions) is quite poor. None of the papers we reviewed included technology in the daily practice, despite the fact that it's available.

We therefore used technology to see if it can relieve SAPUs – used a pressure mapping system and an active Activpal3 accelerometer – looks at periods of time spent sitting/standing/stepping. We also wanted to know about posture (angle of trunk tilt) so we had someone develop an algorithm for us to measure angle of trunk tilt.

The Activpal3 is compact and useful.

First study: Spinal cord injury and pressure ulcer prevention: using functional activity in pressure relief.

Study aim: to explore pressure relieving behaviours over a one hour period and investigate if a forward weigh shift would affect interface pressure outcomes.

This study has already been published.

Method: Recorded the patients at a desk, working at a computer, for a 1 hour period

And also, what they would do in a 30-minute subsequent period (then the computer was placed on a rolling table, moved away from them, forced a 150 degree reach to the computer to force a weight shift)

To see: Could we try and encourage weight shifting as a daily activity?

We used 14 patients (wheelchair bound, spinal cord injury, in Belfast)

Findings:

- 36% of the participants weight shifted every 15 minutes.
- 43% of the participants performed either 1 or no weight shifts in 60 minutes.
- The majority of weight shifts were held for less than 20 seconds.
- 85% of all weight shifts yielded less than 25% reduction in scale interface pressure when compared to normal sitting.
- No single weigh shift yielded as complete offloading (so they were ineffective).
- Weak relationship was found between angle of trunk tilt and interface pressures (very important!).

Reaching forward by 150% of the arm length significantly reduced interface pressures around the IT region, but only 10 of our 14 participants could in fact tolerate that!

Very important – trying to find out what is tolerable for our participants. Clearly, trunk control is an issue with spinal cord patients.

Clinical messages:

- The majority of individuals did not adhere to either the frequency or magnitude of movements recommended for pressure ulcer prevention.
- The majority of pressure reliefs performed were held for less than 20 seconds and had minimal effect on reducing seating interface pressures, that is, the reliefs were ineffective in dispersing the loads around their seating-interface area which could cause pressure ulceration.
- The angle of trunk tilt (forward lean) is NOT a reliable indicator of interface pressure unloading, so the therapist can't presume effectiveness of the weight shift by solely viewing the magnitude of the lean performed.
- Interface pressure mapping technology has a key role to play in providing educational biofeedback to service users to support condition self-management.

2nd study: This study investigates the sitting behaviour of older people on a rehabilitation ward: the impact of optimal sitting and activity on seating interface pressures.

We know that:

- Older adults are at greater risk of pressure ulcer development.
- Activity levels need to be increased and sitting time needs to be decreased in order to prevent sitting acquired pressure ulcers.
- Already, the National Guidelines encourage early mobilisation, independent transfers and rehabilitation.

Study Aim: to explore current time older adults spend sitting while on a rehabilitation ward and how often they reposition or are assisted to reposition.

Method used in this study:
Design: exploratory multiple case study design

Sample: 7 participants (3 male, 4 female) aged 85-94 years under orthopaedic conditions for rehabilitation in the UK

Method: Participants were seated correctly in bedside chairs on ward and instructed to continue with normal activities. The researcher observed them over a six-hour daytime period over two days. (bedside chair facilitated independent transfers)

Technology outcomes: Activpal 3 accelerometer x2 in two places – on the sternum and on the thigh. Seated movement was defined as any postural change involved in moving the upper body at least 10% and had to be held for at least 3 seconds.

Findings: Our findings were very sad.

- Participants sat for an average of 201 minutes on day one and 193 minutes on day 2. Just sat.
- Walked an average of 71 steps on day 1 and 88 steps on day 2. (This is quite short of 10,000 steps/day for health!)
- Note that on day one, 3 out of 7 participants didn't walk at all, and on day 2, 5 out of 7 participants didn't take any steps at all.
- None of the participants were either repositioned or encouraged to reposition by health care staff.

Clinical messages:

- Older adults on an orthopaedic rehabilitation ward spent a significant proportion of their day sitting despite national guidelines encouraging early mobilisation, independent transfers and rehabilitation.
- Sedentary elderly are at particular risk of pressure ulcers.
- This 'at risk' group also did not perform the frequency or magnitude of repositioning movements to redistribute seating interface pressures.
- This group were not assisted by healthcare staff to perform seated movements capable of off-loading seat interface pressure.
- The concept of active rehabilitation (NICE guidelines) needs to be integrated into all care settings to minimize the risk of SAPU.

How can technology help to prevent SAPUs?

While uptake of technology is considered to rely *"… heavily upon the degree to which the provider community is educated in the field and is prepared to engage in medical practice focused on risk assessment and predictive/prognostic modeling" (WHO, 2014), as these studies illustrate, it offers much to the OT in terms of identifying "the right person at the right time with the right intervention"*.

Use of technology in personalized medicine:

Personalized medicine offers the scientific and healthcare communities the opportunity to introduce new models through the ability to segment groups of patients with greater risk, and focus on prevention and early intervention with those groups.

This approach avoids trial and error, enhances quality of life and minimizes cost.

Challenge to personalized medicine:

- It relies heavily upon the degree to which the provider community is educated in the field and is prepared to engage in medical practice focused on risk assessment and predictive/prognostic modeling.
- It offers a lot to the occupational therapist to use the technologies to identify the right person using the right intervention and then offering the right interpretation of that information.

Conclusions:

- Repositioning is an important and powerful tool.
- Patients who can independently reposition themselves should be educated to do so.
- When patients have been educated on how to reposition themselves, the effectiveness depends on the individual patient.
- Means of assessment can be visual, such as how far a patient leans forward.
- Angle of trunk tilt, though, is NOT a reliable indicator.
- Leaning the trunk does NOT necessarily mean that this is effective, so it shouldn't be used as an assessment component.
- Frequency for spinal cord injury patients (who have been educated) – only 36% actually do what they are educated to do, while 43% performed NO weight shifts (well below the guidelines).
- Pressure mapping has shown that although patients BELIEVE they are performing weight shifts to prevent pus, they are actually NOT. This is of great concern.