

The use of micro-stimulation in pressure ulcer prevention

It is well known that small movements can help to re-establish blood flow to areas which have been under pressure, thus reducing the risk of pressure ulceration. The Volker MiS® and Volker MiS® Activ micro-stimulation systems (Volker, Germany) are unique mattress support surfaces which reduce the risk of pressure ulcer development by redistributing pressure and providing kinaesthetic feedback which maintains and improves the autonomic movement of the patient.

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KEY WORDS

Pressure ulcer
Prevention
Basal stimulation
Micro-stimulation system

Despite the raised awareness of the causes of pressure ulcers, there are still significant numbers of patients developing ulcers in a variety of care settings (Clark et al, 2008). However, there are a number of strategies that can be implemented to prevent their occurrence (Clark, 2006).

The first step towards the successful prevention of pressure ulcers lies in gaining the ability to recognise people who may be vulnerable to developing these wounds (Clark, 2006). This involves the use of both informal and formal assessment procedures based on clinical presentation and the consideration of risk factors. Identification of trigger factors such as immobility, age, or incontinence should alert the clinician to conduct a formal assessment using a recognised and appropriate risk assessment tool.

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Once risk has been identified, there are many strategies which can be implemented in an attempt to prevent the development of pressure ulcers (Clark, 2006).

Aspects of care such as medical management of any underlying conditions, nutritional support and psychosocial issues need to be addressed in order to improve outcomes for the patient. It is also essential that skin assessment is carried out regularly to identify any change in condition which could indicate pressure damage (Cooper, 2006).

The European Pressure Ulcer Advisory Panel guidelines also recommend regular repositioning of the patient and the use of appropriate equipment when necessary to avoid skin breakdown (EPUAP, 1998). Manual repositioning of people considered to be vulnerable to pressure ulcer development is one of the longest established methods through which the duration of loading of the skin and soft tissues can be controlled (Clark, 2006). Although guidance on the repositioning of patients is sometimes contradictory as to the time between position changes, it is common for patients to be moved every two hours or more frequently if needed.

NICE (2005) recommended that mobilisation and/or repositioning should be considered for all individuals at risk of pressure ulceration, the frequency of which should be determined by the patient's individual needs.

Changing position is helpful in pressure ulcer prevention as this allows blood flow to improve in the tissue on which the patient was resting. When manually repositioning, the skin can be inspected at the same time to check for signs of pressure damage. Importantly, the communication and patient contact which takes place during repositioning is both therapeutic and a good time for the nurse to make other assessments, give fluids and encourage interaction.

Early studies of pressure ulcer development highlighted the lack of spontaneous movements by elderly bed-bound patients while sleeping (Exton-Smith and Sherwin, 1961). Exton-Smith et al (1961) discovered that patients who moved less than 21 times per night were most likely to develop pressure ulcers. If this fact was translated into nursing actions then patients would require a positional change every 40 minutes in an eight-hour shift. This would obviously be difficult to achieve given staffing numbers, so alternating therapy systems were created which help to mimic these small body movements (Winman and Clark, 1997).

Pressure-redistributing beds and mattresses are now widely available and used across a range of healthcare settings. Most redistribute pressure by increasing the surface area of the body in contact with the support surface, such as a cut foam mattress, or by altering the parts of the body that bear weight on a cyclical basis, e.g. through dynamic or alternating pressure.

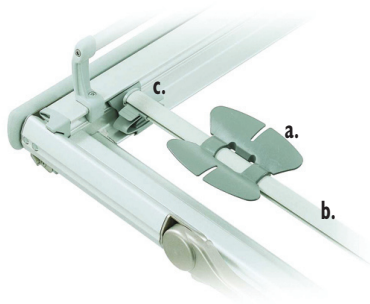


Figure 1. The components of the Volker MiS® micro-stimulation system; a. butterfly plates; b. support profiles, c. suspension units.

Most pressure-redistributing mattresses and overlay products are placed onto solid mattress platforms, which offer some resistance when the patient is in bed. However, the MiS micro-stimulation system from Volker, Germany, is a unique, flexible mattress platform which helps to prevent pressure damage.

The Volker MiS® micro-stimulation system

The Volker MiS® micro-stimulation system is a mattress platform consisting of three flexible components (Figure 1). Sixty dynamic, plastic butterfly plates are positioned on 12 flexible fibreglass support profiles, each held in place by a pair of elastic suspension units that rest on the mattress platform's frame. The platform is divided into four decks and can be moved into numerous positions by means of a hand control unit, which help to make positioning of the patient simpler. The mattress support surface is positioned on the Volker aluminium bed frame.

When the patient moves, the butterfly sprung plates underneath rock on their axis to create an opposing movement under the mattress. It is recommended that the Rubex® Finess Mattress is used with the micro-stimulation system as it is thinner than regular foam mattresses, thus allowing the movement of the butterfly plates to be felt beneath. This movement happens across a number of the plates which all move simultaneously and in different directions.

This sensory stimuli is processed by the patient's central nervous

system and movement occurs as a response to the stimuli. The resultant basal movement allows circulation in the skin to be stimulated, while the flexible support profiles also 'give' when the patient moves, creating less resistance to the tissues than a solid bed frame. There are two versions of the system: the Volker MiS® and the Volker MiS® Activ.

The Volker MiS® Activ micro-stimulation system

The MiS system is a passive system for use by patients who are able to move themselves but who are considered to be at risk of pressure ulcer development. In patients who are at risk of pressure damage but who have little or no mobility, the MiS Activ system can be used.

The MiS Activ mattress platform has activators instead of suspension units which hold the support profiles into position (Figure 2) and raise and lower them in a predetermined pattern programmed by a hand-held control panel. There are a wide range of set patterns of movement to choose from, or a unique pattern can be pre-programmed to meet the individual patient's needs. This facility means that patient movement can be completely controlled by the nurse, patient or carer.

The standard MiS suspension unit and activator units are interchangeable, meaning that the MiS system can become Activ, and vice versa.

The bed frame has two high and two low integrated assist rails (Figure 3) which can be extended to two heights vertically. The rails can also be positioned laterally to extend the mattress platform. These features mean that the rails can be used in different combinations to suit the needs of each patient. For special requirements, a spacer can be inserted between the assist rails to create a full length-side rail, which can be padded if required. The rails can also be used as a support for the patient when transferring in and out of bed. When not in use, the rails disappear into the mattress platform, so they are not in the way of the patient or staff.

Infection control

As a result of healthcare-acquired infection (HAI) there are now policies in place which necessitate the cleaning and decontamination of medical equipment in order to reduce the risk of cross-contamination. On both the MiS and MiS Activ mattress platforms, the four decks can be removed and are jet, steam or machine washable to allow decontamination. Once removed, there is easy access to the bed frame for cleaning, ensuring that the whole procedure does not take longer than deep cleaning a normal electronically-operated hospital bed frame.

Clinical performance

A multi-centre, randomised, open, comparative pilot study of neurological and geriatric patients was carried out in Germany during the period 1 October 2006 to 31 May 2007 to determine the effects of the MiS and MiS Activ systems on patient's comfort and movement, pain and vigilance when compared to a standard hospital bed (Osterbrink et al, 2008).

Results were analysed for 89 patients and found that the subjects considered the MiS and MiS Activ systems to be more comfortable than their previous standard bed ($p=0.009$ and $p<0.0003$, respectively). Patients also considered their mobility to be better when using the MiS Activ and MiS ($p<0.001$; $p=0.002$) compared to the conventional hospital bed. Patients using the MiS Activ and MiS systems had a lower (although not statistically significant) pain level than patients using the conventional bed system. Vigilance,



Figure 2. The components of the Volker MiS® Activ micro-stimulation system.



Figure 3. The Volker bed frame with assist rails in the raised position.

in terms of alertness as assessed by the Stanford Sleepiness Scale was lower in subjects using the standard bed than in those using the MiS and MiS Activ systems (Osterbrink et al, 2008).

Case reports

The Volker MiS® and Volker MiS® Activ micro-stimulation systems were used in conjunction with the Volker S960-2 bed frame in the acute medicine for the elderly unit at Woodend Hospital in Aberdeen for one month.

Case 1

One acutely ill female patient was admitted to the ward with multiple pathologies, including a urinary tract infection, renal failure, sepsis and acidosis. Upon assessment she was considered at high risk of pressure ulceration (risk score of 26) as so was managed on the MiS Activ system for a period of one month.

During this period, the patient underwent a skin inspection every three hours, when her bed was moved electronically using the MiS Activ 'ripple' pattern of movement. The patient found the bed very comfortable and did not consider the noise of the electronic motors to be disturbing. Throughout her time on the bed, no signs of pressure damage to the skin were observed.

Case 2

An elderly gentleman was admitted following a cerebrovascular accident. He had limited mobility with a risk assessment score of 14, putting him at a low risk of pressure ulcer development. He was nursed on the passive bed system, MiS, for one month.

Throughout this time, the patient had his skin checked four times a day and it remained intact and healthy throughout. The patient reported that he found the bed comfortable and was able to transfer from it onto his chair with minimal assistance.

The staff in the ward reported that the beds performed well, and particularly liked the feature which enables the assist rails to be stored in the mattress platform when not in use. The fact that the assist rails could also extend higher than normal was considered to be a good safety feature, particularly when the patient is in an upright position.

Conclusion

In the search for the perfect bed and mattress combination to help reduce pressure ulcer incidence, there is a need to evaluate new technologies which can be harnessed to improve patient care.

While the need to prevent pressure ulcers is paramount, there is also a need to provide comfortable products for patients which are also practical for nurses. Maintenance and cleaning are also important, and should always be considered before purchase or rental.

The Volker MiS® and MiS Activ® systems offer a unique approach to pressure ulcer prevention. In the work carried out so far using these systems in Europe, improved patient comfort and reduced pressure ulcer incidence have both been achieved. While larger scale trials in the UK are planned, the European findings and our experience in Aberdeen would suggest that these bed systems deserve to be considered as an equipment option when selecting pressure-redistributing equipment in patients at risk of pressure ulceration. **WUK**

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Key Points

- ▶▶ Changing position is helpful in pressure ulcer prevention as it allows blood flow to improve in the tissue upon which the patient has been resting.
- ▶▶ The Volker MiS® micro-stimulation system is a mattress platform consisting of three flexible components: dynamic butterfly plates, flexible support profiles and elastic suspension units.
- ▶▶ When the patient moves, the plates rock underneath the mattress, stimulating the patient to move, resulting in pressure relief.
- ▶▶ The Volker MiS Activ® micro-stimulation system moves the support profiles electronically, providing pressure redistribution to patients with little or no mobility.

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