

# Evaluation of the Dyna-Form™ Static Air HZ in a coronary care setting

## KEY WORDS

- ▶ Cardiac intensive care
- ▶ Dyna-Form Static Air HZ
- ▶ Hospital-acquired pressure ulcers
- ▶ Prevention

A year-long evaluation is underway in a cardiac unit in Wales to see whether a switch to using Dyna-Form Static Air HZ for every patient (apart from when they are in Cardiac Intensive Care) would reduce the number of hospital-acquired pressure ulcers (HAPUs) on the unit and also reduce the amount of money that was previously being spent on alternating pressure mattresses. Patients in this group have a particularly high risk of pressure ulcer development, and in the previous year 19 cases were documented. This article reports on the interim findings 5 months into the evaluation and discusses the problems of conducting an evaluation in a busy clinical environment. As yet, there have been no reported HAPUs in the 383 patients placed on the mattress to date. The attempt to reduce the number of pressure ulcers in this environment is part of the zero tolerance to pressure ulcers inspired by the 1000 lives campaign.

The prevention of pressure ulcers has been high on the clinical agenda in Wales since the inclusion of pressure ulcers as a quality measure as part of the 1000 Lives Plus campaign (NHS Wales, 2010). Activity to prevent pressure ulcers in Wales was escalated when they became part of a mandatory target which required a zero tolerance approach to pressure ulcer formation.

In 2011, Whitlock et al described the impact of implementing a quality improvement programme based on Surface, Keep moving, Incontinence, Nutrition (or SKIN) bundles in acute care on the occurrence of pressure ulcers. The study used the Institute for Health Improvement model of improvement to undertake Plan Do Study Act cycles in order to transform staff attitudes to pressure ulcers from accepting them as an inevitability to active scrutiny and efforts to prevent them. The use of the SKIN bundle alongside the very visible measure of the Safety Cross (a ward-based measure of pressure ulcer occurrence) resulted in a significant increase in the days between the occurrence of pressure ulcers.

The measure, described by Whitlock, has over the following years spread across many hospitals, including the Abertawe Bro Morgannwg University, with the hope of eliminating avoidable pressure ulcers. Despite intensive interventions including the use of alternating pressure mattresses (APAMs) and the implementation of SKIN bundles, the cardiac unit at Abertawe Bro Morgannwg University Health Board identified 19 hospital-acquired pressure ulcers (HAPUs) in the previous 12 months, all of which were in the cardiac area. Of the 19 pressure ulcers:

- ▶ Ten were to the sacrum/buttocks:
  - ▶ Of which one grade IV was related to extended time in theatre, complications and cardiac instability
  - ▶ Four were grade II
  - ▶ Five that, when reviewed by the tissue viability team, were identified as being moisture lesions
- ▶ Nine were to the heel and these were a mixture of suspected deep tissue injury and grade II pressure ulcers.

In addition to this there were five device-related pressure ulcers.

The cardiac unit is made up of an eight-

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bed intensive care unit, an eight-bed high dependency unit (HDU) and a 25-bed ward. The unit has an average length of stay of 7–10 days, with the most common reasons for admission being elective coronary grafting and coronary artery bypassing, which makes up 80% of admissions. Emergency care admissions make up 10% of admissions and these patients go direct to the cardiac intensive care unit (CICU). Elective patients are admitted to the ward from theatre. They are then transferred to CICU post-operatively for 48–36 hours, moved down to cardiac HDU for 24–48 hours, and then go back to the ward for 4–5 days before discharge. This is a complex pathway with five points of admission (ward, theatre, CICU, cardiac HDU, and then back to the ward) for the majority of patients, meaning that transfer of information — particularly regarding pressure ulcer risk — is crucial. It also means that the patient may experience five different pressure-redistributing surfaces during his or her stay.

The hospital was using more than its contracted number of APAMs and was looking to both improve patient outcomes and reduce costs.

The staff working in the cardiac unit were keen to reduce the incidence of pressure ulcers and acknowledged the specific challenges of the patient group that they cared for. Patients in the coronary care setting present with an increased risk of pressure damage. Paul et al (2014) identified that 6% of patients developed pressure damage within a high-volume cardiac care environment. Brindle and Wegelin (2012) performed a prospective study on the use of a prophylactic dressing in cardiac surgery patients and identified that in the control group eight pressure ulcers developed in four patients (from a sample of 35), again suggesting a high rate of occurrence in this patient group. Feuchtinger et al (2005) performed a literature review to identify specific risk factors in cardiac patients, identifying the following factors:

- » Tissue tolerance for oxygen due to temperature manipulation
- » Vasoactive drugs
- » Hypotensive periods
- » Reduced haemoglobin and haematocrit levels.

Other significant factors were:

- » Time on the operating table
- » Frequency of repositioning
- » Immobility
- » Older age
- » Low albumin levels
- » Use of corticosteroids.

In addition, several papers report a reluctance to reposition patients due to cardiac instability (Brindle et al, 2013; Cooper, 2013). This intolerance to movement in cardiopulmonary status can cause delays or omissions in turning, repositioning and other interventions designed to improve a patient's mobility, thereby increasing the risk of pressure damage.

#### EVALUATION OF THE DYNA-FORM STATIC AIR HZ

An evaluation of the Dyna-Form Static Air HZ was proposed at the unit to determine whether placing the patient on a surface designed for people at a higher risk of pressure damage immediately on admission would reduce the number of pressure ulcers occurring and also reduce the amount of additional equipment (specifically APAMs and heel boots) being used. The Dyna-Form Static HZ was previously evaluated in a group of general medical patients (Fletcher, 2014) to determine equivalence with existing equipment. This 26-patient evaluation identified that no new damage occurred during the evaluation and concluded by recommending that further evaluation be carried out in patients who had a greater risk of pressure damage.

Dyna-Form Static Air HZ is a mattress replacement system that combines the benefits of effective air displacement technology with the best of modern foams for a new standard of innovative pressure ulcer prevention and management. A new and unique 'air only' intelligent heel zone and specially designed U-Core effectively off-load pressure on the particularly vulnerable heel area. The U-Core is the outer foam frame of the mattress, which has carefully placed slits that allow the mattress to conform better to an articulating bed frame. Dyna-Form Static Air HZ is specifically designed for patients considered to be at 'very high risk' of pressure ulcer development (Direct Healthcare Services, 2015).

The evaluation is being performed over a

**PLEASE LEAVE THIS FORM IN PATIENT KARDEX.  
WHEN COMPLETED LEAVE IN RED/YELLOW  
FILE ON NURSES' STATION**

Section 1: Please complete on admission to the unit

Date of admission:

**Patient data:**

\*Age:  \*Gender: M  F  \*Height (f/m):  \*Weight (kg):

Patient ID:

Diagnosis:

**Start of Evaluation of mattress**

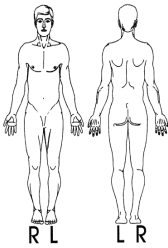
Waterlow Pressure Ulcer Risk Score

**Existing pressure ulcer:**

Are there already any existing pressure ulcers: YES  NO

If yes, please add grade and location and healing response

Grade (EPUAP)	Healing yes/no /static / don't know
Grade I	
Grade II	
Grade III	
Grade IV	



**Section 2 in Cardiac ITU**

Date and Time Patient put on air mattress \_\_\_\_\_  
(if applicable)

Date and Time patient returned to HZ \_\_\_\_\_  
(if applicable)

**PLEASE LEAVE THIS FORM IN PATIENT KARDEX.  
WHEN COMPLETED LEAVE IN RED/YELLOW  
FILE ON NURSES' STATION**

**Section 3**

**End of evaluation of mattress**

\*Date

How many days was the mattress in use?

**Reason for completion of evaluation – please tick**

Patient discharged	Patient transferred	Patient requires higher specification mattress	Patient died	Other please state
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**Status Pressure Ulcer**

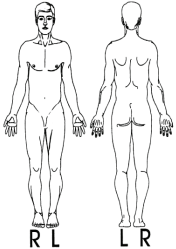
No pressure ulcers developed  New pressure ulcer developed

Existing pressure ulcer improved  Existing pressure ulcer deteriorated

If new pressure ulcer developed, please add grade and localisation:

Grade (EPUAP)	D / NC / I
Grade I	
Grade II	
Grade III	
Grade IV	

D= Deteriorated NC= No Change I = Improved



**\*Please check your response (1 = No/ Poor 5 =Yes / Excellent) :**

	1	2	3	4	5	Don't know
How easy was mattress to use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In your opinion were patient turning times reduced during treatment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 1. Sections 1–3 of the form used by staff to evaluate the use of the Dyna-Form Static Air HZ.

12-month period with all mattresses on the coronary care ward being replaced with the Static Air HZ, with an interim analysis at 5 months. After approval via local governance procedures, local champions were identified to support the evaluation and training was given to all staff across all shifts, including night duty.

The same evaluation form was used as had been used in the previous study (see Figure 1) to ensure consistency of data capture (Fletcher, 2014). The CICU did not switch from APAMs due to the patients being at high risk during their short stay in the unit. Visits to the ward to support staff with the documentation and address any ongoing queries were made every week by the tissue viability nurse and supporting team from

the Welsh Wound Innovation Centre. During the first month of the evaluation it became evident that there was confusion among staff about who should start the documentation and it was difficult to track when the patient was transferred on to and off the APAM in CICU. The form was therefore amended and a new section added specifically for CICU staff to complete (see section 2 of Figure 1). Further support and training were then put into place.

**RESULTS**

This represents an interim analysis carried out at 5 months to identify lessons learned and the outcomes that have been observed so far.

Forms have been returned for 41 patients, but

seven had insufficient data to report. Data are therefore presented regarding the remaining 34 patients. Of those whose data were used, there were 11 women and 23 men with an average age of 69. The patients' pressure ulcer risk scores (Waterlow) ranged from 5 to 30 and one patient had a grade II pressure ulcer on admission.

Two patients developed pressure ulcers during this period. After a root cause analysis, however, these were attributed to an extended period in theatre with complications and an extended time in the CICU, again due to complications. No patient developed a pressure ulcer due to the use of the Dyna-Form Static Air HZ.

**DISCUSSION**

Data capture has been challenging in the initial phase of the evaluation, but it has been possible to monitor the occurrence of pressure ulcers in other ways, such as via Datix reporting and Safety Cross, and therefore we are confident that in comparison with the previous 12 months, the number of pressure ulcers that have occurred is considerably lower and those that have occurred cannot be attributed to time spent on the new mattress.

Use of the new mattress has simplified nursing procedures and reduced the use of APAMs on the ward. Completing evaluation forms has been challenging for the ward staff within their normal busy clinical environment, despite the appointment of product champions.

This study is a clear example of where real-world evaluation activity varies from the research activity, when actions would be much more controlled. The mattresses are being evaluated in the setting they would be used in and within a normal environment. This real-world approach to the building of evidence does not replace the randomised controlled trial but does provide an alternative and equally valuable form of evidence with strong relevance to daily practice.

**CONCLUSION**

The prevention of pressure ulcer occurrence is a multifaceted intervention requiring considerable assessment skill and preventive activity from

**Table 1. Demographic details**

	Minimum All (M:F)	Maximum All (M:F)	Mean All (M:F)
Age	50 (54:50)	84 (81:84)	69.1
Risk Score	5(5:7)	30 (30:25)	13.9

clinical staff, with decisions made at key points of a patient's care pathway. This initiative aims to simplify one area of activity and reduce staff actions by implementing an all-in-one equipment solution at the first point of care.

The initial stage of the evaluation suggests that so far the initiative has been successful. Due to the low monthly pressure ulcer occurrence due to previous initiatives, however, it is important to continue the evaluation for the full 12 months to ensure that this change is a true change and not a product of chance. The reduction in the occurrence of pressure ulcers so far suggests that it is possible to improve the quality of care, simplify nursing processes and achieve financial savings by switching to the Dyna-Form Static Air HZ mattress.

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**REFERENCES**

Brindle CT, Malhotra R, O'Rourke S et al (2013) Turning and repositioning the critically ill patient with hemodynamic instability: a literature review and consensus recommendations. *J Wound Ostomy Cont Nurs* 40(3):254–67

Brindle CT, Wegelin JA (2012) Prophylactic dressing application to reduce pressure ulcer formation in cardiac surgery patients. *J Wound Ostomy Cont Nurs* 39(2):133–42

Cooper KL (2013) Evidence-based prevention of pressure ulcers in the intensive care unit. *Crit Care Nurs* 33(6):57–66

Direct Healthcare Services (2015) Product Information Page. Available at: <http://directhealthcareservices.co.uk/products/dyna-form-static-air-hz-2-2> (accessed 16.10.2015)

Feuchtinger J, Halfens RJ, Dassen T (2005) Pressure ulcer risk factors in cardiac surgery: a review of the literature. *Heart Lung* 34 (6): 375–85

Fletcher J (2014) Development and preliminary evaluation of a static air mattress with a heel flotation zone. *Wounds UK* 10(3): 80–7

NHS Wales (2010) 1000 Lives Plus. Pressure Ulcer Safety Cross. Available at: <http://www.1000livesplus.wales.nhs.uk/pressure-ulcers> (accessed 16.10.2015)

Paul R, McCutcheon SP, Denend LT, Zenios SA (2014) Sustaining pressure ulcer best practices in a high – volume cardiac care environment. *Am J Nursing* 114 (8): 34–44

Whitlock J, Rowlands S, Ellis G, Evans A (2011) Using the SKIN Bundle to prevent pressure ulcers. *Nursing Times* 107: 35, 20-23

**Declaration of interest**

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