

Implementing hybrid support surfaces: key components for a step change in ulcer prevention

KEY WORDS

- ▶ Hybrid mattresses
- ▶ Pressure ulcer
- ▶ Prevention
- ▶ Quality improvement

Preventing pressure ulcers in acute care is a complex and multifaceted activity. The implementation of hybrid support surfaces alongside targeted education and staff support activities has resulted in sustained reduction in the rate of pressure ulcer development in one organisation. Key determinants of the successful implementation include a culture that is open to innovation, embraces new technology, has a learning rather than blame culture and fosters a collaborative approach. This culture is underpinned by a redesigned toolkit, education and awareness, and new protocols and pathways. Improved outcomes for patients, staff and the organisation have been generated.

Preventing pressure ulcers occurring within NHS care is an ongoing target, as laid out in section 5.3, domain 5 of the NHS Outcomes Framework (Department of Health, 2016). Domain 5 requires a reduction in harm from category 2, 3 and 4 pressure ulcers. In addition to this, Lord Carter of Coles' report (Carter, 2016) requires organisations to revisit and review the processes of care delivery, acknowledging the need to do more with less money, fewer staff and reduced physical resources.

The triple aim, as set out in *Leading Change, Adding Value* by Professor Jane Cummings, Chief Nurse for England (2016), measures:

- ▶ Outcomes
- ▶ Patient and staff experiences
- ▶ Use of resources.

It was first put forward in *Five Year Forward View* (NHS England et al, 2014) and focuses on how high-quality care is intimately related to the better use of resources (including staff and equipment), resulting in a better patient experience and ultimately leading to better outcomes. The report acknowledges the importance of balancing the amount of time clinical staff spend delivering direct care with that spent on administration. The number and availability of clinical staff, particularly nurses, has also been the focus of reports from

the National Institute for Health and Care Excellence (NICE, 2014a) and *Leading Change, Adding Value* (Cummings, 2016). All of these strategic documents emphasise the importance of ensuring that staff are not losing clinical time performing unnecessary tasks and are allowed to concentrate on delivering high-quality evidence-based care.

REDUCING PRESSURE ULCERS IN SOUTH TEES

South Tees Hospitals NHS Foundation Trust is the largest hospital trust in the Tees Valley, with two acute hospitals and services in a number of community hospitals. The prevention of pressure ulcers is high on its list of strategic objectives, with a 20% reduction in new pressure ulcers being the 2015/16 Commissioning for Quality and Innovation target. The organisation also set a local target in 2014/15 to eliminate avoidable category 3 and 4 pressure ulcers (which develop in healthcare settings) over the next 3 years and reduce avoidable category 2 pressure ulcers by 50%. During 2014/15 there was an 10% reduction in category 2 pressure ulcers and a 26% reduction in category 3 and 4 pressure ulcers but at this point the numbers appeared to plateau, and the number of new pressure ulcers levelled out in early 2015 (*Figure 1*).

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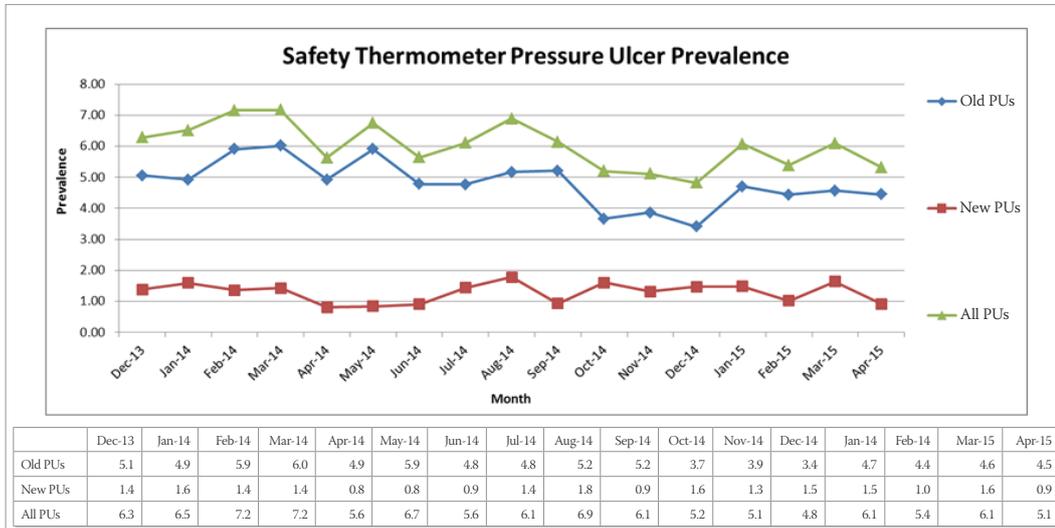


Figure 1. South Tees Hospitals NHS Foundation Trust safety thermometer data from December 2013 to April 2015

Within the Trust, high-specification foam mattresses were provided for all patients in line with NICE guidance that ‘all vulnerable patients, including those with a category 1–2 pressure ulcer, should receive, as a minimum provision, a high specification foam mattress’ (NICE, 2014b). If a patient was identified to be at increased risk or if he or she developed a category 3 or 4 pressure ulcer, the ward rented a dynamic alternating pressure air mattress (APAM) from a contracted provider. A recurring theme, when 16 cases were reviewed, was the delay in transferring the patient onto the appropriate surface. The delay was often not attributed to APAM delivery or service from the supplier (the contract specifies a maximum time frame) but was associated with practicalities such as the availability of a spare bed frame on which to inflate the rented mattress and the availability of the nursing staff required for safe patient transfer. Expenditure on standard static mattresses was significant and, while not quantified, moving mattresses on and off bed frames and temporarily storing them in corridors while waiting collection undoubtedly increased damage to mattress covers as well as creating clutter in clinical areas.

Piloting hybrid mattresses

Used in conjunction with regular and systematic repositioning, early intervention with a hybrid

mattress is considered to be a key enabler to securing significant reductions in pressure ulcer numbers. The fractured neck of femur wards have high numbers of at-risk patients. The old pathway stated that patients with a Braden score of 9–14 should be placed on an APAM. Hybrid mattresses have been introduced as part of the updated care pathway, which states that patients should stay on a hybrid mattress: the mattress should be on a low setting if they have a Braden score of 13 or 14 and a high setting if they have a score of 9–12.

Since implementation, no APAMs have been utilised. There have been 889 patients on these wards, who were in hospital for a total of 8,022 bed days. The wards were previously paying £5.75 per day to hire their alternating systems, therefore the £46,126.50 that would have been spent on mattress hire for those units in 2015/16 has been saved. In addition to this saving, pressure ulcer incidence has dropped.

Following the pilot on the fractured neck of femur wards, the roll-out of hybrid mattresses was seen by the Trust as key to improving processes, and therefore patient outcomes based on the themes of the root cause analysis (RCA), which were reducing the delay in obtaining mattresses and lowering the percentage of patients requiring reassessment.

The Pressure Ulcer Prevention Collaborative

In May 2014, the organisation established the South Tees Pressure Ulcer Prevention Collaborative. This multi-professional and multi-agency steering group (including commissioners) meets on a monthly basis. Pressure ulcer prevention is one of the agreed priorities for clinical matrons, and as such all attend the Collaborative meeting. The Collaborative’s work plan for 2105/16 included:

- » Continued focus on, training and interventions in the areas of highest pressure ulcer incidence, with clinical matrons and tissue viability nurses providing leadership. This ‘intensive intervention’ was to be evaluated for effectiveness in terms of outcomes
- » A number of key documents being reviewed, updated and ratified:
 - Intentional rounding chart
 - Wound care chart
 - Pressure ulcer categorisation tool
 - Revised patient/carer information leaflets
 - Mattress check card.
- » Participation in the ThinkSAFE initiative (www.thinksafe.care), educating patients at the earliest opportunity in how they can reduce the risk of harm. This initiative includes education on pressure ulcer prevention
- » A review of wound care products to be undertaken within the hospital setting to improve quality and reduce variation in treatment
- » Completion of the planned roll-out of hybrid mattresses for the top ten high-rental, high-risk wards in the Trust.

A robust learning process was already in place

Box 1. Predicted annual savings based on previous annual expenditure

- » **Outlay:** Purchase costs (200 full systems, 100 mattresses, 200 cushions and three trolley mattresses for accident and emergency)
- » **Saving:** Total hire spend in 2014/15
- » **Saving:** Recycling 75% of the static mattresses:

Total expenditure:
Purchase costs – Hire costs – Recycling = –£180,594.84

as part of the RCA system. Since its introduction in 2014/15, the numbers of category 3 and 4 ulcers had dropped. The overriding theme at panel reviews, however, was the need for accurate assessment and robust, systematic intervention (i.e. patient repositioning). The complexity of patients in terms of multiple comorbidities was apparent. Many patients had preexisting pressure damage, i.e. a category 2 ulcer, that had progressed further while patients were receiving Trust care.

Rolling out hybrid mattresses

The Trust purchased Dyna-Form® Mercury Advance (Direct Healthcare Services) hybrid mattresses. Efficiency savings were realised through a ‘one-system’ approach as treatment could be stepped-up or -down when clinically required. Efficiencies included:

- » Reduced rental spend on dynamic systems. There are patients who will continue to require highly specialist systems, however, which was taken into account during analysis and financial modelling.
- » Reduced decontamination costs associated with step-up and -down mattress changes.
- » The removal of process costs associated with the resource and logistics required for traditional step-up/step-down protocols and thus the release of nursing time that could be spent on improving patient care.
- » Reduced numbers of avoidable pressure ulcers, and therefore reduced treatment costs.

The process change led to the most beneficial efficiency savings as it released staff time. Staff members would not be required to carry out the administration associated with ordering and cancelling hire equipment. A significant amount more time was saved as staff members did not need to inflate the APAMs, transfer patients from the existing mattress onto the APAM (a process that frequently required two or more individuals and hoists or other equipment) or clean/decontaminate and store the foam mattress during step-up and the APAM during step-down processes. With the hybrid mattress, the power unit is already connected to the bed and can simply be switched on or can be stored on the ward, connected and switched on when

necessary (taking fewer than 5 minutes). This simplification of the process has been reported elsewhere, with the steps required being reduced from 16 to four (Jones and Tite 2013; Fletcher et al, 2016).

In April 2015 the mattresses were initially introduced on the ten wards identified to have the highest spend on APAM rental and/or the patients at highest risk. To ensure intervention at the earliest opportunity, three trolley systems for use in the accident and emergency department were purchased. Across these ten wards, a potential total saving of £180,594.84 was projected (Box 1).

Awareness and education

The hybrid mattresses were introduced on the wards alongside targeted education, including flashcard training on the A S.K.I.N bundle (Figure 2) and mattress management. Leaflets and posters were produced for patients in order to develop their understanding and awareness of their role in pressure ulcer prevention.

Promoting a learning culture

The use of audit and the sharing of information is seen as a key part of a safe and successful implementation process. As part of governance procedures and with the aim of fostering a learning environment, an audit of hybrid mattress use was carried out in September 2015.

The audit identified some minor issues with staff use of equipment, for example the pump was not always switched on when the patient’s risk status suggested that he or she required pressure relief. The Trust sent a clinical risk alert to staff regarding the appropriate use of hybrid mattresses, promoting a learning rather than a blame culture by encouraging staff to openly report incidents and share lessons learned.

Issues identified were discussed with other organisations that have implemented hybrid mattresses. This led to the identification of two useful options for reducing the frequency at which the pumps were incorrectly used:

- ▶▶ The power units should be switched on by default
- ▶▶ A way of carrying out routine checks that does not rely on additional tasks or paperwork

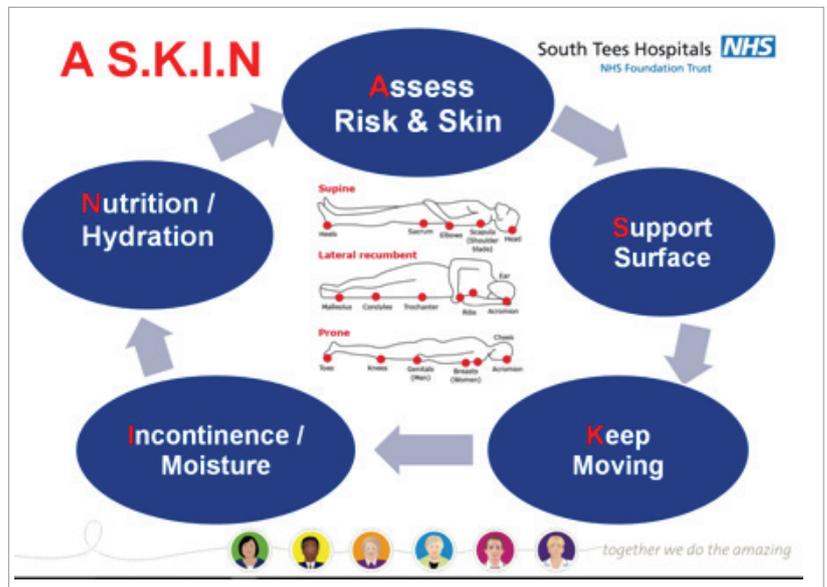


Figure 2. The A S.K.I.N bundle

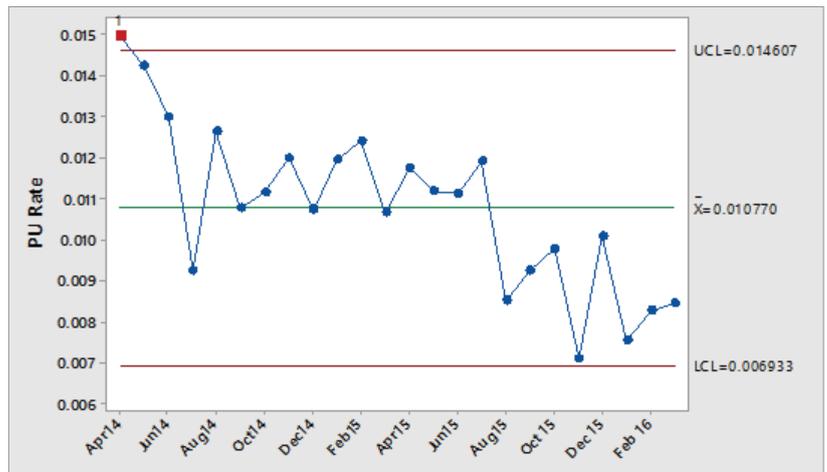


Figure 3. Rate of pressure ulcer occurrence in South Tees, April 2014 to February 2016

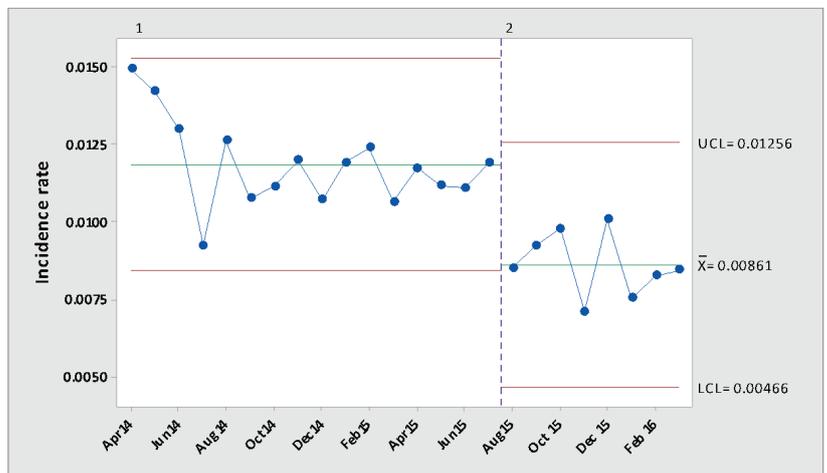


Figure 4. The incidence of avoidable pressure ulcers related to hospital admissions before and after the implementation of hybrid mattresses on ten wards

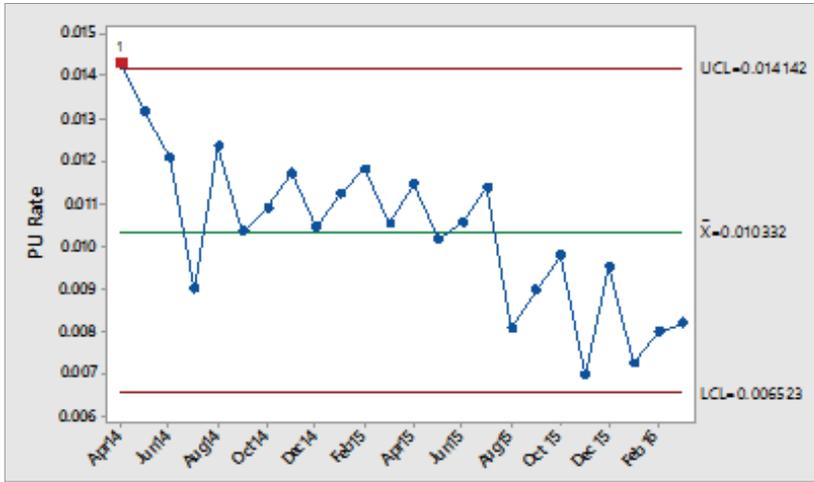


Figure 5. The incidence rate of avoidable category 1 and 2 pressure ulcers related to hospital admissions, April 2014 to February 2016

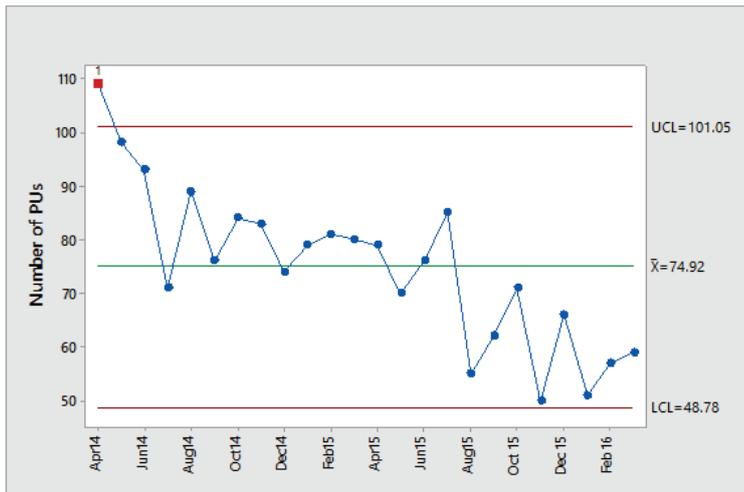


Figure 6. The count of category 1 and 2 pressure ulcer occurrence before and after the implementation of hybrid mattresses on the ten wards

needed to be devised, for example checking the pump is switched on could be incorporated into the 6-hourly drug round. During the drug round, a registered nurse visits every bed space, therefore it would be simple to add this check.

RESULTS

In the 10 months following the introduction of hybrid mattresses, there was a 29.77% reduction in the rate of pressure ulcer occurrence; a drop from 86.69 pressure ulcers per month to 60.88 per month. We have a run of 8 points below the average, the chance of this happening by chance is 1 chance in 256. A consistent 50% reduction, in both the averages and the variation

is evident on *Figure 3*. In *Figure 4*, the average (x-bar) and therefore the upper confidence level (UCL) and lower confidence level (LCL) have been recalculated showing 38% improvement in the monthly average (0.01185 to 0.00861). The expected variation has also reduced by 18% (from 0.01529 to 0.01256). The data in *Figure 4* show a statistically significant and sustained reduction in the mean number of ulcers, despite the common cause variation remaining the same. There was a particularly marked reduction in the occurrence of category 1 and 2 pressure ulcers (*Figures 5 and 6*). Tissue viability nurses observed that there was a significant reduction in category 2 ulcers. The 29.77% reduction in avoidable pressure ulcers equates to a 27% reduction in pressure ulcer incidence. Put into the context of patient numbers, before implementation for every 10,000 patients admitted 119 would develop a pressure ulcer; after implementation, this number dropped to 86. This change is not only significant but, as can be seen from the data, has been sustained.

While the use of APAMs has not been completely stopped, it has been dramatically reduced and there has been a noticeable drop in number of mattresses being stored off beds. The data relating to this have yet to be reviewed in detail.

Staff members reported greater ease when stepping-up patient care, but it was noted during the audit that patients also seemed to be stepped-down more frequently. While this did not accrue additional cost savings, it did better prepare patients for discharge, particularly if they were returning to their own bed-mattress combination, giving both the patient and community staff confidence that this was a safe step. The process of stepping-up the mattress was felt to be significantly quicker, as many administrative steps had been removed, resulting in less paperwork and time savings.

Members of staff also commented on the reduction in moving and handling activities, as they were no longer lifting mattresses on and off beds on a daily basis. Figures relating to staff injuries and benefits to portering will be reviewed in April 2017. This was also believed to be significantly better for patient comfort, as patients did not need to be hoisted in and out of bed.

Staff members acknowledged the efficiency of the new system. They noted that it released significant amounts of their time, enabling them to deliver more care.

DISCUSSION

The key attributes of this successful implementation are outlined in *Figure 7*.

It was hoped that the implementation of hybrid mattresses would achieve five main benefits for the organisation:

- » Reduced rental spend on dynamic systems
- » Reduced decontamination costs associated with step-up/step-down mattress change
- » Lower costs associated with the resource and logistics required for traditional step-up/step-down protocols
- » Reduced health economy expenditure on the treatment of avoidable pressure ulcers
- » More nursing time released for patient care.

These benefits were all realised within the first year. All of the benefits achieved contribute to delivery of the strategic objectives of the Trust and wider objectives of the NHS. Lord Carter focussed on the amount of variation across organisations, suggesting that considerable amounts of time and money could be saved if organisations could learn from others where good practice produced better outcomes in efficient, patient-centred ways. It is clear both from patient outcomes and staff feedback that the focus on an improved process has resulted in significant patient-centred and financial benefits.

CONCLUSION

Alongside the main patient benefits — reduction in pressure ulcers with the associated reduction in pain and distress and impact on length of stay and quality of life — there were benefits for staff as increased time could be spent providing high-quality care. While all of the other activities involved in the implementation and general drive to reduce pressure ulcer numbers must be acknowledged, the timing of the reductions in relation to the implementation of hybrid mattresses suggests that the innovation made a significant difference to step-change in care delivery.

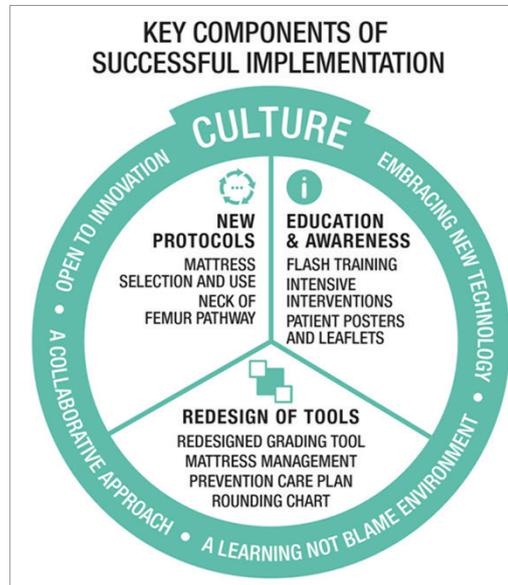


Figure 7. Key attributes of successful implementation

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