Five steps: a novel approach to minimise the spread of healthcare-associated infections

This article reports on one acute trust's attempt to stop the spread of healthcare-associated infections — particularly *Clostridium difficile* — among patients using pressure-relieving mattresses. After an audit exposed the fact that mattresses displayed visible contamination and staff were unclear about the trust's decontamination policy, a five-step system was instigated to ensure that devices that had been contaminated with alert organisms were effectively processed and decontaminated. Alongside this initiative, clearer cleaning instructions were devised and distributed.

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KEY WORDS
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Clostridium difficile
Decontamination procedure
Audit

The Department of Health is firmly committed to reducing healthcare-associated infections (HCAIs). This is clearly evident in the abundance of guidance documents that have been produced over the past few years. Since the launch of *The NHS Plan* in 2000, a national investment has been made to improve the cleanliness of hospitals (DoH, 2000). Cleanliness and infection control are closely linked in the mind of the public, but preventing infections requires more than simple cleanliness. (DoH, 2004). Effective prevention and control of HCAIs needs to be embedded into everyday practice and should be consistently applied by everyone. This should encompass the demonstration of good infection control and hygiene practice.

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NHS bodies have a duty of care to ensure that they have effective arrangements for the appropriate decontamination of medical devices (DoH, 2008a). Effective decontamination is essential and systems to protect patients and staff which minimise the risk of transmission of infection from medical devices which have been in contact with patients or their body fluids should be in place. The term medical device refers to a wide range of products and includes pressure relieving devices. The 'Five steps' system described in this article has been developed in order to eliminate this risk in an acute trust — Doncaster and Bassetlaw Hospitals NHS Foundation Trust — which uses pressure-relieving devices as part of its pressure ulcer management strategy.

The trust has had a proactive pressure ulcer prevention and management strategy in place for the past 16 years. Evidence from the trust's annual prevalence data in 2008 showed that an increasing number of patients who developed pressure ulcers were over the age of 65. As *Clostridium difficile* most commonly affects the elderly population with underlying diseases (DoH, 2007), it is vital that these vulnerable patients are not subjected to additional risks of infection during their hospital stay. This view is firmly embedded in *High Quality Care for All* (DoH, 2008b), which sees the first dimension of quality as being that patients are not subjected to any harm. This includes ensuring that a reduction in avoidable HCAIs is achieved.

During a review of the pressure-relieving devices at the trust, it became evident that the devices had visible contamination to the inner components of the mattress. This coincided with the trust seeing a rise in the number of cases of *C. difficile* infection. The trust had identified 10 'hot spot' wards where an increase in the number of patients with *C. difficile* had been recorded. While there could be numerous causative factors which could contribute to the increase in *C. difficile* figures, the lead nurse in tissue viability (LNTV) required assurance that the pressure-relieving devices were not a source of cross-contamination and were not posing potential harm to vulnerable patients.

The tissue viability team (TVT) has led the development of an innovative approach which has transformed the management of the decontamination of pressure-relieving devices. It is crucial that the devices are subjected to robust decontamination procedures which are sustainable if the trust is to ensure that it is committed to the reduction of HCAIs.

Table 1
Audit tool and abbreviated results

	Positive replies
Decontamination	
1. The responsibility for cleaning of the pressure-relieving equipment is clearly defined.	83.4%
2. Manufacturers' instructions are available for the decontamination of newly-purchased equipment.	47.6%
3. Staff can state the procedure for the routine/terminal cleaning of pressure-relieving equipment.	62.4%
4. Staff can state the procedure for the disinfection of pressure-relieving equipment.	10.4%
5. Pressure-relieving mattresses are visibly clean. (Open mattress cover and observe for any staining of body fluids and/or odour.)	22.6%
6. Pressure-relieving mattresses with removable cells are decontaminated between patient usage according to manufacturers' instructions.	38.9%
7. Staff are aware of the need to complete a decontamination status certificate before equipment is maintained/serviced/repaired, whether within the area or transferred from the area.	73.1%
8. Staff can state the process for external decontamination of the pressure-relieving equipment.	42.3%
Fault notification	
9. Staff can state the process for fault notification of pressure-relieving equipment.	79.8%
10. Staff can identify the appropriate documentation that is required when reporting a fault.	74.9%
Equipment availability	
11. Staff can state the process for requesting pressure-relieving equipment.	77.6%
12. Staff can state the relevant information that is required when requesting pressure-relieving equipment.	60.0%
13. Staff are aware of the procedure when they are unable to access pressure-relieving equipment in a timely manner.	75.7%
Ward:	
Grade of staff:	
Number of systems not in use on the ward:	

Audit programme

An audit tool (*Table 1*) was devised from the trust's Saving Lives Infection and Prevention and Control Ward/Department Accreditation pack, which was developed as a delivery programme to reduce HCAIs. This audit focused upon the management of the pressure-relieving devices and was aimed at establishing whether effective prevention and control of HCAIs was embedded into everyday practice and could be consistently applied by everyone. The audit tool comprised 13 questions and over an eight-day period, 146 face-to-face interviews were carried out by members of the TVT.

The audit results were analysed by the trust's clinical audit team and are shown in an abbreviated form in *Table 1*. The results showed inconsistencies in staff being able to state the procedure for both the routine and terminal cleaning (after the patient episode is complete) of pressure relieving equipment. The surface wash, comprising a neutral detergent and hot water, was only being performed on the mattress cover and not the other components of the pressure-relieving device. At the time of the audit the trust's disinfection policy stated that the mattress should be cleaned using a neutral detergent, hot water and a disposable cloth, rinsed and dried. The pump and tube set should be cleaned using a detergent wipe. This policy omitted to give clear instructions as to the cleaning of the inner components of the pressure-relieving device. Despite the trust's disinfection policy outlining safe systems of work to protect patients and staff from the transmission of infection from medical equipment or devices, none of the staff interviewed could state the procedure for the disinfection of pressure-relieving equipment. Should the device show contamination of blood or blood-stained body fluids, the policy stated that a solution of 10,000ppm available chlorine should be used to disinfect the device. Following the use of a device on an infected patient, a weaker solution of 1,000ppm chlorine provided decontamination of the pressure-relieving mattress.

The surface wash was also being used on devices that had been in contact with patients who had tested positive for alert organisms such as methicillin-resistant *Staphylococcus aureus* or *C. difficile*. The disinfection policy indicates that should evidence of strike-through be apparent, the device should be sent for external decontamination as the trust does not have the facilities or expertise to undertake this robust procedure in-house. Devices were neither identified or packaged up and were being

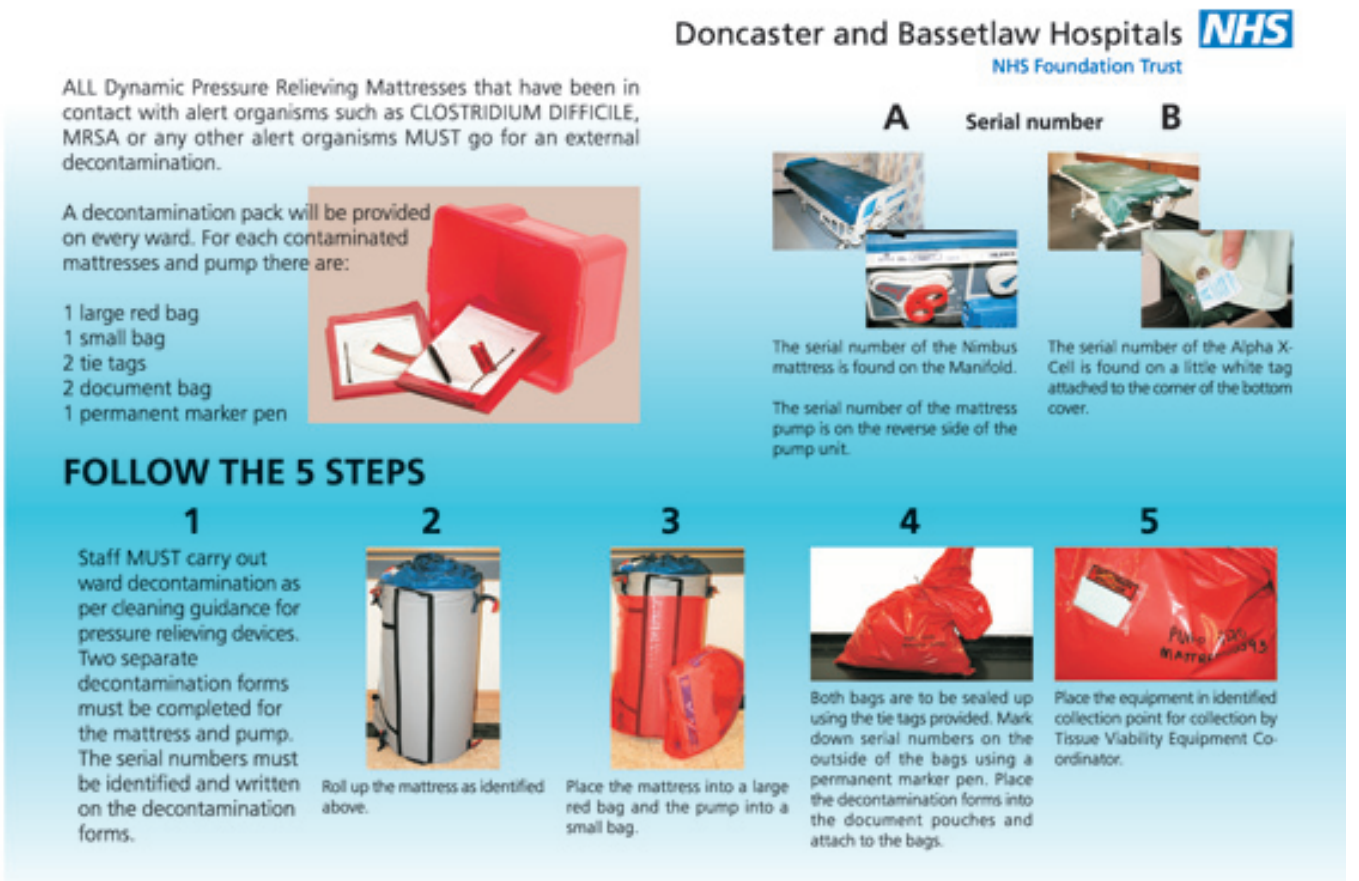

Figure 1. The five-step system for decontamination of pressure-relieving mattresses.

transferred back to the trust's medical equipment library. These devices would then be used on another patient which clearly carries risks of cross-contamination

In order to ensure that all key stakeholders were engaged in the proposed changes to the management of the pressure-relieving devices, the LNTV felt it was crucial to engage with as many staff across the trust as possible. A presentation was delivered at the trust's *C. difficile* Leadership Summit where the director of nursing services, director of infection and prevention control, ward sisters and matrons from the 'hot spot' areas were gathered to examine and critically evaluate their clinical practice in order to establish why the trust's *C. difficile* figures were rising.

The LNTV presented the results from the audit that had taken place and shared pictures highlighting the visual contamination of the devices. The stakeholders were in agreement that the pressure-relieving devices could be a contributory factor to the rising number of patients with *C. difficile* and were keen to explore options for improving clinical practice.

The way forward

The LNTV collaborated with the infection control team in the development of instructions for the cleaning of pressure-relieving devices. Before the launch of the instructions, the LNTV contacted the manufacturers of the pressure-relieving devices to ascertain whether the concentrations of chlorine releasing agents would have detrimental affects on the mattress components. The manufacturers confirmed that this approach is in line with their instructions.

Routine cleaning/disinfection/terminal clean

- Clean mattress interior and exterior, pump and cable with Chlor-Clean 1,000ppm chlorine releasing agent
- Then rinse with clean water and dry thoroughly with paper towels.

Disinfection — for visible contamination with blood or blood-stained body fluids

- Clean mattress interior and exterior, pump and cable with Haz Tabs 10,000ppm chlorine releasing agent followed by a disinfection using Chlor-Clean 1,000ppm chlorine releasing agent
- Then rinse with clean water and dry thoroughly with paper towels.

In addition to these cleaning instructions, the LNTV presented the proposed new procedures which would ensure that all devices that have been used on patients with *C. difficile*, MRSA or other alert organisms are identified, packaged up appropriately and sent out for external decontamination. A formal arrangement was developed with an external contractor.

As the LNTV had been able to secure funding for a tissue viability equipment co-ordinator (TVC) in order to facilitate the 'day-to-day' management of the decontamination of the devices, an overview of this post was also presented.

The views of the attendees of the *C. difficile* Leadership Summit were taken into consideration by the TVT when developing the new operational procedures for the decontamination of the pressure-relieving devices. The five-step system (*Figure 3*) that has been developed by the TVT would aid the facilitation of the external decontamination of the devices.

External decontamination

A retrospective audit was performed by the LNTV which identified the numbers of patients with alert organisms. These audit figures were used as a basis to secure the funding for the external decontamination contract. The TVC uses a trust database and is able to identify the patients with known alert organisms on a daily basis. A tagging system acts as a reminder that the devices are required to go for external decontamination.

The 'red box' system

The 'red box' system has been devised to ensure that the devices are packaged up when care for a patient who has had an alert organism episode is complete.

All wards throughout the trust have a 'red box'. The contents of the 'red box' ensure that the ward staff have the necessary components to package up the devices before sending them to Karomed — the contractor. The TVC ensures that the red boxes are kept topped up with the necessary components as part of the daily ward round routine.

Attached to the lid of the red box is a poster illustrating the five steps (*Figure 1*). This guides the staff through the procedure that is needed before the devices are sent for external decontamination. This ensures that the pressure-relieving devices are sent to Karomed in an appropriate manner.

The packing up procedure involves the completion of decontamination status documentation and the noting of the serial numbers of the devices. This robust tracking system allows the trust to be able to produce a full audit trail on the decontamination history of the devices. This approach will ultimately ensure that patient safety is at the forefront of the TVT's decontamination strategy.

Once the device is packaged up, it is placed in the designated ward collection point awaiting the TVC. The devices — irrespective of their manufacturer — are collected by Karomed on a weekly basis and a comprehensive decontamination is carried out. The trust is showing its commitment to this initiative as a two-year agreement is now in place with Karomed for external decontamination. Once decontaminated, the devices are sealed, packaged and then returned to the trust within an agreed timeframe. When the devices are returned, they are unpacked and safety checked before the next patient use. This approach is vital in ensuring that the tissue viability service has the assurance that is required in its quest to reduce HCAIs.

Conclusion

While the trust has instigated other strategies in its attempt to reduce the number of cases with *C. difficile*, the pressure-relieving devices no longer have visual contamination. The trust has robust procedures in place for the decontamination of pressure-relieving devices. The revised cleaning instruction, in addition to the external decontamination arrangements, gives the assurance that the devices are clean and safe to use for vulnerable patients. This will ultimately reduce the risk of vulnerable patients developing an HCAI. WUK

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Key points

- Effective prevention and control of healthcare-associated infections needs to be embedded into everyday practice and should be consistently applied by everyone.
- One acute trust investigated the rise in *Clostridium difficile* infections and after an audit discovered that there may be a link to incorrect decontamination of medical devices.
- To combat the spread, robust cleaning instructions were issued for routine and terminal cleaning of pressure-relieving mattresses. Instructions were explicit as to the cleaning requirements of all components of the pressure-relieving device.
- The red box system incorporating the 'Five-step approach' was devised to ensure that any beds that had come into contact with any alert organisms were decontaminated thoroughly.
- An external contract was formalised which ensures robust decontamination of devices that have been used with patients with alert organisms.