Using a non-corrosive, broad spectrum antimicrobial rinse after every wash cycle to minimise the risk of infection/transmission from macerators

Improvement Issue and Context

In the clinical setting re-usable bedpans have historically been used to manage the toileting requirements of the bedbound patient. However with up to 33% of re-usable bedpans contaminated with *Clostridium difficile* even after processing in dedicated washers [1] the advent of pulp-based, single use disposable bedpans offers an alternative approach and eliminates the risk of cross infection from contaminated bedpans [2].

Disposal of the single use, pulp-based bedpans requires a macerator which chops the used pulp bowls and associated waste into a fine slurry which is discharged into the sewage system.

Opening the macerator lid in order to dispose of used bedpans results in a risk of aerosolised particles being released into the clinical environment from the macerator. Due to the nature of the waste being processed in these devices it is highly likely that any aerosolised particles released from the macerator will contain significant numbers of potentially hazardous microbes.

With increasing evidence linking the transmission of nosocomial pathogens with environmental surfaces [3, 4] and clean clinical environments reducing the risk of infection [5], it is logical to put policies, protocols and procedures in place that reduce the opportunity for potentially harmful microbes to be dispersed into the clinical environment.

Although external macerator surfaces are cleaned in line with standard cleaning procedures there is no specific protocol for cleaning or disinfecting the internal workings and with some HCAI outbreaks traced back to macerators, there is a clear need to identify an effective disinfection protocol that will minimise the risk of infection / transmission posed via this route.

Contact slides taken from five standard macerators in use in a hospital highlight that up to hundreds of thousands of bacteria (10^5, equivalent to 100,000) are present per $11cm^2$ area on the surface of the macerator drum and inside the lid of the macerator. See Table 1.

Table 1. Bacterial bioburden in colony forming units (CFU) associated with macerators in normal clinical use.

TEST LOCATION	CLINICAL AREA				
	Urology	Stroke Unit	Ante-Natal	CCU	General Ward
Macerator drum	10^3	10^4	10^4	10^3	10^3
Macerator inside lid	10^3	0	10^5	10^5	10

Aim

The aim of this work was to perform a series of tests under controlled conditions in order to define and confirm an effective protocol for the use of TECcare® CONTROL Technology (see Figure 1) for disinfecting the internal surfaces of the Haigh Quattro new generation macerator (see Figure 2).

Figure 1. TECcare® CONTROL Technology

Method

The Haigh Quattro new generation macerator was used on cycle C1 for all testing. Testing was performed using tap water and the macerator temperature was 17-18°C.

This testing was performed in order to identify an appropriate dilution rate for the disinfectant rinse. To clear-down the macerator prior to each test, two full cycles were run with the macerator empty (i.e. no inoculum and no TECcare CONTROL were used between tests).

Figure 2. The Haigh Quattro macerator used in this testing

2.5ml of each bacterial strain [*S. aureus* (ATCC25923); *E. coli* (ATCC25922)] were inoculated onto each pulp bedpan in order to standardise the bioburden loaded into the macerator and to evidence the activity of the TECcare CONTROL Technology. Contact slides were taken from four pre-determined locations inside the macerator after completion of the wash cycle for each test. See Table 2 for test details and the associated contact slide results.

Evidence of Improvement

Table 2. Test conditions and results

Test No.	Test Conditions / Description			Contact slide test results from inside macerator [number of microbes recovered in colony forming units (CFU)]			
	Bacteria* added to 2 pulp bedpans (2.5ml of inoculum to each)	Doses of TECcare CONTROL added	Contact slides taken post cycle	Upper drum	Lower drum	Impeller disc (base of drum)	Inside lid
1	-	-	Y	10^6	10^5	10^6	10^5
2	Y	-	Y	10^3	10^3	10	10^3
3	Y	Y (0.7ml)	Y	0	0	0	<10

* Pre-inoculation / contamination per test consisted of 5ml of *S. aureus* (ATCC25923) and 5ml of *E. coli* (ATCC25922).

Test results show that using 0.7ml of TECcare CONTROL as a final rinse to every cycle reduces the number of bacteria present on the macerators internal surfaces to zero at three of the sampling points and less than 10 colony forming units at the fourth sampling point.

Discussion / Conclusion

As demonstrated by the results presented in Table 1 there are significant numbers of bacteria present inside macerators used in everyday clinical practice. During normal use the inside of these machines are not cleaned or disinfected, therefore every time a macerator lid is opened there is a very real risk of dispersing microbes out into the clinical environment via aerosolisation. This can effectively seed the clinical environment with high numbers of potentially dangerous microbes thereby increasing the risk of transmission / infection.

Since clinical literature acknowledges that environmental surfaces within clinical settings are a recognised transmission pathway [3, 4] it is important from a risk management perspective to put appropriate procedures in place that reduce the opportunity for potentially harmful microbes to be dispersed into the clinical environment.

Based on the test results reported in Table 2 the addition of 0.7ml of TECcare CONTROL Technology rinse at the end of every Haigh Quattro macerator wash cycle reduces the risks posed by microbes to its lowest practical level – even within a highly challenging (intentionally seeded / inoculated) environment. TECcare CONTROL is a broad spectrum antimicrobial technology and is highly effective against a wide range of microbes which includes E. coli, C. diff, MRSA and norovirus. In addition it is also very safe, non-corrosive, easy to use and clinically proven within healthcare settings.

Using the TECcare CONTROL Technology with the Haigh Quattro system effectively raises the bar for all other macerators by minimising any potential infection or transmission risk associated with these devices, thereby promoting the cleanest – and therefore safest - possible clinical environment.

The TECcare CONTROL Technology is available to order on NHS Supply Chain from 1st February 2017.

References

1. Bryce E, Lamsdale A, Forrester L, Dempster L, Scharf S, McAuley M, Clearie I, Stapleton S, Browning S. Bedpan washer disinfectors: an in-use evaluation of cleaning and disinfection. Am J Infect Control. 2011 Sep;39(7):566-70.
2. Phua MY, Salmon S, Straughan P, Fisher D. Disposable single-use receptacles in a tertiary hospital: A large survey of staff after a hospital-wide implementation. Am J Infect Control. 2016 Sep 1;44(9):1041-3.
3. Otter JA, Yezli S, French GL. The role played by contaminated surfaces in the transmission of nosocomial pathogens. Infect Control Hosp Epidemiol 2011 Jul;32(7):687-99.
4. Department of Health. Clean, safe care: Reducing infections and saving lives. London: 2008.
5. Orenstein R, Aronhalt KC, McManus JE Jr, Fedraw LA (2011) A targeted strategy to wipe out Clostridium difficile. Infect Control Hosp Epidemiol 2011 Nov; 32(11):1137-9.

Technical bulletin produced by TECcare® in association with Haigh Engineering Company Ltd (www.haigh.co.uk)

TECcare® Antimicrobial Technologies

HAIGH

Haigh Engineering Company Ltd
Ross-on-Wye, Herefordshire, HR9 5NG UK
Tel: +44 (0)1989 763131
E-mail: info@haigh.co.uk

Rev 1 (01/2017)