A Scientific Assessment Of An Automated Disinfection System For The Decontamination Of Pressure-Relieving Hospital Mattresses

Thomas, H, Thornton M and Westgate S J.

Introduction

Pressure-relieving mattresses can become contaminated with pathogens. Pathogens can be transferred from the mattress to patients and healthcare practitioners. Disinfection can break the epidemiological chain of infection. Traditionally mattress disinfection involves manual cleaning following pre-determined wipe protocols whilst mattress covers are decontaminated according to widely-publicised washing machine protocols. Manual methods are open to human error. Automated decontamination procedures remove opportunities for human error and decrease the risk of cross-contamination.

Aim

To determine the efficacy of the RehaWash mattress disinfection system.

Method

- Three 'dirty' pressure-relieving mattresses were randomly selected.
- Prior to cleaning, 10 contact plate samples were taken per mattress representing the head, torso and feet.
- Mattresses were decontaminated using the automated disinfection system.
- Following decontamination contact plates were again used to sample for microorganisms.

- Microbiological samples were enumerated according to standard methodologies.
- Mattress covers were also sampled pre- and post-cleaning. Covers were washed following industry standard washing and drying procedures.

Condition	Mattress Number	Sampling Location									
		1	2	3	4	5	6	7	8	9	10
Before cleaning	1	1	1	3	12	TNTC	TNTC	1	4	0	6
	2	1	2	0	0	0	0	1	1	0	0
	3	TNTC	TNTC	TNTC	TNTC	TNTC	TNTC	TNTC	TNTC	TNTC	TNTC
After cleaning	1	1	11	7	0	0	7	2	3	2	2
	2	4	6	6	1	11	6	4	4	4	1
	3	1	1	9	TNTC	1	0	1	2	0	0

Table 1. Number of colony forming units recovered from mattresses processed by an automated cleaning system per 33.18 cm^2 Tryptic Soy Agar contact plate (TNTC = Too Numerous To Count).

Condition	Mattress Number	Sampling Location				
		1	2	3	4	5
Before cleaning	1	5	14	5	11	4
	2	4	49	11	2	8
	3	31	TNTC	TNTC	TNTC	TNTC
After cleaning	1	1	9	0	6	0
	2	0	0	0	2	0
	3	4	0	34	0	5

Table 2. Number of colony forming units recovered from mattress covers per 33.18 cm^2 Tryptic Soy Agar contact plate (TNTC = Too Numerous To Count).
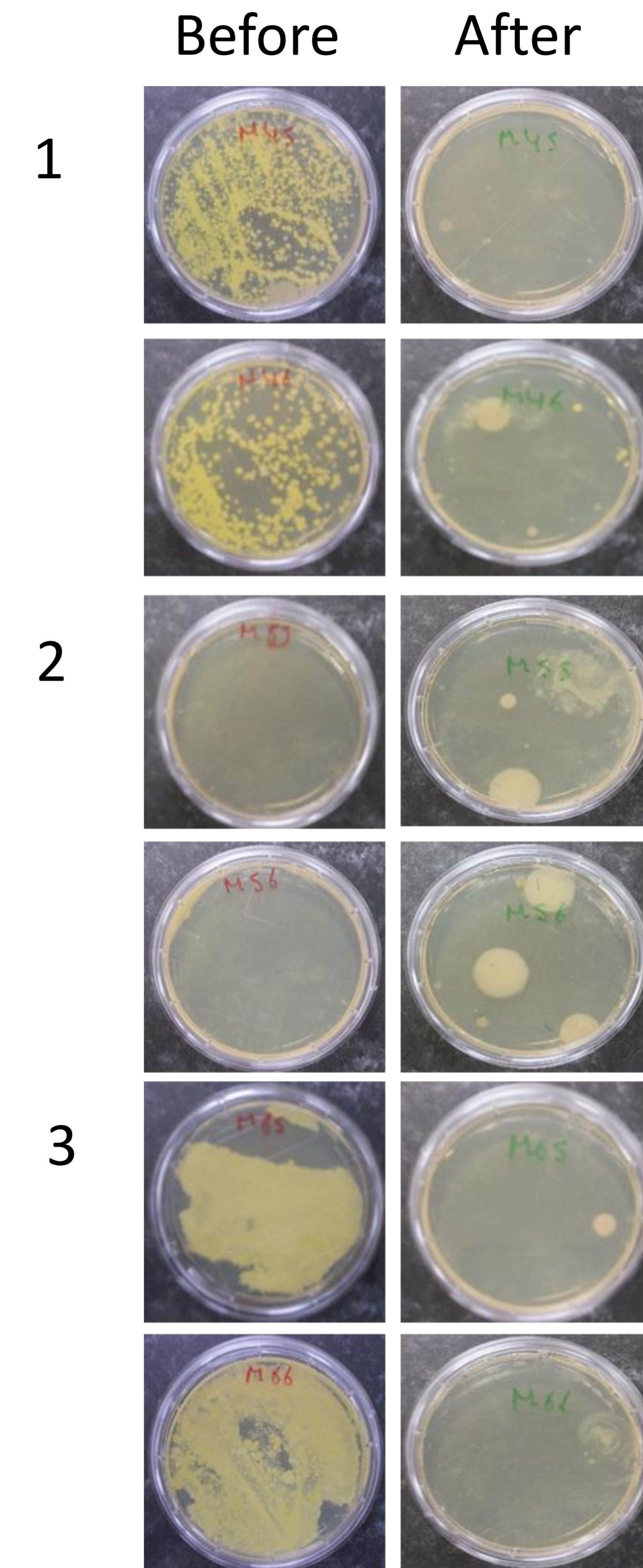
Before After

Figure 1. Photographs of TSA contact plates taken from two sampling locations on mattresses 1, 2 and 3 (left: before cleaning, right: after cleaning).

Results

Following decontamination there was a significant reduction in the number of microorganisms recovered from each mattress (Table 1). Prior to disinfection, extremely high levels of microorganisms were recovered from one mattress in particular. Post disinfection, these levels had dropped significantly at each sampling site (Figure 1). Prior to cleaning, microorganisms were recovered from all contact plates used to sample the mattress covers. Post cleaning all but one sample resulted in the recovery of less than 10 colonies per plate (Table 2).

Discussion

The automated system reduced the quantity of microorganisms recovered from the mattresses, and standard cleaning methods reduced the bacterial load on the mattress covers. Utilising an automated system decreases variability in the disinfection process and thus provides an assurance of quality relating to the disinfection process. A direct comparison of manual and automated methods would be an ideal next step to this study.

Conclusions

Hospital beds can pose a potential infection risk for the patient if not adequately disinfected. A number of outbreaks have been quoted in the literature involving antibiotic-resistant microorganisms and hospital bed components. It is essential that these items are adequately decontaminated to minimise the risk of cross-infection.