Improving process efficiency and medical device cleanliness at a Foundation Trust by adopting a new combined cleaner/disinfector into routine use in a busy Medical Device Library

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Improvement Issue and Context

Microbial contamination of the hospital environment is unavoidable and the environment is becoming increasingly recognised as a key risk factor for healthcare associated infection (HCAI). Environmental surfaces are clearly linked to the transmission of nosocomial pathogens [1, 2, 3] and improved cleanliness of these environments reduces the incidence of microbial infection and acquisition by patients, visitors and staff. [1, 4]

From the perspective of a medical device library (MDL) any device returned from a clinical area (irrespective of how long it remained in this area) must be treated as dirty and potentially contaminated with microbes which may pose a risk of cross-contamination and infection. Consequently all devices returned to the MDL after use must undergo an effective cleaning process prior to MDL staff checking, servicing and storing them ready for future use. Inadequately cleaned devices pose a potential infection risk to patients, MDL staff and Medical Engineers.

Historically, the cleaning of medical devices returned into the MDL after use in a clinical area involved the following two-stage process;

Step 1 – washing with neutral detergent solution and / or wipes

Step 2 – drying with paper towels

The improvement aim was to identify a new method of medical device cleaning which would maintain device cleanliness whilst simultaneously improving process efficiency and reducing the waste generated from the standard two stage cleaning process.

Methods and Measurement

The medical device team at Lancashire Teaching Hospitals NHS Foundation Trust identified TECcare® CONTROL textured wipes and trigger sprays as a potential replacement for the existing two stage cleaning process for medical devices returned to the MDL after use in a clinical area.

Figure 1. TECcare® CONTROL textured wipes and trigger spray

TECcare® CONTROL textured wipes and trigger sprays (see Figure 1) provide simultaneous cleaning and disinfection. This offered a potential process efficiency for the MDL at the Trust which were looking to streamline their existing two stage cleaning process.

To ensure that the new spray and wipe based cleaning process was appropriate for the MDL team a formal evaluation took place comparing standard detergent based cleaning with the new TECcare® CONTROL wipes and spray. The evaluation was based on the cleaning of medical devices (infusion pumps, see Figure 2) returned to the MDL after use and looked at the following four outcomes;

Figure 2. Infusion pump

Medical device cleanliness. This was determined using adenosine triphosphate (ATP) swab testing of ten devices before and after standard (detergent-based) cleaning and when using the new cleaning / disinfecting spray and wipes.

Process efficiency. The time required to clean ten devices returned from the wards was assessed by performing 'time and motion' assessments when processing devices with either the existing two stage process or the new single stage process.

Waste. The weight and volume of the waste created from each cleaning process was measured and reported.

Cost. The direct (material) and indirect (labour) costs associated with each cleaning method were identified and reported.

Results for the above outcomes are detailed in Tables 1 and 2.

Evidence of Improvement

Table 1. Comparison of ATP swab test results for standard (two stage) cleaning vs. cleaning with TECcare® CONTROL spray and wipes.

Cleaning Method	Device No.	ATP swab test location and results in relative light units					
		Keypad		Carry Handle		Air Inline Sensor	
		Before	After	Before	After	Before	After
Standard Cleaning	1	73	18	243	24	30	22
	2	176	91	77	24	35	22
	3	84	35	119	28	25	13
	4	23	22	147	31	11	12
	5	28	9	127	23	12	12
	MEAN	77	35	143	26	23	16
TECcare® CONTROL	6	140	4	194	8	30	2
	7	186	5	379	18	14	3
	8	52	5	245	21	123	5
	9	28	6	265	15	28	14
	10	215	0	117	9	40	2
	MEAN	124	4	240	14	47	5

Looking specifically at the mean ATP scores it is evident that standard cleaning improved the cleanliness of the infusion pump keypad, carry handle and sensor by 55%, 82% and 30% respectively. TECcare® improved the cleanliness of these swab sites by 97%, 94% and 89% respectively. Combining all swab sites in a 'before' vs. 'after' analysis of ATP measurements, standard cleaning improved device cleanliness by 68% with TECcare® improving device cleanliness by 94%.

The five devices cleaned with TECcare® were in clinical use for a total of 107 days (mean = 21 days; range 4 – 47 days). The five devices cleaned with standard processes were in clinical use for a total of 37 days (mean = 7 days; range 4 – 10 days). This may explain differences in pre-clean ATP levels between groups.

Table 2. Outcomes for cleaning five medical devices (infusion pumps).

Cleaning Method	Total time required to clean all five devices (mins:secs)	Total waste produced from cleaning		Total cost in pence*	
		Weight (g)	Volume (l)	Direct	Indirect
Standard Cleaning	14:11 (range; 2:05 – 3:17)	132	1.56	21.2	196.24
TECcare® CONTROL	6:45 (range; 1:15 – 1:35)	35	0.75	15.98	93.39
% Improvement with TECcare®	52%	73%	52%	25%	52%

*Direct (material) costs were based on the following: Standard cleaning used 2 paper towels and 1 j-cloth at a cost of 4.24p per device per clean. TECcare® CONTROL used 1 textured wipe and 5ml of spray at a cost of 3.195p per device per clean. Indirect (labour) costs were based on the following: £8.30/hour for a cleaning operative = 13.83 pence per minute = 0.2306 pence per second.

Future Steps

The results detailed in Table 1 demonstrate that switching from the existing detergent based two-stage cleaning process to the single stage TECcare® CONTROL spray and wipe based process offers clear benefits in terms of device cleanliness. Despite facing a tougher challenge (i.e. higher pre-clean ATP levels) the infusion pumps cleaned with TECcare® products were markedly cleaner after processing compared to those cleaned using the standard products and processes.

Cleanliness is of paramount importance in the clinical environment. Optimising the cleanliness of medical devices minimises any potential infection or cross contamination risk posed by these products to patients, MDL staff and Medical Engineers.

The new TECcare® CONTROL products improved efficiency of the cleaning process by over 50% (see Table 2). In practice this allows twice as many devices to be processed in a set period compared to using the standard procedure.

In addition to improving cleanliness and efficiency, using TECcare® CONTROL wipes and sprays eliminates the need for paper towels. This had a significant impact on both the volume and weight of the waste produced by the cleaning process which fell by 52% and 73% respectively (Table 2).

The TECcare® CONTROL wipes and sprays also offered a clear cost benefit to the MDL management team both in terms of direct (material) and indirect (labour) costs associated with the cleaning of medical devices (Table 2).

Replacing the existing medical device cleaning process with TECcare® CONTROL improved device cleanliness and departmental efficiency, reduced the volume and weight of waste produced whilst simultaneously offering a cost benefit to MDL management. As a direct result of these benefits the MDL have now adopted the new cleaner disinfector into routine use for all device cleaning.

References

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