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INFECTION PREVENTION SOCIETY CONFERENCE, LIVERPOOL 2019

Introducing a new, safe, fast and effective zonal decontamination process at an NHS Foundation Trust

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Introduction

Infection prevention is a clear priority for governments, private and public healthcare providers and service users. This is laid out clearly in The Health and Social Care Act 2008: Code of Practice on the prevention and control of infections and related guidance which states that;

'Good infection prevention (including cleanliness) is essential to ensure that people who use health and social care services receive safe and effective care.'

'Providers should use risk assessments about the health, safety and welfare of people using their service to make required adjustments. These adjustments may be to premises, equipment, staff training, processes, and practices and can affect any aspect of care and treatment.' [1]

This work is an example of how to utilise high quality terminal cleaning with limited resources and in challenging circumstances at the University Hospitals of Morecambe Bay (UHMB) NHS Foundation Trust.

The Issue

Challenges to overcome:

- chronic ward with elderly people
- high rate of MRSA and ESBL colonisation
- no free capacity to relocate patients during zonal decontamination
- recurring gastrointestinal outbreaks on the ward
- limited capacity of hotel service
- limited nursing capacity
- limited time for cleaning processes
- building structure does not allow use of a hydrogen-peroxide fogging system

Methods

An alternative high-level disinfectant technology meeting the UHMB NHS Foundation Trusts safety, efficacy and efficiency requirements was identified.

The antimicrobial technology in question was TECcare® CONTROL (see Figure 1). This is a broad spectrum high level disinfectant based on a combination of quaternary ammonium compounds (QACs).

FIGURE 1.
TECcare CONTROL product range

Microbiology and Infection Prevention and Control (IP&C) teams set up a formal evaluation to test the impact of the TECcare CONTROL technology with both a physical (manual) cleaning process followed by room fogging within the clinical area. The environment chosen was a 22 bedded rehabilitation ward with a total space of 1506m^3.

To determine levels of environmental cleanliness, Adenosine Triphosphate (ATP) swab-testing of multiple pre-agreed high-touch surfaces in the clinical setting were performed at the following points in the zonal decontamination process;

- Swab test 1: Pre-clean
  - To determine baseline levels of cleanliness
- Swab test 2: Post manual-clean with TECcare CONTROL
  - To determine the impact of a manual wipe down with the new disinfectant
- Swab test 3: Post manual-cleaning followed by room fogging with TECcare CONTROL
  - To determine the impact of the VorTEC fogging system (see Figure 2)

ATP swab test results were reported in relative light units (RLUs) with a lower RLU score indicating a cleaner clinical environment.

FIGURE 2.
The TECcare VorTEC fogging system used for room decontamination

Results

The results of the ATP swab testing after the various cleaning processes are reported in Table 1.

Based on ATP swab test results from the 23 high touch surfaces there was a notable reduction in baseline RLU after manual cleaning with TECcare CONTROL.

Further reductions in ATP levels were reported after the room fogging with TECcare CONTROL which was dispensed using the VorTEC fogging system.

Following the introduction of the terminal cleaning process on the ward there have been no more gastroenteritis outbreaks, or locally spread MRSA or ESBL patient infections/colonisations identified.

One further notable benefit of the new terminal clean process was an improvement in process efficiency due to a reduction in the turnaround time required for terminal cleans. The new process enabled the entire ward, including the day room, kitchen, and additional facilities to be completed within a 12 hour working day by using 6 cleaners and the ward nurses.

Discussion

New QAC based disinfectant technology The traditional QAC based disinfectants used in healthcare are typically seen as being less efficacious than chlorine releasing agents, peracetic acid or hydrogen peroxide. Independent testing of this new QAC technology (based on didecyldimethyl ammonium chloride and benzalkonium chloride) clearly demonstrates that it performs in line with chlorine dioxide disinfectants in terms of reducing microbial viability. [2] The new disinfectant is designed for general cleaning and disinfection of all surfaces and it can be applied in multiple ways, including wipes and sprays for manual wipe down processes and via a specialist, automated TECcare VorTEC fogging system (see Figure 2) which ensures all surfaces within the room are thoroughly disinfected by dispensing the disinfectant throughout the room over a 45 minute period.

ATP as an outcome measure From an infection prevention perspective the authors acknowledge that ATP represents a surrogate outcome and is a test to determine the level of cleanliness, and not the bacterial bioburden present on surfaces. However, literature supports the view that cleaner clinical environments reduce the incidence of microbial acquisition and infection by patients [3, 4, 5] therefore ATP represents a valid way to determine efficacy of the cleaning and disinfection process. It is notable that after manual wiping there were one or two instances where ATP scores increased. It is believed that this was a result of human error with the manual cleaning procedure, rather than by the chemical in the wipe.

Adopting a Change in Practice The ATP swab testing results demonstrate a markedly cleaner clinical environment after manual cleaning with TECcare CONTROL. Room fogging following manual cleaning with this safe in use (chlorine-free and hydrogen peroxide-free), high-level disinfectant improved cleanliness of the high touch surfaces within the clinical environment. Cleaner clinical environments correlate to safer clinical environments and a reduction in the risk of infection / cross infection posed to patients. [3, 4, 5] As a result of this work the TECcare CONTROL wipes, sprays and VorTEC fogging system have now been adopted into routine use by UHMB for terminal cleans and room fogging. These products and the practices and processes associated with them are now successfully used to help manage certain infection outbreaks such as Glycopeptide Resistant Enterococci (GRE) across the Trust. The Trust's *Clostridium difficile* infection (CDI) rate has also been well below its CDI trajectory since the new fogging system for outbreak management has been introduced.

Location	Surface	ATP Score (Relative Light Units)		
		Pre-clean	Post manual clean (with TECcare)	Post manual clean (with TECcare + VorTEC fogging)
Beds 1 - 4	Bed 2 locker	22	43	21
	Bed 2 bed frame	6	0	6
	Radiator	368	4	n/a
	Bed 3 table	166	96	14
	Storage drawer	14	4	0
	Toilet raiser	12	158	8
	Toilet door handle	232	150	14
	Bed 2 patient chair	390	44	0
	MEAN ATP SCORE	**151**	**62 (59% reduction)**	**7 (95% reduction)**
Nursing Station	Portable keyboard	175	57	18
Beds 13 - 18	Bin lid	39	7	2
	Bed 13 patient chair	829	79	14
	Visitor's chair	95	50	14
	Bed 17 pillow	32	19	14
	Bed 13 curtain rail	9	3	2
	Bed 13 suction unit	31	9	n/a
	Toilet sink	317	113	71
	Shower seat	1476	87	45
	Door handle	75	65	21
	MEAN ATP SCORE	**323**	**48 (85% reduction)**	**23 (93% reduction)**
Bed 5	Hot tap	182	45	1
	Commode seat	171	28	18
	Table	209	172	14
	Mattress pump	97	10	0
	Patient chair	659	17	1
	MEAN ATP SCORE	**264**	**54 (80% reduction)**	**7 (97% reduction)**

TABLE 1.
ATP swab test results from 23 high touch surfaces in the clinical setting

Conclusion

Identifying, evaluating, implementing and adopting new antimicrobial products, protocols and practices around terminal cleans and room fogging has enabled UHMB to minimise the risk to patients during the terminal clean / zonal decontamination process whilst optimising cleanliness of the clinical environment and simultaneously reducing the spread of certain infection outbreaks such as viral gastroenteritis, GRE, MRSA and *Clostridium difficile*.

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09/2019