Your inhouse Laundry Partner

Norfolk & Norwich University Hospital

OTEX Microbiological Results

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CONTENTS

1. INTRODUCTION
2. SITE DETAILS
3. METHODOLOGY
4. BACTERIOLOGICAL TEST RESULTS
5. OBSERVATIONS & CONCLUSION
6. REFERENCES

APPENDIX A GLOSSARY OF TERMS

1. INTRODUCTION

JLA's OTEX ozone disinfection system was introduced in September 2006 at Norfolk & Norwich University Hospital (NNUH). The system, three 16 kilo washers with a double and single OTEX system was set up to process mops (microfibre and traditional) and cloths. Current laundry guidelines are recommended in HSG(95)18. These guidelines were first introduced 30 years ago following research carried out in the 1960's. Whilst the guidelines are considered adequate for the disinfection of most vegetative bacteria, heat resistant spore forming organisms were not included in the original research by the Public Health Laboratory. Spore forming bacteria have been found to survive the laundering process at high wash temperatures[1]. The OTEX system utilises the second most powerful disinfectant known, ozone, which is produced throughout the wash process providing full bacteriological protection. This allows laundry to be processed at lower temperatures resulting in benefits to both utility and textile life.

A visit was made to NNUH on the 31st July 2007 to check the OTEX system and take samples for microbiological analysis.

2. SITE DETAILS

2.1 Equipment

Three JLA HC165 washers were installed within the laundry. These have been fitted with a double and single OTEX unit. It is currently fitted to both the cold and hot water supply, although the OTEX wash cycle only requires cold water. Detergent is dosed within the main wash section of the wash cycle only.

2.2 Wash Program Details

Program	OTEX	Thermal Disinfection
	Temp	Temp
Pre Wash	Cold	Warm 40°C
Main Wash	Cold	Hot 75°C
Rinse 1	Cold	Cold
Rinse 2	Cold	Cold
Rinse 3	Cold	Cold
Cycle Time	47 mins	1 hour

Based on a 16 kilo machine, cycle times dependent upon machine.

3. METHODOLOGY

To investigate the effectiveness of the ozone wash process analysis of microfibre cloths was carried out before and after washing. In addition to samples collected on arrival from the washing machines and dryers individual microfibre cloths were randomly selected and cut in half. One portion was retained as the pre sample. The other remaining half was processed with OTEX. Its allocated batch number plus laboratory ref number identified each sample. All samples were handled in an aseptic manner and analysed by an independent laboratory which is UKAS accredited.

4. BACTERIOLOGICAL TEST RESULTS.

				Colony Forming Units / ml (CFU/g)							
REF	*Code*	*Sample Id:*	*SITE*	*TVC*	*Yeasts*	*Moulds*	*S. Aureus*	*MRSA*	*E.coli*	*C.difficile*	*Mycobacteria*
M46	NN1	Mop After OTEX	Norfolk	5.7E+01	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M47	NN2	Mop After OTEX T Dry	Norfolk	6.0E+02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M48	NN3	Cloth After OTEX	Norfolk	1.1E+03	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M49	NN4	Cloth After OTEX/T Dry	Norfolk	9.1E+01	<1	<1	<1	<1	< 1	< 1	< 1
M50	NN5	Cloth after OTEX	Norfolk	6.0E+02	4.0E+01	< 1	< 1	< 1	< 1	< 1	< 1
M51	NN6	1/2 cloth B4 Otex Blue	Norfolk	5.6E+08	3.9E+09	1.7E+05	9.0E+02	2.0E+00	3.1E+04	1.9E+02	< 1
M54	NN9	1/2 Cloth After OTEX Blue	Norfolk	9.0E+01	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M52	NN7	1/2 cloth B4 OTEX L Pink	Norfolk	8.3E+12	2.8E+07	2.0E+04	9.0E+03	2.1E+01	< 1	< 1	< 1
M55	NN10	1/2 Cloth After OTEX L Pink	Norfolk	3.4E+02	< 1	< 1	< 1	< 1	< 1	< 1	< 1
M53	NN8	1/2 cloth B4 Otex Pink	Norfolk	1.8E+09	3.6E+05	1.2E+04	1.9E+05	5.6E+01	< 1	7.8E+01	< 1
M56	NN11	1/2 Cloth After OTEX Pink	Norfolk	7.4E+02	< 1	< 1	< 1	< 1	< 1	< 1	< 1

5. OBSERVATIONS & CONCLUSION

Whilst good laundry practices were observed there are a number of areas, which need attention:

- Storage of laundered items on top of washers. Alternative storage arrangements should be considered.
- Need to increase the awareness of staff to the handling and hygiene requirements when working with contaminated (dirty) laundry. Staff were observed handling dirty items with hands ie no gloves being worn with no washing of hands afterwards.
- There is good provision for hand washing on site.
- The room becomes very warm during the day – as a result of the presence of service pipes and constant use of tumble dryers. It is recommended that a wall-mounted fan be installed to aid circulation of air inside the room together with a drinking water supply. This should be located outside the laundry.
- Clear segregation of the laundry – dirty and clean should be improved, particular outside the laundry area.

At the time of the site visit a fault on the detergent dosing equipment was detected. This resulted in an intermittent occurrence of no detergent being dosed. This was rectified by JLA following discussions with the detergent supplier. The results however still clearly show that consistent log reduction is being achieved with the OTEX system and the results confirm the effectiveness of ozone to eradicate pathogenic bacteria including C.Difficile.

6. REFERENCES

1. J.A.Wilson. H.P.Loveday, P.N.Hoffman, R.J.Pratt. Uniform: an evidence review of the microbiological significance of uniforms and uniform policy in the prevention and control pf healthcare-associated infections. Report to the Department of Health (England). J Hosp Infect (2007) **66, 301-307**

APPENDIX A
GLOSSARY OF TERMS

- ***Log Reduction***

Log reduction is the reduction in microbial counts in relation to the Control (Before) treatment count.

e.g. : 1 Log reduction = 10 microbes reduced
2 Log Reduction = 100
3 Log Reduction = 1000
4 Log Reduction = 10000
5 Log Reduction = 100000

However the Control count should be taken into account in relation to the reduction number,

- ***CFU***

CFU stands for Colony Forming Units. This is a measure of the number of viable (alive) micro-organisms that are remaining following sampling.

- ***TVC***

TVC (or Total Viable Count) is the total number of live micro-organisms found. The count can include both pathogenic and non-pathogenic bacteria.

- **Yeasts**

  Yeasts are unicellular, budding fungi. Some species of yeast are opportunistic pathogens where they can cause infection in people with compromised immune systems. Aspergillosis and candidosis infections are occurring in ever-increasing numbers among neutropenic patients, transplant recipients and patients with AIDS.

- **Moulds**

  There are thousands of known species of moulds, which include opportunistic pathogens affecting the human body whilst others result in food spoilage. Mould spores can be allergenic. When inhaled, the spores germinate and attach themselves along the respiratory tract, causing further problems in those with weak immune systems. One example is Stachybotrys chartarum, which has been associated with sick building syndrome.

- **Staphylococcus Aureus**

S. Aureus is commonly found on the skin and mucosal surfaces such as the nasal passage of up to one third of the healthy population. Young children, the elderly or immuno-compromised individuals are at a higher risk of infection.

It is an opportunistic pathogen whereby entry through the skin or blood via a wound causes local minor infections (e.g. boils, sores, urinary tract infections) but can potentially lead to more severe infections including bacteraemia (blood poisoning), pneumonia or meningitis.

- **Methicillin Resistant *S. aureus* (MRSA).**

A member of the Staph family is Methicillin Resistant *S. aureus* (MRSA). With symptoms ranging from skin boils to necrotizing fasciitis, popularly known as flesh-eating disease, causing gangrenous infections. *S. aureus* can be spread via skin-to-skin contact with pus-infected wounds, or contaminated items such as towels, clothing and sheets used by the infected person.

- **E.coli**

  Escherichia coli (E.coli) is one of many species of bacteria living in the lower intestines of mammals. It can cause several intestinal and extra intestinal infections such as urinary tract infections, meningitis, peritonitis, mastitis, and septicaemia and gram negative pneumonia.

- **Clostridium difficile**

  C.Difficile can be found living in the gut in healthy people, rarely causing any problems.
  However it is an opportunistic bacteria where it can cause severe infections in the infirm, elderly and those with a low immune system due to surgery or illness (immuno-compromised).

- Cross infection in hospitals and care homes are also common due to *C. difficile* spores produced, surviving in the environment & on surfaces for a long period of time.

- Elderly people are at a higher risk with 80% of *C. difficile* infections in people aged over 65 years.

- **Mycobacteria**

  Mycobacterium is a genus of Actinobacteria, given its own family, the Mycobacteriaceae. The genus includes pathogens known to cause serious diseases in mammals, including tuberculosis and leprosy.