

# Environmental reservoirs of methicillin-resistant *Staphylococcus aureus* (MRSA) in clinical areas and the efficacy of Ultra-V decontamination in an outbreak situation

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## INTRODUCTION

- Colonisation with methicillin-resistant *Staphylococcus aureus* (MRSA) has been described as a risk factor for subsequent MRSA infection
- Hospital MRSA infection is one of the biggest concerns in healthcare industry (1)
- Measures such as early screening, effective decontamination/cleaning methods and antimicrobial stewardship are all key in reducing acquisition of MRSA and hospital outbreak
- Introducing an enhanced decontamination system can help control MRSA environmental contamination (1,3)
- An Ultra-V™ UV-C decontamination system has been shown effectively eliminate residual MRSA from the environment and achieved >5 log reduction (2) of microorganisms within our hospital environment during MRSA outbreak on a gastroenterology ward affecting 10 patients

## QUESTIONS ADDRESSED

- **Is UV-C system more effective than manual cleaning in decontaminated hospital environment?**
- **What actions are important in protecting against MRSA outbreak?**

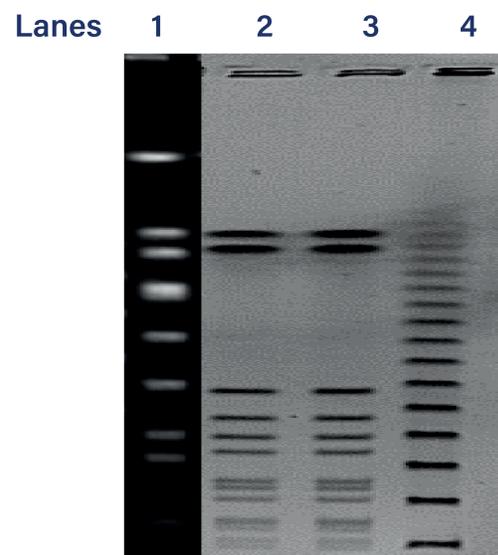
## MATERIALS AND METHODS

- Patient isolates (n=10) and environmental isolates (n=17) were collected from ward SMW17 from Buckinghamshire NHS Trust (3)
- Samples were collected from the horizontal surfaces in decontaminated patient spaces using mannitol salt agar contact plate to detect any similarities
- Confirmation of presumptive MRSA isolates was done by Gram stain, subculture & coagulase testing
- Antibiotic susceptibility to methicillin was determined using a methicillin 5 mg disk
- PFGE genotyping was performed on all the isolates
- Environmental decontamination was performed by ward Ultra-V™ UV-C system provided by Inivos Ltd

## RESULTS

### 1. Identification of MRSA outbreak

- Once typing results were received, type T032 was confirmed
- The environmental and patient isolates were indistinguishable (Figure 1)
- As such, paired patient and environmental collection of isolates had similar PFGE profiles and were therefore considered to be clonally related (Figure 1)



**Figure 1:**

Pulsed-field gel image obtained following pulsed-field gel electrophoresis of patient (Lane 2) and environmental (Lane 3) strains of methicillin-resistant *Staphylococcus aureus*. *S. aureus* NCTC 8325 was included as control (Lane 1). Lane 4 is the marker.

### 2. Implementation of UV-C system in heavily contaminated gastroenterology ward

- Manual cleaning was not effective in decontaminated SMW17 environment
- The identified outbreak of MRSA led to ward closure
- To decontaminate heavily affected ward Ultra-V™-UV-C system was used for three days
- Post clean environmental swabs were taken and all came back negative for MRSA
- Usage of UV-C system successfully decontaminated infected ward environment

### 3. IPC actions are essential to protect against MRSA outbreaks

- Increased awareness and training of hand hygiene with staff and patients
- Improved integrity equipment check
- On-going weekly MRSA patient screenings
- Implementation of an educational program on manual cleaning to domestic and clinical staff
- Assessment of single use equipment used within the ward
- Appropriate PPE provided and usage monitored

## CONCLUSIONS

- The environmental and patient isolates were indistinguishable from SMW17
- Manual cleaning did not protect against MRSA outbreak that led to gastroenterology ward closure
- Usage of UV-C system successfully decontaminated MRSA infected environment and is better infection prevention control system than manual cleaning (2)
- Additional IPC actions have to be monitored to protect against future outbreaks (4;5)
- Overall, UV-C is the most effective system to decontaminate infected environment and with regular usage protect against future MRSA outbreaks

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