



Wiping out infection

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Disclosures

- Healthcare Infection Society
- NHS improvement
- UK Department of Health
- GAMA
- PALL medical



Overview

- Importance of cleaning
- Research at UHB
 - Cleaning of multi-use patient equipment
 - AMU cleaning



University Hospitals Birmingham NHS Foundation Trust (UHB)

- Largest teaching hospital trusts in England
- Includes Birmingham Heartlands Hospital, the Queen Elizabeth Hospital Birmingham (QEHB), Solihull Hospital and Community Services, Good Hope Hospital and Birmingham Chest Clinic
- Treat ~2.2 million people every year
- Military hospital
- Largest co-located critical care unit in the world

Environmental survival of key pathogens

Pathogens	Survival times
<i>S. aureus</i> (including MRSA)	7 days to >12 months
<i>Enterococcus spp.</i> (including VRE)	5 days to >48 months
<i>Acinetobacter spp.</i>	3 days to 11 months
<i>Clostridium difficile</i> (spore form)	>5 months
Norovirus	8 hours to 28 days (temperature dependent)
<i>Pseudomonas aeruginosa</i>	6 hours to 16 months
<i>Klebsiella spp.</i>	2 hours to >30 months
<i>Neisseria gonorrhoea</i>	20 seconds

Hota B *et al.*, Clin Infect Dis 2011
Kramer A *et al.*, BMC Infect Dis 2007
Dancer SJ *et al.* Clin Micro Rev 2014

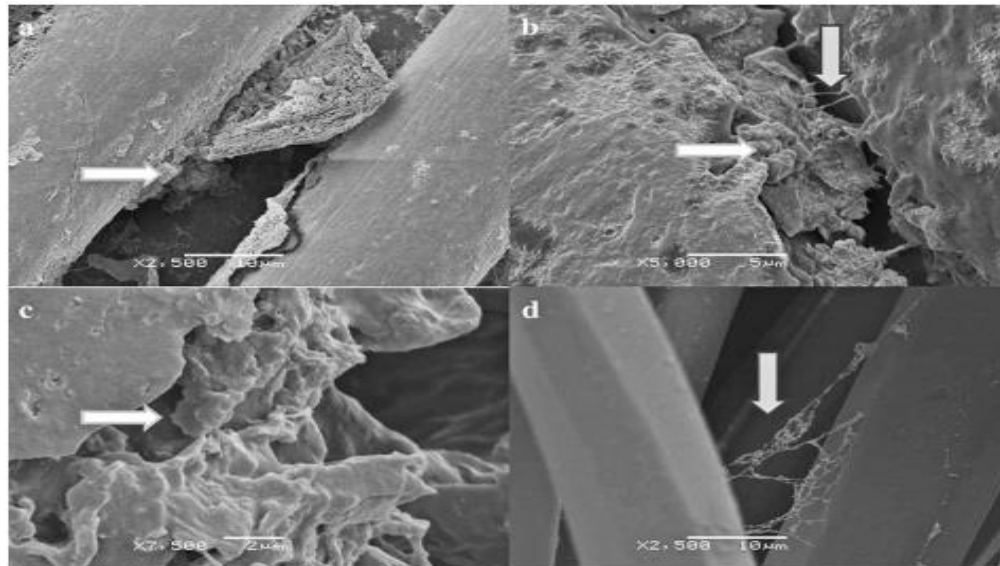
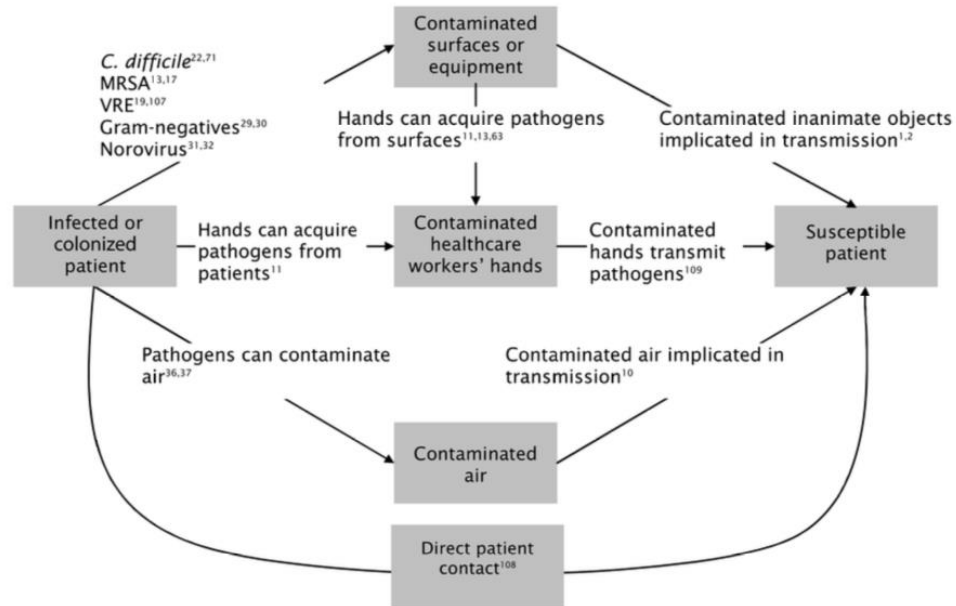


Figure 1. Scanning electron micrographs of: (a) blind cord (original magnification $\times 2500$); (b) see-through ward door (original magnification $\times 5000$); (c) red reagent box (original magnification $\times 7500$); (d) curtain (original magnification $\times 2500$). Horizontal arrows indicate coccoid bacteria embedded in exopolymeric substance (EPS). Vertical arrows indicate residual strings of EPS dehydrated during processing.

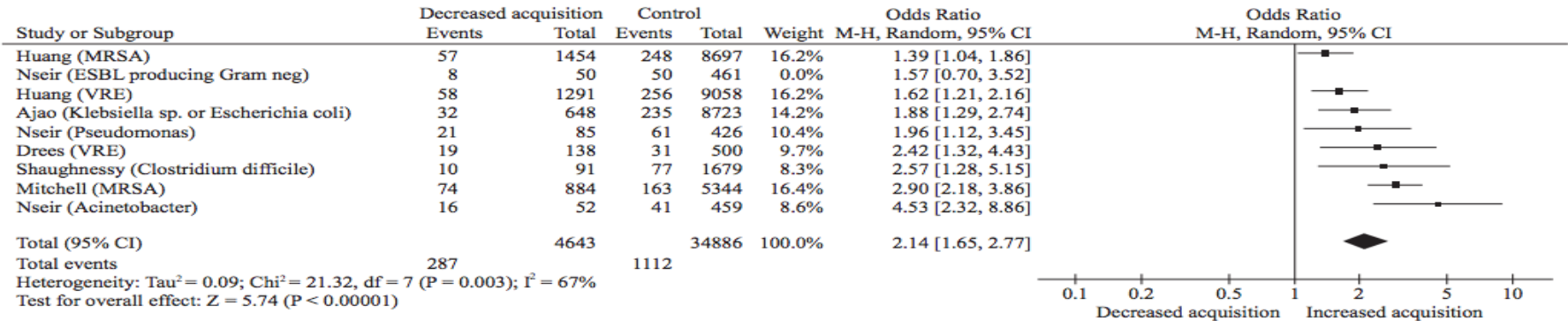
Contamination of the environment and transmission of pathogens in healthcare settings



Otter JA *et al.*, ICHE 2011

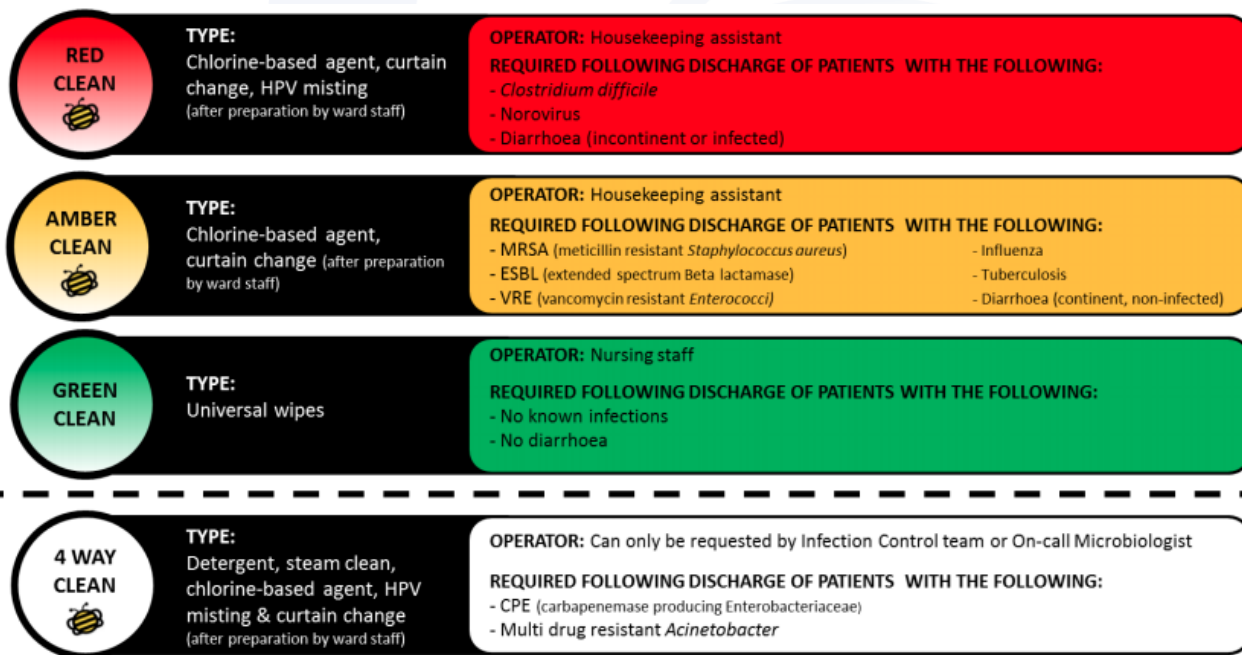
Risk of transmission from previous room occupant

- Meta analysis of all studies with evidence of transmission
 - Pooled acquisition odds for MRSA
 - 1.89 for Gram positives (95% CI: 1.62-2.21)



Mitchell B *et al.*, J Hosp Infect 2015

UHB cleaning



Garvey *et al.*, ARIC 2019

Wipes

- Over recent years, wipes have become firmly established in clinical areas in the UK and other countries
 - Used on patients, equipment (from nasendoscopes to commodes) and the environment
 - For cleaning and/or disinfection
- Advantages relate to human factors
 - Convenient – can be placed at point of care
 - Compare with alcohol hand rub
 - Premixed and premeasured

Garvey *et al.*, ARIC 2019




Garvey *et al.*, ARIC 2019

RESEARCH

Open Access



Wiping out MRSA: effect of introducing a universal disinfection wipe in a large UK teaching hospital

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Abstract

Background: Contamination of the inanimate environment around patients constitutes an important reservoir of MRSA. Here we describe the effect of introducing a universal disinfection wipe in all wards on the rates of MRSA acquisitions and bacteraemias across a large UK teaching hospital.

Methods: A segmented Poisson regression model was used to detect any significant changes in the monthly numbers per 100,000 bed days of MRSA acquisitions and bacteraemias from April 2013 - December 2017 across QEHB.

Results: From April 2013 to April 2016, cleaning of ward areas and multi-use patient equipment by nursing staff consisted of a two-wipe system. Firstly, a detergent wipe was used, which was followed by a disinfection step using an alcohol wipe. In May 2016, QEHB discontinued the use of a two-wipe system for cleaning and changed to a one wipe system utilising a combined cleaning and disinfection wipe containing a quaternary ammonium compound. The segmented Poisson regression model demonstrated that the rate of MRSA acquisition/100,000 patient bed days was affected by the introduction of the new wiping regime (20.7 to 9.4 per 100,000 patient bed days; $p < 0.005$).

Discussion: Using a Poisson model we demonstrated that the average hospital acquisition rate of MRSA/100,000 patient bed days reduced by 6.3% per month after the introduction of the new universal wipe.

Conclusion: We suggest that using a simple one wipe system for nurse cleaning is an effective strategy to reduce the spread and incidence of healthcare associated MRSA.

Keywords: Meticillin-resistant *Staphylococcus aureus*, MRSA bacteraemias, MRSA acquisitions, Disinfection wipes

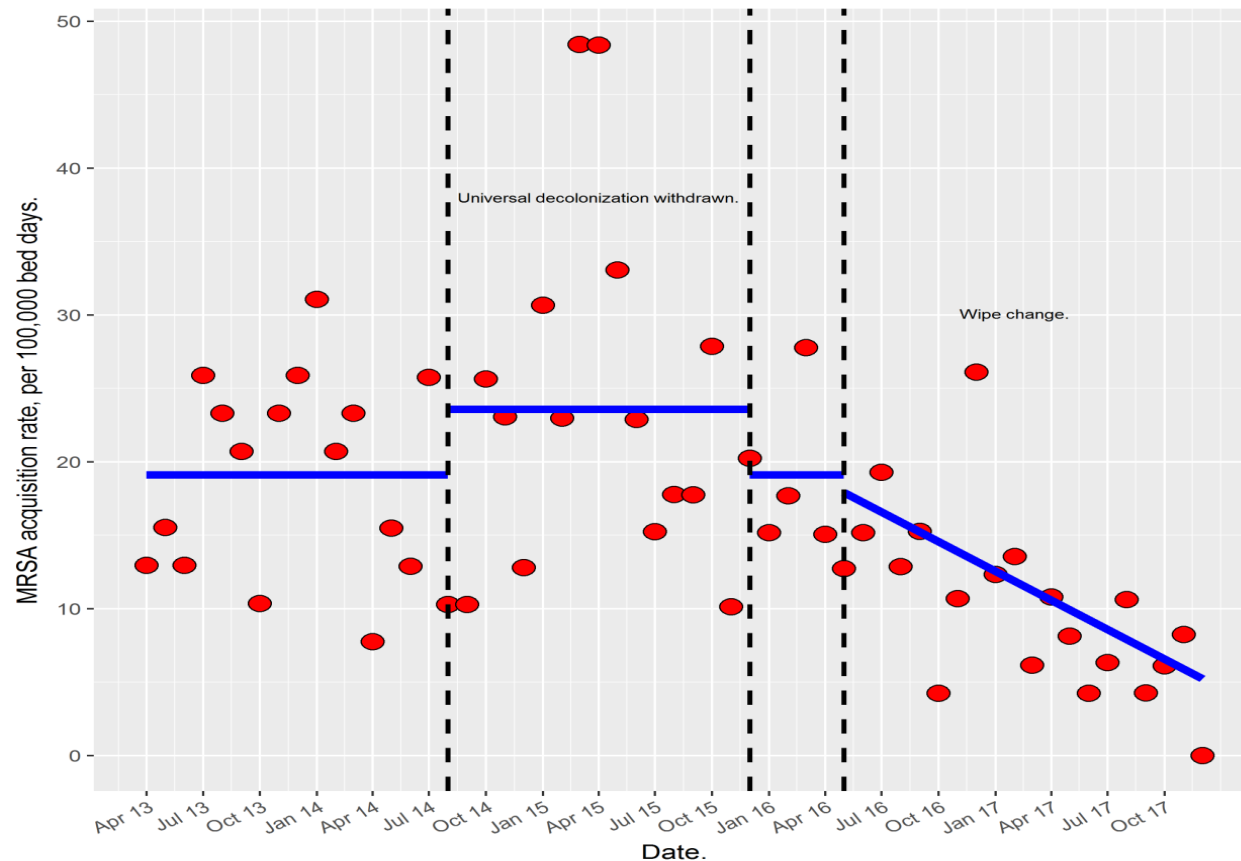
Table 1 Wipes used at QEHB between April 13 to December 17 including chemical composition of wipes

Wipe	Detergent/ disinfectant wipe	Contents
A	Detergent/ disinfectant wipe (Clinell Universal Sanitising Wipes, GAMA Healthcare Limited, UK)	Bezalkonium chloride $\leq 0.5\%$, Didecyl dimethyl ammonium chloride $\leq 0.5\%$, Polyhexamethylene biguanide (PHMB) $\leq 0.10\%$, Water $> 75\%$, Additives each $< 1\%$
B	Detergent wipe	Phenoxyethanol $< 1\%$, Alkyl polyglycoside $< 0.2\%$, Diethylene glycol $< 0.1\%$, 2-Octyl-2H-Isothiazol-3-one $< 0.01\%$
C	Alcohol wipe	Propan-2-ol 50-80%

Table 2 Total number of patients admitted to ICU and to the hospital during the 3 study periods. The total number of MRSA acquisitions and bacteraemias across QEHB are shown during the 3 study periods

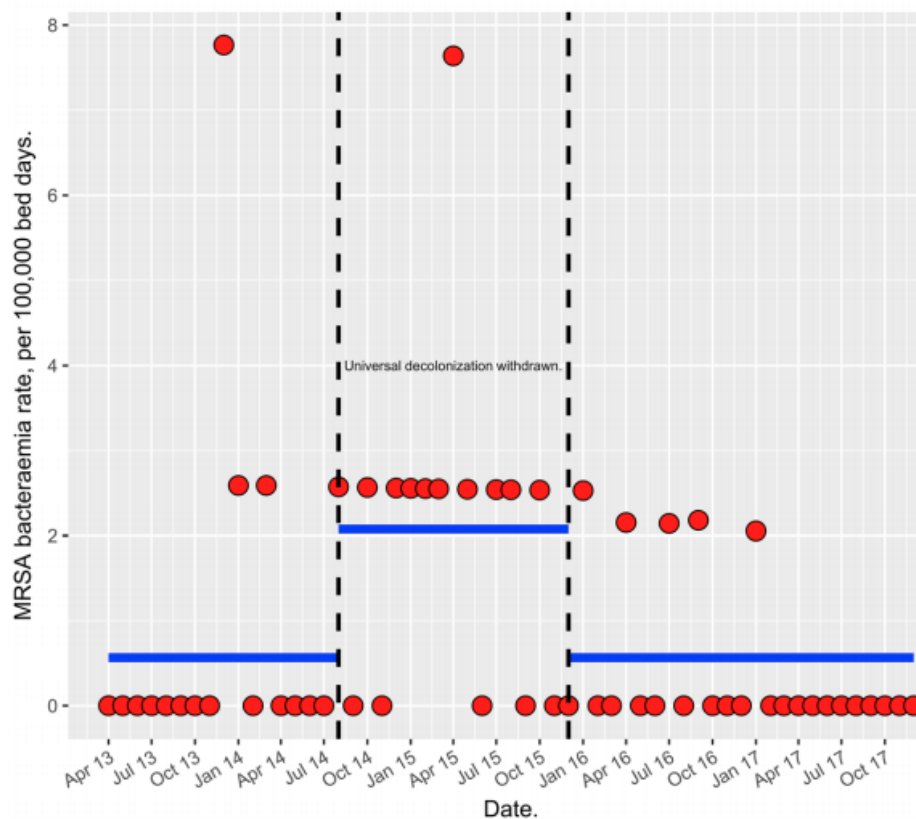
	April 13 - August 14	August 14 - March 16	April 16 - December 17
Bed days - Critical Care	35,595	40,165	51126
Bed days - QEHB Total	550,107	606,820	989,724
MRSA acquisitions	119	191	93
MRSA bacteraemias	5	16	2

MRSA acquisition rate with segmented Poisson regression model.



Garvey *et al.*, ARIC 2019

b MRSA bacteraemia rate with segmented Poisson regression model.



Garvey *et al.*, ARIC 2019

Acute Medical Unit (AMU)

AMU study

- Environmental samples taken by swabbing seven high-touch sites
- Sites were:
 - Bed rail, patient arm chair, patient chair seat, patient table overside, patient table underside, patient locker, nurse call button
- Samples were taken before cleaning and after each subsequent stage of cleaning
- Looked for: MRSA, CPE, ESBL, VRE and *C. difficile*
- Educational training

Mean pre TVC

- Green – 5791.66
- Amber – 22324.91
- Red – 681.43

Mean post TVC

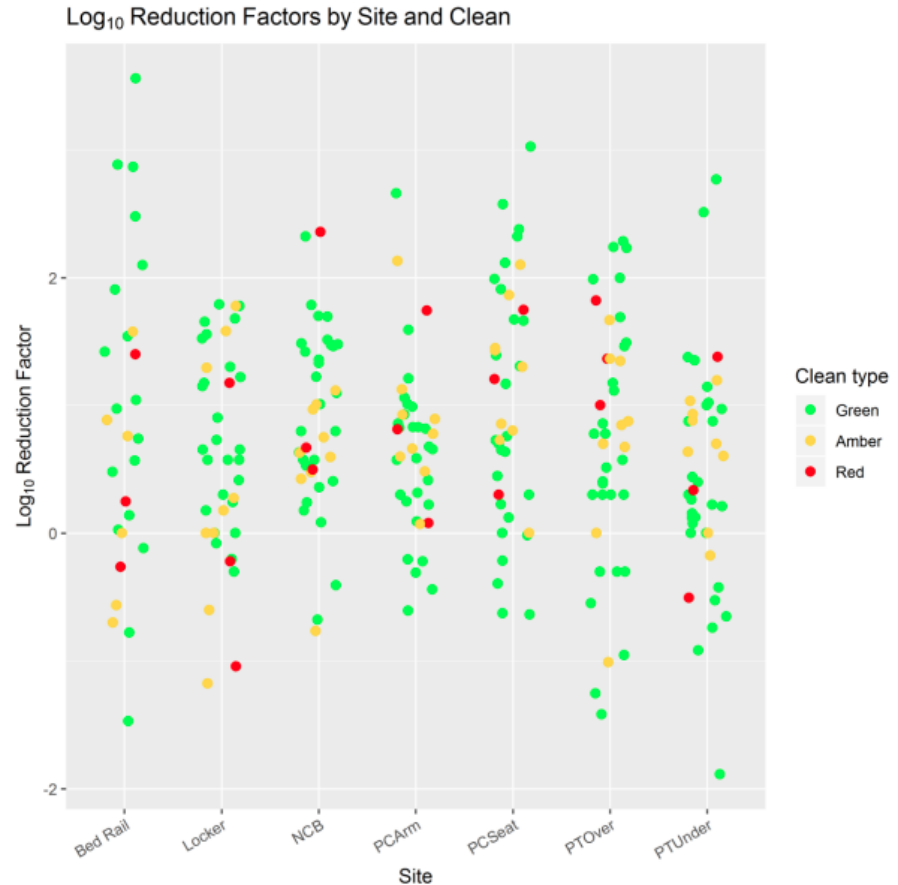
- Green – 604.68
- Amber – 366.72
- Red – 73.95

Mean log₁₀ Reduction factor's

- Green – 0.92
- Amber – 0.60
- Red – 0.77

GREEN CLEANS very effective
However they can be missed

Figure 3

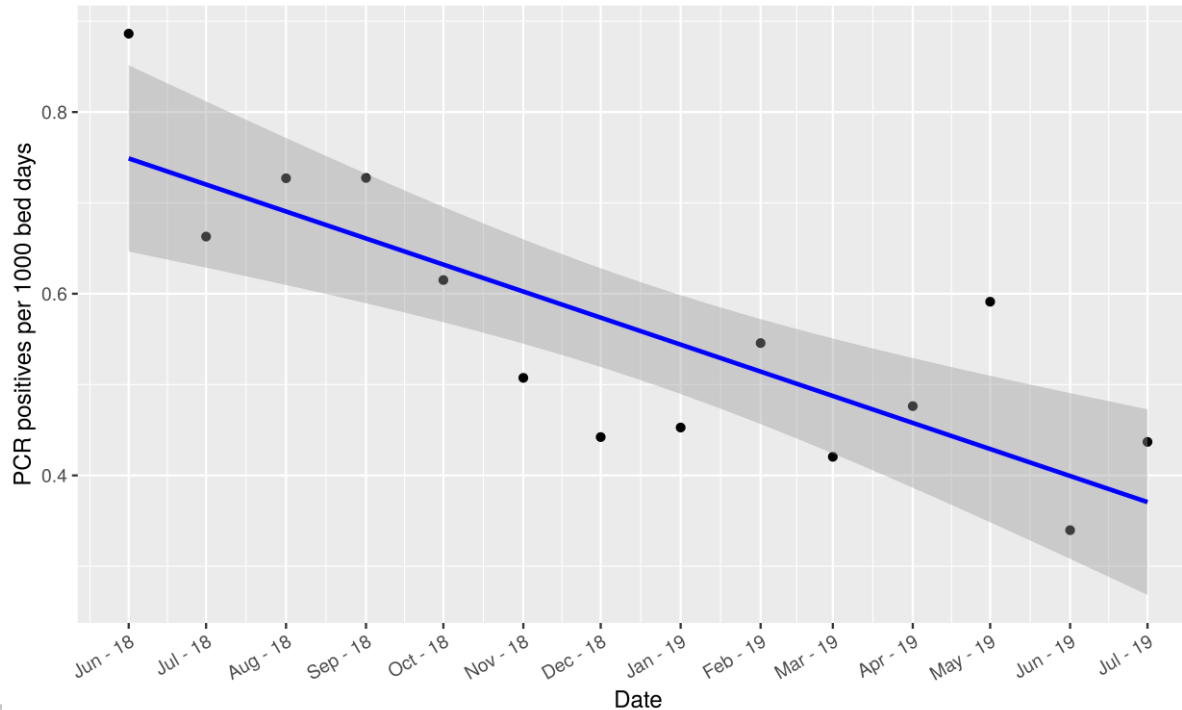


Isolates

- No MRSA
- No CPE or ESBLs
- VRE isolated
- *C. difficile*?
 - X23 times before green ~4%
 - X3 times before amber ~2%
 - 9.07 fold increase in probability for recovery of *C. difficile* in winter
 - Green clean big reductions when cleaned high touch points such as PC seat and NCB
 - Associated with lower *C. difficile* numbers during cleaning study

C. difficile Trust numbers

Decline in PCR positives over time ($p = 0.000481$)



Final thoughts

- Cleaning is a Science
 - Time to recognize it as such
- Change the language
 - Don't say 'Has that been cleaned?' say 'is that room/piece of equipment safe?'
- Educate nursing staff in the importance of cleaning
- Simple solutions for staff
- Simple change over to more practical wipes – reduced MRSA
- Importance of cleaning in AMU – *C. difficile* rates
- Can we help flow – quicker effective cleans



Acknowledgements

- Dr Martyn Wilkinson
- Tina Bradley
- Craig Bradley
- GAMA
- Martin Kiernan
- @uhbipc
- @HIRLaboratory
- @uhbtrust



Thank you

Questions?