Reduction in the burden of *Clostridium difficile*

Gloucestershire Hospitals NHS Foundation Trust

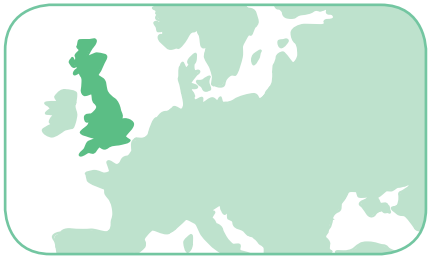
Executive summary

Following the introduction of UK government set national targets designed to reduce the incidence of *Clostridium difficile* infection (CDI), Gloucestershire Hospitals NHS Foundation Trust evaluated, over a three year period, the impact of a bundle of interventions to control CDI. The bundle included the introduction of cohort wards, antibiotic control, empirical treatment for suspected CDI and hydrogen peroxide vapour (HPV) bio-decontamination using the Bioquell Proactive service.

After the introduction of the bundle of measures, a 65% reduction in the number of CDI cases (2010 vs. 2007) was observed.

During this period, the Bioquell HPV decontamination process was conducted regularly around the hospital by experienced Bioquell technicians. Overall average cycle times of two hours for single occupancy rooms and four hours for multi-occupancy bays were achieved, causing minimum disruption to staff and patients.

The bundled approach of interventions including HPV bio-decontamination was effective in reducing the number of CDI cases each year and it continues to be used by this large hospital trust.



Key findings

- Bundled intervention including HPV reduced C. *difficile* by 65%.[1]
- Single occupancy rooms bio-decontaminated with HPV in less than 2 hours.
- HPV was routinely implemented over a three year period (with 2,763 areas decontaminated)

Background

Clostridium difficile is the leading cause of hospital acquired diarrhoeal disease in the UK, and the government has imposed a set of challenging targets to reduce the national incidence of *C. difficile* infection (CDI). *C. difficile* endospores are highly resistant to decontamination and can survive for months on surfaces such as taps, sinks, bed rails, light switches and tables.[2] This creates a reservoir of potential infection where *C. difficile* can either be directly transferred to patients via the environment or indirectly transferred to patients via the hands of healthcare workers.[3]

In 2006, Gloucestershire Hospitals NHS Foundation Trust sought to reduce their CDI rates by introducing and assessing a series of infection control measures.

The Solution

A bundle of interventions aimed at reducing the number of *C. difficile* cases was introduced in the Trust's hospitals during 2006/7. It included the use of cohort wards, restriction on the use of fluoroquinolones and proton pump inhibitors, empirical commencement of treatment for suspected cases, and Bioquell's hydrogen peroxide vapour (HPV) bio-decontamination technology. Employing Bioquell's Proactive room bio-decontamination service, HPV was used for terminal disinfection of rooms, bays and cohort wards used to care for pateints with *C. difficile* and other pathogens. Bioquell's Proactive service was tailored to the needs of the Trust, which entailed the deployment of a trained Bioquell technician and proprietary HPV bio-decontamination equipment within the hospital. The service was also used to ensure contamination-free areas as part of a routine maintenance and refurbishment programme.

> "HPV technology has played an important part in helping to reduce *C. difficile* infection as part of an overall bundle of interventions. The approach helps to decontaminate hard-to-clean medical equipment, such as monitors, due to the vapour process. The Bioquell system has now been successfully integrated into the daily operations of our hospitals."
>
> **Paul Garrett, Deputy Nursing Director**

bioquell

Room volume (m^3)	Number of deployments	Typical room type	Average cycle time (h:m)
<30	512	Non-clinical area	01:38
30-40	1011	Small single room	01:58
40-100	731	Large single room	02:32
>100	427	Bay	04:09

Table 1. Average HPV bio-decontamination cycle time at Gloucester 2007-2010

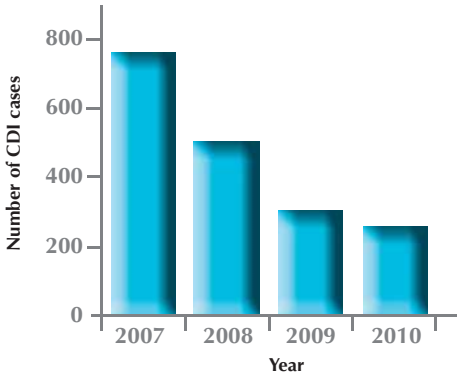


Figure 1. CDI cases at Gloucester 2007-2010

Results

Over three years, the Trust observed a 65% reduction in the number of *C. difficile* toxin positive cases (comparing 2010 with 2007 – Figure 1). Each year showed a steady decline in cases, indicating that the bundle of measures was very effective in helping to manage CDI.

Bioquell's HPV technology was shown to decontaminate (on average) a small size single occupancy room in two hours and a large multi-occupancy bay in four hours (Table 1). The Bioquell Proactive service became an integral part of the hospital infection control procedures and a total of 2,763 areas were decontaminated using HPV over the three years.

Outcomes

As a result of the bundle of interventions including Bioquell's HPV bio-decontamination process, Gloucestershire Hospitals NHS Foundation Trust observed a significant reduction in CDI cases. Bioquell's HPV process was successfully integrated into the standard infection prevention and control routines of the hospital. Bio-decontamination of rooms using HPV technology continues to be routinely implemented, complementing other infection control measures.

References

1. Murdoch *et al*. IPS conference 2011.
2. Kramer *et al*. *BMC Infect Dis* 2006;6:130.
3. Otter *et al*. *Infect Control Hosp Epidemiol* 2011;32:687-699.

C. difficile background information

- *C. difficile* is a rod shaped, anaerobic bacterium that lives in the human intestines.
- It can produce hardy spores, which allow *C. difficile* to survive in the human gut and for extended periods on a wide variety of surfaces in the healthcare environment.
- Antibiotic use can kill off some of the other more friendly bacteria in the intestines, which allows *C. difficile* to grow to high numbers and produce a toxin that causes diarrhoea.

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