Norovirus Suppression
Arresting the annual norovirus outbreak

- Successfully combat norovirus outbreaks with Bioquell’s hydrogen peroxide vapour (HPV) and Pod technology
- Enhanced patient containment and environmental decontamination are vital for effective norovirus remediation
- Reduce the risk of nosocomial transmission and expensive bed blocking and ward closures

Successfully combating a norovirus outbreak

Norovirus is associated with outbreaks of diarrhoea and vomiting which are usually self-limiting. However in hospitalised patients, norovirus can cause more severe clinical problems. Also, norovirus outbreaks can cause significant financial and operational difficulties to a hospital. The virus is extremely contagious and necessitates patient isolation, which often results in bed blocking and ward closure. Norovirus affects both patients and healthcare workers (HCWs), resulting in substantial staff absenteeism. Bed blocking caused by the virus restricts the ability of hospitals to generate revenue through additional admissions. Further, there are often substantial ‘catch-up’ costs relating to cancelled procedures.

Bioquell’s technology is designed to eliminate rapidly norovirus from contaminated patient areas and facilitate more efficient patient containment, reducing the risk of transmission. Bioquell will develop a plan that is tailored to individual hospital requirements, allowing hospitals to maximise the benefit of Bioquell’s technology and ensuring full integration with any existing infection control bundles. This bespoke programme reduces the spread of norovirus and helps generate significant cost-benefit.

**Figure 1.** A Bioquell Pod in an NHS hospital.

**Figure 2.** A Bioquell Q-10 suite (HPV generator kit).
**Issues associated with norovirus: the role of Bioquell Pod and HPV**

The control of norovirus outbreaks is a key priority for many hospitals. Diarrhoea and vomiting resulting from norovirus outbreaks cause major operational, financial and reputational challenges each winter. In the US, there are over 50,000 hospitalisations per year due to norovirus, and the UK norovirus outbreaks were recently estimated to cost the UK over 1% of the NHS annual budget. Although symptoms are typically short lived (<72 hours), norovirus is extremely contagious, spreading rapidly to HCWs, patients and visitors. This forces hospitals to block beds, close wards and hire temporary staff to replace those who have been sent home. The bed blocking and ward closures prevent the hospital from admitting new patients and, ultimately, reduce the number of patients the hospital can treat per year, which affects revenues.

Norovirus is characterised by extensive shedding, and concentration in vomit and stool can be very high (>10^6 particles per ml of vomit and >10^{11}/g in faeces); however, the infectious dose has been estimated to be only 1-100 virus particles. Thus, it is important to place patients with confirmed or suspected norovirus into single rooms. However, this is challenging given the lack of available single rooms combined with the high number of affected patients, particularly those with diarrhoea and vomiting. The Bioquell Pod is a semi-permanent single occupancy enclosure designed for the containment of pathogens. The Pod is suitable for housing patients with confirmed or suspected norovirus.* This can both help to prevent transmission, and increase patient throughput during an outbreak.

Data suggest that the viral particles remain viable outside the body for many days. Furthermore, contaminated surfaces have been implicated in the transmission of norovirus. This has led many hospitals to employ increased environmental decontamination protocols for patients suffering from norovirus in order to stop transmission. However, it is difficult to achieve efficacious and consistent decontamination of norovirus through the manual cleaning of hospital rooms and equipment. Given the low infectious doses, eradicating viral particles is critical to manage successfully a norovirus outbreak. Bioquell HPV is an automated room decontamination system that has been shown to inactive norovirus surrogates in vitro and eliminate hospital pathogens from environment surfaces. HPV should be used for the terminal decontamination of clinical areas used to care for patient with confirmed norovirus to ensure that an environmental reservoir does not contribute to the continuation of the outbreak.

**How the Bioquell Pod can improve patient throughput during norovirus outbreaks**

There are a number of scenarios in which the Bioquell Pod would improve patient throughput during norovirus outbreaks. These are some illustrative examples, recognising that each individual hospital may tackle these scenarios in a different way. Furthermore, there are other scenarios where the Bioquell Pod would improve patient throughput.

1. Confirmed and suspected cases in a bay
   - Before Pods: confirmed and unconfirmed symptomatic cases cohorted together in a bay. This can be unavoidable during larger outbreaks. The alternative is to block beds in the bay, which reduces patient throughput.
   - After Pods: confirmed symptomatic cases placed in Pods and unconfirmed symptomatic cases placed in the remainder of the bay.

*Since the Pod does not contain toileting and hand washing facilities, it would need to be combined with a commode and be close to a sink to be suitable for containing patients with confirmed or suspected norovirus.
2. New case in a bay

- **Before Pods:** a patient becomes symptomatic in a bay. If there are no side rooms available, the patient remains in the bay awaiting laboratory diagnostics, and either the other patients remain in the bay with increased transmission risk, or the bay is evacuated, which reduces patient throughput.
- **After Pods:** the symptomatic patient is placed in the Pod as soon as their symptoms manifest, and the bay can remain occupied.

3. Improving patient flow from A&E / acute medical assessment unit (AMAU)

- **Before Pods:** a symptomatic patient gets ‘stuck’ in an A&E / AMAU side room because there are no side rooms on the specialist ward that they require.
- **After Pods:** the patient can be admitted to a Pod in the specialist ward, thus ‘unblocking’ A&E / AMAU.

**Generating value through the use of Bioquell’s HPV and Pod**

Bioquell can help to overcome issues associated with the speed of norovirus onset, the scale of environmental contamination, the acute patient containment challenges and the operational issues it causes. Hospitals can combine their own preferred protocols and infection control bundles with Bioquell’s knowledge of contamination risk management and control, alongside our best practice lessons learnt during ‘real world’ norovirus deployments.

Our carefully designed protocols improve the containment of suspected and confirmed cases, and eliminate the pathogen from the environment after a patient is discharged or transferred. This reduces the risk of spread during the stay of patients shedding the viruses, and minimises the risk of nosocomial acquisition by the next patient, thus restricting the spread of the outbreak. To minimise the risk of relapses, areas of any size, from rooms through to entire units, are ‘bioquelled’ at the end of the outbreak. Thus, Bioquell can help to reduce transmission, and improve patient throughput during norovirus outbreaks.

“We feel that using Bioquell has helped reduce the spread of norovirus in our hospital over the last two years, and now forms a critical part of our norovirus remediation procedures.”

Ann Kerrane,
Matron for Infection Prevention and Control, The Rotherham NHS Foundation Trust.
References


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