

## Information for staff on *Bacillus* spp.

### Outbreak Prevention and Management

The purpose of this information is to provide an aide-memoire for clinical staff and Infection Prevention and Control Teams (IPCT), who may be involved in the outbreak prevention and management of *Bacillus* spp.

All staff should be familiar with [Standard Infection Control Precautions \(SICPs\) and transmission-based precautions \(TBPs\)](#).

The following advice is supplementary and provides details of specific actions necessary to prevent and manage *Bacillus* spp. outbreaks. Please note that *B. anthracis* is not discussed within this document.

### Outbreak Prevention

#### What types of infections do *Bacillus* spp. cause?

*Bacillus* spp. are spore forming bacteria, ubiquitous in the environment. *B. cereus* in particular is a frequently recognised cause of toxin-induced acute gastroenteritis. Other infections caused by this genus include sepsis, pneumonia, endocarditis, central nervous system (CNS) and ocular infections.<sup>1;2</sup>

#### Which patient groups are considered high risk for infection?

Most commonly reported are neonates, patients with traumatic or post-surgical wounds and those with indwelling catheters or other devices.<sup>1;2</sup>

#### How is a potential *Bacillus* spp. outbreak identified?

An outbreak may be suspected if the incidence of infection is higher than normally expected, and where there is a potential link in time and place.

*Bacillus* spp. are, in many instances considered to be contaminants within clinical samples.<sup>1;2</sup> It is therefore critical for the Microbiology Department and clinical staff to be alert to any sudden increases in isolation rates and contact the IPCT in these instances.<sup>2</sup> This is a particular consideration during construction/renovation activities. **(Good Practice Point)**

## How can a *Bacillus* spp. outbreak be prevented?

There is currently no specific guidance on prevention of (non-foodborne) *Bacillus* spp. infections. Due to the types of infections known to be caused by these organisms, healthcare staff should be particularly familiar with [HPS Infection Control Care Bundles](#), specifically those relating to preventing contamination when taking blood cultures, preventing surgical site infections and preventing infections due to use of central and peripheral venous catheters.

In addition, as a number of studies have linked outbreaks to construction/renovation activities; the [Healthcare Associated Infection System for Controlling Risk in the Built Environment \(HAI-SCRIBE\)](#) tool should be used to assess and manage the risk of infection in the built healthcare environment. As a further measure, due to contaminated laundry also being implicated in a number of outbreaks, staff should be mindful of the route clean laundry takes from entry to the care facility to point-of-use, in order to ensure risk of exposure to construction dust is minimised. **(Good Practice Point)**

## Outbreak Management

### How should *Bacillus* spp. outbreaks be managed?

The risk of person-to-person transmission is typically considered to be low.<sup>3</sup>

Since spores are known to be resistant to various methods of decontamination, sterilization of equipment is considered to be best practice, to ensure full eradication of spores.<sup>4</sup> In the majority of instances, this will likely be either impractical or contraindicated by manufacturers' instructions; therefore SICPs and TBPs should be followed for both decontamination of reusable non-critical care equipment and the environment.

If use of surveillance swabs is implemented, it should be noted that *Bacillus* spp. isolated from asymptomatic patients may represent colonisation and treatment is typically not recommended unless the patient is symptomatic.<sup>3</sup>

As these organisms are known to cause various infections, therapeutic options should, where possible, be guided by local antimicrobial policy and the antibiotic susceptibility pattern of each isolate.<sup>2</sup>

Although limited information is available, initiation of appropriate empirical therapy has been associated with a favourable clinical outcome.<sup>5</sup> Vancomycin is indicated as the optimal empirical agent of choice,<sup>3;5</sup> alongside appropriate first/second line agents as guided by local policy. Duration of treatment will depend on the type of infection and the response to treatment. In addition, it is vital to remove the probable source of infection e.g. catheter.<sup>3</sup>

## Supporting Outbreak Literature

The scientific and nursing literature was searched for reports of outbreaks caused by *Bacillus* spp. in health and social care settings. A total of 17 studies, spanning the last 10 years were evaluated. A summary of the results is presented below.

**Background:** Specifically within care settings, outbreaks were typically not linked to the consumption of contaminated food. In the vast majority of cases blood-stream infections<sup>3;6-14</sup> were reported, although respiratory,<sup>8;15</sup> CNS<sup>16</sup> and gastrointestinal infections<sup>8;17</sup> also occurred. Typically, a relatively low mortality rate was described, although several outbreaks reported multiple fatalities.<sup>3;8;16</sup>

**Organism(s):** The majority of infections were due to *B. cereus*,<sup>3;6-10;12;13;15-21</sup> although *B. circulans*,<sup>9</sup> *B. licheniformis*<sup>8;11</sup> and *B. pumilus*<sup>8</sup> were also isolated in a small number of studies.

**Population/setting:** The majority of outbreaks occurred in paediatric units.<sup>3;9-11;13-15;17;20</sup> A small number were also reported in haematology,<sup>7;8;16</sup> burn<sup>18</sup> and maternity<sup>21</sup> units. A number of outbreaks were considered to be hospital-wide<sup>6;7;12</sup> and one was related to contamination within a pharmacy unit.<sup>19</sup>

**Transmission:** Airborne dissemination of the organisms from environmental sources is considered to further facilitate contamination of the care environment. Construction activity<sup>7;9;12;21</sup> and contaminated linen/laundry items<sup>6;7;9;12;21</sup> were identified as contributory factors in multiple outbreaks. Inhalation,<sup>13;15;20</sup> ingestion<sup>3;16;17</sup> and indirect contamination of skin disinfection materials<sup>7;10</sup> and catheters<sup>11;14</sup> were typically reported.

**Outbreak control measures:** In most instances, limited information on successful infection prevention measures was provided. Specific measures for linen related outbreaks included:

- Sodium hypochlorite treatment<sup>7;12</sup> or autoclaving of linen<sup>6;12</sup>;
- Storage of linen in canvas rather than plastic bags (considered to be a less favourable environment for spore germination)<sup>12</sup> and;
- Relocation of loading docks for linen supply.<sup>9</sup>

Other generic measures included more frequent cleaning of ventilation air filters/vents,<sup>7;9;13</sup> use of HEPA filtration/temporary ventilation units,<sup>13;21</sup> autoclaving<sup>15;20</sup> of respiratory equipment where possible or this being single-patient use<sup>15</sup>, enhanced cleaning<sup>9;12;16;18;21</sup>, reinforced emphasis on hand hygiene,<sup>3;9;21</sup> and identifying probable implicated products (e.g. gloves,<sup>18</sup> cotton wool,<sup>8</sup> alcohol preparation pads<sup>10</sup>) and removing these from use.

## References

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