Infection Control Precautions for Antibiotic Resistant Bacteria

IC/287/10

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Owner | Name | Dr Nicki Hutchinson |
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Job Title | Consultant Microbiologist |
Final approval committee | Name | Infection Control Committee |
Date of meeting | 05/03/2010 |
Authoriser | Name | Anne Stebbing |
Job title | Chair, ICC |
Signature | |
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Standards | Standards for Better Health & Hygiene code |
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Executive Summary:
This is a policy that describes the infection control precautions necessary for the surveillance and management of patients infected with multi drug resistant bacteria e.g. Acnitobacter and Stenotrophomonas Gram negative organisms. It describes the procedures necessary to prevent spread of these infections within Basingstoke and North Hampshire Foundation Trust (BNHFT).
Implementation Plan
Summary of changes

This updated protocol is written to formally describe current practice for multi drug resistant bacteria control due to rise in these infections recently. Current practice is based on isolation precautions policy under multi drug resistant organisms. It conforms to the revised hygiene code 16 December 2009 requirements

Action needed and owner of action

- All clinical staff need to be aware of rise in antibiotic resistance and need for prudent use of antibiotics and infection control precautions. They are responsible for seeking and attending infection control training sessions
- The Infection control team (ICT) and the microbiologists are responsible for monitoring infections as they arise as well as trends, using lab based ward liaison surveillance, ensuring appropriate precautions are undertaken. They are responsible for updating staff on infection trends and isolation precautions required to prevent spread (contact precautions).
- Microbiologists and pharmacists are responsible for highlighting links between resistance and antibiotic prescribing by ensuring an up to date antibiotic policy is in place and monitoring antibiotic usage
- Managers should ensure that all necessary equipment for managing patients infected with multi drug resistant organisms is in place. They are responsible for observing trends of such infections in their areas, when reported by the ICT and ensuring control measures are in place
- The Consultants in Communicable Disease Control will be informed by microbiologists if serious infections with multi drug resistant bacteria occur in hospital or the community.

Audit standard and criteria:

**Standard:** Patients infected with a multi drug resistant bacterium are managed according to precautions set out in this policy and no cross infection occurred. (100%)

**Audit criteria:**

- Number of infections with antibiotic resistant bacteria acquired in hospital
- Isolation precautions undertaken for all patients infected with these bacteria regardless to whether they are acquired in hospital or the community
- Staff awareness assessment (of nature of infection and precautions required)
Infection Control Contacts:

Dr N Hutchinson Consultant Microbiologist/Infection Control Doctor Ext 3310
Dr F El Bakri Consultant Microbiologist Ext 3305
Hazel Gray Senior Infection Control Sister Ext 6774 or bleep 2364
Linda Swanson Infection Control Sister Ext 6774 or bleep 2364
Bruce Wake Trust Surveillance Co-ordinator Ext 3904

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1.0 Purpose
This is a clinical and infection control protocol that sets out management standards for patients infected with antibiotic resistant bacteria to ensure appropriate management of the infected patient and prevent spread within the hospital.

2.0 Introduction
Antimicrobial resistance describes the ability of a micro-organism to resist the growth-suppressing or microbicidal effects of particular antimicrobial agents. This ability can reflect a naturally occurring property of an organism (e.g. having a thick cell-wall), or might develop through alteration of the organism's genes. In some cases, genes conferring resistance to a particular antimicrobial can be transferred between different strains of micro-organisms, the recipient organisms thus becoming resistant.

Emergence of antimicrobial resistance in infectious organisms at a population level is dependent on the survival and further spread of organisms with antimicrobial properties. The extensive use of antimicrobial agents probably helps this process along by eliminating sensitive microorganisms, which in turn allows the resistant ones a greater opportunity to spread.1,2

Many hospitals in England are encountering problems with multi-resistant *Acinetobacter* spp and *Stenotrophomonas maltophilia*. Attempts to limit the spread of such strains have led to the development of guidance on control.1 Locally at BNHFT, there have been no outbreaks of multi drug resistant Gram negative bacteria detected but sporadic cases have been detected.

3.0 Definitions

3.1 Acinetobacter spp
*Acinetobacter* is a Gram-negative bacterium that is readily found throughout the environment including drinking and surface waters, soil, sewage and various types of foods. *Acinetobacter* is also commonly found as a harmless coloniser on the skin of healthy people and usually poses very few risks.

*Acinetobacter* infections acquired in the community are very rare and most strains found outside hospitals are sensitive to antibiotics. While *Acinetobacter* poses few risks to healthy individuals, a few species, particularly *Acinetobacter baumannii*, can cause serious infections - mainly in very ill hospital patients. The most common *Acinetobacter* infections include pneumonia, bacteraemia (blood stream infection), wound infections, and urinary tract infections. "Hospital-adapted" strains of *Acinetobacter* are sometimes resistant to antibiotics and are increasingly difficult to treat.

Multi-resistant *Acinetobacter* spp (MRAB) for example is defined as: isolates that are resistant to any aminoglycoside (e.g. gentamicin) AND to any third generation cephalosporin (e.g. ceftazidime, cefotaxime). An even more multi-resistant *Acinetobacter* spp is defined as an MRAB that is also resistant to carbapenems (imipenem or meropenem). There are rarer strains that are resistant to all aminoglycosides and sensitive to carbapenems and others that are also resistant to colistin.1 The same definition can be applied to multi resistant Enterobacteriaceae and Pseudomonads.
National guidance suggests that there may be no perceived need for local guidance, provided at least one aminoglycoside and a carbapenem are still active against the strain(s).  

3.2 Stenotrophomonas maltophilia
This is a Gram-negative bacterium found in a variety of environments including soil, water, and plants. It also occurs in the hospital environment and may cause infections such as, bloodstream infections, respiratory infections, urinary infections and surgical-site infections.

However clinically-significant infections usually only occur in those with significantly impaired immune defences, such as severely immuno-compromised patients. Infections in previously normal patients are unusual. Risk factors pre-disposing a hospitalised patient towards infection include prior exposure to antimicrobials (especially broad-spectrum antibiotics), mechanical ventilation, and prolonged hospitalisation. 

S. maltophilia may also affect the lungs of patients with cystic fibrosis.

Stenotrophomonas maltophilia does not readily spread between patients and is not a common cause of healthcare-associated infection. While hospital outbreaks for many pathogens (e.g. Acinetobacter baumannii) are usually caused by a single strain, apparent outbreaks attributed to S. maltophilia are frequently caused by multiple strains, implying acquisition from environmental sources as opposed to inter-patient spread. 

S. maltophilia is inherently resistant to many antibiotic classes (e.g. cephalosporins, carbapenems, and aminoglycosides) meaning that treatment options are relatively limited. However, most strains remain susceptible to co-trimoxazole which is regarded as the drug of choice for treating infections.

4.0 Clinical presentations
Multi drug resistant bacteria are associated are usually associated with hospitals with risk factors being underlying condition, malignant disease, venous and urinary catheters, recent treatment with broad-spectrum antibiotics, admission to intensive care, prolonged length of hospital stay, surgical and other wounds, ventilation and parenteral nutrition. Clinical presentations range from UTI, lower respiratory tract infections (usually ventilator associated pneumonia) and line related sepsis.

5.0 Microbiological investigation
Samples should be sent to the laboratory for investigations as per standard protocol. In the laboratory the standard operating procedures for culture and sensitivity testing will be undertaken and mechanism of resistance will be established. Isolated organisms will be sent to the Reference Laboratories for further testing and typing when indicated to explore epidemiological hypotheses and the impact of interventions.

6.0 Treatment
Choice of antibiotic treatment will normally be governed by local information about trends in antibiotic resistance or a known sensitivity of the organism isolated. A cluster of Multi Resistant bacteria linked in time or place will trigger a review of antibiotic prescribing.
7.0 Control measures
Where a single patient is found to be colonised or infected, then ideally s/he should be contact isolated in a side-room and infection control and antimicrobial prescribing reviewed (see below).

Risk assessment of the case should be performed and numbers and results of clinical specimens from other patients on the ward/unit reviewed to inform whether screening of other patients is indicated. Risk factors for colonisation or infection should be reviewed, including intensive care or burns unit admissions, prolonged length of hospital stay, presence of surgical and other wounds, broad spectrum antibiotic treatment including carbapenem usage (see below), urinary and vascular catheters, ventilation and parenteral nutrition.

Where there is more than one patient with the same isolate of a multi-resistant organism on the same unit/ward, an outbreak team should be convened as per the Diarrhoea and Vomiting Outbreak Management Protocol (IC/274/09) and an investigation undertaken. Case definitions should be agreed and dates of admission, discharge, ward and bed locations of all infected and colonised patients documented, along with time line analysis of patient activity such as movement to, and from, theatre, and for bronchoscopy. When several patients are infected at the same time, cohort-nursing as advised by the ICT is acceptable with designated nursing and if possible physiotherapy staff.

Standard contact precautions as per section 9.0 below will be implemented and re-enforced e.g. hand hygiene, correct use of gloves and device usage.

Where cases are continuing, or spread outside isolated room or bay detected, the ward will be closed on infection control advice

Patient and environmental screening strategies should be agreed by the outbreak team, For multi-resistant acinetobacter(MRAB) screening sites that have been advocated include the nose, throat, perineum and any wounds, sputa, tracheostomy sites, the hairline (to detect dispersers), faeces and ante-cubital fossa

Instruments or equipment (eg writing materials, sphygmomanometers, stethoscopes, lifting slings, and resuscitator bags) should be designated for affected patients. If possible, single-patient use items are to be preferred. Alternatively, such items should be decontaminated suitably before use on another patient. Special attention should be paid to ventilator circuits, suction catheters and humidifiers.

A thorough decontamination of the environment and all equipment should ensured before the isolated area is reopened.Especial attention should be paid to horizontal surfaces and dust-collecting areas, bedclothes, curtain rails, beds, tables, ventilators, sinks, doorknobs, and telephones. Curtains should be changed as part of the terminal clean after an infected/colonised patient leaves. Where a curtain forms a common divider between two beds, it should be changed when one patient leaves. Easily decontaminated computer keyboards, for example those with flat sealed membranes, should be used. Electrical equipment that generates static need particular attention.

Acinetobacter can contaminate stock items stored in a patient's room. Following a patient's departure, any such items in a room should be decontaminated adequately or
disposed of. All unused disposable items such as packets of unopened gloves, needles etc, should be discarded. Stocks of these should thus be kept to the minimum needed for the care of that patient, so that wastage is minimised.

One should consider a thorough decontamination of the environment and all equipment once the final patient has left, as part of a terminal clean. MRAB can survive well in dust, much of which originates from patients' skin. Thus it is important to remove all dust as part of this terminal clean.

A chlorine-based agent (e.g. NaDCC) at 1,000 ppm available chlorine with or following cleaning with a compatible anionic detergent should be used. In case of corrosion problems, 70% alcohol can be used.

Pillows, mattress covers and mattresses should be checked for damage and similarly disinfected.

Therapy beds need specialist cleaning (e.g. high quality thermal washing/disinfection). Special mattresses must be cleaned according to manufacturers’ instructions after patient use.

8.0 Staff carriage
There have been no published reports implicating staff carriage as a source of patient colonisation or infection. Screening of staff for carriage during an outbreak or as part of an investigation is unhelpful and may cause considerable stress.

9.0 Infection control Precautions

9.1 Hand hygiene
Effective hand hygiene is the most important measure to prevent and control the spread of antimicrobial resistant organisms. Hands should be decontaminated between each patient contact, whether or not the patient is known to be infected with a multi drug resistant bacterium.

Alcohol-based solutions or gels are effective against multi drug resistant bacteria. They are not cleansing agents and are not recommended in the presence of "physical dirt". An alcohol gel is appropriate during ward rounds or when additional hand hygiene is required. Many workers support the use of an alcoholic hand rub or gel because of its convenience and efficiency. Where patients are being nursed on an open ward, dispensers containing these materials should be readily available, ideally by each bed.

9.2 Isolation of patients and environmental cleaning
As per control measures above.
9.3 Transfer of patients with infections with multi-resistant bacteria
Where patients infected or colonised with multiresistant bacteria, or exposed to it but screened and thought to be clear, are being transferred to another hospital or other care provider, clinical staff should ensure that the receiving area is aware of the patient's status and the context of the exposure to multi-resistant bacteria, and the Infection Control Team at that hospital should be informed. This needs to happen before the transfer takes place. Colonisation with multiple-resistant organisms, must never be a reason for refusing admission if there are clear clinical reasons for the transfer.

9.4 Control of antibiotic usage
The emergence and spread of these infections is encouraged by the use of certain antimicrobials. The use of the cephalosporins and carbapenems has been implicated in the emergence of these infections. It is good clinical practice not to use any antimicrobial unnecessarily and clinical units should adhere to the trust wide antibiotic policy.

Table 2: summary of infection control precautions for Multi drug resistant bacteria (contact precautions)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Hand washing</strong></td>
<td>Before an after patient contact</td>
</tr>
<tr>
<td><strong>Gloves</strong></td>
<td>On entering room, during care e.g. When likely to touch, blood, body fluids and contaminated items</td>
</tr>
<tr>
<td><strong>Masks</strong></td>
<td>During procedures likely to generate contamination with blood and body fluids</td>
</tr>
<tr>
<td><strong>Eye/face protection</strong></td>
<td>During procedures likely to generate contamination with blood and body fluids</td>
</tr>
<tr>
<td><strong>Apron/gown</strong></td>
<td>On entering if contact with patient or environment anticipated</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>As per decontamination policy</td>
</tr>
<tr>
<td><strong>Cleaning</strong></td>
<td>As per cleaning standards and description above</td>
</tr>
<tr>
<td><strong>Linen</strong></td>
<td>As per policy. Regard as infected</td>
</tr>
<tr>
<td><strong>Isolation room</strong></td>
<td>Single room and minimise time outside, or as advised by ICT</td>
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References