Carbapenemase-Producing Enterobacteriaceae Multi Drug Resistant Organism Management Procedure

(IPC Manual)
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1. INTRODUCTION

Multi drug resistant gram negative bacteria (MDR-GNB) are a growing concern for infection prevention and control (IPC); it is imperative that patients who have or are suspected of having one are managed safely and appropriately.

This procedure focuses on Carbapenemase-Producing Enterobacteriaceae (CPE) gram negative bacteria, however the guidance can be followed for all MDR-GNBs.

1.1 Multi Drug Resistant-Gram Negative Bacteria

These are organisms exhibiting resistance to multiple classes of antimicrobial agents. The organisms most often associated with multi-resistance are, but not limited to:

- Acinetobacter sp
- Enterobacter sp
- Escherichia coli
- Klebsiella sp
- Pseudomonas sp

Extended spectrum beta-lactamase (ESBL) producing organisms eg. Escherichia coli (E.coli) and Klebsiella species from urine samples, are increasing in frequency in the community.

An emerging group of resistant organisms are the CPEs. Enterobacteriaceae are a large family of bacteria, including species such as E. coli, Klebsiella spp and Enterobacter spp that live harmlessly in the gut but are common causes of urinary tract infections, intra-abdominal and bloodstream infections.

Carbapenems, such as meropenem and ertapenem, are a powerful group of broad spectrum antibiotics which in many cases are the last effective defence against multi-resistant infections. However the use of these drugs increases the risk of CPE development, particularly in patients previously hospitalised in countries such as Turkey, Israel, Greece, Indian sub-continent and the USA.

Over the last 8 years there has been a rapid increase in the incidence of infection and colonisation by multi-drug resistant CPEs in the UK, with a number of outbreaks reported.

Refer to Appendix 42 for further guidance on multidrug resistant organisms and resistant antibiotics.

2. PROCEDURE

2.1 Management of a patient with Carbapenemase-Producing Enterobacteriaceae.
Refer to appendix 43 - flowchart for management of a patient with CPE.

When a patient is admitted the Healthcare Associated Infections (HCAI) Risk Assessment Template must be completed on SystmOne. This will identify patients who:

- May be colonised or infected
- Meet the criteria for screening

In the community:

- The patient may already be known to have CPE

CPE may be identified from specimens sent to the laboratory as the patient has clinical signs of infection e.g. diarrhoea, exudating wounds.

2.2 Screening for CPE

Routinely screening of patients for CPEs is not advocated. A screen is required for:

- All patients who, in the last 12 months, have been an in-patient in hospital abroad or UK hospital known to have problems with the spread of CPEs (predominantly Manchester and London)
- Previously positive cases
- Contacts of a patient who is known to have CPE

Endoscope-related transmissions of carbapenem-resistant organisms have been reported in the UK and France

A rectal swab should be sent for screening for CPE. A stool sample can be sent if a rectal swab cannot be obtained.

Procedure for taking a rectal swab:

- Moisten swab in a transport medium
- Insert swab 1-1.5 inches into rectum and gently rotate
- There must be visible faecal matter on the swab
- Place swab into the tube deep enough that medium covers the cotton tip
- Ensure laboratory request form is labelled CPE screen
- Swabs should be sent to the laboratory as soon as possible – preferably on the day of collection. If this is not possible, they should be refrigerated until transported

Screening may also be requested by the Infection Prevention and Control Team (IPCT)/Consultant Microbiologist to identify colonised patients during an outbreak.

Currently, there is no evidence to support screening of staff as part of
routine infection prevention and control measures. Adherence to standard precautions in the workplace and effective hand hygiene at all times are the key measures to prevent spread.

Common sites for colonisation include superficial wounds and pressure ulcers.

Infection may be associated with intravenous or urinary catheters and management may include their removal.

If a specimen returns a positive result for CPE the IPCT/Consultant Microbiologist must be informed so specific clinical management advice can be given on an individual basis.

2.3 Treatment for CPE

If the patient is colonised:

- No antibiotic treatment is required for colonisation
- Decolonisation is NOT advised for the following reasons:
  1. Skin decolonisation – not advised as these bacteria generally colonise the gut rather than the skin
  2. Gut decolonisation (by prescribing antibiotics) – not advised as although antibiotics may provide some benefit, there is concern that their use would contribute to increasing resistance in the longer term
- Advise patient of the need for good hand hygiene, especially if they develop loose stools or diarrhoea

If the patient develops an infection:

As CPEs are often multi-resistant with limited therapeutic options for treatment, antibiotic management must always be discussed with a Consultant Microbiologist promptly. Treatment should be guided by laboratory results.

2.4 Isolation - CPE

Symptomatic patients with CPE MUST be isolated in single rooms with en-suite facilities/designated commode. If this is not possible then a risk assessment based on clinical needs and the risk to other patients in the area must be undertaken following discussion with the IPC team/Consultant Microbiologist. Staff must also refer to the Isolation Procedure for guidance.

All patients who, in the last 12 months, have been an in-patient in a hospital abroad or a UK hospital known to have problems with the spread of CPEs (predominantly Manchester and London), or who have been previously positive must be isolated on admission.

Patient should remain in isolation until two further consecutive samples test
negative – samples being taken 48 hours apart (ie Day 0 [initial sample], day 2 and day 4)

Asymptomatic patients may be able to come out for rehabilitation and meals after risk assessment. The decision to discontinue isolation precautions will be made by the IPC team/Consultant Microbiologist.

The decision to discontinue precautions will be based on factors such as microbiology samples, likelihood of transmission, risk factors and priorities for isolation of other patients.

**Note:** Previously positive individuals with subsequent negative screens can revert to a positive state, especially after a course of antibiotics – careful risk assessment is required if removed from isolation.

**Isolation in the community**

Isolation precautions are not required in the patient’s own home. Strict standard precautions must, however, be in place at all times, as with any patient cared for by staff.

2.5 **Hospital and Community Care**

2.5.1 **Visitors to inpatient areas**

Patients may continue to receive visitors. Any visitor must ensure that they wash their hands on leaving the isolation room and be instructed to use the alcohol hand rub outside the room.

Visitors are not routinely expected to wear gloves and aprons unless they are providing personal care. The IPCT/Consultant Microbiologist will inform staff if this changes due to resistance patterns.

2.5.2 **Personal Protective Equipment**

Staff must refer to the Personal Protective Equipment Procedure.

- Wear a disposable polythene apron if there is a risk that clothing may be exposed to blood, body fluids, secretions or excretions
- Wear a long-sleeved fluid-repellent gown if there is a risk of extensive splashing of blood, body fluids, secretions or excretions onto skin or clothing
- Use aprons or gowns as single-use items, for one procedure or one episode of direct patient care and ensure they are disposed of correctly
- Face masks and eye protection must be worn where there is a risk of blood, body fluids, secretions or excretions splashing into the face and eyes

2.5.3 **Hand Hygiene**

Staff must refer to the Hand Hygiene policy and procedure.
• The most important measure to control the spread of all organisms, including multi resistant organisms is scrupulous attention to hand hygiene.
• Staff must adhere to the bare below the elbow guidance.
• Staff must decontaminate their hands thoroughly using liquid soap and water or soapy hand wipes if hand washing facilities are not available, followed by alcohol based hand rub.

2.5.4 Environmental and Equipment Cleaning

Staff must refer to the Cleaning and Decontamination of the Environment and Patient Equipment Procedure.

• Equipment and the patient’s environment may become contaminated with multi resistant organisms and this risk is increased if patients have colonised respiratory secretions, open wounds or diarrhoea.
• The environment must be kept clean and uncluttered to minimise dust accumulation and to facilitate effective environmental cleaning.
• Encourage patients/family/carers to keep the environment clean.

2.5.5 Waste Disposal

Staff must refer to the Waste Policy.

• Waste must be disposed of as hazardous / infected.

2.6 Transfer/Discharge of Patients

Transfer of patients with multidrug resistant organisms should be minimised to reduce the risk of spread, but this should not compromise other aspect of patient’s care. All transfers should be discussed with a member of the IPCT prior to transfer.

If a patient with a multi resistant organism is transferred to another health-care institution the receiving clinical and IPCT must be informed. The ambulance service should be notified as well.

In general, multidrug resistant organisms do not present a risk to healthy people in the community or patients in residential or nursing homes who do not have catheters, wounds or other lesions.

2.7 Death of a patient

No special precautions are required. Standard precautions are sufficient.

3. DEFINITIONS

*Acinetobacter* - a bacterium that causes infections such as pneumonia, particularly in people who have a compromised immune system

Antimicrobial - capable of destroying or inhibiting the growth of disease-
causing microbes

**Carbapenems** - are a group of powerful antibiotics, used to treat severe infections. They include meropenem, ertapenem, doripenem and imipenem

**Carbapenemases** - Enzymes produced by some bacteria which cause destruction of the carbapenem antibiotics, resulting in resistance – health professionals sometimes use this enzyme abbreviation only

Colonised/Colonisation – *when a microbe establishes itself in an environment such as a body site without causing an infection*

Endoscope - *a long slender medical instrument used for examining the interior of hollow organs including the lung, stomach, bladder, and bowel*

**Enterobacter** - any of a class of Gram-negative rodlike bacteria that occur in the gastrointestinal tract

**Escherichia coli** - genus of Gram-negative rodlike bacteria that are found in the intestines of humans and many animals

Fomites - objects or substance capable of carrying infectious organisms, such as germs or parasites, and hence transferring them from one individual to another.

Gram negative and positive bacteria. Gram staining is a method of staining used to distinguish and classify bacterial species into two large groups (gram-positive and gram-negative). Gram-positive bacteria are more receptive to antibiotics than Gram-negative

**HCAI** - Healthcare Acquired Infection. HCAI are acquired as a result of healthcare interventions.

Infection - the invasion of an organism's body tissues by disease-causing agents (pathogens), their multiplication, and the reaction of host tissues to the infectious agents and the toxins they produce

**Klebsiella** – a Gram-negative bacteria found in the respiratory, intestinal, and urinogenital tracts of humans and animals, which can cause pneumonia and urinary infections

**Pathogenic** - able to cause or produce disease

**Pseudomonas** - any of a genus of rodlike Gram-negative bacteria that live in soil and decomposing organic matter: many species are pathogenic to plants and a few are pathogenic to man

**Staphylococcus aureas** - a spherical Gram-positive bacterium typically occurring in clusters and including many pathogenic species, causing boils, infection in wounds, and septicaemia

**Sepsis** - the presence of pus-forming bacteria in the body
Septicaemia - blood poisoning, especially that caused by bacteria or their toxins

4. **RESPONSIBILITIES, ACCOUNTABILITIES AND DUTIES**

4.1 Refer to the home page, section 4, of the Infection Prevention and Control Policy Manual

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5. **LINKS TO ASSOCIATED POLICIES/DOCUMENT**

**Infection Prevention and Control Manual | RDaSH NHS Foundation Trust**

6. **REFERENCES/FURTHER READING**


Multi-Resistant Gram Negative Bacteria – Prevention and Control Policy, Doncaster and Bassetlaw Hospitals NHS Foundation Trust. Accessed on line 22.08.2018


7. **APPENDICES**

(Please see IPC Policy Manual webpage for Appendices not attached to this procedure) [https://www.rdash.nhs.uk/46192/infection-prevention-and-control-manual/](https://www.rdash.nhs.uk/46192/infection-prevention-and-control-manual/)

- Appendix 42 Multidrug resistant organisms and antibiotic resistance
- Appendix 43 Management of a patient with Carbapenemase-Producing Enterobacteriaceae