Title: Multi-Drug Resistant Gram Negative Organisms

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Purpose

This policy sets out the management of patients infected with multi-drug resistant gram negative organisms (MDROs) including those that produce extended spectrum beta-lactamase (ESBL). This will ensure appropriate management of the infection and prevent spread within the hospital.

1. Introduction

1.1 Significance

Multidrug resistant gram negative organisms (MDRO’s) are bacteria such as E coli, Stenotrophomonas species or Acinetobacter baumanii which are resistant to three or more groups of antibiotics.

MDRO producers are clinically significant because:

- They are resistant to many antibiotics commonly used in hospitals
- Treatment may require second line antibiotics which may be less effective or have more side effects
- Delays in identifying the causative organism as a MDRO result in significant morbidity
- Depending on the species they may colonize the environment for long periods of time.
- They may colonize patients and eradication may not be possible
- Strains exist that are resistant to all known antibiotics. Such strains have been found in Dumfries and Galloway.

Recently organisms have been identified in the UK which are resistant to meropenem and ertapenem, and often many other groups of antibiotic. These strains, called carbapenemase producers, are especially difficult to treat.

1.2 Prevention and Eradication

Preventing infections will reduce the burden of MDROs in healthcare settings. Prevention of antimicrobial resistance depends on appropriate clinical practices that should be incorporated into all routine patient care. These include optimal management of vascular and urinary catheters, prevention of lower respiratory tract infection in intubated patients, accurate diagnosis of infectious etiologies, and judicious antimicrobial selection and utilization.

When an organism such as Stenotrophomonas or Acinetobacter becomes established in a unit it can be difficult to eradicate, and will often take time and many different interventions. The IPCT will coordinate the actions of the affected unit, Estates/SERC,O, management and others. It is occasionally useful to seek advice from national agencies such as Health Facilities Scotland. Typing of isolates will also help focus efforts on the endemic strain.

1.3 Evidence
There is a considerable and growing literature on the infection control of MDRO’s. Examples include an MDR serratia eradicated from 13 special-care units and two hospitals and reports of the eradication of a variety of MDRO’s from smaller outbreaks. These studies provide clear evidence that carefully applied standard infection control precautions and the avoidance of trigger antibiotics can be effective.

Carbapenemase producers reported in Scotland by AMRHAI Reference Unit (PHE).

From EARRS Annual Report 2011
Clinical Presentation and Disease Spectrum

This depends on the causative organism. E coli is our most common MDRO and is the commonest cause of UTI. Patients are occasionally admitted because there is no oral treatment left to use.

Stenotrophomonas and Acinetobacter species are occasional causes of respiratory infections, line sepsis and bacteraemia, especially in the debilitated or hospitalized patient.

Any gram negative organism can be a carbapenemase producer. Suspicion should be high when a patient has spent significant time in or been treated in South Eastern Europe such as Greece and Romania and Thailand.

There is no presentation that rules out infection by a MDRO. Where there is increased prevalence or first line therapy has failed MDRO’s should be suspected.

2. Risk Factors

Most of the infections have occurred in people with other underlying medical conditions who are already very sick, and in elderly people. Patients who have been taking antibiotics or who have been on previously hospitalized are mainly affected.

3. Microbiological Investigation

The Area Department of Microbiology will be able to identify the causative agent and undertake appropriate sensitivity testing as for any other potentially pathogenic organism. It can help with selecting antimicrobials to test if the sender informs the lab that the patient is known to carry a resistant organism. Where a problem has been identified on a ward or unit extra sensitivity testing may be undertaken at the discretion of the Duty Clinical Microbiologist or Infection Control Doctor.

Carefully taken samples are essential to the identification of MDRO’s and to treatment planning.

The microbiology laboratory can also arrange for resistance mechanism testing. Very occasionally if an outbreak is suspected then screening e.g. of rectal swabs, line sites and skin breaks can be undertaken after discussion with the IPCT. Protocols are available from the HPA.
4. Treatment

The important factor in successfully treating a MDRO is quick diagnosis and recognition that the bacteria causing infection are resistant to antibiotics, so that the most appropriate treatment can be prescribed quickly.

Most MDR E.coli are resistant to cephalosporins, penicillins, fluoroquinolones, trimethoprim, tetracycline and some other antibiotics, leaving very limited options for oral treatment. Treatment of MDRO’s should be discussed with a consultant microbiologist.

Key points to remember when treating a MDRO infection:

- Broad spectrum antimicrobials are required if an MDRO is suspected.
- If second line or uncommon antimicrobials are used the clinical staff should familiarize themselves with the interactions and side effects.
- Adequate doses should be used as some second line agents are less effective.
- There may be other antimicrobials tested by the lab but not released.
- Delayed appropriate therapy is the biggest cause of patient harm when infected with a MDRO.

Drugs such as aztreonam, colistin, temocillin, tigecycline or fosfomycin are rarely used at present and often remain effective as organisms become resistant to more commonly used agents.

5. Infection Control Measures

It is important to control the emergence and spread of MDRO for the reasons stated previously; the limited therapeutic alternatives, the increasingly compromised in-patient population, and the potential for transfer of resistance to other pathogenic bacteria and development of further resistance. In addition controlling such infections once colonization of patients or the environment occurs is complex and takes on average eight interventions (CDC HICPAC Guidelines).

The epidemiology of MDRO infection can be complex: hospitals may be affected by sporadic cases of MDRO, epidemics or endemic colonization and infection. Each of these situations will need to be managed in different ways, depending on the risk to the patients involved.

As with all other infection control interventions, the quality of clinical care must not suffer as a result of the precautions implemented. Because of the uncertainty surrounding the management of MDRO, discussion between the microbiologists, infection control team and the clinical staff is essential.

Control measures must be informed by a risk assessment. This will include the extent and site of patient infection, the presence of intravenous and urinary catheters, whether the patient is incontinent of urine or not and the susceptibility to
infection of patients on the affected wards. Use of CAUTI bundles and PVC Checking Charts are especially important to optimize practice.

A leaflet is available (appendix 1) and should be provided to those patients who have been diagnosed with a MDRO.

6.1 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 MDRO.

Alcohol-based solutions or gels are effective and can be used as long as hands are socially clean.

6.2 Isolation of patients

The decision to isolate individual patients affected by MDRO should be based on the clinical needs and risk assessment described above, by the clinical team caring for the patient in conjunction with the ICT. Ideally, patients infected with these organisms should be source isolated in single rooms.

Patients with MDRO and the following should be isolated as a priority:

- Faecal incontinence
- urinary catheters
- intra abdominal drains

Occasionally a patient carrying the first isolate of a potentially serious pathogen may also be prioritized as their isolation represents an opportunity to prevent the organism becoming established in the environment.

It is not usually necessary for visitors to take special precautions beyond hand washing.

Isolation will be required until there is no significant risk of cross transmission. This may be while a patient is incontinent or has a drain or wound. However where bowel carriage is likely it may be for the duration of stay and even through future admissions.
6.3 Cleaning and Decontamination

During MDRO outbreaks, additional cleaning may be requested. Terminal cleaning is particularly important when the organism has a potential environmental reservoir e.g. Stenotrophomonas. Details of cleaning can be found in the Infection Control Manual online.

Equipment is a common source of cross infection for many MDRO’s. Following the decontamination policies and only purchasing equipment that can easily be cleaned will contain this risk.

Endoscopes have been associated with several outbreaks (MHRA in references). Special care should always be taken with equipment such as cameras which require separate cleaning procedures.

6.4 Transfer of patients with MDRO

In general, MDRO does not present a risk to people in the community, nor to patients in residential or nursing or nursing homes who do not have catheters, wounds or other lesions. Standard precautions during and after discharge are sufficient to prevent spread. Staff should be informed if a patient is being transferred to another healthcare unit.

6.5 Staff Carriage

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

6.6 Control of antibiotic usage

The emergence and spread of MDRO is encouraged by the use of broad spectrum antimicrobials for prolonged periods of time. Antibiotic guidelines indicate the most appropriate antibiotic and duration of treatment for common infections. It may be necessary to recommend different treatments where MDRO’s are prevalent. The Consultant Microbiologist and AMT can advise.
6.7 Eradication

When colonization of a patient occurs it may be within the bowel, e.g. E coli, or in a wound e.g. Serratia, or the respiratory tract, e.g. Stenotrophomonas. Decolonization, the removal of the organism when it is not causing an infection, can be impossible. Colonization may therefore be prolonged or even lifelong. The decision to relax precautions is therefore based on a combination of:

- The organism
- The site colonized
- The significance of cross infection

6.8 Education

Education is central to all infection control activity. With MDRO's clinical staff will often be faced with an organism they rarely treat and cannot be expected to be familiar with. Few successful eradication initiatives have not had unit or organism wide education as a core intervention.

7 Screening

We routinely screen for MRSA because it has been shown that detecting colonization early can allow us to eradicate carriage and prevent infection and cross infection. With MDRO the effects of screening are less clear. Where an organism is rare the effort may best be directed elsewhere. Where the organism is carried in the bowel and cannot be eradicated such as resistant E coli screening may be useful to prevent cross infection. Where the organism is present in the environment and this is the main route of cross infection, as with Stenotrophomonas, and then patient screening is unhelpful.

Environmental screening is rarely useful as the sensitivity is low and the potential risk of a given site acting as a reservoir is unpredictable. It is occasionally used to determine the dynamics of environmental spread.

7 Last Offices

No special precautions are required and a release form is not required if being transferred out with Scotland.
9 Surveillance

Careful monitoring of isolates from the clinical microbiology lab often gives the first warning of a potential cluster of cases. The antibiotic resistance pattern, the antibiogram, can give an indication of the strain though it is not as accurate as typing.

Typing a group of organisms is the process by which they are examined for relatedness. This is undertaken for us in the relevant reference lab and is usually a molecular technique. It provides evidence for which isolates are related and therefore potentially cross infected. It is used with clinical and epidemiological evidence.

10 Communication

The IPCT should be informed when a patient is found to carry a MDRO. They will assist in deciding which measures are required.

The patient discharge summary should include the carriage and any further precautions or treatment required. The GP should be asked to include it in any referral letter.

The GP should be asked to include carriage of a MDRO in future referral letters.

The patient should be told of the carriage, even if active treatment is not required, and asked to include it if asked for a past medical history.

Where an outbreak is suspected the Outbreak Plan should be followed. This includes a communications pathway.
What effect does a MDRO have?
The infection from MDRO bacteria may be in urine, a wound or in the blood.

The symptoms are usually the same as any other infection in these parts of the body i.e. fever, shivering, pain on passing urine, pus in wound, confusion in some people.

Do I have to stay in hospital?
No. Any isolation precautions are to prevent cross infection to another patient at particular risk of contracting the same bug.

What happens when I go home?
If you go home before treatment for your infection is complete you may be asked to complete a course of antibiotics. At home no precautions are required as these organisms are not harmful to healthy people. If you are readmitted or seen by healthcare staff it is helpful to mention that you have been colonised though this will be in your notes.

This information is also available on request in other formats by phoning 01387 241627.
What is MDRO?
Multi Drug Resistant Gram Negative Organisms have been increasing in recent years due to the ability of certain organisms to destroy certain commonly used antibiotics.

ESBL stands for Extended Spectrum Beta Lactamase.

It is an enzyme which is produced by some bacteria when they break down antibiotics. These bacteria will be resistant to certain antibiotics which can make infection difficult to treat. Your Doctor will prescribe an antibiotic which is suitable for you.

Where are MDRO found?
Some people carry these organisms within their bowel (gut) without becoming ill. This is called colonisation.

How are MDRO spread?
Organisms’ e.g. E.coli can become ESBL producing following previous antibiotic treatments so you, or your relative, may not have been passed the organism by another person.

However, MDRO organisms can be spread from person to person by direct contact e.g. on the hands of patients or staff.

They can also be passed indirectly e.g. from equipment which may not have been cleaned or via hands and into the mouth on food.

People who are in hospital or who are already ill are more at risk from MDRO infection because their immune systems are weakened by illness, surgery, medication and procedures.

In most cases, healthy people will not be affected by ESBL producing organisms.

How are MDRO treated?
As these bacteria are resistant to some, but not all, antibiotics, your Doctor will prescribe an antibiotic which will be active against your infection.

You, or your relative, may be moved to a single room within the hospital for your treatment. This is to prevent the infection being spread to others who may have to share equipment e.g. toilet.

How can the spread of MDRO be prevented?
Good hand washing is essential to prevent the spread of MDRO. You, your visitors and any staff involved in your care should always wash their hands and clean any equipment they use.

Staff will also wear gloves and aprons when providing care for you. Visitors do not need to wear gloves and aprons unless they are involved in patient care.

Good personal hygiene is essential.

Visitors should always wash their hands and/or use the alcohol rub before and after visiting. They must not sit on the patient’s bed.

Any laundry should be sent home and washed as soon as possible.
References


7. Guidance for Control of Infections with carbapenem-resistant or carbapenem-producing Enterobacteriaceae in Acute Care Facilities. MMWR. 2010; 20: 256-60.
