

# METALLO-BETALACTAMASE (MBL) PRODUCING BACTERIA: PATIENT MANAGEMENT - CHW POLICY<sup>®</sup>

## DOCUMENT SUMMARY/KEY POINTS

- Gram-negative bacteria such as coliforms and pseudomonas species can acquire a gene which allows them to break down many of our most powerful and useful antibiotics. The gene codes for a metallo-betalactamase (MBL) enzyme which destroys carbapenems such as imipenem and meropenem, as well as all antibiotics of the penicillin and cephalosporin classes. This gene can also spread between different bacteria, so hospital outbreaks may be hard to recognise.
- Certain patients are at increased risk for infection or colonisation with MBL-producing bacteria. These include the critically ill (particularly ICU patients), transplant recipients, those with prolonged hospital admissions, and those who have received broad spectrum antibiotics.
- Transmission of MBL-producing bacteria between patients can occur rapidly. The Infection Control Team should be contacted to advise and assist with the implementation of Infection Control precautions.
- **Standard, Contact and Additional Infection Control precautions must be enforced.**
- Patients with MBL-producing bacteria (colonised or infected) **MUST** be nursed in a single room or cohorted with other children MBL-producing bacteria in a dedicated room. They should remain in the ward most appropriate to their medical condition, and transfer to an isolation ward (e.g. Variety Ward) is not required.
- Transient MBL carriage by persons entering the patient's room and then contaminating the general ward environment imposes a significant risk. All healthcare workers entering the room must wear PPE including single use long sleeved isolation gown and non-sterile gloves. Visitors must wear a single use long sleeved isolation gown. Parents/carers must wear a long sleeved cloth gown.
- Patient care equipment must be dedicated for the sole purpose of the patient (or cohort room).
- MBL colonisation can persist for many months or even years. No guidelines currently exist for determining if a patient is clear of MBL-producing bacteria.
- This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

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<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> July 2013	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Clinical Nurse Consultant	<b>Area/Dept:</b> Infection Control, CHW

## CHANGE SUMMARY

- General editing
- Harmonisation with VRE policy
- Clarification of parent/carer and visitor gown requirement
- Emphasise that Isolation (Variety) Ward transfer is not appropriate
- Remove directions for Ronald McDonald House as we have no jurisdiction

## READ ACKNOWLEDGEMENT

- All medical and nursing staff working in clinical areas should read and acknowledge they understand the contents of this policy.

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# 1 Introduction

Gram-negative bacteria such as coliforms and *pseudomonas species* are commonly found in the bowel, on the skin, and in the hospital environment. If they develop resistance to antibiotics, they can cause infections which may be difficult to treat or require more toxic medications. When patients carrying antibiotic-resistant bacteria in their body are exposed to broad spectrum antibiotics, these resistant bacteria survive and multiply, becoming the predominant colonising strains under antibiotic selection pressure. As the result of this increased colonisation-density, such patients will be more likely to transmit these resistant bacteria to adjacent patients via the hands of hospital staff, or via inanimate surfaces such as bed rails, charts, or other equipment. Being on a broad spectrum antibiotic is also a risk factor for a patient acquiring 'resistant' bacteria, probably because antibiotics eliminate the patient's normal healthy "colonising" flora.<sup>1, 2, 3, 4</sup>

One of the ways that bacteria become resistant to antibiotics is by picking up genes for "self-defence" mechanisms, such as enzymes which destroy the antibiotics. Metallo-beta-lactamases are enzymes which destroy our most important antibiotic classes, such as carbapenems (imipenem and meropenem), cephalosporins and penicillins. The genes that allow the bacteria to make these enzymes are easily spread between different bacteria, via mobile genetic elements known as plasmids. These plasmids can also carry resistance to other types of antibiotics, making the bacteria very difficult to treat.<sup>5, 6, 7</sup>

The mortality rate from infections caused by MBL-producing bacteria has been high<sup>5</sup> reflecting the vulnerability of the patients who tend to get these infections, difficulties and delays in selecting the correct treatment, and the more toxic antibiotics required.

## 1.1 Clinical Manifestations

MBL-producing bacteria may be cultured from blood, wounds, urine, or airway specimens (particularly in intubated intensive care patients). Patients can be either colonised or infected with MBL-producing bacteria. MBL-producing bacteria readily colonise the bowel without causing symptoms of infection. If MBL-producing bacteria are cultured from a patient who does not have signs of local or systemic infection, the patient is considered to be **colonised**. MBL-producing bacteria do not cause diarrhoea.

## 1.2 Risk Factors

Certain patients are at increased risk for infection or colonisation with MBL-producing bacteria. These include the critically ill (particularly ICU patients), transplant recipients, those with prolonged hospital admissions, and those who have received broad spectrum antibiotics.<sup>1, 2, 5</sup>

## 2 Command and Control

Responsibility for implementation of this policy is the direct responsibility of appropriate clinical line managers caring for affected patients. The clinical line managers will take advice and direction from Infection Control staff and the Chair or Deputy Chair of the CHW Infection Control Committee. Issues of dispute between clinical line managers and Infection Control will be referred to the Director of Clinical Operations who in turn will refer any issues to the Chief Executive, if required, for resolution based on best evidence and expert advice.

If there is no policy on a particular issue, or the policy needs updating then there needs to be further discussion between clinical line managers, Infection Control, Microbiology and the Director of Clinical Operations to develop a consensus agreement based on best evidence. If a dispute arises about policy it is to be referred to the Chief Executive for resolution.

MBL-producing bacteria are not currently a reportable infection to Public Health Units.

A Reportable Incident Brief (RIB) will be sent to NSW Department of Health on any potential media interests or problems. This is currently the responsibility of the Executive Support Manager. Isolations of MBL-producing bacteria identified by the clinical manager or microbiologist must be reported to Infection Control who will determine the type and level of response and provide advice on implementation of this policy.

The Clinical Microbiologist or Infection Control Practitioner will notify the Director of Clinical Operations of identification of any isolates of MBL-producing bacteria outside of known clusters. The Director of Clinical Operations will in turn notify the Chief Executive.

A report on management of any new MBL-producing bacteria cluster will be made to the next Infection Control Committee meeting. The Infection Control Committee minutes will be sent to the Senior Management Group for information.

## 3 Mode of Transmission

Transmission of MBL-producing bacteria between patients can occur rapidly, and can be compounded by transmission of the resistance genes between different bacterial types. It may be hard to recognise such a "gene outbreak", as different patients within the same unit may carry different multiresistant bacteria.<sup>5</sup> For instance, one patient may have a multiresistant *Klebsiella*, and their neighbour may have a multiresistant *Enterobacter* infection.

## 4 Notification of MBL-producing bacteria

Infection Control or the Department of Microbiology will notify wards when a patient is diagnosed as having MBL-producing bacteria. Infection Control will initiate the 'Infectious Risk flag' which manifests as an 'L' in the Isolation Alert of the Patient Management System.

Following notification Staff are required to implement strict Contact Precautions. The MBL positive result should be documented in the patient's medical record and the child's consultant will inform the family and the child. An [Information sheet for Parents and Carers](#) can be printed and given to the patient and family.

## 5 Infection Control Precautions

The Infection Control Team should be contacted to advise and assist with the implementation of the Infection Control precautions.

Standard Precautions must be maintained at all times, whether or not the patient is known to be carrying MBL-producing bacteria. Laboratory screening for MBL-producing bacteria carriage is slow and never 100% sensitive. All MBL-producing bacteria carriers in a ward or unit may not have been identified. Adherence to standard precautions, (along with good environmental hygiene and prudent antimicrobial use) is our best defence against the transmission of MBL-producing bacteria and other multiply-resistant micro-organisms.

Standard precautions are the following:

- Wash hands before patient contact,
- Hand washing with antiseptic hand wash and water for 30 seconds after patient contact, or
- Use of alcohol 'hand rub' after patient contact. Allow alcohol to dry.

In addition to Standard Precautions, Contact and Additional Precautions must be commenced immediately following the notification of probable or confirmed MBL-producing bacteria. These precautions apply to **all** persons entering the room (i.e. medical staff, nurses, physiotherapists, pathology collectors, patient relatives and visitors etc).

### 5.1 Contact and Additional Precautions

Contact Precautions are designed to reduce the risk of transmission of MBL-producing bacteria by direct contact with the patient (skin-to-skin contact) or by indirect contact with environmental surfaces or patient care items in the environment<sup>8</sup>. Contact and Additional Precautions are used in addition to Standard Precautions. (refer to [Flowchart 1](#) [Ward Management] and [Flowchart 2](#) [ED Management] at end of this policy). Contact precautions are the following:

- Wash hands before patient contact, with antiseptic solution
- Wear long sleeved isolation gowns during contact with patient and/or their environment,
- Wear non-sterile gloves during contact with patient and/or their environment,
- Wear protective eyewear for contact with the patient, where there is a likelihood of splash and /or when cleaning the environment.
- Hand washing with antiseptic hand wash and water for 30 seconds after patient contact, OR
- Use of alcohol 'hand rub' after patient contact. Allow rub to dry.

### 5.2 Room Placement

Patients colonised or infected with MBL-producing bacteria should remain in the ward most appropriate to their medical condition where they can be best cared for. Transfer to a specific isolation ward (e.g. Variety Ward) is not appropriate unless they also have another condition which requires use of those isolation facilities. Patients **MUST** be nursed in a single room

with dedicated patient-care equipment such as stethoscopes, thermometers, sphygmomanometers, bedpans, etc. Patients with MBL-producing bacteria must not share a room with patients who do not have MBL-producing bacteria. The patient's room must have a staff hand wash basin. Adequate supplies of isolation gowns, gloves and alcohol 'hand rub' are required outside the room.

### 5.3 Personal Protective Equipment (PPE)

Transient MBL-producing bacteria carriage by persons entering the patient's room and then contaminating the general ward environment is a significant risk. All personnel (staff, parents/carers, and visitors) entering the room must wear appropriate PPE. Single use long sleeved isolation gowns must be worn at all times by staff and visitors when entering the patient's room or the patient's environment. Non-sterile gloves must be worn by staff. The gown and gloves must only be worn once and then discarded.

#### 5.3.1 Exceptions for Parents and Carers

- Single use long sleeved cloth gowns may be worn by parents and carers, instead of the single use disposable isolation gowns, as they spend lengthy periods in the patient's room.
- Gloves are not required.
- The gown must only be worn once and then laundered.
- Parents/carers must wash hands extremely carefully after leaving the child's room and then leave the ward area immediately to avoid contaminating shared items in the environment.
- Where possible and safe, equipment which the parents/carers might require should be placed in the child's room to avoid the need to use shared ward facilities.
- Parents and Carers must not visit other children in the hospital.

#### 5.3.2 Steps in PPE removal are:

- i. Remove gloves by rolling back from the wrist. Do not touch the skin of the ungloved hand with the other, still gloved, hand
- ii. Remove gown and fold carefully with contaminated side in and place in clinical waste bin
- iii. Wash hands with 2% chlorhexidine hand wash and water for 30 seconds
- iv. Leave the room
- v. Use alcohol hand rub process for 15 seconds

Alcohol hand rub must be located inside and outside the patient room for decontamination of hands between different procedures on the patient.

Visitors must always remove their isolation gown and wash their hands, then use alcohol hand rub after leaving the patient's room. After leaving the room the visitors have no restrictions.

	Staff	Parent/Carer	Visitors
Gown	Yes – non-sterile, long sleeved impervious gowns	Yes – cloth gowns	Yes -non-sterile, long sleeved impervious gowns
Hand Hygiene	Yes	Yes	Yes
Gloves	Yes – non-sterile	No	No
Visit other inpatients	Yes	No	No
Hospital grounds including gardens	Yes	Yes	Yes
Leave ward area immediately	No	Yes	Yes

#### 5.4 Patient Care Equipment

- Equipment must be dedicated for the **sole purpose** of the patient (or patients, where appropriate, in a cohort room).
- The patient should have his / her own equipment such as stethoscopes, sphygmomanometers, thermometers and pans.
- This equipment should remain in the patient's room for the duration of the patients stay.
- Once the patient has left the room, all dedicated equipment must be wiped over with a one step, quaternary based cleaner concentrate providing broad spectrum disinfection at 1:256 dilution.

#### 5.5 Room Management

- Minimal items should be kept in the room.
- Only essential items, including sterile consumables, should be taken into or stored in the room. Unused stock is to be discarded when the patient has been discharged from the room.
- The patient medical record, old notes and x-rays must be kept outside the child's room.

**NOTE:** Sterile equipment normally processed in the Central Sterilising Service Department (CSSD) should be placed in the Ward CSSD container for return to CSSD.

#### 5.6 Transfer of a Patient diagnosed with MBL-producing bacteria from Shared Room

- Screen other patients in the room for MBL-producing bacteria unless they are already known to be carriers<sup>8</sup>.
- Infectious cleaning of the room and bathroom is required as per [Section 23](#) of this policy, with attention to the bed locker, all surfaces and fixtures. The bed screen and shower curtains are to be changed.

- No new patients are to be admitted to the room until all original (exposed) patients have been discharged from the room, and the room has been "Infectious Cleaned" and inspected.
- Additional screening may be required as directed by Infection Control.

## 6 Screening Patients for MBL-producing bacteria

- All screening will be directed by Infection Control.
- A stool culture is the preferred specimen for detecting MBL-producing bacteria.
- Patients sharing a room for more than 24 hours with a child newly recognised to be carrying MBL-producing bacteria, will need to have a stool culture collected unless they are already known to be MBL-colonised themselves.
- Awareness of all patients colonised with MBL-producing bacteria assists the prevention of transmission to at-risk patients.<sup>8</sup>

## 7 Outpatient Clinic

In outpatient clinics where vulnerable children are regularly seen (e.g. OTC, Renal and Liver Clinics), all patients who are positive for MBL-producing bacteria must be seen as in a designated area. Infection Control precautions must be followed as outlined throughout this policy.

In general outpatient clinics (e.g. fracture clinic) careful standard precautions are adequate.

## 8 Bear Cottage

It is impractical to implement contact precautions in this setting. Meticulous adherence to standard precautions (particularly hand hygiene) is advised, as well as careful room cleaning daily and after discharge.

## 9 Day Stay

All patients who are positive for MBL must be seen as outpatients in a designated area. Infection Control precautions must be followed as outlined throughout this policy.

## 10 Neonatal Emergency Transport Service (NETS)

- Contact and additional precautions apply: Wear long-sleeved isolation gown and non-sterile gloves.

- Infection Control or the receiving institution must be notified of admission or transfer or a child with MBL.
- The receiving ED or unit should be advised of the child's MBL status as soon as possible – ideally prior to arrival – to enable appropriate placement
- Equipment should be cleaned with Viraclean or Virex prior to use on another patient.
- Following transfer, the area(s) occupied by the patient, must be “cleaned as per ‘Special Purpose Cleaning Work Procedure 5.12’

## 11 Long Stay Units

Children with MBL-producing bacteria should not be accommodated in the long stay units.

## 12 Other Departments for Diagnostic Tests

- The receiving department must be notified in advance of the patient's positive MBL-producing bacteria status.
- Porters must wear single use long sleeved isolation gown and gloves when transporting patients. Parents or carers accompanying the child must wear a clean single use long sleeved isolation gown. These must be removed and discarded when the patient contact has finished.
- Wash hands following removal of gown and gloves.
- All surfaces such as the chair and x-ray table used by the patient must be cleaned as per section 8 of this policy following completion of the test. The cleaning must be attended before the equipment is use for another patient.

## 13 Operating Theatres

- The operating theatre suite must be notified in advance of the patient's MBL-producing bacteria status.
- Porters must wear single use long sleeved isolation gown and gloves when transporting patients. Parents or Carer's accompanying the child must wear a clean single use long sleeved isolation gown. These must be removed and discarded when the patient contact has finished.
- Wash hands following removal of gown and gloves.
- All surfaces such as the bed and theatre table used by the patient must be cleaned as per section 6 of the [Infection Control: Standard and Transmission Based Precautions for Operating Suite policy](#). The cleaning must be attended before the equipment is use for another patient.

## 14 Patient Activity Outside Room

- The child can use the outside areas in the hospital grounds.
- The child cannot visit the common food outlet areas.
- The child cannot visit the Starlight Room.
- The child cannot attend the schoolroom.
- The child cannot visit other inpatients.
- Activities and school can be organised in the room.
- All other activities must be negotiated with Infection Control.

## 15 Room Cleaning Requirements

- Daily cleaning as per the Cleaning Services policy.
- MBL-producing bacteria can extensively contaminate the environment therefore cleaning must be of the highest standard.
- It is advisable to clean the patient room last to accommodate efficient work practice.
- Clean with detergent and water; disinfect by wiping over surfaces with Viraclean or Virex.
- Cleaning must include all surfaces that the patient comes in contact with, paying particular attention to the bed, commodes, chairs, hoists, toilets, hand basins, door handles, bed rails, taps, telephones, and call bells.
- Dedicated cleaning equipment is required. Cleaning cloths and mop heads should not be used elsewhere and after use are subject to normal laundry procedure.

## 16 Linen and Waste

Used linen and waste should be managed as per Standard Precautions. Linen and waste bags should be removed from the room and taken directly to the collection area.

## 17 Pathology Specimens

Pathology personnel must comply with Standard, Contact and Additional Precautions when entering and leaving the room. Seal specimen receptacles correctly and label accurately. Place specimen and pathology form into a plastic biohazard specimen bag for transport. Tourniquet is to be cleaned before use on any other patient (may be left in room for the duration of patient stay and then cleaned or discarded).

## 18 Food Services

The combination of hot water and detergent in a dishwasher is sufficient to decontaminate eating utensils.

Used eating utensils should be sent directly to the Food Services department.

## 19 Occupational Therapy

Occupational therapists and play therapists are required to wear long sleeve isolation gowns and non-sterile gloves when in the child's room. All equipment used for the session with the child must be cleaned with Virex or wiped over with Alcohol wipes before the equipment is used for other sessions.

## 20 Clearing a Patient of MBL-producing bacteria

No guidelines currently exist for determining if a patient is clear of MBL-producing bacteria. Laboratory tests are imperfect and may miss low-level carriage. Colonisation with MBL-producing bacteria can persist for many months or even years

## 21 Patient and Family Education

Education and support for the patient and relatives is fundamental to the compliance and understanding of the management of MBL-producing bacteria. For more information refer to:

***Information for Patient / Relative Fact Sheet:***

[http://chw.schn.health.nsw.gov.au/ou/infection\\_control/resources/factsheets/parents/metallo-beta-lactamase.pdf](http://chw.schn.health.nsw.gov.au/ou/infection_control/resources/factsheets/parents/metallo-beta-lactamase.pdf)

## 22 Staff Precautions

Contact and Additional Precautions must be implemented at all times. Staff can look after other children if required. For more information refer to:

***Information for Staff Fact Sheet:***

[http://chw.schn.health.nsw.gov.au/ou/infection\\_control/resources/factsheets/staff/metallo-beta-lactamases.pdf](http://chw.schn.health.nsw.gov.au/ou/infection_control/resources/factsheets/staff/metallo-beta-lactamases.pdf)

## 23 Cleaning of Room and Bathroom After Discharge

- Cleaning procedures are as per Cleaning Services Infectious Cleaning.
- Discard all pre-sterile consumable items, on discharge only.
- Equipment normally processed in CSSD should be placed in the Ward CSSD container for return to CSSD.
- Items for personal hygiene used by the patient are to be discarded.
- All surfaces, patient equipment, doorknobs, tap handles, curtains and electronic devices, etc must be included in the cleaning of the room / environment.
- Bed curtains must be changed if soiled and toilet brush should be discarded.
- The room, bathroom and all patient care equipment inside the room must be quarantined until the area is cleaned.
- Following cleaning an inspection of the room will be undertaken by Infection Control Staff.

## 24 Discharge of Patient from Hospital

Discussion should take place before discharge to ensure the patient and family is fully informed about MBL-producing bacteria. The patient should be requested to alert staff of MBL-producing bacteria status if admitted to another health care facility.

## 25 Emergency Department

### 25.1 Identifying a patient with MBL-producing bacteria

- An 'Infection Risk Flag' is in place on patients identified with a multi-resistant organism (MRO).
- This manifests as an '**L**' in the Powerchart and this pulled into Health-e-care. This child **must be placed in one of the single rooms.**
- **Contact and additional precautions apply:** Wear long-sleeved gown and non-sterile gloves
- Infection Control **must** be notified if the child is to be admitted.
- Contact Precautions are to be instigated immediately following identification of a patient with MBL-producing bacteria.

## 25.2 Patient placement

- Requires a dedicated room (or cohort room with other patients who have MBL-producing bacteria)
- Ensure the child has a dedicated pan and or bottle.
- Contact and Additional Precautions are to be implemented immediately.
- Depending on the patient's clinical status, the most senior doctor on duty is to negotiate with the admitting team for the patient to be transferred directly to ward for admission or assessed / admitted in ED. Advise Bed Management / AHNM of bed requirements as soon as known. Priority for appropriate bed placement is to be given to the patient with MBL-producing bacteria. Remove all non-essential equipment and sterile consumables and equipment from the room.
- Equipment must be dedicated for the sole purpose of the patient.
- Equipment should be left in the room for the duration of the patients stay.
- Equipment should be cleaned with Viraclean or Virex prior to use on another patient.
- Following discharge from the Emergency Department the room occupied by the patient, including the Resuscitation room / treatment room must be cleaned as per 'Special Purpose Cleaning Work Procedure 5.12'

## 25.3 Patients who require immediate attention

Patients who require immediate attention (for example: resuscitation / cardiac monitoring / joint reduction) are to be managed in the most appropriate area of ED to allow for their clinical care. However, the implementation of Contact and Additional Precautions must occur. Following stabilization, the patient must be admitted to a ward as a priority or transferred to a single room within the ED and cared for as above.

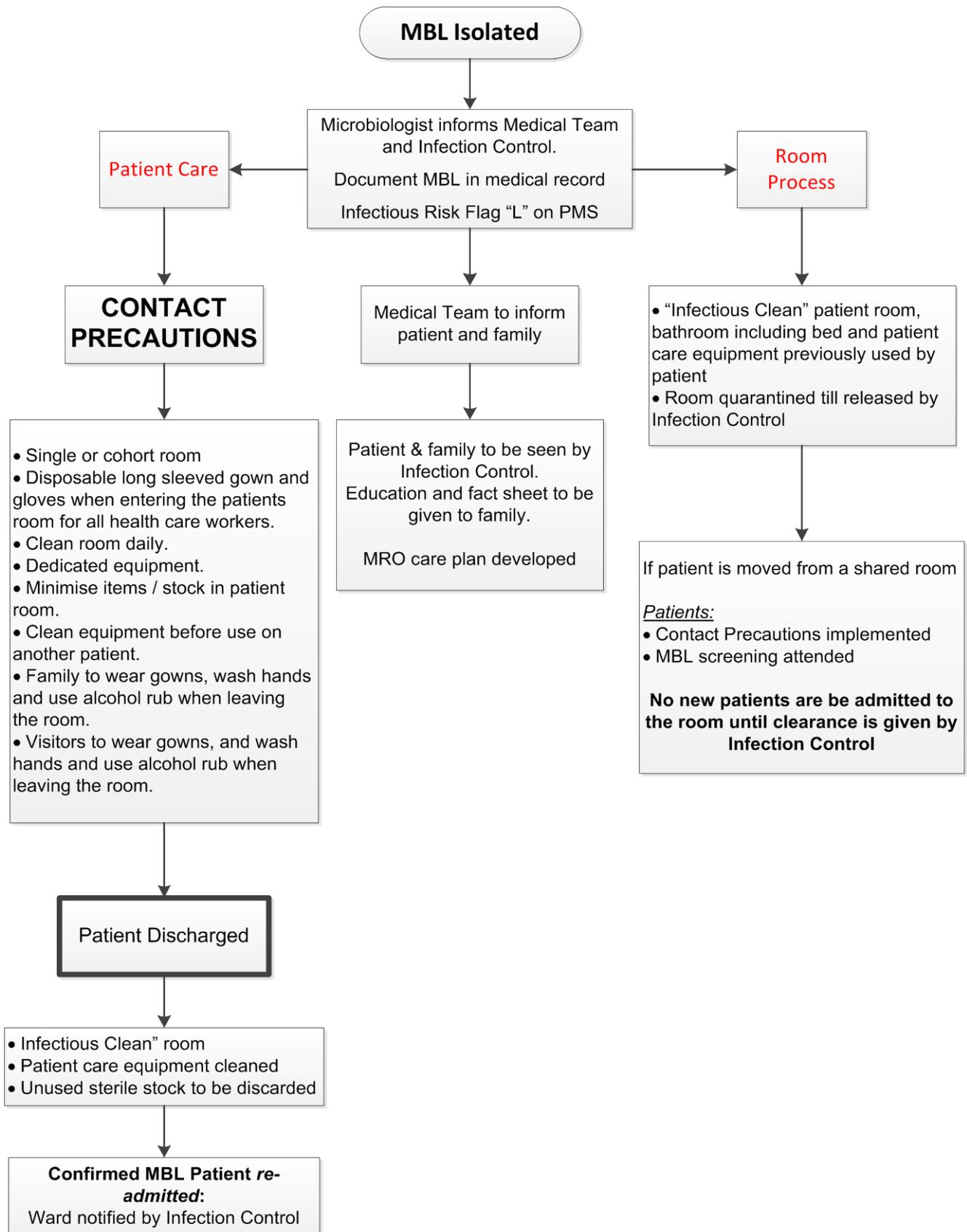
Advise Bed Management / AHNM of bed requirements as soon as known.

## 26 Broad Spectrum Antibiotic Use

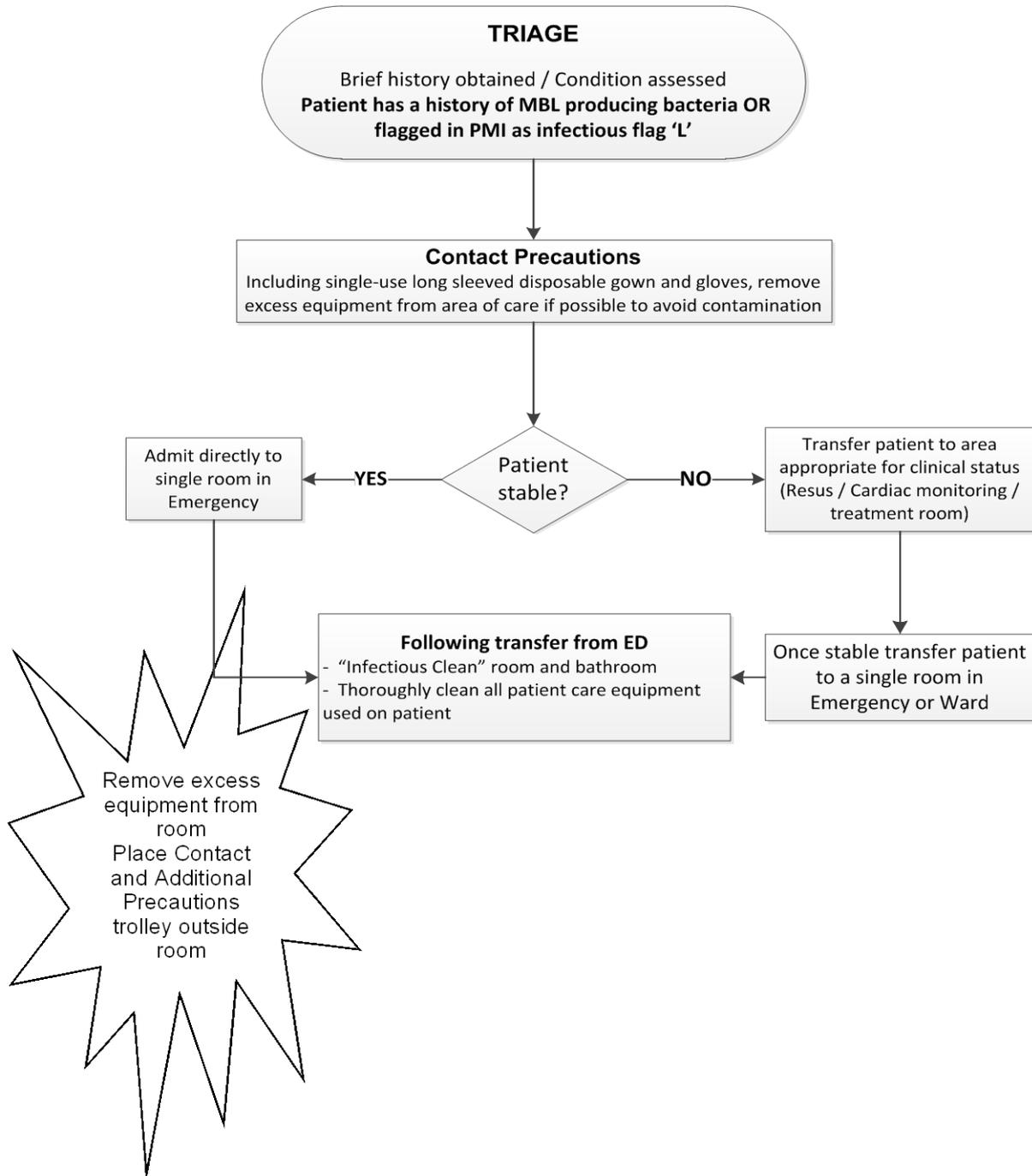
Broad spectrum antibiotic use, particularly advanced generation cephalosporins such as cefotaxime and ceftriaxone, have consistently been reported as risk factors for infection and colonisation with multiresistant bacteria 1, 2, 3 and will certainly increase the colonisation-density and likelihood of transmission of these organisms by carriers. Narrow spectrum antibiotics (particularly penicillins) should therefore be used as alternatives wherever possible. Most broad spectrum antibiotics are restricted agents under the CHW [Antimicrobial Stewardship policy](#) and therefore require prior approval or registration within 24 hours of commencement.

Antibiotic advice is always available from the Infectious Diseases or Microbiology consultant on-call, or the Infectious Diseases registrar during normal work hours.

## 27 Flowchart 1: Ward Management of MBL-producing bacteria



## 28 Flowchart 2: ED Management of MBL-producing bacteria



## 29 Glossary and References

### Glossary

**Colonisation:** The presence of an organism in the body without symptoms or clinical manifestations of illness or infection

**Infection:** Is characterised by a condition in which organisms capable of causing disease enter the body and elicit a response from the host's immune defences.

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