Healthcare associated Multidrug-resistant Organism (MRO) Surveillance

The MRO surveillance indicators are targeted at important antibiotic-resistant organisms that can spread amongst patients within hospitals and can cause invasive infections that are difficult to treat.

Case definition

Data are collected on the new acquisition of healthcare associated infection or colonisation due to one of the following targeted organisms:

Vancomycin-resistant enterococci (VRE)
E. faecalis or *E. faecium* reported resistant to vancomycin.

Methicillin-resistant *Staphylococcus aureus* (MRSA)
Staphylococcus aureus reported resistant to oxacillin or cefoxitin.

Vancomycin-intermediate *Staphylococcus aureus* (VISA or hVISA)
Staphylococcus aureus with reduced susceptibility to vancomycin.

Vancomycin-resistant *Staphylococcus aureus* (VRSA)
Staphylococcus aureus reported resistant to vancomycin.

Extended spectrum beta-lactamase producers (ESBL)
Gram-negative organism (e.g. *E.coli*, *Klebsiella* spp., *Enterobacter* spp.) in which a transmissible ESBL enzyme has been reported.

Plasmid-mediated AmpC beta-lactamase producers (AMPC)
Gram-negative organism in which laboratory detection of plasmid-mediated AmpC has been reported

Multidrug-resistant *Pseudomonas aeruginosa* (MRPAER)
P. aeruginosa resistant to at least one antibiotic from 2 or more classes out of the following 3 groups:

- aminoglycosides (e.g. gentamicin, tobramycin)
- fluoroquinolones (e.g. ciprofloxacin, norfloxacin)
- beta-lactams (e.g. piperacillin, ticarcillin, ceftazidime, cefipime, meropenem[+])

NOTE:
Include results reported with intermediate resistance.

Exclude **MRPAER** isolates from cystic fibrosis patients and *Pseudomonas* species other than *P. aeruginosa*.

[+] If resistance to carbapenems is detected, record as **CRPAER** and if this resistance is detected via a plasmid-mediated carbapenemase, record the type identified (e.g. GES, VIM) under *Resist "Other" details*.

Multidrug-resistant *Acinetobacter baumannii* (MRAB)

A. baumannii resistant to at least one antibiotic from 2 or more classes out of the following 3 groups:

- aminoglycosides (e.g. gentamicin, tobramycin)
- fluoroquinolones (e.g. ciprofloxacin, norfloxacin)
- carbapenems (e.g. meropenem, imipenem, ertapenem)

NOTE:

Acinetobacter species are naturally resistant to the following beta-lactams: penicillins, cefazolin/cephalexin and ceftriaxone

Include results reported with intermediate resistance.

⁺ If resistance to carbapenems is detected, record as **CRAB** and if this resistance is detected via a plasmid-mediated carbapenemase, record the type identified (e.g. IMP, OXA) under *Resist "Other" details.*

Carbapenem-resistant Enterobacterales and Acinetobacter species (CRGNB)

Enterobacterales (e.g. *E.coli*, *Enterobacter* spp., *Klebsiella* spp., *Proteus* spp.) or *Acinetobacter* spp. reported as resistant to carbapenems.

Record full identification (i.e. genus and species) and document the resistance mechanism under *Resist "Other" details* ^

1. Plasmid mediated (carbapenemase enzymes):

   - ***Klebsiella pneumoniae* carbapenemase (KPC)***
     Gram-negative organism* in which laboratory detection of KPC has been reported
   - **Metallo-beta-lactamase producers (MBL)**
     Gram-negative organism in which laboratory detection of MBL has been reported
     e.g. New Delhi MBL (**NDM**), Verona integron-encoded MBL (**VIM**),
     Imipenemase (**IMP**)
   - **Oxacillinase (OXA)**
     Gram-negative organism in which laboratory detection of OXA has been reported
   - **Guiana extended-spectrum *β*-lactamases (GES)**
     Gram-negative organism in which laboratory detection of GES has been reported

2. Non-plasmid mediated

   If carbapenemase is not detected, record the resistance mechanism as "non-plasmid"

NOTE:

^Resistance to carbapenems may be due to either plasmid mediated enzymes (carbapenemase) or other mechanisms other than transmissible enzymes.

*Although *K. pneumoniae* remains the most prevalent organism carrying KPC, the enzyme has been identified in several other Gram-negative organisms.

Episode / Case attributes

Acquisition Count

Total number of new healthcare associated MRO acquisitions for the surveillance period. Record separately for MRSA, VRE and all other MRO combined.

- Include all patients who became colonised or infected for the first time in your facility during the surveillance period, where the event was classified as healthcare associated (see below).
- Patients transferred to another facility and found to be positive for an MRO on admission are included in the discharging hospital's statistics.

Infection (Morbidity) Count

Total number of new healthcare associated MRO infections for the surveillance period. Record separately for MRSA, VRE and all other MRO combined.

- Include patients who are known to be colonised and then develop a new healthcare associated infection with the same MRO.
- Count only one infection episode in the surveillance period for each patient.

NOTE: Ensure it is not an on-going infection recorded in a previous surveillance period

Definition of Infection

Isolates from specimens that are sterile (obtained by aseptic technique) are almost always considered significant, whereas isolates from non-sterile specimens cannot always be attributed to infection and may require clinical judgement to determine if an infection is present.

- A *sterile site infection* – blood culture, CSF, aspirate from a normally sterile body cavity (e.g. peritoneum, pleural or pericardial space) or a tissue sample collected by aseptic means (biopsy)
- A *non-sterile site infection* - wound swab, drain fluid, urine, sputum where the identified MRO was treated (including an intent to treat) with antibiotic therapy by a clinician.

Place of Acquisition

Healthcare associated

The episode is considered healthcare associated if the relevant specimen was collected:

- greater than 48 hours after admission/delivery at your facility and was not present or incubating on admission*, **or**
- within 48 hours of discharge/transfer, **or**
- the episode is epidemiologically linked to a previous admission/intervention at your facility (e.g. within one month of discharge and there is no evidence to link the isolate to another healthcare facility or intervention).

NOTE:

*Present or incubating on admission means there is *documented* clinical, radiological or laboratory evidence of related infection on admission and there is *no evidence* of a link to a medical procedure and/or prior admission. If there is any uncertainty, then the episode should be classified as an HAI.

If MRO identification was a direct result of an admission, intervention or procedure undertaken at another institution, the episode should be included in the statistics of the hospital responsible for the event (e.g. Patient had surgery at Hospital A and was discharged. Patient admitted to Hospital B with a MRO wound infection. Hospital B should advise Hospital A of the infection and the episode is included in Hospital A numbers.)

ICU Associated

(AICU=Adult, PICU=Paediatric, or NICU= Neonatal Intensive Care Units)

- The episode occurs > 48 hours after ICU admission, or
- within 48 hours of ICU discharge.

Burden

The MRO burden is defined as the number of patients with a MRO colonisation/infection that have been discharged from your facility during the surveillance period.
Record individual counts for MRSA, VRE and all other MROs combined in the summary table of the surveillance reporting form (SRF).

- Include all infected or colonised patients on MRO precautions – new acquisitions and those admitted with a previously recorded history of MRO.
- Patients discharged, readmitted and discharged again during the surveillance period are counted twice.
- It is not necessary to have a positive culture during the admission.
- Exclude same-day patients.

NOTE:
Burden is recorded as a summary figure for reporting. Patient details are not included in the **Patient Detail** table unless they also fulfil criteria for a new acquisition or infection during the surveillance period.

	MRSA	VRE	OTHER MRO
BURDEN			
ACQUISITION			
MORBIDITY			

Hierarchy of reporting

When a *new infection* is isolated from a sterile site (e.g. blood, CSF) and is also identified in a non-sterile site (e.g. wound, urine, sputum) during the same surveillance period, the sterile site episode takes precedence and is the reported event.

For example, the below records should be reported…

MRN or Postcode	Gender	Date of Birth	Date of Collection	ICU / Non-ICU	Lab Name	Specimen No.	Organism	Resist. code	Resist "Other" details	Specimen Site	Sterile/ Non-Sterile	Col / Inf	New / Known
123456	M	01/01/1990	07/03/2014	Non-ICU	SAPATH		E. COLI	ESBL		URINE	Non-Sterile	I	NEW
123456	M	01/01/1990	10/03/2014	Non-ICU	SAPATH		E. COLI	ESBL		BLOOD CULTURE	Sterile	I	KNOWN

…as a single record as we only count one infection per surveillance period.

MRN or Postcode	Gender	Date of Birth	Date of Collection	ICU / Non-ICU	Lab Name	Specimen No.	Organism	Resist. code	Resist "Other" details	Specimen Site	Sterile/ Non-Sterile	Col / Inf	New / Known
123456	M	01/01/1990	10/03/2014	Non-ICU	SAPATH		E. COLI	ESBL		BLOOD CULTURE	Sterile	I	NEW

If the non-sterile site episode is either a colonisation and the collection date was prior to the sterile site episode, or the non-sterile site episode occurred in a previous surveillance period then it remains included in the numerator for the relevant surveillance period.

For example, the below case would be reported as two records

MRN or Postcode	Gender	Date of Birth	Date of Collection	ICU / Non-ICU	Lab Name	Specimen No.	Organism	Resist. code	Resist "Other" details	Specimen Site	Sterile/ Non-Sterile	Col / Inf	New / Known
123456	M	01/01/1990	07/03/2014	Non-ICU	SAPATH		E. COLI	ESBL		URINE	Non-Sterile	C	NEW
123456	M	01/01/1990	10/03/2014	Non-ICU	SAPATH		E. COLI	ESBL		BLOOD CULTURE	Sterile	I	KNOWN

QA NOTES:
If a MRO is isolated from a blood culture which has been classified as contaminant it should not be reported in the MRO or BSI surveillance data. Consideration should be given to screening the patient for MRO carriage.

Ensure each reported MRO bacteraemia has a corresponding episode documented in the BSI data for the relevant surveillance period.

Do not include details for on-going colonisation episodes from previously identified patients (i.e. Colonised / Infected = **Colonised** and New / Known = **Known**).

Resistance Codes

CODE	Description
AMPC	Plasmid-mediated AmpC beta-lactamase producer
CRAB	Multidrug-resistant *Acinetobacter baumannii* with resistance to carbapenems
CRGNB	Carbapenem-resistant Enterobacterales and *Acinetobacter* species
CRPAER	Multidrug-resistant *Pseudomonas aeruginosa* with resistance to carbapenems
ESBL	Extended spectrum beta-lactamase producer
MRAB	Multidrug-resistant *Acinetobacter baumannii*
MRPAER	Multidrug-resistant *Pseudomonas aeruginosa*
MRSA	Methicillin-resistant *Staphylococcus aureus*
VISA/VRSA	*Staphylococcus aureus* with reduced susceptibility or resistance to vancomycin
VRE Van A	Vancomycin-resistant enterococci Van A (*E. faecalis* or *E. faecium)*
VRE Van B	Vancomycin-resistant enterococci Van B (*E. faecalis* or *E. faecium)*
Other	For identification of new isolates of significance

For further information on infection definitions:

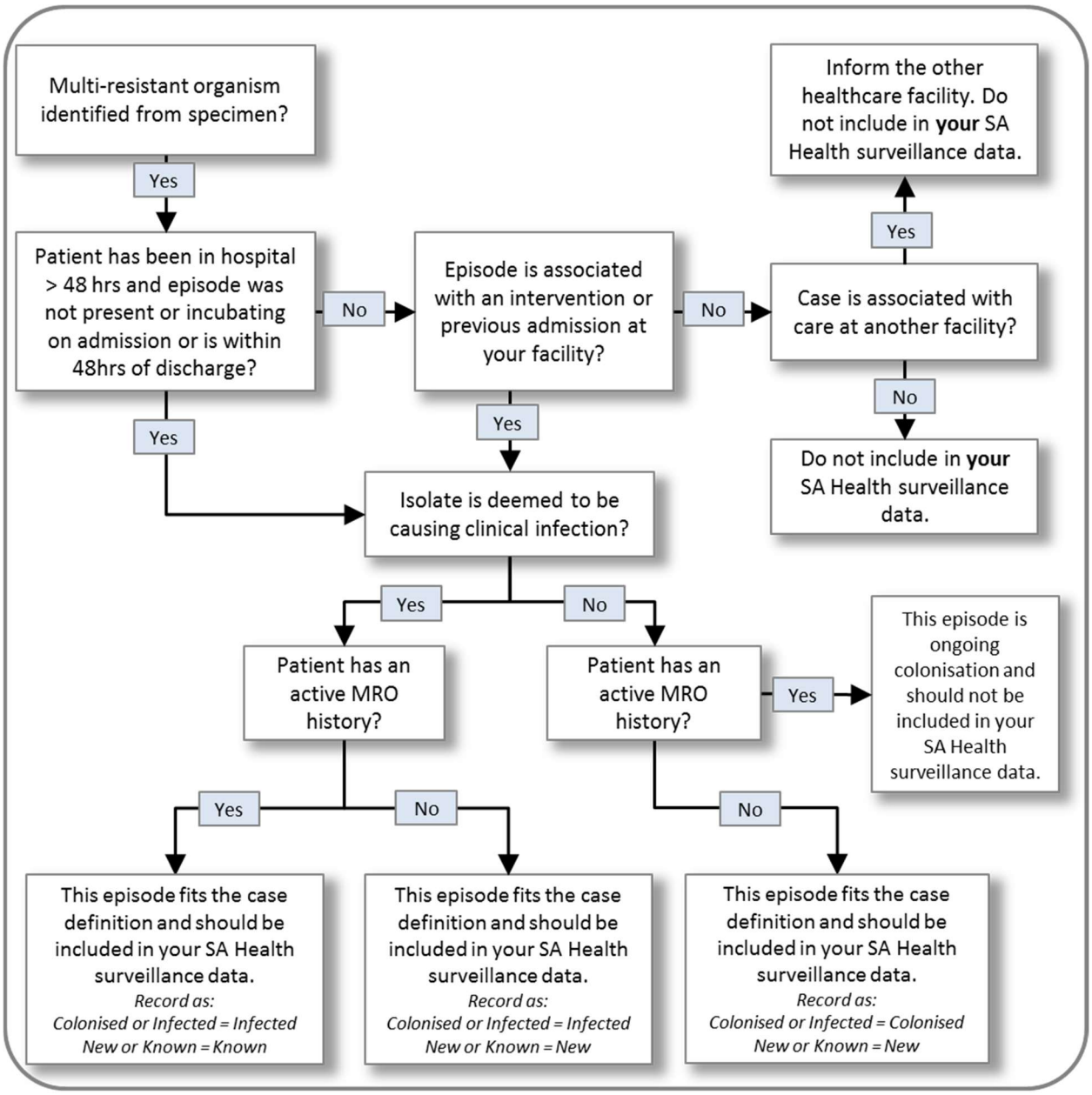
Centers for Disease Control and Prevention (CDC) / National Healthcare Safety Network (NHSN) definitions for specific type of infections are available under “supporting materials” from: http://www.cdc.gov/nhsn/acute-care-hospital/cdiff-mrsa/index.html

Data Element Table

The data specification table is intended to support standardised provision of MRO surveillance data by assisting with the application of definitions and identification of the minimum data requirements.

Field Name	Description	Details
UR or Postcode	Unique record identification number	• This is the patient's medical record number (MRN) or postcode for Private hospitals that do not supply MRN • Mandatory field, cannot be null
Gender	Sex of the patient	• Mandatory field, cannot be null
Date of Birth	The patients full year of birth, including day and month	• If date of birth is not known or cannot be provided, provision of a generic estimate is acceptable (the first day of the appropriate month or 01/01/ of the appropriate year. • Format date as dd/mm/yyyy • Mandatory field, cannot be null
Specimen Date	Identifies the date the specimen was taken	• Format date as dd/mm/yyyy • Must be within the reporting month • Mandatory field, cannot be null
ICU Status	Identifies if the specimen was taken in an Intensive Care Unit or a Non Intensive Care Unit i.e. ward	• Record as: AICU = Adult ICU PICU = Paediatric ICU NICU = Neonatal ICU Non-ICU = for all other ward locations • Mandatory field, cannot be null
LAB Name	Identifies the laboratory organisation that processed the specimen	• Mandatory field, cannot be null • If unavailable record N/A
Specimen Number	Positive specimen's unique identification number	• Identifier allocated by the laboratory to the pathology result • Mandatory field, cannot be null • If unavailable record N/A
Organism	Record organism associated with the antibiotic resistance	• For VRE, ensure species (faecium or faecalis) is recorded • Mandatory field, cannot be null
Resistance Code	Record the code that identifies the type of resistance	• Record corresponding code from the *"Resistance Codes"* table. • Mandatory field, cannot be null
Resistance Code "Other"	Initially used for identification of new isolates of significance	• For plasmid mediated CRGNB, CRPAER or CRAB record resistance mechanism (e.g. MBL, OXA) • Mandatory if *"Resistance Code" = Other* or Resistance code = CRGNB, CRPAER or CRAB
Specimen Site	The site of the specimen (e.g. Blood, Urine, leg wound or screening etc.)	• "Screening" only applies to specimens specifically collected for identification of an MRO • Mandatory field, cannot be null
Sterile / Non-sterile	Indicates whether the specimen was taken from a sterile or non-sterile site	• Record sterile status according to the rules set out under "Specimen classification" • Mandatory field, cannot be null
Colonised / Infected	Indicates if the episode is an infection or colonisation	• Document infection status according to the rules set out under "Episode/Case attributes" • Mandatory field, cannot be null • Record as I or C
New / Known	Identifies whether the episode is a first isolation or an infection in a previously colonised patient	• Record acquisition status according to the rules set out under "Episode/Case attributes" • Mandatory field, cannot be null
Comment	Record any other relevant information here	
Acquisition Ward	Patient's ward at time of acquisition	• Institution specific ward names are acceptable and are automatically assigned to ward groups on load to the database.
Acquisition Clinical Unit	Patient's Clinical Unit at time of acquisition	• Institution specific clinical names are acceptable and are automatically assigned to clinical unit groups on load to the database.

Flow Chart



For more information

Infection Control Service
Communicable Disease Control Branch
Telephone: 1300 232 272
www.sahealth.sa.gov.au/infectionprevention

Public-I1-A2

Government of South Australia
SA Health

Multidrug-resistant Organism (MRO) Infection Surveillance

The following table provides a guide to the interpretation and recording of multidrug-resistant organisms/specimens for surveillance purposes only.

SINGLE LAB RESULT DETAILS			CLASSIFICATION FOR ICS SURVEILLANCE – (column labels)			
Organism	**RESIST#**		**Organism**	**Resistance**	**"Other" resistance***	**Comment**
Org 1. *S. aureus* Org 2. *E. faecium*	MRSA VRE		*S. aureus* *E. faecium*	MRSA VRE		Report as 2 records Different organisms Different resistance mechanisms
Org 1. *E. coli*	NDM		*E. coli*	CRGNB	NDM	
Org 1. *E. coli* {	ESBL		*E. coli*	ESBL		Report as 4 records
	AmpC		*E. coli*	AmpC		*E.coli* x 3 resistance mechanisms
	NDM		*E. coli*	CRGNB	NDM	*K.pneumoniae* x 1 resistance mechanism
Org 2. *K. pneumoniae*	IMI		*K. pneumoniae*	CRGNB	IMI	
Org 1. *P. aeruginosa* Lab result comment: "This organism produces a metallo-beta-lactamase or carbapenemase that inactivates all penicillins, caphalosporins and carbapenems"	Amikacin Colistin Gentamicin Tobramycin Pip/Taz Ciproflox Ceftazidime Meropenem Cefepime	R S R R R R R R R	*P. aeruginosa*	CRPAER	Plasmid mediated	This generic lab comment does not identify the resistance mechanism; exact details should be specified elsewhere on the lab report. If no other resistance mechanism is documented, record as "Plasmid-mediated"
Org 1. *P. aeruginosa*	Amikacin Colistin Gentamicin Tobramycin Pip/Taz Ciproflox Ceftazidime Meropenem Cefepime	R S R R R R R S R	*P. aeruginosa*	MRPAER		*P. aeruginosa* sensitive to carbapenems should be recorded as MRPAER
Org 1. *A. baumannii* "This organism produces a metallo-beta-lactamase (MBL) or other carbapenemase. Org 2. *K. pneumoniae* "This organism produces a metallo-beta-lactamase (MBL) or other carbapenemase	KPC OXA-23		*A. baumannii* *K. pneumoniae*	CRAB CRGNB	KPC OXA	Report as 2 records Different organisms Different resistance mechanisms

*Use the *Resist "Other" details* column on the surveillance reporting form to record resistance mechanisms.