



Government of **Western Australia**
Department of **Health**

Micro-alert Codes Utilised in Western Australian Public Healthcare Facilities

Information for Infection Prevention and Control Staff

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Reviewed by Micro-alert Governance Group

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Introduction

Multi-resistant organisms (MROs) are microorganisms, including bacteria and fungi that have developed resistance to multiple classes of antimicrobials. They pose a serious threat to public health worldwide. In healthcare facilities (HCF), MROs are associated with increased morbidity and mortality in vulnerable patients who may acquire a healthcare associated infection (HAIs) with an MRO that will have limited treatment options. MROs can spread readily in HCFs due to the exposure of a high-density, high-acuity patient population to extensive antimicrobial use, frequent contact with healthcare workers (HCW) and contamination of the environment ¹.

Patients may be infected or colonised i.e. have asymptomatic carriage with an MRO and both are a potential source of transmission to other patients. If the MRO status of a patient is known prior to, or during a hospital admission, there are measures that can be taken by HCWs to prevent transmission, reduce the risk of an infection developing in that patient.

The assignment of micro-alerts on the patient administration system in Western Australian (WA) HCFs commenced in 1981 to enable the MRO status of persons, or their contacts, to be known to relevant HCWs during their admission and therefore ensure appropriate infection prevention strategies were implemented. In recent years the use of the micro-alert as a clinical flag, to ensure appropriate antimicrobial prescribing when required, has been promoted. The current PAS used in public HCFs is a *Web-based Patient Administration System known as WebPAS*.

MROs of relevance for micro-alerting are: *Candida auris* (*C. auris*), carbapenem-resistant *Enterobacteriaceae* (CRE), methicillin-resistant *Staphylococcus aureus* (MRSA); multi-resistant Gram-negative bacteria (MRGNB) and vancomycin-resistant enterococci (VRE).

The purpose of this document is to provide information about the use of micro-alerts for infection prevention and control (IP&C) staff.

At no time shall a patient's micro-alert status interfere with the admission, transfer or provision of healthcare in any WA HCF.

Governance

- The Western Australian Multi-resistant Organism (WAMRO) Expert Advisory Group (EAG) provides advice on the state-wide response to MROs. This group also identifies the MROs that require a micro-alert and endorses over-arching policy and guidelines for the management of these MROs.
- Factors considered by WAMRO in deciding which MROs require a micro-alert include those that are associated with a demonstrated increase in transmissibility within and between HCFs; increased virulence and/or adverse outcomes, specific antimicrobial resistance profiles, and the emergence of new MROs.
- The Micro-alert Governance (MAG) group is a sub-group of WAMRO that provides advice on the administration and functionality of micro-alerts on WebPAS to ensure the requirements of WAMRO and users of the system are met.
- The Healthcare Associated Infection Unit (HAIU) is the administrative arm for both WAMRO and MAG, and ensures any enhancements or request for changes to micro-alerts are discussed with key stakeholders prior to any changes being made to WebPAS by Health Support Services (HSS).
- HCFs are to report issues with the administration of micro-alerts, or requests for enhancements, to the HAIU hiswa@health.wa.gov.au.

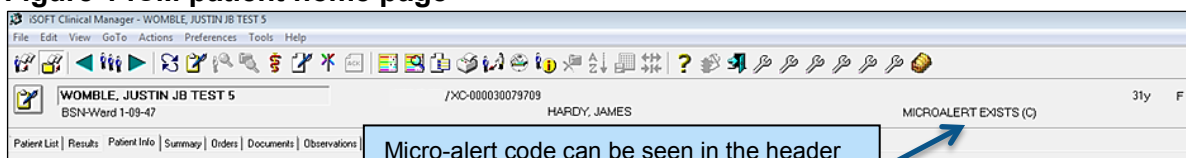
1. Access to micro-alert function

- Personnel are required to apply for personal access to WebPAS by completing an Access Request System form (eHFN-030).
- WebPAS coordinators are appointed for each Health Service Provider (HSP) and they implement a 'no train no access' policy. Training is available by PAS technical support teams and on-line packages. Types of access are :
 - *view only* access: the micro-alert status of patients can be viewed but unable to add or clear micro-alerts
 - *full* access: able to add and clear micro-alerts.
- Full access to WebPAS for micro-alerts is restricted to IP&C teams and designated medical scientists / laboratory staff.
- Administrative staff do not add or clear micro-alerts unless there are exceptional circumstances and only under the direction of IP&C staff, clinical microbiologists and /or infectious diseases physicians.

2. Description

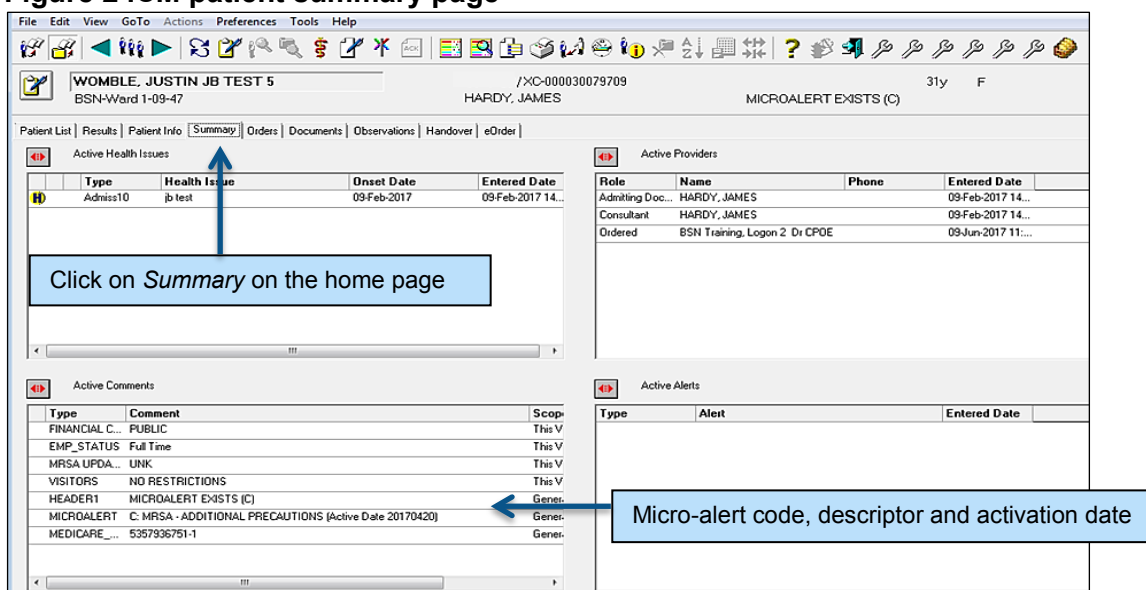
- Micro-alerts are accessed and viewed through WebPAS. This patient administration system is a database that contains the names, unique medical record numbers (UMRN) and admission/discharge information of patients presenting at public HCFs.
- Micro-alerts are assigned on WebPAS by the electronic tagging of the patient's UMRN with a MRO specific code for those people who have been identified as MRO-positive (infection or colonisation) and their contacts (Refer to Section 3 and Appendix 1).
- Private HCFs cannot access the public WebPAS but generally have their own internal micro-alert systems.
- Micro-alert data stored on WebPAS includes: the micro-alert code, a descriptor and the date the micro-alert was activated and cleared (if relevant). On WebPAS the name of the HCF initiating the alert will be shown.
- The micro-alerts placed on WebPAS can also be viewed on patient labels printed for medical records and they feed downstream into the iSOFT Clinical Manager (iCM) system allowing all HCWs providing clinical care to view the micro-alert code of a patient on iCM at any time. The code can be viewed on both the home and summary pages (refer to Figures 1 and 2. NB: fictitious data used).

Figure 1 iCM patient home page



Note: if a patient has a medical alert, the micro-alert code(s) may not be visible in the header and will read *Micro-alert exists*. The code and activation date can be viewed on the 'summary page'.

Figure 2 iCM patient summary page



3. Micro-alert codes

- The micro-alert codes and management of MROs are described in the WA Department of Health MRO policies (Refer to Table 1).
- MRO specific codes and the descriptor on WebPAS are summarised in Appendix 1.

3.1 Global codes

- Global micro-alert codes are defined as codes that are viewed on WebPAS in all WA public HCFs.
- All positive carriers with MRSA, VRE, CRE and *C.auris* and their contacts are assigned a global micro-alert (Refer to Appendix 1).
- WebPAS is programmed to automatically remove the following codes one year after the date of activation:
 - W (MRSA contact)
 - F (VRE contact)

Note: micro-alert H (CRE contact) is excluded from the automatic removal system and will remain on the WebPAS until clearance criteria are fulfilled as per policy. Automatic clearance of micro-alert H is currently under review and may be added to the automatic removal system in the future.

3.2 Restricted code - Micro-alert Y

- Micro-alert Y has been a restricted code for MRGNB (non-CRE) since 2012. It is only assigned at King Edward Memorial Hospital (KEMH), Perth Children's Hospital (PCH) and Fiona Stanley Hospital (FSH) where neonates in high-level intensive care units are at higher-risk of a MRGNB bloodstream infection (BSI) (Refer to section 3.2). Mothers of neonates identified with MRGNB (non-CRE) are also assigned an alert due to their close contact with neonates.
- Micro-alert Y code placed at KEMH, PCH and FSH are broadcast and viewed globally on WebPAS and iCM due to the design of these systems. It is not possible to suppress this micro-alert Y at other HCFs. A patient with a micro-alert Y may present at other HCFs and therefore it is important that an explanation and information on management of MRGNB and micro-alert Y is provided in individual HCF IP&C policy.

3.3 Available codes

- These are global codes that can be activated in response to a threat from new emerging MROs.
- There are eleven codes (A, D, E, L, M, N, P, Q, R, S, T,) that are available for use. Activation of new codes will only be implemented via the HAIU following endorsement by WAMRO.

4. Reasons for micro-alert use

4.1 Infection prevention and control

The assignment of a micro-alert on WebPAS allows for early identification of patients with alerted MROs and implementation of appropriate IP&C management and patient placement to minimise transmission within HCFs. Management is outlined in WA Department of Health MRO policies (Table 1). Micro-alerts should be assigned as soon as possible, once the MRO is confirmed.

Table 1 MRO policy

MRO	Relevant state policy	Version
<i>C. auris</i>	Mandatory Policy under development	NA
CRE	Infection Prevention and Control of Carbapenem-resistant <i>Enterobacteriaceae</i> (CRE) in WA HCFs	OD 0399/12
MRSA	Infection Prevention and Control of Methicillin- resistant <i>Staphylococcus aureus</i> (MRSA) in WA HCFs	OD 0478/13
MRGNB	No state policy. Risk-assessment based management is recommended and outlined in individual HCF policy.	NA
VRE	Infection Prevention and Control of Vancomycin-resistant Enterococci in WA HCFs	OD 0646/16

These policies can be accessed from the WA Department of Health [Policy Frameworks](#) page and found within the [Public Health Framework](#).

4.2 Clinical flag

- The MRSA policy (Table 1) requires that micro-alerts are used and promoted as a clinical flag in hospitals to guide medical management and ensure appropriate antimicrobial prescribing.
- There is evidence in the published literature that patients who are colonised with MRSA are at an increased risk for developing MRSA HAIs. Knowledge of the colonisation status can be important for implementation of prevention strategies, such as, empirical antibiotic treatment of sepsis, surgical antibiotic prophylaxis, MRSA suppression or decolonisation treatment to reduce the bacterial load -especially for higher-risk procedures and patient populations e.g. cardiothoracic, orthopaedic (joint replacements), haemodialysis and intensive care units^{2,3,4}.
- A micro-alert for MRGNB aids the selection of empirical antibiotic treatment of infection in specific paediatric patient populations who are at a higher-risk for developing a BSI, e.g. pre-term neonates requiring care in higher-level neonatal intensive care units⁵.
- There is no evidence to recommend the global micro-alerting of adult patient populations who are MRGNB-positive and studies have found that this practice can adversely impact antimicrobial stewardship⁶. Studies have identified low transmission

rates of ESBL-producing *Enterobacteriaceae* (in particular *Escherichia coli*) when managed by standard precautions and a risk-assessment approach in acute hospital settings outside of outbreak situations ⁷.

5. Notification of MROs

- It is essential that IP&C staff liaise with their laboratory service provider to ensure they receive notification of all positive *C. auris*, CRE, MRSA, MRGNB and VRE isolates from specimens obtained at their HCF, including outpatient and emergency departments.
- In WA, CRE, MRSA and VRE (colonisation and infection) are notifiable conditions, via laboratory notification, under the [Public Health Act 2016](#). Public and private referring laboratories send MRSA and VRE isolates to the PathWest Gram-positive Reference Laboratory and CRE isolates to the PathWest Gram-negative Reference Laboratory for confirmation and further characterisation and molecular typing.
- In WA, *C. auris* is currently not a notifiable disease, however, due to the significance of this organism, all laboratory detections of *C. auris* are to be notified to the HAIU using the email HISWA@health.wa.gov.au
- HCFs that assign micro-alerts based on antibiotic susceptibility when the initial results are reported, i.e. prior to receiving the final typing results, need to review confirmatory typing results and modify the micro-alert on WebPAS if required.

5.1 MRSA typing results

- New MRSA cases are entered on WebPAS as a micro-alert B or C according to the following classifications reported by the PathWest Gram-positive Reference laboratory:
 - micro-alert B PVL negative (strain not identified)
 - micro-alert B PVL positive (strain identified)
 - micro-alert C (strain identified).
- The laboratory distributes the MRSA typing results (refer to Figure 3) to the referring laboratory, and also to the generic IP&C e-mail address, at the relevant HCF. It is essential that IP&C personnel ensure their e-mail address is maintained. The majority of reports are sent within four days of the MRSA isolate being received by PathWest.

Figure 3 Sample MRSA HCF report from typing laboratory

		PathWest Laboratory Medicine-WA Department of Microbiology Fiona Stanley Hospital and ACCESS Typing and Research, Curtin University				
		Results for Tuesday, 30th May 2017 for PathWest - BROOME				
EPI No.	URMN #	Name	Site	Lab No.	PVL PCR	POC
Micro-alert B, PVL negative MRSA.						

- In 2013 the assignment of a micro-alert for PVL-positive clones, with the exception of USA300 and Bengal Bay, changed from a micro-alert C to B. When patients affected by this change present to a HCF, the alerts can be changed following a review by IP&C personnel i.e. the micro-alert C can be cleared and the patient assigned a micro-alert B if no other specimens have identified a micro-alert C strain. When assigning the micro-alert B, the initial activation date or the date of the most recent micro-alert B isolate is to be used.

6. Identification of MRO contacts

- Identifying MRO contacts for screening and/or micro-alerting requires tracking the location of MRO-positive patients during an admission and identifying patients that have shared a room, bathroom or toilet with them as per definitions in the relevant MRO policy (Refer to Table 1 and Appendix 1).
- The use of WebPAS for electronic contact tracing is recommended due to the potential for multiple internal transfers of patients during an admission. WebPAS coordinators can provide further information.

7. Activation and clearance of micro-alerts

7.1 Activation

- Prior to activating an alert, it is essential that IP&C personnel ensure that the isolate is a laboratory-confirmed MRO of relevance for micro-alerting.
- The micro-alert code is assigned on WebPAS by personnel at the HCF where the specimen was identified, including from emergency and outpatient departments. PathWest provide support for adding C, G, H, J, and V alerts for MROs identified in the private sector.
- The date of collection of the first specimen that resulted in a positive MRO result (infection or colonisation) is to be recorded as the date activated.

7.2 Inactive status and clearance

- There are no criteria for use of an inactive status in the MRSA, VRE or CRE policies and there is no requirement for a micro-alert to be made inactive before a clearance date is entered. **The inactive field is not to be used.**
- Patients can be cleared of a micro-alert only when clearance criteria outlined in the relevant MRO policy is met. This applies to MRSA or VRE positive patients and contacts and CRE and *C. auris* contacts. There is no clearance policy for CRE or *C. auris* positive patients.
- The date of clearance is to be entered in the End Date (date cleared) field on the Update page in WebPAS. This will result in the micro-alert code being removed from global view on WebPAS and iCM.
 - IP&C staff can still view the history and date cleared on the *Update* page in WebPAS
 - on WebPAS the date the micro-alert is cleared will show in the *Inactive/Exp End date* field on the micro-alert home page
 - clearance history is not shown on iCM.
- Private hospitals who have obtained screening swabs for MRSA and VRE clearance or *C. auris* and CRE contact clearance can send copies of the results to hiswa@health.wa.gov.au.
- For VRE clearance refer to the VRE Clearance Protocol and Form at http://ww2.health.wa.gov.au/Articles/S_T/Tools-and-Resources

7.3 Deletions

- A micro-alert is not to be deleted unless it is entered in error e.g. wrong patient or the final laboratory results confirm the isolate is not a significant MRO that requires a micro-alert.

8. Informing patients of their MRO and micro-alert status

- Transparent management of personal information and open communication between the health service provider and health consumer are important for balancing the dual goals of providing the flow of information to HCWs who need to know and steps to meet patient privacy requirements.
- State MRO policies require that a person who is identified as MRO-positive and micro-alerted at a HCF is to receive written notification of their MRO status and provided with an information sheet on the MRO isolated.
- When a MRO contact is identified and discharged prior to notification and completion of screening it is recommended that hospitals provide written information in a letter.

9. References

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6. Rottier W, Bamberg Y, Dorego-Zetsma J, Van der Linden P, Amerlaan H et al. Predictive value of prior colonization and antibiotic use for third-generation cephalosporin-resistant *Enterobacteriaceae* bacteraemia in patients with sepsis. *CID* 2015;60 (11):1622-30.
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Appendix 1 Micro-alert codes and definitions

MRO and micro-alert code	Definition
<i>Candida auris</i>	
micro-alert J	Laboratory confirmed <i>C. auris</i>
micro-alert K - contact	Any person who has shared a patient room, bathroom or toilet facility with a known positive <i>C. auris</i> patient (infection or colonisation) within the period 28 days prior to first isolation of <i>C. auris</i> and for whom screening has not been completed prior to discharge.
Carbapenemase-resistant <i>Enterobacteriaceae</i>	
micro-alert G	Laboratory confirmed CRE with confirmed presence of a carbapenemase producing enzyme, including but not limited to, KPC, NDM, VIM, OXA and IMP. <i>KPC: Klebsiella pneumoniae carbapenemase; NDM: New Delhi metallo-β-lactamase; VIM: Verona integron-encoded metallo-β-lactamase; OXA: Oxacillinases; IMP: Imipenemase.</i>
micro-alert H - contact	Any person who has shared a patient room, bathroom or toilet facility with a CRE positive patient prior to implementation of contact precautions and for whom screening has not been completed prior to discharge.
Methicillin-resistant <i>Staphylococcus aureus</i>	
micro-alert B	Laboratory confirmed MRSA and MRSA clones with increased anti-microbial resistance and/or virulence factors, and have not demonstrated high transmissibility in hospitals. micro-alert B PVL negative clones WA community MRSA clones (not typed) micro-alert B PVL positive clones - Nomenclature (MLST-SCCmec) includes: Qld clone (ST93-IV) Western Samoan (WSPP) (ST30-IV) Taiwan CA-MRSA (ST59/952-V _T) European CA-MRSA (ST80/583/728-IV) WA-121 (ST-5-IV) WA-62 (ST-923-IV)
micro-alert C	Laboratory confirmed MRSA and MRSA clones with increased anti-microbial resistance and/or virulence factors and/or demonstrated high transmissibility in hospitals, as determined by the WAMRO Expert Advisory Group. Micro-alert C clones - Nomenclature (MLST-SCCmec) includes: EMRSA-15,16 (ST22-IV,ST36-II) Aus-2/3 (ST-239-III) New York/Japan (ST5-II) Irish-2 (ST8-VI) USA300 (ST8-IV) (PVL positive) Bengal Bay (ST772-V) (PVL-positive)
micro-alert W - contact	Any person who has shared a patient room with a micro-alert C positive patient prior to the patient having contact precautions initiated and for whom screening has not been undertaken or completed prior to discharge.

Vancomycin-resistant enterococci	
micro-alert V	Laboratory confirmed vancomycin resistant <i>Enterococcus faecalis</i> and <i>Enterococcus faecium</i> (vanA and vanB).
micro-alert F - contact	Any patient who has shared a patient room, bathroom or toilet facility with a VRE positive patient prior to implementation of contact precautions and for whom screening has not been completed prior to discharge.

Appendix 2 Abbreviations

BSI	Bloodstream infection
<i>C.auris</i>	<i>Candida auris</i>
CDCD	Communicable Disease Control Directorate
CRE	Carbapenem-resistant <i>Enterobacteriaceae</i>
ESBL	Extended spectrum beta-lactamase
FSH	Fiona Stanley Hospital
HAI	Healthcare-associated infection
HAIU	Healthcare Associated Infection Unit
HCF	Healthcare facility
HCW	Healthcare worker
HICWA	Healthcare Infection Council of Western Australia (Executive group)
HISWA	Healthcare Infection Surveillance Western Australia
HSP	Health Service Provider
HSS	Health Support Services
iCM	iSOFT Clinical Manager
IP&C	Infection prevention & control
KEMH	King Edward Memorial Hospital
MAG	Micro-alert Governance (Group)
MRGNB	Multi-resistant Gram-negative Bacteria
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
PAS	Patient Administration System(s)
PCH	Perth Children's Hospital
PVL	Panton-valentine leukocidin
VRE	Vancomycin-resistant enterococci
WA	Western Australia
WAMRO	WA Multi-Resistant Organism (Expert Advisory Group)
WebPAS	Web-based Patient Administration System

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