Panton-Valentine Leukocidin (PVL) - Meticillin sensitive *Staphylococcus aureus* (MSSA) and Meticillin Resistant *Staphylococcus aureus* (MRSA)

Investigation, control and management of patients colonised or infected with Panton-Valentine Leukocidin (PVL) - Meticillin sensitive *Staphylococcus aureus* (MSSA) and Meticillin Resistant *Staphylococcus aureus* (MRSA)

Lead Author	Jacqueline Barmanroy	Date Approved	October 2024
Version	6	Review Date	October 2027

TARGET AUDIENCE	NHSL WIDE, Acute, Health and Social Care Partnerships
PATIENT GROUP	All in patients and outpatients

Clinical Guidelines Summary

PVL is a toxin produced by some strains of *S.aureus*. The PVL gene is found in approximately 2% of laboratory isolates associated with *staphylococcal* disease. At present 60% of PVL-*S.aureus* isolates are MSSA and 40% MRSA.

The epidemiology of PVL-*S.aureus* differs from that of other *S.aureus* in that cases tend to be younger and, in the UK, associated with community settings rather than acute hospital settings.

Guideline Body

1.0 INTRODUCTION

This guideline has been developed for use in NHS Lanarkshire (NHSL) to be read in conjunction with the National Infection Prevention and Control Manual (NIPCM)-
Chapter 1: Standard Infection Control Precautions (SICPS)
Chapter 2: Transmission Based Precautions: (TBPS)
Chapter 3: Healthcare Infection Incidents, Outbreak and Data Exceedance.
Chapter 4: Infection Control I the Built Environment and Decontamination

Also refer to

- The guideline for the control and management of patients colonised or infected with Meticillin Resistant *Staphylococcus aureus* (MRSA)

2.0 AIM, PURPOSE AND OUTCOMES

- To ensure that patients receive appropriate and timely investigation, care and management in line with current national guidelines and best practice.
- To ensure that NHSL staff minimise the risks that PVL MSSA/ MRSA pose to vulnerable contacts.

3.0 SCOPE

3.1 Who are the guidelines intended to Benefit or Affect

This guideline is designed to safeguard patients, staff and the wider public from the risk of PVL MSSA/ MRSA colonisation or infection. The guideline is aimed at healthcare staff working in NHS Lanarkshire (NHSL).

3.2 Who are the Stakeholders

Patients, carers, relatives, staff and those defined within Section 5 - Roles and Responsibilities.

4.0 PRINCIPLE CONTENT

PVL is a toxin produced by some strains of *S.aureus*. The PVL gene is found in approximately 2% of laboratory isolates associated with *staphylococcal* disease. At present 60% of PVL-*S.aureus* isolates are MSSA and 40% MRSA.

The epidemiology of PVL-*S.aureus* differs from that of other *S.aureus* in that cases tend to be younger and, in the UK, associated with community settings rather than acute hospital settings

Table 1: Summary

Causative organism	Meticillin sensitive *Staphylococcus* aureus (MSSA) Meticillin resistant *Staphylococcus aureus* (MRSA)
Clinical Manifestation	Recurrent skin and soft tissue infections: • Boils, carbuncles, foliculitis, cellulitis, purulent eyelid infection • Tissue necrosis • Abscesses Invasive Infections: • Necrotising pneumonia • Necrotising fasciitis • Osteomyelitis, septic arthritis and pyomyositis • Purpura fulminans • Bacteraemia
Incubation period	Variable- N/A as per NIPCM
Period of infectivity	As long as lesions continue to drain or colonisation is evident.
Mode of transmission	**Direct & Indirect Contact:** • Contaminated items (e.g. towels) • Close contact (contact sports)
Risk Factors that aid transmission	• Crowding (e.g. closed communities) • Cuts and other compromised skin integrity
Reservoirs	• Staff • Patients • Environment
Notifiable	• Yes if PVL as per NIPCM
Population at risk	• Household and close contacts of positive patient • Contacts in social/sports settings • Closed community settings e.g. military camps, gyms, prisons • Care homes and healthcare settings (hospital wards)

4.1 Case Definitions

Definition	Criteria

Suspected Case	Any individual: • who presents with a history of recurrent boils; abscesses or necrotising pneumonia, necrotising fasciitis indicative of PVL-like infection. • where the laboratory isolates a positive *S.aureus* from an individual who presents with history stated above.
Confirmed Colonised Case	• Any individual where the laboratory isolates a positive PVL MSSA/ MRSA from an admission or elective screen.
Confirmed Infected Case	• Any individual where the laboratory isolate a positive *S.aureus* from a patient with a PVL-like infection e.g. skin and soft tissue infection, necrotising pneumonia and in which the MRSA reference Laboratory confirm PVL carriage.
Close Contact	• Contacts from a household-type setting or sexual contacts within seven days before onset of the acute infection.
High Risk Groups	• Healthcare/social care workers, teachers/childcare workers, regular gym users, participants in contact sport (e.g. rugby, judo), resident in Care Home or in-patient hospital setting, resident in closed community (e.g. prison, military camp).
Suspected Outbreak	• Two or more confirmed cases of PVL MSSA/ MRSA residing in the same household or those who have been in contact within the same healthcare setting, sports centre, or any other social/closed community setting.

4.2 Risk Assessment in Healthcare Settings

- Effective management of PVL MSSA/ MRSA depends upon assessing the risk to the individual patient and the risk that the PVL MSSA/ MRSA patient could pose to others. Advice on risk assessment can be sought from the IPCT/ HPT.
- The microbiology laboratory will inform the Infection Prevention and Control Nurse (IPCN) and if in the Community, the HPT if any suspected/confirmed cases.
- Investigation and management of cases should be undertaken using the flow chart in Appendix 1.
- Ward staff must inform the IPCN of any re-admission of patients known to be PVL MRSA positive.

Quick Reference Guide: Implement the MRSA and PVL *S.aureus* Management Guidance and Swab record. This must be reviewed and updated on a regular basis for all positive cases.

4.3 Management in Household Settings:

INFECTION PREVENTION & CONTROL MEASURES FOR HOUSEHOLD SETTINGS	
Personal Hygiene	Daily shower/bath is recommended (particularly those with eczema).
Skin Lesions	Ensure skin lesions are covered with a clean dry dressing. Change dressings regularly or when discharge seeps to the surface.
Hand Hygiene	Wash hands frequently with soap and water, especially after changing dressings or touching skin lesions.
Decolonisation of index case	• Decolonisation of PVL MSSA/ MRSA is recommended to be commenced at the same time as the treatment. • Decolonisation regimes can be found in Appendix 2
Decolonisation of close contacts	Risk assessment will be undertaken by GP/HPT to determine whether screening and/or decolonisation is required. If close contacts require decolonisation then start all contacts simultaneously.
Environmental Hygiene	• Regular household cleaning (vacuuming and damp dusting each room) – daily where possible; using routine household detergents. • Clean the sink, taps, bath and shower after use with a disposable cloth and household detergent. Discard the cloth after use. • It is important to clean shared items such as keyboards.
Laundry	Launder towels, bed linen and clothing in a hot washing cycle (60°) where possible, daily.
Personal Belongings	Do not share towels; razors; toothbrushes; face cloths etc. with anyone else within the house.

4.4 PVL MSSA/ MRSA and Healthcare Workers

- A HCW with a proven PVL- S.aureus infection should not work until the **acute infection** has **resolved and 48 hours of a five -day decolonization regimen has been completed**.
- **Enquiries** regarding PVL- S.aureus -related disease in **close contacts of the staff member** should be made, so that families can be treated simultaneously, if required.
- **Follow up screens** – Use decolonisation for 5 days à Stop for 2 full days (48 hours) à Repeat full MRSA screen until x3 negative screens 48 hours apart.
- **NB. If patient is on antimicrobial therapy do not screen until 48 hours following completion of all antibiotics.**
- Unlike HA-MRSA, staff who are found to have PVL- S.aureus are likely to have acquired the infection in the community, and hence re-colonization may occur from a close contact. Therefore, even if screens have been negative, staff should understand that they **should stop working if a further skin lesion develops**.

- **If, despite two courses of decolonisation treatment**, a staff member remains a **carrier**, they should be able to continue work providing **they are not implicated in hospital transmission of PVL-S aureus infection** and they **cease working** as soon as a possibly **infected skin lesion develops**.

- In line with good infection control practice, **HCWs should not work with infected skin or purulent eye lesions**, and all cuts and grazes should be covered. All such lesions should be reported promptly to the Occupational Health Service.

- Routine screening of staff is not recommended, however, if an outbreak is confirmed this may be undertaken if advised by the PAG (Problem Assessment Group)/IMT (Incident Management Team). Refer to Staff Screening during incidents and outbreaks.

4.5 Management of an Outbreak of PVL MSSA/ MRSA within the Healthcare Setting:

Definition: Two or more confirmed cases of the same strain of PVL MSSA/ MRSA, identified within a 30 day period, which are thought to have acquired the PVL MSSA/ MRSA on a particular ward.

- The IPCT will assess the situation to determine if there is indeed an outbreak.
- If an outbreak is confirmed discuss the situation with the local Consultant Microbiologist, the Head of IPC, Senior Nurse IPC to determine if a PAG is required, Chapter 3 of the National IPC Manual (NIPCM) will be used for outbreak management.
- Notify IPCT/ HPT of possible outbreak.
- Notify local Senior Management Team.

4.6 Management of an Outbreak of PVL MSSA/ MRSA within the Community Setting:

If the Health Protection Team are advised of an outbreak within a Care Home where there are two or more residents or staff with PVL/MSSA/MRSA they will offer advice on appropriate decolonisation treatment and infection prevention and control measures. Staff will require a prescription from their own GP, residents treatment will be prescribed by the GP who has responsibility for the Care Home. The HPT will assess if screening and/or decolonisation is required for community contacts. The HPT can provide information leaflets on MRSA / PVL- S.aureus and decolonisation for those affected and for close contacts/family.

5.0 Standard Infection Control Precautions (SICPs) and Transmission Based Precautions (TBPs)

SICPs & TBPs	
Patient placement	• A single room should be made available for all patients colonised/ infected with PVL-*S.aureus*, preferably with en-suite facilities. If a single room is not available this must be discussed in the first instance with IPCT, a risk assessment must then be completed and documented within the Personal Care Record. In some instances the patient's clinical condition may not support the placement of the patient in a single room a risk assessment must be completed and the reasons documented in the personal care record. • To minimise the spread to adjacent areas single room doors should be closed with appropriate signage fixed to the outside of the door. • Please see Nurse in Charge Door Sign to door. • If the door being closed compromises patient care, a risk assessment should be made regarding whether the door may be kept open. This must be documented in the personal care record.
Hand hygiene	• Strict adherence to hand hygiene guidelines, hands must be decontaminated before and after each direct patient episode. • Patients and visitors should be offered guidance on appropriate hand hygiene. • Refer to National Infection Prevention and Control Manual (NIPCM) Standard Infection Control Precautions (SICPs).
Patient Screening	From admission until discharge the screening criteria is as follows: • If one negative screen is obtained, screen again after 48 hours. • If this screen remains negative, screen again after 48 hours – there will now be a total of 3 negative screens obtained. • Screen weekly in high risk areas (Renal, orthopaedic, haematology, vascular and adult critical care areas) there after unless otherwise instructed by the IPCN. • If a patient is on antimicrobial therapy do not screen patients until 48 hrs following completion of all antibiotics.
Specimens for Screening	• Nasal. • Perineum*. • Skin lesions/wounds. • Indwelling Invasive Devices, e.g. Central Venous Catheters, Hickman line, PICC Line. • Catheter urine.

SICPs & TBPs	
	• Sputum from patients with a productive cough. • *If patient refuses perineal screening they should be offered throat screening. Any modifications to the standard screening should be recorded in the notes.
Decolonisation	• It is recommended that patients who screen positive (colonised/infected) with PVL-*S.aureus* should be prescribed a course of decolonisation – see Appendix 2 of guidelines for decolonisation regimes. If active PVL-S.aureus infection is present it is advisable to continue with decolonisation whilst the patient is receiving antimicrobial therapy. Treatment advice should be discussed with the Microbiologist. • Process for decolonisation and screening is in Appendix 3 of guidelines.
Quick Reference Guide	Implement the MRSA Management Guidance and Screening Record (MRSA and PVL *S.aureus* Management Guidance and Swab record) for all PVL-S.aureus cases. The MRSA and PVL *S.aureus* Management Guidance and Swab record must be reviewed and updated on a regular basis.
Moving between wards, hospitals and departments	Discuss patient transfers/discharge to offsite facilities with the IPCN. • Prior to transfer, Healthcare Workers (HCW) from the ward where the patient is located must inform the receiving ward/hospital of the patients PVL-*S.aureus* status. A record of this can be documented on the SBAR transfer document and inserted into the patient's personal care record. • When the patient requires to attend other departments the receiving area should put in place arrangements to minimise contact with other patients and arrange for additional cleaning if required. • Patients can attend physiotherapy/occupational therapy departments provided SICPs and TBPs are adhered to. The IPCT can be contacted for advice if required.
Equipment	• Use single-use items if possible. • Where possible allocate equipment for individual patient use e.g. washbowl, commodes etc.
Equipment & Environmental cleaning	• **Domestic Staff** - Daily environmental cleaning must be undertaken with a solution of 1,000ppm available Chlorine releasing agent. • **Nursing Staff** - Dedicated equipment should be cleaned after each use with Clinell Universal Disinfectant wipes (Green Clinell wipes). • Additional cleaning may be advised by the IPCT.
Personal Protective Equipment (PPE)	• Aprons must be worn for direct contact with the patient or the patient's environment/equipment. Gloves and aprons must be worn when exposure to blood and/or other body fluids is anticipated/likely. Gloves and aprons are single use and must be discarded immediately after completion of task,

SICPs & TBPs	
	discarded as clinical waste and hands decontaminated.
Patient Information	The clinical team with overall responsibility for the patient must inform the patient of their status and provide the patient/relatives with a PVL-*S.aureus* patient information leaflet. The clinical team should document this in the patient's notes.
Linen	Linen should be treated as 'infectious linen' as outlined in the Laundry: 'Bagging & Tagging' poster. • Linen hamper bags must be tagged appropriately (e.g. date, hospital ward/care area) to ensure traceability. • Bed linen and patient clothing should be changed daily.
Patient Clothing	• There are no special requirements when handling patients clothing, however, advise relatives to wash hands thoroughly after clothing is put into the washing machine. Clothes should be washed at the temperatures advised on the clothing labels. Laundry Guidelines information leaflet is available if required – if this leaflet is provided document this in the personal care record. • HCWs handing patient clothing should use the appropriate PPE Refer to PVL MRSA Guidelines.
Waste	• Waste from patients with PVL-*S.aureus* must be designated as clinical waste and placed in an orange bag.
Removing Precautions	Patients infected and/or colonised should remain in isolation for the duration of their stay. Discuss further arrangements with the IPCT.
Terminal Cleaning ***Following transfer, discharge or once the patient is no longer considered infectious***	Remove all of the following from the vacated single room: • healthcare waste and any other disposable items (bagged before removal from the room); • bedding/bed screens/curtains and manage as infectious linen (bagged before removal from the room); and • reusable non-invasive care equipment (decontaminated in the room prior to removal). The room should be decontaminated using : • a combined detergent disinfectant solution (Titan Plus) at a dilution, (1,000ppm av.cl.) (this process applies for **domestic staff** for the environment only). • Clinell Universal Disinfectant wipes (Green Clinell wipes) (**clinical staff** only for decontaminating the environment including near patient equipment). • The room must be cleaned from the highest to lowest point and from the least to most contaminated point.
Discharge Planning	The clinical team with overall responsibility for the patient must inform the General Practitioner (GP) and others in the community care team of the patients MRSA status.
Last Offices	No additional precautions required.
Visitors	No restrictions on visitors. Advise visitors to perform hand hygiene with either hand rub or liquid soap and water before entering and leaving the facility.

SICPs & TBPs	

6.0 ROLES AND RESPONSIBILITIES

All staff are responsible for implementing and following the advice provided in this policy.

Who	Roles & Responsibilities
NHS Board	• To provide a managed system in relation to IPC control across NHSL. • To cooperate with partner agencies (e.g. Local Authority) to protect the local population from hazards to health by preventing, controlling or reducing exposure to these.
Hospital Management Teams	• To take steps to limit damage to health when such exposures occur. • Support the HCWs and the IPCT in following this policy. • Cascade new policies to clinical staff after approval by the Infection Control Committee (ICC).
Infection Prevention & Control Team	• Keep this guideline up to date. • Once notified via the Laboratory that there is a new isolate of PVL MRSA, the IPCT will electronically tag the patient on the Trakcare system identified as a pink star ★ (PVL MSSA is not tagged on Trakcare system). • Investigation, risk assessment and management of all healthcare in-patient cases (excluding care homes), and ensuring appropriate treatment and decolonisation is prescribed. • Provide healthcare in-patients with information leaflets on MRSA and/or PVL-S.aureus as relevant to the patient condition. • Identify patient contacts within the healthcare and home environment in line with current guideline. • Assess if screening and/or decolonisation is required for healthcare/community contacts.
Microbiology/ Laboratory staff	• To provide laboratory testing, clinical support and interpretation of results for clinical staff. • Ensure that all PVL MSSA/ MRSA confirmed results from the Scottish MRSA reference laboratory (SMRSARL) are communicated to IPCT or HPT as appropriate. • Advising clinicians and GPs about appropriate antimicrobial and decolonisation treatment. • In the absence of an onsite IPCN contact the ward to advise the staff of new isolates of PVL MSSA/ MRSA.

Who	Roles & Responsibilities
Health Protection Team	• Investigation and management for all community cases (including care home residents) and ensuring appropriate decolonisation treatment is prescribed. • Providing all community cases with information leaflets on MRSA / PVL-S.aureus and decolonisation. • Identify and advise appropriate treatment for all vulnerable household contacts in line with current policy. • Advise the IPCT if a case notified to them is likely to be hospital acquired. • Advise SALUS of any NHSL staff member identified with PVL MSSA/ MRSA to ensure appropriate occupational health support, follow up and management.
Senior Charge Nurse (Ward Manager)	• To provide clinical and managerial leadership within the clinical area and act as role models in relation to infection prevention and control. • Ensure all staff follow the guidelines set out in this policy. • To ensure implementation and ongoing compliance with SICPs and TBPs and take appropriate action to address any area of non-compliance. • To report any difficulty in accessing or providing sufficient resource to achieve this. • Recognise and report to the IPCT any incidences of clinical conditions where the signs/symptoms, number of cases are suggestive of an outbreak.
Health Care support Workers (HCSWs)	• To ensure implementation and ongoing compliance with SICPs and TBPs. • Ensure PVL MSSA/ MRSA positive patients are managed in accordance with this guideline. • On admission/transfer ensure Trakcare has been checked to verify PVL MRSA status of patient.
Clinicians	• To act as role models in relation to IPC. • Report to hospital management any difficult in accessing or providing sufficient resource to adhere to this policy. • Report any incidences of clinical conditions where the signs/symptoms are suggestive of an outbreak to the IPCT.
PSSD	• To provide support services including domestic services to NHS Lanarkshire to maintain the cleanliness and safety of premises in line with local/national policy.
SALUS Occupational Health & Safety	• Providing advice, help and support on matters related to health in the workplace to the IPCT, HPT and others as required. Carry out risk assessment for all PVL MSSA/ MRSA positive staff and advise them of appropriate treatment, screening and follow up in line with this policy. • Facilitate onward referral of staff with recurrent infection to specialist clinicians if required (e.g. Infectious Diseases, Dermatology). Carrying out wider staff screening during outbreak of PVL MSSA/ MRSA if required.
Communications Department	• To lead on the development and dissemination of media statements and other key information to NHS Lanarkshire and external agencies.

Who	Roles & Responsibilities
	• Take the lead on public communication.

7.0 COMMUNICATION PLAN

The policy will be launched and distributed as follows:

- Staff brief
- First port -Infection prevention and Control section
- Right Decision Clinical App
- Acute and Health and Social Care Partnerships Hygiene Groups

8.0 REFERENCES

HPS National Infection Prevention & Control Manual

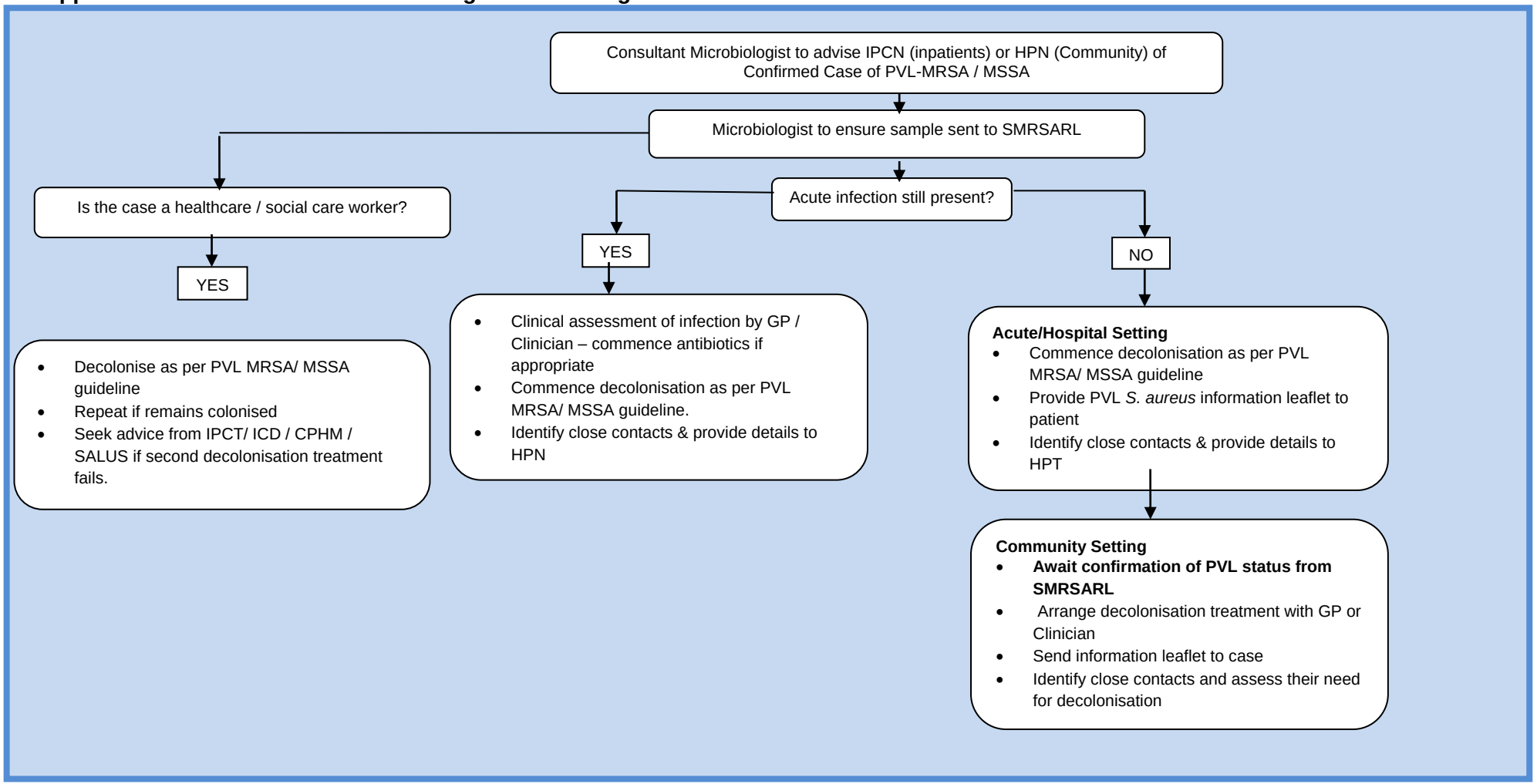
HPS (2014) *interim Advice for the Diagnosis and Management of PVL-associated Staphylococcus aureus infections (PVL-S.aureus)*

Author:	**Infection Prevention and Control Team (IPCT)**
Responsible Lead Executive Director:	Executive Director of Nursing
Endorsing Body:	Infection Control Committee (ICC)
Governance or Assurance Committee:	NHS Lanarkshire Healthcare Governance Committee (NHSLHGC)
Implementation Date:	October 2024
Version Number:	Version 6
Review Date:	October 2027
Responsible Person:	Jacqueline Barmanroy

CONSULTATION AND DISTRIBUTION RECORD	
Contributing Author / Authors	• Infection Prevention & Control Team (IPCT)
Consultation Process / Stakeholders:	• IPCT • Health Protection Team (HPT) • Lead Antimicrobial Pharmacist • Consultant Microbiologists • Infection Control Doctor • Chiefs of Nursing Services • Chief Medical staff • Property & Support Services Department (PSSD)
Distribution:	• NHS Lanarkshire intranet – First Port (internal) • Right Decision clinical website

CHANGE RECORD			
Date	**Author**	**Change**	**Version No.**
10/06/2015	IPCT	Content revised & updated. New policy template applied.	V1.0
19/07/2015	IPCT	Comments collated and policy updated with amendments.	V2.0
20/05/2017	Policy Review Group	Content revised via the Policy Review Group.	V2.1
19/08/2019	Governance Review Group (GRG)	Reviewed and updated by Governance Review Group	V3.0
18/11/2019	GRG	Reviewed and updated by Governance Review Group	V3.0
22/09/2021	GRG	Reviewed and updated by the Governance Review Group in line with the Vale of Leven recommendations.	V4.0
27/07/2023	GRG	Date extended to reflect NHSL protocol for policies, guidelines and SOP	V4.1
11/09/2024	GRG	SOP added to document. Update in line with NHSL guidelines	V5

Appendix 1 – PVL MSSA/ MRSA Investigation & Management Flow Chart



Lead Author	Jacqueline Barmanroy	Date Approved	October 2024
Version	6	Review Date	October 2027

Appendix 2 - Nasal and Skin Decolonisation Regimens

Prior to commencing any decolonisation regimen results from the most recent PVL MRSA/ MSSA screen must be available.

Mupirocin Sensitive PVL MSSA/ PVL MRSA	• Mupirocin 2% nasal ointment to nostrils three times daily for 5 days • Chlorhexidine Gluconate 4%solution as a body wash in bath/shower daily for 5 days • Chlorhexidine Gluconate 4% solution as a shampoo on days 1 and 4 or twice within the 5 days.
Mupirocin resistant PVL MSSA/ PVL MRSA	• Naseptin four times daily to nostrils for 10 days • Chlorhexidine Gluconate 4% solution as a body wash in bath/shower daily for 5 days • Chlorhexidine Gluconate 4% solution as a shampoo on days 1 and 4 or twice within the 5 days.
Treatment for patients with damaged/broken skin	• Mupirocin 2% nasal ointment to nostrils three times daily for 5 days • Oilatum Plus wash lotion – bath/shower daily for 5 days • Oilatum Plus wash lotion as shampoo on days 1 and 4 or twice within the 5 days.