NHS GG&C Public Health Protection Unit (PHPU)
Standard Operating Procedure
for the investigation and management of
Panton Valentine Leukocidin
(PVL-SA)

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INTRODUCTION AND AIM	Panton - Valentine Leukocidin (PVL) is a cytotoxin produced by some *Staphylococcus aureus* (SA) which destroys white blood cells and predominantly causes skin and soft tissue infections. Rarely, it can cause necrotising haemorrhagic pneumonia and other invasive infections. There is not a strong evidence base on which to base policy; this policy draws on national guidance and local agreements and aims to prevent and control PVL Staph aureus (PVL-SA) infections.
STATEMENT	Early studies found the PVL gene in approximately 2% of laboratory isolates associated with *S.aureus* disease (Cunnington et al, 2009), however more recent studies have shown an increase. Shallcross *et al* found the PVL gene in approximately 10% of unselected consecutive S.aureus isolates. Furthermore, approximately 20% of skin & soft tissue *S.aureus* isolates were PVL positive. Scottish MRSA Reference Laboratory data suggest that approximately 50% of PVL SA isolates are meticillin sensitive (MSSA) and 50% meticillin resistant (MRSA), however Shallcross *et a*l found that PVL MRSA was rare. The epidemiology of PVL SA differs from that of other SA. Cases tend to be younger and, in the UK, associated with community settings rather than hospital. Centers for Disease Control and Prevention (CDC) guidance refers to risk factors for PVL related infection as 5 Cs: ▪ Contaminated items (e.g. towels) ▪ Close contact (contact sports) ▪ Crowding (e.g. closed communities) ▪ Cleanliness ▪ Cuts and other compromised skin integrity Outbreaks or clusters can occur in the community.
TIMING	Rarely urgent as situation usually ongoing for some time before PHPU has been notified. Carefully planned liaison and coordination agreements are usually required between health service professionals and the family of case / cases prior to active intervention if required.

DEFINITIONS	▪ **Case:** the isolation of a PVL-positive S.aureus from a patient with a PVL-like infection including: skin and soft tissue infection, necrotising pneumonia and septic shock. ▪ **Close contact**: contacts from a household-type setting or sexual contacts within seven days before onset of acute infection ▪ **High risk groups**: healthcare workers, prisoners, military personnel, residential/care home staff, those involved in contact sport ▪ **Outbreak**: Two or more confirmed cases of the same strain of PVL SA within the same household or in a care home setting.
PROCEDURE SUMMARY	**Single sporadic cases (and contacts).** **N.B. The decolonisation regime and infection control advice for PVL SA are the same as for MRSA and can be found at:** **http://www.nhsggc.org.uk/media/233147/mrsa-policy-v5-may-2015.pdf** ▪ Assessment and management of single cases in the community should be undertaken by the GP with advice from Microbiologist as required as per flowchart in **appendix 1: Risk assessment and Management of cases of PVL-SA infection (p6).** ▪ Cases in high risk groups or possible clusters/outbreaks should be reported to the Public Health Protection Unit (PHPU) on 0141 201 4917. ▪ If a case/contact requiring decolonisation has a pre-existing dermatological condition or is a neonate, this should be discussed with a dermatologist/obstetrician prior to starting the course of treatment. ▪ After decolonisation, further screening is not required unless a case or a close household contact is particularly vulnerable to infection or poses a special risk to others. If this is the case repeat screening of the case and/or contacts should be undertaken one week post decolonisation. ▪ Healthcare workers should not work if they have a proven acute PVL SA infection and should not return to work until the infection has resolved and 48 hours of a 5 day de-colonisation regime has been completed. Occupational Health should be informed. ▪ The public health assessment and management of close contacts of cases reported to PHPU should be undertaken as per the flowchart in Appendix 2.

	Management of potential clusters/outbreaks The HPA "Guidance on the diagnosis and management of PVL SA infections" should be followed : https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322857/Guidance_on_the_diagnosis_and_management_of_PVL_associated_SA_infections_in_England_2_Ed.pdf An Outbreak Control Team should be established chaired by the Consultant in Public Health Medicine if the community is the main focus or ICD if it is the hospital. The local outbreak control plan should also be used: http://www.nhsggc.org.uk/media/221632/Outbreak%20Policy%20V6%20-%20BICC%2001.12.14.pdf
AFTER CARE	▪ If there is further acute infection after treatment, specialist advice should be sought. ▪ If an individual has recurrent abscesses consider other alternative underlying conditions, e.g. diabetes, inflammatory disease, immune deficiency.

LITERATURE	

Cunnington et al, (2009), Severe Invasive Panton-Valentine Leukocidin positive Staphylococcus aureus infections in children in London UK, Journal of Infection, Vol 59, pp28-36.
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http://www.documents.hps.scot.nhs.uk/about-hps/hpn/pvl-guidance.pdf

Shallcross LJ, Williams K, Hopkins S, Aldridge RW, Johnson AM, Hayward AC. Panton-Valentine leukocidin associated staphylococcal disease: a cross-sectional study at a London hospital, England. Clin Microbiol Infect 2010;16:1644-8. http://www.ncbi.nlm.nih.gov/pubmed/20969671

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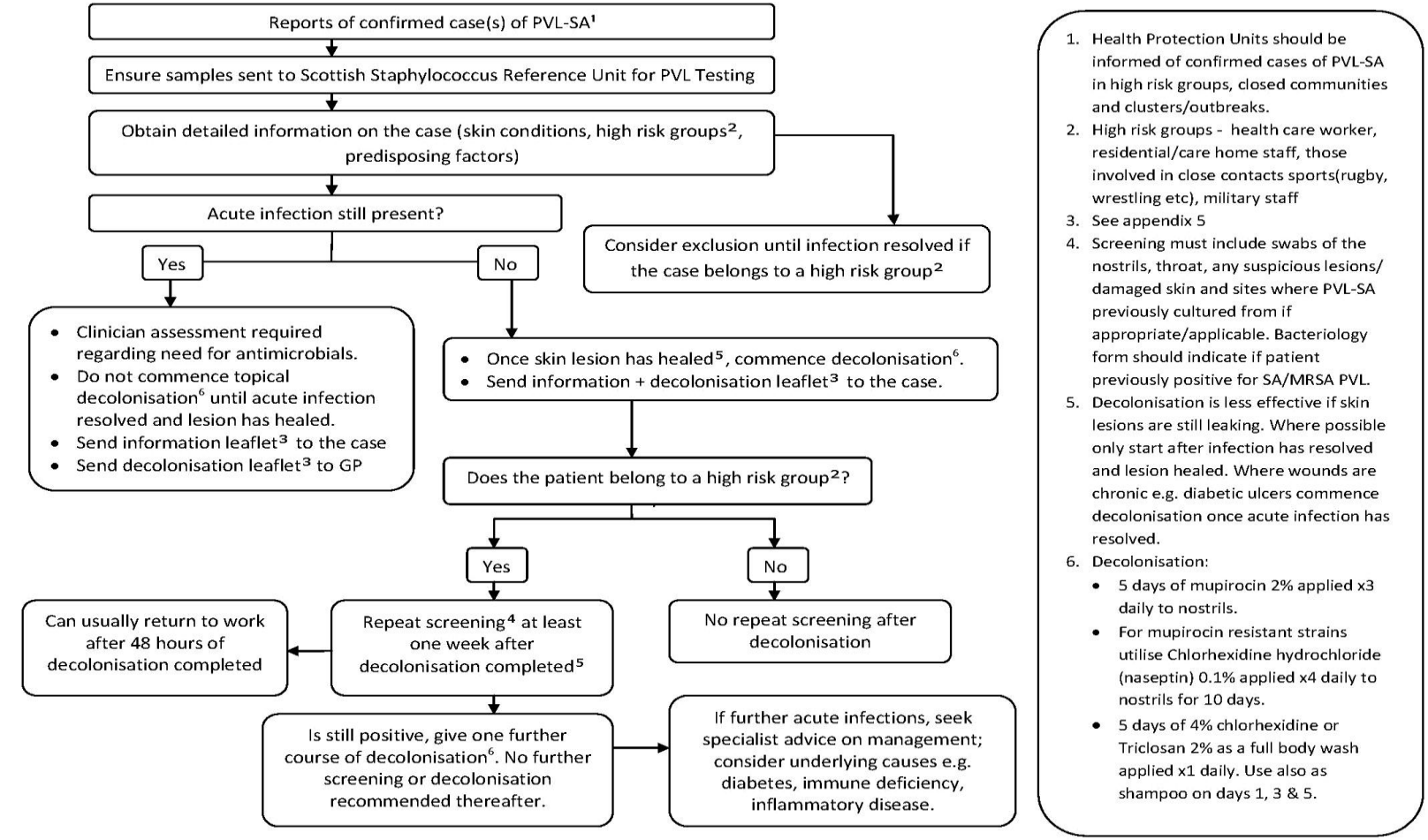
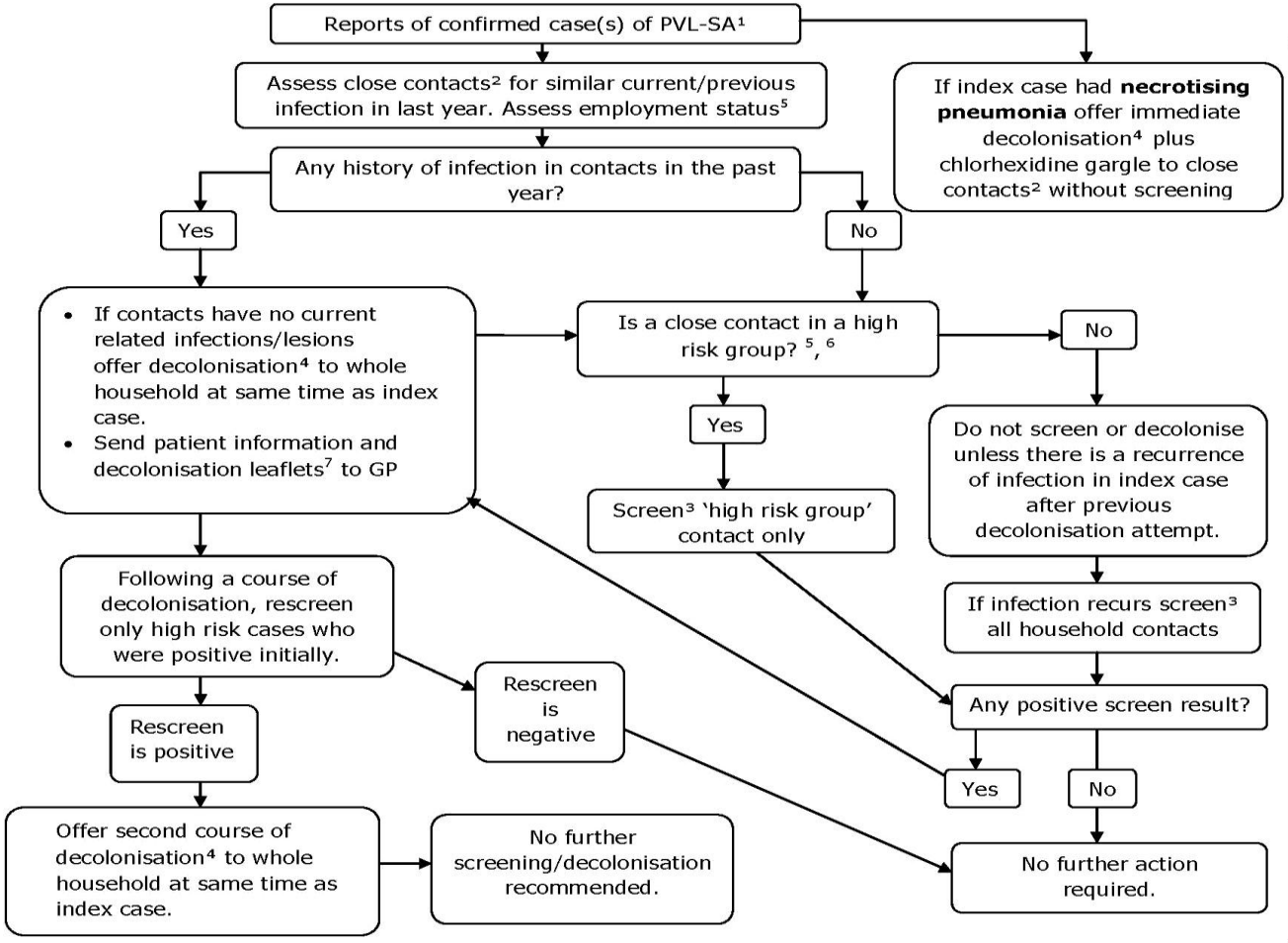
http://www.nhsggc.org.uk/media/233147/mrsa-policy-v5-may-2015.pdf

APPENDIX 1: RISK ASSESSMENT AND MANAGEMENT OF CASES OF PVL-SA INFECTION



1. Health Protection Units should be informed of confirmed cases of PVL-SA in high risk groups, closed communities and clusters/outbreaks.
2. High risk groups - health care worker, residential/care home staff, those involved in close contacts sports(rugby, wrestling etc), military staff
3. See appendix 5
4. Screening must include swabs of the nostrils, throat, any suspicious lesions/ damaged skin and sites where PVL-SA previously cultured from if appropriate/applicable. Bacteriology form should indicate if patient previously positive for SA/MRSA PVL.
5. Decolonisation is less effective if skin lesions are still leaking. Where possible only start after infection has resolved and lesion healed. Where wounds are chronic e.g. diabetic ulcers commence decolonisation once acute infection has resolved.
6. Decolonisation:
   - 5 days of mupirocin 2% applied x3 daily to nostrils.
   - For mupirocin resistant strains utilise Chlorhexidine hydrochloride (naseptin) 0.1% applied x4 daily to nostrils for 10 days.
   - 5 days of 4% chlorhexidine or Triclosan 2% as a full body wash applied x1 daily. Use also as shampoo on days 1, 3 & 5.

APPENDIX 2: RISK ASSESSMENT AND MANAGEMENT OF CLOSE CONTACTS OF PVL-SA INFECTION



1. HPUs should be informed of new confirmed cases of PVL-SA in high risk groups, closed communities and clusters/outbreaks
2. Close contacts is defined as someone who has had prolonged close contact with the case in a household type setting during the seven days before onset of illness. Examples of such contacts would be those living and/or sharing a bathroom in a hall of residence
3. Screening must include swabs of the nostrils, throat, any suspicious lesions/ damaged skin and sites where PVL-SA was previously cultured from if appropriate/applicable. Bacteriology form should indicate if patient previously positive for SA/MRSA PVL
4. Decolonisation is less effective if skin lesions are still leaking. Where possible only start after infection has resolved and lesion healed. Where wounds are chronic e.g. diabetic ulcers commence decolonisation once acute infection has resolved.
5. High risk groups – Health care worker; close contact sports (rugby, wrestling, etc), military training camps, gym and prison.
6. If there are new cases linked to the index case outside the household in a social or other setting, consider convening an Outbreak Control Team
7. See appendix 5.

APPENDIX 3 : PVL STAPHYLOCOCCUS AUREUS – INFORMATION FOR PATIENTS

What is PVL Staphylococcus aureus?

Staphylococcus aureus ('SA') is a bacterium (germ) that commonly lives on healthy skin. About one third of healthy people carry it quite harmlessly, usually on moist surfaces such as the nostrils, armpits and groin. This is known as colonization. Some types of *Staphylococcus aureus* produce a toxin called Panton-Valentine Leukocidin (PVL) and they are known as PVL SAs. (Panton and Valentine were two doctors who first found this chemical which can kill white blood cells called leukocytes – hence 'leukocidin').

What type of illness does it cause?

All SAs, including PVL SAs, can cause harm if they get an opportunity to enter the body, for example through a cut or a graze. They can cause boils or skin abscesses and are occasionally associated with more serious infections of the lungs, blood, joints and bones. Some SAs such as PVL SA are more likely to cause infections than others.

How do you catch PVL-SA?

Anyone can get a PVL SA infection. Infection can occur in fit, healthy people. PVL SA can be picked up by having:

- skin-to-skin contact with someone who is already infected, for example close family or during contact sports, or
- contact with an item or surface that has PVL SA on it from someone else, for example shared gym equipment, shared razors, shared towels.

How is PVL SA treated?

Boils and abscesses should be drained by incision by a doctor or nurse. Some infections may be treated with a course of antibiotics. In addition, the PVL SAs carried on your skin may be eliminated with a five day skin treatment (washes, creams and shampoos). This is done to reduce the chances of you getting repeated infections and reduce the chances of you spreading PVL SAs to others. In some patients this skin treatment may not be entirely successful, but the more carefully you follow the instructions, the more likely you are to clear the PVL SAs from your skin. Your GP may recommend checking members of your household and close contacts, e.g. partners/children, in case they are also carrying PVL SAs, and offering them skin treatments where necessary.

How do I prevent passing PVL SAs to other people?

- You need to keep infected areas of your body covered with clean, dry dressings or plasters. Change these regularly and as soon as discharge seeps to the surface. It is important that fluid or pus from infected skin is contained, because it has large numbers of PVL SAs that can spread to others.

- Do not touch, poke or squeeze infected skin. This contaminates your hands and can push the PVL SAs deeper into the skin. Contact your GP surgery if you have a boil or abscess that needs draining.
- Cover your nose and mouth with a tissue when you cough or sneeze, particularly if you have a cold, because PVL SAs can live in your nose. Throw the tissue in the bin at once and then wash your hands.
- Wash your hands frequently with liquid soap and water, and **especially** after changing your plasters, dressings, and bandages or touching infected skin.
- Encourage others at home to wash their hands regularly with liquid soap.
- Use a separate towel and keep it separately, so others don't use it by mistake. Have it washed frequently in a hot wash.
- Regularly vacuum and dust (wiping with a damp cloth) your bedroom, bathroom, kitchen and other rooms, as well as personal items and shared items, such as keyboards. Household detergent is adequate for cleaning.
- Clean your sink, taps and bath after use with a disposable cloth and household detergent, then rinse clean and throw away the cloth.

Can I go to work or school when I have a PVL SA infection?

- You should not work as a carer in a nursery, hospital, residential or care home or similar place until your skin has healed and you have permission to return to work from your local occupational health department, GP or manager.
- You should not work in the food industry, e.g. waitress, chef, food production, until your skin has healed and you have permission to return to work from your local occupational health department or GP.
- You may carry on with other types of work, provided you keep infected skin areas covered with clean, dry dressings. If you are not sure about working, contact your local occupational health department or your GP.
- Children can only go to school if they are old enough to understand the importance of good hand hygiene, and if their infected skin is covered with a clean dry dressing which will stay dry and in place until the end of the school day. Children should not take part in contact sports, or use communal gym equipment until their skin is healed. The GP's advice is essential, and school management should be informed.
- People who have eczema or a more generalised skin condition should remain off work or school until treatment has been completed for both the eczema or skin condition and the PVL SA infection. You need to continue treating your skin to keep it in good condition. In the long term this helps to reduce the risk of spread of PVL SA to others.

Can I go to swimming pools, gyms or sports facilities when I have a PVL SA infection?

- You should not use communal facilities for example gym equipment, saunas, swimming pools, or have a massage, manicure or similar until your skin has healed.

APPENDIX 4: HOW TO USE THE PVL-SA DECOLONIZATION PREPARATIONS.

The purpose of decolonization is to try to rid the body of the bacteria that have caused boils or other infections. Preparations must be used as detailed below.

General notes on skin treatment:

As with all treatments to be applied to the skin, avoid contact with the eyes. Those who are pregnant, have eczema, or are under a year old should be screened first to see if they are carrying the bacteria (the doctor or nurse who is arranging your treatment will explain how this is done). The doctor will then decide whether treatment is appropriate. This treatment should not be used if there are any boils or skin lesions that are still leaking. Wait until boils or lesions are dry. Whilst the skin treatments are being used the following will help reduce spread of the bacteria within the care home or household:

- Sheets/towels should be changed daily
- Regular vacuuming and dusting, particularly the bedrooms
- If possible avoid bar soap and use pump action liquid soap
- Use individual personal towels and facecloths. Wash them frequently in a
- hot wash.
- Clean sink and bath with a disposable cloth and detergent after use, and
- then rinse clean.

Chlorhexidine 4% bodywash/shampoo or Triclosan 2%

- Use once a day for 5 days.
- Use daily as liquid soap in the bath, shower or bowl and as a shampoo on days 1, 3 and 5.
- Do **NOT** dilute it beforehand in water as this will reduce its efficacy — apply directly to wet skin on a disposable wipe or on your hand.
- Do not use regular soap in addition during baths/showers.
- Do **NOT** apply to dry skin.
- Pay particular attention to armpits, groins, under breasts, hands and buttocks
- It should remain in contact with the skin for about a minute.
- Rinse off well before drying skin thoroughly. This is particularly important in
- people with skin conditions (e.g. eczema).
- Towels should be for individual personal use and, if possible, changed daily.

Plus either:

Mupirocin 2% (Bactroban Nasal):

- Use three times a day for 5 days.
- Apply a matchstick head-sized amount (less for a small child) on the end of a cotton bud to the inner surface of each nostril. Press the sides of the nose together and massage gently to spread the ointment inside the nostrils.

Or:

Chlorhexidine hydrochloride 0.1% (Naseptin):

- Use four times a day for 10 days.
- Apply a matchstick head-sized amount (less for a small child) on the end of a cotton bud to the inner surface of each nostril. Press the sides of the nose together and massage gently to spread the ointment inside the nostrils.

You might also be asked to gargle with an antiseptic solution.
For individual concerns or further advice please contact your GP or your local Health Protection Unit on 0141 201 4917