# *Staphylococcus aureus* bacteraemia (bloodstream infection)

## *Executive summary*

## Introduction

*Staphylococcus aureus* (*S aureus*) is a Gram positive coccus, commonly carried on the skin and in the nose of healthy persons (in approximately 1/4 of Gambian children aged 5-10 years). When it penetrates the skin it causes local abscesses and can seed to cause severe metastatic infection in bones, heart valves, lungs and other sites. It is one of the most important causes of community and hospital acquired bloodstream infection (bacteraemia – when *S aureus* is grown in blood cultures). *S aureus* is also recognized as a cause of severe community acquired pneumonia, often following influenza.

In the laboratory it must be distinguished from less pathogenic ‘coagulase-negative Staphylococci’ (CNS) to enable identification of any deep seated infection and targeted therapy to deal with this and/or reduce the chances of these metastatic infections developing at a later date.

This guideline covers the clinical approach and treatment of *S aureus* bloodstream infection (bacteraemia).

## Target users

* Nurses
* Doctors

## Target area of use

* Outpatient Department
* Ward

## Key areas of focus / New additions / Changes

Diagnosis and management of *S aureus* bacteraemia.

## Limitations

Echocardiography is not always available.

Treatment of methicillin resistant *S aureus* (MRSA) in The Gambia is limited by availability of suitable antibiotics (eg. The glycopeptides vancomycin and teicoplanin, linezolid, tigecycline and daptomycin) and availability of therapeutic drug monitoring for such agents (eg vancomycin levels).

## Clinical approach to a patient with proven or suspected *S aureus* bacteraemia:

### History and examination:

History should focus on any recent hospital admission or surgery (which may suggest a hospital acquired source), recent pyogenic infection (abscess, adenitis etc) or recent trauma. Attention should also be paid to any history of pre-existing valvular heart disease or prosthesis and any symptoms that may localize infection (eg back pain, cough with sputum, joint pain and swelling etc).

Patients with *S aureus* bacteraemia need to be carefully examined for signs of deep seated infection. At times this will entail recalling patients who have been discharged home prior to the blood culture result being available. Attention should be paid to the following:

Fever – to suggest ongoing infection, though note that recent antibiotic use may have led to absence of fever without fully sterilizing any collections or metastatic spread.

Clinical signs of infective endocarditis – splinter haemorrhages in nails of hands & feet, conjunctival and subconjunctival haemorrhages, embolic phenomenon in hands & feet, Oslers nodes and Janeway lesions, Roth spots (on fundoscopy), splenomegaly, microscopic haematuria and auscultation for new murmurs.

Clinical signs of new osteomyelitis – pain and focal tenderness in any bone or joint, particularly vertebrae.

Skin abscess or collection - in particular pay attention to sites of previous intravascular cannulation.

Meningitis/brain abscess – baseline & repeated neurological examination may lead to suspicion of intracerebral or spinal spread of infection.

Haematoma or intravascular thrombus – *S aureus* can infect haematomas and intravascular thrombi.

### Blood cultures:

Where possible, multiple blood cultures (at least 2) should be drawn prior to commencing antibiotic therapy in patients with suspected *S aureus* sepsis. This is to provide evidence of genuine infection (rarely *S aureus* can be found as a skin contaminant).

Further sets of blood cultures should be drawn 48-96 hours after starting antibiotics to treat *S aureus*. Failure to clear the bacteraemia (ie persisting positive cultures at this timepoint) is a sign that deep infection may have occurred and prolonged therapy +/- identification and surgical eradication of deep infection is required.

### Source control

Any potential deep infection should be aggressively investigated (plain imaging, echocardiography, ultrasound, CT scan as indicated) and any pyogenic infection drained. This may include removal of infected cannulas, drainage and washout of septic joints or surgical interventions to drain pus from abscesses anywhere in the body.

Echocardiography should be considered, where possible, for all confirmed cases of *S aureus* bacteraemia. It is highly desirable in cases where blood cultures show ongoing growth at 48-96 hours after therapy, where fever is ongoing, after 72 hours of therapy, and where there are signs of endocarditis or deep infection. In cases where bacteraemia is uncomplicated (see below) and thought to be hospital acquired (eg infected intravascular cannula site) echocardiography may not be necessary.

## Antibiotic therapy

Two weeks of appropriate intravenous antibiotic therapy is considered the minimum therapy for ‘uncomplicated’ *S aureus* bacteraemia to ensure that late metastatic infections are minimized.

Cases are considered ‘uncomplicated’ if *all* the following are met:

* No indwelling vascular prosthesis (eg prosthetic heart valves, infected intravenous cannula)
* Fever resolved within 48-72 hours of starting antibiotic therapy
* No evidence of metastatic or deep infection
* No evidence of endocarditis
* Negative cultures drawn 48-96 hours after commencing antibiotic therapy

Complicated cases (ie not meeting the above criteria) will require longer therapy and thorough investigation for an underlying focus.

(Flu)cloxacillin 2 g every 6 hours is appropriate for adults with normal renal function (note should be 4 hourly if endocarditis highly suspected). In children a dose of 25 mg/kg every 6 hours is appropriate (max 1 g/dose and reduced dosing frequency if ≤ 21 days old).

Combination of (flu)cloxacillin with an aminoglycoside (eg gentamicin) is not routinely indicated, except where prosthetic valve endocarditis is suspected.

## Methicillin Resistant *Staphylococcus aureus* (MRSA)

All strains of *S aureus* identified by the laboratory should be routinely checked for resistance to methicillin. Resistance to methicillin is often assessed in the lab by resistance to cefoxitin and is considered to signify resistance to (flu)cloxacillin, ceftriaxone, amoxicillin/clavulanate and other Beta-lactams available in the Gambia. Such infections should be discussed immediately with a consultant and the microbiology department on a case by case basis.

## Severe penicillin allergy (anaphylaxis)

Where *S aureus* bacteraemia occurs in a patient with a documented anaphylactic reaction to penicillins, the case should be discussed immediately with a consultant and the microbiology department.

## Key Issues for Nursing care

* Monitor vital signs especially temperature, heart rate, blood pressure, oxygen saturation.
* Prevention of hospital acquired *S aureus* infection depends on careful, aseptic insertion of intravenous cannulas and their timely removal when no longer needed or showing signs of infection.

## References

Health Improvement Scotland *S aureus* bacteraemia algorithm. <https://www.sapg.scot/quality-improvement/hospital-prescribing/staph-aureus-bacteraemia/> accessed 22 June 2020

# 2015 ESC Guidelines for the Management of Infective Endocarditis: The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC). <https://academic.oup.com/eurheartj/article/36/44/3075/2293384> accessed 22 June 2020

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| --- | --- | --- |
| **Written by:** | Name: Behzad Nadjm | Date: 22 June 2020 |
| **Reviewed by:** | Name: Karen Forrest | Date: 15 October 2020 |
| **Version:** | **Change history:** | **Review due date:** |
| 1.0 | New document | 15 October 2022 |
| Review Comments (*if applicable)* |  |  |