Guideline: Native Vertebral Osteomyelitis/Discitis (NVO)

Purpose

This guideline addresses the management of adult patients (≥15 years old) presenting to CMDHB with suspected native vertebral osteomyelitis/discitis (NVO). For the purposes of this guideline NVO will relate to vertebral osteomyelitis and/or vertebral discitis. The advice contained is felt to be appropriate for the vast majority of patients presenting with suspected NVO however it does not replace clinical judgement.

This guideline is NOT applicable to the following populations…

1. Post-operative or metal ware associated spinal infections.

2. Spinal infections with a contiguous source (e.g. pressure sore associated spinal infections, post-traumatic spinal infections).

3. Paediatric patients (<15 years old)

Scope of Use

This guideline is applicable to all medical staff.

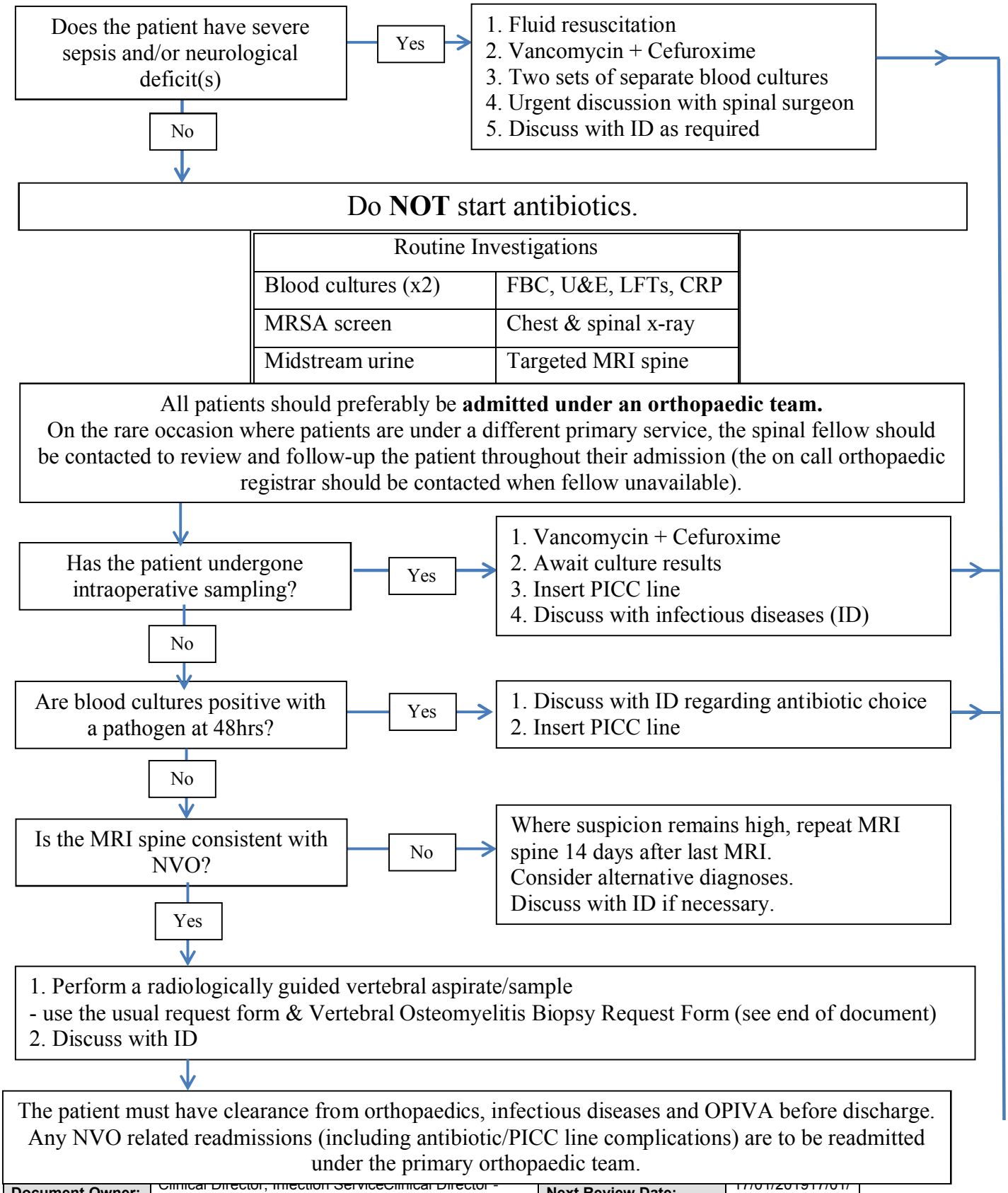
Index

Guideline

The “Suspected NVO Flowchart” is intended to provide an executive summary of the management of patients presenting with suspected NVO with subsequent documentation

providing more in depth guidance (see below).

Suspected NVO Flowchart



I. Acute management of suspected NVO

The diagnosis of NVO requires a high level of clinical suspicion. NVO should be considered in all patients with localising symptoms to the spine and an infective clinical picture (see table 1).

All patients should undergo a thorough clinical history and examination including a thorough neurological examination. Standard investigations include...
…Two sets of peripheral blood cultures (separate venepunctures)
…Full blood count, urea & electrolytes, liver function tests and CRP
…Midstream urine
…Nasal and perineal swabs for staphylococcal colonisation
…Chest and spinal x-ray
…Targeted MRI spine (based on clinical localization)

Table 1: Clinical parameters suggestive of Native Vertebral Osteomyelitis/Discitis

Localising Symptoms	Infective Symptoms/Signs
Back or neck pain (new or worsening) New spinal cord neurology	Fever Raised inflammatory markers (CRP, ESR) Bacteraemia Infective Endocarditis

Full Empiric Antibiotics

"Full empiric antibiotics" should not be given unless the patient develops/has either…

1) Sepsis (haemodynamic instability, septic shock or new end-organ dysfunction)
    - Where uncertain the case should be discussed with a spinal surgeon or infectious diseases physician
2) Severe or progressive neurological compromise potentially attributable to spinal cord pathology (this includes meningitis which can complicate epidural abscess on rare occasions)
    - In cases with chronic neurological deficits it may be reasonable not to initiate "Full empiric antibiotics", however this decision should only be made on the advice of a spinal surgeon.
3) Completed intraoperative sampling for suspected NVO and awaiting culture results
    - This does NOT apply to patients who have undergone radiologically guided aspiration/culture where antibiotics should be withheld whislt awaiting culture results in the absence of another indication to initiate antibiotics

- In other patients, all antibiotics should be withheld to optimise microbiological sampling.
- For empiric antibiotics for culture negative NVO, see the relevant section under "PICC line insertion and Antibiotic initiation" below

Patients with severe sepsis or new neurological compromise should be managed as a medical emergency.

1) Fluid resuscitation
2) Start "Full empiric antibiotics"
    a. Vancomycin (dose as per the vanculator)
    b. AND Cefuroxime IV 1.5g Q8hrly (see dosing guidelines for renal dosing)
3) Urgent MRI and discussion with a spinal orthopaedic surgeon with a view to urgent surgical intervention

Infectious diseases should be consulted acutely at the time of "Full empiric antibiotics" in the following situations.

a) Patients with a contraindication to recommended "Full empiric antibiotics" (e.g. penicillin anaphylaxis)
b) Clinical suspicion of an atypical organism(s), e.g. *Salmonella typhi/paratyphi*
c) Clinical suspicion of meningitis

II. Patient Care Model

All patients with suspected or confirmed NVO should be managed by an orthopaedic team. In general, NVO should not be cared for under a non-orthopaedic service without specific indication for involvement of that service. Where there are other major, active medical issues beyond the scope of the orthopaedic service (including orthogeriatrics for eligible patients), shared care is required and should be discussed on a case by case basis.

Where a non-orthopaedic service is acting as the primary team for a patient with NVO, their primary point of referral and ongoing orthopaedic support within regular hours is the spinal orthopaedic fellow. Outside of regular hours, acute referrals and reviews will be performed by the on call orthopaedic registrar who will then handover orthopaedic care to the spinal orthopaedic fellow or spinal surgeon at the next practical opportunity.

All patients undergoing treatment for NVO should be referred to the ID service for review and advice on antibiotic management.

III. Radiology

Routine chest and spinal x-rays should be performed. All patients with suspected NVO should undergo a targeted MRI spine. The spinal levels to be imaged should be directed by clinical examination findings. Inpatient MRI spine requests for suspected NVO will be triaged as soon as possible with an expected maximum timeframe of 3 days. Where urgent MRI scans are required after hours or on the weekend, the request should be discussed directly with a radiologist.

Where the MRI spine is consistent with NVO, microbiological confirmation should be pursued before any antibiotic treatment in the absence of indications for full empiric antibiotics .

Where the initial MRI is not consistent with vertebral osteomyelitis/discitis, alternative diagnoses should be explored however if the suspicion for vertebral osteomyelitis/discitis remains high, a repeat MRI spine should be performed ≥14 days later. False negative MRI spine is well recognised in early NVO.

Where MRI is not practical, discuss with radiology regarding the next most appropriate imaging modality for the patient.

IV. Microbiological Sampling

Identification of the infecting pathogen allows targeted antimicrobial management. This is critical to optimise the chances of infective cure, particularly where a non-operative approach is adopted. Although the majority of cases are likely to be due to *Staphylococcus aureus* infection, a significant minority are caused by gram negative organisms with unpredictable antibiotic susceptibilities.

All patients should have two sets of blood cultures from separate venepunctures (three if any suspicion of infective endocarditis). All patients should have a midstream urine and nasal/perineal swabs for MRSA carriage (unless the patient is already known to be colonised with MRSA). In the absence of a neurological deficit or significant sepsis, all antibiotics should be withheld whilst obtaining microbiological samples.

1) Patients undergoing surgery

All patients undergoing surgery for NVO should have multiple tissue samples taken for microbiology and histology, regardless of whether microbiology is already known. Usual surgical antibiotic prophylaxis should be withheld until immediately after sampling to maximise culture yield.

Samples should always be sent for…
…1) Bacterial culture and susceptibilities
…2) Mycobacterial culture
…3) Fungal culture
…4) Histology

Where a clear bacterial pathogen is identified, mycobacterial and fungal cultures may be held but not processed at the discretion of the laboratory. Where processing for atypical organisms is still indicated, the requesting team should discuss testing with the clinical microbiologist.

There is no role for urgent, intraoperative gram stains. Gram stain results are insensitive for infection and are therefore unable to exclude the presence of infection.

Following operative sampling, if the causative pathogen is not yet known, patients should be started on “Full empiric antibiotics” (see above) whilst awaiting cultures. Where the causative

pathogen is already known (e.g. positive blood cultures, positive vertebral cultures etc), directed antibiotic therapy should be continued (discuss with ID if uncertain).

2) Patients not undergoing surgery
Attempts should be made to obtain microbiology in all cases of suspected NVO. In cases without an indication for "Full empiric antibiotics", withhold all antibiotics and take two separate sets of peripheral blood cultures (three separate sets if there is a suspicion of infective endocarditis).

Positive blood cultures should be discussed with the infectious diseases service to advise on the relevance of the culture isolate(s), in particular whether antibiotic treatment should be initiated or whether further microbiological sampling is required (e.g. radiologically guided vertebral aspiration). In general, where blood cultures reveal a likely pathogen (*Staphylococcus aureus*, *Candida spp,* enterobacteriaceae without another source or the causative pathogen of confirmed infective endocarditis), no radiologically guided aspirate/biopsy is required and treatment can be initiated according to susceptibilities.

Where no likely infecting organism is identified on blood cultures at 48hrs, radiologically guided vertebral aspirate/biopsy should be considered.

- Patients with a suspicion of malignancy should be discussed with an orthopaedic tumour surgeon prior to any request for vertebral aspirate/biopsy (these cases often need discussion at the tumour MDM)
- Patients with a suspicion of tuberculosis should be discussed with an infectious diseases physician prior to any request for vertebral aspirate/biopsy to ensure appropriate screening for pulmonary tuberculosis and extrapulmonary sites amenable to sampling.

Patients with ongoing suspicion of conventional bacterial NVO (as adjudged by an orthopaedic or infectious diseases physician) should undergo radiologically guided vertebral aspiration/biopsy. Each case should be discussed with an interventional radiologist and all requests completed on the "Radiologically guided vertebral aspirate/biopsy request form".

The interventional radiologist will decide on the most appropriate site of biopsy according to clinical and radiological findings. In general:

1. Aspiration of fluid collections/abscesses are the target of choice if present and amenable to sampling. Where purulent material is aspirated, no further sampling is required.
2. In the absence of a fluid collection, disc aspiration (+/- saline wash in the case of dry taps) will be attempted.
3. Where there is paravertebral soft tissue enhancement, additional tissue sampling from this site should be undertaken.
4. Bone biopsy will only be undertaken after specific discussion between the interventional radiologist and either a spinal surgeon or infectious diseases physician.

Unless otherwise specified, these samples will be processed for routine bacterial culture only.

V. PICC line insertion and Antibiotic initiation

In order to expedite patient care, a PICC line should be inserted when the decision to initiate antibiotic treatment for NVO has been made. Antibiotics should be withheld except in the following circumstances.

1. Severe sepsis or neurological deficit (see "Acute management of suspected NVO")
    - "Full empiric antibiotics"
2. Positive microbiology likely to represent the pathogen causing NVO is available. These patients should have their microbiology discussed with the ID service prior to antibiotic initiation.
    - Targeted antibiotic treatment as discussed with ID
3. Compelling scenario for NVO (clinical suspicion, consistent MRI, persistent fever and/or non-resolving CRP > 50) where two sets of blood cultures and at least one radiologically guided vertebral aspiration/biopsy has been obtained. All patients should be discussed with ID prior to antibiotic initiation.
    - Culture negative empiric antibiotics (see below)
4. Agreement between orthopaedics and ID to initiate antibiotics for NVO
    - Best guess empiric antibiotics (discuss with ID)

Antibiotics should not be initiated before fulfilling at least one of the criteria above as stopping antibiotics again to facilitate an "antibiotic washout period" prior to microbiological sampling to optimise yield may lead to unnecessary delays.

Where patients are on renal replacement therapy (dialysis) or are being worked up for renal replacement therapy, discussion with the renal consult service should occur PRIOR to requesting a PICC line to ensure future dialysis access is not compromised. These patients may need a temporary tunnelled line.

Culture negative empiric antibiotics

A proportion with NVO will be culture negative despite investigations. Where there is agreement between orthopaedics and infectious diseases that a patient is to receive antibiotic treatment for culture negative NVO, the first line antibiotic recommendations are generally directed towards *S. aureus* infection. This needs to take into consideration the patients MRSA colonisation status and any contraindications to *B*-lactam therapy (see table 2).

The antibiotic treatment may be broadened at the discretion of the ID team where clinical circumstances raise a significant possibility of non-*S. aureus* disease.

Table 2: Empiric antibiotic regimens for culture negative NVO

Patient characteristics	First line antibiotic regimen
No MRSA colonisation AND no strong contraindication to *B*-lactams	Flucloxacillin IV 2g Q6hrly (may need renal dosing)
MRSA colonisation OR strong contraindication to *B*-lactams	Vancomycin as per the "Vanculator"

VI. Discharge requirements on outpatient intravenous antibiotic therapy

Patients on treatment for NVO who are to be discharged under the OutPatient IntraVenous Antibiotics (OPIVA) service need to be clinically safe and improving, have a clear management and follow-up plan after discharge and have a safe mechanism of outpatient antibiotic administration.

This requires specific planning and arrangements to be made by each service and sufficient evidence of clinical improvement on treatment…

1) Orthopaedic team*
    - Orthopaedic clearance for discharge including evidence of improvement on antibiotic treatment
        i. ≥48hrs of clinical and biochemical improvement on antibiotics (e.g. stable/improving neurology, absence of fever, CRP trending down, no sign of adverse effect of antibiotics eg. deteriorating LFTs)
        ii. If vancomycin is being administered, adequate levels with stable renal function is required prior to discharge
    - Orthopaedic outpatient follow-up plan
2) Infectious diseases review
    - Antibiotic plan
    - Infectious diseases outpatient follow-up plan
3) OPIVA team
    - Functional PICC
    - Safe and practical discharge plan for community antibiotic administration**

* Where the orthopaedic team is not the primary team caring for the patient (e.g. patient is under the care of the renal service, AT&R service etc), medical clearance from the primary team is also required over and above the orthopaedic team assessment.
** The OPIVA team performs an assessment of all patients as to their suitability for the OPIVA service. Where the OPIVA team deems a patient is unsuitable for the programme due to practical or safety issues, this service will not be offered.

VII. Readmission Protocol

Patients with NVO who are readmitted because of concerns regarding NVO and/or the treatment of NVO are to be readmitted to the orthopaedic team associated with the patient. Where this team is not available or unknown, readmission will occur under the acute admitting orthopaedic team.

Reasons for readmission under the orthopaedic team includes patients requiring investigation and management of adverse events due to antibiotic administration (e.g. PICC line sepsis, antibiotic reactions, inpatient antibiotic introductions etc). These patients should all be discussed with/reviewed by the ID service.

Vertebral Osteomyelitis Biopsy Request Form

PART A: Referrer to complete (also complete routine request form)

Patient Label (affix patient label here) Referring Consultant:_____

Contact number:_____

Documented Fever (>38^{0}C)	YES NO *(Circle)*
White cell count (highest this admission)	_____xE9/L
CRP (highest this admission)	_____mg/L
Blood Cultures negative (≥48hrs)	YES NO *(Circle)*
MRI consistent with OM/discitis	Date:
Paraspinal Fluid Collection	YES NO *(Circle)*
Disc fluid	YES NO *(Circle)*
Paravertebral Muscle Oedema	YES NO *(Circle)*

PART B: Interventional radiologist to complete

Radiologist accepting request:_____ Date:_____

Procedure performed by:_____ Date:_____

Paraspinal fluid collection aspirated?	YES NO *(Circle)*
Disc fluid aspirated?	YES NO *(Circle)*
Needle size (for aspiration)	20G Other_____
Saline injected and aspirated?	YES NO *(Circle)*
Single paravertebral muscle biopsy performed?	YES NO *(Circle)*
Needle Gauge (for muscle biopsy)	18G Other_____
Spinal level biopsied (for muscle biopsy)	Level(s)_____

PART C: Infectious Diseases to complete

	Organism(s) cultured	Suspected pathogen
Paraspinal fluid aspiration		YES NO *(Circle)*
Disc aspiration		YES NO *(Circle)*
Paraspinal muscle Biopsy		YES NO *(Circle)*

References

Expert opinion group : Spinal Infection Group (SIG) – Counties Manukau District Health Board (CMDHB)

Mr. Alpesh Patel[1], Dr. Christopher Luey[2], Dr. Stewart Hawkins[3], Dr. Susan Taylor[4], Terry Rings[5], Mr. Rodney Gordon[1], Mr. Andrew Clarke[1], Dr. Stephen McBride[2], Dr. David Holland[2], Dr. Genevieve Walls[2], Dr. Susan Morpeth[2,4], Dr. Damien Hoon[3], Dr. Clinton Pinto[3], Elizabeth Bryce[5], Anne Hutley[5], Tracy Norton[5], Mr. Tom Geddes[1]

Definitions/Description

Terms and abbreviations used in this document are described below:

Term/Abbreviation	Description
NVO	native vertebral osteomyelitis/discitis

Associated Documents

Other documents relevant to this guideline are listed below:

NZ Legislation & Standards	None
CM Health Documents	None
Other related documents	None