NORTHERN TERRITORY GOVERNMENT DEPARTMENT OF HEALTH

ACUTE CARE ADULT SEPSIS PATHWAY

Principal name:
Other name(s):
D.O.B:
HRN:
Sex:

Patient Label

Address must be documented if patient details handwritten

Sepsis is a time-critical MEDICAL EMERGENCY

Clinical pathways never replace clinical judgment. Use this pathway for patients with an acute illness 18 years and older in conjunction with NT Adult Sepsis Guideline and NT Observation Chart.

Date: _____ **Time:** _____ **Initial:** _____ **Print name:** _____ **Role:** _____

RECOGNISE

Could it be sepsis?

Consider sepsis in all patients with signs/symptoms of an infection and abnormal vital signs. Presentation can vary between patients and at times may not be obvious. *Tick below all that apply.*

Are there signs/symptoms that are consistent with an infection?

- ❑ Fever or hypothermia, rigors, myalgia, chills
- ❑ **Neurological**: confusion, neck stiffness, headache
- ❑ **Skin**: cellulitis, increased pain, infected wounds, tenderness out of proportion
- ❑ **Respiratory**: cough, sputum, breathlessness
- ❑ **Abdomen**: severe pain, tenderness
- ❑ **Genitourinary**: dysuria, frequency, discharge
- ❑ **Intravenous (IV) line access**: redness, pain, swelling, discharge
- ❑ **Musculoskeletal**: swollen, painful, tender, hot joints or limbs, back pain or spinal tenderness
- ❑ **Maternity**: given birth or TOP/ miscarriage in the last 6 weeks AND increased vaginal bleeding OR new offensive discharge OR new abdominal pain

Increase your suspicion of sepsis in these patients:

- ❑ Aboriginal and Torres Strait Islander people greater than 45 years, non-Indigenous people greater than 65 years
- ❑ Homeless
- ❑ Alcohol misuse
- ❑ Previous sepsis admission
- ❑ Re-presentation
- ❑ Worsening of recently treated infection
- ❑ Recent surgery or invasive procedure
- ❑ **Chronic illnesses**: diabetes, renal failure, haemodialysis, cirrhosis
- ❑ **Bacteraemia risk**: prosthetic valves, IV drug use, implantable/indwelling medical devices
- ❑ **Immunocompromised**: HIV, cancer or immunosuppressive therapy
- ❑ Patient on beta-blockers
- ❑ Recent trauma including minor trauma

Maternity:

- ❑ Recent birth, operative or assisted birth and/or prolonged rupture of membranes and/or pre-term birth

PLUS any of the following criteria:

- ❑ Vital signs that trigger a MET call
- ❑ Vital signs that trigger a Rapid Response/Escalation in ED
- ❑ A drop in systolic blood pressure (SBP) of 40 mmHg or more compared to usual SBP

- ❑ Vital signs in the pink or yellow zone (outside of normal limits) on the observation chart
- ❑ MEWS score of 2 and above
- ❑ Lactate greater than 2 mmol/L (if known)
- ❑ White cell count greater than 12.0 x 10^9/L or less than 4.0 x 10^9/L
- ❑ New altered mental status
- ❑ Petechiae
- ❑ Unexplained severe/strong pain
- ❑ Clinician/patient/caregiver concern

- ❑ Nil escalation criteria present

RESPOND & ESCALATE

Patient may have **septic shock**	Patient may have **sepsis** or have **other causes** for deterioration	Sepsis screening negative
Ward: Call medical emergency team on *** **ED:** Notify senior emergency doctor or up-triage to ATS 1 or 2	Notify senior medical officer (SMO) for a clinical review or up-triage to ATS 2 Escalated to:_____ Time: _____	Re-screen as clinically indicated. Initial: _____

If sepsis suspected by a senior medical officer, commence the **SEPSIS BUNDLE.** Consider alternate diagnoses and simultaneous investigation and treatment for differential diagnoses.

- Sepsis/septic shock diagnosis Y / N

Time: _____ Initial: _____ Print name: _____ Role: _____

- If sepsis is not suspected **now,** document the provisional diagnosis in the medical records. Re-evaluate as clinically indicated. If patient deteriorates, re-screen by starting a new pathway.
- If to be discharged home, give patient sepsis recognition education.

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SEPSIS BUNDLE: 6 KEY ACTIONS IN 60 MINUTES*
*If patient at risk of febrile neutropenia with septic shock, administer antibiotics within 30 minutes.

Ensure management plan aligns with patient's goals of care.
If there are any clinically indicated variations in care to the pathway, document this in the patient record.

RESUSCITATE

1. Consider oxygen therapy
Maintain SpO_2 94% and above (aim 88-92% for moderate/severe COPD).
- SpO_2 maintained Y / N

2. Establish intravenous (IV) access
If unsuccessful, obtain access with intraosseous (IO) or central venous catheter.
- Access established Y / N

3. Collect blood cultures (2 sets), sputum, urine and wound MC&S prior to antibiotics (where possible) and a venous blood gas (with lactate)
Other blood tests: FBC, UEC, LFTs, CRP, blood glucose and coagulation studies.
Other investigations as indicated: CXR, urinalysis and joint aspirates.
- Blood cultures collected Y / N
- Lactate collected Y / N

Lactate level: _____ mmol/L

4. Administer IV antibiotics (check allergies)
If source unknown, use sepsis/septic shock without clear focus regimen (p.3).
If source known, use empirical regimen (p.3 to 6).
Ensure nursing staff administer antibiotics immediately.
If surgical source suspected, consult the relevant surgical team.
- 1st antimicrobial commenced Y / N
- 2nd antimicrobial commenced Y / N

5. Assess fluid state and consider fluid resuscitation
If SBP less than 100mmHg or lactate greater than 2mmol/L give 250 to 500 mL fluid bolus (0.9% sodium chloride or Hartmann's) up to 30mL/kg.
Fluid rates, end points and additional boluses must be titrated to meet patient's physiological reserve.
Assess and document baseline physiological reserve (baseline eGFR, exercise tolerance, ejection fraction).
Consider inotropes early in consultation with SMO +/- intensive care physician.
- Fluids administered Y / N
- Inotropes required Y / N

6. Monitor signs of deterioration and urine output
For the first 2 hours, monitor vital signs every 30 minutes and urine output every 60 minutes. If warranted, insert IDC.
- Fluid balance commenced Y / N
- IDC required Y / N

Bundle completed. Time: _____ Initial: _____ Print name: _____ Role: _____

RE-ASSESS & MONITOR

Re-assess and monitor observations every 30 minutes. Aim for the following:

- Targeted vital signs as per medical consultation
- Lactate less than 2 mmol/L
- Urine output greater than 0.5mL/kg/hour

Lactate level at 4 hours: Time:_____ Level: _____ mmol/L
8 hours: Time:_____ Level: _____ mmol/L

Escalate for further medical review if patient meets any of the following: *Tick below which escalation criteria apply.*

- ❑ Targeted vital signs are not achieved
- ❑ Lactate not trending down
- ❑ Urine output less than 0.5mL/kg/hour
- ❑ New altered mental state
- ❑ Clinician/patient/caregiver concern

If patient deteriorates or fails to improve, re-assess and refer to higher level of care

- Reconsider diagnosis
- Reconsider treatment
- Consider treatment as a cause for deterioration
- Follow local transfer procedure
- Use ISBAR/ISOBAR to handover to receiving team

REVIEW

The 24 hour management plan to be documented in the patient record and include: *Tick once completed/request initiated.*

- ❑ Likely source of sepsis
- ❑ Frequency of observations and monitoring
- ❑ Fluid balance
- ❑ Medication review
  - Withhold diuretic and anti-hypertensive medications
  - Review of antibiotics against microbiology sensitivities
- ❑ Consultation with relevant specialists such as infectious diseases, intensive care or surgical teams
- ❑ Sepsis diagnosis and management plan discussed with patient/family/carer and education provided

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NT Empirical Antibiotic Guide for Severe Infections – Central Australia and Barkly Regions

Disclaimer: Antibiotic protocols may change. Prescribers should check for updates to the sepsis pathway on PGC.

- Call Infectious Diseases (IFD) for advice as needed. IFD and CHAMPS should be used for restricted antimicrobial codes.
- **Call IFD or Antimicrobial Stewardship team within 48 hours of prescribing empirical restricted antimicrobials, for ongoing antibiotic advice.**
- Review antibiotics daily and de-escalate where appropriate (within 48 to 72 hours).
- Below recommendations are for normal renal function (CrCl greater than 50mL/min). Adjust dose in renal impairment.
- Refer to CHAMPS, eTG, Vancomycin – Adults and Children ≥ 12 years NT Hospitals Guideline or Aminoglycoside Dosing and Monitoring TEHS Guideline for Vancomycin and Gentamicin dosing and contraindications.
- Administer antibiotics from shortest to longest infusion times (antibiotics are listed in the order of administration).
- When administering Meropenem in patients with immediate severe or delayed penicillin hypersensitivity, administer cautiously and monitor.

Box 1: Gentamicin first dose for septic febrile neutropenia. For obese patients, use adjusted body weight (= Ideal Body Weight + 0.4 x Actual Body Weight).

Administer gentamicin over 3 to 5 minutes.

- Adults **without** known or likely kidney impairment requiring intensive care support: 7 mg/kg (maximum 680mg)
- Adults **without** known or likely kidney impairment with sepsis and febrile neutropenia: 7 mg/kg (maximum 680mg)
- Adults **with** known or likely pre-existing kidney impairment: 4 to 5 mg/kg (maximum 680mg)

Box 2: Gentamicin first dose for septic community acquired pneumonia, urinary tract infection, pelvic inflammatory disease, genitourinary infections, intra-abdominal source. For obese patients, use adjusted body weight (= Ideal Body Weight + 0.4 x Actual Body Weight).

- Adults **without** pre-existing kidney impairment with septic shock or requiring intensive care support: 7 mg/kg (maximum 680mg)
- Adults **with** pre-existing kidney impairment with septic shock or requiring intensive care support: 4 to 5 mg/kg (maximum 680mg)
- Adults **without** septic shock and not requiring intensive care support: 4 to 5 mg/kg (maximum 680mg)

*** Risk factors for ESBL (extended spectrum beta-lactamase producing bacteria):**

Previous colonisation/infection with resistant bacteria, recent high-risk travel (Asia, southern/eastern Europe), prolonged hospitalisation or recent intensive care unit admission, long-term care facility resident or renal patients.

β Risk factors for MRSA (methicillin-resistant *Staphylococcus aureus*): resident from a jail/detention centre, Aboriginal and Torres Strait Islander people, previous MRSA colonisation and line-associated infection.

Monitor renal function if using Piperacillin/Tazobactam and Vancomycin in combination. Avoid combination for longer than 72 hours.

	Preferred therapy	Immediate non-severe or delayed non-severe penicillin hypersensitivity	Immediate severe (anaphylaxis) or delayed severe penicillin hypersensitivity (SJS, TEN, DRESS, interstitial nephritis)
SEPSIS OR SEPTIC SHOCK WITHOUT CLEAR FOCUS			
SEPSIS OR SEPTIC SHOCK WITHOUT CLEAR FOCUS	**(Community Acquired)**		
	Gentamicin IV (refer to Box 2) as a single dose, **AND THEN** Flucloxacillin 2g IV 4 hourly **OR** Cefazolin 2g IV 6 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	
	(Hospital Acquired)		
	Piperacillin/Tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	
FEBRILE NEUTROPENIA WITH SEPSIS/SEPTIC SHOCK	Piperacillin/Tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	
	For febrile neutropenia without sepsis/septic shock refer to **Febrile Neutropenia Initial Management ASH Pathway.**		

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	Preferred therapy	Immediate non-severe or delayed non-severe penicillin hypersensitivity	Immediate severe (anaphylaxis) or delayed severe penicillin hypersensitivity (SJS, TEN, DRESS, interstitial nephritis)
RESPIRATORY SYSTEM			
SEVERE COMMUNITY ACQUIRED PNEUMONIA SMART-COP = 5 OR HIGHER	Ceftriaxone 1g IV 12 hourly *If possibility of melioidosis,* **USE** Meropenem 1g IV 8 hourly instead **AND** Azithromycin 500mg IV 24 hourly *Consider* Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV		Moxifloxacin 400mg IV 24 hourly *If possibility of melioidosis,* **ADD** Meropenem 1g IV 8 hourly *Consider* Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV
SEVERE COMMUNITY ACQUIRED PNEUMONIA SMART-COP = LESS THAN 5	Ceftriaxone 1g IV 12 hourly **AND** Azithromycin 500mg IV 24 hourly		Moxifloxacin 400mg IV 24 hourly
SEVERE HOSPITAL ACQUIRED PNEUMONIA	Piperacillin/Tazobactam 4.5g IV 6 hourly **AND** Vancomycin # loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Cefepime 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Ciprofloxacin 400mg IV 8 hourly **OR** Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV
CENTRAL NERVOUS SYSTEM			
MENINGITIS Not associated with shunts or neurological procedure Call IFD	Ceftriaxone 2g IV 12 hourly		Moxifloxacin 400mg IV 24 hourly
	ADD Dexamethasone 10mg IV 6 hourly for 4 days prior to or with administration of antibiotics. *If patient has risk factors for Listeria* such as elderly, alcohol abuse, pregnant and/or immunocompromised, **ADD** Benzylpenicillin 2.4g IV 4 hourly (use Trimethoprim-Sulfamethoxazole 5+25mg/kg [maximum dose 480+2400 mg] IV 8 hourly for severe penicillin allergy). For duration of therapy refer to eTG. *If viral encephalitis suspected,* **ADD** Aciclovir 10mg/kg IV 8 hourly. If gram-positive cocci in CSF, LP not undertaken, pneumococcal PCR positive, recent sinusitis/otitis media or beta-lactam antibiotics **ADD** Vancomycin loading dose 25mg to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) and **THEN REGULAR** Vancomycin IV		
GENITOURINARY			
SEVERE PYELONEPHRITIS	Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function **AND** Ampicillin 2g IV 6 hourly. *If amino-glycoside contraindicated*, **USE** Ceftriaxone 2g IV 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function *If aminoglycoside contraindicated,* **USE** Ceftriaxone 2g IV 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function *If aminoglycoside contraindicated,* call IFD
PELVIC INFLAMMATORY DISEASE	Ceftriaxone 2g IV 24 hourly (if septic shock or ICU Ceftriaxone 1g 12 hourly) **AND** Azithromycin 500mg IV 24 hourly **AND** Metronidazole 500mg IV 12 hourly		Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function **AND** Azithromycin 500mg IV 24 hourly **AND** Clindamycin 600mg IV 8 hourly

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	Preferred therapy	Immediate non-severe or delayed non-severe penicillin hypersensitivity	Immediate severe (anaphylaxis) or delayed severe penicillin hypersensitivity (SJS, TEN, DRESS, interstitial nephritis)
GASTROINTESTINAL			
INTRA-ABDOMINAL **Source Unknown**	Ampicillin 2g IV 6 hourly **AND** Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function **AND** Metronidazole 500mg IV 12 hourly. *If aminoglycoside contraindicated,* **USE** Piperacillin/Tazobactam 4.5g IV 6 hourly instead	Ceftriaxone 1g IV 12 hourly **AND** Metronidazole 500mg IV 12 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) daily for up to 3 days dependent on renal function **AND** Clindamycin 600mg IV 8 hourly *If aminoglycoside contraindicated,* **USE** Meropenem 1g IV 8 hourly
	Consider antifungal therapy if yeast identified from deep surgical sites or involvement of upper GI, **call IFD**		
BONE, JOINT, SOFT TISSUE, SKIN			
CELLULITIS	Cefazolin 2g IV 8 hourly *If MRSA[β] suspected*, **ADD** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Cefazolin 2g IV 8 hourly *If MRSA[β] suspected*, **ADD** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV
	ADD Clindamycin 600mg IV 8 hourly if suspected toxic shock syndrome and discuss IVIG with IFD. Consider MRSA cover in presence of skin abscesses.		
WATER-ASSOCIATED INFECTION **Call IFD**	Cefepime 2g IV 8 hourly **AND** Metronidazole 500mg IV 12 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV *If sea water exposed,* **ADD** Ciprofloxacin 400mg IV 8 hourly		Ciprofloxacin 400mg IV 8 hourly **AND** Clindamycin 600mg IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCL less than 20mL/min) **THEN REGULAR** Vancomycin IV
NECROTISING FASCIITIS **Call surgeon and IFD**	Meropenem 1g IV 8 hourly **AND** Clindamycin 600mg IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than20mL/min) **THEN REGULAR** Vancomycin IV and discuss IVIG with IFD.		
	If immersed in water, **ADD** Ciprofloxacin 400mg IV 8 hourly		
SEPTIC ARTHRITIS	Ceftriaxone 1g IV 12 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV		Ciprofloxacin 400mg IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV
	Take diagnostic samples as soon as possible. **Urgent** empirical therapy and early surgical intervention is essential for patients with septic arthritis complicated by sepsis. Acute rheumatic fever may present as an acute mono-arthritis and should be excluded in Aboriginal and Torres Strait Islander peoples.		

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DIABETIC FOOT INFECTION	Piperacillin/Tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Ciprofloxacin 400mg IV 8 hourly **AND** Clindamycin 900mg IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	
INTRAVASCULAR CATHETER RELATED SEPSIS **Remove line-discuss with team**	Piperacillin/Tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Ceftazidime 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV (20mg/kg if CrCl less than 20mL/min) **THEN REGULAR** Vancomycin IV
	Use Meropenem instead of Piperacillin/Tazobactam or Ceftazidime if known colonisation with or risk factors for ESBL*****. Discuss with IFD if *Candida* cover required with septic shock/high risk (e.g., prolonged prior antibiotic exposure, potential upper gastrointestinal source or parenteral nutrition)		

Sepsis Resources for Health Professionals