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.

Sepsis screening on DD / MM / YY **at** HH : MM **Name:** Clinician

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.

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

- ❑ Fever, 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

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, cardiac implantable electronic device, indwelling medical devices
- ❑ **Immunocompromised**: HIV, cancer or immunosuppressive therapy
- ❑ Patient on beta-blockers
- ❑ Recent trauma including minor trauma

PLUS any of the following criteria:

- ❑ Vital signs that trigger a MET call
- ❑ A drop in systolic blood pressure (SBP) of 40 mmHg compared to usual SBP

- ❑ Vital signs in the pink or yellow zone on the observation chart
- ❑ Alice Springs Hospital criteria: MEWS score of 2 and above
- ❑ Lactate greater than 2 mmol/L
- ❑ 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
- ❑ Clinical/patient/caregiver concern

RESPOND & ESCALATE

Patient may have **septic shock**	Patient may have **sepsis** or have **other causes** for deterioration
Ward: Call medical emergency team on ***	Notify senior medical officer (SMO) for a clinical review or allocate ATS 2
ED: Notify senior emergency doctor or allocate ATS 1 or 2	

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

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 using this 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.

RESUSCITATE

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.

1. Consider oxygen therapy	❑
2. Establish intravenous (IV) access If unsuccessful, obtain access with intraosseous (IO) or central venous catheter.	❑
3. Collect blood cultures prior to antibiotics (where possible) and a blood gas (with lactate) Other blood tests: FBC, UEC, LFTs, CRP, blood glucose and coagulation studies. Other investigations as indicated: CXR, urinalysis, urine culture, sputum culture, joint aspirates, cryptococcal Ag, wound and melioid swabs.	Blood cultures ❑ First Lactate ❑
4. Administer IV antibiotics (check allergies) If source unknown, use undifferentiated sepsis/septic shock antibiotic regimen (page 3). If source known, use empirical antibiotic regimen (page 3 to 5). Ensure nursing staff administer antibiotics immediately. If source suspected, consult relevant surgical team as surgical intervention may be warranted.	❑
5. Assess fluid state and consider fluid resuscitation If SBP less than 100mmHg or lactate greater than 2mmol/L commence 250 to 500 mL 0.9% sodium chloride or Hartmann's (up to 30mL/kg). Fluid rate and end points 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.	❑
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.	❑

RE-ASSESS AND MONITOR

Re-assess and monitor observations. 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

Escalate for a medical review if patient meets any of the following:

- ❑ Targets not achieved
- ❑ Vital signs in the coloured zone (follow escalation process)
- ❑ Lactate not trending down
- ❑ Urine output less than 0.5mL/kg/hour
- ❑ New altered mental state
- ❑ Clinician/patient/caregiver concerns

If patient deteriorates or fails to improve, reassess and refer to higher level of care

- ❑ Follow local transfer procedure
- ❑ Discuss management plan with patient and/or caregiver (ensure sepsis is explained)
- ❑ Use ISOBAR/ISBAR to handover to receiving team
- ❑ Reconsider diagnosis
- ❑ Reconsider treatment
- ❑ Consider treatment as a cause of deterioration

REVIEW

The 24 hour management plan to be documented in the patient record and include:

- ❑ Likely source of infection
- ❑ 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 (ID) or intensive care teams

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NT Empirical Antibiotic Guide for Severe Infections

- Review antibiotics daily and de-escalate where appropriate (within 48 to 72 hours).
- Call ID specialist for advice and approval for restricted antibiotics as required.
- Below recommendations are for normal renal function (CrCl greater than 50mL/min). Adjust dose in renal impairment.
- Refer to TEAMS, CHAMPS, eTGA, Vancomycin – Adults and Children ≥ to 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 in a critical care area and monitor for reaction.

Box 1: Gentamicin first dose for septic febrile neutropenia. For obese patients, use adjusted 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, PID, genitourinary infections, intra-abdominal source. For obese patients, use adjusted 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:**

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: residence 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)
UNDIFFERENTIATED SEPSIS OR SEPTIC SHOCK			
UNDIFFERENTIATED SEPSIS OR SEPTIC SHOCK	**Central Australia (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 **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly (call ID on call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Central Australia (Hospital Acquired) and Top End Dry Season		
	Piperacillin/tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly (call ID on call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Top End Wet Season		
	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly (call ID on call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
FEBRILE NEUTROPENIA AND SEPSIS/SEPTIC SHOCK	**Central Australia**		
	Piperacillin/tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly (call ID on call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV

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FEBRILE NEUTROPENIA AND SEPSIS/SEPTIC SHOCK	**Top End Dry Season**		
	Gentamicin 4 to 7mg/kg IV as a single dose (refer to box 1) **AND** Piperacillin/tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Gentamicin 4 to 7mg/kg IV as a single dose (refer to box 1) **AND** Ceftazidime 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV *if suspected abdominal or peritoneal infection,* **ADD** Metronidazole 500mg IV 12 hourly	Meropenem 1g IV 8 hourly (call ID on call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Top End Wet Season		
	Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		
	For febrile neutropenia without sepsis/septic shock refer to **TEHS Adult Febrile Neutropenia Guideline**		
RESPIRATORY SYSTEM			
SEVERE COMMUNITY ACQUIRED PNEUMONIA Requiring ICU	**Central Australia**		
	Ceftriaxone 1g IV 12 hourly **AND** Azithromycin 500mg IV 24 hourly. *Consider* Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		Moxifloxacin 400mg IV 24 hourly *Consider* Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin
	Top End Dry Season		
	Piperacillin/tazobactam 4.5g IV 6 hourly # **AND** Azithromycin 500mg IV 24 hourly *If MRSA[β] suspected,* **ADD** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly **AND** Azithromycin 500mg IV 24 hourly *If MRSA[β] suspected,* **ADD** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	
	Top End Wet Season		
	Meropenem 1g IV 8 hourly **AND** Azithromycin 500mg IV 24 hourly *If MRSA[β] suspected,* **ADD** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		
SEVERE COMMUNITY ACQUIRED PNEUMONIA Not requiring ICU	**Central Australia**		
	Ceftriaxone 1g IV 12 hourly **AND** Azithromycin 500mg IV 24 hourly	Ceftriaxone 1g IV 12 hourly **AND** Azithromycin 500mg IV 24 hourly	Moxifloxacin 400mg IV 24 hourly
	Top End		
	Gentamicin 4 to 7mg/kg IV then review (refer to box 2) **AND** Ceftriaxone 2g IV 24 hourly **AND** Doxycycline 100mg PO 12 hourly		Meropenem 1g IV 8 hourly (call ID on call first) **AND** Doxycycline 100mg PO 12 hourly
SEVERE HOSPITAL ACQUIRED PNEUMONIA	**Top End and Central Australia**		
	Piperacillin/tazobactam 4.5g IV 6 hourly **AND** Vancomycin # loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Cefepime 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Ciprofloxacin 400mg IV 8 hourly **OR** Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Top End		
	ADD Gentamicin 4 to 7mg IV then review (refer to box 2)		
GENITOURINARY			
PELVIC INFLAMMATORY DISEASE	Ceftriaxone 2g IV 24 hourly **(i**f 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) **AND** Azithromycin 500mg IV 24 hourly **AND** Clindamycin 600mg IV 8 hourly
SEVERE PYELONEPHRITIS	**Central Australia**		
	Gentamicin 4 to 7mg/kg IV (refer to box 2) **AND** Ampicillin 2g IV 6 hourly *If aminoglycoside contraindicated*, **USE** Ceftriaxone 1g 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) *If aminoglycoside contraindicated,* **USE** Ceftriaxone 1g 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) *If aminoglycoside contraindicated,* call ID on-call.

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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)
SEVERE PYELONEPHRITIS	**Top End**		
	Gentamicin 4 to 7mg/kg IV (refer to box 2) **AND** Cefazolin 2g IV 8 hourly *If aminoglycosides contraindicated*, **USE** Ceftriaxone 2g IV 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) **AND** Cefazolin 2g IV 8 hourly *If aminoglycosides contraindicated*, **USE** Ceftriaxone 2g IV 24 hourly	Gentamicin 4 to 7mg/kg IV (refer to box 2) *If aminoglycosides contraindicated,* call ID on-call.
GASTROINTESTINAL (GI)			
INTRA-ABDOMINAL Source Unknown	Ampicillin 2g IV 6 hourly **AND** Gentamicin 4 to 7mg/kg IV (refer to box 2) **AND** Metronidazole 500mg IV 12 hourly *If aminoglycoside contraindicated,* **USE** Piperacillin/tazobactam 4.5g IV 6 hourly instead	**Central Australia**	
		Ceftriaxone 2g IV 24 hourly **AND** Metronidazole 500mg IV 12 hourly	Meropenem 1g IV 8 hourly
		Top End	
		Ceftriaxone 2g IV 24 hourly **AND** Metronidazole 500mg IV 12 hourly **AND** Gentamicin 4 to 7mg/kg IV (refer to box 2)	Clindamycin 600mg IV 8 hourly **AND** Gentamicin 4 to 7mg/kg IV (refer to box 2)
	Consider antifungal therapy if yeast identified from deep surgical sites or involvement of upper GI, **call ID**		
BONE, JOINT, SOFT TISSUE, SKIN			
CELLULITIS	Flucloxacillin 2g IV 6 hourly **OR** *if MRSA$^{\beta}$ suspected*, **USE** Cefazolin 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Cefazolin 2g IV 8 hourly ***If*** *MRSA$^{\beta}$ suspected*, **ADD** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	ADD Clindamycin 600mg IV 8 hourly if suspected toxic shock syndrome and discuss IVIg with ID. Consider MRSA cover in presence of skin abscesses.		
WATER-ASSOCIATED INFECTION Call ID	Ciprofloxacin 400mg IV 8 hourly, Meropenem 1g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		
	ADD Clindamycin 600mg IV 8 hourly if crocodile or shark bite		
NECROTISING FASCIITIS Call surgeon and ID	Meropenem 1g IV 8 hourly **AND** Clindamycin 600mg IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		
	If immersed in water, **ADD** Ciprofloxacin 400mg IV 8 hourly		
DIABETIC FOOT INFECTION	Piperacillin/tazobactam 4.5g IV 6 hourly # **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Ciprofloxacin 400mg IV 8 hourly **AND** Clindamycin 900mg 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	
SEPTIC ARTHRITIS	Ceftriaxone 2g IV 24 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV		Ciprofloxacin 400mg IV 12 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Take diagnostic samples **before** starting antibiotic therapy. **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.		
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 **AND CHART REGULAR** Vancomycin IV	Ceftazidime 2g IV 8 hourly **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV	Meropenem 1g IV 8 hourly (call ID on-call first) **AND** Vancomycin loading dose 25 to 30mg/kg IV **AND CHART REGULAR** Vancomycin IV
	Use Meropenem instead of Piperacillin/tazobactam or Ceftazidime if known colonisation with or risk factors for ESBL*****. Discuss with ID if Candida cover required with septic shock/high risk (e.g. prolonged prior antibiotic exposure, potential upper gastrointestinal source or parenteral nutrition)		
CENTRAL NERVOUS SYSTEM			
MENINGITIS Not associated with shunts or neurological procedure **Call ID**	Ceftriaxone 2g IV 12 hourly		Moxifloxacin 400mg IV 24 hourly
	ADD Dexamethasone 10mg IV 6 hourly for 4 days. *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 penicillin hypersensitivity). For duration of therapy refer to eTGA. 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 IV 25mg to 30mg/kg and then **CHART REGULAR** Vancomycin IV		

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