Sepsis Toolkit

Sepsis Program Implementation Guide for NSW Healthcare Facilities

Version 4 (October 2013)
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Foreword

Sepsis is a world-wide public health issue. In Australia, sepsis claims thousands of lives each year. Sepsis causes more deaths per year than prostate cancer, breast cancer and HIV/AIDS combined ¹. The incidence of sepsis is escalating as the population ages, and its treatment is becoming an increasingly significant burden on national health care expenditure.

Sepsis arises when the body’s response to infection causes a generalised inflammatory response. It is a medical emergency just like a heart attack or stroke, and can lead to shock, multiple organ failure and death, especially if not recognised early and treated promptly.

The Clinical Excellence Commission launched the *Sepsis Kills* Program in May 2011. The Program seeks to engage and support our clinical staff in hospitals across NSW. Together we aim to facilitate sustainable improvement in the recognition and management of severe infection and sepsis throughout New South Wales.

Sepsis awareness, early identification, resuscitation and referral to specialist care will ensure that all patients with sepsis receive timely and appropriate care. I encourage each of your facilities, and all of your staff (clinical and managerial) to implement the *Sepsis Kills* Program:

- It does offer improvement in sepsis mortality
- It will lessen morbidity associated with infection
- It is all about our patients.

Professor Cliff Hughes AO  
CHIEF EXECUTIVE OFFICER  
CLINICAL EXCELLENCE COMMISSION
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Purpose of the Sepsis Toolkit

The Sepsis Toolkit aims to provide local health districts (LHDs) and healthcare facility staff with an easy to use guide to improve the recognition and management of sepsis in adults and paediatrics. The Sepsis Toolkit has been developed from the collective knowledge and experience of clinicians and Clinical Excellence Commission (CEC) staff who have been actively involved in the Sepsis Kills Program development and implementation.

As far as possible the Sepsis Toolkit focuses on the necessary tasks and minimises the use of terminology. It is highly recommended that key implementation staff in healthcare facilities read all Sepsis Toolkit material prior to commencement of the Sepsis Kills Program.

The CEC envisages that as the Program is implemented throughout NSW, new tools and resources will be developed in response to clinician feedback and program needs. As new resources are developed, they will be added to the online Sepsis Toolkit which is available on the CEC website www.cec.health.nsw.gov.au/programs/sepsis. Tools and resources on the CEC website are in PDF format. The CEC will provide documents on request in Microsoft Word format to enable facilities to adapt the tools to suit local needs.
Sepsis Kills Program overview

Appropriate recognition and timely management of patients with severe infection and sepsis is a significant problem in NSW hospitals and healthcare facilities around the world. Severe sepsis and septic shock are associated with high morbidity and a mortality rate of around 25%\(^2\) and have significant impact on the patients and the healthcare system.

The mortality rate for adult patients with septic shock has been shown to increase by 7.6% for every hour of delay after the onset of hypotension, in commencing antibiotic therapy\(^3\). In paediatric patients, sepsis is one of the leading causes of death with mortality rates as high as 10% and many of these deaths are preventable.\(^4\)

Sepsis has been identified by the NSW Clinical Risk Review Committee as a recurrent problem. The findings from the CEC Clinical Focus Report on the Recognition and Management of Sepsis\(^5\) demonstrated significant deficits in the identification and management of sepsis in a range of clinical settings. The detection and management of sepsis was included in the CEC Quality Systems Assessment for 2011 and showed variable and often non-existent approaches to the detection and management of sepsis across New South Wales.

The CEC Sepsis Kills Economic Analysis\(^6\) estimates that if the status quo is maintained over the next ten years, sepsis-related conditions in the NSW health system will constitute $3.7billion, 1.3million bed days, 701,000 cost weighted separations and an unknown number of potentially avoidable deaths.

The Sepsis Kills Program is based on quality and safety improvement principles and international evidence based practice.\(^7,8,9\) The Program outlines a concerted effort by the CEC to collaborate with clinicians to improve the recognition and treatment of sepsis and septic shock and to reduce their impact, mortality and financial costs in NSW.

Key elements of the Sepsis Kills Program are:

- **Recognition** of risk factors, signs and symptoms of sepsis
- **Resuscitation** with rapid intravenous fluids and administration of antibiotics within the first hour of recognition of sepsis
- **Referral** to senior clinicians and teams including retrieval if appropriate
The *Sepsis Kills* Program has been introduced into NSW public hospitals in a phased approach (diagram 1).

**Diagram 1:**

<table>
<thead>
<tr>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase 1</strong></td>
<td><strong>Phase 2.1</strong></td>
<td><strong>Phase 2.2</strong></td>
<td><strong>2014</strong></td>
</tr>
<tr>
<td>May 2011</td>
<td>August 2012</td>
<td>2013</td>
<td>2014</td>
</tr>
<tr>
<td><strong>SEPSIS KILLS</strong> Program launched in EDs in medium and large hospitals in NSW</td>
<td><strong>SEPSIS KILLS</strong> Program extended into EDs and wards in small hospitals in NSW</td>
<td><strong>SEPSIS KILLS</strong> paediatric resources for EDs roll-out</td>
<td><strong>SEPSIS KILLS</strong> Program roll out to inpatient wards in NSW</td>
</tr>
<tr>
<td></td>
<td>November 2012 paediatric sepsis pilot study</td>
<td>Inpatient ward pilot study in selected large hospitals in NSW</td>
<td>Program evaluation</td>
</tr>
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</table>

**Phase 1** commenced in May 2011 and is focussed on the recognition and management of sepsis in emergency departments. Clinician engagement has been high and clinical governance units have worked collaboratively with the CEC to provide support for the Program at LHD and facility levels.

**Paediatric** sepsis resources including a clinical pathway and education package have been developed for emergency departments throughout NSW.

**Phase 2.1** commenced in 2012 and focuses on implementation in emergency departments and inpatient wards of small facilities in rural and remote areas of NSW. Many of these sites are staffed by General Practitioner visiting medical officers and locum staff.

**Phase 2.2** focuses on implementation in inpatient wards. Preliminary data suggests that 30% of deteriorating hospital inpatients requiring a Rapid Response are septic.

This phase commenced piloting tools and resources in 2013 in selected inpatient wards. Large healthcare facilities require a staged approach to optimally manage implementation in the complex inpatient environment.
Links between the Sepsis Kills Program and other quality and safety initiatives have been strongly established to ensure an integrated and comprehensive approach in the management of patients with sepsis. These initiatives include the Clinical Excellence Commission programs for Between the Flags, Quality Systems Assessment, Falls, In Safe Hands, Antimicrobial Stewardship, Healthcare Associated Infections, Partnering with Patients and the Agency for Clinical innovation (ACI) Care of the Hospitalised Older Person (Delirium) Program.
Implementation

The Sepsis Kills Program is a quality improvement initiative and aims to improve the recognition and timely management of sepsis in acute hospitals in NSW. The expected Program outcome is a reduction in sepsis mortality and morbidity.

Governance and Administration

The success and long term sustainability of the Sepsis Kills Program will depend crucially on appropriate governance structures and processes at all levels of the healthcare facility. Strong leadership by both management and clinicians will enable a top-down, bottom-up approach to drive and sustain improved outcomes for patients with sepsis.

Where possible it is recommended that the governance for the Sepsis Kills Program is integrated with existing structures for the recognition and management of patients who are clinically deteriorating. This will promote and further embed the Between the Flags Program and provide an established framework for the recognition and management of the patient with sepsis in both the emergency department and hospital inpatient settings.
Roles of key staff

To streamline the implementation of the Sepsis Kills Program, each LHD and healthcare facility will need to identify and appoint key position holders with operational responsibility for implementation of the Program.

Suggested roles and responsibilities are detailed below.

LHD Chief Executive

- Responsibility for governance of LHD initiatives to improve the recognition and management of sepsis
- Dissemination of information to the LHD regarding the Sepsis Kills Program and timeframes for implementation and reporting.

LHD Clinical Governance

- Engage collaboratively with the CEC to develop appropriate implementation frameworks for each LHD
- Establish an effective governance structure for the LHD including integration with existing deteriorating patient initiatives and risk management frameworks
- Support the facility Executive sponsors by advising on Sepsis Kills Program implementation, monitoring and reporting
- Incorporate Sepsis Kills Program monitoring via the LHD peak quality and safety committee, Clinical Council and other relevant LHD meetings.

Facility Executive Sponsor

- Establish an effective governance structure for the healthcare facility including integration with existing deteriorating patient initiatives and risk management frameworks
- Establish an advisory/implementation committee/group – consider incorporation with an existing committee/group
- Incorporate sepsis on the facility risk register
- Identify and allocate resources to support implementation
- Ensure that all key personnel have been identified and appointed including medical and nursing clinical leads for each ward/unit
- Assist and support clinical leads by endorsing the Sepsis Kills Program as a vital initiative which is part of the deteriorating patient program.
Medical and nursing clinical leads

- Work with the Executive Sponsor in the development of local implementation plan for the Program
- Promote and drive the *Sepsis Kills* Program in the ward/unit in close collaboration with the nursing and medical ward/unit heads
- Coordinate awareness and education sessions for the *Sepsis Kills* Program
- Coordinate data collection to measure improvement in the recognition and management of patients with sepsis
- Attend regular teleconferences hosted by the CEC for facility support and updates
- Provide on-going feedback and progress reports to the facility executive sponsor.

Suggestions for advisory/implementation groups or committees

- Ensure there is representation from relevant clinical staff and subgroups including *Between the Flags* Program, *Antimicrobial Stewardship* Program, resuscitation committee, pathology services, after hours clinical services
- Amend terms of reference (if an existing committee) to include the *Sepsis Kills* Program key elements of recognition, resuscitation and referral
- Ensure linkages between the facility and LHD quality and safety committee and sepsis advisory/implementation group or committee
- Implement a communication plan to engage department and ward/unit heads
- Co-ordinate awareness and education sessions for all staff
- Ensure *Sepsis Kills* Program materials are freely available and distributed widely
- Monitor the progress of implementation and ensure that problems and risks are identified and reported to the facility management.
Developing an Implementation Plan

It is highly recommended that a local implementation plan is developed to facilitate a robust process for rollout and sustainability.

A number of primary drivers have been identified to improve the recognition and timely management of sepsis. Each of the primary drivers has a series of secondary drivers which are key action strategies that will lead to successful clinical practice improvement — see the Sepsis Kills Program Framework below.

A series of change concepts and ideas have been identified for each of the secondary drivers. The Sepsis Kills Program Implementation Plan shows the primary and secondary drivers and the associated change ideas.

It should be noted that some change ideas will not be relevant for all facilities and they can be adapted to suit local needs based on facility size, purpose and available resources.

The following is a framework for the implementation plan.
**Sepsis Kills Program Framework**

**Aim:** To improve the recognition and timely management of sepsis in acute hospitals in NSW  
**Expected outcome:** Reduction in healthcare facility sepsis mortality and morbidity

<table>
<thead>
<tr>
<th>PRIMARY DRIVER</th>
<th>SECONDARY DRIVER</th>
</tr>
</thead>
</table>
| 1. Culture of quality and safety improvement | Executive sponsorship  
Multidisciplinary team/group/committee to drive improvement  
Clinical leadership  
Measurement frameworks to guide improvement |
| 2. Reliable sepsis recognition and escalation | Reliable sepsis screening  
Timely notification and assessment by a senior clinician or team  
Culture of early and repeated lactate measurement |
| 3. Reliable sepsis management | Reliable delivery of Sepsis Six (adult), and resuscitation treatment guideline (paediatrics)  
- Administer O₂ to maintain SpO₂ > 95%  
- Blood cultures taken before administration of antibiotics  
- Lactate measurement  
- Administration of IV fluid challenge  
- Administration of IV antibiotics within one hour of diagnosis  
- Ongoing patient monitoring and assessment |
| 4. Seamless transitions of care | Effective transition with/between in-patient units  
Effective transition with other facilities/jurisdictions |
| 5. Education and awareness | Communication of *Sepsis Kills* Program  
Staff training on clinical knowledge and skills |
### Sepsis Kills Implementation Plan

**Note:** The change ideas can be adapted to suit the local environment. They can be implemented in any order and concurrently.

<table>
<thead>
<tr>
<th>PRIMARY DRIVER</th>
<th>SECONDARY DRIVER</th>
<th>CHANGE IDEA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Culture of quality and safety improvement</td>
<td>Executive sponsorship</td>
<td>Establish facility Executive sponsor for sepsis improvement</td>
</tr>
<tr>
<td></td>
<td>Multidisciplinary team/group/committee to drive improvement</td>
<td>Consider incorporation with an existing committee/group such as BTF deteriorating patient</td>
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<tr>
<td></td>
<td></td>
<td>Include medical, nursing, intensive care, pharmacy, infectious diseases, clinical governance etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Brainstorm the causes of inadequate or delayed recognition and treatment of sepsis</td>
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<tr>
<td></td>
<td>Clinical leadership</td>
<td>Establish senior nursing and medical lead clinicians in the department/ward/unit and facility</td>
</tr>
<tr>
<td></td>
<td>Measurement frameworks to guide improvement</td>
<td>Establish measures and monitoring processes for wards/units</td>
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<tr>
<td></td>
<td></td>
<td>Establish a process for ongoing data collection and entry in the online CEC sepsis database</td>
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<td></td>
<td>Display sepsis data and discuss at department/ward/unit forums</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include sepsis recognition and management in the department/ward/unit and facility clinical risk management system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include sepsis as a standing agenda item on the facility quality and safety committee meeting linking with deteriorating patient monitoring</td>
</tr>
<tr>
<td>2. Reliable sepsis</td>
<td>Reliable sepsis screening</td>
<td>Implement sepsis pathway or worksheet</td>
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<tr>
<td>PRIMARY DRIVER</td>
<td>SECONDARY DRIVER</td>
<td>CHANGE IDEA</td>
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<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>recognition and escalation</td>
<td></td>
<td>Place sepsis pathway in patient care notes/bed areas/triage</td>
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<tr>
<td></td>
<td></td>
<td>Consider sepsis screening as part of clinical handover</td>
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<tr>
<td></td>
<td></td>
<td>Develop process for communication across clinical teams of patients at higher risk of sepsis</td>
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<tr>
<td></td>
<td>Timely notification and assessment by a senior clinician or team</td>
<td>Link sepsis Program with local Clinical Emergency Response System (CERS, Between the Flags Program)</td>
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<tr>
<td></td>
<td></td>
<td>Promote sepsis as one of the top 5 causes of clinical deterioration and a clinical emergency</td>
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<tr>
<td></td>
<td></td>
<td>Utilise standardised communication or ISBAR to escalate care of the patient with possible sepsis</td>
</tr>
<tr>
<td>3. Reliable sepsis management</td>
<td>Ensure reliable delivery of sepsis management</td>
<td>Utilise sepsis packs or trolley including sepsis pathway, oxygen masks/tubing, pathology forms, blood tubes/bottles/cultures, IV antibiotics, syringes, IV sets and IV fluids</td>
</tr>
<tr>
<td></td>
<td>Blood cultures taken before administration of antibiotics</td>
<td>Promote use of the <em>Sepsis Kills</em> or local blood culture sampling guideline</td>
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</tbody>
</table>
|                               | Early source control | Initiate investigations to identify source of infection, e.g. chest x ray, ultrasound, urine/sputum/wound/other cultures  
**DO NOT delay antibiotic administration waiting for results** |
<p>|                               | Culture of early and repeated lactate measurement | Educate staff on the importance and relevance of lactate in patients who could be/are septic |
|                               |                  | Establish a process for prompt lactate results including point of care lactate testing e.g. VBG, iStat machine |</p>
<table>
<thead>
<tr>
<th>PRIMARY DRIVER</th>
<th>SECONDARY DRIVER</th>
<th>CHANGE IDEA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standardise the pathology order set for patients with sepsis including blood culture and lactate default</td>
<td></td>
</tr>
<tr>
<td>Administration of IV fluid challenge</td>
<td>Implement <em>Sepsis Kills</em> pathway resuscitation guideline for IV fluid challenge (20mL/kg) or 250ml boluses with rigorous assessment process in place</td>
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<td></td>
<td>Ensure accessible IV fluids with a rapid method of infusion are made available in each area where appropriate (sepsis kits/trolley including blood pump set, pressure bag)</td>
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<tr>
<td>Administration of IV antibiotics within one hour of diagnosis</td>
<td>Implement process for review/establishment of IV access at time of sepsis diagnosis</td>
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<tr>
<td></td>
<td>Implement use of Sepsis First Dose Empirical Intravenous Antibiotic Guideline. Adapt locally in consultation with pharmacy and infectious diseases</td>
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<tr>
<td>Continued patient assessment</td>
<td>Establish minimum monitoring requirements for patients with diagnosis of sepsis including vital signs and fluid balance</td>
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<tr>
<td></td>
<td>Implement escalation process in line with Clinical Emergency Response System and local deteriorating patient guidelines</td>
<td></td>
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<tr>
<td><strong>4. Seamless transitions of care</strong></td>
<td><strong>Effective transition with/between inpatient units</strong></td>
<td>Promote early communication with department/ward/unit where patient is being transferred</td>
</tr>
<tr>
<td></td>
<td>Standardise clinical handover for patients with sepsis using ISBAR</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Effective transition with other facilities/jurisdictions</strong></td>
<td>Promote early communication with retrieval service and ensure staff are aware of transfer processes and telephone numbers</td>
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<tr>
<td></td>
<td>- Adult Medical Retrieval Service 1800 650 004</td>
<td></td>
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<tr>
<td></td>
<td>- NETS NSW 1300 36 2500</td>
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<tr>
<td></td>
<td>- Local Critical Care Advisory Service</td>
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<tr>
<td>PRIMARY DRIVER</td>
<td>SECONDARY DRIVER</td>
<td>CHANGE IDEA</td>
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<tr>
<td></td>
<td>Promote regular liaison with small/referral sites to discuss management and transfer issues</td>
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</tbody>
</table>
| 5. Education and awareness | Communication of *Sepsis Kills* Program | Develop communication plan to inform all staff regarding the burden of sepsis, case for change and *Sepsis Kills* Program including:  
  - Individual staff follow up/feedback  
  - Presentations at staff forums  
  - Newsletters  
  - Sepsis information boards and data display in wards  
  - Standing agenda item on ward/department meetings, M&M meetings, quality and safety meetings  
  - Grand Round presentations |
|                | Staff training on clinical knowledge and skills | Develop sepsis education plan to include  
  - Rapid response/CERS team training  
  - New staff orientation (ward/unit, JMOs, registrars)  
  - In-service education  
  - Self-directed learning packages  
  - CEC/HETI *Sepsis Kills* online module  
  - Posters  
  - Sepsis reference cards  
  - Integration of sepsis scenarios into DETECT |
### Sepsis Kills Program Checklist

The Sepsis Kills Program checklist gives the implementation team a tool to check the major tasks that need to be completed for implementation.

<table>
<thead>
<tr>
<th>Key task</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Executive sponsor</td>
<td></td>
</tr>
<tr>
<td>2. Sepsis advisory/implementation group or committee</td>
<td></td>
</tr>
<tr>
<td>3. Implementation plan</td>
<td></td>
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<tr>
<td>4. Clinical leads</td>
<td></td>
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<tr>
<td>5. Sepsis pathway</td>
<td></td>
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<tr>
<td>6. Antibiotic guideline</td>
<td></td>
</tr>
<tr>
<td>7. Sepsis pack or trolley</td>
<td></td>
</tr>
<tr>
<td>8. Pathology process including lactate testing</td>
<td></td>
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<tr>
<td>9. Data collection process</td>
<td></td>
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<tr>
<td>10. Reporting/monitoring process</td>
<td></td>
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<tr>
<td>11. Communication plan</td>
<td></td>
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<tr>
<td>12. Education plan</td>
<td></td>
</tr>
<tr>
<td>13. Other (add as per local facility needs)</td>
<td></td>
</tr>
</tbody>
</table>
Clinical Practice Improvement

A quality improvement framework can be used to structure implementation of the Sepsis Kills Program. Clinical practice improvement (CPI) methodology is a structured approach for setting aims, forming teams, establishing measures, and testing/implementing changes based on PDSA (Plan, Do Study, Act) cycles.

The Sepsis Kills Program lends itself to the CPI methodology in that it:

- is clinically focused
- involves a process in health care delivery
- has supporting data that there is a problem
- has a high cost if nothing is done
- has documented patient dissatisfaction and
- has proved that there is dissonance between evidence and clinical practice.

The Sepsis Kills Program Framework, Implementation Plan and checklist can be used in conjunction with CPI methodology.

Sustainability

The statewide Sepsis Kills Program has used the CPI process to implement a sustainable change:

Standardisation of existing systems and processes for performing work activities. The Program has implemented a sepsis pathway and related tools to standardise recognition and treatment of patient presenting with signs and symptoms of sepsis.

Documentation of associated policies, procedures, protocols and guidelines. The Sepsis Kills adult, paediatric and inpatient pathways are guides for clinical staff and incorporate clinical processes and documentation.

Measurement and review to ensure that the change becomes part of the routine practice. Each facility is encouraged to collect and enter data into the online database and to provide feedback to staff, facility management and LHD clinical governance units on their progress against NSW and facility median times.

Training and education of staff. Powerpoint education presentations and an online learning sepsis module are available on the CEC website. LHD sepsis workshops have been very successful with presenters from the LHD and CEC promoting the Recognition, Resuscitation and Referral of patients with sepsis.

Implementing and sustaining the Sepsis Kills Program requires an investment of time, resources and commitment at all levels of the organisation and at all stages of implementation. Elements known to enhance sustainability include:
Adequate resources – financial, staffing, infrastructure

Building and sharing a clear vision

Strong executive commitment and day-to-day leadership

Embedding change via policy, standard practice, clinical pathway functions

Identification and training key messengers who communicate to others

Formally assigning people to clear roles

Providing adequate training and support

Using data to highlight benefits of change

Rewarding good practice

Creating a learning organisation

Anchoring change, so it becomes standard and accepted practice.

Tips from the frontline
To assist in the implementation of the Sepsis Kills Program into your facility, here are some initiatives that emergency departments in NSW have used.

Successful sites have a medical lead and nursing lead working collaboratively

Use a page or overhead communication system to inform staff that a sepsis patient has been assessed in triage

Use a high Australasian Triage Score to reflect the seriousness of their condition and commencement on the sepsis pathway

Implement sepsis packs or trolleys which include all the equipment, medications and fluids for treating sepsis

Use a stopwatch that has 60 minutes on the clock for staff to refer to when treating sepsis

Incorporate sepsis management in the quality framework

Use case studies to highlight positive and negative sepsis management

Use September (international sepsis awareness month) as an initiative to raise awareness of sepsis. Some sites have used the month of September to re-invigorate staff using sepsis in education, simulation scenarios and games. Promote World Sepsis Day (September 13th) to spread the word about sepsis.
The following tools and URL links can be found in Appendix A:

A.1 Sepsis Kills Program checklist
A.2 Easy Guide to Clinical Practice Improvement – A guide for health care professionals
A.3 Clinical Excellence Commission CPI training Program
A.4 Cause and effect diagram template
A.5 Sample cause and effect diagram
ADULT Clinical tools and resources

A range of clinical tools are available to assist clinicians in the recognition and management of sepsis. All resources are available on the CEC website and in Appendix B: www.cec.health.nsw.gov.au/programs/sepsis

The CEC has worked collaboratively with clinical experts and the NSW Rural Critical Care Taskforce to develop sepsis pathways for use in the emergency department and wards.

The sepsis pathways are based on the key elements of the Sepsis Kills Program: Recognise, Resuscitate and Refer. They provide clear guidelines for sepsis recognition, notification, escalation and initial management. The pathways facilitate:

- Early involvement of senior clinicians in diagnosis and management of sepsis
- Bundles of care
  - \(O_2\) to maintain \(\text{SpO}_2 >95\%\)
  - Blood cultures before antibiotic administration
  - Serum lactate monitoring
  - Appropriate and timely fluid resuscitation
  - Prompt administration of antibiotics (within 60 minutes)
- On-going monitoring and reassessment
- Referral of care to clinical teams including retrieval if appropriate.

ADULT Sepsis Pathway

The adult sepsis pathway is intended for use in emergency departments and small hospitals. The CEC sepsis pathways are NOT intended for patients who are at potential risk of febrile neutropenia. A patient who has a recent haematological or oncology diagnosis should be commenced on local or The Cancer Institute of NSW eviQ guidelines for prompt treatment of febrile neutropenia.

ADULT Sepsis Worksheet

The worksheet is a combination of the adult sepsis pathway and the sepsis data collection form and is designed to facilitate concurrent data collection.
ADULT Sepsis Reference Card

The adult sepsis reference card prompts clinicians on key points of the sepsis management of adult patients. Healthcare facilities can print and laminate the cards for staff use.

Rural ADULT Emergency Clinical Guideline - Severe Sepsis

The intention of the Rural Adult Emergency Clinical Guidelines is to ensure early appropriate management of acute and life threatening conditions and to relieve pain and discomfort for patients at hospitals where medical practitioners are not immediately available. The guidelines reflect best clinical practice and are not mandatory. They have however, been adopted and implemented across the State since 2004 providing essential clinical support for rural emergency clinicians.

It is important to note that the Severe Sepsis Guideline is not a stand-alone document and must be used in conjunction with the Rural Adult Emergency Clinical Guidelines and can be utilised by First Line Emergency Care accredited nurses in rural facilities that do not have medical staff on-site.

ADULT Sepsis Pathway - Inpatient

The adult sepsis inpatient pathway is currently in development and will be made available on the CEC sepsis webpage when finalised.

Sepsis ADULT First Dose Empirical Intravenous Antibiotic Guideline

The sepsis adult first dose empirical intravenous antibiotic guideline aims to guide the prescription and timely administration of the FIRST DOSE of intravenous (IV) antibiotics for adult patients who have a diagnosis of sepsis. Prompt administration of antibiotics and resuscitation fluids is vital in the management of the patient with sepsis. The goal is to commence antibiotic therapy within 60 minutes of recognition/diagnosis of sepsis.

The guideline is based on the Therapeutic Guidelines: Antibiotic version 14, 2010 Prophylactic, empirical or directed antimicrobial therapy and incorporates best available evidence and the principles of appropriate use of antibiotics. The guideline is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required.

An electronic link to the Therapeutic Guidelines and a link to NSW Health Information Bulletin Best Practice Prescribing of Aminoglycosides IB2011_012 are available in Appendix B.

ADULT Blood Culture Sampling Guideline

The adult blood culture sampling guideline outlines best practice, frequently asked questions and a visual guide for blood culture sampling.
The following links and tools can be found in Appendix B:

B.1 ADULT Sepsis Pathway
B.2 ADULT Sepsis Worksheet
B.3 Rural ADULT Emergency Clinical Guidelines
B.4 ADULT Sepsis Reference Card
B.5 Sepsis ADULT First Dose Empirical Intravenous Antibiotic Guideline
B.7 NSW Health Information Bulletin Best Practice Prescribing of Aminoglycosides IB2011_012
B.8 Cancer Institute of NSW and eviQ website
B.9 Sepsis guide phone app - The Apple App store
B.10 Sepsis guide phone app - Google Play
B.11 ADULT Blood Culture Sampling Guideline
PAEDIATRIC Clinical tools and resources

The Sepsis Kills Program has acknowledged from the commencement of the Program, the need to develop clinical resources and tools for the paediatric population.

An expert committee was convened in October 2011 to develop resources to support clinicians in the prompt recognition and management of sepsis in paediatrics patients. The paediatric sepsis resources are closely aligned with the NSW Paediatric Clinical Practice Guidelines, Between the Flags Program and DETECT Junior. The sepsis resources are specific to the paediatric population and have been successfully trialed in a range of facilities covering tertiary, metropolitan, rural and remote areas across NSW.

PAEDIATRIC Sepsis Pathway
The paediatric pathway has been developed for patients under sixteen years of age, presenting to emergency departments.

PAEDIATRIC Sepsis Worksheet
The worksheet is a combination of the paediatric sepsis pathway and sepsis data collection form and is useful in facilitating concurrent data collection.

PAEDIATRIC Sepsis Reference Card
The paediatric sepsis reference card prompts clinicians on key points of the sepsis management of paediatric patients. Healthcare facilities can print and laminate the cards for staff to use.

PAEDIATRIC Frequently Asked Questions
This document provides information of frequently asked questions regarding the paediatric sepsis pathway and antibiotic guidelines.

Sepsis NEONATAL First Dose Empirical Parenteral Antibiotic Guideline
The sepsis neonatal first dose empirical parenteral antibiotic guideline aims to guide the prescription and timely administration of the FIRST DOSE of intravenous (IV) or intraosseous (IO) antibiotics for neonatal patients who are less than 4 weeks of age who have a diagnosis of sepsis. Intramuscular (IM) administration should only be used FOR SHORT TERM if unable to obtain IV or IO access. Prompt administration of antibiotics and resuscitation fluids is vital in the management of the patient with sepsis. The goal is to commence antibiotic therapy within 60 minutes of diagnosis of sepsis.

Sepsis PAEDIATRIC First Dose Empirical Parenteral Antibiotic Guideline
The sepsis neonatal first dose empirical parenteral antibiotic guideline aims to guide the prescription and timely administration of the FIRST DOSE of intravenous (IV) or intraosseous (IO) antibiotics for paediatric patients who have a diagnosis of sepsis. Intramuscular (IM) administration should only be used FOR SHORT TERM if unable to obtain IV or IO access.

Both the neonatal and paediatric guidelines are based on the Therapeutic Guidelines: Antibiotic version 14, 2010 Prophylactic, empirical or directed antimicrobial therapy and incorporate best
available evidence and the principles of appropriate use of antibiotics. The guideline is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required.

**PAEDIATRIC Blood Culture Sampling Guideline**
The blood culture sampling guideline outlines best practice, frequently asked questions and a visual guide for blood culture sampling in paediatric patients.

The following links and tools can be found in Appendix C:

- **C.1** PAEDIATRIC Sepsis Pathway
- **C.2** PAEDIATRIC Sepsis Worksheet
- **C.3** PAEDIATRIC Sepsis Reference Card
- **C.4** PAEDIATRIC Frequently Asked Questions
- **C.5** Sepsis NEONATAL First Dose Empirical Parenteral Antibiotic Guideline
- **C.6** Sepsis PAEDIATRIC First Dose Empirical Parenteral Antibiotic Guideline
- **C.7** PAEDIATRIC and NEONATAL Blood Culture Sampling Guideline
Measurement and monitoring

Measurement ensures that clinical practice changes are actually being carried out and provides a source of feedback and learning. The measures for emergency departments that have been agreed in consultation with clinicians are as follows:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
<th>Definitions</th>
<th>Data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Time to administration of antibiotics</td>
<td>Timely administration of antibiotics increases the likelihood of survival</td>
<td>Time of triage/sepsis recognition to time first IV antibiotic is administered</td>
<td>Sepsis data collection form</td>
</tr>
<tr>
<td>2. Time to IV fluid resuscitation</td>
<td>Appropriate and timely fluid resuscitation to improve tissue and organ perfusion</td>
<td>Adult: Time of triage/sepsis recognition to time that second litre of fluid bolus is commenced&lt;br&gt;Pediatric: Time of triage/recognition to time that the first 20mL/kg bolus is</td>
<td>Sepsis data collection form</td>
</tr>
<tr>
<td>3. Percentage of patients recognition</td>
<td>Serum lactate measures provide indication of tissue perfusion</td>
<td>First serum lactate value</td>
<td>Sepsis data collection form</td>
</tr>
</tbody>
</table>

Measures for inpatient wards are in development.

Data collection

The CEC Sepsis Data Collection provides a tool to collect and analyse sepsis data. It is a web-based application which is accessed by entering hospital facility or LHD username and password on the NSW Health intranet system.

Data has been entered by facilities since the commencement of the Sepsis Kills Program in 2011. Both retrospective and prospective data collection are enabling facilities and LHDs to evaluate the impact and effectiveness of the change in the clinical management of sepsis patients in the emergency department.

The database collects a minimum dataset including date of birth, triage time and date, triage category, observations including systolic blood pressure, lactate, administration time and date of first intravenous antibiotic, start time and date of the second litre of intravenous fluid administration.
Healthcare facilities have developed a number of ways to facilitate data collection, some of which are listed below:

- Have a sepsis champion on each shift to promote sepsis and data capture
- Keep pathways and data entry forms at triage so they are accessible
- Provide positive feedback to staff collecting and filling out data forms
- Rotate staff to enter data— they will tell their peers how important it is to have the form filled in correctly
- Display data so that staff are able to see how they have improved.

Data support is available from the Clinical Excellence Commission sepsis team. Support includes guidance on database access, entering/searching data and creating graphs and reports at hospital and LHD levels.

**Monitoring**

It is important to monitor, report and evaluate the Sepsis Kills Program data to ensure that clinical practice and processes for recognition and management of the patient with sepsis are effective.

**Facility:** Processes should be established for ward/unit and facility monitoring of progress. It is suggested that monitoring and report processes be integrated with existing Clinical Emergency Response Systems (CERS) for the deteriorating patient.

**Local Health District:** Clinical governance units have established monitoring and reporting requirements and systems at LHD level.

**Clinical Excellence Commission:** monitors and reports on statewide progress. Reports are provided six-monthly to LHD and facilities.

The following tools are available to support and facilitate data monitoring, reporting and evaluation in your healthcare facility.
Data tools and resources

Sepsis Data Collection Form
The data collection form provides clinicians with a tool to collect the data points required for entering data into the electronic database.

ADULT Sepsis Worksheet
The worksheet is a combination of the adult sepsis pathway and sepsis data collection form and aims to facilitate concurrent data collection.

PAEDIATRIC Sepsis Worksheet
The worksheet is a combination of the paediatric sepsis pathway and sepsis data collection form and aims to facilitate concurrent data collection.

Sepsis data collection form
The form provides data entry personnel with instructions on how to enter data and trouble shoot data entry problems when entering data into the online database.

Guide to performing a quality data review
This guide will enable the user to review data to ensure high quality and accuracy.

Guide to charting median time to IV antibiotics
This is a step-by-step guide on how to build a chart for presenting data for the facility and also enables benchmarking with LHD emergency departments and NSW. An example of the graph is available in Appendix D.

FirstNet
FirstNet has a sepsis build that assists clinicians to apply the sepsis pathway in clinical practice and monitor performance. The FirstNet sepsis build was approved by the Statewide FirstNet Committee in December 2011 for addition in all LHDs.

Facilities that use FirstNet can highlight patients who meet the sepsis pathway using the tracking speciality drop down box. Once Sepsis Pathway is selected, an icon in the form of the sepsis bomb appears on the tracking screen in the model of care column. Events can be recorded such as time to antibiotics and time to second litre of fluids in adults. These events can be generated into a report, which is consistent with the Sepsis Kills Program online database.

Other data initiatives
Evaluation of clinical outcomes for patients with sepsis utilising data linkage between NSW Health clinical records and the CEC online Sepsis Kills database is an on-going process. Progress reports on Sepsis Kills Program outcomes will be made available to the participating healthcare facilities and LHD Clinical Governance Units.
CEC Sepsis Toolkit

With the introduction of Electronic Medical Records (eMR) and Electronic Medication Management (eMM) into healthcare facilities, the Clinical Excellence Commission is exploring the inclusion of alerts for patients who are potentially septic and reports for key sepsis data.

There are many tools to support data collection and display. The following can be found in Appendix D:

- **D.1** Sepsis Data Collection Form
- **D.2** ADULT Sepsis Worksheet
- **D.3** PAEDIATRIC Sepsis Worksheet
- **D.4** Guide to performing a quality data review
- **D.5** Guide to charting median time to IV antibiotics
- **D.6** Examples of sepsis charts that can be generated from the database
Education resources

Education resources have been developed to assist healthcare facilities to facilitate engagement with the *Sepsis Kills* Program and improve knowledge and clinical skills. Synergies between CEC quality and safety programs and the programs developed by the Agency for Clinical Innovation (ACI), Health Education Training Institute (HETI), and Bureau of Health Information (BHI) are promoted wherever possible.

The CEC education resources can be adapted to meet individual hospital needs. It is highly recommended that local sepsis case studies and data are incorporated into the resources to support and promote the Program.

All education resources are available on the CEC sepsis website and are periodically updated. Resources include:

- *Sepsis Kills* presentation - key concepts of recognition, resuscitation, referral for ADULT patients with sepsis in Emergency Departments
- *Sepsis Kills* online module (ADULT AND PAEDIATRIC)
- *Sepsis Kills* presentation – key concepts of recognition, resuscitation, referral for PAEDIATRIC patients with sepsis in Emergency Departments
- Generic sepsis presentation - can be cut and pasted to suit local needs

Education resources for recognition and management of sepsis in the wards are currently in development and will be made available on the CEC website.
Social media

You can follow us on Twitter using our handle @sepsis_kills.

The sepsis team use Twitter to communicate with a wide audience and have connected with local and international communities.

On World Sepsis Day September 13 2012, NSW commenced the ball rolling in the inaugural international sepsis Twitter chat. Questions that related to sepsis were posed to the Twitter community for a twenty-four hour period, which generated a buzz of conversation. NSW handed over to Wales, UK and Scotland, who generated great conversations around sepsis. Canada wrapped up the sepsis buzz from around the world. The chat generated over 800,000.00 impressions internationally.

We encourage you to become part of the Twitter family.

Twitter guide links can be found in Appendix E:

E.1 NSW Health Code of Conduct PD2012_018
E.2 BC Sepsis - Twitter for Healthcare professionals
E.3 1000 Lives - Lessons Learned using Twitter
SEPSIS KILLS useful links

Between the Flags Program

Clinical Excellence Commission
http://www.cec.health.nsw.gov.au

Clinical Focus Report: Recognition and Management of Sepsis

Delirium

DETECT Junior

Falls Program

Healthcare Associated Infections

Paediatric Clinical Practice Guidelines

Quality Use of Antimicrobials in Healthcare
International groups targeting sepsis

The CEC Sepsis Kills Team would like to acknowledge the support and efforts by the following groups in developing resources to assist clinical staff internationally to target and fight sepsis.

**Sepsis Trust UK**

The Sepsis Trust is a non-profit charity registered with the Charities Commission for England and Wales (Registration number 1146234). Trustees include lay persons affected by sepsis, and opinion leaders on sepsis from the health professions.


**Global Sepsis Alliance**

The Global Sepsis Alliance (GSA), a non-profit organization supporting the efforts of over 1 million caregivers in more than 70 countries as they seek to better understand and combat what many experts believe to be the leading cause of death worldwide: sepsis. The GSA has rallied the Global Sepsis Community to elevate public, philanthropic and governmental awareness, understanding and support of sepsis and to accelerate collaboration among researchers, clinicians, associated working groups and those dedicated to supporting them.


**Surviving Sepsis Campaign**

The Surviving Sepsis Campaign was launched as a collaboration of three professional organizations at the European Society of Intensive Care Medicine's annual congress in Barcelona in 2002. The Surviving Sepsis Campaign is committed to increasing the number of hospitals contributing data to 10,000 worldwide; to applying the guidelines to 100% of patients in whom the diagnosis is suspected; and developing a strategy to improve the care of septic patients in under-resourced areas.

The potential to save lives is enormous. Assuming that the reduction in mortality seen to date can be sustained and 10,000 hospitals comply with the Campaign recommendations, 400,000 lives if we could be saved if only half of the eligible patients are treated with the Surviving Sepsis Campaign Bundles.

[http://www.survivingsepsis.org/Pages/default.aspx](http://www.survivingsepsis.org/Pages/default.aspx)

**British Columbia Patient Safety and Quality Council - BC Sepsis Network**

The British Columbia Sepsis Network was established in June 2012 to provide a mechanism of support for clinicians in emergency departments around the British Columbia province to share resources, improve consistency of care, spread innovation and improvement ideas, and collaborate on change. Sepsis leaders within the network are implementing the new BC Sepsis Guidelines in
hospitals, delivering simple therapies quickly and screening patients effectively as soon as they come in the door.

http://bcpsqc.ca/clinical-improvement/sepsis/

Healthcare Improvement Scotland

Healthcare Improvement Scotland’s (HIS) job is to encourage and support continuous improvement in healthcare practice. HIS encourage both patients and staff to challenge and change healthcare services for the better. HIS works collaboratively with the staff of healthcare providers, partner organisations and the public to drive improvements which can be sustained and measured.

http://www.knowledge.scot.nhs.uk/sepsisvte.aspx

South Wales Critical Care Network

The South East Wales and Mid and West Critical Care Networks were established in 2007 as regionally based collaborative partnerships, enabling clinical services to work together to promote the highest quality critical care services for the regions. The South East Wales and Mid and West Critical Care Networks were merged in 2010 to form the South Wales Critical Care Network.

The Network takes a whole system approach to ensuring the delivery of safe and effective services across the South Wales health community in order to provide valuable expertise, advice and facilitation

http://www.wales.nhs.uk/sites3/home.cfm?orgid=962

World Sepsis Day Organisation

The World Sepsis Day Organisation aims to reduce the incidence of sepsis through effective prevention strategies. They work with stakeholders to ensure that prevention and control strategies target those who are most in need. The World Sepsis Day Organisation encourages the implementation of international sepsis guidelines to enable healthcare workers to recognise sepsis earlier, and treat it more effectively.

The World Sepsis Day Organisation is working to raise awareness of sepsis, and political support to place sepsis firmly on the development agenda and make the disease a priority for clinical improvement.

http://www.world-sepsis-day.org/
References


7. Gaeziski DF, Mikkelsen ME, Band RA, et al. Impact of time to antibiotics on survival in patients with severe sepsis or septic shock in whom early goal-directed therapy was initiated in the emergency department. *Critical Care Medicine* 2010; 38:1045-1053.


Bibliography


Select papers

The following papers have been selected due their relevance and significance to the development of the Sepsis Kills Program


**Background:** To determine the prevalence and impact on mortality of delays in initiation of effective antimicrobial therapy from initial onset of recurrent/persistent hypotension of septic shock.

**Conclusion:** This paper concluded that effective microbial administration within the first hour of documented hypotension was associated with increased survival to hospital discharge in adult patients with septic shock. Despite a progressive increase in mortality rate with increasing delays, only 50% of septic shock patients received antimicrobial therapy within 6 hours of documented hypotension.


**Background:** Severe sepsis is common and often fatal. The expanding armamentarium of evidence based therapies has improved the outcomes of persons with this disease. However, the existing national estimates of the frequency and outcomes of severe sepsis were made before many of the recent therapeutic advances. Therefore, it is important to study the outcomes of this disease in an aging US population with rising co-morbidities.

**Conclusion:** An increasing number of admissions for severe sepsis combined with declining mortality rates contribute to more individuals surviving to hospital discharge. Importantly, this leads to more survivors being discharged to skilled nursing facilities and home with in-home care. Increased attention to this phenomenon is warranted.


**Background:** To provide an update to the “Surviving Sepsis Campaign Guidelines for management of Severe Sepsis and Septic Shock”, last published in 2008.

**Conclusion:** Strong agreement existed among a large cohort of international experts regarding many level 1 recommendations for the best care of patients with severe sepsis. Although a significant number of aspects of care have relatively weak support, evidence based recommendations regarding the acute management of sepsis and septic shock are the foundation of improved outcomes for this important group of critically ill patients.
Tables summarizing the recommendations can be a useful tool in clinical settings.

- Initial resuscitation and infection issues
- Hemodynamic support and adjunctive therapy
- Other supportive therapy of severe sepsis
- Special considerations in paediatrics

*Based on the 2012 guidelines the SURVIVING SEPSIS CAMPAIGN BUNDLES were also updated as follows:*

**To be completed within 3 hours:**

1) Measure lactate level
2) Obtain blood cultures prior to administration of antibiotics
3) Administer broad-spectrum antibiotics
4) Administer 30 ml/kg crystalloid for hypotension or lactate \( \geq 4 \text{mmol/L} \)

**To be completed within 4 hours:**

5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) \( \geq 65 \text{ mm Hg} \)
6) In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate \( \geq 4 \text{ mmol/L} \) (36 mg/dL)
   - Measure central venous pressure (CVP)*
   - Measure central venous oxygen saturation (ScvO2)*
7) Re-measure lactate if initial lactate was elevated**

Background: Compliance with ventilator care bundles affects the rate of VAP. It was not known, however, whether compliance with sepsis care bundles has an impact on outcome. The aims of the study were to determine the rate of compliance with 6-hour and 24 hour sepsis bundles and to determine the impact of the compliance on hospital mortality in patients with severe sepsis or septic shock.

Conclusion: Non-compliance with the 6 hour bundle was associated with a more than twofold increase in hospital mortality. Non-compliance with the 24 hour sepsis bundle...
resulted in 76% increase in risk for hospital death. All medical staff should practice these relatively simple, easy cheap bundles within a strict timeframe to improve survival rates in patients with severe sepsis and septic shock.

**Background:** Sepsis and septic shock are life-threatening conditions which may be difficult to diagnose. This poses challenges for clinicians because the early recognition and management of sepsis is crucial in terms of morbidity and mortality. Although published Australian epidemiologic studies of sepsis are scant, a Victorian study (Sundararajan et al 2005) conducted over a four year period July 1999- June 2003 suggests that the overall incidence of sepsis was 1.1 per cent of hospital overnight admissions. This study identifies a mortality rate of 18.4 per cent. Twenty-three point eight per cent of the patients with sepsis received care in an intensive care unit (ICU).

**Conclusion:** Within the limitations of the data, there is evidence that the responsiveness of the system to patients presenting with or developing severe sepsis or septic shock in hospital is not optimal. The reason for this is not clear. Challenges related to early diagnosis and/or capacity to recognise and respond to patients with subtle signs of deterioration were evident throughout the incident data. The management of sepsis may need to be considered in terms of which guidelines are available to assist junior staff to identify and manage sepsis and septic shock in all locations, but particularly in emergency departments.
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Appendix A

The following appendices do not contain page numbers so that the documents can be printed directly from this document. The URL link will direct you to the specified document.

A.1  *Sepsis Kills* Program checklist

A.2  Easy Guide to Clinical Practice Improvement – A guide for health care professionals

A.3  Clinical Excellence Commission CPI training Program

A.4  Cause and effect diagram template

A.5  Sample cause and effect diagram
<table>
<thead>
<tr>
<th>Key task</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Executive sponsor</td>
<td></td>
</tr>
<tr>
<td>2. Sepsis advisory/implementation group or committee</td>
<td></td>
</tr>
<tr>
<td>3. Implementation plan</td>
<td></td>
</tr>
<tr>
<td>4. Clinical leads</td>
<td></td>
</tr>
<tr>
<td>5. Sepsis pathway</td>
<td></td>
</tr>
<tr>
<td>6. Antibiotic guideline</td>
<td></td>
</tr>
<tr>
<td>7. Sepsis pack or trolley</td>
<td></td>
</tr>
<tr>
<td>8. Pathology process including lactate testing</td>
<td></td>
</tr>
<tr>
<td>9. Data collection process</td>
<td></td>
</tr>
<tr>
<td>10. Reporting /monitoring process</td>
<td></td>
</tr>
<tr>
<td>11. Communication plan</td>
<td></td>
</tr>
<tr>
<td>12. Education plan</td>
<td></td>
</tr>
<tr>
<td>13. Other (add as per local facility needs)</td>
<td></td>
</tr>
</tbody>
</table>
The following blank template can be used to illustrate the causes of delayed recognition and management of sepsis.
Cause and effect diagram - template
The following is an example of a completed cause and effect diagram for delayed recognition and management of sepsis.
Sample cause and effect diagram – SEPSIS KILLS

Knowledge
- Lack of knowledge in relation to the management of sepsis
- JMO's not aware to take a venous blood gas
- Lack of knowledge and uncertainty about appropriate antibiotic use

Pathology
- Time to pathology results
- Lack of understanding of blood results
- Timely communication of results
- Lack of venous blood gases in inpatient environment
- Lack of availability of blood culture bottles

People
- skill mix
- delays in rapid response
- communication
- reduced staffing after hours
- skill set
- education

Measurements
- Data collection
- IV cannulation
- Antimicrobial stewardship
- Drug committee sign off
- Antibiotic availability

Policy
- Delayed charting of IV antibiotics
- Local pharmacy guidelines
- Delays to stat IV antibiotics administration

Medications
- IV antibiotic administration culture
- IV antibiotic administration

Delayed recognition and management of sepsis
Appendix B

The following appendix does not contain page numbers so that the documents can be printed directly from this document. The URL link will direct you to the specified document.

B.1  ADULT Sepsis Pathway
B.2  ADULT Sepsis Worksheet
B.3  Rural ADULT Emergency Clinical Guidelines
B.4  ADULT Sepsis Reference Card
B.5  Sepsis ADULT First Dose Empirical Intravenous Antibiotic Guideline
B.7  NSW Health Information Bulletin Best Practice Prescribing of Aminoglycosides IB2011_012
B.8  Cancer Institute of NSW and eviQ website
     eviQ and the Cancer Institute
B.9  Sepsis guide phone app - The Apple App store
B.10 Sepsis guide phone app - Google Play
     https://play.google.com/store
B.11 ADULT Blood Culture Sampling Guideline
ADULT SEPSIS PATHWAY v2
Use local febrile neutropenia guideline if patient has haematology/oncology diagnosis

**Does your patient have risk factors, signs or symptoms of infection?**
- Immunocompromised
- Indwelling medical device
- Recent surgery/invasive procedure
- History of fever or rigors
- Re-presentation within 48 hours
- Fall not related to mechanism of injury
- **Age > 65 years**
- **Immunocompromised**
- **Abdomen**: pain, peritonism
- **Lung**: cough, shortness of breath
- **Neuro**: altered LOC, new onset of confusion, neck stiffness, headache
- **Skin**: wound, cellulitis
- **Urine**: dysuria, frequency, odour

---

**Does your patient have 2 or more yellow criteria?**
- **Respirations ≤ 10 or ≥ 25 per minute**
- **Sp0₂ < 95%**
- **Systolic blood pressure ≤ 100 mmHg**
- **Heart rate ≤ 50 OR ≥ 120 per minute**
- **Altered LOC or new onset of confusion**
- **Temp < 35.5 or > 38.5°C**

**YES**
Perform venous blood gas if available

**Does your patient have any red criteria?**
- **SBP < 90mmHg**
- **Lactate ≥ 4 mmol/L**
- **Base excess < - 5.0**
- **Age > 65 years**
- **Immunocompromised**

---

**Sepsis may still be a concern**
- Monitor vital signs and fluid balance
- Treat and re-assess
- Consider septic screen

**Patient may have SEPSIS**
- Obtain senior clinician review within 30 minutes
- Look for other causes of deterioration
- Turn over page for SEPSIS SIX

**Patient has SEVERE SEPSIS or SEPTIC SHOCK**
- Obtain IMMEDIATE senior clinician review
- Expedite transfer to resuscitation area or equivalent
- Commence resuscitation as per SEPSIS SIX

---

Clinical Excellence Commission © 2013, Version 2, SHPN: (CEC) 130088
ADULT SEPSIS PATHWAY v2

Does the patient have an Advance Care Directive; are there any treatment limitations?

Sepsis Six

Acknowledgement: The Sepsis Six in this document is an adaptation of the Sepsis Six by Ron Daniels, UK Sepsis Trust.

1. OXYGEN
   Administer oxygen to maintain SpO₂ > 95%

2. BLOOD CULTURES
   Take blood cultures (2 aerobic, 2 anaerobic), FBC, EUC, LFTs, coags, glucose, +/- wound, urine, sputum or other cultures

3. LACTATE
   Take blood for formal lactate or VBG

4. IV FLUIDS
   Give 20mL/kg 0.9% sodium chloride fluid challenge STAT
   Aim to achieve MAP of > 65mmHg or SBP > 100mmHg
   If no response, repeat 20mL/kg 0.9% sodium chloride unless there are signs of pulmonary oedema
   If no response commence inotropes as per local protocol and in consultation with senior doctor

5. IV ANTIBIOTICS
   Prescribe and commence within 60 MINUTES from triage/time of diagnosis or within 30 MINUTES if haematology/oncology patient (refer to local guidelines and seek specialist advice)
   Do not wait for results of investigations

6. MONITORING
   Monitor respiratory rate, SpO₂, blood pressure, heart rate, temperature, LOC, fluid balance, urinary output
   Review antibiotics when blood/specimen results available

SIGNs OF IMPROVEMENT

- SpO₂ > 95%
- Decreasing tachycardia
- Improving LOC
- MAP > 65mmHg or SBP > 100mmHg
- Decreasing serum lactate level
- Urine output > 0.5mL/kg/hr

IF IMPROVING TAKE THE FOLLOWING ACTION

- Refer to admitting team/ICU
- Continue monitoring vital signs and fluid balance closely
- Investigate and treat the source of infection

IF NO IMPROVEMENT THIS PATIENT NEEDS INTENSIVE CARE MANAGEMENT

- Reassess suitability to continue resuscitation
- Request review by ICU doctor to occur within 30 minutes
- If no ICU at your facility, seek advice immediately from the ADULT MEDICAL RETRIEVAL SERVICE 1800 650 004 or local Critical Care Advisory Service

Minimum patient monitoring requirements:

- Respiratory rate, SpO₂, blood pressure, heart rate, temperature, LOC
- Repeat serum lactate every 4 hours
- Fluid balance, consider measuring urine output via IDC
Clinical Excellence Commission
ADULT Sepsis Worksheet
Version 2, SHPN: (CEC) 120130

<table>
<thead>
<tr>
<th>SURNAME</th>
<th>MRN</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>OTHER NAMES</th>
<th>[ ] MALE</th>
<th>[ ] FEMALE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>D.O.B. ___ /___ /______</th>
<th>M.O.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>ADDRESS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>LOCATION</th>
</tr>
</thead>
</table>

COMPLETE ALL DETAILS OR AFFIX PATIENT LABEL HERE

_SEPSIS ASSESSMENT_

**Time:** :  
**Date:** / / 

**Facility** _________  
**Service type** _________  
**MRN**

Tick the relevant risk factors, signs or symptoms of infection

- **Immunocompromised**  
  Consider chronic illness, medications, chemotherapy/radiotherapy  
  Use local febrile neutropenia guideline if patient has haematology/oncology diagnosis

- **Indwelling medical device**

- **Recent surgery/invasive procedure**

- **History of fever and/or rigors**

- **Re-presentation within 48 hours**

- **Fall not related to mechanism of injury**

- **Abdomen:** pain, peritonism

- **Lung:** cough, SOB

- **Neuro:** altered LOC, new onset of confusion, neck stiffness, headache

- **Skin:** cellulitis, wound

- **Urine:** dysuria, frequency, odour

**Does the patient have any YELLOW criteria?**

- **Respirations** ≤10 or ≥25/min  
  /min

- **Sp02** <95%  
  %

- **SBP** ≤100mmHg  
  mmHg

- **Heart rate** ≤50 or ≥120/min  
  /min

- **Altered LOC or new onset of confusion**  
  ___________

- **Temp** <35.5 or >38.5  
  °C

If any risk factor, sign or symptom of infection

PLUS two yellow criteria
THE PATIENT MAY HAVE SEPSIS

- Obtain Senior Clinical Review within 30 minutes
- Look for other causes of deterioration
- Commence SEPSIS SIX

If fewer than 2 yellow criteria present, treat and re-assess simultaneously
SEPSIS may still be a concern

**In addition does the patient have any RED criteria?**

- **SBP** < 90mmHg  
  mmHg

- **First Lactate** ≥4mmol/L  
  mmol/L

- **Base excess** < - 5.0 + / -  
  mEq/L

- **Age** > 65years

- **Immunocompromised**

If one or more red criteria present
THE PATIENT HAS
SEVERE SEPSIS or SEPTIC SHOCK
until proven otherwise

- Obtain immediate Senior Clinical Review
- Expedite transfer to resuscitation area or equivalent
- Commence resuscitation as per SEPSIS SIX

**Triage Category (1-5)** (ED Only)

Does the patient have an Advance Care Directive; are there any treatment limitations?

No [ ]  Yes [ ]  If YES, consider how this may impact ongoing management of sepsis.
## SEPSIS MANAGEMENT: SEPSIS SIX

### 1. OXYGEN
Maintain SpO₂ > 95
If increased oxygen is required seek senior medical review

| Oxygen administration: | litres/minute |

### 2. BLOOD CULTURES
Blood cultures (2 aerobic, 2 anaerobic)
FBC, UECs, LFTs, coags, glucose, +/- wound, urine, sputum or other cultures

- Blood cultures
- Other cultures
- Swabs

| FBC | UEC | Coags | BGL |

### 3. LACTATE
Take blood for formal lactate or VBG

| mmol/l |

### 4. IV FLUIDS
Give 20ml/kg 0.9% sodium chloride fluid challenge STAT
Aim to achieve MAP of > 65mmHg or SBP > 100mmHg
If no response, repeat 20ml/kg 0.9% sodium chloride unless there are signs of pulmonary oedema
If no response commence inotropes as per local protocol and in consultation with senior medical officer

<table>
<thead>
<tr>
<th>FLUID RESUSCITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second litre IV fluid commenced:</td>
</tr>
<tr>
<td>YES: Time:</td>
</tr>
<tr>
<td>Date: / /</td>
</tr>
<tr>
<td>NO: Not prescribed Fluid restricted</td>
</tr>
</tbody>
</table>

### 5. IV ANTIBIOTICS
Prescribe and commence within 60 minutes from triage/time of diagnosis
or within 30 MINUTES if haematology/oncology patient (refer to local guidelines and seek specialist advice)
Do not wait for results of investigations

<table>
<thead>
<tr>
<th>ANTIBIOTIC ADMINISTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>First IV antibiotic commenced:</td>
</tr>
<tr>
<td>Time:</td>
</tr>
<tr>
<td>Date: / /</td>
</tr>
</tbody>
</table>

### 6. MONITORING
Monitor respiratory rate, SpO₂, blood pressure, heart rate, temperature, LOC, fluid balance, urinary output, consider urinary catheter
Review antibiotics when blood/specimen results available

<table>
<thead>
<tr>
<th>Frequency of observations required over next six hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every minutes</td>
</tr>
</tbody>
</table>

Management plan (discuss with senior medical officer)

### PRESUMPTIVE SOURCE OF SEPSIS
- Abdomen
- CNS
- Lung
- Orthopaedic
- Skin/soft tissue
- Urinary tract
- Vascular device
- Other
- Unknown

### DISPOSITION
- Unchanged
- Home
- Ward
- Other hospital
- HDU/ICU
- Death

| Date of death: / / |
CEC Sepsis Toolkit
The ADULT reference card template displayed on the opposite page can be printed and laminated for clinicians to use as a quick reference.
**ADULT SEPSIS**

**Recognise**

1. **Risk Factor**
   - Immunocompromised
   - Fever/rigors
   - Recent surgery
   - Indwelling medical device
   - Fall

2. **Sepsis Criteria**
   - SpO2 <95%
   - Systolic BP <100
   - Lactate ≥4
   - Base excess <−5.0

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Sepsis Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunocompromised</td>
<td>SpO2 &lt;95%</td>
</tr>
<tr>
<td>Fever/rigors</td>
<td>Systolic BP &lt;100</td>
</tr>
<tr>
<td>Recent surgery</td>
<td>Lactate ≥4</td>
</tr>
<tr>
<td>Indwelling medical device</td>
<td>Base excess &lt;−5.0</td>
</tr>
<tr>
<td>Fall</td>
<td></td>
</tr>
</tbody>
</table>

**Resuscitate**

1. **Oxygen**
   - To maintain SpO2 >95%

2. **Blood cultures**
   - And other specimens

3. **Serum lactate**

4. **IV fluids**
   - 20mL/kg 0.9% NaCl bolus
   - Aim for systolic BP >100mmHg
   - Repeat bolus 20mL/kg if needed

5. **IV antibiotics**
   - Within 60 minutes

6. **Monitor vital signs & urine output**

**Refer**

- Consult specialist team(s) early
- Investigate source of sepsis
- If no improvement review by ICU doctor within 30 minutes
- If no ICU seek immediate retrieval advice Tel: 1800 650 004

**Escalate as per local protocol**

- If no improvement review by ICU doctor within 30 minutes
- Lactate
- Base excess <−5.0
- Temp. <35.5 or >38.5
- Age >65 years

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Version 2, SHPN(CEC) 120236
CEC Sepsis Toolkit
The Clinical Excellence Commission Sepsis Adult FIRST DOSE Empirical Intravenous Antibiotic Guideline aims to guide the prescription and timely administration of the FIRST DOSE of intravenous (IV) antibiotics for adult patients who have a diagnosis of sepsis. The guideline is based on the Therapeutic Guidelines: antibiotic. Version 14, 20101 and incorporates best available evidence2-5 and the principles of appropriate use of antibiotics. The Guideline is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required.

Prompt administration of antibiotics and resuscitation fluids is vital in the management of the patient with sepsis. The goal is to commence antibiotic therapy within the first hour of recognition of sepsis. Subsequent treatment should be based on clinical and laboratory findings to facilitate targeted therapy.

Table 1: Antibiotic Prescribing
- If renal failure is present, dosages and intervals of antibiotics may need to be adjusted in particular for vancomycin, gentamicin and penicillin drugs. See Therapeutic Guidelines: antibiotic. Version 14, 20101
- ALL penicillin and cephalosporin class antibiotics are contraindicated in patients with history of DRESS (drug rash with eosinophilia and systemic symptoms), Stevens-Johnson syndrome or IgE-mediated penicillin or cephalosporin allergy
- Obtain other clinical specimens as appropriate but do not delay administration of antibiotics or wait for results of investigations. Contact the ID Physician/Microbiologist on call to seek advice as needed.

Table 2: Antibiotic Administration
- Administer the antibiotic which takes the least time to inject or infuse balancing this with administering the most needed/effective antibiotic for the organism suspected of causing the sepsis
- Reconstitute antibiotics with sterile water for injection unless stated otherwise
- If further dilution is required for IV injection or infusion, use sterile sodium chloride 0.9% or sterile glucose 5% unless stated otherwise
- To avoid drug incompatibility without delaying fluid administration, flush the IV line with sterile sodium chloride 0.9% before and after the antibiotic injection/infusion
- Where possible use separate dedicated lines for resuscitation fluid and for medications.

Special considerations

Vancomycin* The first dose is a loading dose based on the patient’s actual body weight.
Subsequent doses and intervals will be based on the patient’s GFR and creatinine clearance. Please see Therapeutic guidelines: antibiotic. Version 14, 20101 for further information.

<table>
<thead>
<tr>
<th>Loading dose IV vancomycin. Infuse at 10mg/minute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s actual body weight (kg)</td>
</tr>
<tr>
<td>LOADING DOSE</td>
</tr>
</tbody>
</table>

*Subsequent doses and dosing intervals are based on calculated creatinine clearance (not eGFR): http://www.mdcalc.com; seek ID/Micro advice

Gentamicin** dose relates to lean body weight. A ‘one dose’ instruction rather than a dosing frequency indicates the need for review of renal function and specimen results to deliver appropriate, targeted therapy. When administering ampicillin followed by gentamicin, do not wait between infusions. Flush the IV line well.
### Table 1: Antibiotic Prescribing

<table>
<thead>
<tr>
<th>Likely source of sepsis</th>
<th>Empirical antibiotic regimen</th>
<th>Penicillin hypersensitivity</th>
<th>Penicillin anaphylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe sepsis, unknown source and the patient is immunocompetent</td>
<td>flucloxacillin 2g IV, 6-hourly&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640mg)</td>
<td>cephalosporin 2g IV, 8-hourly&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640mg)</td>
<td>vancomycin* 1 to 2.5g IV loading dose&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640mg)</td>
</tr>
<tr>
<td><strong>Consider adding vancomycin if there is a higher risk of MRSA infection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe sepsis and meningococcal infection suspected</td>
<td><strong>ADD</strong> benzyl penicillin 1.8g IV, 4-hourly</td>
<td><strong>ADD</strong> ceftriaxone 2g IV, 12-hourly</td>
<td><strong>ADD</strong> moxifloxacin 400mg IV daily</td>
</tr>
<tr>
<td>Severe sepsis and toxin mediated shock likely or present (seek advice for diagnosis of toxic shock syndrome)</td>
<td><strong>ADD</strong> lincomycin 600mg IV, 8-hourly&lt;br&gt;<strong>OR</strong> clindamycin 600mg IV, 8-hourly</td>
<td><strong>ADD</strong> lincomycin 600mg IV, 8-hourly&lt;br&gt;<strong>OR</strong> clindamycin 600mg IV, 8-hourly</td>
<td><strong>ADD</strong> clindamycin 600mg IV, 8-hourly</td>
</tr>
<tr>
<td>Febrile neutropenia</td>
<td>piperacillin 4g &amp; tazobactam 500mg IV, 8-hourly&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td>cefepime 2g IV, 8-hourly&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td>vancomycin* 1 to 2.5g IV loading dose&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
</tr>
<tr>
<td>Febrile neutropenia and shocked or possible catheter related infection</td>
<td><strong>ADD</strong> vancomycin* 1 to 2.5g IV loading dose</td>
<td><strong>ADD</strong> vancomycin* 1 to 2.5g IV loading dose</td>
<td></td>
</tr>
<tr>
<td>SEVERE Community acquired pneumonia (USE SMART-COP or CORB for scoring)</td>
<td>ceftriaxone 1g IV, daily&lt;br&gt;<strong>plus</strong> azithromycin 500mg IV, daily</td>
<td>ceftriaxone 1g IV, daily&lt;br&gt;<strong>plus</strong> azithromycin 500mg IV, daily</td>
<td>moxifloxacin 400mg IV, daily&lt;br&gt;<strong>plus</strong> azithromycin 500mg IV, daily</td>
</tr>
<tr>
<td>Urinary source likely e.g. pyelonephritis</td>
<td>ampicillin 2g IV, 6-hourly&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td>ceftriaxone 1g IV, daily&lt;br&gt;<strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>and seek ID/Micro advice</td>
</tr>
<tr>
<td>Likely source of sepsis</td>
<td>Empirical antibiotic regimen</td>
<td>Penicillin hypersensitivity</td>
<td>Penicillin anaphylaxis</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Intra-abdominal source likely</td>
<td>ampicillin 1g IV, 6-hourly &lt;br&gt; <strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)  &lt;br&gt; <strong>plus</strong> metronidazole 500mg IV, 12-hourly</td>
<td>ceftriaxone 1g IV, daily &lt;br&gt; <strong>plus</strong> metronidazole 500mg IV, 12-hourly</td>
<td>seek ID/Micro advice</td>
</tr>
<tr>
<td>Neurological</td>
<td>ceftriaxone 2g IV, 12-hourly &lt;br&gt; <strong>plus</strong> benzyl penicillin 2.4g IV, 4-hourly (if at risk for Listeria infection) &lt;br&gt; <strong>and seek ID/MICRO advice</strong></td>
<td>ceftriaxone 2g IV, 12-hourly &lt;br&gt; <strong>and seek ID/MICRO advice</strong></td>
<td>vancomycin* 1 to 2.5g IV loading dose &lt;br&gt; <strong>plus</strong> moxifloxaxin 400mg IV, daily &lt;br&gt; <strong>and seek ID/MICRO advice</strong></td>
</tr>
<tr>
<td>Skin</td>
<td>flucloxacillin 2g IV, 6-hourly &lt;br&gt; <strong>Consider adding vancomycin if there is a higher risk of MRSA infection</strong></td>
<td>cephalozin 2g IV, 8-hourly</td>
<td>lincomycin 600mg IV, 8-hourly &lt;br&gt; <strong>OR</strong> clindamycin 600mg IV, 8-hourly &lt;br&gt; <strong>OR</strong> vancomycin* 1 to 2.5g IV loading dose</td>
</tr>
<tr>
<td>Female genital tract</td>
<td>ceftriaxone 1g IV, daily &lt;br&gt; <strong>plus</strong> azithromycin 500mg IV, daily &lt;br&gt; <strong>plus</strong> metronidazole 500mg IV, 12-hourly</td>
<td>ceftriaxone 1g IV, daily &lt;br&gt; <strong>plus</strong> metronidazole 500mg IV, 12-hourly</td>
<td>lincomycin 600mg IV, 8-hourly &lt;br&gt; <strong>OR</strong> clindamycin 600mg IV, 8-hourly &lt;br&gt; <strong>OR</strong> vancomycin* 1 to 2.5g IV loading dose</td>
</tr>
<tr>
<td>IV line related</td>
<td>vancomycin* 1 to 2.5g IV loading dose &lt;br&gt; <strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td>vancomycin* 1 to 2.5g IV loading dose &lt;br&gt; <strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
<td>vancomycin* 1 to 2.5g IV loading dose &lt;br&gt; <strong>plus</strong> gentamicin** 7mg/kg IV, for 1 dose (max 640 mg)</td>
</tr>
</tbody>
</table>

With thanks to Liverpool Hospital Emergency Department for the use of their Empirical Intravenous Antibiotic Guideline which forms the basis of Table 1.

**References:**

### Table 2: Antibiotic Administration

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Presentation (adult)</th>
<th>Reconstitution fluid / volume</th>
<th>Final volume*</th>
<th>Minimum administration time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ampicillin</td>
<td>Vial 1g</td>
<td>10mL WFI</td>
<td>10 - 20mL</td>
<td>3 – 5 minutes</td>
<td>Penicillin class antibiotic</td>
</tr>
<tr>
<td>azithromycin</td>
<td>Vial 500mg</td>
<td>4.8mL WFI, then add to infusion fluid bag</td>
<td>250mL 500mL</td>
<td>60 minutes</td>
<td>Concentration must be 1 or 2mg/mL to avoid local infusion site reaction. Rare reports of prolonged QT interval</td>
</tr>
<tr>
<td>benzyl penicillin</td>
<td>Vials 600mg</td>
<td>2mL WFI</td>
<td>10 - 20mL</td>
<td>3 – 5 minutes</td>
<td>Penicillin class antibiotic. Consider administering doses ≥ 2.4g over 30 minutes</td>
</tr>
<tr>
<td>cefepime</td>
<td>Vial 1g</td>
<td>10 mL NS</td>
<td>10mL</td>
<td>3 – 5 minutes</td>
<td>Cephalosporin class antibiotic</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>Vials 1g</td>
<td>10mL WFI</td>
<td>10 - 20mL</td>
<td>2 - 4 minutes</td>
<td>Cephalosporin class antibiotic. Incompatible with calcium containing solutions, flush thoroughly before and after with sodium chloride 0.9%</td>
</tr>
<tr>
<td>cefazolin</td>
<td>Vial 1g</td>
<td>10mL WFI</td>
<td>10 - 20mL</td>
<td>3 – 5 minutes</td>
<td>Cephalosporin class antibiotic</td>
</tr>
<tr>
<td>clindamycin</td>
<td>Ampoules 300mg/2mL</td>
<td>N/A</td>
<td>600mg in 50mL</td>
<td>20 minutes</td>
<td>Check product is clear of any crystals prior to administration</td>
</tr>
<tr>
<td>flucloxacillin</td>
<td>Vial 1g</td>
<td>5mL WFI</td>
<td>10mL (1g)</td>
<td>3 - 5 minutes</td>
<td>Penicillin class antibiotic</td>
</tr>
<tr>
<td>Gentamicin</td>
<td>Ampoule 80mg/2 mL</td>
<td>N/A</td>
<td>10 - 20mL</td>
<td>(240mg or less) 3 – 5 minutes</td>
<td>Some centres may give up to 640mg IV push over 3 – 5 minutes; refer to Reference 4: Loewenthal MR &amp; Dobson PM 2010 J Antimicrob Chemoth</td>
</tr>
<tr>
<td>lincomycin</td>
<td>Vial 600mg/2mL</td>
<td>N/A</td>
<td>600mg in 100mL</td>
<td>60 minutes</td>
<td></td>
</tr>
<tr>
<td>metronidazole</td>
<td>Infusion bag 500 mg/100mL</td>
<td>N/A</td>
<td>See presentation column</td>
<td>20 minutes</td>
<td>May prolong QT interval and lead to ventricular arrhythmias. May induce seizures in epileptics</td>
</tr>
<tr>
<td>moxifloxacin</td>
<td>Infusion bag 400mg/250mL</td>
<td>N/A</td>
<td>See presentation column</td>
<td>60 minutes</td>
<td>May prolong QT interval and lead to ventricular arrhythmias. May induce seizures in epileptics</td>
</tr>
<tr>
<td>piperacillin with tazobactam</td>
<td>Vial 4g/0.5g</td>
<td>20mL WFI</td>
<td>50mL</td>
<td>30 minutes</td>
<td>Penicillin class antibiotic</td>
</tr>
<tr>
<td>ticarcillin with clavulanic acid</td>
<td>Vial 3 g/0.1g</td>
<td>13mL WFI</td>
<td>50mL</td>
<td>30 minutes</td>
<td>Penicillin class antibiotic</td>
</tr>
<tr>
<td>vancomycin</td>
<td>Vials 1g</td>
<td>1g /200mL</td>
<td>Maximum of 10mg/minute</td>
<td>Infusion related effects are common, decrease infusion rate and monitor closely if these occur</td>
<td></td>
</tr>
</tbody>
</table>
SUMMARY

This guideline outlines evidence-based practice for obtaining blood cultures in adult patients with suspected sepsis.

Key Messages:

1. Two sets (4 bottles) of blood cultures are a minimum for each sepsis episode
2. The two sets must be obtained aseptically and from two different peripheral veins (in the same timeframe)
3. Clean the skin with 70% alcohol and then with chlorhexidine and 70% alcohol (reduces skin contamination of blood cultures), allow to dry for 30 seconds
4. Remove the caps and clean the tops of the blood culture bottles with chlorhexidine and 70% alcohol swabs and allow to dry for 30 seconds
5. Fill each bottle with 10mL blood (total 40mL); do not over or under fill
6. Do not take blood cultures from a pre-existing central, peripheral or arterial line
7. Where a catheter-related blood stream infection is suspected, a blood culture set from the pre-existing vascular access device may be required in conjunction with a peripheral site set of blood cultures. This must be specifically discussed with the Consultant responsible for the care of the patient and the sites of collection noted on the request form
8. Where multiple stabs may be required in patients with difficult access, one blood culture set may be drawn from a freshly inserted, unused IV cannula that was inserted under aseptic technique. The second set is drawn at the same time from a peripheral venepuncture

In what clinical situations should blood cultures be taken?

All patients

- who meet criteria for commencement on the Adult Sepsis Pathway
- with SEVERE pneumonia as scored by CORB/SMARTCOP
- with fever or history of fever and suspected or proven neutropaenia
- with fever and who are immunocompromised
- with a fever or evidence of infection and a vascular access device
- overseas travellers with fever
- with suspected bacterial endocarditis take 3 sets (or 6 sets if the patient has received antibiotics within the last 30 days)²
- with delirium

Selected patients with fever of unknown origin who appear unwell or are at risk of sudden deterioration, such as the elderly (age ≥ 65) or chronically ill, but do not meet criteria for the sepsis pathway may benefit from blood cultures. Discuss these patients with the Staff Specialist or Senior Doctor in charge of the department/overseeing care to the patient.

TRANSPORT

- Blood culture sample sets should be stored at room temperature prior to collection
- Where collection is delayed, the facility should liaise with the receiving laboratory to establish a simple guideline for sample storage
PROCEDURE

1. Perform hand hygiene - Moment 1, before touching the patient
2. Check patient identification, inform patient of the procedure and its purpose
3. Ensure that the relevant history and tests are stated on the blood culture request form as this may affect incubation requirements
4. Collect all equipment required (including personal protection equipment) and place on a trolley cleaned with alcohol-based wipes and bring to the patient zone
   - Two blood culture sets (4 bottles) comprising two aerobic and two anaerobic bottles
   - Check expiry date for each bottle and mark 10mL above the broth for fill level
   - Sterile gloves, small dressing pack, cotton balls, tape, tourniquet(s)
   - Chlorhexidine gluconate (> 0.5%) with 70% alcohol solution, opened onto the sterile field or chlorhexidine and 70% alcohol swabs x 6 or more, opened onto the sterile field
   - Vacutainer and leash with winged infusion set designed to fit over the blood culture bottle
     - if unavailable, use a winged infusion set with luer adapter and syringe
     - once a blood sample has been obtained using a syringe, attach a blood transfer device to the syringe to enable safe innoculation of the blood culture bottles
5. Remove the cap of each blood culture bottle and using a non-touch technique scrub the vial stoppers well using a fresh chlorhexidine and 70% alcohol swab and allow to dry for 30 seconds
6. Prepare winged infusion set and vacutainer, prepare other equipment
7. Position patient appropriately, apply tourniquet to palpate and identify appropriate vein
8. Perform hand hygiene – Moment 2, before the procedure
9. Put on sterile gloves (essential if re-palpation occurs post cleansing of the venepuncture site)
10. Using chlorhexidine with 70% alcohol swabs, disinfect the venepuncture site using a scrubbing motion, use a fresh swab for each scrub. Use 2-3 scrubs. Do this for a total of 1-2 minutes, allowing the site to dry (approximately 30 seconds)
11. Perform venepuncture using vacutainer and leash with winged infusion set/luer adapter (release tourniquet during procedure where appropriate, this will contaminate the gloved hand and using a sterile towel or the non-dominant hand is advised)
12. Place 10mL blood per bottle (20mL/set, 40mL in total), keeping blood culture bottle upright and at/below the level of the venepuncture
13. Always collect/innoculate the blood culture bottles FIRST (innoculating the aerobic bottle first) then, if required, collect additional blood pathology tubes at this point
14. Apply cotton ball and pressure to site (where possible obtain patient assistance to hold and apply pressure); repeat procedure for 2nd set of blood cultures at a different peripheral site, maintaining aseptic technique, invert bottles gently several times to prevent clotting
15. Discard sharps, collect all rubbish/dirty items and dispose appropriately
16. Label each bottle with patient name, MRN, date/time for collection of blood and location of site used for each set. Do not cover any bar codes or the bottom of the bottle
17. Place bottles into biohazard bag and arrange to send to the lab with request form, transport bottles at room temperature
18. Remove gloves and perform hand hygiene – Moment 3, after the procedure
19. Explain to patient that results may not be available for 48 hours, conclude procedure
20. Document that (a) two sets of blood cultures have been taken, (b) from which sites, (c) include reason for site choice if this differs from a peripheral site
21. Do not delay administering antibiotics, do not wait for results, see the CEC Sepsis Adult FIRST DOSE Empiric IV Antibiotic Guideline.

For Paediatric Blood Culture (infant/small child): use one paediatric aerobic bottle and fill with 0.5mL to 4mL blood. If the child is less than 2 months of age, use only 70% alcohol swabs. Using a spiral motion clean from the proposed puncture site outwards and use a fresh swab for each spiral. Do this for 1-2 minutes and allow to dry.
Frequently Asked Questions:

Q1: Why do I need to use an aseptic technique? Why do I need to use a dressing pack?
Aseptic technique using a dressing pack prevents contamination of the sample and a false positive result.

Q2: Why do I need to wear sterile gloves?
Sterile gloves should be worn if there is the risk of re-palpating the cleansed site.

Q4: Why should I take an anaerobic bottle as part of a set of blood cultures?
An anaerobic bottle is now recommended as improvements in broth medium and pathology equipment have increased anaerobic yield and some aerobic organisms will signal faster in an anaerobic bottle.

Q5: Why 2 sets (4 bottles) of blood cultures?
A single set (2 bottles) may miss up to 40% of bacteraemias/fungaemias and if only one set is taken and it is positive it could be the result of a contaminant (false positive result). Two sets showing growth makes it easier to eliminate the risk that a skin contaminant has been cultured. Taking blood from separate sites is a further aid.

Q6: Do you have to wait between taking the first and second set of blood cultures?
No. If 2 sets of blood cultures are taken from different peripheral sites and antibiotics have not been given, there is no reason to delay between taking the blood cultures.

Q7: My ED has a once daily collection of pathology. When treating patients with suspected sepsis we give antibiotics and then transfer the patient to a referral facility. Wouldn't it be more efficient to let the receiving hospital (with onsite pathology services) take the blood cultures?
No. Once you have given IV antibiotics, it will then be difficult to grow an organism in the blood culture bottle. Also, having given your first dose of empirical antibiotics you would then want to review results when available to prescribe targeted ongoing therapy.

Q8: Most blood cultures come back negative – why bother taking them?
There are many ways to render a blood culture worthless. If you follow this Blood Culture Sampling guideline, you can help reduce false negative/positive results. Remember to use aseptic technique, obtain the correct volume required for each bottle in each set of blood cultures (10mL/bottle, total of 4 bottles, 2 from a peripheral site; repeat). Where an inadequate blood volume sample is obtained, blood volume ≤ 10mL should be placed solely into the aerobic bottle. Do not overfill the bottles as this also impedes detection (the culture result is less sensitive).

Q9: Why do I need to clean the tops of the blood culture bottles after removing the caps?
The tops of the blood culture bottles are clean but may become contaminated. Clean the tops using aseptic technique prior to inoculating the bottles with blood.

REFERENCES

For further enquiries contact the CEC Sepsis Program Manager via email
At all times ensure hand hygiene is attended ‘The 5 Moments of Hand Hygiene’

1. Assemble equipment, use sterile field and aseptic technique.

2. Vacutainer and winged blood collection kit can be used; take blood cultures first then other blood samples.

3. Mark 10mL above the broth level, remove caps from bottles and clean vial stoppers with chlorhexidine and 70% alcohol swabs. Allow to dry for 30 seconds.

4. Clean vein site with chlorhexidine and 70% alcohol swabs in a scrubbing motion for 1 minute, using multiple swabs. Allow to dry for 30 seconds. Do not re-palpate vein.

5. If there is a risk of re-palpating the cleansed site, wear sterile gloves when performing venepuncture for blood culture sampling. Keep blood culture bottle upright, insert into vacutainer. Collect 10mL blood per bottle and inoculate the aerobic bottle first.

6. Remove winged collection set, cover the venepuncture site and apply pressure. Dispose of sharps appropriately.

7. Gently mix blood with broth, keep at room temperature and send promptly to the lab as an urgent request. Do not cover bar codes or base of bottle and state from which site the blood culture set was obtained.

8. Finally:
   
   Repeat process for second set of blood cultures. Label and complete request form. Document in health care record that blood cultures were sent to lab (date/time). Give antibiotics as soon as possible and as indicated. Do not delay antibiotic therapy.
Appendix C

The following appendix does not contain page numbers so that the documents can be printed directly from this document. The URL link will direct you to the specified document.

C.1 PAEDIATRIC Sepsis Pathway
C.2 PAEDIATRIC Sepsis Worksheet
C.3 PAEDIATRIC Sepsis Reference Card
C.4 PAEDIATRIC Sepsis Frequently Asked Questions
C.5 Sepsis NEONATAL First Dose Empirical Parenteral Antibiotic Guideline
C.6 Sepsis PAEDIATRIC First Dose Empirical Parenteral Antibiotic Guideline
C.7 PAEDIATRIC and NEONATAL Blood Culture Sampling Guideline
PAEDIATRIC SEPSIS PATHWAY v1

Use local febrile neutropenia guideline if the patient has haematology/oncology diagnosis

**Does your patient have risk factors, signs or symptoms of infection?**

- **Signs of toxicity** alertness, arousal or activity decreased; colour pale or mottled; cool peripheries; cry weak; grunting; rigors
- **Non-blanching rash**
- **Clinician concern of sepsis**
- **High level parental concern**
- **3 months of age or younger** (corrected)
- **Re-presentation within 48 hours**
- **Recent surgery**
- **Indwelling medical device**
- **Immunocompromised e.g. asplenia, malignancy, chronic steroid use**

**AND**

**Does your patient have 2 Yellow Zone BTF or 1 Red Zone BTF criteria?**

<table>
<thead>
<tr>
<th>Yellow Zone</th>
<th>Respiratory Rate</th>
<th>Red Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Zone</td>
<td>Respiratory Distress</td>
<td>Red Zone</td>
</tr>
<tr>
<td>Yellow Zone</td>
<td>Heart Rate</td>
<td>Red Zone</td>
</tr>
<tr>
<td>≥ 3 sec</td>
<td>Central Capillary Refill</td>
<td>≥ 5 sec</td>
</tr>
<tr>
<td>Voice</td>
<td>Level of Consciousness (AVPU)</td>
<td>Pain or Unresponsive</td>
</tr>
<tr>
<td>Yellow Zone</td>
<td>Temperature</td>
<td>Red Zone OR ≥ 38°C if less than 4 weeks of age</td>
</tr>
</tbody>
</table>

**NO**

- Continue observations regularly
- Manage and reassess
- Sepsis may still be of concern
- Refer to Recognition of the Sick Baby or Child and/or Fever CPG

**YES**

Senior Clinician Review

- Urgent blood gas (if available)
- Obtain IV access (if indicated)
- Blood culture, lactate, procalcitonin, BGL, FBC & EUC

**Does your patient have any of the additional criteria?**

| SBP in BTF Yellow/Red Zone | Lactate ≥ 4 or procalcitonin (if available) ≥ 0.5 | Ongoing clinician concern |

**NO**

**YES**

**Patient may have SEPSIS**

- Escalate to Senior Clinician and/or Paediatrician within 30 minutes
- Monitor vital signs and fluid balance
- IV access and IV fluids
- Heightened concern if lactate > 2
- Investigate source of infection e.g. cultures/urine MC&S/swabs/CXR
- Do not delay administering antibiotics if IV access or septic screen unsuccessful
- Administer empirical antibiotics within 1 hr unless other diagnosis more likely

**PATIENT HAS SEVERE SEPSIS or SEPTIC SHOCK**

until proven otherwise

- Escalate immediately as per local CERS
- Expedite transfer to resuscitation area or equivalent
- Immediate IV/IO access, fluid resuscitation and antibiotics

**TURN OVER PAGE FOR RESUSCITATION GUIDELINE**

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PAEDIATRIC SEPSIS PATHWAY v1

GET HELP as per local CERS

RESUSCITATE & RE-ASSESS

A
Maintain patent airway

Give oxygen
Maintain SpO₂ > 95%
Monitor: Resp rate SpO₂ Resp distress

B
Intravenous access and collect:
- FBC
- UEC
- LFTs
- PCT
- VBG
- Blood culture(s)
- Coags
- Lactate
- BE
- BGL
- LFTs
- Blood culture(s)
- Coags
- BGL
Consider intraosseous access after two failed IVC attempts or 60 seconds

C
Fluid resuscitation
Give 0.9% NaCl 20mL/kg bolus STAT
Repeat 20mL/kg bolus if no improvement in heart rate, capillary refill, colour or perfusion
Monitor: HR Capillary refill BP Colour

START EMPIRICAL ANTIBIOTICS WITHIN 60 MINUTES
Neonatal or Paediatric First Dose Empirical IV Antibiotic Guideline

D
Assess level of consciousness
Monitor: LOC

E
Examine patient for source of sepsis
Monitor: Temperature
Collect appropriate swabs, urine MCS, NPA, CXR

F
Fluid balance
Consider indwelling catheter
Maintain urine output ≥1mL/kg/hr
Monitor: Urine output

RE-ASSESS
Continue monitoring
Signs of improvement:
- Improved LOC
- Decreased lactate
- Improved capillary refill & BP
- Decreased tachycardia
- Improved colour
- Urine output ≥1mL/kg/hr

IF NO IMPROVEMENT ADDITIONAL MANAGEMENT IS REQUIRED
This child may need transfer to a Paediatric Intensive Care Unit
Seek advice immediately from NETS (1300 36 2500)
in collaboration with local/regional paediatric experts
or consult paediatric intensivist within your hospital if available

Consider and/or prepare for:
1. Other diagnoses or contributing factors
2. Further IV/IO 20mL/kg fluid boluses of 0.9% NaCl or colloid
3. Intubation
4. Inotropes to achieve SBP above the Red Zone threshold
5. Corticosteroids (discuss with NETS/paediatric intensivist)
6. Correct hypocalcaemia if present

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The PAEDIATRIC reference card template displayed on the opposite page can be printed and laminated for clinicians to use as a quick reference.
## Paediatric Sepsis

### Recognise

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Sign or Symptom</th>
<th>Sepsis Criteria</th>
<th>Urgent senior clinician review</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

- Risk factors, signs or symptoms of infection
- Signs of toxicity
- Non-blanching rash
- Parental concern

### Sepsis Criteria

(Note only need 1 of any criteria if Immunocompromised)

- Respiratory rate
- Respiratory distress
- Heart rate
- Central capillary refill
- Level of consciousness (AVPU)
- Temperature

### Refer

- Maintain patent airway
- Give oxygen to maintain SpO2 ≥95%
- Intravenous or intraosseous access
- Commence fluid resuscitation

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9% NaCl</td>
<td>20ml/kg bolus STAT</td>
</tr>
</tbody>
</table>

- Start Empirical Antibiotic within 60 minutes
- Normal or Paediatric Red Dose Empirical IV Antibiotic Guideline

- Assess level of consciousness
- Continuous monitoring
- Signs of improvement:
  - Decreased tachycardia & lactate
  - Improved capillary refill, BP, LOC, colour & urine output >1ml/kg/hr

- If no improvement additional management is required
  - Seek advice immediately from NETS 1300 36 2500 in collaboration with local / regional experts or consult paediatric intensivist within your hospital if available.

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CEC Sepsis Toolkit
1. Our local guidelines have different doses to those in the CEC sepsis guidelines. What should I do?

The doses in the CEC Sepsis Neonatal and Paediatric First Dose Empirical Guidelines are based on the information in MIMS Australia and the Therapeutic Guidelines: Antibiotic version 14, 2010 and incorporates best available evidence and expert opinion. The Guideline is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required. If further information is required seek advice from paediatric and infectious diseases experts and / or NETS.

2. Can the neonatal First Dose Empirical Antibiotic Guideline be used for in-patient settings such as the post natal ward and Neonatal Intensive Care Units?

The Neonatal Empirical Parenteral Antibiotic Guideline aims to guide the prescription and timely administration of the FIRST DOSE of antibiotics for neonatal patients (less than one month of age) who re-present after going home and have a diagnosis of sepsis. It is not intended to be used for pre-term neonates or infections acquired in hospital.

3. Is it safe to administer IV gentamicin via a “push” over 5 minutes in the neonatal and paediatric population?

Gentamicin is safe to administer as an intravenous push over 5 minutes in both neonatal and paediatric patients. 3,4

4. What if we do not stock the recommended antibiotic?

Alternatives are listed in the Guidelines for a number of the drugs if a site does not stock a particular drug. With the revised Guidelines we suggest hospital drug and therapeutics committees review antimicrobials available on formulary and liaise with the pharmacy department to ensure appropriate antimicrobials are readily accessible in the sepsis setting.

5. What resources are available in managing patient’s with a haematolology/ oncology diagnosis with sepsis?

Use local febrile neutropenia guidelines for any patient with a haematology or oncology diagnosis. Some sites have adapted protocols from the specialty paediatric hospitals or use the guideline from the patients treating hospital. A clinical practice guideline (CPG) Recognition and Management of
6. Can these guidelines be utilised beyond the initial first dose?

The neonatal and paediatric guidelines are intended for the FIRST DOSE of antibiotics after which clinicians should consult local experts and guidelines or Therapeutic Guidelines: Antibiotic to decide on further therapy. Test results may also inform decisions.

Further advice is available from paediatric and infectious diseases experts or NETS. In all cases the dosing regimen for the indicated drug is given on the CEC guideline so that on-going dosing can be provided if required.

7. Can the sample from an EZ IO be used in the point of care testing machines?

There is currently not enough evidence suggesting accuracy of intraosseous (IO) sample results using point of care testing. It is possible that IO samples can damage some machines therefore it is advised that you check with your local pathology regarding testing capabilities. IO samples can be used for a number of tests including blood cultures however it is important that they are labelled as an “Intraosseous sample”.

8. Why is aciclovir suggested for all suspected sepsis without risk factors for herpes simplex virus (HSV) ?

This guideline is for neonates in an emergency setting therefore broad antimicrobial cover against multiple organisms is recommended. Aciclovir is an antiviral agent that is effective against herpes simplex infection and is first-line therapy for suspected or proven herpes simplex encephalitis according to Therapeutic Guidelines: Antibiotic. Although the incidence of neonatal herpes is not common, the outcomes are often devastating if not treated appropriately. Neonatal HSV infection can present as pneumonia, hepatitis, sepsis, encephalitis and skin disease. Aciclovir is recommended for consideration in these conditions.

9. Is it safe to administer a 20mL/kg bolus of 0.9% sodium chloride solution (Normal Saline) in neonates or patients at risk of cardiac disease?

Neonates with a possible diagnosis of sepsis presenting to the emergency department may require a 20mL/kg bolus of 0.9% sodium chloride solution. However it is important to use caution in neonates and patients at risk of cardiac disease who may not tolerate larger volumes. If you have any concerns administer 10mL/kg aliquots and assess the patient’s response to the fluid bolus.
10. Is it possible to adapt either the paediatric pathway or the antibiotic guidelines to best fit our local needs?

The intention of both the pathway and antibiotic guidelines are to provide general guidance to improve the process of care for paediatric patients with sepsis. It may be necessary for some sites to make minor changes to the pathway and guidelines to “best fit” the needs of an individual department.

It is requested that an electronic copy is sent to the CEC so they have a record of the documents being used by individual facilities or local health districts. It is suggested that teams implementing the paediatric and neonatal guidelines consult their local antimicrobial stewardship committees when reviewing or changing guidelines.

References

The Clinical Excellence Commission (CEC) Sepsis Neonatal Empirical Parenteral Antibiotic Guideline aims to guide the prescription and timely administration of the **FIRST DOSE** of antibiotics for neonatal patients (less than one month of age) who re-present after going home and have a diagnosis of sepsis.

Antibiotics can be administered via umbilical or intraosseous access when peripheral intravenous access is not available. Prior to gaining intraosseous access in the neonate, consideration must be given as to whether the umbilical vein is still accessible. If in doubt please refer to local neonatologist or NETS NSW. Intramuscular antibiotics should only be used FOR SHORT TERM if unable to obtain intravenous, umbilical or intraosseous access.

The guideline is based on MIMS, 2011 and the Therapeutic Guidelines: Antibiotic version 14, 2010. Some doses may vary from Therapeutic Guidelines as they are under review. The CEC guideline incorporates best available evidence and expert opinion and is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required.

Prompt administration of antibiotics and resuscitation fluids is vital in the management of the neonate at risk of, or with, sepsis. The goal is to commence antibiotic therapy within the first hour of the recognition of the risk of sepsis. Neonates at risk of sepsis may develop irretrievable septic syndromes if antibiotics are delayed.

Sepsis in neonates is often described as early-onset or late-onset. Neonates with early-onset sepsis may have antenatal risk factors of positive group B streptococcus colonisation of the maternal vagina, premature or prolonged rupture of membranes, unexplained premature labour and/or peri-partum maternal fever. Sepsis in the neonate often presents with subtle signs which may include dusky episodes, pallor, temperature instability (fever or hypothermia), poor feeding, sleepiness, low blood glucose, milky or bilious vomits or early onset respiratory distress before becoming a fulminant, systemic illness. This is why a low index of suspicion should be maintained and treatment instituted where **two or more** of the above risk factors or signs are present prior to fulminant disease.

Late-onset disease is described as occurring after 48 hours of age. Term infants with late-onset sepsis may have a history of obstetric complications but this is less characteristic. It is important to note that many septic newborns have no apparent antenatal or obstetric risk factors.

**Use Table 1 when there is no obvious source of infection**

**Use Table 2 when the source of infection is suspected or known**
### Table 1: NEONATAL antibiotic prescribing when NO OBVIOUS SOURCE OF INFECTION

<table>
<thead>
<tr>
<th>Sepsis or suspected sepsis, with NO OBVIOUS SOURCE of infection</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 7 days age</td>
<td><strong>CEFOTAXIME</strong> 50mg/kg/dose IV/IO, 12-hourly <strong>PLUS</strong> <strong>GENTAMICIN</strong> 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly <strong>PLUS</strong> <strong>AMPICILLIN</strong> 50mg/kg/dose IV/IO, 8-hourly <strong>PLUS</strong> <strong>ACICLOVIR</strong> 20mg/kg/dose IV/IO, 8-hourly</td>
<td><strong>CEFOTAXIME</strong> 50mg/kg/dose IV/IO, 8-hourly <strong>PLUS</strong> <strong>GENTAMICIN</strong> 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly <strong>PLUS</strong> <strong>AMPICILLIN</strong> 50mg/kg/dose IV/IO, 6-hourly <strong>PLUS</strong> <strong>ACICLOVIR</strong> 20mg/kg/dose IV/IO, 8-hourly</td>
<td><strong>CEFOTAXIME</strong> 50mg/kg/dose IM, 12-hourly (age &lt; 7 days) <strong>OR</strong> 8-hourly (age 7-28 days) <strong>PLUS</strong> <strong>GENTAMICIN</strong> 5mg/kg/dose IM, 24-hourly <strong>PLUS</strong> <strong>AMPICILLIN</strong> 50mg/kg/dose IM, 8-hourly (age &lt; 7 days) <strong>OR</strong> 6-hourly (age 7-28 days)</td>
</tr>
<tr>
<td>7-28 days age</td>
<td><strong>CEFOTAXIME</strong> 50mg/kg/dose IV/IO, 8-hourly <strong>PLUS</strong> <strong>GENTAMICIN</strong> 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly <strong>PLUS</strong> <strong>AMPICILLIN</strong> 50mg/kg/dose IV/IO, 6-hourly <strong>PLUS</strong> <strong>ACICLOVIR</strong> 20mg/kg/dose IV/IO, 8-hourly</td>
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</tr>
</tbody>
</table>

**Intramuscular (IM) administration** indicated ONLY FOR SHORT TERM USE if unable to obtain intravenous, umbilical or intraosseous access.

**Notes for Table 1:**
- If renal failure is present, dosages and intervals of antibiotics may need to be adjusted especially for vancomycin, gentamicin and penicillin drugs.
- All antibiotic dosing in neonates relates to birth weight. Where scales are available the baby should be bare weighed. If no scales available the weight can be estimated by the paediatrician or neonatologist. When in doubt call NETS 1300 36 2500 for adequate dosing and management.
- Obtain 1mL of blood for blood culture (aerobic bottle) before administering antibiotics if possible (0.5mL absolute minimum for blood culture).
- Obtain other clinical specimens as appropriate but do not delay administration of antibiotics or wait for results of investigations.
- All neonates with presumed or suspected sepsis should be discussed with a consultant Paediatrician or Neonatologist. If not available call NETS NSW phone 1300 36 2500 for urgent advice.
- Always obtain expert advice about further investigation and treatment if blood culture or CSF cultures become positive.
Table 2: NEONATAL antibiotic prescribing when SOURCE OF INFECTION IS SUSPECTED OR KNOWN

Notes – see numbers in table text below:
1. Consider aciclovir if severe sepsis, pneumonia, meningitis, seizures, hepatitis or if skin vesicles or ulceration present.
2. Consider adding clindamycin if high risk for community acquired MRSA.
3. Add vancomycin if severe sepsis 15mg/kg/dose 12 hourly (less than 7 days age) or 8 hourly (7-28 days age).

<table>
<thead>
<tr>
<th>Apparent source of sepsis</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningitis / encephalitis</td>
<td>ceftoxatime 50mg/kg/dose IV/IO, 12-hourly PLUS ampicillin 50mg/kg/dose IV/IO, 8-hourly PLUS aciclovir 20mg/kg/dose IV/IO 8-hourly</td>
<td>ceftoxatime 50mg/kg/dose IV/IO, 8-hourly PLUS ampicillin 50mg/kg/dose IV/IO, 6-hourly PLUS aciclovir 20mg/kg/dose IV/IO 8-hourly</td>
<td>ceftoxatime 50mg/kg/dose IM, 8 or 12-hourly PLUS ampicillin 50mg/kg/dose IM, 8-hourly (age &lt; 7 days) OR 6-hourly (age 7-28 days)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>benzylpenicillin 60mg/kg/dose IV/IO, 12-hourly PLUS gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly PLUS azithromycin 10mg/kg/dose IV/IO, 24-hourly (if considering chlamydia or pertussis)</td>
<td>benzylpenicillin 60mg/kg/dose IV/IO, 6-hourly PLUS gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly PLUS azithromycin 10mg/kg/dose IV/IO, 24-hourly (if considering chlamydia or pertussis)</td>
<td>benzylpenicillin 60mg/kg/dose IM, 12-hourly (age &lt; 7 days) OR 6-hourly (age 7-28 days) PLUS gentamicin 5 MINUTE PUSH 5mg/kg/dose IM, 24-hourly</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>ampicillin 50mg/kg/dose IV/IO, 8-hourly PLUS gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly</td>
<td>ampicillin 50mg/kg/dose IV/IO, 6-hourly PLUS gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly</td>
<td>ampicillin 50mg/kg/dose IM, 8-hourly (age &lt; 7 days) OR 6-hourly (age 7-28 days) PLUS gentamicin 5mg/kg/dose IM, 24-hourly</td>
</tr>
<tr>
<td>Apparent source of sepsis</td>
<td>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</td>
<td>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</td>
<td>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</td>
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<tr>
<td>-------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Less than 7 days age</td>
<td>7-28 days age</td>
<td></td>
</tr>
<tr>
<td>Cellulitis or omphalitis</td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 12-hourly</td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 6-hourly</td>
<td>flucloxacillin 50mg/kg/dose IM, 12-hourly (age &lt; 7 days)</td>
</tr>
<tr>
<td></td>
<td>Refer to notes (2),(3) above</td>
<td>OR</td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 12-hourly</td>
<td>6-hourly (age 7-28 days)</td>
<td>6-hourly (age 7-28 days)</td>
</tr>
<tr>
<td>Osteomyelitis/septic arthritis</td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 12-hourly</td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 6-hourly</td>
<td>flucloxacillin 50mg/kg/dose IM, 12-hourly (age &lt; 7 days)</td>
</tr>
<tr>
<td></td>
<td>Refer to notes (2)(3)</td>
<td>OR</td>
<td>OR</td>
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<td></td>
<td>flucloxacillin 50mg/kg/dose IV/IO, 12-hourly</td>
<td>6-hourly (age 7-28 days)</td>
<td>6-hourly (age 7-28 days)</td>
</tr>
<tr>
<td>Intra-abdominal infection</td>
<td>gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly</td>
<td>gentamicin 5 MINUTE PUSH 5mg/kg/dose IV/IO, 24-hourly</td>
<td>gentamicin 5mg/kg/dose IM, 24-hourly</td>
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<td>PLUS</td>
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<tr>
<td></td>
<td>ampicillin 50mg/kg/dose IV/IO, 8-hourly</td>
<td>ampicillin 50mg/kg/dose IV/IO, 6-hourly</td>
<td>ampicillin 50mg/kg/dose IM, 8-hourly (age &lt; 7 days)</td>
</tr>
<tr>
<td></td>
<td>PLUS</td>
<td>PLUS</td>
<td>PLUS</td>
</tr>
<tr>
<td></td>
<td>metronidazole 15mg/kg IV/IO as a loading dose then 7.5mg/kg/dose IV/IO</td>
<td>metronidazole 15mg/kg/dose IV/IO, 12-hourly</td>
<td>clindamycin 5mg/kg/dose IM, 8-hourly (age &lt; 7 days)</td>
</tr>
<tr>
<td></td>
<td>12-hourly</td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>This is given 12 hours after the loading dose.</td>
<td></td>
<td>6-hourly (age 7-28 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PLUS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>clindamycin 5mg/kg/dose IM, 8-hourly (age &lt; 7 days)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6-hourly (age 7-28 days)</td>
</tr>
</tbody>
</table>
## Table 3: Antibiotics that treat common infecting organisms

<table>
<thead>
<tr>
<th>Drug</th>
<th>Susceptible organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>aciclovir</td>
<td>Herpes simplex type 1, herpes simplex type 2 and varicella zoster viruses</td>
</tr>
<tr>
<td>ampicillin</td>
<td>Group A and B streptococci, Listeria monocytogenes, penicillin SENSITIVE</td>
</tr>
<tr>
<td></td>
<td>Staphylococcus aureus, E coli*, Proteus mirabilis*</td>
</tr>
<tr>
<td>azithromycin</td>
<td><em>Chlamydia trachomatis</em></td>
</tr>
<tr>
<td>benzyl penicillin (penicillin G)</td>
<td>Group A and B streptococci, pneumococcus, meningococcus Listeria monocytogenes, ,</td>
</tr>
<tr>
<td></td>
<td>penicillin SENSITIVE Staphylococcus aureus</td>
</tr>
<tr>
<td>cefotaxime</td>
<td>Group A and B streptococci, pneumococcus, meningococcus, methicillin SENSITIVE</td>
</tr>
<tr>
<td></td>
<td>Staphylococcus aureus, E coli, Klebsiella, Proteus mirabilis. Note: Good CNS penetration.</td>
</tr>
<tr>
<td>clindamycin</td>
<td><em>Staphylococcus aureus</em>, Group A streptococcus* (Streptococcus pyogenes)*</td>
</tr>
<tr>
<td></td>
<td><em>Streptococcus pneumoniae</em> (pneumococcus) and anaerobes</td>
</tr>
<tr>
<td>flucloxacillin</td>
<td>Methicillin SENSITIVE Staphylococcus aureus, group A and B streptococci</td>
</tr>
<tr>
<td>gentamicin</td>
<td>Enterobacteriaceae (e.g. E coli, Klebsiella, Proteus, Enterobacter, Serratia, Morganella,</td>
</tr>
<tr>
<td></td>
<td>Hafnia species) and Pseudomonas aeruginosa. Note: Poor CNS penetration.</td>
</tr>
<tr>
<td>metronidazole (Flagyl)</td>
<td>Anaerobic gram negative bacteria including <em>Bacteroides fragilis</em>.</td>
</tr>
</tbody>
</table>

* = if sensitive

**Footnote:** This table provides information about common infecting bacteria and their probable sensitivities. This is not an exhaustive list further information can be obtained from a microbiologist or infectious diseases physician. Final sensitivities are dependent on laboratory testing.
Table 4: NEONATAL antibiotic administration

- Administer the antibiotic which takes the least time to inject or infuse, in the order provided.
- Reconstitute antibiotics with sterile water for injection (WFI) unless stated otherwise.
- If further dilution is required for IV injection or infusion, use sterile sodium chloride 0.9% or sterile glucose 5% unless stated otherwise.
- To avoid drug incompatibility without delaying fluid administration, flush the IV line with 0.5mL sterile sodium chloride 0.9% before and after the antibiotic injection/infusion.
- When injecting antibiotics directly into an IV injection port which has resuscitation fluid (0.9% sodium chloride) running:
  - clamp the infusion fluid line
  - administer antibiotic over the required time
  - recommence resuscitation fluid (0.9% sodium chloride)

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Presentation</th>
<th>Reconstitution volume / fluid for intravenous (IV), umbilical or intraosseous administration</th>
<th>Final volume for IV, umbilical or intraosseous administration</th>
<th>Minimum IV, umbilical or intraosseous administration time</th>
<th>Intramuscular (IM) administration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ampicillin</td>
<td>Vial 1g</td>
<td>10mL WFI</td>
<td>10 - 20mL</td>
<td>3 – 5 minutes</td>
<td>Reconstitute 1g vial with 1.5mL WFI and administer intramuscularly</td>
<td>Penicillin class antibiotic.</td>
</tr>
<tr>
<td>aciclovir</td>
<td>250mg/10mL Vial</td>
<td>50mL WFI</td>
<td>250mg/50mL or 5mg/mL</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Dose interval adjusted if renal impairment</td>
</tr>
<tr>
<td>azithromycin</td>
<td>Vial 500mg</td>
<td>4.8mL WFI</td>
<td>100mg/mL</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Concentration must be 1 or 2 mg/mL to avoid local infusion site reaction. Rare reports of prolonged QT interval.</td>
</tr>
<tr>
<td>benzylpenicillin</td>
<td>Vials</td>
<td></td>
<td></td>
<td></td>
<td>For 600mg vial: Add 1.6mL WFI = 300mg/mL and administer intramuscularly</td>
<td>Penicillin class antibiotic.</td>
</tr>
<tr>
<td></td>
<td>600mg</td>
<td>2mL WFI</td>
<td>300mg/1mL</td>
<td>15 minutes</td>
<td>For 1.2g vial: Add 3.2mL WFI = 300mg/mL and administer intramuscularly</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.2g</td>
<td>4mL WFI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic</td>
<td>Presentation</td>
<td>Reconstitution volume / fluid for intravenous (IV), umbilical or intraosseous administration</td>
<td>Final volume for IV, umbilical or intraosseous administration</td>
<td>Minimum IV, umbilical or intraosseous administration time</td>
<td>Intramuscular (IM) administration</td>
<td>Notes</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>cefotaxime</td>
<td>Vial 500mg</td>
<td>5 mL WFI</td>
<td>100mg/mL</td>
<td>3 minutes</td>
<td>Reconstitute with lignocaine 0.5-1% or WFI to a final concentration of 330mg/mL and administer intramuscularly.</td>
<td>Cephalosporin class antibiotic.</td>
</tr>
<tr>
<td></td>
<td>Vial 1g</td>
<td>10 mL WFI</td>
<td>100mg/mL</td>
<td>3 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>clindamycin</td>
<td>Ampoule: 300mg/2mL, 600mg/4mL</td>
<td>Dilute 0.5 mL from vial with 35 mL 0.9% saline</td>
<td>75 mg / 25mL solution. 1.67 mL = 5mg</td>
<td>1 hour</td>
<td>If giving intramuscularly do NOT dilute</td>
<td>FRIDGE ITEM: Kept at 2-8°C Check product is clear of any crystals before administration.</td>
</tr>
<tr>
<td>flucloxacillin</td>
<td>Vial 500mg</td>
<td>Add 4.6mL WFI; then add 20mLs 0.9% sodium chloride</td>
<td>20mg/mL</td>
<td>10 minutes</td>
<td>Administer undiluted intramuscularly</td>
<td>Check product is clear of any crystals prior to administration. Penicillin class antibiotic.</td>
</tr>
<tr>
<td></td>
<td>Vial 1g</td>
<td>9.3mL WFI. Further reconstitution required: 1mL of reconstituted solution with 4mLs WFI</td>
<td>20mg/mL</td>
<td>10 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>gentamicin</td>
<td>Ampoule 10mg/1mL</td>
<td>Dilute 10mg ampoule to 5mL with WFI</td>
<td>2mg/mL</td>
<td>5 minutes</td>
<td>Administer undiluted intramuscularly</td>
<td>Administration via a 5 MINUTE PUSH is safe and will deliver rapid therapy. IV gentamicin is inactivated by IV cephalosporins and penicillins. Flush line before giving gentamicin to prevent inactivation. Monitor levels for ongoing dosing.</td>
</tr>
</tbody>
</table>
Table 4: NEONATAL antibiotic administration (cont.)

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Presentation</th>
<th>Reconstitution volume / fluid for intravenous (IV), umbilical or intraosseous administration</th>
<th>Final volume for IV, umbilical or intraosseous administration</th>
<th>Minimum IV, umbilical or intraosseous administration time</th>
<th>Intramuscular (IM) administration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>metronidazole</td>
<td>Infusion bag 500mg/100mL</td>
<td>Not required</td>
<td>500mg/100mL</td>
<td>15 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Infusion related effects are common. Baby may flush red in “red man syndrome”. In this instance decrease infusion rate, check dosing and monitor closely. Serum Levels required for ongoing dosing.</td>
</tr>
<tr>
<td>vancomycin</td>
<td>500 mg, 1000 mg</td>
<td>500 mg dilute with 10 mL WFI or 1000 mg dilute with 20 mL WFI Dilute 2 mL of above with 8 mL WFI</td>
<td>10mg/mL</td>
<td>1 hour</td>
<td>Do NOT give intramuscularly</td>
<td></td>
</tr>
</tbody>
</table>

References
5. Paediatric Sepsis Reference Group, Clinical Excellence Commission.

Acknowledgments
With kind thanks to The Children’s Hospital at Westmead for use of their Antibiotic Guidelines which form the basis of Table 1 and 2. Antibiotic Guidelines are based on MIMS (2011).
The Clinical Excellence Commission (CEC) Sepsis Paediatric Empirical Parenteral Antibiotic Guideline aims to guide the prescription and timely administration of the FIRST DOSE of antibiotics for paediatric patients (1 month to 16 years of age) who have a diagnosis of sepsis. Antibiotics can be administered via intraosseous access or intramuscularly when intravenous access is not available. Intramuscular antibiotics should only be used FOR SHORT TERM.

The guideline is based on MIMS, 2011 and the Therapeutic Guidelines: Antibiotic version 14, 2010. Some doses may vary from Therapeutic Guidelines as they are under review. The CEC guideline incorporates best available evidence and expert opinion and is intended to provide an accessible resource which can be adapted to suit individual facility preferences as required.

This is a guideline for the FIRST DOSE of antibiotics after which clinicians should seek local assistance and examine results of tests to inform ongoing directed therapy.

For general guidance, refer to Principles for antimicrobial use (Therapeutic Guidelines).

Important notes
- PROMPT ADMINISTRATION OF ANTIBIOTICS (within one hour of provisional diagnosis) and resuscitation fluids is vital in the management of the patient with sepsis.
- A differential diagnosis should always be considered and documented.
- If further advice is required call your LOCAL PAEDIATRICIAN.
- Always discuss patients who present with febrile neutropenia with the relevant Oncology or Haematology consultant.
- Obtain blood cultures if possible before administering antibiotics. Don’t wait for other test results before commencing antibiotics.
- All penicillin and cephalosporin class antibiotics are contraindicated in patients with history of DRESS (drug rash with eosinophilia and systemic symptoms) or documented immediate allergy (including Stevens Johnson syndrome) to penicillin or cephalosporin in the past. See also Antimicrobial hypersensitivity (Therapeutic Guidelines).

Use Table 1 when there is no obvious source of infection

Use Table 2 when the source of infection is suspected or known
**Table 1: PAEDIATRIC antibiotic prescribing when NO OBVIOUS SOURCE OF INFECTION**

<table>
<thead>
<tr>
<th>Severe sepsis with NO OBVIOUS SOURCE of infection</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
<th>Anaphylaxis to penicillin FIRST DOSE empirical Intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>See Table 3 for common infecting bacteria</td>
<td>cefotaxime 50mg/kg/dose IV/IO, 8-hourly (max. dose 2g) <strong>OR</strong> ceftriaxone 50mg/kg/dose IV/IO, 24-hourly (max. dose 2g) <strong>PLUS</strong> gentamicin** 5 MINUTE PUSH (dose based on lean body weight) &lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg) ≥10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg) <strong>PLUS</strong> vancomycin*** (dose based on actual body weight) 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
<td>cefotaxime 50mg/kg/dose IM, 8-hourly (max. dose 2g) <strong>OR</strong> ceftriaxone 50mg/kg/dose IM, 24-hourly (max. dose 2g) <strong>PLUS</strong> gentamicin** (dose based on lean body weight) &lt;10 years, 7.5mg/kg/dose IM, 24-hourly (max. dose 320mg) ≥10 years, 6mg/kg/dose IM, 24-hourly (max. dose 560mg)</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight) &lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg) ≥10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg) <strong>PLUS</strong> moxifloxacin 10mg/kg/dose IV/IO, 24-hourly (max. dose 400mg) <strong>OR</strong> ciprofloxacin 10mg/kg/dose IV/IO, 12-hourly (max. dose 400mg) <strong>PLUS</strong> vancomycin*** (dose based on actual body weight) 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
</tr>
</tbody>
</table>

vancomycin CANNOT be given intramuscularly
### Table 2: PAEDIATRIC antibiotic prescribing when SOURCE OF INFECTION IS SUSPECTED OR KNOWN

<table>
<thead>
<tr>
<th>Apparent source of sepsis</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
<th>Anaphylaxis to penicillin FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe pneumonia</strong></td>
<td><strong>First Dose</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(community acquired)</td>
<td>ceftriaxone 50mg/kg/dose IV/IO, 24-hourly (max. dose 2g)</td>
<td>ceftriaxone 50mg/kg/dose IM, 24-hourly (max. dose 2g)</td>
<td>moxifloxacin 10mg/kg/dose IV/IO, 24-hourly (max. dose 400mg)</td>
</tr>
<tr>
<td></td>
<td>OR cefotaxime 50mg/kg/dose IV/IO, 8-hourly (max. dose 2g)</td>
<td>OR cefotaxime 50mg/kg/dose IM, 8-hourly (max. dose 2g)</td>
<td>OR ciprofloxacin 10mg/kg/dose IV/IO, 12-hourly (max. dose 400mg)</td>
</tr>
<tr>
<td></td>
<td>PLUS clindamycin 15mg/kg/dose IV/IO, 8-hourly (max. dose 900mg)</td>
<td>PLUS clindamycin 15mg/kg/dose IM, 8-hourly (max. dose 900mg)</td>
<td>PLUS vancomycin*** (dose based on actual body weight) 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
</tr>
<tr>
<td></td>
<td>OR lincomycin 15mg/kg/dose IV/IO, 8-hourly (max. dose 600mg)</td>
<td>OR lincomycin 15mg/kg/dose IM, 8-hourly (max. dose 600mg)</td>
<td></td>
</tr>
<tr>
<td><strong>Urinary tract infection</strong></td>
<td>ampicillin 50mg/kg/dose IV/IO, 6-hourly (max. dose 2g)</td>
<td>ampicillin 50mg/kg/dose IM, 6-hourly (max. dose 2g)</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
</tr>
<tr>
<td></td>
<td>PLUS gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
<td>PLUS gentamicin** (dose based on lean body weight)</td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg)</td>
</tr>
<tr>
<td></td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg)</td>
<td>&lt;10 years, 7.5mg/kg/dose IM, 24-hourly (max. dose 320mg)</td>
<td>&gt;10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg)</td>
</tr>
<tr>
<td></td>
<td>&gt;10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg)</td>
<td>&gt;10 years, 6mg/kg/dose IM, 24-hourly (max. dose 560mg)</td>
<td>PLUS vancomycin*** (dose based on actual body weight) 15mg/kg IV/IO, 6-hourly (max. dose 750mg)</td>
</tr>
</tbody>
</table>
Table 2: PAEDIATRIC antibiotic prescribing SOURCE OF INFECTION IS SUSPECTED OR KNOWN (cont.)

<table>
<thead>
<tr>
<th>Apparent source of sepsis</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
<th>Anaphylaxis to penicillin FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra-abdominal source including cholangitis</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
<td>gentamicin** (dose based on lean body weight)</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
</tr>
<tr>
<td></td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO 24-hourly (max. dose 320 mg)</td>
<td>&lt;10 years, 7.5mg/kg/dose IM, 24-hourly (max. dose 320mg)</td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg)</td>
</tr>
<tr>
<td></td>
<td>&gt;10 years, 6mg/kg/dose IV/IO 24-hourly (max. dose 560mg)</td>
<td>&gt;10 years, 6mg/kg/dose IM, 24-hourly (max. dose 560mg)</td>
<td>&gt;10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg)</td>
</tr>
<tr>
<td></td>
<td>PLUS</td>
<td>PLUS</td>
<td>PLUS</td>
</tr>
<tr>
<td></td>
<td>ampicillin 50mg/kg/dose IV/IO 6-hourly (max. dose 2g)</td>
<td>ampicillin 50mg/kg/dose IM, 6-hourly (max. dose 2g)</td>
<td>metronidazole 12.5mg/kg/dose IV/IO, 12-hourly (max. dose 500mg)</td>
</tr>
<tr>
<td></td>
<td>PLUS</td>
<td>PLUS</td>
<td>PLUS</td>
</tr>
<tr>
<td></td>
<td>metronidazole 12.5mg/kg/dose IV/IO, 12-hourly (max. dose 500mg)</td>
<td>clindamycin 15mg/kg/dose IM, 8-hourly (max. dose 900mg)</td>
<td>vancomycin*** (dose based on actual body weight)</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>OR</td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td>lincomycin 15mg/kg/dose IM, 8-hourly (max. dose 600mg)</td>
<td>moxifloxacin 10mg/kg/dose IV/IO, 24-hourly (max dose 400mg)</td>
<td>vancomycin*** (dose based on actual body weight)</td>
</tr>
<tr>
<td></td>
<td>PLUS</td>
<td>PLUS</td>
<td>PLUS</td>
</tr>
<tr>
<td></td>
<td>vancomycin and aciclovir CANNOT be given intramuscularly</td>
<td>vancomycin and aciclovir CANNOT be given intramuscularly</td>
<td>vancomycin*** (dose based on actual body weight)</td>
</tr>
<tr>
<td></td>
<td>then seek ID/MICRO advice</td>
<td>then seek ID/MICRO advice</td>
<td>then seek ID/MICRO advice</td>
</tr>
</tbody>
</table>

Meningitis / encephalitis
Steroids prior to antibiotic therapy may be indicated; see Meningitis: immediate and early hospital management [Therapeutic Guidelines]

|                          | ceftriaxone 50mg/kg/dose IV/IO, 12-hourly (max. dose 2g) | ceftriaxone 50mg/kg/dose IM, 12-hourly (max. dose 2g) | moxifloxacin 10mg/kg/dose IV/IO, 24-hourly (max dose 400mg) |
|                          | OR | OR | OR |
|                          | cefotaxime 50mg/kg/dose IV/IO, 6-hourly (max. dose 2g) | cefotaxime 50mg/kg/dose IM, 6-hourly (max. dose 2g) | ciprofloxacin 10mg/kg/dose IV/IO, 12-hourly (max. dose 400mg) |
|                          | PLUS | PLUS | PLUS |
|                          | vancomycin*** (dose based on actual body weight) | vancomycin*** (dose based on actual body weight) | vancomycin*** (dose based on actual body weight) |
|                          | 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg) | 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg) | 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg) |

If signs of encephalitis
ADD aciclovir

|                          | 1 month-5 years | 1 month - 5 years | 1 month - 5 years |
|                          | 20mg/kg/dose IV/IO, 8 hourly | 20mg/kg/dose IV/IO, 8 hourly | 20mg/kg/dose IV/IO, 8 hourly |
|                          | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly |
|                          | >12 years, 10mg/kg/dose IV/IO, 8 hourly | >12 years, 10mg/kg/dose IV/IO, 8 hourly | >12 years, 10mg/kg/dose IV/IO, 8 hourly |

then seek ID/MICRO advice

If signs of encephalitis
ADD acyclovir

|                          | 1 month - 5 years | 1 month - 5 years | 1 month - 5 years |
|                          | 20mg/kg/dose IV/IO, 8 hourly | 20mg/kg/dose IV/IO, 8 hourly | 20mg/kg/dose IV/IO, 8 hourly |
|                          | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly | 5 -12 years, 15mg/kg/dose IV/IO, 8 hourly |
|                          | >12 years, 10mg/kg/dose IV/IO, 8 hourly | >12 years, 10mg/kg/dose IV/IO, 8 hourly | >12 years, 10mg/kg/dose IV/IO, 8 hourly |
### Table 2: PAEDIATRIC antibiotic prescribing SOURCE OF INFECTION IS SUSPECTED OR KNOWN (cont.)

<table>
<thead>
<tr>
<th>Apparent source of sepsis</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
<th>Anaphylaxis to penicillin FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin/soft tissue/bone/joint (with shock)</td>
<td><strong>flucloxacillin</strong> 50mg/kg/dose IV/IO, 6-hourly (max. dose 2g) <strong>PLUS</strong> <strong>vancomycin</strong>* (dose based on actual body weight) 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
<td><strong>flucloxacillin</strong> 50mg/kg/dose IM, 6-hourly (max. dose 2g) <strong>PLUS</strong> <strong>clindamycin</strong> 15mg/kg/dose IV/IO, 6-hourly (max. dose 900mg) <strong>OR</strong> <strong>lincomycin</strong> 15mg/kg/dose IV/IO, 8-hourly (max. dose 600mg) <strong>PLUS</strong> <strong>vancomycin</strong>* (dose based on actual body weight) 15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
<td><strong>gentamicin</strong> <strong>5 MINUTE PUSH</strong> (dose based on lean body weight) &lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg) &gt;10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg) <strong>PLUS</strong> <strong>clindamycin</strong> 15mg/kg/dose IV/IO, 8-hourly (max. dose 900mg) <strong>OR</strong> <strong>lincomycin</strong> 15mg/kg/dose IV/IO, 8-hourly (max. dose 600mg) <strong>PLUS</strong> <strong>azithromycin</strong> 10mg/kg/dose IV/IO, 24-hourly (max. dose 500mg)</td>
</tr>
<tr>
<td>Female genital tract (sexually acquired pelvic inflammatory disease)</td>
<td><strong>ceftriaxone</strong> 50mg/kg/dose IV/IO, 24-hourly (max. dose 2g) <strong>OR</strong> <strong>cefotaxime</strong> 50mg/kg/dose IV/IO, 8-hourly (max. dose 2g) <strong>PLUS</strong> <strong>metronidazole</strong> 12.5mg/kg/dose IV/IO, 12-hourly (max. dose 500mg) <strong>PLUS</strong> <strong>azithromycin</strong> 10mg/kg/dose IV/IO, 24-hourly (max. dose 500mg)</td>
<td><strong>ceftriaxone</strong> 50mg/kg/dose IM, 24-hourly (max. dose 2g) <strong>OR</strong> <strong>cefotaxime</strong> 50mg/kg/dose IM, 8-hourly (max. dose 2g) <strong>PLUS</strong> <strong>metronidazole</strong> 12.5mg/kg/dose 12-hourly ORALLY if tolerated (max. dose 400mg) <strong>PLUS</strong> <strong>azithromycin</strong> 10mg/kg/dose 24-hourly ORALLY if tolerated (max dose 500mg)</td>
<td><strong>metronidazole and azithromycin</strong> CANNOT be given intramuscularly and therefore must be given orally</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PLUS</strong> <strong>clindamycin</strong> 15mg/kg/dose IV/IO, 8-hourly (max. dose 900mg) <strong>OR</strong> <strong>lincomycin</strong> 15mg/kg/dose IV/IO, 8-hourly (max. dose 600mg) <strong>PLUS</strong> <strong>azithromycin</strong> 10mg/kg/dose IV/IO, 24-hourly (max. dose 500mg)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: *vancomycin*** cannot be given intramuscularly.*
<table>
<thead>
<tr>
<th>Apparent source of sepsis</th>
<th>FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
<th>FIRST DOSE empirical intramuscular (IM) antibiotic regimen</th>
<th>Anaphylaxis to penicillin FIRST DOSE empirical intravenous (IV) or intraosseous (IO) antibiotic regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV line related N.B. remove line</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
<td>ceftriaxone 50mg/kg/dose IM, 24-hourly (max. dose 2g)</td>
<td>gentamicin** 5 MINUTE PUSH (dose based on lean body weight)</td>
</tr>
<tr>
<td></td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg)</td>
<td>OR cefotaxime 50mg/kg/dose IM, 8-hourly (max. dose 2g)</td>
<td>&lt;10 years, 7.5mg/kg/dose IV/IO, 24-hourly (max. dose 320mg)</td>
</tr>
<tr>
<td></td>
<td>≥10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg)</td>
<td>PLUS gentamicin** (dose based on lean body weight)</td>
<td>≥10 years, 6mg/kg/dose IV/IO, 24-hourly (max. dose 560mg)</td>
</tr>
<tr>
<td></td>
<td>PLUS vancomycin*** (dose based on actual body weight)</td>
<td></td>
<td>PLUS vancomycin*** (dose based on actual body weight)</td>
</tr>
<tr>
<td></td>
<td>15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
<td></td>
<td>15mg/kg/dose IV/IO, 6-hourly (max. dose 750mg)</td>
</tr>
</tbody>
</table>

Notes for Tables 1 and 2:
** Gentamicin: most patients have a single dose only.
  - Dose relates to [Ideal Body Weight](#).
  - For infants and children < 10 years, use 7.5mg/kg/dose IV initially (max. dose 320 mg).
  - For children ≥ 10 years, use 6mg/kg/dose IV initially (max. dose 560mg).
  - For subsequent dosing, see [Aminoglycoside dosing and monitoring](#) (Therapeutic Guidelines).
  - Administration via a 5 MINUTE PUSH is safe and will deliver rapid therapy. \(^7,8,9,10\)
  - Monitoring of levels is NOT required for empirical therapy less than 48 hours duration.

*** Vancomycin: for infants and children use 15mg/kg/dose (up to 750mg) IV 6-hourly.
  - Dosing relates to actual body weight.
  - For children with renal impairment or failure or neonates, see recommendations in [Vancomycin dosing and monitoring](#) (Therapeutic Guidelines).
  - Monitoring of levels is NOT required for empirical therapy less than 48 hours duration.

For subsequent dose modifications of other antimicrobials in renal failure, see Table 2.31 (Therapeutic Guidelines). Use [estimated calculated creatinine clearance](#) or eGFR for estimating renal function.
Table 3: Antibiotics that treat common infecting organisms

<table>
<thead>
<tr>
<th>Drug</th>
<th>Susceptible organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>aciclovir</td>
<td>Herpes simplex type 1, herpes simplex type 2 and varicella zoster viruses</td>
</tr>
<tr>
<td>ampicillin</td>
<td>Group A streptococcus (<em>Streptococcus pyogenes</em>), penicillin SENSITIVE <em>Staphylococcus aureus</em>, <em>E coli</em>, <em>Proteus mirabilis</em>. NOT <em>Klebsiella</em> species.</td>
</tr>
<tr>
<td>azithromycin</td>
<td><em>Chlamydia trachomatis</em></td>
</tr>
<tr>
<td>cefotaxime</td>
<td>Group A streptococcus (<em>Streptococcus pyogenes</em>), <em>Streptococcus pneumoniae</em> (pneumococcus), <em>Neisseria meningitidis</em> (meningococcus), methicillin SENSITIVE <em>Staphylococcus aureus</em>, <em>E coli</em>, <em>Klebsiella</em>, <em>Proteus mirabilis</em>. Note: Good central nervous system penetration.</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>Group A streptococcus (<em>Streptococcus pyogenes</em>), <em>Streptococcus pneumoniae</em> (pneumococcus), <em>Neisseria meningitidis</em> (meningococcus), methicillin SENSITIVE <em>Staphylococcus aureus</em>, <em>E coli</em>, <em>Klebsiella</em>, <em>Proteus mirabilis</em>. Note: Good central nervous system penetration.</td>
</tr>
<tr>
<td>ciprofloxacin</td>
<td><em>Enterobacteriaceae</em> (e.g. <em>E. coli</em> <em>Klebsiella</em>, <em>Proteus</em>, <em>Enterobacter</em>, <em>Serratia</em>, <em>Citrobacter</em> species), <em>Pseudomonas aeruginosa</em>, <em>Staphylococcus aureus</em>.</td>
</tr>
<tr>
<td>clindamycin</td>
<td><em>Staphylococcus aureus</em>, Group A streptococcus* (<em>Streptococcus pyogenes</em>)* Streptococcus pneumoniae* (pneumococcus) and anaerobes</td>
</tr>
<tr>
<td>flucloxacillin</td>
<td>Methicillin SENSITIVE <em>Staphylococcus aureus</em>, group A streptococcus (<em>Streptococcus pyogenes</em>).</td>
</tr>
<tr>
<td>gentamicin</td>
<td><em>Enterobacteriaceae</em> (e.g. <em>E coli</em>, <em>Klebsiella</em>, <em>Proteus</em>, <em>Enterobacter</em>, <em>Serratia</em>, <em>Morganella</em>, <em>Hafnia</em> species) and <em>Pseudomonas aeruginosa</em>. Note: Poor central nervous system penetration.</td>
</tr>
<tr>
<td>lincomycin</td>
<td><em>Staphylococcus aureus</em>, Group A streptococcus* (<em>Streptococcus pyogenes</em>)* Streptococcus pneumoniae* (pneumococcus) and anaerobes (Streptococcus pyogenes)* and anaerobes</td>
</tr>
<tr>
<td>metronidazole</td>
<td>Anaerobic gram negative bacteria including <em>Bacteroides fragilis</em>.</td>
</tr>
<tr>
<td></td>
<td>(flagyl)</td>
</tr>
<tr>
<td>vancomycin</td>
<td>Methicillin RESISTANT <em>Staphylococcus aureus</em>, group A streptococci (<em>Streptococcus pyogenes</em>), cefotaxime RESISTANT <em>Streptococcus pneumoniae</em> (pneumococcus) in central nervous system infections.</td>
</tr>
</tbody>
</table>

* = if sensitive

Footnote: This table provides information about common infecting bacteria and their probable sensitivities. This is not an exhaustive list further information can be obtained from a microbiologist or infectious diseases physician. Final sensitivities are dependent on laboratory testing.
Table 4: PAEDIATRIC antibiotic administration

- Administer the antibiotic which takes the least time to inject or infuse, in the order provided.
- Reconstitute antibiotics with sterile water for injection (WFI) unless stated otherwise.
- If further dilution is required for IV injection or infusion, use sterile sodium chloride 0.9% or sterile glucose 5% unless stated otherwise.
- To avoid drug incompatibility without delaying fluid administration, flush the IV line with sterile sodium chloride 0.9% before and after the antibiotic injection or infusion.
- When injecting antibiotics directly into an IV injection port which has resuscitation fluid running:
  - clamp the infusion fluid line and flush with 20mL sterile sodium chloride 0.9%
  - administer antibiotic over the required time
  - flush the line with 20mL sterile sodium chloride 0.9% and recommence resuscitation fluid

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Presentation</th>
<th>Reconstitution volume / fluid for intravenous (IV) or intraosseous (IO) administration</th>
<th>Final volume IV/IO</th>
<th>Minimum IV/IO administration</th>
<th>Intramuscular (IM) administration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>aciclovir</td>
<td>Vial: 250mg/10mL</td>
<td>50mL WFI</td>
<td>250mg/50mL or 5mg/mL</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Dose interval adjusted if renal impairment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ampicillin</td>
<td>Vial: 500mg</td>
<td>5mL WFI</td>
<td>100mg/mL</td>
<td>Doses ≤500mg: 5 minutes</td>
<td>Reconstitute with WFI</td>
<td>Penicillin class antibiotic.</td>
</tr>
<tr>
<td></td>
<td>1g</td>
<td>10mL WFI</td>
<td></td>
<td>Doses &gt;500mg: 30 minutes</td>
<td>500mg vial with 1.7mL WFI</td>
<td></td>
</tr>
<tr>
<td>azithromycin</td>
<td>Vial: 500mg</td>
<td>4.8mL WFI</td>
<td>100mg/mL</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Rare reports of prolonged QT interval</td>
</tr>
<tr>
<td>cefotaxime</td>
<td>Vial: 500mg</td>
<td>5mL WFI</td>
<td>100mg/mL</td>
<td>3 minutes</td>
<td>Reconstitute with WFI or lignocaine 0.5%</td>
<td>Cefalosporin class antibiotic. It is inadvisable to give more than 4mL by the IM route. If IM injection is required, ceftriaxone is the preferable agent.</td>
</tr>
<tr>
<td></td>
<td>1g</td>
<td>10mL WFI</td>
<td></td>
<td></td>
<td>500 mg vial with 2mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2g</td>
<td>20mL WFI</td>
<td></td>
<td></td>
<td>1g vial with 3mL</td>
<td></td>
</tr>
<tr>
<td>Antibiotic</td>
<td>Presentation</td>
<td>Reconstitution volume / fluid for intravenous (IV) or intraosseous (IO) administration</td>
<td>Final volume IV/IO</td>
<td>Minimum IV/IO administration time</td>
<td>Intramuscular (IM) administration</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>----------------------------------</td>
<td>----------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>ceftriaxone</td>
<td>Vial: 1g</td>
<td>10mL WFI</td>
<td>Dilute to 40mg/mL</td>
<td>5 minutes</td>
<td>Doses ≤1g: 5 minutes</td>
<td>Reconstitute with lignocaine 1% Avoid in premature infants or in first 6 weeks of life due to bilirubin displacement. Ceftriaxone and IV calcium-containing solutions must not be administered within 48 hours of each other in newborn infants.</td>
</tr>
<tr>
<td></td>
<td>2g</td>
<td>20mL WFI</td>
<td></td>
<td></td>
<td>Doses &gt;1g: 30 minutes</td>
<td>1g vials with 3.5mL lignocaine IM injection without lignocaine is very painful</td>
</tr>
<tr>
<td>ciprofloxacin</td>
<td>Infusion bag or infusion vial: 100mg/50mL 200mg/100mL 400mg/200mL</td>
<td>N/A</td>
<td>N/A</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>May induce seizures in epileptics. Local site reactions are more frequent when shorter infusion times are used.</td>
</tr>
<tr>
<td>clindamycin</td>
<td>Ampoule: 300mg/2mL 600mg/4mL</td>
<td>N/A</td>
<td>Dilute to 18mg/mL</td>
<td>30mg/minute</td>
<td>Inject undiluted</td>
<td>A single dose greater than 600mg at a single site is not recommended</td>
</tr>
<tr>
<td>flucloxacillin</td>
<td>Vial: 500mg</td>
<td>10 mL WFI</td>
<td>50 mg/mL</td>
<td>3 minutes</td>
<td>Reconstitute with WFI</td>
<td>Penicillin class antibiotic.</td>
</tr>
<tr>
<td></td>
<td>1g</td>
<td>20 mL WFI</td>
<td></td>
<td></td>
<td>500mg vial with 2mL</td>
<td></td>
</tr>
<tr>
<td>gentamicin</td>
<td>Ampoules: 10mg/1mL 80mg/2mL</td>
<td>N/A</td>
<td>Undiluted</td>
<td>5 minutes</td>
<td>Inject undiluted</td>
<td>IV gentamicin is inactivated by IV cephalosporins and penicillins. Flush line well before giving gentamicin to prevent inactivation. Monitoring required for ongoing dosing.</td>
</tr>
<tr>
<td>lincomycin</td>
<td>Vial: 600mg/2mL</td>
<td>N/A</td>
<td>10mg/mL</td>
<td>10mg/minute</td>
<td>Inject undiluted</td>
<td>Severe cardiopulmonary reactions have occurred when administering at a higher concentration or rate than recommended.</td>
</tr>
</tbody>
</table>
Table 4: PAEDIATRIC antibiotic administration (cont.)

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Presentation</th>
<th>Reconstitution volume / fluid for IV or IO administration</th>
<th>Final volume IV/IO</th>
<th>Minimum IV/IO administration time</th>
<th>Intramuscular (IM) administration</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>metronidazole</td>
<td>Infusion bag: 500mg/100mL</td>
<td>N/A</td>
<td>Undiluted</td>
<td>20 minutes</td>
<td>Do NOT give intramuscularly</td>
<td>Not TGA approved for paediatric use. May prolong QT interval and lead to ventricular arrhythmias. May induce seizures in epileptics.</td>
</tr>
<tr>
<td>moxifloxacin</td>
<td>Infusion bag: 400mg/250mL</td>
<td>N/A</td>
<td>Undiluted</td>
<td>60 minutes</td>
<td>Do NOT give intramuscularly</td>
<td></td>
</tr>
<tr>
<td>vancomycin</td>
<td>Vial: 500mg</td>
<td>10mL WFI</td>
<td>Dilute to 5mg/mL</td>
<td>10mg/minute</td>
<td>Do NOT give intramuscularly</td>
<td>Infusion related effects are common, may flush with red &quot;red man syndrome&quot;. In this instance decrease infusion rate, check dosing and monitor closely. Serum Levels required for ongoing dosing</td>
</tr>
<tr>
<td></td>
<td>1000mg</td>
<td>20mL WFI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

References

7. Loewenthal MR, Dobson PM. Tobramycin and gentamicin can safely be given by slow push. J Antimicrob Chemother. 2010 Sep;65(9):2049-50

Acknowledgments
With kind thanks to The Children’s Hospital at Westmead for use of their Antibiotic Guidelines which form the basis of Tables 1 and 2. The Antibiotic Guidelines are based on MIMS (2011).
SUMMARY
This guideline outlines evidence-based practice for obtaining blood cultures in paediatric and neonatal patients with suspected sepsis.

Key Messages:
1. One aerobic blood culture is required for each sepsis episode. Aerobic blood culture bottles are used in all patients and an additional anaerobic blood culture bottles are to be used for immunocompromised patients or in patients with suspected anaerobic sepsis e.g. intra-abdominal infections, empyema.
2. Blood cultures must be obtained aseptically and from a peripheral vein. Blood cultures obtained by central venous access are used for some oncology patients to reduce venipunctures.
3. Clean the skin with chlorhexidine and 70% alcohol (reduces skin contamination of blood cultures), allow to dry for 30 seconds.
4. Remove the caps and clean the tops of the blood culture bottles with 70% alcohol swabs and allow to dry for 30 seconds.
5. Fill the aerobic paediatric bottle with between 0.5ml -4 mL blood; do not over or under fill. If using an anaerobic bottle fill with 1 to 10 mL.
6. Do not take blood cultures from a pre-existing peripheral or arterial line.
7. In patients with a pre-existing vascular access device blood cultures must be taken through each lumen. In addition we strongly recommend a peripheral blood culture to assist in identifying the location of infection.
8. Where multiple collections may be required in patients with difficult access, one blood culture set may be drawn from a freshly inserted, unused IV cannula that was inserted under aseptic technique.

In what clinical situations should blood cultures be taken?
All patients:
- who meet criteria for commencement on the Paediatric Sepsis Pathway
- with SEVERE pneumonia as determined by oxygen saturation less than 90%, or the presence of pneumatoceles or an effusion on chest X ray.
- with fever or history of fever and suspected or proven neutropaenia
- with fever and who are immunocompromised
- with a fever or evidence of infection and a vascular access device
- who are overseas travellers with fever
- with suspected bacterial endocarditis take up to 3 sets

Selected patients with fever of unknown origin who appear unwell or are at risk of sudden deterioration, such as the neonates or infants or chronically ill, but do not meet criteria for the sepsis pathway may benefit from blood cultures. Discuss these patients with the Staff Specialist or Senior Doctor in charge of the department or overseeing care to the patient.

TRANSPORT
- Blood culture sample sets should be stored at room temperature prior to collection.
Where collection is delayed, the facility should liaise with the receiving laboratory to establish a simple guideline for sample storage.

**PROCEDURE**

1. Perform hand hygiene – Moment 1, before touching the patient.
2. Check patient identification and inform the parent or carer of the procedure and its purpose.
3. Ensure that the relevant history and tests are stated on the blood culture request form as this may affect incubation requirements.
   - Collect all equipment required (including personal protective equipment) and place on a trolley cleaned with alcohol-based wipes and bring to the patient or procedural area.
   - One blood culture set comprising of one paediatric aerobic bottle. An anaerobic bottle may also be used.
   - Check expiry date for each bottle.
   - If a paediatric blood culture bottle is not available, use a standard aerobic bottle and place all of the blood into this bottle. Do not collect an anaerobic bottle.
   - Gloves, small dressing pack, cotton balls, tape, tourniquet(s).
   - Chlorhexidine gluconate (> 0.5%) with 70% alcohol solution, opened onto the sterile field or chlorhexidine and 70% alcohol swabs x 3, opened onto the sterile field
5. Remove the cap of each blood culture bottle and using a non-touch technique scrub the vial stoppers well using a fresh 70% alcohol swab and allow to dry for 30 seconds.
6. Prepare either the IV cannula or winged infusion set and syringes along with other required equipment.
7. Position patient appropriately, apply tourniquet to palpate and identify appropriate vein.
8. Perform hand hygiene – Moment 2, before the procedure.
9. Put on sterile gloves or clean your non sterile glove finger tip with alcohol and chlorhexidine (essential if re-palpation occurs post cleansing of the venepuncture site)
10. Using chlorhexidine with 70% alcohol swabs, disinfect the venepuncture site using a scrubbing motion, use a fresh swab for each scrub. Use 2-3 scrubs. Do this for a total of 1-2 minutes, allowing the site to completely dry (approximately 30 seconds). ³
11. Place 0.5ml to 4mL blood in the paediatric aerobic bottle and 1 to 10mL in the optional anaerobic bottle (keeping blood culture bottle upright and at/below the level of the venepuncture if using vacutainer).
12. Always inoculate the blood culture bottles FIRST (fill the aerobic bottle first) then, if required, fill additional blood pathology tubes at this point.
13. Apply cotton ball and pressure to site (where possible obtain parent or carer assistance to hold and apply pressure).
14. Discard sharps, collect all rubbish and dirty items and dispose appropriately.
15. Label each bottle with correct patient name, MRN, date and time for collection of blood and location of site used for each set. Do not cover any bar codes or the bottom of the bottle.
16. Place bottles into biohazard bag and arrange to send to the laboratory with request form, transport bottles at room temperature.
17. Remove gloves and perform hand hygiene – Moment 3, after the procedure.
18. Explain to the parent(s) or carer(s) that results may not be available for 48 hours, conclude procedure.
19. Document that: (a) blood culture (or cultures) have been taken, (b) from which site(s), (c) include reason for site choice if this differs from a peripheral site.
20. Do not delay administering antibiotics, do not wait for results, see the CEC Sepsis Paediatric or Neonatal FIRST DOSE Empiric IV Antibiotic Guideline.

Frequently Asked Questions:

Q1: Why do I need to use an aseptic technique? Why do I need to use a dressing pack?
Aseptic technique using a dressing pack prevents contamination of the sample and a false positive result.

Q2: Why do I need to wear sterile gloves?
If using non sterile gloves it is imperative to disinfect the fingertip of the glove used to palpate the vein.

Q3: Why one set of blood cultures?
A single blood culture in a paediatric blood culture bottle is usually all that is required due to the higher organism load in septic children compared with adults and thus the greater sensitivity of this test.

Q4: My department has a once daily collection of pathology. When treating patients with suspected sepsis we give antibiotics and then transfer the patient to a referral facility. Wouldn’t it be more efficient to let the receiving hospital (with onsite pathology services) take the blood cultures?
No. Once you have given IV antibiotics, it will then be difficult to grow an organism in the blood culture bottle. Also, having given your first dose of empirical antibiotics you would then want to review results when available to prescribe targeted ongoing therapy.

Q5: Most blood cultures come back negative – why bother taking them?
There are many ways to render a blood culture worthless. If you follow this Blood Culture Sampling guideline, you can help reduce false negative or positive results. Remember to use aseptic technique, obtain the correct volume required for the paediatric blood culture bottle (1 to 4mL). Do not overfill the bottles as this also impedes detection (the culture result is less sensitive).

Q6: Why do I need to clean the tops of the blood culture bottles after removing the caps?
The tops of the blood culture bottles are clean but may become contaminated. Clean the tops using aseptic technique prior to inoculating the bottles with blood.

REFERENCES
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hand hygiene moment 1.</td>
</tr>
<tr>
<td>2</td>
<td>Assemble equipment, use sterile field and aseptic technique.</td>
</tr>
<tr>
<td>3</td>
<td>Remove caps from culture bottle and clean vial stoppers with alcohol swabs. Allow to dry for 30 seconds.</td>
</tr>
<tr>
<td>4</td>
<td>Apply tourniquet and identify appropriate vein.</td>
</tr>
<tr>
<td>5</td>
<td>Perform hand hygiene moment 2.</td>
</tr>
<tr>
<td>6</td>
<td>Clean vein site with chlorhexidine gluconate (0.5%) and 70% alcohol swabs in a scrubbing motion for 1 minute, using multiple swabs. Allow to dry for 30 seconds. Apply the tourniquet and identify an appropriate vein.</td>
</tr>
<tr>
<td>8</td>
<td>If there is a risk of re-palpating the cleansed site clean the finger tip of the glove used to palpate the vein with a chlorhexidine gluconate (0.5%) and 70% alcohol swab.</td>
</tr>
<tr>
<td>9</td>
<td>Ensure the blood is placed in the blood culture bottle first then if required fill additional pathology tubes at this point. Place the 0.5ml-4ml in the aerobic bottle and &gt;1 to 10ml in the anaerobic bottle (if required). Do not cover bar codes or base of bottle and state from which site the blood culture set was obtained.</td>
</tr>
<tr>
<td>10</td>
<td>Dispose of sharps appropriately.</td>
</tr>
<tr>
<td>11</td>
<td>Hand hygiene moment 3</td>
</tr>
</tbody>
</table>

Document in health care record that blood cultures were sent to laboratory, note the date and time. Give antibiotics as soon as possible and as indicated. **Do not delay administering antibiotics, do not wait for results, see the CEC Sepsis Paediatric or Neonatal First Dose Empiric IV Antibiotic Guideline.**
Appendix D

The following appendix does not contain page numbers so that the documents can be printed directly from this document. The URL link will direct you to the specified document.

D.1 Sepsis Data Collection Form
D.2 ADULT Sepsis Worksheet
D.3 PAEDIATRIC Sepsis Worksheet
D.4 Guide to performing a quality data review
D.5 Guide to charting median time to IV antibiotics
D.6 Examples of sepsis charts that can be generated from the database
CEC Sepsis Toolkit
**SEPSIS DATA COLLECTION FORM**

<table>
<thead>
<tr>
<th>MRN:</th>
<th>Service type:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emergency</td>
</tr>
<tr>
<td></td>
<td>Oncology/Haematology</td>
</tr>
<tr>
<td>DOB:</td>
<td>Critical care</td>
</tr>
<tr>
<td></td>
<td>Maternity</td>
</tr>
<tr>
<td>Facility Code OR</td>
<td>Paediatric ward</td>
</tr>
<tr>
<td>Hospital Name:</td>
<td>Rehabilitation</td>
</tr>
<tr>
<td></td>
<td>Medical</td>
</tr>
<tr>
<td></td>
<td>Aged care</td>
</tr>
<tr>
<td></td>
<td>Surgical</td>
</tr>
<tr>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

**Triage/Sepsis Recognition:**

<table>
<thead>
<tr>
<th>Time:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Triage Category (ED only):**

**Observations at Triage/Recognition:**

<table>
<thead>
<tr>
<th>Heart Rate: /min</th>
<th>SBP: mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resps: /min</th>
<th>Temp: °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Lactate: mmol/L</th>
<th>Immunocompromised: Yes No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**First IV Antibiotic Started:**

<table>
<thead>
<tr>
<th>Time:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IV Fluid Resuscitation:**

**Adult:** 2nd litre IV fluid started, **Paediatric (<16yrs):** 1st 20mL/kg bolus completed

<table>
<thead>
<tr>
<th>Yes</th>
<th>Time:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No</th>
<th>Not prescribed</th>
<th>Fluid restricted</th>
</tr>
</thead>
</table>

**Presumptive source of sepsis:**

<table>
<thead>
<tr>
<th>Abdomen</th>
<th>Urinary tract</th>
<th>Disposition:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS</td>
<td>Vascular device</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Lung</td>
<td>Other</td>
<td>Ward</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>Unknown</td>
<td>HDU/ICU</td>
</tr>
<tr>
<td>Skin/Soft tissue</td>
<td></td>
<td>Death</td>
</tr>
</tbody>
</table>

**Date of death (during admission, if known):**

<table>
<thead>
<tr>
<th>/</th>
<th>/</th>
<th></th>
</tr>
</thead>
</table>

**Comments:**

Clinical Excellence Commission, March 2013, Version 3.1
COMPLETING THE SEPSIS DATA COLLECTION FORM

1. All dates are in dd/mm/yyyy format
2. All times are in hh:mm 24 hour clock format
3. The MRN is a mandatory field and cannot be modified once entered. If the wrong MRN has been entered, delete the record then re-enter
4. The MRN field has additional conditions attached to avoid entering duplicate records. You must mouse click, NOT TAB into the next field from the MRN to allow the duplicate function to be performed
5. The facility code originates from NSW Health and is automatically generated with your login
6. The time and date of triage/sepsis recognition is recorded to most accurately reflect how long it takes from time of recognition or suspicion of sepsis to the time of administration of the first antibiotic. Develop a standard time to measure the recognition time at your facility, for your patients.
7. Immunocompromised patients include those with:
   - a. chemotherapy/radiotherapy
   - b. neutropaenia
   - c. asplenia
   - d. malignancy
   - e. chronic steroid use etc.
8. The first intravenous (IV) antibiotic time and date is a MANDATORY field. Do not collect or enter data on patients who do not have intravenous antibiotics.
9. The aim of IV fluid measurement is to measure fluid resuscitation in sepsis management. Any IV fluid may be included i.e. crystalloid, blood products, albumin. Do not record IV TKVO or maintenance IV fluids as they are maintaining NOT resuscitating.
10. Antibiotics are prescribed in accordance with the presumptive source of infection. However, there are occasions where no source can be immediately identified. Please use “UNKNOWN”. Sources such as ENT, cardiac and haematological should be recorded as “OTHER”.
11. Please use the comments box to record information which may assist in the data analysis. This includes explanations of blank fields, delays in treatment etc. Do not use the comments box as a medication prescribing or pathology record, or a medical record.
<table>
<thead>
<tr>
<th>No.</th>
<th>Field Name</th>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>MRN</td>
<td>Cannot delete or change MRN once record has been generated</td>
<td>Delete record, then re-enter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Using the tab key to move from MRN to DOB wipes out the rest of the data entered</td>
<td>The MRN field has additional conditions attached to avoid entering duplicate records. You must mouse click, NOT TAB, into the next field from the MRN to allow the duplicate function to be performed</td>
</tr>
</tbody>
</table>
| 2.  | Date and time    | Errors in entering date and time                                     | Ensure you enter the date and time in the correct order  
There are two ways to enter this data;  
1. Mouse click into the top area and type the numbers in  
2. Use the calendar. Note: you must enter the date before the time or the date of entry will default into the field  
Always check the automatically generated time calculation to ensure accuracy of entry |
|     | Date of birth    |                                                                      |                                                                                                                                                                                                    |
|     | Triage/Recognition |                                                                      |                                                                                                                                                                                                    |
|     | IV Antibiotic    |                                                                      |                                                                                                                                                                                                    |
|     | IV Fluid         |                                                                      |                                                                                                                                                                                                    |
| 3.  | Service Type     | Specific services are not identified in this database                | Use the service type that best describes your service or your patient group. If you would like to specifically identify your patient, add a self-generated code in the comments section to identify your service. Note: all users within your facility, can see all data entered in the facility |
| 4.  | Triage/Sepsis Recognition | Variance in time recording | Each facility has different processes to triage or identify patients, therefore record a recognition time. Discuss in your facility/service and decide the standard time you will use as the recognition time.                           |
| 5.  | Triage Category  | Restricted use to emergency service type                             | Use the triage category only if your service type is emergency                                                                                                                                 |
| 6.  | Heart Rate       | Significant indicator of sepsis                                      | New field in dataset  
Particularly important in paediatric patients                                                                                                                                                       |
| 7.  | SBP              | Significant indicator of sepsis in adults                           | Particularly important in adult patients  
If not measured record in comments section                                                                                                                                                              |
| 8.  | Respiratory rate | Significant indicator of sepsis                                      | New field in dataset  
Particularly important in paediatric patients                                                                                                                                                         |
| 9.  | Temperature      |                                                                      | Temperature should not determine timing of treatment. Record in comments section if delay in treatment is based upon temperature measurement                                                              |
| 10. | First Lactate    |                                                                      |                                                                                                                                                                                                    |
| 11. | Immunocompromised| Significant risk factor of sepsis                                   | Added to dataset  
Record additional information such as cause/type of immunocompromise in comments section e.g. chemotherapy/radiotherapy, neutropaenia, asplenia, malignancy, chronic steroid use etc |
# Sepsis Database and Data Entry

<table>
<thead>
<tr>
<th>No.</th>
<th>Field Name</th>
<th>Issue:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>First IV Antibiotic Started</td>
<td>Patient septic but no intravenous antibiotic prescribed</td>
<td>If patient has not been given IV antibiotics do not record in database.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: if patient has no intravenous (IV) access and intramuscular (IM) or intraosseous (IO)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>antibiotics are given -</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Record time and date in this field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Record route of administration and reason in the comments section</td>
</tr>
<tr>
<td>13</td>
<td>IV Fluid Resuscitation Given?</td>
<td>What type of IV fluid can be included?</td>
<td>Include all intravenous fluids given as fluid resuscitation i.e. crystalloid, colloid, blood</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>products, albumin etc</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do not record administration of maintenance fluid or TKVO in this section as it is not fluid</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>resuscitation – record as &quot;NO&quot; on the database and select &quot;not prescribed&quot;</td>
</tr>
<tr>
<td>14</td>
<td>Presumptive Source</td>
<td>Lung:</td>
<td>Lung sepsis only, not ENT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Examples: cardiac, ENT, haematological/oncology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other:</td>
<td>Use when antibiotics are prescribed for unknown source</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown:</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Disposition</td>
<td>When to use unchanged</td>
<td>Unchanged (ward) is a new field indicating the patient did not move treatment location as a</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>result of sepsis recognition e.g. patient on ward stays on ward after sepsis recognition or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>patient in critical care that remains in critical care after sepsis recognition.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unchanged should not be used with emergency patients</td>
</tr>
<tr>
<td>16</td>
<td>Date of Death</td>
<td></td>
<td>Use this field if known</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Adds value to your local data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assists in data matching</td>
</tr>
<tr>
<td>17</td>
<td>Comments</td>
<td>Best use of this field</td>
<td>This field is not meant to be a medical record</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Enter concise information that adds value to your data including;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• explanation of missing data</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• hospital transfers to avoid double entries by two facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• more information about source of sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• specific information to identify a subset of your data for further analysis</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use commas and spaces to separate data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do not use enter key – difficult to read entry in excel spreadsheet</td>
</tr>
</tbody>
</table>
### SEPSIS ASSESSMENT

**Time:** [ ] : [ ]  **Date:** [ ] / [ ] / [ ]

<table>
<thead>
<tr>
<th>Facility</th>
<th>Service type</th>
<th>MRN</th>
</tr>
</thead>
</table>

**Address**

**Location**

**Surgeon Name**

**Complete all details or affix patient label here**

#### Tick the relevant risk factors, signs or symptoms of infection

- Immunocompromised ✓ **[high sepsis risk]**
  - Consider chronic illness, medications, chemotherapy/radiotherapy
  - Use local febrile neutropenia guideline if patient has haematology/oncology diagnosis

- Indwelling medical device

- Recent surgery/invasive procedure

- History of fever and/or rigors

- Re-presentation within 48 hours

- Fall not related to mechanism of injury

- Abdomen: pain, peritonism

- Lung: cough, SOB

- Neuro: altered LOC, new onset of confusion, neck stiffness, headache

- Skin: cellulitis, wound

- Urine: dysuria, frequency, odour

#### Does the patient have any YELLOW criteria?

- Respirations ≤10 or ≥25/min  
  - [ ] / min

- SpO2 <95%  
  - [ ] %

- SBP ≤100mmHg  
  - [ ] mmHg

- Heart rate ≤50 or ≥120/min  
  - [ ] / min

- Altered LOC or new onset of confusion  
  - [ ]

- Temp <35.5 or >38.5  
  - [ ] .[ ] °C

**If any risk factor, sign or symptom of infection**

**PLUS two yellow criteria**

THE PATIENT MAY HAVE SEPSIS

- Obtain Senior Clinical Review within 30 minutes
- Look for other causes of deterioration
- Commence SEPSIS SIX

If fewer than 2 yellow criteria present, treat and re-assess simultaneously

SEPSIS may still be a concern

#### In addition does the patient have any RED criteria?

- SBP < 90mmHg  
  - [ ] mmHg

- First Lactate ≥ 4mmol/L  
  - [ ] mmol/L

- Base excess ≤ - 5.0 + / -  
  - [ ] mEq/L

- Age > 65 years

- Immunocompromised

**If one or more red criteria present**

THE PATIENT HAS SEVERE SEPSIS or SEPTIC SHOCK until proven otherwise

- Obtain immediate Senior Clinical Review
- Expedite transfer to resuscitation area or equivalent
- Commence resuscitation as per SEPSIS SIX

#### Triage Category (1-5)

(ED Only)

**Does the patient have an Advance Care Directive; are there any treatment limitations?**

No ☐  Yes ☐  If YES, consider how this may impact ongoing management of sepsis.
### Clinical Excellence Commission

**ADULT Sepsis Worksheet**

**Version 2, SHPN: (CEC) 120130**

Acknowledgement: The Sepsis Six in this document is an adaption of the Sepsis Six by Ron Daniels, UK Sepsis Trust.

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURNAME</td>
<td></td>
</tr>
<tr>
<td>MRN</td>
<td></td>
</tr>
<tr>
<td>OTHER NAMES</td>
<td></td>
</tr>
<tr>
<td>MALE</td>
<td></td>
</tr>
<tr>
<td>FEMALE</td>
<td></td>
</tr>
<tr>
<td>D.O.B.</td>
<td></td>
</tr>
<tr>
<td>M.O.</td>
<td></td>
</tr>
<tr>
<td>ADDRESS</td>
<td></td>
</tr>
<tr>
<td>LOCATION</td>
<td></td>
</tr>
</tbody>
</table>

#### SEPSIS MANAGEMENT: SEPSIS SIX

1. **OXYGEN**
   - Maintain SpO₂ > 95
   - If increased oxygen is required seek senior medical review
   - Oxygen administration: ☐ litres/minute

2. **BLOOD CULTURES**
   - Blood cultures (2 aerobic, 2 anaerobic)
   - FBC, UECs, LFTs, coags, glucose, +/- wound, urine, sputum or other cultures
   - ☐ Blood cultures ☐ FBC ☐ Coags
   - ☐ Other cultures ☐ UEC ☐ BGL
   - ☐ Swabs ☐ LFTs

3. **LACTATE**
   - Take blood for formal lactate or VBG
   - ☐ mmol/l

4. **IV FLUIDS**
   - Give 20ml/kg 0.9% sodium chloride fluid challenge STAT
   - Aim to achieve MAP of > 65mmHg or SBP > 100mmHg
   - If no response, repeat 20ml/kg 0.9% sodium chloride unless there are signs of pulmonary oedema
   - If no response commence inotropes as per local protocol and in consultation with senior medical officer
   - FLUID RESUSCITATION
     - Second litre IV fluid commenced:
     - YES: Time: ☐:☐:☐
     - Date: ☐/☐/☐
     - NO: ☐ Not prescribed ☐ Fluid restricted

5. **IV ANTIBIOTICS**
   - Prescribe and commence within 60 minutes from triage/time of diagnosis
   - or within 30 MINUTES if haematology/oncology patient (refer to local guidelines and seek specialist advice)
   - Do not wait for results of investigations
   - ANTIBIOTIC ADMINISTRATION
     - First IV antibiotic commenced:
     - Time: ☐:☐:☐
     - Date: ☐/☐/☐

6. **MONITORING**
   - Monitor respiratory rate, SpO₂, blood pressure, heart rate, temperature, LOC, fluid balance, urinary output, consider urinary catheter
   - Review antibiotics when blood/specimen results available
   - Frequency of observations required over next six hours
     - Every ☐ minutes

### Management plan (discuss with senior medical officer)

#### PRESUMPTIVE SOURCE OF SEPSIS
- ☐ Abdomen
- ☐ CNS
- ☐ Lung
- ☐ Orthopaedic
- ☐ Skin/soft tissue
- ☐ Urinary tract
- ☐ Vascular device
- ☐ Other
- ☐ Unknown

#### DISPOSITION
- ☐ Unchanged
- ☐ Home
- ☐ Ward
- ☐ Other hospital
- ☐ HDU/ICU
- ☐ Death

Date of death: ☐/☐/☐
The purpose of the NSW Sepsis Database is to provide data that measures how the implementation of the Sepsis Pathway is impacting upon the appropriate recognition and timely management of patients with sepsis. A quality data review, using the Data Extraction tool, should be performed on a regular basis to ensure the accuracy of your data, particularly when generating a chart. Please use the following guide to assist you in reviewing your data.

- Log onto database using your facility password
- On the Data Extraction page;

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Export Data – do not use dates as all data should be reviewed</td>
</tr>
<tr>
<td>2</td>
<td>Open</td>
</tr>
<tr>
<td>3</td>
<td>Save to &lt;file name&gt; - this should be a secure location as the file will contain patient-identifying data</td>
</tr>
</tbody>
</table>

A number of Excel commands can be used to check the data including:

- Scanning for errors
- Sorting the worksheet by the column – repeat for each data field
- Using filters
- Reformatting columns with date and time entry to show both the date and time by
  - <select> column
  - Right mouse click over column
  - <select> format cells
  - Category <select> custom
  - type <select> d/mm/yyyy h:mm

If an error is located, colour the cell and save.

All errors identified need to be corrected in the database (not on the data extraction sheet). After data correction in the database, perform another data extraction.

If all data OK on the new data extraction sheet, generate charts by <select> Charts page

Please report any errors identified within the first five columns, A - F (including the Record ID, Facility Code, Facility Name, LHD Code, LHD Name and Facility Type), to the database administrator.
### Performing a Quality Data Review

#### Sepsis Database V3

<table>
<thead>
<tr>
<th>Column</th>
<th>Field Name:</th>
<th>Issue:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.</td>
<td>ServiceTypeCode</td>
<td>Missing values</td>
<td>This field is generated automatically by selecting the service type. If missing, collect and enter service type data</td>
</tr>
<tr>
<td>H.</td>
<td>ServiceType</td>
<td>Missing values</td>
<td>Check that data has been entered correctly, re-enter as required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Check that any comments are consistent with this entry</td>
</tr>
<tr>
<td>I.</td>
<td>MRN</td>
<td>Are the MRN in the correct format for your facility?</td>
<td>MRN cannot be amended once data is submitted. To correct any MRN errors delete file and re-enter the entire file</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Are there any double entries (sort column by MRN and DOB, look for same MRN, DOB and TriageDateTime)?</td>
<td>Delete double entries where MRN, DOB and triage time are identical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note: an individual patient can have more than one episode of sepsis entered into the database (will have different triage date/times)</td>
</tr>
<tr>
<td>J.</td>
<td>DOB</td>
<td>Missing values</td>
<td>May be missing due to use of &lt;tab&gt; out of MRN field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Collect data and enter</td>
</tr>
<tr>
<td>K.</td>
<td>Age</td>
<td>Missing values</td>
<td>Check Age calculation for errors i.e. &lt;0 or &gt;110</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error values</td>
<td>Where age = 0, compare Date of Birth and Triage Date to identify data entry errors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than 0</td>
<td>Collect and enter correct Date of Birth</td>
</tr>
<tr>
<td>o Greater than 110</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.</td>
<td>TriageDateTime</td>
<td>Missing time (seen by reformatting column to dd/mm/yyyy hh:mm:ss AM/PM)</td>
<td>Collect data and enter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Missing date</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error values</td>
<td>Check that data has been entered correctly (value=2009-now), re-enter as required</td>
</tr>
<tr>
<td>o Less than year 2009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Greater than now date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.</td>
<td>TriageCategory</td>
<td>Error value = -1</td>
<td>-1 is the default for missing data in this field. Collect missing data and enter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Missing values</td>
<td></td>
</tr>
<tr>
<td>Note: 9=non ED patients with no triage value</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N.</td>
<td>HeartRate</td>
<td>Missing value</td>
<td>If missing value, collect and enter data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Error values</td>
<td>Check that data has been entered correctly (value=0-300), re-enter as required</td>
</tr>
<tr>
<td>o Less than 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Greater than 300</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Performing a Quality Data Review

**Sepsis Database V3**

<table>
<thead>
<tr>
<th>Column</th>
<th>Field Name:</th>
<th>Issue:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>O.</td>
<td>SBP</td>
<td>• Missing value</td>
<td>❖ If data missing due to “not recorded” or “paediatric”, check for entry in comments. Enter comment or collect data and enter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Error values</td>
<td>❖ Check that data has been entered correctly (value =0-250), re-enter as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Greater than 250</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: if SBP not palpable or unrecordable SBP = 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>If data missing due to “not recorded” or “paediatric”, check for entry in comments. Enter comment or collect data and enter.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check that data has been entered correctly (value =0-250), re-enter as required.</td>
<td></td>
</tr>
<tr>
<td>P.</td>
<td>RespiratoryRate</td>
<td>• Missing value</td>
<td>❖ If missing value, collect and enter data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Error values</td>
<td>❖ Check that data has been entered correctly (value =0-80), re-enter as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Greater than 80</td>
<td></td>
</tr>
<tr>
<td>Q.</td>
<td>Temperature</td>
<td>• Missing value</td>
<td>❖ If missing value, collect and enter data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Error values</td>
<td>❖ Check that data has been entered correctly (value =34-43), re-enter as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than 34</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Greater than 43</td>
<td></td>
</tr>
<tr>
<td>R.</td>
<td>Lactate1</td>
<td>• Missing value</td>
<td>❖ Not all facilities have point of care testing or perform this test on every sepsis patient, therefore expect blank cells.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Error values</td>
<td>❖ Check that data has been entered correctly (value =0-30), re-enter as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Greater than 30</td>
<td></td>
</tr>
<tr>
<td>S.</td>
<td>Immunocompromised</td>
<td>• Missing values</td>
<td>❖ Collect data and enter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Yes or No</td>
<td></td>
</tr>
<tr>
<td>T.</td>
<td>Antibiotics1DateTime</td>
<td>• Missing time (seen by reformatting column)</td>
<td>❖ A missing time only, will cause the time to antibiotic calculation to be in error. Collect missing data and enter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Missing date and time</td>
<td>❖ If a patient did not receive IV antibiotics (or IM/IO), the record should not be in the database – delete record.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Error values</td>
<td>❖ If missing time and date, collect and enter data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Less than year 2009</td>
<td>❖ Check that data has been entered correctly (value with date and time 2009 –now), re-enter as required.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>o Greater than now date</td>
<td></td>
</tr>
</tbody>
</table>
### Column U. TimeIntervalAntibiotic

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Missing value&lt;br&gt;• Error values&lt;br&gt;  ○ Less than 0&lt;br&gt;  ○ Greater than 1000 minutes&lt;br&gt;Note: values &gt;1000 minutes can be entered but double check as they will skew your data</td>
<td>This field is calculated by entering the correct triage and antibiotic time and date. Check that data has been entered correctly (value =0-1000 minutes), re-enter as required</td>
</tr>
</tbody>
</table>

### Column V. GivenIVFluid

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Missing values&lt;br&gt;  ○ Yes&lt;br&gt;  ○ No</td>
<td>Collect missing data and select YES or NO</td>
</tr>
</tbody>
</table>

### Column W. ReasonForNoIVFCode

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where GivenIVFluid=NO</td>
<td>This field is generated automatically by selecting GivenIVFluid =NO. If missing value, collect and enter data</td>
</tr>
</tbody>
</table>

### Column X. ReasonForNoIVFluid

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where GivenIVFluid=NO</td>
<td>Collect missing data and select correct option</td>
</tr>
</tbody>
</table>

### Column Y. IVFluidDateTime

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where GivenIVFluid=YES</td>
<td>This field is generated automatically by selecting GivenIVFluid =YES. If missing values, collect and enter data&lt;br&gt;  A missing time only, will cause the time to IV fluid calculation to be in error. Collect missing data and enter&lt;br&gt;  Check that data has been entered correctly (value with date and time 2009 –now), re-enter as required</td>
</tr>
</tbody>
</table>

### Column Z. TimeIntervalIVFluid

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where GivenIVFluid=YES</td>
<td>This field is calculated by entering the correct triage and IV fluid time and date. Check that data has been entered correctly (value =0-1000 minutes), re-enter as required</td>
</tr>
</tbody>
</table>

### Column AA. PresumptiveSourceCode

<table>
<thead>
<tr>
<th>Issue</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Missing values</td>
<td>This field is generated automatically by selecting the Presumptive Source. If missing value, collect and enter presumptive source data</td>
</tr>
</tbody>
</table>
### Performing a Quality Data Review

**SEPSIS DATABASE V3**

<table>
<thead>
<tr>
<th>Column</th>
<th>Field Name:</th>
<th>Issue:</th>
<th>Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AB.</strong></td>
<td>PresumptiveSourceName</td>
<td>• Missing values</td>
<td>✏ Check that data has been entered correctly, re-enter as required. ✏ Check that any comments are consistent with this entry.</td>
</tr>
<tr>
<td><strong>AC.</strong></td>
<td>DispositionCode</td>
<td>• Missing values</td>
<td>✏ This field is generated automatically by selecting the disposition. If missing value, collect and enter disposition data.</td>
</tr>
<tr>
<td><strong>AD.</strong></td>
<td>Disposition</td>
<td>• Missing values</td>
<td>✏ Check that data has been entered correctly, re-enter as required. ✏ Check that any comments are consistent with this entry.</td>
</tr>
<tr>
<td><strong>AE.</strong></td>
<td>DOD</td>
<td>• Missing value</td>
<td>✏ Only those patients where the date of death is known will have this field completed. ✏ Check that data has been entered correctly with date (&gt;now), re-enter as required.</td>
</tr>
<tr>
<td><strong>AF.</strong></td>
<td>Comments</td>
<td>• Too many comments – “less is more” • symbol in field</td>
<td>✏ Encourage users to enter comments that add value to existing data fields. This information should be recorded as categorical data i.e. key words that can be transferred to other columns in your analysis of the data. ✏ Do not use the enter key in this field as this will make text difficult to read. Use commas to separate data.</td>
</tr>
</tbody>
</table>
GUIDE TO CHARTING YOUR MEDIAN TIME TO FIRST DOSE INTRAVENOUS ANTIBIOTICS

FOR THE

NSW SEPSIS DATABASE, VERSION 3

The purpose of the NSW Sepsis Database is to provide data that measures how the implementation of the Sepsis Pathway is impacting upon the appropriate recognition and timely management of patients with sepsis. Displaying data allows you to graphically demonstrate your median time to intravenous antibiotic administration over the period of data collection and entry. Charting your data will also provide you with comparative data to your local health district and to statewide data.

Prior to the generation of any charts you should perform a quality check of your data. The Sepsis Database Data Extraction tool allows you to view all your data in a table where any errors may be identified (for example, missing or out of expected range data), then corrected in the database prior to charting.

The following guide is a step-by-step of how to use the Sepsis Database Chart and a word template to chart and display your data.

- Open the Sepsis Chart template in Word
- Save document as Sepsis – Chart – [date] – [hospital name]
- Turn on ¶ - non print symbol so formatting is easily seen

- Log onto database using your facility password
- On the Sepsis Treatment page;
  - <Triage Date From> enter value
  - <Triage Date To> enter value
  - <select> Show record
- Write down the number of records in the triage range and the dates used

- On the Chart page;
  - <select> Build Chart
  - Check <Chart Type> set as Line Chart
  - Check <Chart Content> set as Median time to intravenous antibiotics
  - Check <Interval of X Axis> set as Months
  - <Triage Date From> enter value (same date as above)
  - <Triage Date To> enter value (same date as above)
  - <select> Build Chart

- When the chart is produced check your data. If OK
  - Right mouse click over chart
  - <select> Copy
• Move back to the Word document
  - Move mouse over and highlight [insert chart here]
  - From your toolbar <select> Paste Special
  - <select> Device Independent Bitmap
  - <select> OK (text should be deleted)
  - Right mouse click over chart <select> size
  - Lock aspect ratio
  - Increase width to 22cms
  - <select> Close

• Complete the chart by overtyping the following information;

[NAME] HOSPITAL
Date range: [DATE TO] TO [DATE FROM]
No. of patients: [INSERT NUMBER HERE]

- <select> Save

- <select> Print
  Note: template is designed in A3 format
  To print in A4 format use your printer options to resize

Troubleshooting:

- The non print symbols can be used to ensure correct positioning of the chart in the red box. From the top margin of the box to the chart there should by two full line spaces. From the chart to the text under the chart there should be one line space
- If you are having trouble copying and pasting the chart directly from the database to the word template, try saving the chart from the database to the desktop, then insert as a picture into the word template
- If you are not sure what dates to use, try 1 May 2011 to the last full month
- Do not chart incomplete data for the current month
The following pages contain:

- An example of a template displaying NSW data
- An example of a template displaying hospital data.
ALL NSW

MEDIAN TIME TO ADMINISTRATION OF FIRST ANTIBIOTIC - MINUTES

Source: NSW Clinical Excellence Commission Sepsis Database

Date range: 1 May 2011 to 30 April 2013
No. of patients: 8082
NSW Median Time to Intravenous Antibiotics

Date range: 1 May 2011 to 31 January 2013

No. of patients: 531

Print date: 27 February 2013

Source: Clinical Excellence Commission Sepsis Database
CEC Sepsis Toolkit
Appendix E

The following appendix contains URL links which will direct you to the specified document.

**E.1**  NSW Health Code of Conduct PD2012_018


**E.2**  BC Sepsis - Twitter for Healthcare professionals


**E.3**  1000 Lives - Lessons Learned using Twitter
