Implementing an adult sepsis pathway

Toolkit
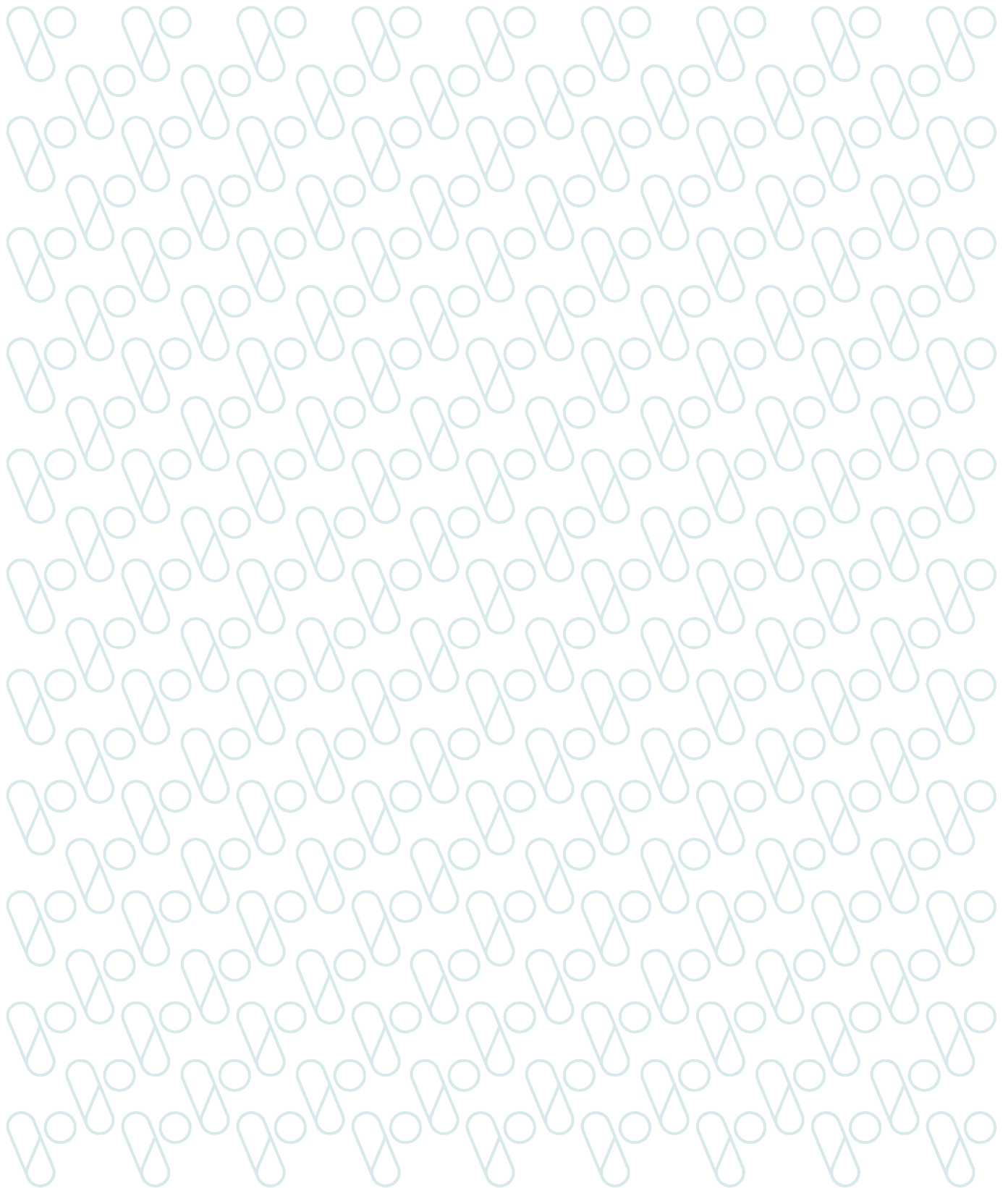
Contents

About this toolkit

This toolkit will help health services implement an adult sepsis pathway, and improve the recognition and management of sepsis. It is based on our previous life-saving work and the experience of many Victorian health services in improving patient care and outcomes.

Why use this toolkit?

Recognising and responding to sepsis early can significantly improve patient outcomes. Sepsis is a medical emergency and occurs when the body has an extreme response to an infection. It can lead to organ failure and death if not treated promptly. The in-hospital mortality rate is estimated to be approximately 25 per cent globally.[1]

The toolkit is based on findings of our sepsis bundle of care program and the 'Think sepsis. Act fast.' scaling collaboration. For more background on these projects and their outcomes, see **Appendix 1**.

HOW TO USE THIS TOOLKIT

This toolkit contains guidance and resources to help health services implement a sepsis pathway, including:

- sepsis recognition criteria and definitions, and an example of a sepsis pathway
- a guide to implementing a sepsis pathway
- an example driver diagram and change ideas
- quality improvement tools and templates.

Supporting resources

This toolkit is not an exhaustive list of resources, and should be used along with other evidence-based tools and resources.

ACKNOWLEDGEMENTS

This toolkit builds on the previous work by the New South Wales Clinical Excellence Commission, UK Sepsis Trust, Surviving Sepsis Campaign, Melbourne Health and the Peter MacCallum Cancer Centre. It is also informed by the hard work of health services who have participated in our previous sepsis recognition and management projects **(Appendix 1)**.

Acronyms

ED Emergency department

ICU Intensive care unit

PDSA Plan-Do-Study-Act

SIRS Systemic inflammatory response syndrome

EMR Electronic medical record

LOS Length of stay

qSOFA Quick sepsis organ failure assessment

UCC Urgent care centre

Sepsis pathway and bundle of care

A sepsis pathway and bundle of care guide appropriate recognition and care and have been shown to improve adult patient outcomes and reduce costs.[2,3]

To clarify:

- a **sepsis pathway** is a document that guides sepsis recognition and management. This include the 'sepsis bundle'
- the **sepsis bundle of care** is the six key clinical actions to take within 60 minutes of sepsis recognition. These are:
  - oxygen administration
  - two sets of blood cultures
  - venous blood lactate
  - fluid resuscitation
  - appropriate antibiotics
  - monitoring observations.

WHEN TO INITIATE THE PATHWAY

The primary focus for sepsis should always be early recognition and prompt treatment.

Sepsis recognition criteria

Sepsis pathway initiation is guided by the presence of infection and abnormal vital signs.

The sepsis recognition criteria are based on the following indicators:

- Early warning signs – Systemic Inflammatory Response Syndrome (SIRS)[7,8,9,10]
- Poor outcomes (severe sepsis) – quick Sepsis Related Organ Failure (qSOFA) score and lactate level[4,5,6]

Figure 1: SIRS and qSOFA criteria

System inflammatory response syndrome (SIRS)	Sepsis related organ failure (qSOFA)
Two or more of the following:	**Two of the following:**
• Respiratory rate >20 breaths/minute	• Alteration in mental state
• Heart rate >90 beats/minute	• Systolic blood pressure <100 mmHg
• Temperature <36 or >38°C	• Respiratory rate >22 breaths/minute
• White cell count <4 or >12 x109/L	

Terminology

Various terminology and criteria exist for the recognition of sepsis.
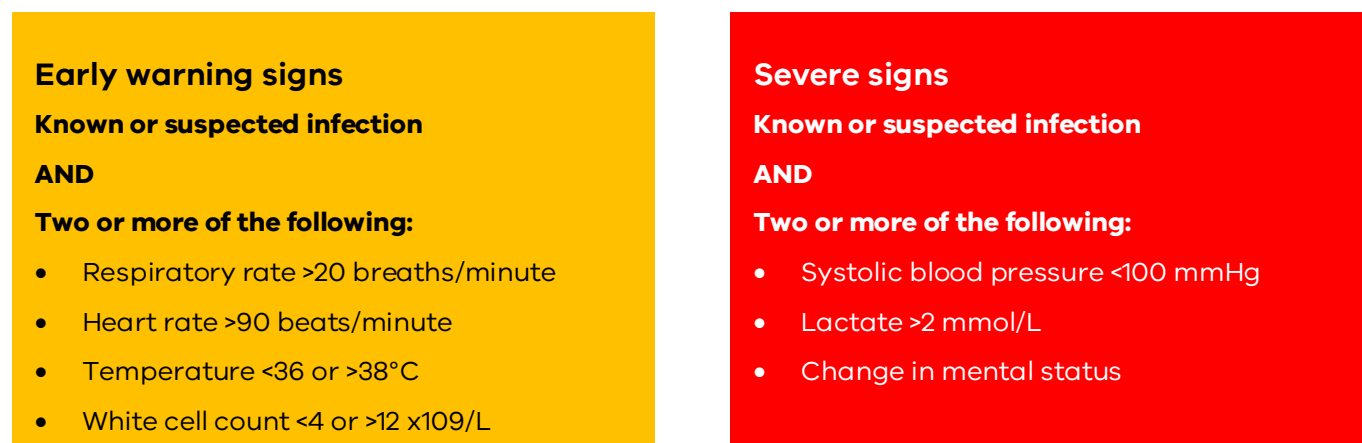
For instance, the Sepsis-3 definitions published in 2016 by The Sepsis Definitions Task Force no longer recognise SIRS criteria.[4] The Surviving Sepsis Campaign suggests that the presence of SIRS criteria with known or suspected infection should be used in screening patients for early sepsis identification.[7]

The qSOFA score was based on studies examining retrospective data and found that patients with two or more of these criteria are at increased risk of intensive care unit (ICU) admission or dying in hospital.[4] Recent literature found the use of SIRS criteria had sensitivity superior to qSOFA, supporting the use of SIRS for screening patients.[8,9,10]

Consensus approach for recognition

The criteria used in this pathway were developed by a consensus approach, incorporating components of both qSOFA and SIRS. The Think Sepsis Act Fast Scaling Collaboration (2018) demonstrated that the pathway was effective in identifying patients with infection and sepsis appropriately, and that all elements of appropriate care were instituted earlier.

Figure 2: Sepsis pathway consensus approach for recognition

| Early warning signs	Severe signs
Known or suspected infection	**Known or suspected infection**
AND	**AND**
Two or more of the following:	**Two or more of the following:**
• Respiratory rate >20 breaths/minute	• Systolic blood pressure <100 mmHg
• Heart rate >90 beats/minute	• Lactate >2 mmol/L
• Temperature <36 or >38°C	• Change in mental status
• White cell count <4 or >12 x109/L	

EXAMPLE SEPSIS PATHWAY

A sepsis pathway is typically multiple pages.

The first page should be a flowchart for how to appropriately activate the sepsis pathway and highlights the key actions for management. An example of this is on the next page. Please note the following:

● It includes limited instructions and should be adapted and tailored to your health service – such as your equipment, protocol/procedures and operating environment. Consulting with stakeholders on this will improve buy-in and ownership by your clinicians.

● While the pathway should be tailored to your health service, the clinical criteria and the sepsis bundle of care actions should stay the same.

- The pathway should be paired with your antimicrobial guidelines to ensure appropriateness of antimicrobial administration.
- Patients should not remain on the pathway for longer than six hours.

Figure 3: Example sepsis pathway
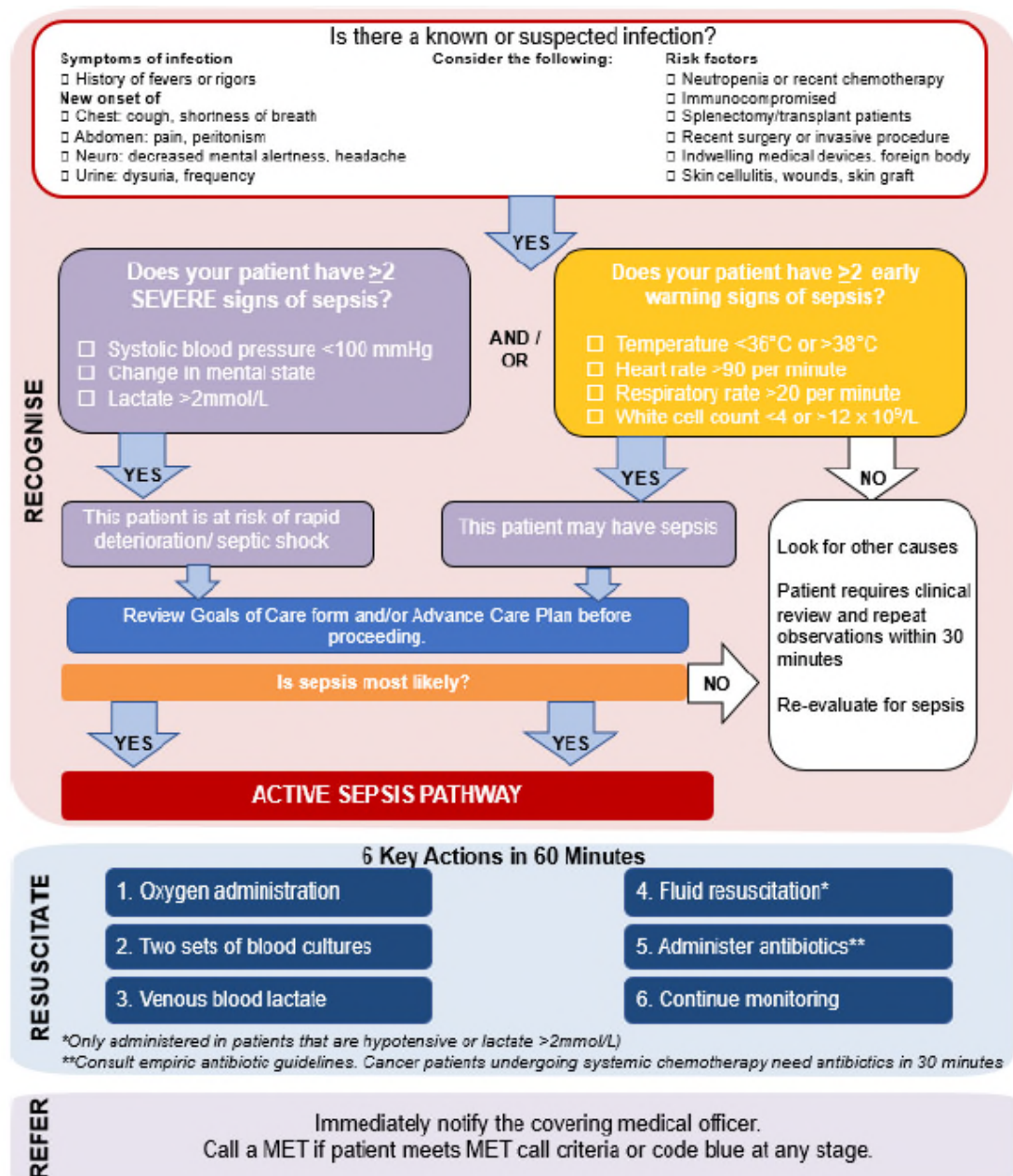
Implementing the sepsis pathway

Additional pages of the pathway can include an audit tool, providing a place for clinicians to document pathology results and record timing of process measures. Many health services also include their empiric antibiotic guidelines in the pathway.

To successfully implement a sepsis pathway at your health service, you will need a project team and a plan. You will also need to first understand the current state of practice, and gather baseline data and information.

It is reasonable to assign six to 12 months to implement a sepsis pathway. Use the below timeline as a guide to adapt and implement a sepsis pathway at your health service, depending on available resources. Further information on each phase is detailed in the following pages.

Table 1: Suggested project timeline and phases

Activity	1	2	3	4	5	6	7	8	9	10	11	12
PLAN*												
1. Build a team and establish governance	•											
2. Define the problem and develop a project aim	•											
3. Define project measures	•											
4. Collect initial measures		•	•									
5. Identify changes required for implementation (including tools and resources to support the changes)			•	•	•							
6. Develop a communication and education strategy				•	•							
7. Complete project plan and submit to executive sponsor/senior leadership team					•							
PILOT#												
8. Pilot the sepsis pathway and test changes						•	•	•				
IMPLEMENT/SPREAD												
9. Embed the changes into standard practice									•	•	•	
SUSTAINABILITY												
10. Sustain and spread the changes											•	→

* Document steps 1–7 on the project plan (see **Appendix 2**)

Use the Plan-Do-Study-Act template to guide testing (see **Appendix 3**)

1. BUILD A TEAM AND ESTABLISH GOVERNANCE

Your project team should be multidisciplinary and include relevant stakeholders. Team members may differ between an urgent care centre and a large acute hospital.

The **core project team** will deliver the work and should consist of a:

- **Project lead** – coordinates the project timeline and team. It is beneficial if the project lead has an interest in sepsis or has experience with quality improvement initiatives
- **Clinical lead** – ensures that the clinical requirements of the process (including policies) meet required standards. Acts as a clinical champion for the change
- **Executive sponsor** – person responsible for the project and accountable for the outputs and outcomes of the project. This role is the business owner for the implemented service.

Consider including the following members in your **broader team**:

- consumer representative(s)
- emergency department (ED) or urgent care centre (UCC)/acute nurse
- ED physician, nurse practitioner or local general practitioner
- local champions
- quality or clinical governance representative
- infection prevention/control
- innovation and improvement adviser (if available)
- infectious diseases physician (if available)
- pharmacist (if available)
- local pathology representative (if available)
- local ambulance representative (if available)
- nursing and medical education
- data analyst
- finance
- human resources

For an acute hospital, also consider representation from:

- surgical specialty
- ICU.

As a minimum, have a nursing and medical representative on your team. If your health service uses an electronic medical record (EMR), be sure to include representation from the EMR team.

It can be challenging embarking on project work if you have a clinical caseload. Consider the addition of clinical and non-clinical staff to your team to distribute the workload and ensure the project can be delivered successfully.

Each team member should have defined roles and responsibilities.

You will also need to develop local champions in clinical areas who can facilitate the successful implementation of the sepsis bundle, promote the use of the sepsis pathway, provide education at the point of care, address issues efficiently and feedback to the project team.

Identify champions across multiple disciplines (nursing, medical, pharmacy) and levels of seniority (senior leaders, frontline clinicians). You may like to make them identifiable, with a special t-shirt or a badge.

2. DEFINE THE PROBLEM AND DEVELOP A PROJECT AIM

For change to be successful it must address a demonstrable need. What are you trying to accomplish? Start by defining the:

- problem
- project description
- rationale
- expected benefits and outcomes
- aim statement.

Problem

Identify current issues or problems related to sepsis management that you hope to improve. For example:

- a critical incident related to sepsis
- lack of consistent practice
- no sepsis policy or guideline available
- poor staff understanding and awareness of sepsis.

Project description

Outline what you intend to achieve by completing this project. Consider long-term vision and short-term project goal and objectives. For example:

- implement a standardised pathway for managing sepsis
- improve staff knowledge
- increase staff capability in managing sepsis.

Rationale

Explain why it is important that your health service embarks on this project. Include baseline data.

For example: There is poor recognition and management of sepsis within our health service, as evidenced by our in-hospital mortality rate of 25 per cent.

Expected outcome and benefits

Describe the expected outcome and benefits this project will have on patients, staff, the health service and the community. Also outline how you intend to collect information on the actual outcomes and benefits. For example:

- We expect staff confidence in managing sepsis will increase, which will be measured by collecting staff stories.
- We expect length of stay (LOS) will decrease, which will be measured by collecting LOS pre- and post-implementation of the sepsis bundle of care.

Aim statement

Develop a project aim that outlines the outcomes you are hoping to achieve. The project aim should be:

- specific
- measurable
- achievable
- relevant
- time bound.

For example: 80 per cent of patients who fit sepsis criteria in the ED will be managed according to the sepsis bundle of care by December 2019.

3. DEFINE PROJECT MEASURES

Collecting data will help you assess whether the change you have made is an improvement. Data should be collected regularly and displayed either weekly or monthly. More frequent data points will allow you to see changes over time and determine whether your Plan-Do-Study-Act (PDSA) cycles are resulting in an improvement.

When defining your project measures, ensure you provide an operational definition so that it is clear about what data to collect. Also identify the numerator and denominator.

Choose measures from the following three categories to provide an overview of the impact on the system of changes you are making:

- **Outcome measure(s)** measure the impact of the project on the health system (e.g. sepsis-related mortality rate).
- **Process measures(s)** measure a step in the system that can contribute to a positive impact (e.g. time to administration of intravenous antibiotics, proportion of patients who have lactate measured, proportion of patients who had two sets of blood cultures collected).
- **Balancing measure(s)** measure unintended consequences of the project (e.g. appropriateness of initial antibiotic therapy or Clostridium difficile infection rates).

Required measures with operational definitions are provided in **Appendix 4.**

Consult key stakeholders and discuss with your project team before defining your final measures. Consider the time required to collect each data point and whether ethics is required (check with your health service, you may need to submit a low risk ethics application).

4. COLLECT BASELINE MEASURES

The purpose of collecting baseline data is to clearly define current service levels so that improvements can be measured against them. To show improvement, you will need to collect data before and after implementing change. Prior to starting, collect baseline data from the previous six months.

Liaise with your health information department to identify patient cases of sepsis.

Hospitals

You may want to use the Victorian Admitted Episodes Dataset (VAED) discharge codes related to sepsis to identify patient cases.

Urgent care centres

Use local coding processes if available or identify patients by screening presenting complaints. Consider screening for the following key words:

- sepsis or septic shock
- urosepsis or urinary tract infection
- pneumonia
- infection.

Inclusion criteria

Use the sepsis recognition criteria to identify patient cases to include in your baseline data:

- Meets criteria for sepsis: Known or suspected infection plus abnormal vital signs
- Bundle components align with Advance Care Plan
- Age >18 years

If you are unsure, consult the clinical lead for advice.

5. IDENTIFY CHANGES REQUIRED FOR IMPLEMENTATION

To implement the sepsis pathway into your health service you will need to identify what changes need to occur.

A driver diagram is a useful tool you can use to determine what contributes to the achievement of your project aim. It is a visual display of the project aim, the primary and secondary drivers and specific change ideas.

Table 2: Driver diagram structure

AIM	Primary driver	Secondary driver	Change idea
		Secondary driver	Change idea
	Primary driver	Secondary driver	Change idea

The main components of a driver diagram are:

- **Aim:** a clear goal or objective describing the desired outcome, it should be specific, measurable and time-bound
- **Primary drivers:** components or factors that contribute directly to achieving the aim
- **Secondary drivers:** actions or interventions that are required to achieve the primary drive
- **Specific change ideas:** ideas and concepts to test that will support or achieve the secondary driver.

Complete the driver diagram with the entire project team. It is beneficial if a range of stakeholders review the drivers and change ideas to ensure the whole system is considered and that the project is a success.

New tools and resources may be required to enact the specific change ideas identified.

6. DEVELOP A COMMUNICATION STRATEGY

It can be challenging to keep stakeholders well informed about the project in a busy hospital environment. It is best that you use multiple methods of communication and education to capture as many people as possible.

Your communications strategy should evolve through the project lifecycle. For example, the early stages of the project your key message may be 'sepsis is a medical emergency and here is how we define it' and may change to 'use the sepsis pathway' closer to implementation. Allow time to create awareness before implementing. Be sure to consider existing communication methods rather than creating many new forms of communication.

Be creative! Some ideas include:

- using visual management – create a visual board on the wards with education, information and data
- using your local champions to spread the word and be present at the point of care to provide one-on-one education when required
- communicating through the hospital newsletter
- setting a standing agenda item at regular meetings
- using double staffing time or staff huddles to project short, regular updates
- creating posters and lanyards
- holding a project launch (morning or afternoon tea)

- conducting a quiz before and after an education session
- distributing information to rural general practitioners (for UCC)

7. COMPLETE PROJECT PLAN

A project plan is a living document that is used to guide the implementation, including scope, time and budget. As the project develops the plan is refined to reflect new knowledge or changes. The project plan details the approach you will take to implement the project, outlining:

- the governance structure
- the project team
- the approach to delivering the project (phases and checkpoints for decision making, change management)
- funding and budget
- the detailed project schedule
- risks that have been identified and how they will be managed
- project reporting.

The plan ideally is developed through collaboration and consultation with key stakeholders and members on the project team.

Document your project plan in the template provided (**Appendix 2**) and submit to your executive sponsor for review. This will ensure your executive sponsor/senior leadership are well informed, can offer advice or support and advocate for the project at an executive level.

Request feedback and amend the project plan accordingly. Ensure you have documented endorsement of your project plan from executive and senior leadership.

Set the project up for success by completing a sustainability tool and developing a plan at the start of the project. The NHS sustainability model and guide (www.improvement.nhs.uk) can help you plan for sustainability.

Be sure to develop a risk management plan to assess risk that could impact the success of the project.

8. PILOT THE SEPSIS PATHWAY AND TEST CHANGES

To pilot means to test on a small scale. This may be on one patient, one ward, or even across a department. The benefits of testing include:

- learning how to adapt the change to the local setting
- understanding and overcoming potential barriers or challenges
- involving key stakeholders so they become invested early
- reducing resistance upon implementation.

We recommend using PDSA cycles to test the sepsis pathway and other identified change ideas from your driver diagram. PDSA cycles allow you to test and adapt the changes in multiple phases so that you can turn an idea into a change that results in improvement.

Use the PDSA template (**Appendix 3**) to guide you to:

- **Plan** – develop questions and predictions and details of the cycle (who, what, where, when)
- **Do** – carry out the plan, document problems and unexpected observations, collect data
- **Study** – analyse and compare data, summarise learnings
- **Act** – decide on your next steps and any changes to be made.

Documentation will help you keep track of the changes you have made and the impact they have had. Consult your key stakeholders regularly and request feedback about the feasibility of the changes you are making.

Table 3: PDSA example

	Plan	Do	Study	Act
Screening tool	Implement sepsis pathway which is to be included in patient's medical chart	Use pathway on 10 ward-based patients, collect feedback from staff and any issues with the pathway	Staff unsure how to document if the pathway has been ceased and why	Add section to the pathway, 'pathway ceased at (datetime), for (reason)'
Sepsis alert in ED	Develop an alert and sepsis icon for patients with sepsis in ED electronic system	Test the alert and sepsis icon on 10 patients presenting to ED	Review accuracy of the alert and clinician's feedback on the sepsis icon	Refine alert – sepsis icon can now be de-activated if sepsis unlikely

9. EMBED THE CHANGES INTO STANDARD PRACTICE

The implementation phase involves embedding the successful changes from the pilot/testing phase. Identify a specific launch date to start using the sepsis pathway. Ensure you deliver education and disseminate communication before the launch date so that staff are prepared for the implementation.

Aim to have a local champion on each shift in the first few weeks of implementation, where possible. The additional support will help encourage use of the sepsis pathway, provide education as needed, manage issues and obtain feedback.

Data collection

Once implementation has begun, start to collect data on your chosen project measures. It is best to track this weekly if you have adequate patient numbers. You may like to display your results and project progress in the department, so staff are informed.

We recommend tracking your results on a run chart. Download a run chart template at http://www.ihi.org/resources/Pages/Tools/RunChart.aspx

- Develop a process of identifying patients. Consider the following:
  - Integrate pathway into EMR
  - Create a log book where staff can place stickers on records of patients with sepsis
  - Include 'sepsis pathway' in handover or patient tracking system
  - Link pathway into antibiotic approvals system or pathology ordering system
- Request staff to file the completed sepsis pathways in an allocated area.
- Liaise with medical records or the health information department to identify patients with a sepsis discharge code (request for a fortnightly or monthly list) – this will help to identify 'missed' patients.

10. SUSTAIN AND SPREAD THE CHANGES

Once the change has been sustained within the initial areas consider spreading to other areas of the health service.

Sustainability

Sustainability means holding the gains and continuously improving as required. It is building on the hard work that has already been done. It is a collective responsibility and the greatest impact on patients will result from continuing the project success.

To indicate that your improvements have been sustained, regular periodic audits will be required. We recommend conducting at least monthly audits post implementation to show sustained results. Once changes have been sustained, you can change to three-monthly or six-monthly audits.

Revisit the sustainability planner you completed at the start of the project. Revise your sustainability plan, if required, based on your experience during the project.

Spread

Spreading the changes will involve disseminating successful interventions into other care settings, for example, implementing the sepsis pathway outside of the emergency care setting.

Develop a plan if you intend to spread the sepsis pathway outside the initial areas. Consider:

- agenda or aim
- governance
- communication
- measurement system.

Drivers in this toolkit

The below table summarises primary and secondary drivers, and change ideas relevant to implement a sepsis pathway, with further detail included in the following pages.

Table 4: Driver diagram detailing change ideas

Reduce sepsis related mortality in adults by 20% across participating Victorian health services through earlier identification and management by December 2021	Reliable recognition and assessment	Reliable sepsis screening (early warning and severe)	• Standardise sepsis definitions • Implement sepsis pathway • EMR trigger • Triage screening tool • Other visual prompts
		Timely and reliable communication/escalation	• Escalation procedure • Develop clear roles for key actions • Determine time-zero and provide performance feedback • Code sepsis • Standardise standing pathology orders
	Reliable care and delivery	Delivery of sepsis bundle (6 key actions) within 60 minutes: 1. Oxygen 2. Two sets of blood cultures 3. Venous blood lactate 4. Intravenous fluids 5. Appropriate antibiotics 6. Continued monitoring 6-hour bundle with re-review Escalation/de-escalation of care as appropriate	• Monitor compliance with 6 key actions with timely performance feedback • Develop order sets including two sets of blood culture and venous lactate • Upskill nursing staff to cannulate and collect relevant pathology • Develop notification system for positive blood cultures of elevated lactate • On-site pathology • Develop antibiotic guidelines and protocol for administration • Stock appropriate antibiotics in clinical areas • Educate all clinicians on importance of re-review and de-escalation • Link sepsis pathway with antibiotic approval system • Add 'ceased' box on sepsis pathway • Consumer information/brochure
	Awareness and education	Clinician/consumer awareness of sepsis	• Sepsis communications plan • Visual management and display of performance data • Highlight sepsis at gatherings (i.e. daily operating system. Huddles, etc.) • Consumer information/brochure
		Clinical knowledge and skills training	• Build sepsis education into local and organisation-wide orientation • Train-the-trainer approach for medial and nursing education • E-learning module

PRIMARY DRIVER: RELIABLE RECOGNITION AND ASSESSMENT

Reliable sepsis screening

Sepsis must be recognised in a timely manner to ensure proper management. Standardisation of sepsis recognition criteria makes it easier to develop a systematic approach.

Change ideas

- Standardise vocabulary and definitions for sepsis across your health service. Use these definitions in education materials.
- Sepsis pathway including sepsis criteria on front page.
- Electronic medical record trigger.
- Triage screening tool.
- Use visual tools.

Timely and reliable communication and escalation

Once sepsis is recognised, it is important that this is communicated and escalated as appropriate. There should be a standardised and reliable process for escalation at your health service.

Change ideas

- Develop escalation procedure for notification of senior nursing and medical staff.
- Develop clear roles for all key actions related to the sepsis pathway.
- Determine 'time zero' (as defined in **Appendix 4**) and provide performance feedback to treating team.
- 'Code sepsis' – a paging or phone trigger to gather appropriate members of the care team.
- Standardise communication using 'ISBAR'.
- Develop standing orders for relevant pathology.

PRIMARY DRIVER: RELIABLE CARE DELIVERY

Delivery of sepsis bundle within 60 minutes

The sepsis pathway includes a sepsis bundle which focuses on the completion of six key clinical actions within 60 minutes. The key actions are:

- oxygen administration
- two sets of blood cultures – likely easier to monitor performance
- venous blood lactate – likely easier to monitor performance
- fluid resuscitation
- appropriate antibiotics – likely easier to monitor performance
- monitoring observations.

Be sure to review existing protocols, procedures and policies at your health service to ensure they enable the completion of these clinical actions. We will focus on the two sets of blood cultures, venous blood lactate and appropriate antibiotics for this section, as these are typically easier to monitor. However, all actions are important to improving patient outcomes.

Two sets of blood cultures

Two sets of blood cultures are recommended as this increases the likelihood of identifying the organism causing the infection.

Venous blood lactate

A lactate level is used to identify hypoperfusion in patients who may not have a low blood pressure. A lactate level >2 mmol/L is considered high and these patients should have intravenous fluids unless otherwise contraindicated.

Appropriate antibiotics

Antibiotics should be administered within 60 minutes. It is important to not only administer the antibiotics quickly but ensure that the antibiotic is appropriate for the patient. Antibiotics guidelines or recommendations should be included within the sepsis pathway.

Change ideas

- Monitor compliance with the above actions and provide performance feedback in a timely manner (within one week).
- Develop order sets for sepsis which include two sets of blood cultures and a lactate.
- Upskill nursing staff to ensure they can cannulate and draw appropriate pathology tests.
- Develop notification system for elevated lactate or positive blood cultures.
- Ensure on-site pathology is available, and if not, determine process for collection and analysing results.
- Develop antibiotic guidelines and protocol for administration (involve pharmacy and infectious disease team, if available).
- Stock appropriate antibiotics on clinical areas to ensure they are rapidly available.

Six-hour bundle with re-review

The sepsis pathway outlines a six-hour care bundle. It is important to continue monitoring and observations following the key actions completed in the first 60 minutes. This may include imaging to confirm source of infection, repeat lactate, review by specialists, etc.

Patients should not stay on the sepsis pathway for longer than six hours.

Change ideas

- Educate all clinicians on importance of escalation and de-escalation.

- Link sepsis pathway with antibiotic approval system or antimicrobial stewardship rounding (if available).
- Add 'ceased' box on sepsis pathway.

Escalation and de-escalation of care, as appropriate

Patients should not remain on the sepsis pathway for longer than six hours. It is important to reassess and escalate or de-escalate, as appropriate.

Change ideas

- Add 'cease' box on sepsis pathway.
- Sepsis pathway only includes one dose of antibiotics.
- Develop handover tool.
- Educate all clinicians on importance of escalation and de-escalation.
- Develop approval protocol for administration of second dose antibiotics.
- Patients with sepsis included on antimicrobial stewardship rounds.
- Consumer discharge information/brochure.

PRIMARY DRIVER: AWARENESS AND EDUCATION

Clinician and consumer awareness of sepsis

Launch a communications plan. Please note, your communications strategy will change throughout the project period based on what phase you are in and what your key message is.

Change ideas

- Map out existing communications modes and build in 'Think sepsis. Act fast.' This may include:
  - newsletters
  - posters
  - television screens or computer screensavers
  - intranet/internet cues
  - local champions wearing t-shirts
  - patient stories.
- Build 'Think sepsis. Act fast.' into your existing communications framework (what already exists, and can you use it?).
- Executive walkarounds in clinical areas to promote the pathway.
- Highlight sepsis at gatherings (daily operating system huddles, ward huddles or ED muster, handover, etc.)
- Create visual cues in clinical areas and display performance data where possible.
- Consumer discharge information/brochure.

Clinical knowledge and skills training

All clinicians should be educated on sepsis as well as how to use the sepsis pathway. Map out existing education structures and incorporate sepsis education to ensure sustainability. During the early stages of the project you will likely need to organise targeted sepsis education.

Change ideas

- Local orientation.
- E-learning modules.
- Mandatory organisation-wide education on induction.
- Train-the-trainer approach using medical and nursing education.
- Upskilling of nurses for cannulation and pathology collection.

Potential barriers and enablers

The sepsis pathway has been implemented across many health services, including small UCCs and large, tertiary hospitals. The following are common barriers and enablers experienced by health services when implementing a sepsis pathway. We recommend you complete this assessment throughout the project. Be sure to complete the assessment during the planning and sustainability stages.

Table 5: Barriers and enablers assessment

Category	Item	Rating	Comments
People Are the organisation's people ready to support the project?	Existing training programs including content, audiences, frequency and delivery mechanisms support the activities of the project The organisation has the right people with the right skills to be able to deliver the project tasks within the proposed budget and to support the activities of the project	*Select from:* On track Improvement required At risk Complete	
	Adequate organisational support and resources are available to support the activities of the project There are strong advocates and champions for change to support the activities of the project		
	The leadership team has been identified to guide the change effort within the project The stakeholders and those affected by the activities in this phase are supportive of the change process There is a method for engaging with the medical teams. Consider: transient workforce, visiting medical officers		
Policy and process Is the internal structure ready to support this phase of the project?	The organisation's governance structure is set up to support the project activities		
	Existing policies and procedures support the activities of the project. Consider policies and procedures relation to: Blood culture and cannulation, escalation, deteriorating patient, verbal medication orders, handover, frequency of observation, intravenous fluid and antimicrobial administration, catherization, transfers, infection control and abnormal pathology result notification Existing business reporting processes support the activities of the project The existing performance management framework such as key performance indicators and metrics support the activities of the project The exiting inventory processes such as those relating to consumables support the activities of the project Antimicrobial policy exists including recommendations on appropriate empiric therapy Reliable escalation procedure and processes for identifying at-risk patients exists		

Category	Item	Rating	Comments
	There are enough existing IT systems to support the activities of the project. Consider: Electronic medical record system, pathology ordering, bundles, coding and triggers/alerts		
Infrastructure Is the organisation's infrastructure ready to support this phase of the project?	The physical space is adequate and supports the activities of the project		
	There is on-site pathology and microbiology service available		
	There is an on-site pharmacy service that can provide appropriate antimicrobials efficiently during all hours		
	The hospital has critical care outreach services (e.g. MET)		
	There is clinician awareness of sepsis across the service		
Sepsis-specific Specifically related to sepsis, what is the status of the following?	There is current protocol for sepsis management on the wards		
	There is a current protocol for algorithm for sepsis management in the ED		
	Sepsis related education and materials are available across the service		
	There is a mechanism for monitoring performance related to sepsis		
Other What other barriers and facilitators may be encountered/impede implementation?	There is a feedback system to reinforce benefits, progress and performance		
	Sepsis is recognised as an organisational priority		
	The innovation itself; feasibility, accessibility, other		
	Individual professional; attitude, motivation to change, behavioural routines, scope of practice, other		
	Patient and consumers; knowledge, attitude, compliance, other		
	Social context: opinions of colleagues, culture of the health service, collaboration, other		
	Organisation context: staff capacity, staff structure, other		
	Economic and political context: financial constraints (e.g. pressure to reduce pathology tests, scans, etc., or pressure on ED LOS that may impact entering patient, etc.), other		

Appendix 1: Background

We have run or supported three different projects to improve identification and management of sepsis, as well as patient outcomes. The projects and their outcomes are summarised below.

Melbourne Health sepsis improvement project

In 2016–17, the Sepsis Improvement Project adapted and spread the clinical sepsis pathway that was developed at Peter MacCallum Cancer Centre for use across the Royal Melbourne Hospital (part of Melbourne Health).

Supported by our Better Care Victoria innovation fund, the project implemented a clinical pathway and a multidisciplinary education package that was collaboratively developed for use across all adult clinical services. The pathway standardised initial sepsis management, including clinical criteria for sepsis recognition and six actions in the 60 minutes following sepsis recognition: oxygen, two sets of blood cultures, venous blood lactate, rapid fluid resuscitation, appropriate antibiotic administration and continued monitoring.

The pathway was paper-based and held a patient's chart. The pathway supported nurses to initiate sepsis care and escalate to senior clinicians.

Project outcomes

- Mortality decreased from 13.5 per cent to 6.7 per cent
- ICU admissions decreased from 25.4 per cent to 8.8 per cent
- LOS decreased from 7 days to 4 days
- Significant improvements in compliance with pathway components: time to antibiotics, lactate and blood culture collection

Implementing a sepsis bundle of care project

Beginning in 2016–17, this SCV project aimed to reduce variation in sepsis management, standardise clinical practice Implementing a sepsis bundle of care and enhance knowledge and capability of frontline clinicians.

In 2018, we expanded the project to 12 EDs and 20 UCCs, providing them with an ED or UCC clinical pathway which was adapted from the 'Think sepsis. Act fast.' scaling collaboration. This project ran concurrently with the 'Think sepsis. Act fast.' Scaling Collaboration detailed below.

Project outcomes

- 80 per cent of participating health services implemented the pathway during the project period
- Compliance with key components of the pathway increased from 7 per cent to 30 per cent

'Think sepsis. Act fast.' scaling collaboration

A 12-month collaborative model of learning, the collaboration supported 11 health services to implement the sepsis pathway. It was funded by our Better Care Victoria innovation fund.

The collaboration enabled peer-to-peer learning, rapid testing, trialling and spreading of improvements. Each health service applied the Melbourne Health version of the pathway adapted to their local health service context and operating environment. Our champion site Melbourne Health provided project resources and peer support, and facilitated shared learning. We provided additional support and hosted six face-to-face workshops to support project teams, build capability, and share learnings.

Project outcomes

- 52 lives saved – mortality decreased from 11.4 per cent to 5.8 per cent
- 96 ICU admissions avoided – ICU admissions decreased from 23.5 per cent to 15.5 per cent and mean ICU LOS decreased from 4.6 days to 3.4 days
- 3,781 bed days saved – mean total LOS decreased from 9.1 days to 6.2 days
- $11.7 million in savings based on reduced LOS and associated costs (a six-fold return on investment)
- Significant improvements in compliance of pathway components: time to antibiotics, lactate and blood culture collection

TOP 10 CHECKLIST

This following list is based on learnings and advice from those who have previously implemented this pathway.

Engage with stakeholders early and often (and don't forget consumers)

Build a multidisciplinary team

Collect baseline data at the start (use data to tell your story)

Use real-time performance data and feedback

Use run charts to display you data

Test changes on a small scale (before spreading)

Build leadership support

Think sustainability from the start

Integrate into existing processes and structures

Celebrate success

Appendix 2: Example project plan template

1. TEAM AND GOVERNANCE

Project title	
Project start date	
Team members and roles	Project lead
	Nursing and medical representatives
	Consider: quality team or clinical governance team, improvement adviser, pharmacy, infectious diseases, infection prevention/control, pathology, local AV, clinical champions

Approval to implement and use sepsis pathway and empiric antibiotic guide

Committee, group or person required to approve	Next meeting date	Date approved
E.g. Medication safety committee		

Project reporting

Committee or person	Frequency of reporting
E.g. ED/UCC NUM	Monthly

Project team meetings

Meeting	Date
E.g. Meeting 1 – assign roles and responsibilities	

2. PROBLEM AND PROJECT AIM

What are you trying to accomplish?	
Problem	*Identify the current issues and problems related to sepsis management*
Project description	*Outline what you intend to achieve by completing this project*
Rationale	*Explain why it is important for your health service to undertake this project*
Expected outcomes and benefits	*Describe expected outcomes and benefits to patients, staff and the community*
Aim statement	*Outline the outcomes you are hoping to achieve – should be specific, measurable and time-bound*

3. PROJECT MEASURES

Refer to **Appendix 4** for examples

Outcome measure(s)

Measure	
Operational definition	
Numerator	
Denominator	

Process measure(s)

Measure	
Operational definition	
Numerator	
Denominator	

Balance measure (s)

Measure	
Operational definition	
Numerator	
Denominator	

4. INITIAL MEASURES

Refer to **Appendix 3** and record baseline data collection.

5. CHANGES TO IMPLEMENT

Refer to **Appendix 4** and **5** for driver diagram examples and template.

Specific change ideas identified in driver diagram

Change idea	Drivers	Tools or resources required
E.g. Ensure point-of-care equipment is ready and available in triage	Primary: Increase recognition at triage	Blood pressure machine
	Secondary: Assess patients appropriately in triage	Pulse oximeter
		Point of care testing (iSTAT)
	Primary:	
	Secondary:	

6. COMMUNICATION AND EDUCATION STRATEGY

What	Who	When
E.g. Staff education	All nursing, medical and pharmacy staff in ED/UCC	Multiple sessions during double-staffing over two weeks

7. EXECUTIVE SPONSOR AND SENIOR LEADERSHIP ENDORSEMENT

☐ Complete sustainability plan (see Health Quality Ontario sustainability planner or NHS sustainability model and guide)

By signing the below, you agree to endorse and support this project according to the plan outlined above.

ED/UCC NUM	Name	
	Signature	Date
ED/UCC director	Name	
	Signature	Date
Executive sponsor	Name	
	Signature	Date

Appendix 3: PDSA template

PDSA series name		PDSA cycle number in series	
Start date		End date	
Objective for PDSA series			
This PDSA cycle will	☐ Collect information	☐ Develop a change	☐ Test a change
	☐ Implement a change		
Confidence	☐ Not confident	☐ Slightly confident	☐ Somewhat confident
	☐ Confident	☐ Very confident	

PLAN

Fill in the sections below as part of planning

What question(s) do you want to answer on this PDSA cycle?	
Briefly describe what you want to achieve in this cycle of the series?	What are we going to do? How long will the test last? Where will it be carried out? Who will carry it out?

Task to be completed to undertake test	**Who**	**When**	**Where and how**
Prediction	What do you think will happen? Make a prediction for each question		
How will you collect the information/data needed for this cycle?			

DO

Execute the plan

Record your observations and summarise the information/data collected	Include any problems or unexpected events encountered, and any feedback from the participants.

STUDY

Complete analysis of information/data

Compare the information/data collected to your predictions and summarise the learning	What does the information/data show? Was your prediction confirmed? If not, what did you learn?

ACT

Decide the next steps

Following this test, you will	☐ Abandon idea	☐ Modify and retest	☐ Increase scale of testing
	☐ Move to next cycle	☐ Implement	
What is you plan for the next cycle?			

Appendix 4: Measures and operational definitions

OUTCOME MEASURE

Sepsis-related mortality

Operational definition

The number of patients who die in hospital from sepsis during the acute admission (all-cause). This excludes patients who are transferred during an episode of care.

Numerator

The number of patients with sepsis who died within the health service.

Denominator

The total number of patients with sepsis identified within the health service.

PROCESS MEASURES

Time to antibiotics for EDs

Operational definition

The time from triage to administration of first dose of antibiotics, recorded in minutes. This information can be collected from the triage record and medication chart, respectively (or electronic medical record if available).

Numerator

The number of minutes from triage to intravenous antibiotic administration.

Denominator

N/A

Time to antibiotics for wards

Operational definition

The time from meeting sepsis criteria (as per sepsis criteria) to administration of antibiotics, recorded in minutes. This information can be collected from the observation chart, medical record and medication chart (or electronic medical record if available). This excludes patients already on antibiotics.

Numerator

The number of minutes from meeting sepsis criteria to antibiotic administration.

Denominator

N/A

Lactate measurement

Operational definition

The number of patients who have lactate measured within sixty minutes of sepsis recognition (or two hours prior to sepsis recognition). This information can be collected from pathology or should be documented in the patient medical record. This requires lactate testing be available.

Numerator

The number of patients who have lactate measured.

Denominator

The total number of patients identified with sepsis within the health service.

Blood cultures taken

Operational definition

The number of patients who have two sets of blood cultures taken within sixty minutes of sepsis recognition (or 24 hours prior). This information can be collected from the pathology or microbiology service. Also note if only one blood culture was taken.

Numerator

The number of patients who have two sets of blood cultures taken.

Denominator

The total number of patients identified with sepsis within the health service.

BALANCING MEASURE

Appropriateness of antibiotic therapy

Operational definition

The number of patients with sepsis (who had antibiotics administered) where the initial antibiotic administered following sepsis recognition was compliant with local antibiotic guidelines. This information can be collected by comparing the medication chart to the empiric antibiotic guidelines at the health service.

Numerator

The number of patients where the initial antibiotic administered was compliant with local empiric antibiotic guidelines.

Denominator

The total number of patients identified with sepsis within the health service.

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