AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE

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Sepsis Medical Record Pilot Review – Supplementary Material

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Contents

1. Sepsis Medical Record Review Pilot - Protocol

Glossary

Term	Description
HREC	Human Research Ethics Committee
Investigation team	The central team that will be responsible for designing data collection tools, training review teams, analysing and reporting data
Medical record	All the clinical documentation associated with a given separation including progress notes, clinical observation charts and medication charts
Participant	Individual patient whose de-identified data will be included in the research sample
Principal investigator	The Principal Investigator is the person responsible for the submission of essential and other study related documents for consideration by the HREC[1] The principal investigator(s)/institution(s) will permit study-related monitoring, audits, HREC review, and regulatory inspection(s). The principal investigator will also provide direct access to source data/documents on request, only where such requests are consistent with the privacy and confidentiality principles described in the Ethical Considerations section.
Review team	Review team based at a given site that will be reviewing each participant's medical record to extract the relevant data. Each review team will consist, at a minimum, of a clinical reviewer and a clinical coding reviewer

Overview

Background

The Australian Sepsis Network (ASN) estimates that approximately 5,000 people die of sepsis in Australia each year. They also estimate that the annual incidence of sepsis in the adult Australian population treated in an Intensive Care Unit (ICU) is approximately 77 per 100,000. However, this estimate is limited to patients treated in an ICU and is based on a study published in 2004. The ASN acknowledge that international estimates may be at least three to four times higher than current data suggests.[2]

The Australian Commission on Safety and Quality in Health Care (the Commission) was appointed by the Australian Government Department of Health to lead and co-ordinate the National Sepsis Program in 2019 in partnership with The George Institute for Global Health. As part of this program, the Commission undertook an epidemiological analysis of national sepsis inpatient data from all Australian public hospitals. The report estimated that the age-standardised incidence of sepsis increased 27% from 994.1 per 100,000 in 2013-14 to 1260.5 per 100,000 in 2017-18.[3]

The report also found that, despite the increase in incidence of sepsis cases, sepsis mortality remained relatively stable, even after accounting for relevant risk factors. The authors attributed this apparent increase to 1) more prominent clinical awareness campaigns around the time of the increase and 2) a change in coding practice. They note the increase could be explained "in a small number of ICD-10-AM codes, especially the most frequently used code A419 (Sepsis, unspecified)". They also note that there was "extensive revision of the

Australian Coding Standard (ACS 0110) Sepsis, severe sepsis and septic shock for ICD-10-AM 9th Edition" which covered the period "when an increase in the rate of inpatient sepsis was observed". The authors recommended that "further investigation of sepsis coding guidelines and practices may assist in understanding reasons for the increases observed".[4]

In support of this recommendation, the Commission is now seeking to undertake a national retrospective medical record review (MRR) examining clinical records of patients with sepsis to assess:

- The relationship between sepsis ICD-10-AM coding practices, and potential underestimation of sepsis cases in Australia
- Instances of detection, recognition and clinical management of sepsis from the review that could be considered as 'gold-standard'
- What factors influence or are most commonly associated with deviation from local, district or jurisdictional sepsis clinical management guidelines, and the potential reasons for this deviation (including care setting, clinical workforce, geographical location and time (day, night, out of hours, weekends).

Closer analysis of medical records will not only provide greater insights into the true incidence of sepsis and factors that influence the detection and early management of sepsis, it will also help inform future initiatives under the National Sepsis Program. For example, sophisticated predictive modelling can help disentangle the impact that multiple interacting factors have on the detection and early management of sepsis. These factors include workforce capacity and capability, emergency department waiting times, individual clinician variation, and health service remoteness. The Commission is also currently drafting a dedicated Sepsis Clinical Care Standard which will be the first nationally agreed set of guidelines on sepsis, developed to support improvements in the delivery of sepsis care. This study offers the opportunity to contribute the insights required to support the Commission's continued commitment to enhancing the safety and quality of sepsis care.[5]

Objectives and purpose of the study

The purpose of this study is to assess the clinical documentation of patients with sepsis to examine:

1. To what extent are cases of sepsis under recognised?
2. Are there cases of gold standard sepsis management?
3. What factors influence deviation from local sepsis guidelines and pathways?

These three high-level questions will be addressed by answering the following sub-questions.

Review question 1: To what extent are cases of sepsis under recognised?

#	Question
1.1	What proportion of cases in the sample meet this study's criteria for sepsis? **NB: the study criteria for defining sepsis, and the rationale for reaching this definition is described in 'The definition of sepsis** For the purpose of this review, sepsis among adult patients will be defined using qSOFA (Quick Sequential Organ Failure Assessment) and sepsis among paediatric patients will be defined using pSOFA (Paediatric Sequential Organ Failure Assessment). The rationale for using these approaches is explored below. qSOFA' section below.

<table>
<tr><th>#</th><th>Question</th></tr>
<tr><td>1.2</td><td>What proportion of cases in the sample that met the study's criteria for sepsis were coded with an ICD-10-AM code for sepsis?</td></tr>
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<tr><td>1.3</td><td>What proportion of cases in the sample that were identified by the treating clinical team as having sepsis were coded with an ICD-10-AM code for sepsis?</td></tr>
<tr><td>1.5</td><td>What proportion of cases in the sample that met the study's criteria for sepsis were coded with an ICD-10-AM code for 'implicit sepsis'?

NB: please see the '

<h2>What is pSOFA?</h2>Matics & Sanchez-Pinto developed a paediatric version of the SOFA score (pSOFA). They found they were able to evaluate the Sepsis-3 definitions in paediatric intensive care unit patients using this pSOFA score.

Matics & Sanchez-Pinto modified the SOFA for paediatric patients through two approaches:

"First, the age-dependent cardiovascular and renal variables of the original SOFA score were modified using validated cutoffs from the PELOD-2 scoring system. Second, the respiratory subscore was expanded to include the SpO2:FiO2 ratio as an alternative surrogate of lung injury"

This review will define sepsis using Matics & Sanchez-Pinto's modified pSOFA score. This pSOFA score includes GCS based using a paediatric scale. Based on the advice of experts consulted in developing this protocol, the review will collect AVPU (Alert, Verbal, Pain, Unresponsive) data, then map these to GCS. Matics & Sanchez-Pinto's modified pSOFA score with the AVPU alterations are included in the table below.

For the purpose of this review, we would consider that paediatric patients were likely to have had sepsis if:

• They are a patient in emergency and have a pSOFA score of ≥2 - driven by one or a combination of any of the variables listed in the table below - on the basis that their baseline score is zero

• They are an inpatient and have a change in their pSOFA score of ≥2, driven by a change in one or a combination of any of the variables listed in the table below, over a 24 hour period.

<table>
<tr><th colspan="6">Modified pSOFA (Matics & Sanchez-Pinto) with GCS tailored to AVPU based on expert advice</th></tr>
<tr><td rowspan="2">Variables</td><td colspan="5">Score[a]</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td colspan="6">Respiratory
Use PaO_2:FiO_2 OR S_pO_2:FiO_2</td></tr>
<tr><td>PaO_2:FiO_2[b]</td><td>≥400</td><td>300-399</td><td>200-299</td><td>100-199 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)</td><td><100 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)</td></tr>
</table>
</td></tr>
</table>

#	Question					
	S_pO_2:FiO_2[c]	≥292	264-291	221-264	148-220 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)	<148 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)
	Coagulation					
	Platelet count, x10^3 / µL	≥150	100-149	50-99	20-49	<20
	Hepatic					
	Bilirubin, mg/dL	<1.2	1.2-1.9	2.0-5.9	6.0-11.9	>12.0
	Cardiovascular *Mean arterial pressure by age group or vasoactive infusion mmHg or µg / kg/ min[d]*					
	<1 month	≥46	<46	Dopamine hydrochloride ≤5 or dopamine hydrochloride (any)	Dopamine hydrochloride >5 or epinephrine ≤0.1 or norepinephrine bitartate ≤0.1	Dopamine hydrochloride >15 or epinephrine >0.1 or norepinephrine bitartate >0.1
	1 – 11 months	≥55	<55			
	12 – 23 months	≥60	<60			
	24 – 59 months	≥62	<62			
	60 – 143 months	≥65	<65			
	144 – 216 months	≥67	<67			
	>216 months	≥70	<70			
	Neurological					
	AVPU (Glasgow Coma Scale)	Alert (15)	Verbal (10-14)		Pain (6-9)	Unresponsive (<6)
	Renal *Creatinine by age group, umol/L (mg/dL)*					
	<1 month	<70.7 (<0.8)	70.7-79.6 (0.8-0.9)	88.4-97.3 (1.0-1.1)	106.1-132.6 (1.2-1.5)	≥141.5 (≥1.6)

#	Question

1 – 11 months	<26.5 (<0.3)	26.5-35.4 (0.3-0.4)	44.2-61.9 (0.5-0.7)	70.7-97.3 (0.8-1.1)	≥106.1 (≥1.2)
12 – 23 months	<35.4 (<0.4)	35.4-44.2 (0.4-0.5)	53-88.4 (0.6-1.0)	97.3-123.8 (1.1-1.4)	132.6 (≥1.5)
24 – 59 months	<53 (<0.6)	53-70.7 (0.6-0.8)	79.6-132.6 (0.9-1.5)	141.5-194.5 (1.6-2.2)	≥203.4 (≥2.3)
60 – 143 months	<61.9 (<0.7)	61.9-88.4 (0.7-1.0)	97.3-150.3 (1.1-1.7)	159.2-221.1 (1.8-2.5)	≥229.9 (≥2.6)
144 – 216 months	<88.4 (<1.0)	88.4-141.5 (1.0-1.6)	150.3-247.6 (1.7-2.8)	256.4-362.5 (2.9-4.1)	≥371.4 (≥4.2)
>216 months	<106.1 (<1.2)	106.1-168 (1.2-1.9)	176.8-300.6 (2.0-3.4)	309.5-433.3 (3.5-4.9)	≥442.1 (≥5)

Abbreviations: FiO2, fraction of inspired oxygen; MAP, mean arterial pressure; pSOFA, paediatric Sequential Organ Failure Assessment; SpO2, peripheral oxygen saturation. SI conversion factors: To convert bilirubin to micromoles per litre, multiply by 17.104; creatinine to micromoles per litre, multiply by 88.4; and platelet count to ×109/L, multiply by 1.

[a] *The pSOFA score was calculated for every 24-hour period. The worst value for every variable in each 24-hour period was used to calculate the subscore for each of the 6 organ systems. If a variable was not recorded in a given 24-hour period, it was assumed to be normal and a score of 0 was used. Daily pSOFA score was the sum of the 6 subscores (range, 0-24 points; higher scores indicate a worse outcome).*

[b] *PaO2 was measured in millimetres of mercury.*

[c] *Only SpO2 measurements of 97% or lower were used in the calculation.*

[d] *MAP (measured in millimetres of mercury) was used for scores 0 and 1; vasoactive infusion (measured in micrograms per kilogram per minute), for scores 2 to 4. Maximum continuous vasoactive infusion was administered for at least 1 hour.*

[e] *Cut-offs for patients older than 18 years (216 months) were identical to the original SOFA score.*

[f] *AVPU equivalent to GCS based on expert advice*

Source: Matics & Sanchez-Pinto

Pre-hospital

In the pre-hospital setting, among patients 18 years of age and over with suspected infection, to meet the qSOFA criteria requires two or more of the following:

qSOFA variable	qSOFA criteria	Score
Systolic blood pressure	≤ 100mmHg	1
Altered mental status	Glasgow Coma Scale < 15	1
Respiratory rate	≥ 22	1

#	Question
	This is because “organ dysfunction can be identified as an acute change in total SOFA score ≥2 points consequent to the infection.” Due to the setting and available equipment in the pre-hospital setting, if the patient is <18 years of age, a score will be calculated using the following criteria. The criteria considers three observations which are possible to assess and utilised by the paramedic service – oxygen saturation, mental state (GCS) and temperature. To meet the sepsis criteria, the patient is required to meet one or more of the following: • GCS Score <15 • SPO2% <95% • Temperature ≥39°C[2122] *Source: Matics & Sanchez-Pinto[20], NICE guideline[21] and QLD Health[22].* Implicit and explicit sepsis’ section
1.6	What proportion of cases in the sample received ICD-10-AM codes for sepsis by a second ‘blind’ coding reviewer?
1.7	For the above questions, what was the influence of the following factors: • Care setting • State / territory • Remoteness • Hospital peer group • Time of day • Day of the week • Time of year • Patient characteristics and risk factors.

Review Question 2: Are there instances of gold standard sepsis management?

#	Question
2.1	What proportion of cases suspected of having sepsis were reviewed by a senior clinician? When did this review occur?
2.2	What proportion of cases suspected of having sepsis had blood cultures taken? When did they have blood cultures taken? How many sets of blood cultures were taken?
2.3	What proportion of cases suspected of having sepsis had serum lactate measured? When did they have their serum lactate measured? What was the highest serum lactate recorded within the first 24 hours after which sepsis was first suspected?
2.4	What proportion of cases suspected of having sepsis were provided with IV fluids for the purposes of fluid resuscitation? When was the first bolus of fluid administered? When was the second bolus of fluid administered? What was the volume of fluid administered in the first 24 hours after which sepsis was first suspected?
2.5	What proportion of cases that were suspected of having sepsis and were desaturating on room air (defined as SpO_2 <95% (except for patients with Chronic Obstructive Pulmonary Disease (COPD) where it is defined as SpO_2 <88%) received supplemental oxygen?
2.6	What proportion of cases suspected of having sepsis received adequate antimicrobial coverage for their provisional diagnosis (where adequate antimicrobial coverage is assessed according to the Australian Therapeutic Guidelines)? When did the patient receive the antimicrobial coverage? What proportion of cases had antimicrobial coverage administered within 60 minutes of sepsis being suspected?

#	Question
2.7	What proportion of cases suspected of having sepsis had their antimicrobials reviewed after they were initially prescribed? When did they receive antimicrobial review?
2.8	For the above questions, what was the influence of the following factors: • Care setting • State / territory • Remoteness • Hospital peer group • Time of day • Day of the week • Time of year • Patient characteristics and risk factors.

Review Question 3: What factors influence deviation from local sepsis guidelines and pathways?

#	Question
3.1	Is there a local dedicated sepsis pathway at the facility / service?
3.2	Where there is a local sepsis pathway, what proportion of cases were commenced on the sepsis pathway?
3.3	Where there is a local sepsis pathway, when were cases commenced on the sepsis pathway?
3.4	What were the characteristics associated with cases where the patient was commenced on the sepsis pathway, including: • Care setting • State / territory • Remoteness • Hospital peer group • Time of day • Day of the week • Time of year • Patient characteristics and risk factors.

The definition of sepsis

For the purpose of this review, sepsis among adult patients will be defined using qSOFA (Quick Sequential Organ Failure Assessment) and sepsis among paediatric patients will be defined using pSOFA (Paediatric Sequential Organ Failure Assessment). The rationale for using these approaches is explored below.

qSOFA (Quick Sequential Organ Failure Assessment)

To assess under-coding or under-detection of sepsis (i.e. to address aspects within Review Question 1), a 'benchmark' of whether or not a patient had sepsis is necessary. This study will use the qSOFA criteria described by Singer et al[6] to assess whether a given case had sepsis or not. qSOFA has been chosen primarily because it is more easily administered across a range of clinical settings (e.g. Emergency, Inpatient setting etc.) than other sepsis screening tools / trigger tools.

What is qSOFA?

Singer et al[7] note that:

"Sepsis should be defined as life-threatening organ dysfunction caused by a dysregulated host response to infection".

They argue that this organ dysfunction:

"can be represented by an increase in the Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score of 2 points or more, which is associated with an in-hospital mortality greater than 10%."

However, assessment of the full SOFA score requires a combination of clinical and laboratory measures that are not necessarily routinely collected when managing patients with sepsis, particularly outside an ICU setting.

Singer et al[8] also developed a qSOFA score which they argue provides a simple bedside criteria to identify adult patients "*with suspected infection who are likely to have a prolonged ICU stay or to die in the hospital*"

Among adult patients with suspected infection, to meet the qSOFA criteria requires two or more of the following:

qSOFA variable	qSOFA criteria	Score
Systolic blood pressure	≤ 100mmHg	1
Altered mental status	Glasgow Coma Scale < 15	1
Respiratory rate	≥ 22	1

This is because "organ dysfunction can be identified as an acute change in total SOFA score ≥2 points consequent to the infection." [9]

Rationale for using qSOFA

Singer et al[10] found that, when compared to the full SOFA, the qSOFA offered similar predictive validity for screening patients likely to have sepsis outside an ICU environment. Among patients in ICU, they acknowledged that while the qSOFA was less robust than the full SOFA:

*"*it [the qSOFA] *does not require laboratory tests and can be assessed quickly and repeatedly*."

Given the criteria used to assess qSOFA are more likely to be collected across patients managed in multiple clinical and geographical settings nationally, this review will use qSOFA to identify adult patients suspected of having sepsis.

Rationale for using pSOFA in paediatric patients

Neither the qSOFA nor the SOFA were developed specifically for paediatric patients. Singer et al[11] noted that:

"The task force focused on adult patients yet recognises the need to develop similar updated definitions for paediatric populations and the use of clinical criteria that take into account their age dependent variation in normal physiologic ranges and in pathophysiologic responses".

Romaine et al[12] noted that:

"The presence of ≥2 of the 3 qSOFA components, altered mentation, raised respiratory rate

(RR), and low systolic blood pressure (BP), was associated with an increased risk of mortality, but the derivation and validation of Sepsis-3 and the qSOFA did not involve paediatric data".

Recognising that qSOFA criteria were not developed for paediatric patients, Schlapbach et al[13] developed age-specific criteria for paediatric patients. In alignment with Singer et al's criteria, Schlapbach et al composed the criteria around the same three clinical parameters tachypnoea, altered mentation, hypotension). In order to establish age-specific qSOFA scores, tachypnoea and hypotension were defined*:*

"by applying age-specific cut-offs for respiratory rate, and systolic blood pressure, respectively, as per the 2005 Paediatric Sepsis definitions"

The authors concluded that:

"In our study, the performance of our adapted qSOFA score to identify children who subsequently died or had prolonged length of stay was only moderate,"

And, *"the performance of qSOFA to identify patients with organ dysfunction at risk for worse outcomes was poor, and may not be of sufficient clinical value to be recommended as a screening tool for paediatric age groups within the ICU"*

Romaine et al[14], seeking to explain the pathophysiological mechanism for this difference between paediatric and adult patients argued that:

"*In contrast to adults, hypotension represents a late sign of paediatric septic shock."*

What is pSOFA?

Matics & Sanchez-Pinto[15] developed a paediatric version of the SOFA score (pSOFA). They found they were able to evaluate the Sepsis-3 definitions in paediatric intensive care unit patients using this pSOFA score.

Matics & Sanchez-Pinto modified the SOFA for paediatric patients through two approaches:

"First, the age-dependent cardiovascular and renal variables of the original SOFA score were modified using validated cutoffs from the PELOD-2 scoring system. Second, the respiratory subscore was expanded to include the SpO2:FiO2 ratio as an alternative surrogate of lung injury"

This review will define sepsis using Matics & Sanchez-Pinto's modified pSOFA score. This pSOFA score includes GCS based using a paediatric scale. Based on the advice of experts consulted in developing this protocol, the review will collect AVPU (Alert, Verbal, Pain, Unresponsive) data, then map these to GCS. Matics & Sanchez-Pinto's[16] modified pSOFA score with the AVPU alterations are included in the table below.

For the purpose of this review, we would consider that paediatric patients were likely to have had sepsis if:

- They are a patient in emergency and have a pSOFA score of ≥2 - driven by one or a combination of any of the variables listed in the table below - on the basis that their baseline score is zero
- They are an inpatient and have a change in their pSOFA score of ≥2, driven by a change in one or a combination of any of the variables listed in the table below, over a 24 hour period.

Modified pSOFA (Matics & Sanchez-Pinto[17]) with GCS tailored to AVPU based on expert advice					
Variables	**Score[a]**				
	0	**1**	**2**	**3**	**4**
Respiratory					

Modified pSOFA (Matics & Sanchez-Pinto[17]) with GCS tailored to AVPU based on expert advice					
*Use $PaO_2:FiO_2$ **OR** $S_pO_2:FiO_2$*					
$PaO_2:FiO_2$[b]	≥400	300-399	200-299	100-199 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)	<100 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)
$S_pO_2:FiO_2$[c]	≥292	264-291	221-264	148-220 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)	<148 with respiratory support (anything over high flow nasal cannulae oxygen ($HFNCO_2$) greater than 2L/kg/min)
Coagulation					
Platelet count, $x10^3$ / µL	≥150	100-149	50-99	20-49	<20
Hepatic					
Bilirubin, mg/dL	<1.2	1.2-1.9	2.0-5.9	6.0-11.9	>12.0
Cardiovascular *Mean arterial pressure by age group or vasoactive infusion mmHg or µg / kg/ min[d]*					
<1 month	≥46	<46	Dopamine hydrochloride ≤5 or dopamine hydrochloride (any)	Dopamine hydrochloride >5 or epinephrine ≤0.1 or norepinephrine bitartate ≤0.1	Dopamine hydrochloride >15 or epinephrine >0.1 or norepinephrine bitartate >0.1
1 – 11 months	≥55	<55			
12 – 23 months	≥60	<60			
24 – 59 months	≥62	<62			
60 – 143 months	≥65	<65			
144 – 216 months	≥67	<67			
>216 months	≥70	<70			
Neurological					

Modified pSOFA (Matics & Sanchez-Pinto[17]) with GCS tailored to AVPU based on expert advice					
AVPU (Glasgow Coma Scale)	Alert (15)	Verbal (10-14)		Pain (6-9)	Unresponsive (<6)
Renal *Creatinine by age group, umol/L (mg/dL)*					
<1 month	<70.7 (<0.8)	70.7-79.6 (0.8-0.9)	88.4-97.3 (1.0-1.1)	106.1-132.6 (1.2-1.5)	≥141.5 (≥1.6)
1 – 11 months	<26.5 (<0.3)	26.5-35.4 (0.3-0.4)	44.2-61.9 (0.5-0.7)	70.7-97.3 (0.8-1.1)	≥106.1 (≥1.2)
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60 – 143 months	<61.9 (<0.7)	61.9-88.4 (0.7-1.0)	97.3-150.3 (1.1-1.7)	159.2-221.1 (1.8-2.5)	≥229.9 (≥2.6)
144 – 216 months	<88.4 (<1.0)	88.4-141.5 (1.0-1.6)	150.3-247.6 (1.7-2.8)	256.4-362.5 (2.9-4.1)	≥371.4 (≥4.2)
>216 months	<106.1 (<1.2)	106.1-168 (1.2-1.9)	176.8-300.6 (2.0-3.4)	309.5-433.3 (3.5-4.9)	≥442.1 (≥5)

Abbreviations: FiO2, fraction of inspired oxygen; MAP, mean arterial pressure; pSOFA, paediatric Sequential Organ Failure Assessment; SpO2, peripheral oxygen saturation. SI conversion factors: To convert bilirubin to micromoles per litre, multiply by 17.104; creatinine to micromoles per litre, multiply by 88.4; and platelet count to ×109/L, multiply by 1.

[a] *The pSOFA score was calculated for every 24-hour period. The worst value for every variable in each 24-hour period was used to calculate the subscore for each of the 6 organ systems. If a variable was not recorded in a given 24-hour period, it was assumed to be normal and a score of 0 was used. Daily pSOFA score was the sum of the 6 subscores (range, 0-24 points; higher scores indicate a worse outcome).*

[b] *PaO2 was measured in millimetres of mercury.*

[c] *Only SpO2 measurements of 97% or lower were used in the calculation.*

[d] *MAP (measured in millimetres of mercury) was used for scores 0 and 1; vasoactive infusion (measured in micrograms per kilogram per minute), for scores 2 to 4. Maximum continuous vasoactive infusion was administered for at least 1 hour.*

[e] *Cut-offs for patients older than 18 years (216 months) were identical to the original SOFA score.*

[f] *AVPU equivalent to GCS based on expert advice*

Source: Matics & Sanchez-Pinto[18]

Pre-hospital

In the pre-hospital setting, among patients 18 years of age and over with suspected infection, to meet the qSOFA criteria requires two or more of the following:

qSOFA variable	qSOFA criteria	Score
Systolic blood pressure	≤ 100mmHg	1
Altered mental status	Glasgow Coma Scale < 15	1
Respiratory rate	≥ 22	1

This is because "organ dysfunction can be identified as an acute change in total SOFA score ≥2 points consequent to the infection." [19]

Due to the setting and available equipment in the pre-hospital setting, if the patient is <18 years of age, a score will be calculated using the following criteria. The criteria considers three observations which are possible to assess and utilised by the paramedic service – oxygen saturation, mental state (GCS) and temperature. To meet the sepsis criteria, the patient is required to meet one or more of the following:

- GCS Score <15[20]
- SPO2% <95%[2122]
- Temperature ≥39°C[2122]

Source: Matics & Sanchez-Pinto[20], NICE guideline[21] and QLD Health[22].

Implicit and explicit sepsis

In order to assess under-coding of sepsis, cases need to be found that were both:

1. Cases of sepsis that were coded for sepsis
2. Cases of sepsis that were not coded for sepsis

Previous studies have achieved this by finding both 'explicit' cases of sepsis and 'implicit' case of sepsis[23, 24, 25]. Essentially, 'explicit sepsis' describes cases that were coded for sepsis by coders, and 'implicit sepsis' describes cases which might have been cases of sepsis but were not coded as sepsis.

'Implicit sepsis' includes cases that were coded with an infection code plus a code for organ dysfunction. The codes for implicit sepsis have been chosen based on the advice of experts consulted regarding the types of infection that are either typically associated with sepsis or have a high risk of leading to sepsis.

The full list of explicit and implicit sepsis codes is presented in '**Error! Reference source not found.**'.

Study design and methodology

Study structure

There will be a pilot review and a main review. The purpose of the pilot review is to test the feasibility of the study design and methodology. Based on this, changes will be made as necessary to the study design and methodology prior to conducting the main review.

Study duration

The pilot review is expected to be undertaken during the period from 20 September 2021 to 5 November 2021. The main review is expected to be undertaken during the period from 7 March 2022 to 15 April 2022.

Sample size

Since each patient is treated in one or more defined settings (e.g. principal referral hospital, public acute group B, ambulance, etc.), we can consider the study design as a retrospective cohort study requiring random sampling. The MRR aims to determine with a reasonable confidence level whether the sepsis clinical management guidelines have been followed appropriately by clinicians in the given setting. We call this the “compliance rate”. It is expected that the underlying distribution of the compliance rate for the samples will be a Bernoulli distribution with a binary outcome (1 – if clinical guidelines were appropriately followed, 0 – otherwise).

Sample sizes will be impacted by the following factors:

- Confidence level – the probability that the compliance rate determined from the sample will represent the true compliance rate of the total population. Higher confidence intervals will require a larger sample size.
- Compliance rate – the proportion of medical records for which clinical guidelines were appropriately followed; testing for a compliance rate closer to 50% will require a higher sample size.
- Margin of error – the tolerance level to which the sample compliance rate can fall within; a higher margin of error leads to a smaller sample size.

Assuming the total number of sepsis cases is 104,912[26], below are some sample size options with various parameters mentioned above:

	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8
Population size	104,912	104,912	104,912	104,912	104,912	104,912	104,912	104,912
Estimated proportion of sepsis cases in which clinical guidelines not followed	50%	50%	50%	50%	50%	50%	10%	2%
Confidence level	95%	90%	95%	95%	90%	90%	95%	95%
Margin of error	1%	1%	2%	5%	5%	10%	1%	1%
Calculated sample size	**8798**	**6354**	**2347**	**383**	**270**	**68**	**3347**	**565**

We recommend that for the pilot, we sample 383 medical records across sites participating in the pilot. Once the pilot has been conducted, the number of sites should be expanded and the sample may be size increased to the given desired confidence level and margin of error, once informed by the outcome of the pilot.

Population

Site selection methodology

Hospitals have been selected and invited to participate in this project based on a number of factors. The selection methodology focused on ensuring that sites from different Australian jurisdictions were part of the sample, and took into consideration factors such as geographical isolation, demographic profile and service level. The sample also included sites whose performance against the National Safety and Quality Health Standards, in particular the requirements outlined in the *Recognising and Responding to Acute Deterioration Standard,* were either met, or met with recommendations.

Prior to conducting the pilot review and the main review, the feasibility

Study sites

The study population for the pilot review will be drawn from the following sites:

Site	State	Peer grouping
Sunshine Coast University Hospital	QLD	Large metropolitan hospital
North West Regional Hospital	TAS	Large regional hospital
Belmont Hospital	NSW	Medium metropolitan hospital
Hedland Health	WA	Small hospital
Greenslopes Private Hospital	QLD	Private hospital
Ambulance Victoria / Adult Retrieval Victoria	VIC	N/A - Ambulance service

The study population for the main review will be drawn from the following sites:

Site	State	Peer grouping
Royal Hobart Hospital	TAS	Major hospital
Royal Melbourne Hospital	VIC	Major hospital
Alice Springs Hospital	NT	Large regional hospital
Orange Health Service	NSW	Large regional hospital
Bankstown-Lidcombe Hospital	NSW	Large metropolitan hospital
Noarlunga Hospital	SA	Medium metropolitan hospital
Cairns Hospital	QLD	Large regional hospital
St John of God Warrnambool	VIC	Large regional hospital
Joondalup Health Campus	WA	Large metropolitan hospital (public-private partnership [PPP])
Gove Regional Hospital	NT	Small hospital

Site engagement strategy

The Commission has written to jurisdictional Health Chief Executives and Chief Executives or General Managers of health service organisations, seeking their support for sites to participate in the project. The Commission will recruit and train local clinicians and clinical coders at each site to undertake data extraction from local clinical documentation. The investigation team will not have access to patient records.

Each site will be required to nominate and recruit the following personnel to support data governance and data collection activities:

- Project sponsor, clinical lead and data custodian

- Clinician reviewer
- Clinical coding reviewer.

Site remuneration

All hospitals participating in the pilot and main reviews will receive remuneration to address any operational burden associated with participation and to support staffing backfill of clinical and coder review teams. A formal contract for services describing an agreement to undertake the required services will be established between the Commission and participating sites. The fee schedule will be on costs basis, payable on execution of the contract.

Inclusion criteria

For both the pilot review and the main review, the following inclusion criteria will be applied, for patients at the agreed sites:

- Separations where the date of separation was within the last three financial years (2018/19, 2019/20 and 2020/21).
- Participants older than 28 days on admission
- Participants with separations coded with 'explicit' and 'implicit sepsis codes (see '**Error! Reference source not found.**')
- FPA codes with 'sepsis' or 'infection' as a level one assessment.

Exclusion criteria

For both the pilot review and the main review, prior to the generation of the sample, we will exclude separations that were:

- Chemotherapy-only
- Dialysis-only.

For the purposes of the data analyses, we will exclude the following separations:

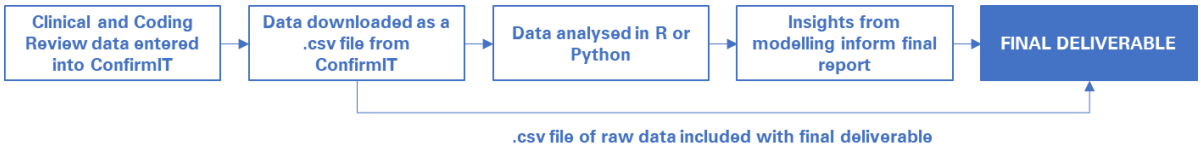
- Patients on an end of life care pathway at the time of diagnosis, or a consultant-led decision made not to escalate care. For the purpose of this review, the end of life pathway means they were not for:
    - Any form of respiratory support OR
    - Antibiotics OR
    - Vascular access OR
    - IV fluids OR
    - Inotropes OR
    - Pathology.

  These cases will be manually excluded from the sample. i.e. If the clinician reviewer establishes the patient meets the end of life exclusion criteria, then the record will be excluded from the sample

Data collection tool

The ConfirmIT tool will be used to capture data entered by clinical and coding reviewers. ConfirmIT is a web-based data collection, analysis and data reporting tool. The investigation team will configure the tool to answer the review questions. Local review teams will access the tool and enter in data in response to questions

Figure 1: Data repository solution architecture



The ConfirmIT tool is secure, with password protected access, with data held on a server in Sydney. Storage of de-identified patient information will be in accordance with HREC guidelines.

Training resources

To support the application of the tool, the investigation team will design training resources for reviewers at the selected sites. This material is likely to include:

- A written instruction manual or user guide
- Frequently asked questions
- How to access support during the review period.

The Commission will be responsible for engaging and recruiting sites, training review teams at each participating site, and any engagement with jurisdictional or health service organisation representatives.

Support

During the pilot review and the main review, the investigation team will provide support to the local review teams. Support will include addressing both:

- Technical enquiries about the ConfirmIT platform, which will be provided through the ISV support team – available during business hours
- Content-related enquires for example those related to the nature of data to be collected.

The types and nature of questions asked during the pilot will be important to gather in order to inform the refinement of the approach for the main review. As such, the review team will keep a log for all enquiries in order to capture this information.

Data collected

The investigation team will collect the following publicly available data about the facility:

- State or territory
- Remoteness (based on ABS categories)
- Hospital peer group (based on AIHW classification)

It is expected that reviewers will consider reviewing all the clinical documentation associated with that separation including:

- All inpatient annotations/medical notes
- Case histories
- Discharge summaries
- Fluid balance charts
- Medication charts
- Observation charts
- Pathology (haematology, biochemistry, microbiology) results
- Progress notes

- Pre-hospital patient records.

The data captured will relate to a range of elements, outline in the tables below

Hospital and health service characteristics

The following hospital and health service characteristics will be captured about each participating site.

Section	Question	Response values
Sepsis education	Is there a dedicated education package at your facility regarding sepsis education and management for clinical staff?	Choose one: • Yes • No
Sepsis education	Is this education package available to nursing and medical staff?	Choose one: • Yes • No
Sepsis education	Is this education package a component of mandatory education?	Choose one: • Yes • No
Sepsis pathway	Was there a local dedicated sepsis pathway at the facility / service at the time of the patient separation?	Choose one: • Yes • No
Sepsis pathway	If there is a local sepsis pathway, please note the source of the pathway.	Choose one: • State / territory pathway (please note which jurisdiction) • Modified state / territory guideline (please note which state or territory) • Locally developed pathway
Sepsis pathway	If there is no local sepsis pathway available, is there other tools or guidance to support sepsis recognition and management?	Free text
End-of-life care	Does your facility have a policy to guide sepsis management for patients on an end-of-life care pathway?	Choose one: • Yes • No • N/A

Separation and initial patient care information

Reviewers will capture relevant characteristics relating to the separation and the patient's initial care.

Section	Question	Response values
Time of deterioration	For adult patients, when did the patient first met any two of the three qSOFA criteria?	Time and date (HH:MM, DD/MM/YYYY)
Time of deterioration	For paediatric emergency patients, when did the patient first have a pSOFA score of ≥ 2?	Time and date (HH:MM, DD/MM/YYYY)

Section	Question	Response values
Time of deterioration	For paediatric inpatients, when did the patient first have a change in their pSOFA score of ≥ 2?	Time and date (HH:MM, DD/MM/YYYY)
Care setting	For adult patients, where was the patient being managed when they first met any two of the three qSOFA criteria*?	Choose one option: • Hospital - Emergency Department • Hospital - Inpatient (ward setting) • Pre-hospital - Paramedical (ambulance setting) • Pre-hospital -Medical Retrieval Service
Care setting	For paediatrics patients, where was the patient being managed when they first had a pSOFA score of 2 or a change in pSOFA score of ≥ 2?	Choose one option: • Hospital - Emergency Department • Hospital - Inpatient (ward setting) • Pre-hospital - Paramedical (ambulance setting) Pre-hospital -Medical Retrieval Service
Admission location	Where did the patient arrive to hospital from?	Choose one option: • Home • RACF • Supported accommodation
Referral	Who referred the patient to hospital?	Choose one option: • Self • GP • Other hospital • Other (specify)
Emergency patients	If the patient present to the Emergency Department, what time were they triaged?	Time and date (HH:MM, DD/MM/YYYY)
Emergency patients	If the patient present to the Emergency Department, what was there triage category (based on the Australian Triage Scale (ATS))?	Choose one option: • ATS 1 • ATS 2 • ATS 3 • ATS 4 • ATS 5
Emergency patients	For adult patients, if patient was being managed in the Emergency Department when they first met any two of the three qSOFA criteria, what time were they discharged from the Emergency Department?	Time and date (HH:MM, DD/MM/YYYY)
Emergency patients	For paediatric patients, if patient was being managed in the Emergency Department when they first had a pSOFA score of ≥ 2, what time were they discharged from the Emergency Department?	Time and date (HH:MM, DD/MM/YYYY)
Emergency patients	For adult patients, if patient was being managed in the Emergency Department when they first met any two of the three qSOFA criteria, where were they discharged to from the Emergency Department?	Choose one option: • Intensive Care Unit (ICU) • High Dependency Unit (HDU) • Operating theatre • Inpatient ward • Transferred to another hospital • Discharged home • Deceased

Section	Question	Response values
		Other (please specify with free text comment)
Emergency patients	For paediatric patients, if patient was being managed in the Emergency Department when they first had a pSOFA score of ≥ 2, where were they discharged to from the Emergency Department?	Choose one option: • Intensive Care Unit (ICU) • High Dependency Unit (HDU) • Operating theatre • Inpatient ward • Transferred to another hospital • Discharged home • Deceased Other (please specify with free text comment)
Emergency patients	What time did the patient leave ED?	Time and date (HH:MM, DD/MM/YYYY)
Admission destination	What was the admission destination from ED?	Choose one option: • Ward • ICU • AMU • Other hospital • Died • Discharged home
Admission specialty	Under what specialty was the patient admitted?	Choose one option: • Infectious diseases • General medicine • General surgery • Urology • Gastroenterology • Geriatrics • Other (specify)
Inpatients	For adult patients, if patient was being managed in an inpatient setting when they first met any two of the three qSOFA criteria, were they transferred to another setting within 24 hours?	Choose one option: • Yes • No
Inpatients	For paediatric patients, if patient was being managed in an inpatient setting when they first had a change in pSOFA score of ≥ 2, were they transferred to another setting within 24 hours?	Choose one option: • Yes • No
Inpatients	For inpatients transferred to another setting within 24 hours, where were they transferred?	Choose one option: • Intensive Care Unit (ICU) • High Dependency Unit (HDU) • Operating theatre • Another inpatient ward (please specify) • Transferred to another hospital • Deceased • Other (please specify with free text comment)
Out of hospital patients	For adult patients, if the patient was being managed by out of hospital teams when they first met any two of the three qSOFA criteria, what time were they	Time and date (HH:MM, DD/MM/YYYY)

Section	Question	Response values
	discharged from the out of hospital team care?	
Out of hospital patients	For paediatric patients, if the patient was being managed by out of hospital teams when they first had a pSOFA score of ≥ 2, what time were they discharged from the out of hospital team care?	Time and date (HH:MM, DD/MM/YYYY)
Out of hospital patients	For adult patients, if the patient was being managed by out of hospital teams when they first met any two of the three qSOFA criteria, where were they discharged to from the out of hospital team care?	Choose one option: • Intensive Care Unit (ICU) • Emergency Department • Inpatient ward • Discharged home • Deceased • Other (please specify with free text comment)
Out of hospital patients	For paediatric patients, if the patient was being managed by out of hospital teams when they first had a pSOFA score of ≥ 2, where were they discharged to from the out of hospital team care?	Choose one option: • Intensive Care Unit (ICU) • Emergency Department • Inpatient ward • Discharged home • Deceased Other (please specify with free text comment)
Re-presentation	Did the patient re-present to ED within 48 hours of a previous presentation?	Yes / no
Re-admission	Was the patient re-admitted to hospital within 30 days (the previous admission could be for any reason)?	Yes / no
Re-admission	Was the patient re-admitted to hospital with sepsis (the previous admission can only be for sepsis)?	Yes / no

Patient characteristics and risk factors

Reviewers will capture relevant patient characteristics and risk factors as outlined in the table below.

Section	Question	Response values
Patient characteristics and risk factors	Did the patient have any of the following characteristics or risk factors?	Choose all that apply (can be left blank if none apply): • Aboriginal or Torres Strait Islander • Age > 65 years • Allergies to antimicrobials • Brought in by ambulance • Burns • COVID-19 • Fall • Immunocompromised • Indwelling medical device, foreign body • Intravenous drug use • Neutropaenia or recent chemotherapy • Pregnancy

Section	Question	Response values
		• Recent surgery / invasive procedure • Re-presentation to ED with sepsis • Re-presentation within 48 hours • Readmission to hospital within 30 days • Sex • Skin cellulitis, skin graft • Splenectomy / transplant patients • Transfer from a residential aged care facility • Wounds • Other (please specify with free text comment)

Clinically suspected sepsis

The time when 'sepsis' or 'septic' first appears in the medical record:

Section	Question	Response values
Clinically suspected sepsis	When did the word 'sepsis' or 'septic' first appear in the medical record in a diagnostic context (e.g. as provisional diagnosis / impression)?	Time and date (HH:MM, DD/MM/YYYY)

Senior clinician review

To assess whether care was escalated, we will capture:

Section	Question	Response values
Escalation of care	In relation to this episode of sepsis, when was the patient first reviewed by a medical officer?	Time and date (HH:MM, DD/MM/YYYY)
Escalation of care	Was care escalated?	Choose one option: • Yes • No • Not applicable because a senior clinician was already providing care
Escalation of care	If care was escalated, when did escalation occur?	Time and date (HH:MM, DD/MM/YYYY)
Escalation of care	If escalation occurred, to whom did the escalation occur?	Choose all that apply: • Emergency Staff Specialist • Emergency Advanced Trainee / Registrar • Intensive Care • Staff Specialist • Advanced Trainee / Registrar • Medical Emergency Team • Ambulance / Retrieval Service • General Practitioner • Nurse Practitioner • Other (please specify with free text comment)
Time of consultant review	At what time was the patient first reviewed by admitting consultant?	Time and date (HH:MM, DD/MM/YYYY)

Investigations

We will collect information to answer the following questions about the following investigations:

Section	Question	Response values
Blood cultures	Did the patient have blood cultures taken?	Choose one option: • Yes • No
Blood cultures	If the patient had blood cultures taken, when did they have blood cultures taken?	Time and date (HH:MM, DD/MM/YYYY)
Blood culture	If the patient had two sets of blood cultures, were both sets of blood cultures taken prior antimicrobial administration?	Choose one option: • Yes • No
Lactate	Did the patient have a serum lactate taken?	Choose one option: • Yes • No
Lactate	If the patient had blood cultures taken, when did they have their serum taken	Time and date (HH:MM, DD/MM/YYYY)
Lactate	For adult patients, what was the highest serum lactate measured in the first 24 hours since the patient first scored a qSOFA score of ≥ 2?	Numeric value (to one decimal place (mmol/L))
Lactate	For paediatric Emergency patients, what was the highest serum lactate measured in the first 24 hours since the patient had a pSOFA score of ≥ 2?	Numeric value (to one decimal place (mmol/L))
Lactate	For paediatric inpatients, what was the highest serum lactate measured in the first 24 hours since the patient first had a change in pSOFA score of ≥ 2?	Numeric value (to one decimal place (mmol/L))

Interventions

We will collect information to answer the following questions about the following interventions:

Section	Question	Response values
Antimicrobial prescribing	Did the patient receive antimicrobials?	Choose one option: • Yes • No
Antimicrobial prescribing	What was the provisional diagnosis source of infection?	Choose one option: • Respiratory source • Urinary tract source • Biliary or gastrointestinal • Skin source • Meningitis • Intravascular device • Bone or joint • Endocarditis

Section	Question	Response values
		• Female genital tract • Other (please specify)
Antimicrobial prescribing	Considering the provisional diagnosis, based on the Australian Therapeutic guidelines, did the antibiotics prescribed provide adequate coverage?	Choose one option: • Yes • No • Unable to assess (please specify with free text comment)
Antimicrobial review	Was there evidence that blood cultures reviewed?	Choose one option: • Yes • No
Antimicrobial review	Was there evidence of a plan to review and / or modify antimicrobials after the blood culture results were review?	Choose one option: • Yes • No
Antimicrobial review	If there was a plan to review antimicrobials, was there evidence this review occurred?	Choose one option: • Yes • No
Intravenous fluids	Were intravenous fluids administered?	Choose one option: • Yes • No
Intravenous fluids	If intravenous fluids were administered, when was the first bolus of fluid administered?	Time and date (HH:MM, DD/MM/YYYY) (can be left blank if one bolus of fluid was not administered)
Intravenous fluids	If intravenous fluids were administered, when was the second bolus of fluid administered?	Time and date (HH:MM, DD/MM/YYYY) (can be left blank if two boluses of fluid were not administered)
Intravenous fluids	If intravenous fluids were administered, what was the volume of fluid administered in the first 24 hours since sepsis was first suspected?	Numeric value (to one decimal place in (L))
Supplemental oxygen	Was the patient desaturating on room air (where desaturating defined as an SaO_2 <95%, except for patient with COPD where it is defined as an SaO_2 <88%)?	Choose one option: • Yes • No
Supplemental oxygen	If there was evidence the patient was desaturating on room air, was there evidence that they received supplemental oxygen?	Choose one option: • Yes • No

Complications of sepsis

We will collect information to answer the following questions about post-sepsis complications:

Section	Question	Response values
Patient characteristics and risk factors	Did the patient have any of the following post-sepsis complications?	Choose all that apply (can be left blank if none apply): • Amputation

Section	Question	Response values
		• Atrial fibrillation • Cardiac arrest • Other cardiac complication • Chronic pain • Depression • Kidney injury/ impaired kidney function / renal injury • Muscle weakness • Post-traumatic stress disorder • Post-sepsis syndrome • Recurrence of sepsis • Tracheostomy • Weight loss • Worsened cognitive state • Worsened physical function • Wound complication • Surgical complication • Unplanned ICU admission • Pressure injury • VTE • Gastrointestinal bleeding • Medication complications • Urinary incontinence • Delirium • Other (please specify with free text comment)

Discharge

We will collect information to answer the following questions about the discharge process and documentation:

Section	Question	Response values
Discharge	Did the discharge summary include a diagnosis of sepsis?	Choose one option: • Yes • No
Discharge	Was there evidence in the discharge summary that information about sepsis was provided to either the patient or their carer?	Choose one option: • Yes • No
Discharge	Was there evidence in the discharge summary that the patient had follow-up appointment/s booked with healthcare specialist/s (where the healthcare specialist/s are specifically following up with the patient in relation to sepsis and not another unrelated medical condition)?	Choose one option: • Yes • No
Discharge	Date of discharge	Date (DD/MM/YYY)
Discharge	Where was the patient discharged to at the end of this separation?	Choose one option: • Home

Section	Question	Response values
		• Residential Aged Care Facility • Outpatient rehabilitation • Deceased • Transferred to another hospital
Discharge	If patient died, was sepsis recorded on the death certificate?	Choose one option: • Yes • No

Pre-hospital assessment

For each record, a clinical reviewer will assess the following questions in a pre-hospital setting.

Section	Question	Response values
Triage	Who called the ambulance?	Choose one option: • Patient • Family/carer • RACF • General practitioner • Other (free text)
Arrival	What time did the paramedics arrive at the patient?	Time and date (HH:MM, DD/MM/YYYY)
Sepsis	Was the word 'sepsis', 'infection' or 'septic' documented in the medical record during this encounter?	Choose one option: • Yes • No
Sepsis	Was there a "sepsis comment" or "sepsis type" stated	Choose one option: • Chest infection • Pneumonia • Respiratory tract infection • Throat infection • Urinary tract infection • Infection – other/not listed (free text) • No
Age group	What age group did the patient fall in?	Choose one option: • 0 to 18 years of age • 18+ years of age
Under 18	If "0 to <18 years of age", During the visit, did the patient exhibit at least one of the following signs: • GCS Score <15 • SPO_2% <95% Temperature ≥39°C	Choose one option: • Yes • No
18 and over	If "18+ years of age ", During this visit, did the patient exhibit at least two of the three following signs: • GCS Score <15 • Systolic BP <100mmHg	Choose one option: • Yes • No

Section	Question	Response values
	• Respiratory rate ≥22	
Transfer	Was the patient transferred to ED, left at home or deceased?	Choose one option: • Loaded for transfer to ED • Left at home, site or facility • Deceased
Transfer	If loaded for transfer to ED, what time was the patient loaded?	Time and date (HH:MM, DD/MM/YYYY)
Transfer	If loaded for transfer to ED, what signal was used for criticality of transfer?	Choose one option: • Signal 1 • Signal 2 • Signal 3 • Signal 4 • Signal 5
Off-stretcher	If loaded for transfer to ED, what time was the patient moved off stretcher?	Time and date (HH:MM, DD/MM/YYYY)
Re-presentation	Had the patient been in contact with the ambulance service in the 48 hours prior to this call?	Choose one option: • Yes • No
Deceased	If 'deceased' was selected, what time was written on the death certificate?	Time and date (HH:MM, DD/MM/YYYY)
Deceased	If 'deceased' was selected, was sepsis written on the death certificate?	Choose one option: • Yes • No
Intravenous fluids	Were intravenous fluids administered?	Choose one option: • Yes • No
Intravenous fluids	If intravenous fluids were administered, when was the first bolus of fluid administered?	Time and date (HH:MM, DD/MM/YYYY) (can be left blank if one bolus of fluid was not administered)
Intravenous fluids	If intravenous fluids were administered, when was the second bolus of fluid administered?	Time and date (HH:MM, DD/MM/YYYY) (can be left blank if two boluses of fluid were not administered)
Intravenous fluids	If intravenous fluids were administered, what was the volume of fluid administered in the first 24 hours since sepsis was first suspected?	Numeric value (to one decimal place in (L))
Supplemental oxygen	Was the patient desaturating on room air (where desaturating defined as an SaO_2 <95%, except for patient with COPD	Choose one option: • Yes • No

Section	Question	Response values
	where it is defined as an SaO_2 <88%)?	
Supplemental oxygen	If there was evidence the patient was desaturating on room air, was there evidence that they received supplemental oxygen?	Choose one option: • Yes • No

Coding assessment

For each record, a clinical coding reviewer will assess whether the codes assigned to the separation were appropriate in the context of sepsis.

Section	Question	Response values
Coding	Which codes would you assign this case to?	Select all relevant options: • List of ICD-10-AM codes
Coding	For pre-hospital, which FPA would you assign this case to?	Choose one option: • List of FPA

Data analysis and statistical methods used

The data for both the pilot and the main review will be analysed. The analysis of pilot review data is expected to take place between 25 October 2021 and 17 December 2021.The analysis of main review data is expected to take place between 7 March 2022 and 20 June 2022.

Data analyses will include univariate and multivariate analyses. For the review questions set out above, we will measure the proportion of separations for which the question was found to be affirmative, and disaggregate those proportions by the available stratification variables. For example, question 1.3 asks “What proportion of cases in the sample that met the definition of Sepsis 3 were also identified by the treating clinical team as having sepsis?”, a univariate analysis of this question will measure the total proportion over all samples, and then analyse how this proportion varies across dimensions such as time of day, time of year, remoteness, peer group, etc. For multivariate analyses, we will employ generalised linear models to measure the “pure effect” that each respective factor has on the outcome variables *holding all other factors equal.* So, for example, to answer question 3.4 “What were the characteristics associated with cases where the patient was commenced on the sepsis pathway?”, we will build a GLM with “commenced pathway – yes / no” as the outcome variable, to measure whether factors such as “time of day”, etc, has a statistically significant impact on whether the pathway was commenced or not.

Ethical considerations

Potential risks and benefits to participants

The main risk for the study relates to the collection of patient information. This is discussed in the table below:

Risk: Loss of personal health data	
Aspect of risk	**Description**
Severity	In the event of a breach of personal health information, there is a risk of moderate distress as: • Health information can be used for identity fraud and other fraudulent activities resulting in financial and social costs to the affected individual

Risk: Loss of personal health data	
	• Any breach of health data can reduce the public's willingness to share such information, either for the purpose of their healthcare or future research endeavours[27]
Likelihood	The risk of the loss of personal health data is low as the project team will undertake several mitigation strategies, including only collecting de-identified health information.
Mitigation strategies	The investigation team will ensure patient information remains de-identified to a level that still allows relevant insights to be gained. Only de-identified patient information will be collected and stored. Storage of de-identified patient information will be in accordance with HREC guidelines. The investigation team are committed to treating the personal information we collect in accordance with the Australian Privacy Principles in the Privacy Act 1988 (Cth) (the Privacy Act).
Potential benefits	The main benefit of collecting this information are that, as described in the background section closer analysis of medical records will not only provide greater insights into the true incidence of sepsis and factors that influence the detection and early management of sepsis, they will also help inform future initiatives under the National Sepsis Program.
Who will benefit from this research	The Australian Sepsis Network (ASN) estimates that approximately 5,000 people die of sepsis in Australia each year. They also estimate that the annual incidence of sepsis in the adult Australian population treated in an ICU is approximately 77 per 100,000. However, this estimate is limited to patients treated in an ICU and is based on a study published in 2004. The ASN acknowledge that international estimates may be at least three to four times higher.28 Hence, understanding sepsis better as a result of this research could potentially prevent a significant burden of disease in the Australian population. It could also have an impact on understanding the disease burden globally.

Consent

Confidential information and Personal Information collected from participating sites

The Commission and Participating Sites will have all necessary notifications and obtain any necessary permissions or consents in connection with the use of data (including Personal Information or Confidential Information) required as part of this research. The Commission and Participating Sites will also have the necessary authorisations to allow parties involved in the research to use such data for the purpose of this project.

Participating sites will consent to data extraction from clinical information systems for upload into the ConfirmIT tool, in order to analyse health information as part of the project.

The data will be collected that is necessary to complete the analysis. No further data will be collected than is necessary. We will use an extract of data from the Admitted Patient Collection (APC), using the diagnosis codes related to sepsis, to generate the sample for the review. This collection has all hospital separations from public hospitals in Australia, and each will have an associated patient identifier that we will use to link the record in the APC to the clinical notes at the hospital.

Individual patient-level data will not be disclosed as part of this research. All reporting and analysis of patient data will be aggregated.

Individual patient consent will not be sought as this project meets the requirements for low and negligible risk research. Identifying data accessed locally by participating site employees (i.e. the review teams) ensures the information will remain on site and be kept confidential. All data will be treated in accordance with relevant jurisdictional information privacy legislation, instruments, regulations and principles.

Identifying data will only be disclosed to the participating sites' staff participating in the review of clinical documentation. Identifying data will not be disclosed to an organisation, individual or third party external to the participating site. Sites will be required to sign a confidentiality agreement to ensure these data are not disclosed.

Participating sites will be provided with an aggregate data set at the completion of the project.

Team details

Team overview

Role	Individual
Principal investigator	Christopher Boyd-Skinner
Investigation team	• Carolyn Hullick • Naomi Poole • Rashin Namivandi-Zangeneh

2. Sepsis Medical Record Review Pilot - Reflective Questions

Questions for Adult Sepsis

Separation and initial patient care information

The following questions focus on characteristics of the separation and the patient's initial care following deterioration associated with an infection or sepsis being suspected.

Question 1: When the patient was diagnosed with "sepsis" or an "infection", was this patient on an end of life care pathway?

- Yes *(if yes, please prompt reviewer to exit survey after completing this section – up to question 23)*
- No

Question 2: Was the word 'sepsis' or 'septic' documented in the medical record during this admission? (e.g. as provisional diagnosis / impression)

- Yes
- No

Question 3: If yes to Question 2, when did the word 'sepsis' or 'septic' first appear in the medical record as a diagnosis?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then 'estimation of the hour (HH:00)' or radio-button for "unknown of exact hour" If they select unknown then drop-down radio-buttons to select:
  - morning 6am-12pm
  - afternoon12pm-6pm
  - evening 6pm-12am
  - overnight12am-6am
  - unknown

Question 4: Where was the patient when either sepsis or infection was first suspected?

- Emergency Department (*if reviewer clicks yes, please show questions 5 to 15 of this section)*
- The patient was already an inpatient (*if reviewer clicks no, please show question 16 to 20 of this section*)

Question 5: If via ED for question 4, What time was the patient triaged?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then 'estimation of the hour (HH:00)' or radio-button for "unknown of exact hour" If they select unknown then drop-down radio-buttons to select:
  - morning 6am-12pm
  - afternoon12pm-6pm
  - evening 6pm-12am
  - overnight12am-6am
  - unknown

Question 6: If via ED for question 4, What was the patient's triage category (based on the Australian Triage Scale (ATS))?

- ATS 1
- ATS 2
- ATS 3
- ATS 4
- ATS 5

Question 7: If via ED for question 4, Where did the patient arrive to hospital from?

- Home
- RACF
- Supported accommodation
- Transfer from another hospital
- Other (*please specify in free text*)

Question 8: If via ED for question 4, Who referred the patient to hospital?

- Self
- GP
- Another hospital
- Other (*please specify in free text*)

Question 9: If via ED for question 4, Did the patient re-present to the Emergency Department within 48 hours of a previous ED presentation?

- Yes
- No

Question 10: If via ED for question 4, Did the patient re-present to the Emergency Department within 30 days of discharge from a hospital admission?

- Yes
- No

Question 11: If yes to question 10, Was the previous admission for sepsis?

- Yes
- No

Question 12: During the patient's ED presentation, did they meet any two of the three qSOFA criteria?

- Yes
- No *(move straight to question 14 to continue survey)*

Question 13: If yes to question 12, What time did they meet any two of the three qSOFA criteria?

- Time and date (HH:MM, DD/MM/YYYY)

- Date (DD/MM/YYYY), then ‘estimation of the hour (HH:00)’ or radio-button for “unknown of exact hour” If they select unknown then drop-down radio-buttons to select:
    - morning 6am-12pm
    - afternoon12pm-6pm
    - evening 6pm-12am
    - overnight12am-6am
    - unknown

Question 14: After the ED, where was the patient discharged / transferred to?

- Intensive Care Unit (ICU)
- High Dependency Unit (HDU)
- Acute medical unit (AMU)
- Operating theatre
- Inpatient ward
- Transferred to another hospital
- Discharged home
- Deceased *(proceed to show question 21 and 22)*
- Other (*please specify in free text*)

Question 15: What time were they discharged / transferred to from the Emergency Department?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then ‘estimation of the hour (HH:00)’ or radio-button for “unknown of exact hour” If they select unknown then drop-down radio-buttons to select:
    - morning 6am-12pm
    - afternoon12pm-6pm
    - evening 6pm-12am
    - overnight12am-6am
    - unknown

Question 16: If the patient is an inpatient, for question 4, what specialty was the patient admitted under at the time sepsis or infection was suspected?

- Infectious diseases
- General medicine
- General surgery
- Urology
- Gastroenterology
- Geriatrics
- Other (*please specify in free text*)

Question 17: If the patient is an inpatient for question 4, During the patient’s hospital admission, did the patient meet any two of the three qSOFA criteria?

- Yes

- No *(please proceed to question 23)*

Question 18: If yes to question 17, When did the patient first met any two of the three qSOFA criteria?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then ‘estimation of the hour (HH:00)’ or radio-button for “unknown of exact hour” If they select unknown then drop-down radio-buttons to select:
  - morning 6am-12pm
  - afternoon12pm-6pm
  - evening 6pm-12am
  - overnight12am-6am
  - unknown

Question 19: If yes to question 17, When the patient first met any two of the three qSOFA criteria, were they transferred to another setting within 24 hours?

- Yes
- No

Question 20: If yes to question 19, Where was the patient transferred to?

- Intensive Care Unit (ICU)
- High Dependency Unit (HDU)
- Operating theatre
- Transferred to another hospital
- Deceased *(proceed to show question 21 and 22)*
- Another inpatient ward (*please specify in free text*)
- Other (*please specify in free text*)

Question 21: Only show If ‘deceased’ was selected in question 14 or 20, What time was written on the death certificate?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then ‘estimation of the hour (HH:00)’ or radio-button for “unknown of exact hour” If they select unknown then drop-down radio-buttons to select:
  - morning 6am-12pm
  - afternoon12pm-6pm
  - evening 6pm-12am
  - overnight12am-6am
  - unknown

Question 22: Only show if ‘deceased’ was selected in question 14 or 20, Was sepsis written on the death certificate?

- Yes
- No

Question 23: Using your clinical judgement, do you think this patient had sepsis?

- Yes
- No
- Unable to determine

If "no" was selected for BOTH question 17 and question 23, please prompt the reviewer to end and exit survey after completing question 23.

If "yes" was selected in Question 1 for this section, please prompt the reviewer to end and exit survey after completing question 23.

Patient characteristics and risk factors

The following questions assist with capturing data on relevant patient characteristics and risk factors.

Question 1 - Did the patient have any of the following characteristics or risk factors? *(Choose all that apply, can be left blank if none apply)*

- ☐ Aboriginal or Torres Strait Islander
- ☐ Allergies to antimicrobials
- ☐ Brought in by ambulance
- ☐ Burns
- ☐ COVID-19
- ☐ Fall
- ☐ Health care worker concern
- ☐ Immunocompromised
- ☐ Indwelling medical device, foreign body
- ☐ Intravenous drug use
- ☐ Neutropaenia or recent chemotherapy
- ☐ Pregnancy
- ☐ Recent surgery / invasive procedure
- ☐ Re-presentation to ED with sepsis
- ☐ Re-presentation within 48 hours
- ☐ Readmission to hospital within 30 days
- ☐ Skin cellulitis, skin graft
- ☐ Splenectomy / transplant patients
- ☐ Transfer from a residential aged care facility
- ☐ Wounds
- ☐ Other *(please specify with free text)*

Senior Clinician Review

The following questions capture data on whether and when senior clinician review occurred after the patient first became unwell with suspected sepsis or infection.

Question 1 – When was the patient first reviewed by a medical officer?

- Time and date (HH:MM, DD/MM/YYYY)

Question 2: Was patient care escalated to a senior clinician?

- Yes
- No
- Not applicable because the most senior clinician was already providing care

Question 3: If yes to question 2, when did escalation occur?

- Time and date (HH:MM, DD/MM/YYYY)

Question 4: If yes to question 2, to whom did the escalation occur? *(Choose all that apply)*

☐ Emergency Physician
☐ Emergency Advanced Trainee / Registrar
☐ Intensive Care Specialist
☐ Specialist Consultant *(please specify in free text)*
☐ Advanced Trainee / Registrar
☐ Medical Emergency Team
☐ Ambulance / Retrieval Service
☐ General Practitioner
☐ Nurse Practitioner
☐ Advanced Practice Nurse
☐ Registrar / Trainee / Other Non-Specialist Senior Emergency Doctor
☐ Other *(please specify with free text)*

Question 5: At what time was the patient first reviewed by admitting consultant?

- Time and date (HH:MM, DD/MM/YYYY)
- Patient was not reviewed by admitting consultant

Investigations

The following questions capture data on the investigations undertaken when the patient first became unwell with suspected sepsis or infection.

Question 1 - Did the patient have blood cultures taken?

- Yes
- No

Question 2 - If yes to question 1, When did they have blood cultures taken?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3 – If yes to question 1, Did the patient have two sets of blood cultures taken?

- Yes
- No

Question 4 - If yes to question 3, Were both sets of blood cultures taken prior antimicrobial administration?

- Yes
- No

Question 5 - Did the patient have a serum lactate taken?

- Yes
- No

Question 6 - If yes to question 5, When did they have their serum lactate taken?

- Time and date (HH:MM, DD/MM/YYYY)

Question 7 – If yes to question 5, What was the highest serum lactate measured in the first 24 hours? *(to one decimal point)*

Numeric Value (to one decimal point) mmol/L

Interventions

The following questions capture data on interventions when the patient first became unwell with suspected sepsis or infection.

Question 1 – Did the patient receive an antimicrobial agent when they deteriorated? ('deteriorating', for this study, is when a patient first meets pSOFA or qSOFA)

- Yes
- No

Question 2 – If yes to question 1, when did the patient receive their first dose of antimicrobial agent?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3 – Was the source of infection identified?

- Yes
- No

Question 4 – If yes to question 3, What was the provisional diagnosis source of infection?

- Respiratory
- Urinary tract source
- Biliary or gastrointestinal
- Skin source
- Meningitis
- Intravascular device
- Bone or joint
- Endocarditis
- Female genital tract
- Other *(please specify with free text)*

Question 5 - Based on the Australian Therapeutic guidelines, did the antibiotics prescribed to the patient provide adequate coverage for the provisional diagnosis?

- Yes
- No
- Unable to assess *(please explain why this was unable to assess with free text)*

Question 6 - Is there evidence that patient's blood cultures were reviewed?

- Yes
- No

Question 7 – If yes to question 6, Is there evidence of a plan to review and / or modify antimicrobials after the blood culture results were reviewed?

- Yes
- No

Question 8 - If yes to question 7, Is there evidence this review occurred?

- Yes
- No

Question 9 – Did the patient have intravenous fluids administered when the patient was deteriorating? ('deteriorating', for this study, is when a patient first meets pSOFA or qSOFA)

- Yes
- No

Question 10 - If yes to question 9, When was the first bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 11 - If yes to question 9, Was a second bolus of fluid administered?

- Yes
- No

Question 12 - If yes to question 11, When was the second bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 13 - If yes to question 9, What was the total volume of fluid administered in the first 24 hours since sepsis was first suspected?

Numeric Value (to one decimal point) L

Question 14 - Was the patient desaturating on room air (where desaturating is defined as an SaO2 <95%, except for patient with COPD where it is defined as an SaO2 <88%)?

- Yes
- No

Question 15 - If yes to question 14, Was there evidence that the patient received supplemental oxygen?

- Yes
- No

Discharge

The following questions assist with capturing data about the discharge process and documentation of sepsis.

Question 1 - Did the discharge summary include a diagnosis of sepsis?

- Yes
- No

Question 2 – If yes to question 1, is there evidence in the discharge summary that information about sepsis was provided to either the patient or their carer?

- Yes
- No

Question 3 - If yes to question 1, is there evidence in the discharge summary that the patient had follow-up appointment/s booked with healthcare specialist/s (where the healthcare specialist/s are specifically following up with the patient in relation to sepsis and not another unrelated medical condition)?

- Yes
- No

Question 4 – What was the time and date of discharge?

- Time and date (HH:MM, DD/MM/YYYY)

Question 5 - Where was the patient discharged to at the end of this separation?

- Home
- Residential Aged Care Facility
- Rehabilitation Centre
- Deceased
- Transferred to another hospital
- Other *(please specify in free text)*

Question 6 - If deceased for question 5, was sepsis recorded on the death certificate?

- Yes
- No

Questions for Paediatric Sepsis

Separation and initial patient care information

The following questions collect information on characteristics of the separation and the patient's initial care following deterioration associated with an infection, or sepsis being suspected.

Question 1: Was the word 'sepsis' or 'septic' documented in the medical record during this admission? (e.g. as provisional diagnosis / impression)

- Yes
- No

Question 2: If yes to Question 1, when did the word 'sepsis' or 'septic' first appear in the medical record as a diagnosis?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3: Where was the patient when either sepsis or infection was first suspected?

- Emergency Department (*if reviewer clicks this option, please show questions 4 to 14 of this section)*
- The patient was already an inpatient (*if reviewer clicks this option, please show question 15 to 19 of this section*)

Question 4: If via ED for question 3, What time was the patient triaged?

- Time and date (HH:MM, DD/MM/YYYY)
- Time not specified

Question 5: If via ED for question 3, What was the patient's triage category (based on the Australian Triage Scale (ATS))?

- ATS 1
- ATS 2
- ATS 3
- ATS 4
- ATS 5

Question 6: If via ED for question 3, Where did the patient arrive to hospital from?

- Home
- Transfer from another hospital
- Other (*please specify in free text*)

Question 7: If via ED for question 3, Who referred the patient to hospital?

- Self
- GP
- Another hospital
- Other (*please specify in free text*)

Question 8: If via ED for question 3, Did the patient re-present to the Emergency Department within 48 hours of a previous ED presentation?

- Yes
- No

Question 9: If via ED for question 3, Did the patient re-present to the Emergency Department within 30 days of discharge from a hospital admission?

- Yes
- No

Question 10: If yes to question 9, Was the previous admission for sepsis?

- Yes
- No

Question 11: During the patient's ED presentation, did the patient have a pSOFA score of ≥ 2?

- Yes
- No *(move straight to question 13 to continue survey)*

Question 12: If yes to question 11, What time and date did the patient first have a pSOFA score of ≥ 2?

- Time and date (HH:MM, DD/MM/YYYY)

Question 13: After the ED, where was the patient discharged / transferred to?

- Intensive Care Unit (ICU)
- High Dependency Unit (HDU)
- Acute medical unit (AMU)
- Paediatric Intensive Care Unit (PICU)
- Special Care Nursery
- Operating theatre
- Inpatient ward
- Transferred to another hospital
- Discharged home
- Deceased (proceed to questions 20-21 of this section)
- Other (*please specify in free text*)

Question 14: What time were they discharged / transferred to from the Emergency Department?

- Time and date (HH:MM, DD/MM/YYYY)

Question 15: If the patient is an inpatient for question 3, what specialty was the patient admitted under at the time sepsis or infection was suspected?

- General paediatrics
- Paediatric surgery
- Infectious disease
- Paediatric oncology

- Ear, Nose and Throat surgery
- Orthopaedic surgery
- Other (*please specify in free text*)

Question 16: If the patient is an inpatient for question 3, During the patient's hospital admission, did the patient meet or have a change in their pSOFA score of ≥ 2 (over a 24 hour period)?

- Yes
- No *(please proceed to question 22)*

Question 17: If yes to question 16, When did the patient first meet or have a change in their pSOFA score of ≥ 2?

- Time and date (HH:MM, DD/MM/YYYY)

Question 18: If yes to question 16, When the inpatient first met or had a change of pSOFA score of ≥ 2, were they transferred for escalation of care to another setting within 24 hours?

- Yes
- No

Question 19: If yes to question 18, Where was the patient transferred to?

- Intensive Care Unit (ICU)
- Paediatric Intensive Care Unit (PICU)
- Special Care Nursery
- Operating theatre
- Transferred to another hospital
- Discharged home
- Deceased (proceed to questions 20-21 of this section)
- Other (*please specify in free text*)

Question 20: Only show If 'deceased' was selected in question 13 or 19, What time was written on the death certificate?

- Time and date (HH:MM, DD/MM/YYYY)
- Date (DD/MM/YYYY), then 'estimation of the hour (HH:00)' or radio-button for "unknown of exact hour" If they select unknown then drop-down radio-buttons to select:

  - morning 6am-12pm
  - afternoon12pm-6pm
  - evening 6pm-12am
  - overnight12am-6am
  - unknown

Question 21: Only show if 'deceased' was selected in question 13 or 19, Was sepsis written on the death certificate?

- Yes
- No

Question 22: Using your clinical judgement, do you think this patient had sepsis?

- Yes
- No *(patient file should be excluded)*
- Unable to determine

If "no" was selected for BOTH question 11 and question 22, please prompt the reviewer to end and exit survey after completing question 22.

If "no" was selected for BOTH question 16 and question 22, please prompt the reviewer to end and exit survey after completing question 22.

Patient characteristics and risk factors

The following questions assist with capturing data on relevant patient characteristics and risk factors.

Question 1 - Did the patient have any of the following characteristics or risk factors? *(Choose all that apply, can be left blank if none apply)*

- ☐ Allergies to antimicrobials
- ☐ Aboriginal and Torres Strait Islander
- ☐ Brought in by ambulance
- ☐ Burns
- ☐ COVID-19
- ☐ Fall
- ☐ Immunocompromised
- ☐ Indwelling medical device, foreign body
- ☐ Intravenous drug use
- ☐ Neutropaenia or recent chemotherapy
- ☐ Parental concern
- ☐ Health care worker concern
- ☐ Pregnancy
- ☐ Recent surgery / invasive procedure
- ☐ Re-presentation to ED with sepsis
- ☐ Re-presentation within 48 hours
- ☐ Readmission to hospital within 30 days
- ☐ Skin cellulitis, skin graft
- ☐ Splenectomy / transplant patients
- ☐ Wounds
- ☐ Other *(please specify with free text)*

Senior Clinician Review

The following questions capture data on whether and when senior clinician review occurred after the patient first became unwell with suspected sepsis or infection.

Question 1 – When was the patient first reviewed by a medical officer?

- Time and date (HH:MM, DD/MM/YYYY)

Question 2: Was patient care escalated to a senior clinician?

- Yes
- No
- Not applicable because the most senior clinician was already providing care

Question 3: If yes to question 2, when did escalation occur?

- Time and date (HH:MM, DD/MM/YYYY)

Question 4: If yes to question 2, to whom did the escalation occur? *(Choose all that apply)*

☐ Emergency Physician
☐ Emergency Advanced Trainee / Registrar
☐ Intensive Care Specialist
☐ Specialist Consultant *(please specify in free text)*
☐ Advanced Trainee / Registrar
☐ Medical Emergency Team
☐ Ambulance / Retrieval Service
☐ General Practitioner
☐ Nurse Practitioner
☐ Advanced Practice Nurse
☐ Registrar / Trainee / Other Non-Specialist Senior Emergency Doctor
☐ Other *(please specify with free text)*

Question 5: At what time was the patient first reviewed by admitting consultant?

- Time and date (HH:MM, DD/MM/YYYY)
- Patient was not reviewed by admitting consultant

Investigations

The following questions capture data on the investigations undertaken when the patient first became unwell with suspected sepsis or infection.

Question 1 - Did the patient have blood cultures taken?

- Yes
- No

Question 2 - If yes to question 1, When did they have blood cultures taken?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3 - If yes to question 1, Was the set of blood cultures taken prior to antimicrobial administration?

- Yes
- No

Question 4 - Did the patient have a serum lactate taken?

- Yes
- No

Question 5 - If yes to question 4, When did they have their serum lactate taken?

- Time and date (HH:MM, DD/MM/YYYY)

Question 6 – If yes to question 4, What was the highest serum lactate measured in the first 24 hours? *(to one decimal point)*

Numeric Value (to one decimal point) mmol/L

Interventions

The following questions capture data on interventions when the patient first became unwell with suspected sepsis or infection.

Question 1 – Did the patient receive an antimicrobial agent when they deteriorated? ('deteriorating', for this study, is when a patient first meets pSOFA or qSOFA)

- Yes
- No

Question 2 – If yes to question 1, when did the patient receive their first dose of antimicrobial agent?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3 – Was the source of infection identified?

- Yes
- No

Question 4 – If yes to question 3, What was the provisional diagnosis source of infection?

- Respiratory
- Urinary tract source
- Biliary or gastrointestinal
- Skin source
- Meningitis
- Intravascular device
- Bone or joint
- Endocarditis
- Female genital tract
- Other *(please specify with free text)*

Question 5 - Based on the Australian Therapeutic guidelines, did the antibiotics prescribed to the patient provide adequate coverage for the provisional diagnosis?

- Yes
- No
- Unable to assess *(please explain why with free text)*

Question 6 - Is there evidence that patient's blood cultures were reviewed?

- Yes
- No

Question 7 – If yes to question 6, Is there evidence of a plan to review and / or modify antimicrobials after the blood culture results were reviewed?

- Yes

- No

Question 8 - If yes to question 7, Is there evidence this review occurred?

- Yes
- No

Question 9 – Did the patient have intravenous fluids administered when the patient was deteriorating?

- Yes
- No

Question 10 - If yes to question 9, When was the first bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 11 - If yes to question 9, Was a second bolus of fluid administered?

- Yes
- No

Question 12 - If yes to question 11, When was the second bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 13 - If yes to question 9, What was the total volume of fluid administered in the first 24 hours since sepsis was first suspected?

Numeric Value (to one decimal point) L

Question 14 - Was the patient desaturating on room air (where desaturating is defined as an SaO2 <95%)?

- Yes
- No

Question 15 - If yes to question 14, Was there evidence that the patient received supplemental oxygen?

- Yes
- No

Discharge

The following questions assist with capturing data about the discharge process and documentation of sepsis.

Question 1 - Did the discharge summary include a diagnosis of sepsis?

- Yes
- No

Question 2 – If yes to question 1, is there evidence in the discharge summary that information about sepsis was provided to either the patient or their carer?

- Yes
- No

Question 3 - If yes to question 1, is there evidence in the discharge summary that the patient had follow-up appointment/s booked with healthcare specialist/s (where the healthcare specialist/s are specifically following up with the patient in relation to sepsis and not another unrelated medical condition)?

- Yes
- No

Question 4 – What was the time and date of discharge?

- Time and date (HH:MM, DD/MM/YYYY)

Question 5 - Where was the patient discharged to at the end of this separation?

- Home
- Rehabilitation Centre
- Hospice
- Deceased
- Transferred to another hospital
- Other *(please specify in free text)*

Question 6 - If deceased for question 5, was sepsis recorded on the death certificate?

- Yes
- No

Questions for Pre-hospital

Separation and initial patient care information

The following questions focus on characteristics of the patient's initial care following deterioration associated with an infection or sepsis being suspected.

Question 1: Who called the ambulance?

- Patient
- Family/Carer
- Residential aged care facility
- General Practitioner
- Other (please specify in free text)

Question 2: What time did the paramedics arrive at the patient?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3: Was the word 'sepsis', 'infection' or 'septic' documented in the patient care record? (e.g. as provisional diagnosis / impression)

- Yes
- No

Question 4: If yes to Question 3, when did the word 'sepsis', 'infection' or 'septic' first appear in the medical record as a diagnosis?

- Time and date (HH:MM, DD/MM/YYYY)

Question 5: If yes to Question 3, was there a "sepsis comment" or "sepsis type" stated?

- Chest infection
- Pneumonia
- Respiratory tract infection
- Throat infection
- Urinary tract infection
- Infection – other/not listed (please provide free text box to 'Please specify')
- No

Question 6: What age group did the patient fall in?

- 0 to 18 years of age *(please show question 7 and 8)*
- 18+ years of age *(please show question 9 and 10)*

Question 7: if "0 to <18 years of age", During the visit, did the patient exhibit at least one of the following signs:

- **GCS Score <15**
- **SPO_2% <95%**
- **Temperature ≥39°C**

- Yes

- No

Question 8: If yes to question 7, What time did they meet one or more of the three factors where GCS <15, SPO_2% <95% or temperature ≥39°C?

- Time and date (HH:MM, DD/MM/YYYY)

Question 9: if "18+ years of age ", During this visit, did the patient exhibit at least two of the three following signs:

- **GCS Score <15**
- **Systolic BP <100mmHg**
- **Respiratory rate ≥22**

- Yes
- No

Question 10: If yes to question 9, What time did they meet two or more of the three following signs:

- **GCS Score <15**
- **Systolic BP <100mmHg**
- **Respiratory rate ≥22**

- Time and date (HH:MM, DD/MM/YYYY)

Question 11: Using your clinical judgement, do you think this patient had sepsis?

- Yes
- No *(patient file should be excluded)*
- Unable to determine

Question 12: Was the patient transferred to ED, left at home or deceased?

- Loaded for transfer to ED (please show questions 13-16)
- Left at home, site or facility (move on to question 16 only)
- Deceased (move to 16 onwards in this section)

Question 13: If loaded for transfer to ED, What time was the patient loaded?

- Time and date (HH:MM, DD/MM/YYYY)

Question 14: If loaded for transfer to ED, What signal was used for criticality of transfer?

- Signal 1
- Signal 2
- Signal 3
- Signal 4
- Signal 5

Question 15: If loaded for transfer to ED, What time was the patient moved off stretcher?

- Time and date (HH:MM, DD/MM/YYYY)

Question 16: Had the patient been in contact with the ambulance service in the 48 hours prior to this call?

- Yes
- No

Question 17: If yes to question 16, What did the patient contact ambulance service for?

- Sepsis
- Infection
- General malaise
- Other (please specify with free text)

Question 18: If 'deceased' was selected, What time was written on the death certificate?

- Time and date (HH:MM, DD/MM/YYYY)

Question 19: If 'deceased' was selected, Was sepsis written on the death certificate?

- Yes
- No

Question 20: What Final Primary Assessment was assigned to this patient?
List of FPAs

Question 21: What Final Primary Assessment would you assign to this patient?
List of FPAs

Patient characteristics and risk factors

The following questions assist with capturing data on relevant patient characteristics and risk factors.

Question 1 - Did the patient have any of the following characteristics or risk factors? *(Choose all that apply, can be left blank if none apply)*

- ☐ Aboriginal or Torres Strait Islander
- ☐ Allergies to antimicrobials
- ☐ Burns
- ☐ COVID-19
- ☐ Fall
- ☐ Hearing loss
- ☐ Immunocompromised
- ☐ Indwelling medical device, foreign body
- ☐ Intravenous drug use
- ☐ Neutropaenia or recent chemotherapy
- ☐ Pregnancy
- ☐ Recent surgery / invasive procedure
- ☐ Re-presentation to ambulance with sepsis
- ☐ Re-presentation within 48 hours
- ☐ Readmission to hospital within 30 days
- ☐ Skin cellulitis, skin graft
- ☐ Splenectomy / transplant patients
- ☐ Transfer from a residential aged care facility
- ☐ Wounds
- ☐ Other *(please specify with free text*

Interventions

The following questions capture data on interventions when the patient first became unwell with suspected sepsis or infection.

Question 1 – Did the patient have intravenous fluids administered when the patient was deteriorating?

- Yes
- No

Question 2 - If yes to question 1, When was the first bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 3 - If yes to question 1, Was a second bolus of fluid administered?

- Yes
- No

Question 4 - If yes to question 3, When was the second bolus of fluid administered?

- Time and date (HH:MM, DD/MM/YYYY)

Question 5 - If yes to question 1, What was the total volume of fluid administered since arriving at the patient?

Numeric Value (to one decimal point) L

Question 6 - Was the patient desaturating on room air (where desaturating is defined as an SaO2 <95%, except for patient with COPD where it is defined as an SaO2 <88%)?

- Yes
- No

Question 7 - If yes to question 6, Was there evidence that the patient received supplemental oxygen?

- Yes
- No

Questions for Coding

For each record, a clinical coding reviewer will assess whether the codes assigned to the separation were appropriate in the context of sepsis.

Question 1: What codes would you assign this to file? *(Please check all that are relevant. You are able to search for the relevant codes, please remember to click the button 'load more' at the bottom to show the rest of the list.)*

- ☐ A02.1 Salmonella sepsis
- ☐ A20.7 Septicaemic plague
- ☐ A22.7 Anthrax sepsis
- ☐ A26.7 Erysipelpthrix sepsis
- ☐ A32.7 Sepsis due to listeria monocytogenes
- ☐ A39.4 Sepsis due to meningococcal infection
- ☐ A40 Streptococcal sepsis
- ☐ A40.0 Sepsis due to streptococcus, group A
- ☐ A40.1 Sepsis due to streptococcus, group B
- ☐ A40.2 Sepsis due to streptococcus, group D
- ☐ A40.3 Sepsis due to Streptococcus pneumoniae
- ☐ A40.8 Other streptococcal sepsis
- ☐ A40.9 Streptococcal sepsis, unspecified
- ☐ A41.0 Sepsis due to Staphylococcus aureus
- ☐ A41.1 Sepsis due to other specified staphylococcus
- ☐ A41.2 Sepsis due to unspecified staphylococcus
- ☐ A41.3 Sepsis due to Haemophilus influenzae
- ☐ A41.4 Sepsis due to anaerobes
- ☐ A41.5 Sepsis due to other Gram-negative organisms
- ☐ A41.5.0 Sepsis due to unspecified Gram-negative organisms
- ☐ A41.5.1 Sepsis due to Escherichia coli [E. Coli]
- ☐ A41.5.2 Sepsis due to Pseudomonas
- ☐ A41.5.8 Sepsis due to other Gram-negative organisms
- ☐ A41.8 Other specified sepsis
- ☐ A41.9 Sepsis, unspecified
- ☐ A42.7 Actinomycotic sepsis
- ☐ A54.86 Gonococcal sepsis
- ☐ B00.7 Sepsis due to herpesvirus
- ☐ B34.2 Coronavirus infection, unspecified site
- ☐ B37.7 Sepsis due to candida infection
- ☐ B97.2 Coronavirus as the cause of diseases classified to other chapters
- ☐ O85 Puerperal sepsis
- ☐ O88.3 Obstetric pyaemic and septic embolism
- ☐ P36 Bacterial sepsis of newborn
- ☐ P36.0 Sepsis of newborn due to streptococcus, group B
- ☐ P36.1 Sepsis of newborn due to other and unspecified streptococci
- ☐ P36.2 Sepsis of newborn due to Staphylococcus aureus
- ☐ P36.3 Sepsis of newborn due to other and unspecified staphylococci
- ☐ P36.4 Sepsis of newborn due to Escherichia coli
- ☐ P36.5 Sepsis of newborn due to anaerobes
- ☐ P36.8 Other bacterial sepsis of newborn
- ☐ P36.9 Bacterial sepsis of newborn, unspecified
- ☐ R57.2 Septic shock
- ☐ T81.4.2 Sepsis following a procedure
- ☐ Etc … (continue with entire list of ICD-10-AM codes)

Questions for the Organisation

The questions in this section collects details about your organisation.

Question 1: For patients referred to hospital from primary care, is information routinely collected on antimicrobials given by primary care and/or ambulance services for incoming patients?

- Yes
- No

Question 2: When the patients become unwell/deteriorate, does your site transfer patients to another hospital for access to critical care?

- Yes
- No

Question 3: Is there a dedicated sepsis education package at your facility for clinical staff?

- Yes
- No

Question 4: If yes to question 3, is this education package available to nursing and medical staff?

- Yes for medical and nursing staff
- Yes for medical staff only
- Yes for nursing staff only
- No

Question 5: If yes to question 3, is this education package mandatory?

- Yes
- No

Question 6: Is there a local sepsis pathway at the facility / service for adults?

- Yes
- No

Question 7: If no to question 6, are there other tools or guidance to support sepsis recognition and management?

- Yes
- No

Question 8: If yes to question 7, please describe the other tools that are available to support sepsis recognition and management?

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Question 9: Is there a local sepsis pathway at the facility / service for paediatrics?

- Yes
- No

Question 10: If no to question 9, are there other tools or guidance to support sepsis recognition and management?

- Yes
- No

Question 11: If yes to question 10, please describe the other tools that are available to support sepsis recognition and management?

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Question 12: Does your facility have a policy to guide sepsis management for patients on an end-of-life care pathway?

- Yes
- No

ICD-10-AM Codes

For each record, a clinical coding reviewer assessed whether the codes assigned to the separation were appropriate in the context of sepsis.

Coding reviewer question

Section	Question	Response values
Coding	Which codes would you assign this case to?	Select all relevant options: • List of ICD-10-AM codes
Coding	For pre-hospital, which FPA would you assign this case to?	Choose one option: • List of FPA

Explicit sepsis codes
A02.1 Salmonella sepsis
A20.7 Septicaemic plague
A22.7 Anthrax sepsis
A26.7 Erysipelpthrix sepsis
A32.7 Sepsis due to listeria monocytogenes
A39.4 Sepsis due to meningococcal infection
A40 Streptococcal sepsis
A40.0 Sepsis due to streptococcus, group A
A40.1 Sepsis due to streptococcus, group B
A40.2 Sepsis due to streptococcus, group D

Explicit sepsis codes
A40.3 Sepsis due to Streptococcus pneumoniae
A40.8 Other streptococcal sepsis
A40.9 Streptococcal sepsis, unspecified
A41.0 Sepsis due to Staphylococcus aureus
A41.1 Sepsis due to other specified staphylococcus
A41.2 Sepsis due to unspecified staphylococcus
A41.3 Sepsis due to Haemophilus influenzae
A41.4 Sepsis due to anaerobes
A41.5 Sepsis due to other Gram-negative organisms
A41.5.0 Sepsis due to unspecified Gram-negative organisms
A41.5.1 Sepsis due to Escherichia coli [E. Coli]
A41.5.2 Sepsis due to Pseudomonas
A41.5.8 Sepsis due to other Gram-negative organisms
A41.8 Other specified sepsis
A41.9 Sepsis, unspecified
A42.7 Actinomycotic sepsis
A54.86 Gonococcal sepsis
B00.7 Sepsis due to herpesvirus
B34.2 Coronavirus infection, unspecified site
B37.7 Sepsis due to candida infection
B97.2 Coronavirus as the cause of diseases classified to other chapters
O85 Puerperal sepsis
O88.3 Obstetric pyaemic and septic embolism
P36 Bacterial sepsis of newborn
P36.0 Sepsis of newborn due to streptococcus, group B
P36.1 Sepsis of newborn due to other and unspecified streptococci
P36.2 Sepsis of newborn due to Staphylococcus aureus
P36.3 Sepsis of newborn due to other and unspecified staphylococci
P36.4 Sepsis of newborn due to Escherichia coli
P36.5 Sepsis of newborn due to anaerobes
P36.8 Other bacterial sepsis of newborn

Explicit sepsis codes
P36.9 Bacterial sepsis of newborn, unspecified
R57.2 Septic shock
T81.4.2 Sepsis following a procedure

Implicit sepsis codes will consist of at least a combination of one code from Part A and one from Part B.

Implicit sepsis codes (Part A)
A17.0 Tuberculous meningitis
A20.3 Plague meningitis
A21.7 Generalised tularaemia
A24.1 Acute and fulminating melioidosis
A28.2 Extraintestinal yersiniosis
A32.1 Listerial meningitis meningoencephalitis
A39.0 Meningococcal meningitis
A39.1 Waterhouse-Friderichsen syndrome
A39.2 Acute meningococcaemia
A39.3 Chronic meningococcaemia
A39.4 Meningococcaemia, unspecified
A39.5 Meningococcal heart disease
A39.8 Other meningococcal infections
A39.9 Meningococcal infection, unspecified
A48.3 Toxic Shock syndrome
A49.9 Bacterial infection
A87 Viral meningitis
A87.0 Enteroviral meningitis
A87.1 Adenoviral meningitis
A87.2 Lymphocytic choriomeningitis
A87.8 Other viral meningitis
A87.9 Viral meningitis unspecified
B00.3 Herpesviral meningitis
B01.0 Varicella meningitis
B01.2 Varicella pneumonia

Implicit sepsis codes (Part A)
B02.1 Zoster meningitis
B05.1 Measles complicated by meningitis
B05.2 Measles complicated by pneumonia
B26.1 Mumps meningitis
B37.5 Candidal meningitis
B37.6 Candidal endocarditis
B38.4 Coccidioidomycosis meningitis
B95.3 Strep pneum caus dis class oth chptr
B96.0 M. pneumoniae cause dis class oth chptr
B96.1 K. pneumoniae cause dis class oth chptr
D47.4 Osteomyelofibrosis
G00 Bacterial meningitis NEC
G00.0 Haemophilus meningitis
G00.1 Pneumococcal meningitis
G00.2 Streptococcal meningitis
G00.3 Staphylococcal meningitis
G00.8 Other bacterial meningitis
G00.9 Bacterial meningitis unspecified
G01 Meningitis in bact dis class elsewhere
G02 Mengits in oth infect & parasit dis cl/e
G02.0 Meningitis in viral dis class elsewhere
G02.1 Meningitis in mycoses
G02.8 Mengits oth spec infect parasit dis cl/e
G03 Meningitis dt other & unspecified causes
G03.0 Nonpyogenic meningitis
G03.1 Chronic meningitis
G03.2 Benign recurrent meningitis [Mollaret]
G03.8 Meningitis due to other specified causes
G03.9 Meningitis unspecified
I01.1 Acute rheumatic endocarditis
I09.1 Rheumatic dis endocardium unsp valve

Implicit sepsis codes (Part A)
I33 Acute and subacute endocarditis
I33.0 Acute & subacute infective endocarditis
I33.9 Acute endocarditis unspecified
I38 Endocarditis valve unspecified
I39 Endocarditis heart valve disrd dis cl/e
I39.8 Endocarditis unsp valve in dis cl/e
I42.4 Endocardial fibroelastosis
J04 Acute laryngitis and tracheitis
J04.1 Acute tracheitis
J04.2 Acute laryngotracheitis
J05 Ac obstructive laryngitis & epiglottitis
J05.1 Acute epiglottitis
J10.0 Influenza w pneumonia other virus id
J11.0 Influenza w pneum virus not identified
J12 Viral pneumonia not elsewhere classified
J12.0 Adenoviral pneumonia
J12.1 Respiratory syncytial virus pneumonia
J12.2 Parainfluenza virus pneumonia
J12.3 Human metapneumovirus pneumonia
J12.8 Other viral pneumonia
J12.9 Viral pneumonia unspecified
J13 Pneumonia dt Streptococcus pneumoniae
J14 Pneumonia due to Haemophilus influenzae
J15 Bacterial pneumonia NEC
J15.0 Pneumonia due to Klebsiella pneumoniae
J15.1 Pneumonia due to Pseudomonas
J15.2 Pneumonia due to staphylococcus
J15.3 Pneumonia due to streptococcus group B
J15.4 Pneumonia due to other streptococci
J15.5 Pneumonia due to Escherichia coli
J15.6 Pneumonia dt oth gram neg bact

Implicit sepsis codes (Part A)
J15.7 Pneumonia dt Mycoplasma pneumoniae
J15.8 Other bacterial pneumonia
J15.9 Bacterial pneumonia
J15.9 Bacterial pneumonia unspecified
J16 Pneumonia dt other infect organisms NEC
J16.0 Chlamydial pneumonia
J16.8 Pneumonia dt oth spec infect organisms
J17 Pneumonia in diseases class elsewhere
J17.0 Pneumonia in bact dis class elsewhere
J17.1 Pneumonia in viral dis class elsewhere
J17.2 Pneumonia in mycoses
J17.3 Pneumonia in parasitic diseases
J17.8 Pneumonia in other dis class elsewhere
J18 Pneumonia organism unspecified
J18.0 Bronchopneumonia unspecified
J18.1 Lobar pneumonia unspecified
J18.2 Hypostatic pneumonia unspecified
J18.8 Other pneumonia organism unspecified
J18.9 Pneumonia unspecified
J20.0 Ac bronchitis dt Mycoplasma pneumoniae
J37 Chronic laryngitis and laryngotracheitis
J37.1 Chronic laryngotracheitis
J85.1 Abscess of lung with pneumonia
K57.32 Diverticular disease
M00 Pyogenic arthritis
M00.9 Pyogenic arthritis unspecified
M00.90 Pyogenic arthritis unsp mult sites
M00.91 Pyogenic arthritis unsp shoulder
M00.92 Pyogenic arthritis unsp upper arm
M00.93 Pyogenic arthritis unspecified forearm
M00.94 Pyogenic arthritis unspecified hand

Implicit sepsis codes (Part A)
M00.95 Pyogenic arthritis unsp pelv rgn & thgh
M00.96 Pyogenic arthritis unsp lower leg
M00.97 Pyogenic arthritis unsp ankle & foot
M00.98 Pyogenic arthritis unspecified other
M00.99 Pyogenic arthritis unspecified site unsp
M46.2 Osteomyelitis of vertebra
M46.20 Vertebral osteomyelitis mult site spine
M46.21 Vertebral osteomyelitis ocpt-atlnt-axl
M46.22 Vertebral osteomyelitis cervical rgn
M46.23 Vertebral osteomyelitis cervicothoracic
M46.24 Vertebral osteomyelitis thoracic rgn
M46.25 Vertebral osteomyelitis thoracolumbar
M46.26 Osteomyelitis of vertebra lumbar region
M46.27 Vertebral osteomyelitis lumbosacral rgn
M46.28 Vert osteomyelitis sacr & sacrcocygl
M46.29 Osteomyelitis vertebra site unsp
M72.6 Necrotising fasciitis
M72.60 Necrotising fasciitis mult sites
M72.61 Necrotising fasciitis shoulder
M72.62 Necrotising fasciitis upper arm
M72.63 Necrotising fasciitis forearm
M72.64 Necrotising fasciitis hand
M72.65 Necrotising fasciitis pelvis thgh
M72.66 Necrotising fasciitis lower leg
M72.67 Necrotising fasciitis ankle foot
M72.68 Necrotising fasciitis other site
M72.69 Necrotising fasciitis site unsp
M86 Osteomyelitis
M86.0 Acute haematogenous osteomyelitis
M86.00 Ac haematogenous osteomyelitis mult site
M86.01 Ac haematogenous osteomyelitis shoulder

Implicit sepsis codes (Part A)
M86.02 Ac haematogenous osteomyelitis upp arm
M86.03 Ac haematogenous osteomyelitis forearm
M86.04 Acute haematogenous osteomyelitis hand
M86.05 Ac haematogenous osteomyelitis pelv thgh
M86.06 Ac haematogenous osteomyelitis low leg
M86.07 Ac haematogenous osteomyelitis ankle ft
M86.08 Acute haematogenous osteomyelitis other
M86.09 Ac haematogenous osteomyelitis site unsp
M86.1 Other acute osteomyelitis
M86.10 Other acute osteomyelitis mult sites
M86.11 Other acute osteomyelitis shoulder
M86.12 Other acute osteomyelitis upper arm
M86.13 Other acute osteomyelitis forearm
M86.14 Other acute osteomyelitis hand
M86.15 Oth acute osteomyelitis pelv rgn & thgh
M86.16 Other acute osteomyelitis lower leg
M86.17 Other acute osteomyelitis ankle & foot
M86.18 Other acute osteomyelitis other
M86.19 Other acute osteomyelitis site unsp
M86.2 Subacute osteomyelitis
M86.20 Subacute osteomyelitis multiple sites
M86.21 Subacute osteomyelitis shoulder region
M86.22 Subacute osteomyelitis upper arm
M86.23 Subacute osteomyelitis forearm
M86.24 Subacute osteomyelitis hand
M86.25 Subacute osteomyelitis pelv rgn & thgh
M86.26 Subacute osteomyelitis lower leg
M86.27 Subacute osteomyelitis ankle and foot
M86.28 Subacute osteomyelitis other
M86.29 Subacute osteomyelitis site unspecified
M86.3 Chronic multifocal osteomyelitis

Implicit sepsis codes (Part A)
M86.30 Chr multifocal osteomyelitis mult sites
M86.31 Chr multifocal osteomyelitis shoulder
M86.32 Chr multifocal osteomyelitis upper arm
M86.33 Chr multifocal osteomyelitis forearm
M86.34 Chronic multifocal osteomyelitis hand
M86.35 Chr multifocal osteomyelitis pelv thgh
M86.36 Chr multifocal osteomyelitis lower leg
M86.37 Chr multifocal osteomyelitis ankle foot
M86.38 Chronic multifocal osteomyelitis other
M86.39 Chr multifocal osteomyelitis site unsp
M86.4 Chronic osteomyelitis w draining sinus
M86.40 Chr osteomyelitis w drain sinus mult sit
M86.41 Chr osteomyelitis w drain sinus shoulder
M86.42 Chr osteomyelitis w drain sinus upp arm
M86.43 Chr osteomyelitis w drain sinus forearm
M86.44 Chr osteomyelitis w draining sinus hand
M86.45 Chr osteomyelitis drain sinus pelv thgh
M86.46 Chr osteomyelitis w drain sinus low leg
M86.47 Chr osteomyelitis w drain sinus ankle ft
M86.48 Chr osteomyelitis w drain sinus other
M86.49 Chr osteomyelts w drain sinus site unsp
M86.5 Oth chr haematogenous osteomyelitis
M86.50 Oth chr haemtgs osteomyelitis mult site
M86.51 Oth chr haemtgs osteomyelitis shoulder
M86.52 Oth chr haemtgs osteomyelitis upper arm
M86.53 Oth chr haemtgs osteomyelitis forearm
M86.54 Oth chr haematogenous osteomyelitis hand
M86.55 Oth chr haemtgs osteomyelitis pelv thgh
M86.56 Oth chr haemtgs osteomyelitis low leg
M86.57 Oth chr haemtgs osteomyelitis ankle ft
M86.58 Oth chr haemtgs osteomyelitis other

Implicit sepsis codes (Part A)
M86.59 Oth chr haemtgs osteomyelitis site unsp
M86.6 Other chronic osteomyelitis
M86.60 Other chronic osteomyelitis mult sites
M86.61 Other chronic osteomyelitis shoulder
M86.62 Other chronic osteomyelitis upper arm
M86.63 Other chronic osteomyelitis forearm
M86.64 Other chronic osteomyelitis hand
M86.65 Oth chr osteomyelitis pelv rgn & thgh
M86.66 Other chronic osteomyelitis lower leg
M86.67 Other chronic osteomyelitis ankle foot
M86.68 Other chronic osteomyelitis other
M86.69 Other chronic osteomyelitis site unsp
M86.8 Other osteomyelitis
M86.80 Other osteomyelitis multiple sites
M86.81 Other osteomyelitis shoulder region
M86.82 Other osteomyelitis upper arm
M86.83 Other osteomyelitis forearm
M86.84 Other osteomyelitis hand
M86.85 Other osteomyelitis pelv rgn & thgh
M86.86 Other osteomyelitis lower leg
M86.87 Other osteomyelitis ankle and foot
M86.88 Other osteomyelitis other
M86.89 Other osteomyelitis site unspecified
M86.9 Osteomyelitis, unspecified
M86.90 Osteomyelitis unspecified mult sites
M86.91 Osteomyelitis unspecified shoulder
M86.92 Osteomyelitis unspecified upper arm
M86.93 Osteomyelitis unspecified forearm
M86.94 Osteomyelitis unspecified hand
M86.95 Osteomyelitis unsp pelv rgn & thgh
M86.96 Osteomyelitis unspecified lower leg

Implicit sepsis codes (Part A)
M86.97 Osteomyelitis unspecified ankle & foot
M86.98 Osteomyelitis unspecified other site
M86.99 Osteomyelitis unspecified site unsp
N39.0 UTI
P23 Congenital pneumonia
P23.0 Congenital pneumonia due to viral agent
P23.1 Congenital pneumonia due to Chlamydia
P23.2 Congenital pneumonia dt staphylococcus
P23.3 Cong pneumonia dt Strep B
P23.4 Congenital pneumonia dt Escherichia coli
P23.5 Congenital pneumonia due to Pseudomonas
P23.6 Cong pneumonia dt oth bacterial agents
P23.8 Congenital pneumonia dt oth organisms
P23.9 Congenital pneumonia unspecified
R50.9 Fever
R65.0 Systemic inflammatory response syndrome [SIRS] of infectious origin without acute organ failure
R65.1 SIRS of infectious origin with organ failure

Implicit sepsis codes (Part B)
E87.2 Acidosis
I50.9 Heart failure, unspecified
J80 Acute respiratory distress syndrome
J95 Intraoperative and post-procedural disorders of respiratory system, not elsewhere classified
J96.0 Acute respiratory failure
J96.00 Acute respiratory failure, type I
J96.01 Acute respiratory failure, type II
J96.09 Acute respiratory failure, type unspecified
K72 Hepatic failure, not elsewhere classified
N17 Acute kidney failure
N99.0 Post-procedural kidney failure

Implicit sepsis codes (Part B)
R57.0 Cardiogenic shock

The principal ICD-10-AM codes assigned to 270 patient records sampled are listed below in **Error! Reference source not found.**.

Table 1: Original principal codes assigned to admitted patient collection data of in-scope reviews and their proportion of the sample size

Primary codes assigned	Description	Percentage
A419	Sepsis, unspecified	20.0%
J189	Pneumonia, unspecified	4.8%
A4151	Sepsis due to Escherichia coli [E. Coli]	4.1%
A410	Sepsis due to Staphylococcus aureus	2.6%
O85	Puerperal sepsis	2.2%
I500	Congestive heart failure	1.9%
A021	Salmonella sepsis	1.5%
T845	Infection and inflammatory reaction due to internal joint prosthesis	1.5%
N390	Urinary tract infection, site not specified	1.5%
J188	Other pneumonia, organism unspecified	1.5%
A408	Other streptococcal sepsis	1.5%
J13	Pneumonia due to Streptococcus pneumoniae	1.5%
K8000	Calculus of gallbladder with acute cholecystitis, without mention of obstruction	1.1%
N10	Acute tubulo-interstitial nephritis	1.1%
K859	Acute pancreatitis, unspecified	1.1%
A400	Sepsis due to streptococcus, group A	1.1%
N132	Hydronephrosis with renal and ureteral calculus obstruction	1.1%
A411	Sepsis due to other specified staphylococcus	1.1%
K8031	Calculus of bile duct with cholangitis, with obstruction	1.1%
A4152	Sepsis due to Pseudomonas	0.7%
N136	Pyonephrosis	0.7%
N12	Tubulo-interstitial nephritis, not specified as acute or chronic	0.7%
K5722	Diverticulitis of large intestine with perforation and abscess, without mention of haemorrhage	0.7%
A4158	Sepsis due to other Gram-negative organisms	0.7%
J128	Other viral pneumonia	0.7%
I330	Acute and subacute infective endocarditis	0.7%
F050	Delirium not superimposed on dementia, so described	0.7%
A402	Sepsis due to streptococcus, group D and enterococcus	0.7%
K8040	Calculus of bile duct with cholecystitis, without mention of obstruction	0.7%
N179	Acute kidney failure, unspecified	0.7%
A401	Sepsis due to streptococcus, group B	0.7%
A403	Sepsis due to Streptococcus pneumoniae	0.7%

L0313	Cellulitis of lower limb	0.7%
M8667	Other chronic osteomyelitis, ankle and foot	0.7%
K352	Acute appendicitis with generalised peritonitis	0.7%
C9280	Acute myeloid leukaemia with multilineage dysplasia, without mention of remission	0.4%
T835	Infection and inflammatory reaction due to prosthetic device, implant and graft in urinary system	0.4%
R02	Gangrene, not elsewhere classified	0.4%
E875	Hyperkalaemia	0.4%
L0312	Cellulitis of upper limb	0.4%
E877	Fluid overload	0.4%
N304	Irradiation cystitis	0.4%
A081	Acute gastroenteropathy due to Norovirus	0.4%
S2232	Fracture of one rib, other than first rib	0.4%
G500	Trigeminal neuralgia	0.4%
K9141	Haemorrhage from stoma of the digestive system	0.4%
G904	Autonomic dysreflexia	0.4%
M2501	Haemarthrosis, shoulder region	0.4%
G943	Encephalopathy in diseases classified elsewhere	0.4%
D70	Agranulocytosis	0.4%
I213	Acute transmural myocardial infarction of unspecified site	0.4%
N950	Postmenopausal bleeding	0.4%
I214	Acute subendocardial myocardial infarction	0.4%
R31	Unspecified haematuria	0.4%
A414	Sepsis due to anaerobes	0.4%
S8081	Abrasion of lower leg	0.4%
I489	Atrial fibrillation and atrial flutter, unspecified	0.4%
K852	Alcohol-induced acute pancreatitis	0.4%
A4150	Sepsis due to unspecified Gram-negative organisms	0.4%
L023	Cutaneous abscess, furuncle and carbuncle of buttock	0.4%
I612	Intracerebral haemorrhage in hemisphere, unspecified	0.4%
L032	Cellulitis of face	0.4%
I8022	Phlebitis and thrombophlebitis of popliteal vein	0.4%
M503	Other cervical disc degeneration	0.4%
J100	Influenza with pneumonia, other influenza virus identified	0.4%
D120	Benign neoplasm of caecum	0.4%
J122	Parainfluenza virus pneumonia	0.4%
E1011	Type 1 diabetes mellitus with ketoacidosis, without coma	0.4%
A090	Other gastroenteritis and colitis of infectious origin	0.4%
E1101	Type 2 diabetes mellitus with hyperosmolarity without nonketotic hyperglycaemic-hyperosmolar coma [NKHHC]	0.4%
A279	Leptospirosis, unspecified	0.4%
E1111	Type 2 diabetes mellitus with ketoacidosis, without coma	0.4%

J152	Pneumonia due to staphylococcus	0.4%
R05	Cough	0.4%
J154	Pneumonia due to other streptococci	0.4%
R568	Other and unspecified convulsions	0.4%
J157	Pneumonia due to Mycoplasma pneumoniae	0.4%
S7203	Fracture of subcapital section of femur	0.4%
A390	Meningococcal meningitis	0.4%
T814	Wound infection following a procedure, not elsewhere classified	0.4%
A418	Other specified sepsis	0.4%
E43	Unspecified severe protein-energy malnutrition	0.4%
J22	Unspecified acute lower respiratory infection	0.4%
C786	Secondary malignant neoplasm of retroperitoneum and peritoneum	0.4%
J36	Peritonsillar abscess	0.4%
K921	Melaena	0.4%
J690	Pneumonitis due to food and vomit	0.4%
L0242	Cutaneous abscess, furuncle and carbuncle of lower limb	0.4%
J939	Pneumothorax, unspecified	0.4%
C9200	Acute myeloblastic leukaemia [AML], without mention of remission	0.4%
J9600	Acute respiratory failure, type I	0.4%
M0081	Arthritis and polyarthritis due to other specified bacterial agents, shoulder region	0.4%
J9601	Acute respiratory failure, type II	0.4%
M4647	Unspecified discitis, lumbosacral region	0.4%
K261	Duodenal ulcer, acute with perforation	0.4%
M6250	Muscle wasting and atrophy, not elsewhere classified, multiple sites	0.4%
A022	Localised salmonella infections	0.4%
N029	Recurrent and persistent haematuria, unspecified	0.4%
K353	Acute appendicitis with localised peritonitis	0.4%
D649	Anaemia, unspecified	0.4%
K420	Umbilical hernia with obstruction, without gangrene	0.4%
D761	Haemophagocytic lymphohistiocytosis	0.4%
K435	Parastomal hernia without obstruction or gangrene	0.4%
N288	Other specified disorders of kidney and ureter	0.4%
K500	Crohn's disease of small intestine	0.4%
N309	Cystitis, unspecified	0.4%
K550	Acute vascular disorders of intestine	0.4%
N61	Inflammatory disorders of breast	0.4%
B377	Candidal sepsis	0.4%
O030	Spontaneous abortion, incomplete, complicated by genital tract and pelvic infection	0.4%
K631	Perforation of intestine (nontraumatic)	0.4%
O988	Other maternal infectious and parasitic diseases in pregnancy, childbirth and the puerperium	0.4%

K659	Peritonitis, unspecified	0.4%
R048	Haemorrhage from other sites in respiratory passages	0.4%
C182	Malignant neoplasm of ascending colon	0.4%
R11	Nausea and vomiting	0.4%
K8010	Calculus of gallbladder with other cholecystitis, without mention of obstruction	0.4%
R33	Retention of urine	0.4%
K8030	Calculus of bile duct with cholangitis, without mention of obstruction	0.4%
R633	Feeding difficulties and mismanagement	0.4%
C240	Malignant neoplasm of extrahepatic bile duct	0.4%
S4200	Fracture of clavicle, part unspecified	0.4%
C638	Overlapping malignant lesion of male genital organs	0.4%
S7204	Fracture of midcervical section of femur	0.4%
K8050	Calculus of bile duct without cholangitis or cholecystitis, without mention of obstruction	0.4%
T402	Other opioids	0.4%
K818	Other cholecystitis	0.4%
T8274	Infection and inflammatory reaction due to central vascular catheter	0.4%
K830	Cholangitis	0.4%
E1173	Type 2 diabetes mellitus with foot ulcer due to multiple causes	0.4%
K831	Obstruction of bile duct	0.4%
K851	Biliary acute pancreatitis	0.4%

3. Sepsis Medical Record Review Pilot - Training Resource

Overview

Background

The Australian Sepsis Network (ASN) estimates that approximately 5,000 people die of sepsis in Australia each year. They also estimate that the annual incidence of sepsis in the adult Australian population treated in an Intensive Care Unit (ICU) is approximately 77 per 100,000. However, this estimate is limited to patients treated in an ICU and is based on a study published in 2004. The ASN acknowledge that international estimates may be at least three to four times higher than current data suggests.[5]

The Commission was appointed by the Australian Government Department of Health to lead and co-ordinate the National Sepsis Program in 2019 in partnership with The George Institute for Global Health. As part of this program, the Commission undertook an epidemiological analysis of national sepsis inpatient data from all Australian public hospitals. The report estimated that the age-standardised incidence of sepsis increased 27% from 994.1 per 100,000 in 2013-14, to 1260.5 per 100,000 in 2017-18.[3]

The report also found that, despite the increase in incidence of sepsis cases, sepsis mortality remained relatively stable, even after accounting for relevant risk factors. The authors attributed this apparent increase to 1) more prominent clinical awareness campaigns around the time of the increase and 2) a change in coding practice. They note the increase could be explained “in a small number of ICD-10-AM codes, especially the most frequently used code A419 (Sepsis, unspecified)”. They also note that there was “extensive revision of the Australian Coding Standard (ACS 0110) Sepsis, severe sepsis and septic shock for ICD-10-AM 9th Edition” which covered the period “when an increase in the rate of inpatient sepsis was observed”. The authors recommended that “further investigation of sepsis coding guidelines and practices may assist in understanding reasons for the increases observed”.[3]

In support of this recommendation, the Commission is undertaking a national retrospective medical record review (MRR) examining clinical records of patients with sepsis to assess:

- The relationship between sepsis ICD-10-AM coding practices, and potential underestimation of sepsis cases in Australia
- Instances of detection, recognition and clinical management of sepsis from the review that could be considered as ‘gold-standard’
- What factors influence or are most commonly associated with deviation from local, district or jurisdictional sepsis clinical management guidelines, and the potential reasons for this deviation (including care setting, clinical workforce, geographical location and time (day, night, out of hours, weekends).

Closer analysis of medical records will not only provide greater insights into the true incidence of sepsis and factors that influence the detection and early management of sepsis, it will also help inform future initiatives under the National Sepsis Program. For example, sophisticated predictive modelling can help disentangle the impact that multiple interacting factors have on the detection and early management of sepsis. The Commission is also currently drafting a dedicated Sepsis Clinical Care Standard which will be the first nationally agreed set of guidelines on sepsis, developed to support improvements in the delivery of sepsis care. This study offers the opportunity to contribute the insights required to support the Commission’s continued commitment to enhancing the safety and quality of sepsis care.[6]

Purpose of the Sepsis MRR study

The purpose of this study is to assess the clinical documentation of patients with sepsis to examine:

4. To what extent are cases of sepsis under recognised?
5. Are there cases of gold standard sepsis management?
6. What factors influence deviation from local sepsis guidelines and pathways?

When will the review be taking place?

There will be two phases in the review: a pilot review, and a main review. The pilot review is expected to be undertaken during the period from October 2021 to November 2021. The main review is expected to be undertaken during the period from March 2022 to April 2022.

Summary of activities and timeframes

The Sepsis MRR data collection will run from October 2021 to April 2022. You will be performing the medical record review and entering your responses in an online survey tool. Following confirmed dates, an online training session will be delivered which will provide information about the data to be collected and how to complete the data collection.

The key activities and timeframes are outlined in the table below.

Key activity
Online training session
Data collection by clinical and coding reviewers begin for pilot sites
Data collection will end for reviewers of pilot sites
Data collection by clinical and coding reviewers begin for main sites
Data collection will end for reviewers of main sites

What if I need help undertaking the review?

Please email sepsis@safetyandquality.gov.au if you require assistance with any aspect of the Sepsis MRR study. For urgent enquiries, please call Chris Boyd-Skinner (Principal Investigator) on 0437 720 390, Monday to Friday between 9am to 5pm.

What data is the study collecting?

As part of the Sepsis MRR study, the Commission is asking clinical and coding reviewers to collect data on a sample of medical records of patients who had or may have had sepsis within their participating hospital or service.

Data is collected on a range of different topics, including:

Hospital and health service characteristics

- Whether your hospital or service provides sepsis education to nursing and medical staff
- Whether your hospital or service has a sepsis pathway or other tools or guidance to support sepsis recognition and management
- Whether your hospital or service has a policy to guide management of sepsis in patients on an end-of-life pathway.

Separation and initial patient care information

Reviewers will capture relevant characteristics relating to the admission / presentation, separation and the patient's initial care, such as:

- Patient's time of deterioration
- The care setting the patient is in when deteriorating
- Who referred the patient and where the patient arrived from
- For patients in emergency: triage time, triage category assigned and admission/discharge process from the emergency department.
- Whether the patient is re-presenting or re-admitted to hospital or pre-hospital setting in a short period of time.

Patient characteristics and risk factors

Reviewers will capture a range of relevant patient characteristics and risk factors for sepsis.

Clinically suspected sepsis

Reviewers will capture information about whether sepsis was documented as being considered in a diagnostic context (i.e. provisional diagnosis, diagnosis or impression).

Senior clinician review

Reviewers will capture whether patient care was escalated when the patient deteriorated.

Investigations

Reviewers will capture whether investigations, such as blood culture or serum lactate, were performed on the patient and these investigations reviewed.

Interventions

Reviewers will capture whether the patient required and / or received interventions, such as antimicrobial agents, intravenous fluids and supplemental oxygen.

Complications of sepsis

Reviewers will capture whether any post-sepsis complications occurred with the patient.

Discharge

Reviewers will capture the discharge process following a patient's encounter and the documentation provided in the discharge summary or death certificate.

Coding assessment

For each record, a clinical coding reviewer will determine what code(s) they believe are most appropriate to assign to this patient's medical record.

1 How to find the data?

As part of each medical record review, it is expected that reviewers will consider all the clinical documentation associated with a selected patient admission / presentation date including:

- All inpatient annotations/medical notes (eMR and paper records)
- Case histories
- Discharge summaries
- Fluid balance charts
- Medication charts
- Observation charts
- Pathology (haematology, biochemistry, microbiology) results
- Progress notes.

2 Data dictionary

To ensure the data collected is suitable for collation and analysis, it is important that all clinical reviewers who participate in the data collection submit information consistently so that it is comparable. To assist the clinical reviewers with identifying and submitting the right information, a 'data dictionary' is in **Appendix A**. This data dictionary provides definitions for the terms used. While some of the definitions provided may be consistent with definitions you use in your everyday work, others may differ. As such, please refer to this dictionary when identifying, preparing, calculating and collating data from the patient's medical record, and before you submit your responses.

3 qSOFA, pSOFA, other tools and conversion formulas

Depending on the patient's age and setting, you will be required to score the patient using qSOFA, pSOFA or another set of variables. Please review these tools in **Appendix B** prior commencing the data collection.

Depending on the setting of the patient during the admission / presentation of interest, you may find some recorded variables need to be converted for you to apply a pSOFA score. Conversion examples are shown in **Appendix B.** While the conversions provided may be consistent with what you use in your everyday work, for others it may differ. As such, please refer to these formulas when calculating and collating data from the patient's medical record before you submit your responses.

4 Where to find data?

Depending on the jurisdiction of your hospital or service, exact locations of where you may find the data can vary. Please ensure you are familiar with your electronic medical record server and consider paper notes that might consist of relevant information during that patient's admission / presentation in hospital.

Some examples would be:

- Progress notes could be viewed on paper notes, ContinuousDocs, Documentation or Clinical Notes. For NSW Health, please consider looking at eRIC if the patient was in ICU
- Medications could be viewed on medications administration record (MAR), MAR summary, medication lists or medication charts
- Blood cultures could be viewed on results, pathology or reports
- Observations could be viewed on BTF Observation chart, Flowsheet and iView.

5 What happens to the data?

The data collected during the Sepsis MRR study will be used to analyse the current volume of diagnosed and suspected sepsis cases across the country in our hospital and pre-hospital setting. Information collected will not be used for any other purpose than this Sepsis MRR study. This includes for compliance purposes. This study is subject to ethics approval.

Data collection and submission

The following section provides information about how to prepare, collect and input data for the Sepsis MRR study. A step-by-step guide will follow to provide guidance on how to complete the data collection.

The online data collection is in the form of a survey with a list of questions that are contingent to the medical record you will be reviewing.

You will be emailed a dedicated login and password to commence the medical record reviews. This login has specific files assigned to each reviewer therefore each login and password is unique. If you

have not received your login details, please contact the Commission's Sepsis project team on sepsis@safetyandquality.gov.au or call Chris Boyd-Skinner on 0437 720 390.

Preparing for the medical record review

It is suggested that you take the following steps to prepare for the data collection:

- Attend the online training session:
  - An online training session will be held prior to the commencement of data collection. You will receive information via email about how to register for the online training session.
  - The online training session will also be recorded and accessible throughout the data submission period. Should you be unable to attend the training session or wish to refer to the online training session at any stage, please refer to the recording for guidance.
- Test your dedicated login and password on the online data collection link to ensure you can access the surveys.

The Commission's Sepsis Project Team will be available via phone and email to help you through the data submission process.

How to use the online survey tool

Prior to starting the any medical record reviews, please be sure to have familiarised yourself with the data definitions (**Appendix A**), as well as qSOFA, pSOFA, conversion formulas and other information (**Appendix B**).

The length of time it will take to undertake each medical record review will vary depending on the length of that patient's admission / presentation and the complexity of their medical record. Some patients will have paper notes and/or electrical medical records for review during that admission / presentation so please ensure you review all documentation associated with that patient's admission / presentation timeframe.

Each review does not need to be completed in a single sitting. If you need to stop or step away from your computer, the online tool will save your progress. When you log back in, that medical record will come up with the status 'in progress'. If you then select that medical record, the tool will take you back to where you had progressed to in the survey. The questions in the survey are mandatory so you will not be able to submit the survey until all required questions are completed.

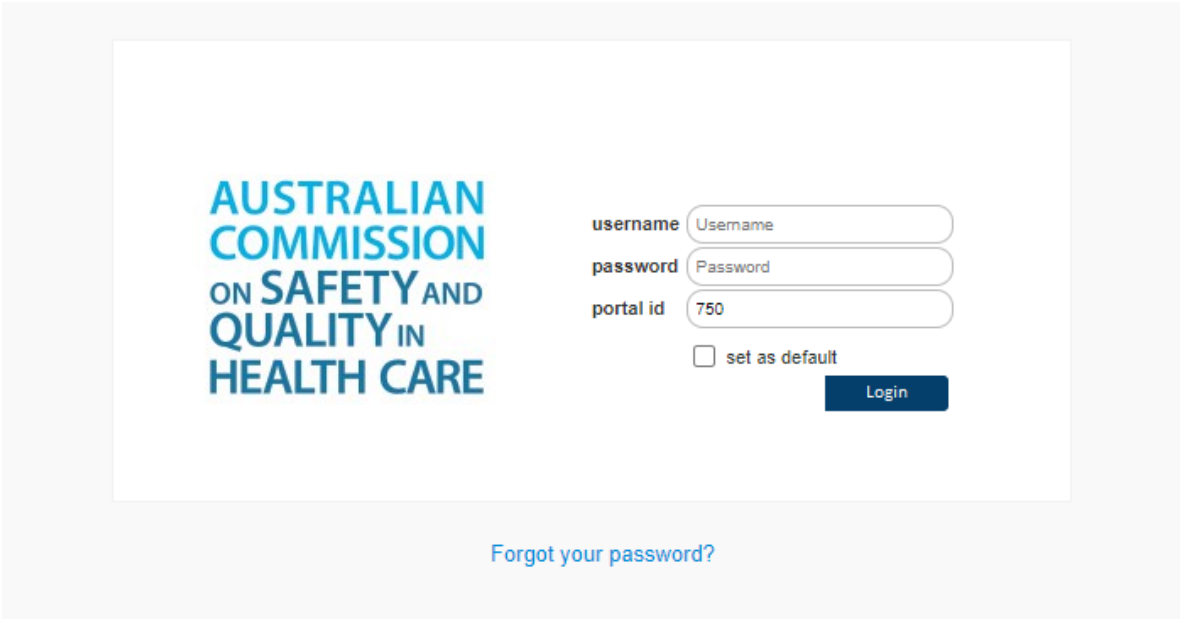
Below is a step by step guide on how to enter your responses into the online data collection tool:

Step 1: Click on the link to the online data submission tool

You will have received a link to the online data collection tool via an email from the Commission's Sepsis Project team. Click on the link contained in the email to open the online data submission tool.

Step 2: Login page

The login screen will require you to enter using your unique username and password. The screen will appear like this:



Please enter your unique username and password then select ‘Login’. If you forget your password please follow the prompt on the page. For any other problems, please contact the Commission.

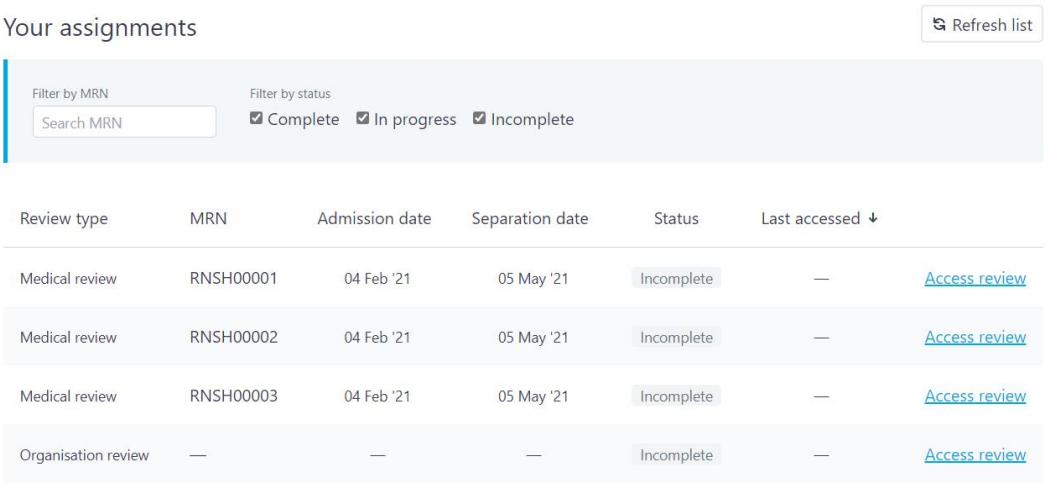
Step 3: Your assignment page

Once you have logged in, your assignment page will appear with a list of MRNs assigned to you for review, along with their MRN, admission date, separation date, status of completion for that patient record (i.e. complete or in progress or incomplete), and date last accessed.

The ‘review type’ column will show differently depending on your role you login as (i.e. clinical reviewer or coding reviewer).

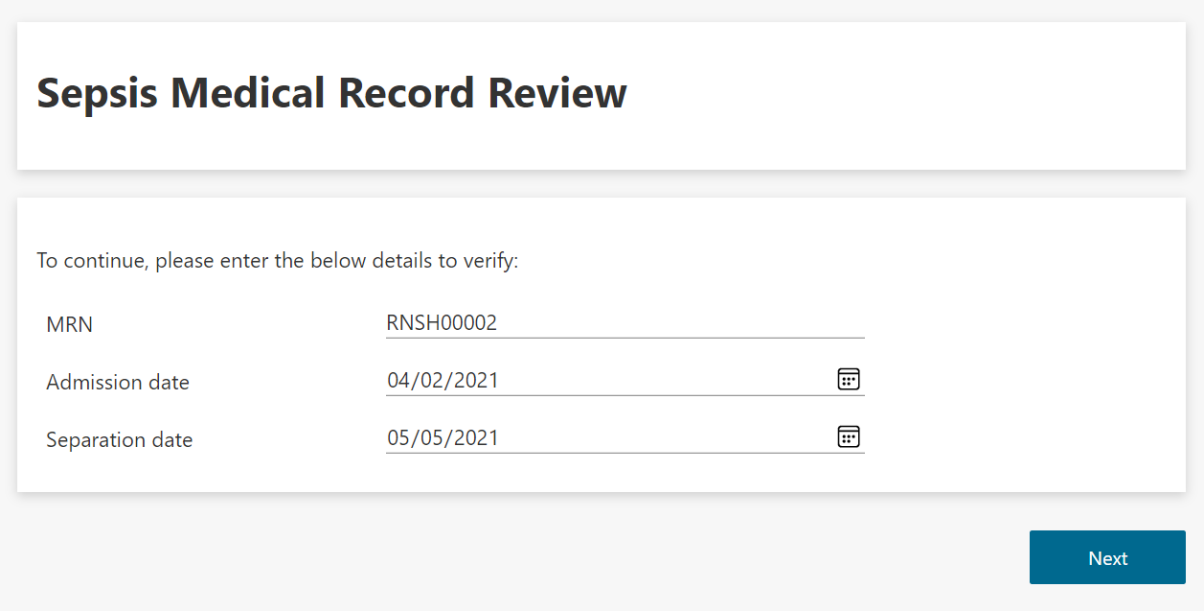
For a clinical reviewer, you will see a list of medical records to review. Some clinical reviewers may also be assigned an organisation review. The organisation review will only be assigned to one reviewer at each hospital or service.

For a coding reviewer, you will see a list of coding reviews.



Step 4: Verify patient file

Once you click on ‘Access review’ for a particular medical record, it will take you to a verification screen.



Please enter the MRN, admission date and separation date to verify the patient record you are reviewing and select 'Next'. If the details are answered incorrectly, the page will request you to make another attempt.

Step 5: Start the survey

Once patient record is verified, the page will load the set of questions. The questions presented to you will depend on your role as the reviewer (i.e. clinical or coding reviewer), the setting of your patient (i.e. hospital or pre-hospital) and the patient's age (i.e. adult [18+ years of age] or paediatrics [<18 years of age]). You do not have to choose a particular question set – the relevant questions will automatically appear.

Step 6: Question response fields

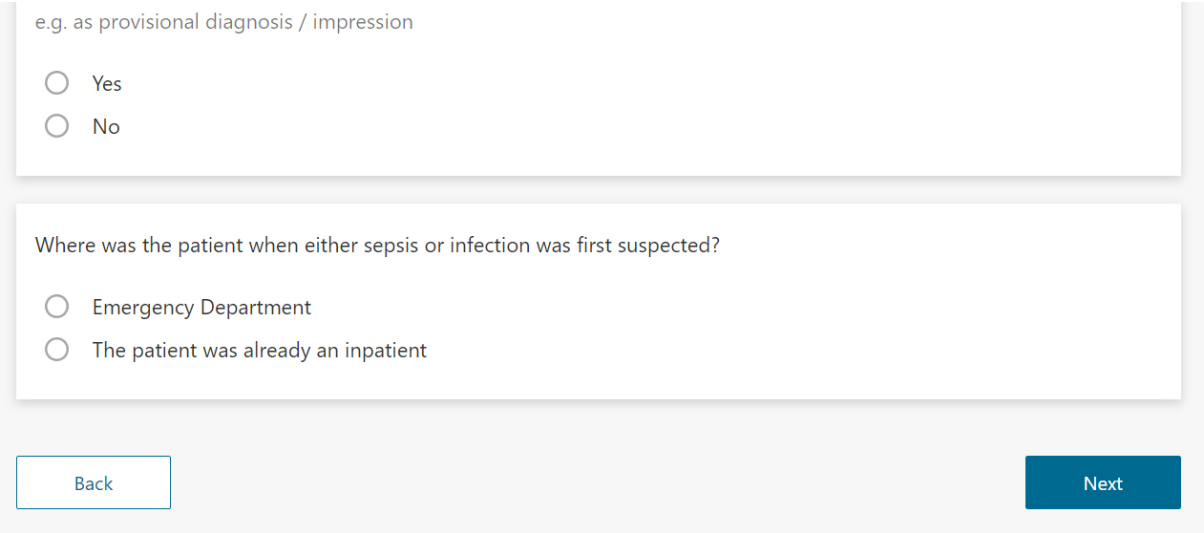
Most questions in the survey have set (closed) response options only. These may include response options such as

- Time and date - HH:MM and DD/MM/YYYY
- Radio-buttons - O
- Checkbox with multiple selections option - ☐

Some questions may have options to enter in text.

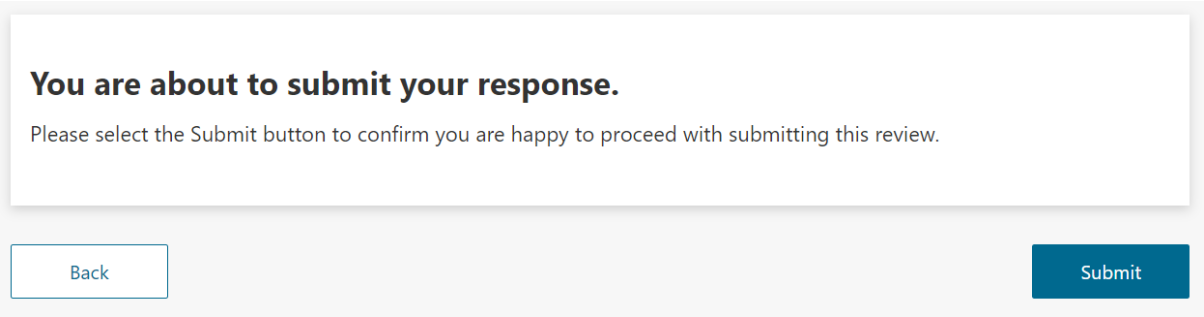
Step 7: Navigating between pages

You are able to navigate between pages in each medical record review by hitting 'back' or 'next'.

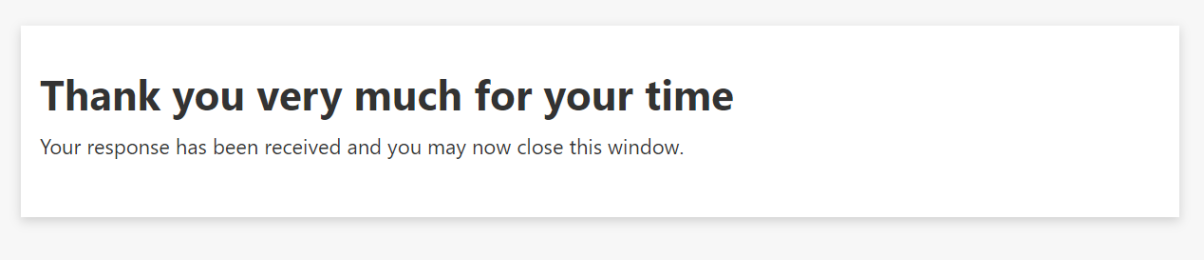


Step 8: Complete responses and submit

Once you have reached the end of the medical record review for the assigned medical record, you will be prompted with this box. Once you have submitted your responses, you will not be able to make any changes.

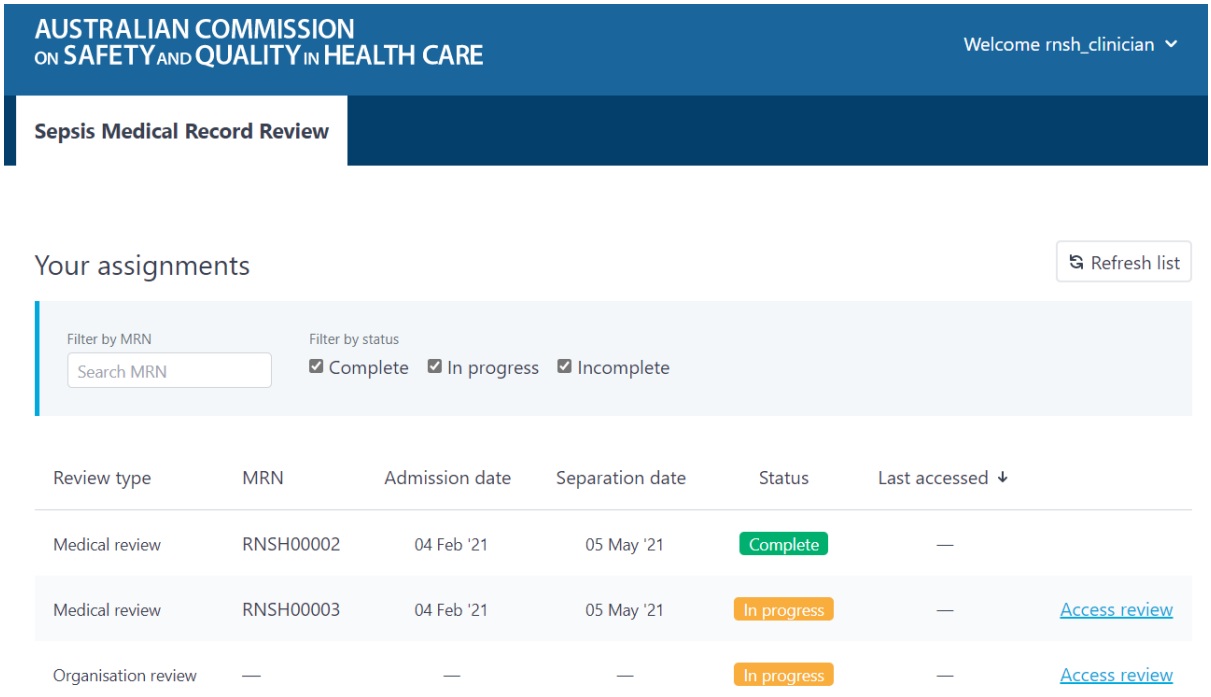


Once you click ‘Submit’, your response will be recorded, and the screen will prompt you to close to window and go back to main screen.



Step 9: Return to your assignment page

Once you close the tab, you will return to your assignment page as depicted below and the patient medical record review will display a green “completed” status (you may need to refresh depending on your browser).


AUSTRALIAN COMMISSION
ON SAFETY AND QUALITY IN HEALTH CARE
Welcome rnsh_clinician
Sepsis Medical Record Review
Your assignments
Refresh list
Filter by MRN
Search MRN
Filter by status
Complete
In progress
Incomplete
Review type
MRN
Admission date
Separation date
Status
Last accessed
Medical review
RNSH00002
04 Feb '21
05 May '21
Complete
—
Medical review
RNSH00003
04 Feb '21
05 May '21
In progress
—
Access review
Organisation review
—
—
—
In progress
—
Access review

Appendix A: Data Dictionary

This appendix list consists of the terms used in the survey of the online collection tool. Please read this appendix prior to beginning your survey.

The series of questions will depend on the reviewer (i.e. clinical or coder), the setting they are in (i.e. hospital or pre-hospital) and the individual patient medical record (i.e. adult or paediatrics [under 18 years of age]). Some reviewers may also have an additional organisational set of survey questions that only need to be completed once for each hospital or service.

Terms	Definitions
Acute medical unit	Short stay medical / surgical unit designed to provide high quality and timely care for patients in the first 24-48 hours in hospital.
Admission	A medical decision for the need for inpatient care is made by an appropriately qualified decision maker.
Admitted	Undergoing an inpatient process to receive treatment and/or care.
Admitting consultant	The most senior grade doctor in a specialty that the patient is admitted into hospital under.
Adult	Any patient 18 years of age and over.
Antimicrobial agent	When an antimicrobial is provided to the patient to treat the growth of microorganisms (i.e. bacteria, fungi, virus).
Australian Triage Scale (ATS)	ATS 1 – Immediate simultaneous assessment and treatment. ATS 2 – Assessment and treatment within 10 minutes (often simultaneous). ATS 3 – Assessment and treatment start within 30 minutes. ATS 4 – Assessment and treatment start within 60 minutes. ATS 5 – Assessment and treatment start within 120 minutes.
Blood culture	A laboratory test to check for bacteria, yeast, fungi, or other microorganisms in the blood.
Bolus	A large defined volume of hypotonic/hypertonic/isotonic fluid given intravenously and rapidly at one time.
Discharge	When a person is well enough to move from hospital to home or to a rehabilitation service or a care facility.
End-of-life care	Care services and pathway to support people who are in the last months or years of their life.
Immunocompromised	Impaired immune system.
Local sepsis pathway	An established sepsis guideline in your health entity.
Medical emergency team	Comprises of a team of doctors and nurses with advanced life support skills, which are hospital based, who respond to emergency calls following a deterioration in a patient's clinical condition.
Medical officer	A Doctor of Medicine who is responsible for the medical care of a particular group of people.
Medical record	The document that explains all detail about the patient's history, clinical findings, diagnostic test results, pre and postoperative care, patient's progress and medication.

Neutropaenia or recent chemotherapy	When patient has known neutropenia or has had chemotherapy within the last four weeks.
Paediatric	Any patient under 18 years of age.
Pre-hospital	A community setting where the patient is under care and/or assessment with paramedics and the ambulance service.
pSOFA	Paediatric Sequential Organ Failure Assessment
pSOFA criteria	Score of two or more if patient is in emergency otherwise a change in score of 2 or more if the patient is an inpatient.
qSOFA	Quick Sequential Organ Failure Assessment
qSOFA criteria	Score of two or more.
RACF	Residential Aged Care Facilities
Senior clinician	Depending on the hospital, this could mean a medical officer with more experience or a medical officer in a require specialty.
Serum lactate	Measures the amount of lactic acid in the blood and is a sensitive and reliable indicator of tissue hypoperfusion and hypoxia.
Specialty	Branch of medical practice that is focused on a defined group of patients, diseases, skills of philosophy (e.g. geriatrics, infectious diseases, general medicine, general surgery)
Supported accommodation	Homes for individuals who have a disability or require heavy assistance.
Transfer	When a person moved from setting to another setting (i.e. ward to intensive care unit, one hospital to another hospital).

Appendix B: qSOFA, pSOFA, tools and conversion

This appendix contains the qSOFA and pSOFA variables used to assign a score to aspects of care the patient receives in their specific setting. There are also worked examples for conversion of data you may collect to determine the pSOFA score for certain variables.

Using qSOFA

In both the hospital and pre-hospital setting for the adult survey, you will be asked to calculate a score using qSOFA (Quick Sequential Organ Failure Assessment). You will be asked whether the patient meets two or more of the following variables? And if so, when?

The qSOFA tool requires you to consider three observations – blood pressure, mental state (GCS) and respiratory rate. If the patient's medical record indicates that they meet at least two of these criteria (outlined below), you should answer 'yes' to this question.

qSOFA variable	qSOFA criteria	Score
Systolic blood pressure	≤ 100mmHg	1
Altered mental status	Glasgow Coma Scale < 15	1
Respiratory rate	≥ 22	1

Using pSOFA

In a hospital setting for paediatric patients, you will be asked to calculate a score using pSOFA (Paediatric Sequential Organ Failure Assessment).

You will be asked to use the tool to determine if:

- They are a patient in emergency and have a pSOFA score of ≥2 - driven by one or a combination of any of the variables listed in the table below - on the basis that their baseline score is zero
- They are an inpatient and have a change in their pSOFA score of ≥2, driven by a change in one or a combination of any of the variables listed in the table below, over a 24 hour period.

To determine the patient's pSOFA score, please review the medical record to gather information about the patient's observations for the variables listed in the table below. As the question within the survey tool only askes about a score of 2 or a 'change' of score by 2, you may not need to look at all variables; if for example the patient presents to the ED with platelets of 25, they will immediately be given a score of '3' and you do not need to look at further observations to answer the question.

In choosing which variables to examine first, please also consider what calculations you might need to undertake to determine the score. While some variables (e.g. platelets or bilirubin) require you only to find the blood test results, for other variables (e.g. respiratory) you will need to undertake a calculation (i.e. SpO_2: FiO_2 or PaO_2: FiO_2 ratios). You may therefore find it quicker to first look for simple variables, prior to moving on to those variables requiring calculation, where possible.

Information on converting respiratory and cardiovascular measures to calculate a pSOFA score is provided below.

Please note, pSOFA scores will not be required to be calculated in the pre-hospital setting for paediatric patients.

Conversion of pSOFA score for respiratory

Calculating the score for the respiratory variable in pSOFA will require determining either the PaO2: FiO2 ratio, or the SpO2:FiO2 ratio.

If you need to convert O2 flow to FiO2, please use the following table.

2 Estimating FiO_2

Method	O_2 flow (l/min)	Estimated FiO2 (%)
Nasel cannula	1	24
	2	28
	3	32
	4	36
	5	40
	6	44
Nasopharyngeal catheter	4	40
	5	50
	6	60
Face mask	5	40
	6-7	50
	7-8	60
Face mask with reservoir	6	60
	7	70
	8	80
	9	90
	10	95

Outlined below is a 'worked example' of how to determine the pSOFA score for respiratory, using the SpO2: FiO2 ratio.

A patient's medical record conveys that the patient was saturating at 90% on deterioration. The patient was administered oxygen via a nasopharyngeal catheter with an O_2 flow at 4L/min. What was the pSOFA score for this variable?

		Conversion of O2 to FiO2
1)	SpO_2 = 90%	O_2 → FiO_2: 4 L/min = 40% = 0.4
2)	$SpO_2:FiO_2 = \frac{90}{0.4}$ = 225	
Therefore, the score is 2 for the respiratory part of pSOFA		

Conversion of pSOFA score for cardiovascular

Please use the following formula to convert systolic and diastolic blood pressure to mean arterial pressure.

$$\boldsymbol{Mean\ arterial\ pressure} = \frac{1}{3}\ systolic\ blood\ pressure + \frac{2}{3}\ diastolic\ blood\ pressure$$

Outlined below is a 'worked example' of how to determine the pSOFA score for cardiovascular.

A patient's medical record conveys that the patient at 20 months of age had a systolic blood pressure at 82 and diastolic blood pressure of 45. Two units of dopamine hydrochloride was given. What was the pSOFA score for this variable?

$$\boldsymbol{Mean\ arterial\ pressure} = \frac{1}{3} x\ 82 + \frac{2}{3}\ x\ 45$$

$$= 27.333 + 30$$

$$= 57.3\ mmHg$$

Therefore, the score is 2 for the cardiovascular part of the pSOFA

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