

# Sepse

časný záchyt a léčba  
v přednemocniční péči

Ivana Zýková

ARO a Urgentní příjem, FN Bulovka

ZZS LK



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# Sepsis

# incidence

3 May 2024

## Key facts

- Sepsis is one of the most frequent causes of death worldwide, but there are challenges in collecting reliable data at the population level (1).
- From data published in 2020, there were 48.9 million cases and 11 million sepsis-related deaths worldwide, representing 20% of all global deaths (2).
- Almost half (20 million) of all estimated sepsis cases worldwide occurred in children under 5 years of age.
- For every 1000 hospitalized patients, an estimated 15 patients will develop sepsis as a complication of receiving health care.
- While sepsis can affect any individual worldwide, significant regional disparities in incidence and mortality exist with the highest rates in lower-middle-income countries (LMICs) (2).
- Sepsis is costly; the average hospital-wide cost of sepsis was estimated to be more than US\$ 32 000 per patient in high-income countries (3).

# Sepsis



arises when the body's response to an infection injures its own tissues and organs. It may lead to shock, multiple organ failure, and death, especially if not recognized early and treated promptly.

**Stage 1**

**From a local infection to a general inflammation**

A local infection – e.g. in the lung – overcomes the body's local defense mechanisms. Pathogenic germs and the toxins they produce leave the original site of the infection and enter the circulatory system.

**Stage 2**

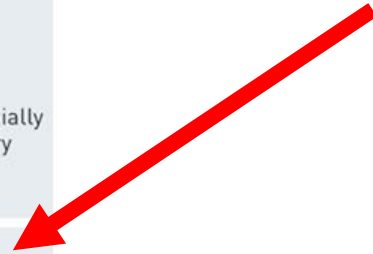
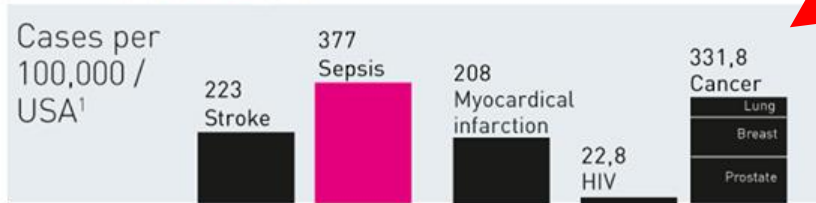
**Organ dysfunction**

This leads to a general inflammatory response: **SIRS** (systemic inflammatory response syndrome). The function of individual organs starts to deteriorate and may completely fail. Sepsis starts with the onset of at least one new organ dysfunction.

**Stage 3**

**Septic Shock**

Several organs stop functioning sequentially or simultaneously, and cardio-circulatory failure leads to a sudden drop in blood pressure. This is called septic shock.

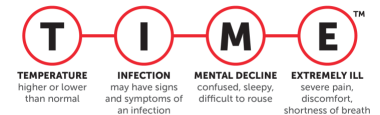


© world-sepsis-day.org | made by Lindgruen-GmbH  
1. Sepsis: Hill MJ, Williams SN, DaFrancos CJ, Golosinsky A. Inpatient care for septicemia or sepsis: A challenge for patients and hospitals. NCHS data brief, no. 42. Hyattsville, MD: National Center for Health Statistics; 2011. | Cancer: <http://apps.nccd.cdc.gov/inicio/hopie/cancers.aspx>. | In: Park, Sridhar S, Chandra M, et al. Population trends in the incidence and outcomes of acute myocardial infarction. N Engl J Med. 2012;367:2155-2163. | Stroke: Fugère VL, Lawes CM, Bennett DA, et al. Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review. Lancet Neurol. 2012;11:788-798. | HIV: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2919237/> [tool-pubmed] (2006)

## Human Cost:

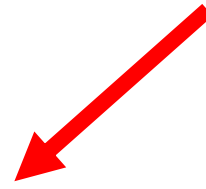
- Sepsis affects an estimated 49 million people worldwide each year, including more than 20 million children under age 5, and nearly 5 million older children and adolescents (ages 5-19).<sup>16</sup>
- Sepsis takes 11 million lives around the world each year, contributing to 20% of all deaths globally and taking more lives than cancer.<sup>16, 17</sup> This is more than 20 deaths every minute.<sup>18</sup>
- More than 1.7 million people in the U.S. are diagnosed with sepsis each year – one every 20 seconds – and the incidence is rising.<sup>2, 19, 20</sup>
- An estimated 350,000 adults die from sepsis every year in the U.S. – one every 90 seconds. This is more than those who die from stroke, prostate cancer, breast cancer, and opioid overdose combined.<sup>2, 21, 22, 23</sup> This includes 270,000 adults who die in-hospital and an estimated 80,000 released to hospice.<sup>2</sup>
- Each year, more than 75,000 children in the U.S. develop severe sepsis and 6,800 of these children die, more than from pediatric cancers.<sup>24, 25</sup>
- Sepsis causes at least 261,000 maternal deaths every year worldwide and is driving increases in pregnancy-related deaths in the U.S.<sup>26, 27</sup>
- Sepsis in the U.S. disproportionately affects the Black community; Blacks bear nearly twice the burden of sepsis deaths, relative to the Black population, as whites.<sup>28, 29, 30</sup>
- Approximately 1% of sepsis survivors undergo one or more surgical amputations of a limb or digit as a result of sepsis.<sup>31, 32</sup> In 2012, there were more than 13,700 sepsis-related amputations in the U.S. This works out to an average of 38 amputations per day.<sup>33</sup>
- Sepsis survivors have a shortened life expectancy, are more likely to suffer from an impaired quality of life, and often experience worsened cognitive (mental) and physical function.<sup>6, 20, 34, 35, 36</sup>
- Missed infections are the third most common cause of diagnostic errors identified in medical malpractice cases. Sepsis is the most common condition among missed infections in diagnostic errors.<sup>37</sup>

When it comes to sepsis, remember  
**IT'S ABOUT TIME™**. Watch for:



If you experience a combination of these symptoms, seek urgent medical care, call 911, or go to the hospital with an advocate. Ask: "Could it be sepsis?"

SEPSIS.



### Economic Cost:

- Sepsis is the #1 cost of hospitalization in the U.S.<sup>38</sup> Costs for acute sepsis hospitalization and skilled nursing are estimated to be \$62 billion annually.<sup>39</sup> This is only a portion of all sepsis-related costs, since there are substantial additional costs after discharge for many.
- The average cost per hospital stay for sepsis is double the average cost per stay across all other conditions.<sup>40</sup>
- Sepsis is the #1 cause of readmission to the hospital, costing more than \$3.5 billion each year.<sup>5, 40</sup>



### Awareness:


- An estimated 34% of U.S. adults have NEVER heard of sepsis.<sup>41</sup>

To find out more please visit [Sepsis.org](https://www.sepsis.org)

When it comes to sepsis, remember  
**IT'S ABOUT TIME™**. Watch for:

<b>T</b>	<b>I</b>	<b>M</b>	<b>E</b> ™
<b>TEMPERATURE</b> higher or lower than normal	<b>INFECTION</b> may have signs and symptoms of an infection	<b>MENTAL DECLINE</b> confused, sleepy, difficult to rouse	<b>EXTREMELY ILL</b> severe pain, discomfort, shortness of breath

If you experience a combination of these symptoms: seek urgent medical care, call 911, or go to the hospital with an advocate. Ask: "Could it be sepsis?"

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# Surviving Sepsis Campaign

Surviving Sepsis Campaign

Society of  
Critical Care Medicine



*The Intensive Care Professionals*

## Surviving Sepsis Campaign

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Zpráva



Timeline

**Informace**

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## Antibiotic Timing

	Shock is present	Shock is absent
<b>Sepsis is definite or probable</b>	<input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition.	<input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition.
<b>Sepsis is possible</b>	<input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition.	<input checked="" type="checkbox"/> Rapid assessment* of infectious vs. noninfectious causes of acute illness.  <input checked="" type="checkbox"/> Administer antimicrobials <b>within 3 hours</b> if concern for infection persists.

\*Rapid assessment includes history and clinical examination, tests for both infectious and noninfectious causes of acute illness, and immediate treatment of acute conditions that can mimic sepsis. Whenever possible, this should be completed within 3 hours of presentation so that a decision can be made as to the likelihood of an infectious cause of the patient's presentation and timely antimicrobial therapy provided if the likelihood is thought to be high.

Guidelines | Published: 02 October 2021

## Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021

Laura Evans , Andrew Rhodes, Waleed Alhazzani, Massimo Antonelli, Craig M. Coopersmith, Craig French, Flávia R. Machado, Lauralyn Mcintyre, Marlies Ostermann, Hallie C. Prescott, Christa Schorr, Steven Simpson, W. Joost Wiersinga, Fayez Alshamsi, Derek C. Angus, Yaseen Arabi, Luciano Azevedo, Richard Beale, Gregory Bellomo, Emilio Bellomo, G. Lisa Burns, Maurizio Cassini, Jaka Centofanti, Angel Coz Yata

Intensive Care  
525k Accesses

### Introduction

Sepsis is life-threatening infection [1]. It affects 27 million people around the world each year and is a leading cause of death and development

Surviving Sepsis Campaign®

## Vasoactive Agent Management

	<input checked="" type="checkbox"/> Use norepinephrine as first-line vasopressor.
<i>For patients with septic shock on vasopressors</i>	<input checked="" type="checkbox"/> Target a MAP of 65 mm Hg. <input type="checkbox"/> Consider invasive monitoring of arterial blood pressure.
<i>If central access is not yet available</i>	<input type="checkbox"/> Consider initiating vasopressors peripherally.*
<i>If MAP is inadequate despite low-to-moderate norepinephrine</i>	<input type="checkbox"/> Consider adding vasopressin.
<i>If cardiac dysfunction with persistent hypoperfusion is present despite adequate volume status and blood pressure</i>	<input type="checkbox"/> Consider adding dobutamine or switching to epinephrine.

● Strong recommendations are displayed in green  
● Weak recommendations are displayed in yellow.

\*When vasopressors are used peripherally, they should be administered only for a short period of time and in a vein proximal to the antecubital fossa.



## History

Campaign's history Since its

Original Stated Goal of Campaign  
To reduce mortality from sepsis  
including:

- Building awareness
- Improving diagnosis
- Increasing the use of
- Educating healthcare providers
- Improving post-ICU care
- Developing guidelines of care
- Implementing a performance improvement

7-point agenda

Implementace,  
změna chování, sběr dat

guidelines

Phase I

Phase II

Phase III

Phase IV

Phase I: Development of Awareness of Scope of the Problem

2002

activities, a sepsis definitions conference

2001 to determine if new data existed to inform updates

Levy MM, Fink MP, Marshall JC, et al

SIS International Sepsis Definitions Conference.

Care Medicine, European

medicine, and the International Sepsis Forum

in Fall 2002 with pre

guidelines and promote sign-on to

- Steering

societies.

January 2003

- Executive committee meeting held in Amsterdam

February 2003

- Survey of global public awareness of sepsis presented at SCCM's 32nd Critical Care Conference in San Antonio, Texas.

Povědomí o problému



Sepsis is the most common pathway to death following an infection. It can be avoided.

But only with your help.



Us

Sepsis Facts

Goals & Actions

Supporters

Info & Tools

Press & News

World Sepsis Day 2015 | Archive | Galleries

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POLAND

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UNITED KINGDOM

North America

CANADA

GUATEMALA

MEXICO

UNITED STATES

South America

BRAZIL

COLOMBIA

COSTA RICA

ECUADOR

PERU

World

INTERNATIONAL

September 13 2015 | World Sepsis Day

Bases e Inscripción

Se realizará en categoría única (tesis, divisa, etc.), podrán participar todos los asistentes al simposium (al menos uno de los autores deberá estar inscrito al simposium), el tema central de todos los trabajos debe ser relacionado a la Sepsis en cualquier área de la medicina.

INSCRIPCIÓN

Enviar resumen en electrónico (Word, Pages, PDF) letra arial 11, extensión máxima de 2 páginas, espacio sencillo, con márgenes 2.5 cm por cada lado, con el contenido antes mencionado, desde la publicación de la presente hasta el 31 de julio de 2015, a: registro.nacional.sepsis@gmail.com

Los trabajos aceptados para presentación en cartel serán notificados por correo electrónico durante agosto de 2015. La información contenida en el cartel deberá tener el nivel de investigación (no divulgación científica ni comunicaciones preliminares), el contenido: título, autores (por apellido) con adscripción, introducción, justificación, metodología, resultados, conclusión y perspectivas, bibliografía (según Vancouver), datos de contacto; deberán tener dimensiones de: ancho 90 cm, alto 120 cm (vertical).

Concurso de CARTELES WSD'15

Hospital Juárez de México

Thu, 04 Sep 2014 - 08:00

Instituto Politécnico Nacional 07370 México

... Show on map

Invitamos a todos a participar en el CONCURSO DE CARTELES...



2nd Annual In Loving Memory of Jeffrey Ray Davis 5K for Sepsis Awareness

Monument Valley Park

Sat, 27 Jun 2015 - 10:00

170 W. Cache La Poudre Blvd. 80903 Colorado Springs

... Show on map



Click here to sign the



**sign**  
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**Declaration**



World Sepsis Day



Ivana

Hlavní stránka

20+

Vyhledat přátele



13

September

world wide

sepsis webinar #wwsw

[www.world-sepsis-day.org/wwsw](http://www.world-sepsis-day.org/wwsw)



**World Sepsis Day**

Nezisková organizace

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Zpráva



Timeline

Informace

Fotky

To se mi líbí

Další

Chybí data!!

# 03 NUMBER OF DEATHS

Between 2015 and 2020, governments in Scotland and Wales reported national mortality rates of 20% and 24% respectively. In 2018, Professor Sir Brian Jarman reported mortality rates in England to be just below 20%.

If we apply a 20% mortality rate across the estimated 250,000 people developing sepsis annually in the UK, we would estimate that we see 50,000 deaths each year. The Global Burden of Disease team estimate from 2020 for the UK was similar, suggesting 48,500 deaths in the UK per year. In 2022, the Academy of Medical Royal Colleges suggested a higher number of deaths at 66,096 each year.

It seems highly likely that, across the UK, sepsis claims 48,500 lives per year.

**SEPSIS CLAIMS MORE LIVES THAN LUNG  
CANCER, AND MORE THAN BOWEL, BREAST  
AND PROSTATE CANCER COMBINED**

---

20% mortalita UK po  
10 letech kampaně

Incidence sepse/rok:  
250 000 UK  
38 000 ČR ???

Mortalita sepse/rok:  
50 000 UK  
8 000 ČR ???

# Sepsis



## Awareness

Have you ever heard the term "Sepsis"?

**NO**

50%

46%

60%

71%

79%

93%

**YES**

49%

44%

40%

29%

21%

7%

Germany

USA

UK

Canada

Sweden

Brazil

# Proč v přednemocniční péči?


## Critical Facts:

- Sepsis is the leading cause of death in U.S. hospitals.<sup>1</sup>
- Approximately 6% of all hospitalizations are due to sepsis and 35% of all deaths in-hospital are due to sepsis.<sup>2</sup>
- Sepsis can be caused by any infection, whether fungal, viral, parasitic, or bacterial, and not all of these pathogens can be cultured. In up to half of septic patients, no pathogen is identified.<sup>3</sup>
- Sepsis is the leading cause of readmissions to the hospital, with as many as 19% of people originally hospitalized with sepsis re-hospitalized within 30 days and about 40% rehospitalized within 90 days.<sup>4, 5, 6</sup>
- As many as 87% of sepsis cases originate in the community and not in the hospital.<sup>2</sup>
- The risk of mortality from sepsis increases by 4-9% for every hour treatment is delayed.<sup>7, 8, 9</sup> As many as 80% of septic shock patients can be saved with rapid diagnosis and treatment.<sup>7</sup>
- Viral sepsis is the most common complication in severe COVID-19, and is more commonly seen in hospitalized COVID-19 patients than hospitalized influenza patients.<sup>10, 11, 12, 13, 14</sup> Studies indicate that 78% of COVID-19 patients hospitalized in the intensive care unit have sepsis.<sup>15</sup>

When it comes to sepsis, remember  
**IT'S ABOUT TIME™**. Watch for:

<b>T</b>	<b>I</b>	<b>M</b>	<b>E</b> ™
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If you experience a combination of these symptoms: seek urgent medical care, call 911, or go to the hospital with an advocate. Ask: "Could it be sepsis?"

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# Sepse

- Obtížná časná diagnostika – nespecifické příznaky (oproti jiným onemocněním s nutností častého zachytu)
- Algoritmus na zachyt sepse – skorovací systémy – užíváno více typů



**Research Article | Open Access**

Volume 2016 | Article ID 6717261 | <https://doi.org/10.1155/2016/6717261>

[Show citation](#)

# Paramedic Recognition of Sepsis in the Prehospital Setting: A Prospective Observational Study

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**Robert S. Green**  ,<sup>1,2</sup> Andrew H. Travers,<sup>3,4</sup> Edward Cain,<sup>3</sup> Samuel G. Campbell,<sup>3</sup> Jan L. Jensen,<sup>3,4</sup> David A. Petrie,<sup>3</sup> Mete Erdogan,<sup>2</sup> Gredi Patrick,<sup>5</sup> and Ward Patrick<sup>1</sup>

[Show more](#)

**Academic Editor:** Rade B. Vukmir

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<b>Received</b> 22 Dec 2015	<b>Accepted</b> 17 Feb 2016	<b>Published</b> 09 Mar 2016
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# BMJ Open Identification of adults with sepsis in the prehospital environment: a systematic review

Michael A Smyth,<sup>1,2,3</sup> Samantha J Brace-McDonnell,<sup>1,4</sup> Gavin D Perkins<sup>1,4</sup>

## INTRODUCTION

Sepsis is a systemic response to infection, which may progress to severe sepsis and septic shock.<sup>1</sup> In the UK, there are an estimated 102 000 cases of severe sepsis each year resulting in >37 000 deaths.<sup>2</sup> It has been reported that more than two-thirds of severe sepsis cases are initially seen in the emergency department (ED)<sup>3</sup> and around half of ED

Table 3 Variables used in screening tools

Author (screening tool)	Variable											
	Respiratory rate*	Heart rate*	Temperature*	LOC†	SpO <sub>2</sub> †	Blood pressure†	Lactate†	Blood glucose†	Skin CBRT	Dispatch category	Location	Age
Seymour (CIS)	•	•			•	•				•		
Polito (PRESS)			•		•	•					•	•
Bayer (PRESEP)	•	•	•		•	•						
Wallgren (Robson tool)	•	•	•	•			•					
Wallgren (BAS 90-30-90)	•				•	•						
McClelland (modified Robson tool)	•	•	•	•	•		•					
Bayer (MEWS)	•	•	•	•		•						
Erwin (unnamed)	•	•	•	•					•	•		
Guerra (unnamed)	•	•	•			•	•					
Shiuh (unnamed)	•	•	•				•					

\*SIRS criteria.

†Organ dysfunction.


CBRT, capillary bed refill time; CIS, critical illness score; LOC, reduced level of consciousness; MEWS, Modified Early Warning Score; PRESEP, Prehospital Early Sepsis Detection; SIRS, systemic inflammatory response syndrome; SpO<sub>2</sub>, oxygen saturations.

ORIGINAL RESEARCH

Open Access



# Screening tools for sepsis identification in paramedicine and other emergency contexts: a rapid systematic review

Megan De Silva<sup>1</sup>, William Chadwick<sup>1</sup>  and Navindhra Naidoo<sup>1\*</sup>

## Abstract

**Background** Sepsis is a life-threatening condition that contributes significantly to protracted hospitalisations globally. The unique positioning of paramedics and other emergency care cadres in emergency contexts enable the prospect of early identification and management of sepsis, however, a standardised screening tool still does not exist in the emergency setting. The objective of this review was to identify and recommend the most clinically ideal sepsis screening tool for emergency contexts such as emergency departments and out-of-hospital emergency contexts.

**Methods** A rapid review of five databases (Medline, Embase, the Cochrane Library, CINAHL, and ProQuest Central) was undertaken, with searches performed on February 10, 2022. Covidence software was used by two authors for initial screening, and full text review was undertaken independently by each reviewer, with conflicts resolved by consensus-finding and a mediator. Systematic reviews, meta-analyses, randomised controlled trials, and prospective observational studies were eligible for inclusion. Data extraction used an a priori template and focused on sensitivity and specificity, with ROBINS-I and ROBIS bias assessment tools employed to assess risk of bias in included studies. Study details and key findings were summarised in tables. The a priori review protocol was registered on Open Science Framework (<https://doi.org/10.17605/OSF.IO/3XQ5T>).

**Results** The literature search identified 362 results. After review, 18 studies met the inclusion criteria and were included for analysis. There were five systematic reviews, with three including meta-analysis, eleven prospective observational studies, one randomised controlled trial, and one validation study.

**Conclusions** The review recognised that a paucity of evidence exists surrounding standardised sepsis screening tools in the emergency context. The use of a sepsis screening tool in the emergency environment may be prudent, however there is currently insufficient evidence to recommend a single screening tool for this context. A combination of the qSOFA and SIRS may be employed to avoid 'practice paralysis' in the interim. The authors acknowledge the inherent potential for publication and selection bias within the review due to the inclusion criteria.

**Keywords** Sepsis, Paramedicine, Emergency, Screening tools, qSOFA, SIRS

## Background

Sepsis is defined as an emergent, life threatening, immunological response to an infectious process that leads to end-stage multi-organ dysfunction and death [1, 2]. The management of sepsis has improved dramatically over the past two decades; however, the importance of early identification cannot be understated, with an increase in mortality of 7.6% for every 6 h of non-identification [3].

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<sup>1</sup> School of Health Sciences: Paramedicine, Western Sydney University,  
Locked Bag 1797, Penrith, Sydney, NSW 2571, Australia





qSOFA (2)

W.Chan  
2016

## Evidence for Use of Validated Sepsis Screening Tools in the Prehospital Population: A Scoping Review

Rae Denise Oanesa<sup>a,b</sup>, Tom Wen-Han Su<sup>b,c</sup>, and Alexandra Weissman<sup>d</sup>

<sup>a</sup>Department of Epidemiology, Graduate School of Public Health, University of Pittsburgh, P  
Care Medicine, School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania; <sup>c</sup>Depa  
Rehabilitation Science, School of Health and Rehabilitation Sciences, University of Pittsburgh  
Emergency Medicine, School of Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania

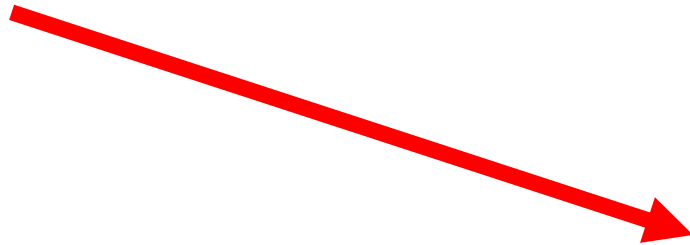
### ABSTRACT

**Introduction:** Early detection and treatment of sepsis improves chances of survival; however, sepsis is often difficult to diagnose initially. This is especially true in the prehospital setting, where resources are scarce, yet time is of great significance. Early warning scores (EWS) based on vital signs were originally developed to guide medical practitioners in determining the degree of illness of a patient in the in-patient setting. These EWS were adapted for use in the prehospital setting to predict critical illness and sepsis. We performed a scoping review to evaluate the existing evidence for use of validated EWS to identify prehospital sepsis.

**Methods:** We performed a systematic search using the CINAHL, Embase, Ovid-MEDLINE, and PubMed databases on September 1, 2022. Articles that examined the use of EWS to identify prehospital sepsis were included and assessed.

**Results:** Twenty-three studies were included in this review: one validation study, two prospective studies, two systematic reviews, and 18 retrospective studies. Study characteristics, classification statistics, and primary conclusions of each article were extracted and tabulated. Classification statistics varied markedly for prehospital sepsis identification across all included EWS: sensitivities ranged from 0.02–1.00, specificities from 0.07–1.00, and PPV and NPV from 0.19–0.98 and 0.32–1.00, respectively.

**Conclusions:** All studies demonstrated inconsistency for the identification of prehospital sepsis. The variety of available EWS and study design heterogeneity suggest it is unlikely that new research can identify a single gold standard score. Based on our findings in this scoping review, we recommend future efforts focus on combining standardized prehospital care with clinical judgment to provide timely interventions for unstable patients where infection is considered a likely etiology, in addition to improving sepsis education for prehospital clinicians. At most, EWS can be used as an adjunct to these efforts, but they should not be relied on alone for prehospital sepsis identification.



# Bylo by to jednodušší...

Box 1: The relationship of lactate level in sepsis to mortality

Lactate	Mortality
<2	15%
2-4	25%
>4	38%

From: Trzeciak S, Dellinger RP, Chansky ME, Arnold RC, Schorr C, Milcarek B, *et al. Intensive Care Med* 2007, 33(6):970-7

# Sepse

Časná léčba v přednemocniční péči

# PH SEPSIS BUNDLE:

## RESUSCITATION & TREATMENT:

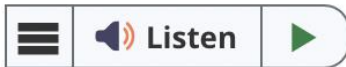
Oxygen to maintain saturations of  $>94\%$  (88% in COPD)  
250ml boluses of Sodium Chloride: max 250mls if  
normotensive, max 2000ml if hypotensive

**CONSIDER IV ANTIBIOTICS IF TRANSIT TIME  $> 1$ h**  
(and if not already given e.g. by GP)



THE UK  
SEPSIS  
TRUST





Editorial

# Usefulness of Prehospital Care for Patients with Septic Shock: Experience and Evidence-Based Medicine Are Mounting

Romain Jouffroy, Papa Gueye, Félix Djossou & Benoît Vivien

Pages 767-768 | Received 09 Jun 2023, Accepted 10 Jun 2023, Published online: 22 Jun 2023

“ Cite this article <https://doi.org/10.1080/10903127.2023.2225093>



Original Contributions

# Prehospital Fluid Administration for Suspected Sepsis in a Large EMS System: Opportunities to Improve Goal Fluid Delivery

Nathaniel S. Miller, Mehul D. Patel , Jefferson G. Williams, Michael W. Bachman, Julianne M. Cyr, José G. Cabañas & ...show all

Pages 769-774 | Received 09 Jan 2023, Accepted 12 Apr 2023, Published online: 27 Apr 2023

 Cite this article  <https://doi.org/10.1080/10903127.2023.2203526>



## Abstract

### Objectives

Despite EMS-implemented screening and treatment protocols for suspected sepsis patients, prehospital fluid therapy is variable. We sought to describe prehospital fluid administration in suspected sepsis patients, including demographic and clinical factors associated with fluid outcomes.

### Methods

A retrospective cohort of adult patients from a large, county-wide EMS system from January 2018-February 2020 was identified. Patient care reports for suspected sepsis were included, and identified by EMS clinician impression of sepsis, or keywords “sepsis” or “septic” in the narrative. Outcomes were the proportions of suspected sepsis patients for whom intravenous (IV) therapy was attempted and those who received  $\geq 500$  mL IV fluid if IV access was successful. Associations between patient demographics and clinical factors with fluid outcomes were estimated with multivariable logistic regression adjusting for transport interval.

## Results

Of 4,082 suspected sepsis patients identified, the mean patient age was 72.5 (SD 16.2) years, 50.6% were female, and 23.8% were Black. Median (interquartile range [IQR]) transport interval was 16.5 (10.9–23.2) minutes. Of identified patients, 1,920 (47.0%) had IV fluid therapy attempted, and IV access was successful in 1,872 (45.9%). Of those with IV access, 1,061 (56.7%) received  $\geq 500$  mL of fluid from EMS. In adjusted analyses, female (versus male) sex (odds ratio [OR] 0.79, 95% confidence interval [CI] 0.69–0.90), Black (versus White) race (OR 0.57, 95% CI 0.49–0.68), and end stage renal disease (OR 0.51, 95% CI 0.32–0.82) were negatively associated with attempted IV therapy. Systolic blood pressure (SBP)  $< 90$  mmHg (OR 3.89, 95% CI 3.25–4.65) and respiratory rate  $> 20$  (OR 1.90, 95% CI 1.61–2.23) were positively associated with attempted IV therapy. Female sex (OR 0.72, 95% CI 0.59–0.88) and congestive heart failure (CHF) (OR 0.55, 95% CI 0.40–0.75) were negatively associated with receiving goal fluid volume while SBP  $< 90$  mmHg (OR 2.30, 95% CI 1.83–2.88) and abnormal temperature ( $> 100.4$  F or  $< 96$  F) (OR 1.41, 95% CI 1.16–1.73) were positively associated.

## Conclusions

Fewer than half of EMS sepsis patients had IV therapy attempted, and of those, approximately half met fluid volume goal, especially when hypotensive and no CHF. Further studies are needed on improving EMS sepsis training and prehospital fluid delivery.

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**ORIGINAL RESEARCH**

Health Science Reports

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WILEY

# Prehospital administration of broad-spectrum antibiotics for sepsis patients: A systematic review and meta-analysis

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Sarya Swed<sup>9</sup>  | Dina M. Awad<sup>2</sup>

# Důležité je avízo na urgent ...zrychlení diagnostiky a léčby

## PH SEPSIS BUNDLE:

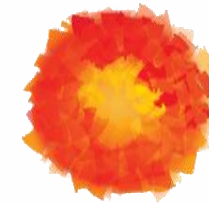
### RESUSCITATION & TREATMENT:

Oxygen to maintain saturations of >94% (88% in COPD)  
250ml boluses of Sodium Chloride: max 250mls if normotensive, max 2000ml if hypotensive

**CONSIDER IV ANTIBIOTICS IF TRANSIT TIME > 1h**  
(and if not already given e.g. by GP)

### COMMUNICATION:

**Pre-alert receiving hospital**  
**Divert to ED (or other agreed destination)**  
**Handover presence of Red Flag Sepsis**



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Article

# Does Prehospital Suspicion of Sepsis Shorten Time to Administration of Antibiotics in the Emergency Department? A Retrospective Study in One University Hospital

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**Abstract:** Early treatment is the mainstay of sepsis therapy. We suspected that early recognition of sepsis by prehospital healthcare providers may shorten the time for antibiotic administration in the emergency department. We retrospectively evaluated all patients above 18 years of age who were diagnosed with sepsis or severe infection in our emergency department between 2018 and 2020. We recorded the suspected diagnosis at the time of presentation, the type of referring healthcare provider, and the time until initiation of antibiotic treatment. Differences between groups were calculated using the Kruskal–Wallis rank sum test. Of the 277 patients who were diagnosed with severe infection or sepsis in the emergency department, an infection was suspected in 124 (44.8%) patients, and sepsis was suspected in 31 (11.2%) patients by referring healthcare providers. Time to initiation of antibiotic treatment was shorter in patients where sepsis or infection had been suspected prior to arrival for both patients with severe infections ( $p = 0.022$ ) and sepsis ( $p = 0.004$ ). Given the well-described outcome benefits of early sepsis therapy, recognition of sepsis needs to be improved. Appropriate scores should be used as part of routine patient assessment to reduce the time to antibiotic administration and improve patient outcomes.

**Keywords:** qSOFA; emergency medical services; screening; scoring; surviving sepsis campaign



**Citation:** Bollinger, M.; Frère, N.; Shapeton, A.D.; Schary, W.; Kohl, M.; Kill, C.; Riße, J. Does Prehospital Suspicion of Sepsis Shorten Time to Administration of Antibiotics in the Emergency Department? A Retrospective Study in One University Hospital. *J. Clin. Med.* **2023**, *12*, 5639. <https://doi.org/10.3390/jcm12175639>

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## 1. Introduction

Early treatment is one of the pillars of sepsis therapy [1], with many studies demonstrating worse outcomes when initiation of treatment is delayed [2,3]. Sepsis and its resultant long-term sequelae are a leading cause of critical illness and mortality worldwide. Additionally, sepsis and its downstream sequela are associated with high healthcare costs [4]. Given these high stakes, recent efforts have been made to identify this pathology earlier and reduce the time to initiation of antibiotic therapy. The goal of these efforts is to ultimately reduce the morbidity and mortality associated with sepsis.

Current guidelines recommend the administration of antimicrobials immediately, ideally within the first hour, in patients with possible septic shock or a high likelihood of sepsis. For patients with possible sepsis but without signs of shock, administration of antimicrobials is recommended within the first three hours after recognition [1].

To the best of our knowledge, data are unavailable on whether prehospital suspicion of sepsis—by paramedics, general practitioners, or prehospital emergency physicians—shortens



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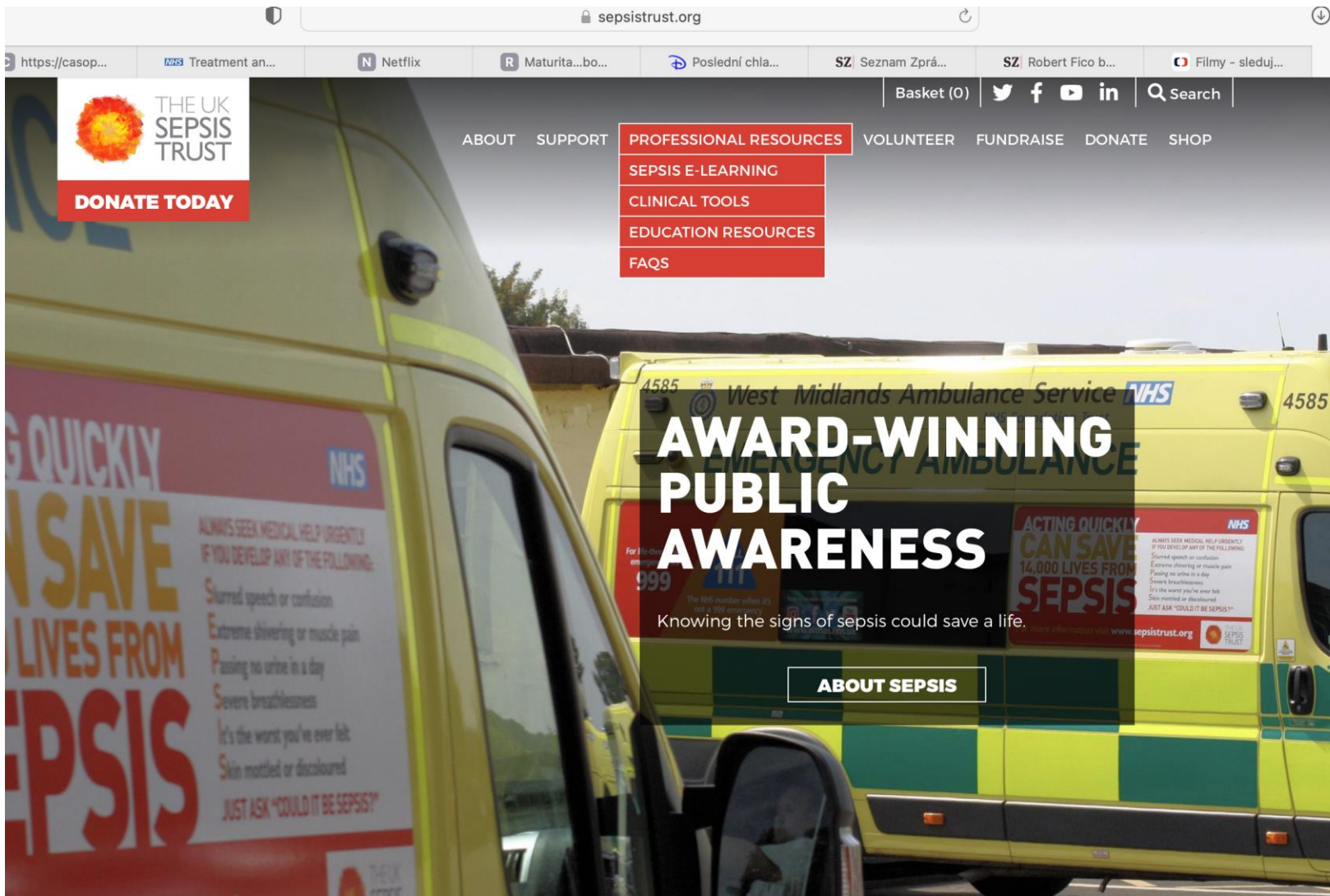
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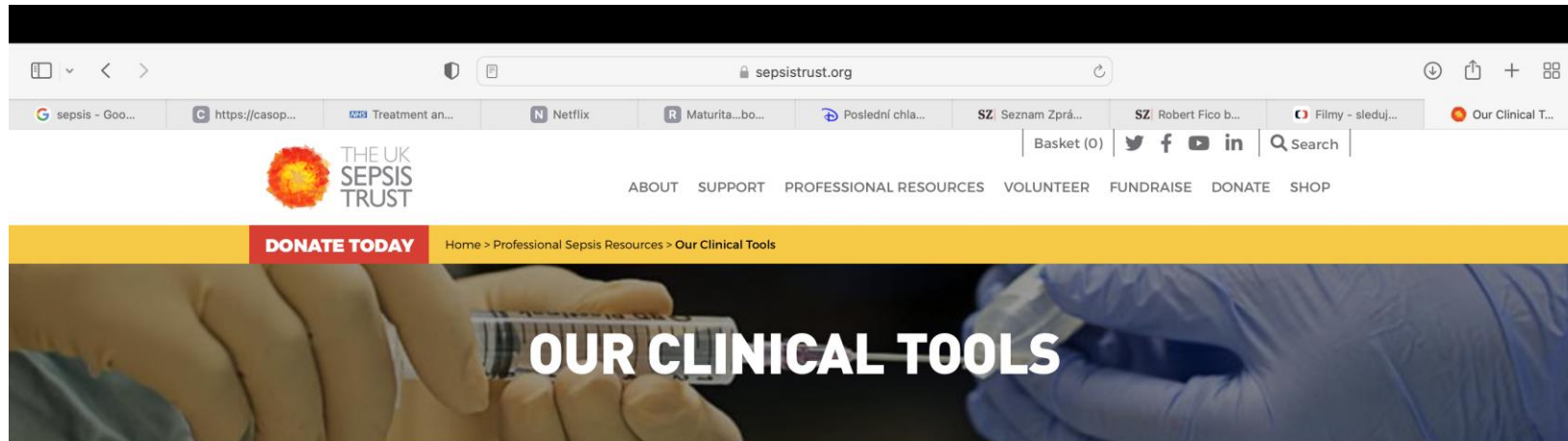
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# THE YELLOW MANUAL

For those working in organisations still using the 2016 NICE guideline NG51

Responsible management of sepsis, severe  
infection and antimicrobial stewardship.






## HOW TO USE OUR TOOLS

Where senior clinical input is available, experienced clinical judgement should trump any clinical tool. These tools are designed to responsibly empower less experienced health professionals to act when presented with a patient with evidence of physiological derangement in the context of infection. Remember, if your clinical judgement is telling you that the tool is reaching the wrong conclusion, trust your instinct and ask a senior colleague.

We believe that the tools below cover the vast majority of clinical areas of healthcare delivery within and outside the NHS. If you feel that your clinical area is not suitably covered, please let us know using [this form](#).

We strongly advise that, if you choose not to offer contact details, you check back in here frequently to look for updates.



**TOOLKIT FAQs**  
1 file(s) 1.7 MB

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**The UK Sepsis Trust's Clinical Tools have not been produced by NICE and are not maintained by NICE. NICE has not made any judgement about the quality and usability**



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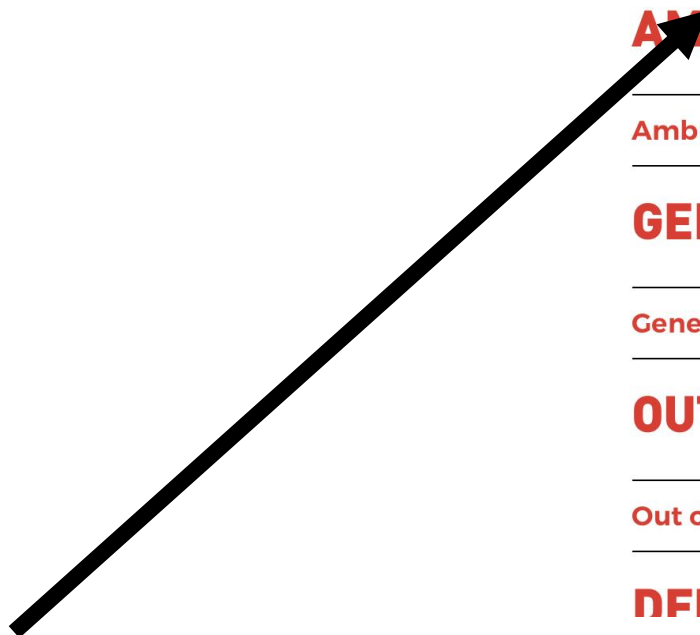
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## Acute Hospital screening and action tools



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### ACUTE HOSPITAL WOMEN WHO ARE PREGNANT OR UP TO 4 WEEKS POST-PARTUM

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# NEWS 2

Physiological parameter	Score						
	3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO <sub>2</sub> Scale 1 (%)	≤91	92–93	94–95	≥96			
SpO <sub>2</sub> Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

## Observation chart for the National Early Warning Score (NEWS2)

NEWS key		FULL NAME						
0	1	2	3					
DATE OF BIRTH		DATE OF ADMISSION						
DATE	TIME	DATE	TIME					
<b>A+B</b> Respirations <small>Breathless</small>	≥25		3			≥25		3
	21-24		2			21-24		2
	18-20		1			18-20		1
	15-17		0			15-17		0
	12-14		0			12-14		0
	9-11		0			9-11		0
	≤8		3			≤8		3
<b>A+B</b> SpO <sub>2</sub> Scale 1 <small>Oxygen saturation (%)</small>	≥96		1			≥96		1
	94-95		2			94-95		2
	92-93		3			92-93		3
	≤91		0			≤91		0
<b>A+B</b> SpO <sub>2</sub> Scale 2 <small>Oxygen saturation (%)</small> <small>Use Scale 2 if target range is 88-92%, eg in hypercapnic respiratory failure</small> <small>*ONLY use Scale 2 under the direction of a qualified clinician</small>	≥97 on O <sub>2</sub>		3			≥97 on O <sub>2</sub>		3
	95-96 on O <sub>2</sub>		2			95-96 on O <sub>2</sub>		2
	93-94 on O <sub>2</sub>		1			93-94 on O <sub>2</sub>		1
	≥93 on air		0			≥93 on air		0
	88-92		0			88-92		0
	86-87		1			86-87		1
	84-85		2			84-85		2
	≤83%		3			≤83%		3
<b>A</b> Air or oxygen?	A=Air					A=Air		
	O <sub>2</sub> L/min		2			O <sub>2</sub> L/min		2
	Device		0			Device		0
<b>C</b> Blood pressure <small>Ranking</small> <small>Score uses systolic BP only</small>	≥220		3			≥220		3
	201-219		2			201-219		2
	181-200		1			181-200		1
	161-180		0			161-180		0
	141-160		0			141-160		0
	121-140		0			121-140		0
	111-120		1			111-120		1
	101-110		2			101-110		2
	91-100		3			91-100		3
	≤50		0			≤50		0
<b>C</b> Pulse <small>Beats/min</small>	≥131		3			≥131		3
	121-130		2			121-130		2
	111-120		1			111-120		1
	101-110		0			101-110		0
	91-100		0			91-100		0
	81-90		0			81-90		0
	71-80		0			71-80		0
	61-70		0			61-70		0
	51-60		0			51-60		0
	≤30		3			≤30		3
<b>D</b> Consciousness <small>Score for NEW</small> <small>Alert if confusion</small> <small>(No score if chronic)</small>	Alert					Alert		
	Confusion		3			Confusion		3
	V		0			V		0
	P		0			P		0
	U		0			U		0
<b>E</b> Temperature <small>°C</small>	≥39.1°		2			≥39.1°		2
	38.1-39.0°		1			38.1-39.0°		1
	37.1-38.0°		0			37.1-38.0°		0
	36.1-37.0°		0			36.1-37.0°		0
	≤35.0°		3			≤35.0°		3
<b>NEWS TOTAL</b>						<b>TOTAL</b>		
Monitoring frequency						Monitoring frequency		
Escalation of care Y/N						Escalation of care Y/N		
Initials						Initials		

## SEPSIS SCREENING TOOL - PREHOSPITAL

AGE 16+

### 01 START THIS CHART IF SEPSIS IS SUSPECTED

Factors prompting screening for sepsis include:

- NEWS2 has triggered
- Carer or relative concern
- Recent chemotherapy / risk of neutropenia
- Patient looks unwell
- Evidence of organ dysfunction (e.g. lactate >2mmol/l)
- Assessment gives clinical cause for concern

Consider any advance directive or care planning carefully

YES

### CALCULATE NEWS2 USING LATEST VITAL SIGNS

Always interpret vital signs and NEWS2 in context of medical history, medications and response to treatment

### 02 IS NEWS2 7 OR ABOVE? OR IS NEWS2 5 OR 6 AND ONE OF:

- Any one NEWS2 parameter with score of 3
- Mottled or ashen skin
- Non-blanching rash
- Cyanosis of skin, lips or tongue
- Patient looks extremely unwell
- Patient is actively deteriorating
- Risk of neutropenia (chemotherapy, immunosuppression)

NO

### 03 IS NEWS2 5 OR 6? OR IS NEWS2 1-4 AND ONE OF:

- Any one NEWS2 parameter with score of 3
- Mottled or ashen skin
- Non-blanching rash
- Cyanosis of skin, lips or tongue
- Patient looks extremely unwell
- Patient is actively deteriorating
- Risk of neutropenia (chemotherapy, immunosuppression)

YES

**RED FLAG  
SEPSIS**  
START PH BUNDLE

### FURTHER ASSESSMENT & REVIEW REQUIRED:

- TRANSFER TO DESIGNATED DESTINATION
- COMMUNICATE POTENTIAL RISK OF SEPSIS AT HANDOVER
- RECALCULATE NEWS2 AT LEAST EVERY 60 MINS AND ESCALATE TO RED FLAG IF APPROPRIATE

YES

NO AMBER FLAGS OR UNLIKELY SEPSIS?: Routine care - Consider other diagnosis - Safety net and signpost as per local guidance

### PH SEPSIS BUNDLE:

#### RESUSCITATION & TREATMENT:

Oxygen to maintain saturations of >94% (88% in COPD)  
250ml boluses of Sodium Chloride: max 250mls if normotensive, max 2000ml if hypotensive

CONSIDER IV ANTIBIOTICS IF TRANSIT TIME > 1h  
(and if not already given e.g. by GP)

#### COMMUNICATION:

Pre-alert receiving hospital  
Divert to ED (or other agreed destination)  
Handover presence of Red Flag Sepsis



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## SEPSIS SCREENING TOOL PREHOSPITAL

Under 5

### 01 START IF CHILD LOOKS UNWELL, IF PARENT IS CONCERNED OR PHYSIOLOGY IS ABNORMAL e.g. PEWS

**RISK FACTORS FOR SEPSIS INCLUDE:**

- Impaired immunity (e.g. diabetes, steroids, chemotherapy)  Indwelling lines / broken skin  
 Recent trauma / surgery / invasive procedure

### 02 COULD THIS BE DUE TO AN INFECTION?

**LIKELY SOURCE:**

- Respiratory  Urine  Skin / joint / wound  Indwelling device  
 Brain  Surgical  Other

**SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS**

### 03 ANY RED FLAGS PRESENT?

- Mental state or behaviour is acutely altered  
 Doesn't wake when roused / won't stay awake  
 Looks very unwell to healthcare professional  
 SpO<sub>2</sub> <90% on air or increased O<sub>2</sub> requirements  
 Severe tachypnoea (see chart)  
 Severe tachycardia (see chart)  
 Bradycardia (<60 bpm)  
 Non-blanching rash / mottled / ashen / cyanotic  
 Temperature <36°C  
 If under 3 months, temperature 38°+

**RED FLAG SEPSIS**  
**START PAEDIATRIC PH BUNDLE**

### 04 ANY AMBER FLAGS PRESENT?

**IF IMMUNITY IMPAIRED TREAT AS RED FLAG SEPSIS**

- Not behaving normally  
 Reduce activity / very sleepy  
 Parental or carer concern  
 Moderate tachypnoea (see chart)  
 Moderate tachycardia (see chart)  
 SpO<sub>2</sub> <92% on air or increased O<sub>2</sub> requirement  
 Nasal flaring  
 Capillary refill time ≥ 3 seconds  
 Reduced urine output (<1ml/kg/h if catheterised)  
 Leg pain / cold extremities  
 If 3-6 months, temperature 39°+

**FURTHER INFORMATION AND REVIEW REQUIRED:**

- TRANSFER TO DESIGNATED DESTINATION
- COMMUNICATE POTENTIAL OF SEPSIS AT HANDOVER
- RECHECK VITAL SIGNS AT LEAST EVERY 30 MINS AND ESCALATE TO RED FLAG IF APPROPRIATE

### PREHOSPITAL SEPSIS BUNDLE:

**RESUSCITATION:**

Oxygen to maintain saturations of >94%  
 Measure lactate if available  
 10ml/kg boluses of Sodium Chloride. Repeat if hypotensive

**COMMUNICATION:**

Pre-alert receiving hospital  
 Divert to ED (or other agreed destination)  
 Handover presence of Red Flag Sepsis

**CONSIDER IV ANTIBIOTICS IF EXPECTED TRANSIT TIME >1HR**

Age (years)	Tachypnoea (breaths per minute)		Tachycardia (beats per minute)	
	Severe	Moderate	Severe	Moderate
<1	≥60	50-59	≥160	150-159
1-2	≥50	40-49	≥150	140-149
3-4	≥40	35-39	≥140	130-139



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## SEPSIS SCREENING TOOL PREHOSPITAL

Age 12-15

### 01 START IF YOUNG PERSON LOOKS UNWELL, IF PARENT IS CONCERNED OR PHYSIOLOGY IS ABNORMAL e.g. PEWS

#### RISK FACTORS FOR SEPSIS INCLUDE:

- Impaired immunity (e.g. diabetes, steroids, chemotherapy)  Indwelling lines / IVDU / broken skin  
 Recent trauma / surgery / invasive procedure

### 02 COULD THIS BE DUE TO AN INFECTION?

#### LIKELY SOURCE:

- Respiratory  Urine  Skin / joint / wound  Indwelling device  
 Brain  Surgical  Other

SEPSIS  
UNLIKELY,  
CONSIDER  
OTHER  
DIAGNOSIS

### 03 ANY RED FLAGS PRESENT?

- Objective evidence of new or altered mental state  
 Respiratory rate  $\geq 25$  per minute  
 New need for O<sub>2</sub> (40% or more) to keep SpO<sub>2</sub> > 92% ( $>88\%$  COPD)  
 Systolic BP  $\leq 90$  mm Hg (or drop of  $>40$  from normal)  
 Heart rate  $> 130$  per minute  
 Not passed urine in 18 hours ( $<0.5\text{ml/kg/hr}$  if catheterised)  
 Non-blanching rash / mottled / ashen / cyanotic

RED FLAG  
SEPSIS  
START PH BUNDLE

### 04 ANY AMBER FLAGS PRESENT?

#### IF IMMUNITY IMPAIRED TREAT AS RED FLAG SEPSIS

- Family report abnormal behavior or mental state  
 Reduced functional ability  
 Respiratory rate 21-24  
 Systolic BP 91-100 mmHg  
 Heart rate 91-130 or new dysrhythmia  
 SpO<sub>2</sub>  $< 92\%$  on air or increased O<sub>2</sub> requirement  
 Not passed urine in 12-18 hr  
( $0.5\text{ml/kg/hr}$  to  $1\text{ml/kg/hr}$  if catheterised)  
 Immunocompromised  
 Signs of infection including wound infection  
 Temperature  $<36^\circ\text{C}$

#### FURTHER ASSESSMENT AND REVIEW REQUIRED:

- TRANSFER TO DESIGNATED DESTINATION
- COMMUNICATE POTENTIAL OF SEPSIS AT HANDOVER
- RECHECK VITAL SIGNS AT LEAST EVERY 30 MINS AND ESCALATE TO RED FLAG IF APPROPRIATE

**NO AMBER FLAGS OR UNLIKELY SEPSIS?: CONSIDER OTHER DIAGNOSIS - SAFETY NET AND SIGNPOST AS PER LOCAL GUIDANCE**  
INTERPRET PHYSIOLOGY IN CONTEXT OF INDIVIDUAL PATIENT

### PREHOSPITAL SEPSIS BUNDLE:

#### RESUSCITATION:

- Oxygen to maintain saturations of  $>94\%$   
Measure lactate if available  
Give normal saline in  $10\text{ml/kg}$  boluses, max  $20\text{ml/kg}$

CONSIDER IV ANTIBIOTICS IF EXPECTED TRANSIT TIME  $>1\text{H}$

#### COMMUNICATION:

- Pre-alert receiving hospital  
Divert to ED (or other agreed destination)  
Handover presence of Red Flag Sepsis



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## SEPSIS SCREENING TOOL PREHOSPITAL

Age 5-11

### 01 START IF CHILD LOOKS UNWELL, IF PARENT IS CONCERNED OR PHYSIOLOGY IS ABNORMAL e.g. PEWS

**RISK FACTORS FOR SEPSIS INCLUDE:**

- Impaired immunity (e.g. diabetes, steroids, chemotherapy)  Indwelling lines / broken skin  
 Recent trauma / surgery / invasive procedure

### 02 COULD THIS BE DUE TO AN INFECTION?

**LIKELY SOURCE:**

- Respiratory  Urine  Skin / joint / wound  Indwelling device  
 Brain  Surgical  Other

**SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS**

### 03 ANY RED FLAGS PRESENT?

- Mental state or behaviour is acutely altered  
 Doesn't wake when roused / won't stay awake  
 Looks very unwell to healthcare professional  
 SpO<sub>2</sub> <90% on air or increased O<sub>2</sub> requirements  
 Severe tachypnoea [see chart]  
 Severe tachycardia [see chart]  
 Bradycardia (<60 bpm)  
 Non-blanching rash / mottled / ashen / cyanotic

**RED FLAG SEPSIS**  
**START PAEDIATRIC PH BUNDLE**

### 04 ANY AMBER FLAGS PRESENT?

**IF IMMUNITY IMPAIRED TREAT AS RED FLAG SEPSIS**

- Not behaving normally  
 Reduce activity / very sleepy  
 Parental or carer concern  
 Moderate tachypnoea [see chart]  
 Moderate tachycardia [see chart]  
 SpO<sub>2</sub> <92% on air or increased O<sub>2</sub> requirements  
 Nasal flaring  
 Capillary refill time ≥ 3 seconds  
 Reduced urine output (<1ml/kg/h if catheterised)  
 Leg pain / cold extremities  
 Immunocompromised  
 Temperature <36°C

**FURTHER INFORMATION AND REVIEW REQUIRED:**

- TRANSFER TO DESIGNATED DESTINATION
- COMMUNICATE POTENTIAL OF SEPSIS AT HANDOVER
- RECHECK VITAL SIGNS AT LEAST EVERY 30 MINS AND ESCALATE TO RED FLAG IF APPROPRIATE

### PREHOSPITAL SEPSIS BUNDLE:

**RESUSCITATION:**

Oxygen to maintain saturations of >94%  
 Measure lactate if available  
 10ml/kg boluses of Sodium Chloride. Repeat if hypotensive

**COMMUNICATION:**

Pre-alert receiving hospital  
 Divert to ED (or other agreed destination)  
 Handover presence of Red Flag Sepsis

CONSIDER IV ANTIBIOTICS IF EXPECTED TRANSIT TIME >1H

Age (years)	Tachypnoea (breaths per minute)		Tachycardia (beats per minute)	
	Severe	Moderate	Severe	Moderate
5	≥29	24-28	≥130	120-129
6-7	≥27	24-26	≥120	110-119
8-11	≥25	22-24	≥115	105-114



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## SEPSIS SCREENING TOOL PREHOSPITAL

**PREGNANT**  
OR UP TO 4 WEEKS POST-PREGNANCY

### 01 START THIS CHART IF THE PATIENT LOOKS UNWELL OR PHYSIOLOGY IS ABNORMAL

#### RISK FACTORS FOR SEPSIS INCLUDE:

- Impaired immunity (e.g. diabetes, steroids, chemotherapy)
- Indwelling lines / IVDU / broken skin
- Recent trauma / surgery / invasive procedure

### 02 COULD THIS BE DUE TO AN INFECTION?

#### LIKELY SOURCE:

- Respiratory
- Urine
- Infected caesarean / perineal wound
- Breast abscess
- Abdominal pain / distension
- Chorioamnionitis / endometritis

**SEPSIS UNLIKELY, CONSIDER OTHER DIAGNOSIS**

### 03 ANY RED FLAGS PRESENT?

- Objective evidence of new or altered mental state
- Systolic BP  $\leq$  90 mmHg (or drop of  $>$ 40 from normal)
- Heart rate  $>$  130 per minute
- Respiratory rate  $\geq$  25 per minute
- New need for O<sub>2</sub> (40% or more) to keep SpO<sub>2</sub>  $>$  92% ( $>$ 88% COPD)
- Non-blanching rash / mottled / ashen / cyanotic
- Not passed urine in 18 hours ( $<$ 0.5ml/kg/hr if catheterised)

**RED FLAG SEPSIS START PH BUNDLE**

### 04 ANY AMBER FLAGS PRESENT?

- Acute deterioration in functional ability
- Family report mental status change
- Respiratory rate 21-24
- Heart rate 100-130 or new dysrhythmia
- Systolic BP 91-100 mmHg
- Has had invasive procedure in last 6 weeks
- Temperature  $<$  36°C
- Has diabetes or impaired immunity
- Close contact with GAS
- Prolonged rupture of membranes
- Offensive vaginal discharge
- Not passed urine in 12-18 h (0.5ml/kg/hr to 1ml/kg/hr if catheterised)
- Wound infection

#### FURTHER INFORMATION AND REVIEW REQUIRED:

- TRANSFER TO DESIGNATED DESTINATION
- COMMUNICATE POTENTIAL OF SEPSIS AT HANDOVER
- RECHECK VITAL SIGNS AT LEAST EVERY 30 MINS AND ESCALATE TO RED FLAG IF APPROPRIATE

**NO AMBER FLAGS OR UNLIKELY SEPSIS?: ROUTINE CARE - CONSIDER OTHER DIAGNOSIS - SAFETY NET AND SIGNPOST AS PER LOCAL GUIDANCE INTERPRET PHYSIOLOGY IN CONTEXT OF INDIVIDUAL PATIENT**

#### PREHOSPITAL SEPSIS BUNDLE:

##### RESUSCITATION:

- Oxygen to maintain saturations of  $>$ 94%
- Measure lactate if available
- Give normal saline in 10ml/kg boluses, max 20ml/kg

**CONSIDER IV ANTIBIOTICS IF EXPECTED TRANSIT TIME  $>$ 1H**

##### COMMUNICATION:

- Pre-alert receiving hospital
- Divert to ED (or other agreed destination)
- Handover presence of Red Flag Sepsis



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# Časné podezření a skorovací systém

## PH SEPSIS BUNDLE:

### RESUSCITATION & TREATMENT:

Oxygen to maintain saturations of  $>94\%$  (88% in COPD)  
250ml boluses of Sodium Chloride: max 250mls if  
normotensive, max 2000ml if hypotensive

**CONSIDER IV ANTIBIOTICS IF TRANSIT TIME  $> 1h$**   
(and if not already given e.g. by GP)



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