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### Definition

The National Institute for Health and Care Excellence (NICE) describes sepsis as ‘a *clinical syndrome caused by the body's immune and coagulation systems being switched on by an infection. Sepsis with shock is a life-threatening condition that is characterised by low blood pressure despite adequate fluid replacement, and organ dysfunction or failure.*’<sup>1</sup>

Currently there is debate around the terminology surrounding sepsis. Previously, the terms systemic inflammatory response syndrome (SIRS), severe sepsis and septic shock were used; it has been suggested that only sepsis and (the more serious) septic shock should be used. Please note that some of the resources on this page may use the terms SIRS and severe sepsis.

More information about the current terminology can be found in The UK Sepsis Trust’s ***The Sepsis Manual***. This document is a comprehensive manual that supports the education and training of healthcare professionals at every level. For this reason, we recommend that you work through the manual before leaving this topic.

Before working through the rest of the information on this page, we recommend that you watch the following video:

### ***The UK Sepsis Trust - 1. The impact of sepsis***



Additionally, ***Sepsis (SEP)*** is a Health Education England programme aimed at improving the diagnosis and management of those with sepsis. There are two sections:

- *Sepsis in Primary Care* – this course is aimed at all clinical staff that work in primary care and consists of five e-learning sessions. It provides guidance on diagnosing sepsis in adults, children, the elderly and complex issues such as maternity and neutropenia.
- *Sepsis in Paediatrics* – this course is aimed at all clinical staff working in paediatrics, and consists of films and workbooks.

*Sepsis in Primary Care* contains the following modules:

Overview of sepsis – this session is aimed at all out-of-hospital clinicians, GPs, nurses, pharmacists, paramedics, community midwives and those providing urgent or unscheduled care. It provides an introduction to key facts about sepsis and outlines the size of the problem, common community presentations and key actions that influence outcomes.

Adult sepsis – this session is aimed at all out-of-hospital clinicians, GPs, nurses, pharmacists, paramedics, community midwives and those providing urgent or unscheduled care. It will cover the subtle ways in which sepsis may present, and highlight the history, examination and the management of the septic patient.

Childhood sepsis – this session is aimed at all out-of-hospital clinicians, GPs, nurses, pharmacists, paramedics, community midwives and those providing urgent or unscheduled care. It will provide an introduction to key facts about childhood sepsis. It outlines the community presentations and key actions that influence outcomes.

Complex sepsis issues and future development – this session is aimed at all out-of-hospital clinicians, GPs, nurses, pharmacists, paramedics, community midwives and those providing urgent or unscheduled care. It will explore neutropenic sepsis and sepsis in maternity, potential opportunities for prevention and some of the recent changes and innovation relevant to sepsis.

Sepsis, care homes and the frail elderly – this session is aimed at all out-of-hospital clinicians, GPs, nurses, pharmacists, paramedics, community midwives and those providing urgent or unscheduled care. It will provide an introduction to key facts about managing sepsis in the elderly.

If you haven't already done so, we recommend accessing this learning programme via CPPE's website: ***e-Learning for Healthcare learning modules***.

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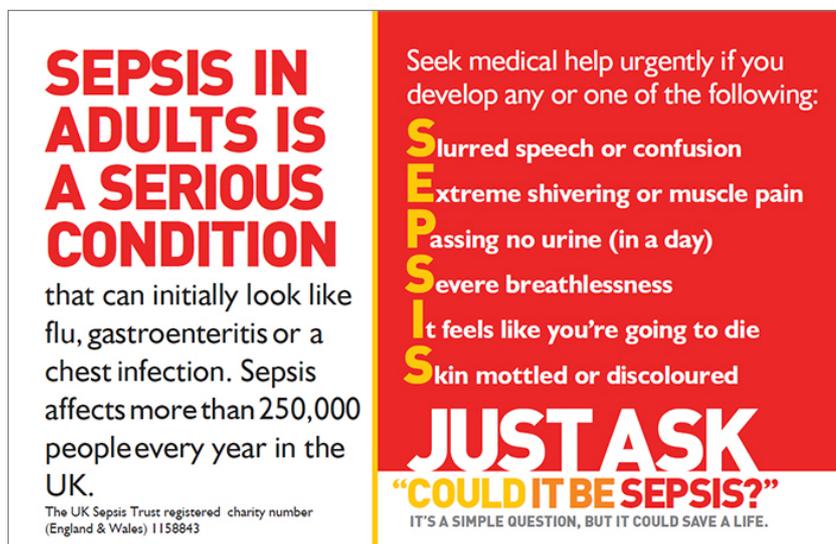
### Prevalence and incidence

Conservative estimates would suggest that we see at least 200,000 cases of sepsis in the UK each year, with up to 52,000 deaths and a direct cost to the NHS of at least £1.5 billion. Sepsis costs our society as much as £15.6 billion every year. It is highly likely that these numbers are under-estimates, since a proportion of the more than 1.7 million patients suffering severe infection in England every year are likely to have uncoded sepsis. Whichever way we cut it, sepsis is huge.<sup>5</sup>

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### Signs and symptoms

The UK Sepsis Trust summarise the symptoms that people should be advised to look out for in the below graphic.



**SEPSIS IN ADULTS IS A SERIOUS CONDITION**

that can initially look like flu, gastroenteritis or a chest infection. Sepsis affects more than 250,000 people every year in the UK.

The UK Sepsis Trust registered charity number (England & Wales) 1158843

Seek medical help urgently if you develop any or one of the following:

**S**lurred speech or confusion  
**E**xtrême shivering or muscle pain  
**P**assing no urine (in a day)  
**S**evere breathlessness  
**I**t feels like you're going to die  
**S**kin mottled or discoloured

**JUST ASK**  
**"COULD IT BE SEPSIS?"**  
IT'S A SIMPLE QUESTION, BUT IT COULD SAVE A LIFE.

Image used with permission from **The UK Sepsis Trust**.

NICE quality standard **Sepsis [QS161]** states the following, 'Symptoms of sepsis can include, but are not limited to:

- *high body temperature or low body temperature*
- *fast heartbeat/breathing*
- *feeling dizzy or faint/loss of consciousness*
- *a change in mental state, for example, confusion or disorientation*
- *diarrhoea/nausea and vomiting*
- *slurred speech*
- *severe muscle pain*
- *breathlessness*
- *reduced urine production*
- *cold, clammy and pale or mottled skin.*<sup>14</sup>

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### Causes/risk factors

Sepsis can be the clinical manifestation of infections acquired both in the community setting or in health care facilities. Any initial site of infection can lead to sepsis, eg, infection of the urinary or respiratory tract. Per NHS choices, some people are more likely to develop sepsis.

Anyone with an infection can get sepsis. However, some people are more likely to get an infection that could lead to sepsis, including:

- babies under 1, particularly if they're born early (premature) or their mother had an infection while pregnant
- people over 75
- people with diabetes
- people with a weakened immune system, such as those having chemotherapy treatment or who recently had an organ transplant

- people who have recently had surgery or a serious illness
- women who have just given birth, had a miscarriage or had an abortion.

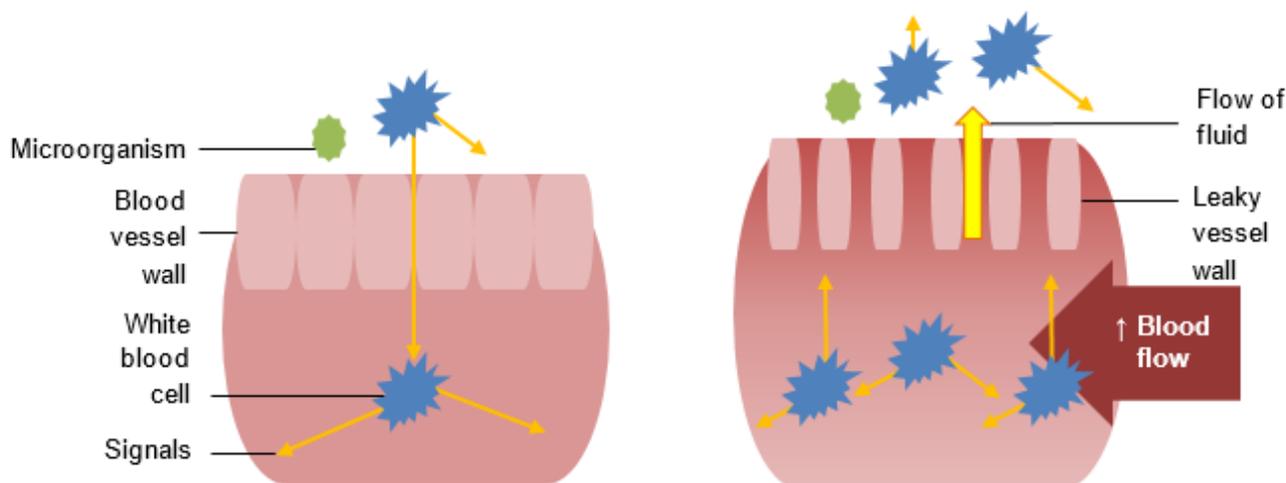
You cannot catch sepsis from another person. It happens when your body overreacts to an infection.<sup>6</sup>

The National Confidential Enquiry into Patient Outcomes and Death (NCEPOD) recommends early identification and immediate management of patients with sepsis, raising awareness of the condition and management by **Just Say Sepsis!**

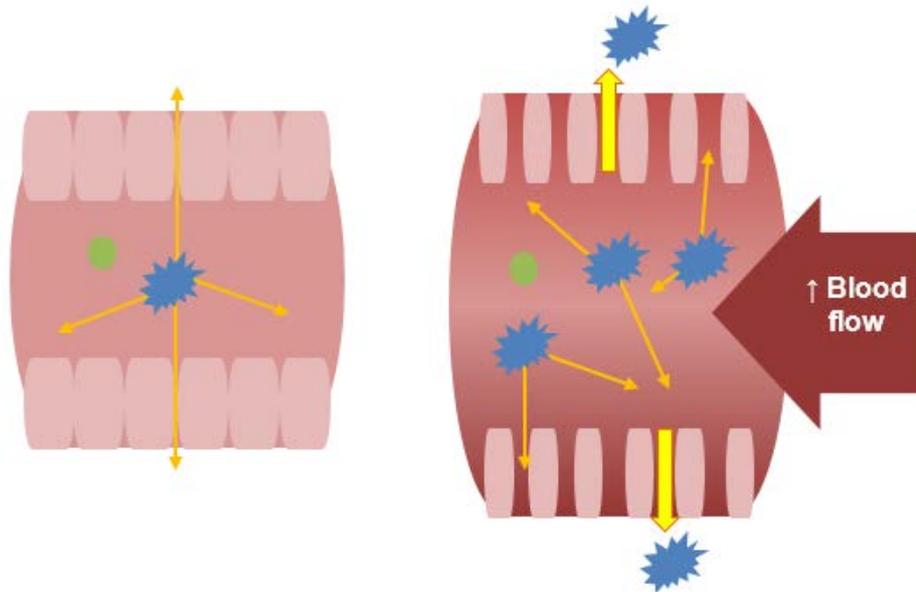
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### Pathophysiology (mechanism of disease)

In order to understand the pathophysiology of sepsis we need to understand how our immune system normally functions. When white blood cells encounter infections outside of the blood stream, they release signals locally to cause blood vessels to dilate and become more permeable. This allows more white blood cells to reach this area and this leads to localised inflammation. During this process there are also signals released which counteract inflammation. The diagram below is a very simple representation of this process as occurring in response to a pathogen outside a blood vessel.



If a person's immune system cannot fight an infection, sometimes it can enter the blood stream. When white blood cells encounter infection in the blood they may trigger an immune response which is too great and causes a systemic inflammatory response.



In this systemic reaction, inflammatory signals can cause blood vessel dilation and increased permeability of blood vessels all over the body. This can lead to systemic swelling, low blood pressure, reduced perfusion and oxygenation and, therefore, organ dysfunction.

The pathophysiology of sepsis is complex and the above description is highly simplified. If you wish to read more, the following article from the *British Medical Journal* (BMJ) provides further detailed information on the pathophysiology of sepsis and also discusses its management: **Sepsis: pathophysiology and clinical management**.

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### Prognosis and complications

Sepsis is a serious condition with a high mortality rate. Figures for estimated mortality rate vary, but mortality in the UK is currently estimated to be approximately 20 percent.<sup>5</sup>

The faster a person with sepsis receives treatment, the greater the chances of survival and the lower the risk of long-term complications. There are some complications that are immediate and life threatening and others that are long term and may affect those who survive sepsis.

The immediate complications that are associated with sepsis<sup>7</sup> are discussed in this *BMJ best practice* article, **Sepsis in adults**.

Some people who survive sepsis may experience long-term complications and these may be both physical and psychological. These problems have become to be known as Post Sepsis Syndrome (PSS). For more information, visit The UK Sepsis Trust's page **Post Sepsis Syndrome (PSS)**.

To hear a husband and wife speaking about their experience of sepsis, watch the following video where Tom Ray speaks to Good Morning Britain.

### Good Morning Britain - Sepsis survivor opens up about his 18 year story



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### Diagnosis/detection

Diagnosis of sepsis is based on the recognition of the signs and symptoms above, along with a clinical assessment which includes measurement of blood pressure, heart rate, respiratory rate, level of consciousness, urine output and oxygen saturation.<sup>1</sup>

When systolic blood pressure drops below 90 mmHg and the person also has an elevated lactate, this is classified as septic shock.<sup>5</sup>

The UK Sepsis Trust has produced a series of **clinical tools** which can be used in different settings to help detect sepsis.

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### Treatment

For sepsis, both pharmacological and non-pharmacological treatment should be offered urgently to improve the prognosis of someone with sepsis.

The three main and immediate treatments for sepsis, which should be started within an hour of diagnosis, are antibiotic treatment, intravenous fluids and oxygen if oxygen saturations are low. Blood cultures should be taken before the first antibiotic dose if possible; however, this should not delay treatment. Monitoring of lactate and urine output should be undertaken alongside monitoring of heart rate, respiratory rate, blood pressure, oxygen saturations, capillary refill time, level of consciousness and temperature.<sup>5</sup>

These initial steps form part of the sepsis six pathway. To learn more about the sepsis six, watch the following video:

### *The UK Sepsis Trust - 3. The Sepsis Six*



#### **Antimicrobial stewardship**

When thinking about antibiotic use, it's always important to remember the need for antimicrobial stewardship. For more information on this topic, access the following resources:

***Antimicrobial stewardship in long term care facilities (LTCFs)*** by Elizabeth Beech, NHS Improvement, signposts to many useful guidance documents.



(Please note that the first 12 minutes relate to general antimicrobial stewardship and the remaining time concentrates on urinary tract infections.)

The slides are also available and contain hyperlinks to the resources that are discussed: ***Antimicrobial stewardship in long term care facilities – room for improvement.***

e-Learning for Healthcare's *Antimicrobial Resistance* programme available via CPPE's website, ***e-Learning for Healthcare learning modules.***

Royal Pharmaceutical Society's, ***The pharmacy contribution to antimicrobial stewardship.***

PresQIPP's page on ***Antimicrobial stewardship***.

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### Patient support

The UK Sepsis Trust offers support to those who have suffered from sepsis and their loved ones on the following page of their website, ***The UK sepsis trust is here to support you.***

NHS also has a ***Sepsis*** page on their website.

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### Further resources

National Early Warning Score (NEWS) 2 – NHS England's ***Sepsis guidance implementation advice for adults*** recommends the use of the National Early Warning Score (NEWS) 2 for assessment of risk of clinical deterioration in acute care (by ambulance staff and in a hospital setting), and states that '*NEWS has not yet received NICE support for use in primary care, pending further evidence of its value in this setting. The National Quality Board and NICE have recommended further evaluation of the use of NEWS in primary care and recognises the value of a 'common language' across the NHS in England to communicate the severity of a patient's acute illness.*

For more information about NEWS, visit the Royal College of Physicians' page ***National Early Warning Score (NEWS) 2.***

NHS England's ***Sepsis guidance implementation advice for adults*** describes an operational definition of sepsis and supports the implementation of the NICE guidelines on the identification and treatment of sepsis.

The NHS England document ***Improving outcomes for patients with sepsis*** contains a summary of the key actions that health and care organisations across the country will take to improve identification and treatment of sepsis.

The Department of Health and Health Protection Agency document ***Prevention and control of infection in care homes - an information resource*** is an information resource to assist staff in taking all reasonable steps to protect residents and staff from acquiring infections and prevent cross infection. It also provides information and guidance on infection prevention and control that will assist managers in undertaking risk assessments and in developing policies. There is a summary document available: ***Prevention and control of infection in care homes - Summary for staff.***

NICE have produced ***Helping to prevent infection – A quick guide for managers and staff in care homes on prevention of infection in care homes.***

To learn more about sepsis and its serious effects, watch the following videos from ***The UK Sepsis Trust.***

### *Sepsis introduction – Facts about sepsis*



### *It's sepsis – not flu! For health professionals*



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### External websites

CPPE is not responsible for the content of any non-CPPE websites mentioned on this page or for the accuracy of any information to be found there.

All web links were accessed on 7 May 2021.

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### References

1. National Institute for Health and Care Excellence. NICE guideline [NG51]. **Sepsis: recognition, diagnosis and early management**. July 2016.
2. NHS England. **Improving outcomes for patients with sepsis: A cross-system action plan**. December 2015.
3. National Institute for Health and Care Excellence. **Health and social care directorate. Quality standards and indicators: Briefing paper**. January 2017.
4. National Institute for Health and Care Excellence. Quality standard [QS161]. **Sepsis**. September 2017.
5. The UK Sepsis Trust. **The Sepsis Manual**. 5<sup>th</sup> edition 2019.

6. World Health Organization. WHO. *Report on the burden of endemic health care-associated infection worldwide*. 2017.
7. BMJ. *Sepsis: pathophysiology and clinical management*. 2016.

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**Last review:** May 2021

**Next review due:** May 2022