

# Sepsis: recognising the needle in the haystack



**Dr Simon N Stockley** discusses new approaches to recognising and tackling an old enemy

Sepsis has become a hot topic in many areas of medicine over the past few years. In England, it is estimated that 123,000 cases occur annually, accounting for nearly 37,000 deaths.<sup>1</sup> There have been numerous investigations into individual cases of sepsis where poor care has played a part in adverse outcomes,<sup>2-4</sup> and systemic analysis has shown that good care is not being consistently delivered.<sup>5</sup> NHS England has estimated that as many as 10,000 deaths per year from sepsis could be avoided with better treatment.<sup>6</sup> Timely recognition of sepsis and intervention with antibiotics, fluids, and oxygen are associated with improving outcomes<sup>7</sup> as the mortality from septic shock increases with each hour that antibiotics are delayed.<sup>8</sup> Approximately 70% of cases develop while patients are in the community,<sup>6</sup> consequently GPs are seen as a key part of a multi-agency response to sepsis.

## What is sepsis?

There are many varieties of infection that can result in fatality if not treated appropriately. Previously, these were considered by the central

### Read this article to learn more about:

- new definitions of and attitudes towards sepsis
- the importance of abnormal physiology in assessing a deteriorating patient
- how best to communicate concern regarding suspected sepsis.

Read this article at: [GinP.co.uk/dec17-sepsis](http://GinP.co.uk/dec17-sepsis)

Test and reflect multiple-choice questions on this article are available on p.43 and online at: [GinP.co.uk/mcq-sepsis](http://GinP.co.uk/mcq-sepsis)



focus of their infection, for example: pneumonia—lung; meningitis—brain; pyelonephritis—kidney. Most infectious diseases derive their lethality through a common pathway, sepsis, and it is perhaps more appropriate to recognise the



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**seriousness** of the infection and treat in a timely manner, than it is to determine the initial location of that infection.

In 2016, the Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) updated its definitions of sepsis and septic shock. It defined **sepsis** as ‘a life-threatening organ dysfunction caused by a dysregulated host response to infection’, and **septic shock** as sepsis where a mean arterial blood pressure of  $\geq 65$  mmHg cannot be maintained without vasopressors, and serum lactate is  $>2$  mmol/l despite fluid resuscitation.<sup>9</sup> What does that mean for GPs? That sepsis is a life-threatening condition which occurs when the body’s response to infection starts to damage its own tissues

Figure 1: The National Early Warning Score (NEWS)<sup>12</sup>

PHYSIOLOGICAL PARAMETERS	National Early Warning Score (NEWS)*						
	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

\*The NEWS initiative flowed from the Royal College of Physicians' NEWS Development and Implementation Group (NEWSDIG) report, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for Innovation

Reproduced from: Royal College of Physicians. National Early Warning Score (NEWS): Standardising the assessment of acute-illness severity in the NHS. Report of a working party. London: RCP, 2012. Available at: [www.rcplondon.ac.uk/file/38/download?token=KEp9KNI0](http://www.rcplondon.ac.uk/file/38/download?token=KEp9KNI0)

and organs. The Sepsis-3 taskforce reported that three elements were strong predictors of organ dysfunction in the presence of infection:<sup>9</sup>

- low systolic blood pressure (≤100 mmHg)
- increased respiratory rate (≥22 breaths/minute)
- altered mental state.

Any two of these in the presence of life-threatening infection are sufficient to make a diagnosis of sepsis.<sup>10</sup>

### Learning point

Identifying that an infection is 'serious' and acting appropriately is more important than determining the source of the infection.

## Tools to augment clinical judgment

NICE Guideline (NG) 51 on *Sepsis: recognition, diagnosis and early management*<sup>11</sup> was published in 2016—the first NICE guideline to cover sepsis as a single topic. The guideline is intended to be used with a risk-stratification tool in the form of three tables (each table covers a different age group), allowing practitioners to assess a patient's risk of severe illness or death from sepsis. The tool categorises symptoms and signs into a traffic-light system of high risk (red), medium risk (amber), and low risk (green). It includes abnormal physiological values, and behavioural signs such as parental or relative concern, that may be suggestive of sepsis. The tables can be accessed from the tools and

resources section of NG51 ([nice.org.uk/guidance/ng51/resources](http://nice.org.uk/guidance/ng51/resources)). Unfortunately, the poor sensitivity and specificity of single parameters in determining the presence of sepsis and absence of good quality data mean that clinical judgment must still guide the use of this risk stratification tool in clinical practice.

Hospitals and ambulance services have been systematically introducing the National Early Warning Score (NEWS) (see Figure 1)<sup>12</sup> as a method to identify deteriorating adult patients, particularly those with sepsis. It uses an aggregated score for a weighted basket of physiological variables to apportion risk of serious illness and to track deterioration.

NB an update to the NEWS scoring system is planned by the end of 2017 or early 2018.

This system has yet to be fully evaluated in primary care<sup>12-14</sup> so it is difficult to determine its utility and predictive value in general practice. It does have a very strong predictive value for mortality when the score is taken by ambulance paramedics,<sup>14</sup> or at the emergency department.<sup>15</sup>

Early warning score systems are known to overvalue patients with pre-existing respiratory illness,<sup>16</sup> as could NICE and Sepsis-3 with their use of Alert, Voice, Pain, Unresponsive (AVPU) or Glasgow coma scale, which make altered mental state difficult to place. It is suggested that any mental deterioration should equate to V, P, or U on the AVPU scale within the NEWS scoring system (i.e. a score of 3).

The multiplicity of guidance and use of different approaches and physiological values to identify sepsis may confuse practitioners, rather than improve the situation. NHS England—with input from the Royal College of General Practitioners (RCGP) and NICE—has made recommendations on what GPs should do when faced with a deteriorating patient where infection is the possible cause. They should:<sup>17</sup>

- exercise clinical judgment, taking into account the patient's history and risk factors (see Box 1), and augment this with a physiological assessment of the patient's condition. The assessment should include measurements of the following physiological variables:
  - respiratory rate
  - blood pressure
  - mental function
  - oxygen saturation
  - temperature
  - pulse.

This pragmatic approach reflects areas of agreement between various guidelines that respiratory rate, lowered blood pressure, and altered mentation are strong predictors of un-wellness and should be acted upon.

## How to avoid missing a person with sepsis

### 'You'll recognise a sick person when you see one'

This is how many GPs were taught to recognise a deteriorating patient, and this still holds true as GPs tend to be able to spot a really sick patient almost as soon as they sit down in the consulting room. What is it that GPs are spotting? If we knew that, could we actively look for these symptoms and signs or record their absence? The author would argue that what we spot is abnormal physiology consistent with the guidelines discussed above. The patient who arrives in the room slower than expected and flops into the waiting chair to catch their breath, who looks ashen or worse, sweaty, and unable to give a clear history of how ill they feel, and who looks to their accompanying relative for support, exemplifies the three elements: increased respiratory rate, low blood pressure, and altered mentation.

If infection is suspected, primary care clinicians are encouraged to record physiological observations, normal or abnormal, particularly when making a clinical judgment about a patient who is unwell with infection, as this can support either the decision to admit the patient or commence treatment at home.<sup>17</sup> Sepsis is not always evident at the first contact with the clinician, and the presence of good objective data make it easier to recognise the change from normal to abnormal. Recording respiratory rate, blood pressure or perfusion, and mental state should form part of the assessment of people with possible infection.

This assessment of physiological symptoms to stratify risk forms part of NICE Quality Standard 161 on *Sepsis*, which has been endorsed by the RCGP.<sup>18</sup>

### Learning point

Recording and assessing physiological variables, particularly respiratory rate, blood pressure, and mentation are important in documenting the presence or absence of sepsis when assessing patients with infection, and should be considered as part of the clinical judgment process.

## Communication and safety netting

In review of cases where opportunities to identify sepsis have been missed, communication regarding concern has regularly been identified as an issue. Communication failure can occur between the patient or relatives and their clinicians, or between clinicians.<sup>5</sup>

Patient and/or relative concern is a known risk factor for sepsis<sup>5,19</sup> but it is difficult to quantify and assess. One report into the unexpected death of a child (due to sepsis) indicated that the parents were unaware what constituted a deterioration and which triggers should prompt them to seek further urgent medical advice. It also stated that GPs may not always listen to the parents, who are best placed to identify concerns and symptoms.<sup>4</sup>

Safety netting should focus on what deterioration of health might look like,<sup>18</sup> (see [bit.ly/2zoPSva](http://bit.ly/2zoPSva) for a sepsis assessment and management leaflet for parents<sup>20</sup>) rather than the non-specific advice 'come back if it gets worse or you are concerned'. Reception staff and call-takers need to be aware of sepsis so that calls can be directed in a timely manner. Similarly when patients are handed to the ambulance service, 999 calls are appropriate, as is the use of the phrase 'suspicion of sepsis', augmented with a NEWS score where appropriate.<sup>21</sup> Where hospital admission is being arranged, a call to a senior admitting clinician may be useful to make them aware of

**Box 1: Patient groups at higher risk of developing sepsis**

Certain groups of people are more susceptible to developing sepsis:<sup>11</sup>

- the very young (under 1 year) and older people (over 75 years) or people who are very frail
- people who have impaired immune systems because of illness or drugs, including:
  - people being treated for cancer with chemotherapy (see recommendation 1.1.9)
  - people who have impaired immune function (for example, people with diabetes, people who have had a splenectomy, or people with sickle cell disease)
  - people taking long-term steroids
  - people taking immunosuppressant drugs to treat non-malignant disorders such as rheumatoid arthritis
- people who have had surgery, or other invasive procedures, in the past 6 weeks
- people with any breach of skin integrity (for example, cuts, burns, blisters or skin infections)
- people who misuse drugs intravenously
- people with indwelling lines or catheters.

National Institute for Health and Care Excellence (2017). *Sepsis: recognition, diagnosis and early management*. NICE Guideline 51. Available from: [www.nice.org.uk/ng51](http://www.nice.org.uk/ng51)  
NICE has not checked the use of its content in this article to confirm that it accurately reflects the NICE publication from which it is taken.

a potentially sick patient who will need timely interventions. It is important that the patient's admission is accompanied by a referral letter that identifies the concern and the physiological assessment at the time the decision to admit was made, so that any change in condition can be identified.

**Learning point**

Communicate concern with the phrase 'suspicion of sepsis' and provide a NEWS score to ambulance services and senior receiving clinicians.

**Children, neutropenia, and other special circumstances**

Currently, there is no equivalent of the NEWS system for children. The physiology of children varies widely with age, meaning that the sensitivity and specificity of a single abnormal variable in determining the presence of sepsis is poor. Recognising when

these physiological variables are straying from the norm should prompt an assessment of all appropriate variables. This information can be augmented with softer signs such as parental or clinician concern to form a clinical judgment.

Some groups of people are at a greater risk of developing sepsis than others, see Box 1. This includes people with altered immunity, in whom the presentation may not be typical and physiological derangement may be a late sign. It is worth considering sepsis as a possible cause in any of these groups if they present non-specifically unwell.

Sepsis is rare in pregnancy and the postpartum period; however, women are in a high-risk group for sepsis if they:<sup>11</sup>

- are pregnant **or**
- in the past 6 weeks, have:
  - given birth
  - had a termination of pregnancy
  - had a miscarriage.

Sepsis should therefore be considered if a woman in this group becomes unwell or shows signs of deteriorating health.<sup>11</sup>

Finally, not everyone with sepsis will benefit from intravenous antibiotics and fluids. In people with frailty and people in the end stages of life, such therapies may be considered burdensome and ultimately futile.<sup>22</sup> Advanced care planning and patient wishes need to be considered as part of the clinical judgment process when responding to suspected sepsis.

**Additional information**

The RCGP sepsis toolkit<sup>23</sup> has an increasing number of resources, including 10 top tips on sepsis for GPs. It also includes tools to help with auditing, significant event analysis, and developing sepsis aware systems in the community.

**Conclusion**

Sepsis will continue to be a focus for improving care for several years to come and GPs can expect to be in the vanguard. Finding sepsis cases earlier will require increased awareness in patients, staff, and clinicians. Validated tools for assessing the physiology of adults in general practice will be available in the short term; however, validated tools for children in the community may be some way off. General practitioners should be sensitive to any alterations in respiratory rate, blood pressure, and mental state, and will need to record and communicate these details more frequently. Developing a common language to express concern about sepsis will help patients, families, and clinicians alike. Clinicians should not be afraid to say there is a 'suspicion of sepsis'.

**Key points are on p.41 and commissioning messages are on p.42. Test and reflect MCQs are on p.43**

**Dr Simon Stockley****RCGP Clinical Champion for Sepsis****References**

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**Key points**

- Sepsis affects 123,000 people in England annually and is a common cause of death
- Patient outcomes can be improved with prompt recognition and intervention with antibiotics, fluid, and oxygen
- Spotting sepsis at an early stage can be challenging in general practice
- Three key features present in sepsis are:
  - increased respiratory rate
  - low blood pressure
  - changes in cognition
- When assessing a deteriorating patient with possible infection, GPs should augment their clinical judgement by performing a physiological assessment of:
  - respiratory rate
  - blood pressure
  - mental function
  - oxygen saturation
  - temperature
  - pulse
- The National Early Warning Score system:
  - is a useful template (for use in adults) for the physiological assessment described above
  - can be used to augment communication of concern to the ambulance service and hospital clinicians
- Paediatric assessment should include an age-appropriate physiological assessment, with recognition of parental and clinician concern
- A 999 call to the ambulance service is appropriate for suspected sepsis cases
- The RCGP sepsis toolkit is a good source of information and resources on sepsis for GPs.

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## GP commissioning take home messages for England

written by Dr David Jenner, GP, Cullompton, Devon

- Sepsis remains a common cause of death with 70% of cases initially presenting in the community
- Early recognition is important and commissioners should consider an education campaign for patients, parents, and carers to highlight the key warning signs
- Scoring systems or at least awareness of the three key warning signs (hypotension, raised respiratory rate, and altered mental state) should be engrained in any clinical triage system (e.g. 111, GP out-of-hours services, and clinical streaming systems used locally)
- Guidance for parents can now be built into clinical apps e.g. the Handi Paediatric App in Devon and can include warning signs for sepsis
- Practices can be encouraged to review cases of sepsis presenting to them through Significant Event Audit to learn from real-life cases and determine if anything could have been done better.

**Guidelines**  
in practice

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