# Sepsis: a 21st century problem

A National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report on the care received by patients with sepsis – 'Just Say Sepsis!' (Goodwin et al, 2015) – has confirmed that sepsis remains a problem in the 21st century.

Sepsis is common: the international prevalence is estimated at 300 per 100 000, implying that there are over 200 000 cases a year in the UK (Dellinger et al, 2013). This is likely to be an underestimate as coding guidelines prioritize the source of infection over sepsis as a recognized term.

Sepsis remains important because it is a major cause of avoidable death in hospitals. The current mortality from sepsis is greater than that from myocardial infarction in the 1960s (Dellinger et al, 2013).

## Recognition of sepsis in the community

Over 70% of cases of sepsis are believed to arise in the community. There is huge variability in the clinical presentation of sepsis and there is no specific test to confirm the diagnosis, although laboratory tests such as procalcitonin and tests designed to rapidly detect bacterial and fungal DNA in the bloodstream are poised to become part of everyday practice. The use of early warning scores in secondary care helps identify a patient whose condition is deteriorating, but it is not clear why GPs do not have similar aids for monitoring vital signs.

## Management of sepsis in secondary care

Successful management of the physiological changes associated with sepsis – hypotension, tachypnoea and altered mental state – requires prompt intervention to identify and control the micro-organism(s), restore oxygen delivery to tissues (with support of organ failure), and escalate for decisive medical and often surgical management. The resuscitative pathway should include the 'Sepsis Six', a set of three investigations and three initial therapies:

1. Start the patient on high flow oxygen
2. Take blood for culture before treatment starts
3. Put up intravenous fluids
4. Give intravenous antimicrobials and later change them as appropriate
5. Measure the lactate level
6. Monitor the urine output.

The Sepsis Six is associated with reduced mortality and, together with education programmes such as 'Survive sepsis', contributes to improving outcomes (Daniels et al, 2011).

## Consultant review

The presence of a consultant improves the early identification and management of serious illness (Academy of Medical Royal Colleges, 2012). Previous NCEPOD studies have identified the need for and benefit of early review by senior clinicians (Cullinane et al, 2005) as has an Ombudsman report into sepsis (Parliamentary and Health Service Ombudsman, 2013). Following admission to hospital, 20.3% of the patients in the latest NCEPOD study were not seen by a consultant within 14 hours, a standard laid down by the Royal College of Physicians (2012). Following consultant review 61.5% patients had changes made to their care, demonstrating the benefit of senior input.

## Use of care bundles

The NCEPOD study showed that where care bundles were not used, there was delay in the administration of antibiotics. Despite the presence of protocols, investigations essential in the diagnosis of sepsis were missed in 39.1% of patients and delayed in 38.9%. Clear clinical pathways are associated with reduced in-hospital complications (Rotter et al, 2010). The NCEPOD study highlighted the requirement for hospitals that admit patients as an emergency to have formal protocols or guidelines for the early identification and immediate management of patients with sepsis. The NCEPOD study highlights the positive effect of care bundles on timely recognition and treatment of patients with sepsis.

## Use of antimicrobials

Early administration of antibiotics is essential. Kumar et al (2006) brought the importance of early antimicrobial therapy in patients with septic shock to the forefront, demonstrating an increase in mortality with increased delay in the administration of antibiotics – each hour's delay resulted in a 7.6% decrease in survival. Similarly, in 2010, the international Surviving Sepsis Campaign published results from over 15 000 episodes showing that delivery of early antimicrobials (at that stage, within 3 hours) was associated with survival but compliance achieved in only 67% of cases (Levy et al, 2010). In the 2015 NCEPOD study 62.6% of patients received antibiotics within 60 minutes, 82% within 2 hours and 93.9% by 6 hours. The National Emergency Laparotomy Study (NELA Project Team, 2015) demonstrated the relationship between time from onset of hypotension, time to administration of antimicrobials and survival fraction.

## Source control

Early consideration of the source of sepsis is paramount, as the importance of source control is often overlooked. The NCEPOD study noted that a possible source of infection was only recorded at triage in 6.1% of patients admitted via the emergency department.

Infection source control dates back to the origins of medicine and the modern management of sepsis still depends on such surgical therapy (Jimenez and Marshall, 2001). The Surviving Sepsis Campaign guidelines recommend that the source of infection be confirmed within 6 hours of presentation. In those patients in whom

**Dr Alexander Goodwin** is Consultant in Anaesthesia and Intensive Care at the Royal United Hospital NHS Foundation Trust, Bath and Clinical Coordinator, NCEPOD, London EC1M 4DZ (agoodwin@ncepod.org.uk)

a source was amenable to control, the NCEPOD study found that control was delayed in 42.6% and the delay in source control could have affected outcome.

## Critical care outreach teams

Critical care outreach teams, rapid response teams or medical emergency teams, depending on the geographical location, have become increasingly involved in reviewing and treating patients early in their acute illness, on the ward as well as in the critical care unit (Jimenez and Marshall, 2001). Critical care outreach teams reduce hospital morbidity and mortality (Priestley et al, 2004). The NCEPOD study reaffirmed the benefit of critical care outreach teams and recommended that they receive trusts' full support.

## Outcomes

Morbidity following sepsis is common. Survivors of sepsis are frequently left with a legacy of long-term physical, neurological and psychological impairments which affect quality of life. Beneficial interventions are increasingly being identified to reduce the prevalence and impact of these long-term complications. One in five patients in the NCEPOD study had evidence of complications following their episode of sepsis. However, there was little evidence of appropriate follow-up and support from specialist therapists.

For those patients who die as a result of sepsis it is important that, where appropriate, sepsis is included on the death certificate and subsequently patients are discussed at mortality and morbidity reviews, facilitating learning and improving future care.

## Clinical leads for sepsis

If clinical management is to improve, clinical leadership is crucial. Clinical leads in sepsis are needed in every hospital to champion best practice and take responsibility for clinical governance of patients with sepsis. However, in only half of the hospitals in the NCEPOD study (166/322; 51.6%) was this the case.

## Just Say Sepsis!

Sepsis remains a major cause of morbidity and death that is reduced by early recognition and treatment. Despite modern approaches to diagnosis and management, patients still slip through the net. Voicing and documenting a possible diagnosis of sepsis will improve care for patients. **BJHM**

### KEY POINTS

- Sepsis remains common and a significant cause of mortality and morbidity.
- Early recognition and treatment of sepsis affects outcome.
- Care bundles and protocols improve the management of sepsis.
- The source of sepsis should be identified and dealt with as soon as possible in the patient episode.
- The long-term sequelae of sepsis should not be underestimated.


Academy of Medical Royal Colleges (2012) The benefits of consultant delivered care. www.aomrc.org.uk/doc_view/9450-the-benefits-of-consultant-delivered-care (accessed 3 March 2016)

Cullinane M, Findlay G, Hargraves C, Lucas S (2005) *An Acute Problem.* National Confidential Enquiry into Patient Outcome and Death, London

Daniels R, Nutbeam T, McNamara G, Galvin C (2011) The sepsis six and the severe sepsis resuscitation bundle: a prospective observational cohort study. *Emerg Med J* **28**(6): 507–12 (doi: 10.1136/emj.2010.095067)

Dellinger RP, Levy MM, Rhodes A et al (2013) Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock. *Crit Care* **41**: 580–637 (doi: 10.1097/CCM.0b013e31827e83af)

Goodwin A, Srivastava V, Shotton H, Protopapa K, Butt A, Mason M (2015) *Just Say Sepsis.* National Confidential Enquiry into Patient Outcome and Death, London

Jimenez MF, Marshall JC; International Sepsis Forum (2001) Source control in the management of sepsis. *Intensive Care Med* **27**: 49–62

Kumar A, Roberts D, Wood KE et al (2006) Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. *Crit Care Med* **34**(6): 1589–96

Levy MM, Dellinger RP, Townsend SR et al; Surviving Sepsis Campaign (2010) The Surviving Sepsis Campaign: results of an international guideline-based performance improvement program targeting severe sepsis. *Crit Care Med* **38**: 367–74 (doi: 10.1097/CCM.0b013e3181cb0cdc)

NELA Project Team (2015) *First Patient Report of the National Emergency Laparotomy Audit.* Royal College of Anaesthetists, London

Parliamentary and Health Service Ombudsman (2013) *Time to Act - Severe Sepsis; rapid diagnosis and treatment saves lives.* Parliamentary and Health Service Ombudsman, London

Priestley G, Watson W, Rashidian A et al (2004) Introducing Critical Care Outreach: a ward-randomised trial of phased introduction in a general hospital. *Intensive Care Med* **30**(7): 1398–404

Rotter T, Kinsman L, James E et al (2010) Clinical pathways: Effects on professional practice, patient outcomes, length of stay and hospital costs. *Cochrane Database Syst Rev* **17**(3): CD006632 (doi: 10.1002/14651858.CD006632.pub2)

Royal College of Physicians (2012) *RCP Acute Care Toolkit4: Delivering a 12-hour, 7-day consultant presence on the acute medical unit.* Royal College of Physicians, London