

The Surviving Sepsis Campaign (SSC) and the emergency department

J Butler

Severe sepsis is a syndrome characterised by systemic inflammation, coagulopathy and acute organ dysfunction in response to an infection.¹ Worldwide, 18 million cases of severe sepsis occur each year. It is estimated that, worldwide, 1400 people die each day from sepsis, with up to 30% dying within 1 month of diagnosis. Comparatively, more people die from sepsis than from breast or colon cancer. Severe sepsis is a major cause of in-hospital mortality with reported mortality rates of 23–46%.² Recent trials involving new therapeutic interventions have shown, for the first time in 20 years, improved survival in patients with severe sepsis and septic shock. However, despite these advances, a recent meta-analysis revealed only a modest decrease in septic shock-induced mortality over the last 30 years.³ The current 28-day mortality for sepsis is comparable to the hospital mortality of patients presenting to hospital in the 1960s with an acute myocardial infarction (AMI) (ie, 30%).⁴ The current in-hospital mortality of AMI ranges from 2.7% to 9.6%. This reduction in mortality was achieved by the development and implementation of life-saving interventions such as aspirin and fibrinolytics which are now part of routine practice within emergency departments nationwide. As a result of its high mortality rates and healthcare costs, AMI has been the focus of media and public attention with considerable research and resources being directed towards its prevention. This has resulted in steady improvements in the management of AMI and a subsequent reduction in its mortality. These same lessons should be applied to the management of sepsis. As with AMI, the speed and appropriateness of treatment administered to a patient with sepsis in the initial hours is likely to influence the outcome. These crucial

initial hours are often spent in the emergency department.

In response to the high mortality from sepsis and the recent published evidence of effective therapeutic interventions, 11 organisations representing critical care, surgery, infectious disease and emergency medicine united in October 2002. An international collaboration, the Surviving Sepsis Campaign (SSC), was formed under the administration of the Society of Critical Care Medicine (SCCM), the European Society of Intensive Care Medicine (ESICM) and the International Sepsis Forum (ISF). Spearheaded by the ESICM, ISF and the SCCM, the SSC is aimed at improving the diagnosis, survival and management of patients with sepsis. The goal of the SSC is to reduce the mortality from sepsis by 25% by the year 2009 using a programme of quality improvement initiatives. The SSC recognised the importance of the emergency department in the chain of survival and the American College of Emergency Physicians (ACEP) represented the interests of emergency physicians.

The SSC incorporates a three-phase focused effort. The Barcelona Declaration (phase I), presented by the SSC at the annual meeting of the European Society of Intensive Care Medicine held in Barcelona in September 2002 committed the campaign to the goal of a significant mortality reduction. Phase II consisted of the development of the SSC clinical guidelines. Forty representatives from around the world reviewed the literature pertaining to severe sepsis and septic shock management in order to produce evidence-based guidelines that would be of practical use to the bedside clinician. The ACEP representatives contributed significantly to the process of guideline development. Phase II began in June 2003 and concluded with final approval in December 2003. The guidelines were published jointly in the journals *Critical Care Medicine* and *Intensive Care Medicine* in 2004.^{5,6} Although many of the recommendations are targeted for the intensive care unit, several recommendations are pertinent to clinicians with acute

resuscitation expertise such as emergency physicians.

The guidelines introduce the concept of “treatment bundles”. A treatment bundle is a group of interventions that, when administered together, may be more efficacious than when administered individually. They incorporate a few key elements from the guidelines that, when combined and performed within the same time and space, will hopefully generate improved outcomes. The SSC recommendations are divided into two time-critical bundles: the resuscitation and the sepsis bundles (see box 1). The initial 6-hour “resuscitation bundle” focuses on the identification of high-risk patients as well as administering early aggressive resuscitation with specific end points. The three components of the 6-hour resuscitation bundle are early identification, early antibiotics and cultures, and early goal-directed therapy. Therapies involve the correction of hypovolaemia, hypotension and myocardial depression, which all contribute to global tissue hypoxia in severe sepsis and septic shock. The “sepsis bundle” recommends interventions that are usually delivered with the critical care areas within 24 h of the initial presentation. Specific recommendations pertinent to the emergency department included initial resuscitation and appropriate antibiotics and cultures, the use of lung protective strategies, activated protein C (Drotrecogin alfa) and steroids where appropriate. Regrettably, there is no single “magic bullet” to reduce the mortality from sepsis. The only way to reduce mortality is to combine different interventions in a quality improvement programme. The SSC recognised that a focused education and implementation plan (phase III) would be required to demonstrate measurable improvements in severe sepsis and septic shock outcomes. Phase III is currently underway and the national launch of the “care bundles” in England took place at Manchester Royal Infirmary on 13 June 2005 and was attended by representatives from the College of Emergency Medicine.

Emergency medicine plays a vital role in the chain of survival for many acute disease presentations (eg, AMI, stroke, trauma). Many patients with sepsis will initially present to the emergency department. In the USA an estimated 390 000 patients with severe sepsis and septic shock initially present to emergency departments each year.⁷ The majority of the patients in the SSC database (approximately 60%) come from emergency

Correspondence to: Dr J Butler, Department of Emergency Medicine & Critical Care Medicine, Manchester Royal Infirmary, Oxford Road, Manchester M13 9WL, UK; John.Butler@cmmc.nhs.uk

Box 1 SSC "treatment bundles"

Sepsis resuscitation bundle

(To be started immediately and completed within 6 h)

- ▶ Serum lactate measured.
- ▶ Blood cultures obtained prior to antibiotic administration.
- ▶ From the time of presentation, broad-spectrum antibiotics administered within 3 h for admissions to the emergency department and within 1 h for non-emergency department admissions to the intensive care unit (ICU).
- ▶ In the event of hypotension and/or lactate levels >4 mmol/l (36 mg/dl):
 - deliver an initial minimum of 20 ml/kg crystalloid (or colloid equivalent)
 - give vasopressors for hypotension not responding to initial fluid resuscitation to maintain mean arterial pressure \geq 65 mm Hg
- ▶ In the event of persistent arterial hypotension despite volume resuscitation (septic shock) and/or initial lactate > 4 mmol/l (36 mg/dl):
 - achieve central venous pressure of \geq 8 mm Hg
 - achieve central venous oxygen saturation \geq 70%*

Sepsis management bundle

(To be started immediately and completed within 24 h)

- ▶ Low-dose steroids administered for septic shock in accordance with a standard ICU policy.
- ▶ Drotrecogin alfa (activated) administered in accordance with a standard ICU policy.
- ▶ Glucose control maintained \geq lower limit of normal but <150 mg/dl (8.3 mmol/l).
- ▶ For mechanically ventilated patients, inspiratory plateau pressures maintained <30 cm H₂O.

*Achieving a mixed venous oxygen saturation of 65% is an acceptable alternative.

department admissions. Patients in emergency departments with severe sepsis are already critically ill and require immediate attention to avoid deterioration. The rapid diagnosis and management of sepsis is critical to successful treatment. Emergency physicians are ideally placed to initiate the early phases of management as recommended by the SSC. The strategies available within the emergency department to optimise patient care include early patient identification and diagnosis, rapid identification of causative organisms where appropriate, timely antimicrobial therapy and appropriate (goal-directed) haemodynamic support. The primary resuscitation component includes haemodynamic optimisation using early goal-directed therapy (EGDT).⁸

EGDT is an organised approach to haemodynamic optimisation performed

upon detection of severe sepsis or septic shock and should be delivered within 6 h of arrival in the emergency department. It uses lactate measurements as a marker of tissue hypoxia. This therapeutic strategy results in outcome benefits (absolute risk reduction in mortality 16%, $p=0.09$) greater than any treatment evaluated by previous sepsis trials. Significant challenges exist in managing severe sepsis in the emergency department and these include limited resources and the pressure of targets. Regrettably, recent studies have shown that only 18% of UK emergency departments are currently able to initiate EGDT in their departments.⁹

The goal of the SSC is to reduce the significant mortality from severe sepsis and septic shock by 2009. One of the keys to the success of the campaign is the multispecialty cooperation of healthcare professionals.

Further information is available on:

Surviving Sepsis Campaign website: <http://www.survivingsepsis.org>
Survive SEPSIS (UK) website: <http://www.survivesepsis.org/>
NELH website: <http://www.library.nhs.uk/emergency/>

Close collaboration between emergency departments and critical care departments is crucial to provide the optimal management for these patients. It is vital that emergency medicine, both in the UK and worldwide, plays a significant role if the goal of mortality reduction is to be achieved and quality of care for patients with sepsis is to be improved.

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REFERENCES

1. **Bone RC**, Balk RA, Cerra FB, *et al.* Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committee. *Chest* 1992;**101**:1644–55.
2. **Dellinger RP**. Cardiovascular management of sepsis shock. *Crit Care Med* 2003;**31**:946–55.
3. **Friedman G**, Silva E, Vincent JL. Has the mortality of septic shock changed with time? *Crit Care Med* 1998;**26**:2078–86.
4. **Anon**. Task Force on the Management of Acute Myocardial Infarction of the European Society of Cardiology. *Eur Heart J* 1996;**17**:43–63.
5. **Dellinger RP**, Carlet J, Masur H, *et al.* Surviving Sepsis Campaign guidelines for the management of severe sepsis and septic shock. *Crit Care Med* 2004;**32**:853–73.
6. **Dellinger RP**, Carlet J, Masur H, *et al.* Surviving Sepsis Campaign guidelines for the management of severe sepsis and septic shock. *Intensive Care Med* 2004;**30**:536–55.
7. **Rivers EP**, Nguyen HB, Huang DT, *et al.* Critical care and emergency medicine. *Curr Opin Crit Care* 2002;**8**:600–6.
8. **Rivers E**, Nguyen B, Havstad S, *et al.* Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med* 2001;**345**:1368–77.
9. **Sivayoham N**. Management of severe sepsis and septic shock in the emergency department: a survey of current practice in emergency departments in England. *Emerg Med J* 2007;**24**:422.