Management of severe sepsis and septic shock in the emergency department: current practice in the Netherlands

MI Gaakeer¹, JM van Lieshout², CD Hugelmeyer³, ARH van Zanten⁴

¹ Emergency Department, Albert Schweitzer Hospital, Dordrecht, The Netherlands
² Emergency Department, Oosterschelde Hospital Goes, The Netherlands
³ Department of Intensive Care, Gelderse Vallei Hospital, Ede, The Netherlands

Abstract · Introduction: Severe sepsis and septic shock may lead to organ failure and death. A substantial proportion (at least 25%) of sepsis cases are initially admitted to emergency departments (EDs). Several national and international initiatives have been developed to optimize sepsis recognition and early treatment to promote better outcome. We addressed aspects of current practice concerning sepsis in Dutch EDs. Methods: In early 2008 we conducted an observational study using questionnaires sent out to 107 medical directors of EDs in the Netherlands. These addressed Surviving Sepsis Campaign (SSC) awareness, aspects of clinical practice, guideline implementation and training programmes concerning sepsis. Results: The response rate was 61%. Awareness of SSC was low (51%). Sepsis identification criteria were available in 35% of EDs. Nurses and physicians were trained in the management of sepsis in 43-51% of EDs. On diagnosis of sepsis, lactate was measured in 83%, cultures are taken in 95% and antibiotics given in 85% of cases. Complete early goal-directed therapy was only applied or initiated in 22% of the responding departments. Conclusions: Sepsis presentation on admission to the emergency department is common. However, Dutch EDs seem to be insufficiently involved in the early recognition of sepsis and initial optimal treatment. There is room for improvement. Therefore, enhanced cooperation between health care professionals from EDs and ICUs is warranted to improve sepsis outcome.

Keywords · sepsis, surviving sepsis campaign, early goal-directed therapy, emergency department, compliance, safety

Introduction
Sepsis is a leading cause of death in critically ill patients in the Western world. Its incidence is increasing, mainly due to the aging population, increasing numbers of individuals at high-risk (immunocompromized, cancer, haematological and HIV patients), a broadening awareness of this condition among physicians, more complex surgery, and greater use of invasive procedures [1]. Mortality increases along the sepsis continuum, from approximately 10 to 36% in sepsis to 18 to 52% in severe sepsis, and 46 to 82% in septic shock [2,3].

The incidence and mortality of sepsis increases with age which makes sepsis a disease of the elderly [4]. The low diagnostic rate and difficulties in tracking sepsis in many countries will confound these numbers. Not only does sepsis cause significant mortality, it is also a very costly disease. Severe sepsis accounts for 2 to 11% of all admissions to hospital ICUs, and each year sepsis costs €7.6 billion in Europe and €17.4 billion in the USA [5].

Sepsis is a complex syndrome. It is an inflammatory response to an infection and is characterized by systemic inflammation and coagulation. An infection is caused by micro-organisms (usually bacteria) invading the body. This infection may be limited to a particular area of the body or it may be widespread in the bloodstream (septicaemia or blood poisoning). Sepsis can occur in virtually any part of the body, although regions such as the lungs, the abdomen, the urinary tract, the skin, the bones and the central nervous system, are the most common sites. In around 20% of cases, the source of the sepsis is never found.

The annual number of admissions for severe sepsis in Dutch ICUs was calculated at 8643 ± 929 cases/year, which is 0.054% of the population, 0.61% of hospital admissions and 11% of ICU admissions [6]. In the prevalence series most patients with severe sepsis - 37% - were admitted to the ICU from surgical departments, 26% came from emergency departments (ED), and 15% were admitted from departments of internal medicine. The major cause for ICU admission for severe sepsis was acute infection in 62% patients, followed by acute surgery in 31%. As substantial numbers of these patients are initially encountered on the ED, emergency medicine plays a pivotal role in the chain of survival. Early goal-directed therapy provides significant benefits to patients with severe sepsis and septic shock. The early identification and initiation of treatment in these patients has been shown to reduce mortality from 46.5% to 30.5% [7]. This strategy was proven in an emergency department setting thus underlining the importance of Emergency Medicine in community-acquired sepsis.

International Surviving Sepsis Campaign guidelines (SSC) have been developed and transformed into a 6-hour resuscitation bundle and a 24-hour management bundle to apply to patients with severe sepsis and septic shock [8]. Implementation of these guidelines may improve sepsis mortality. In the Netherlands, the SSC started in December 2005. We conducted a survey to collect information on the extent to which EDs in the Netherlands are involved in the Surviving Sepsis Campaign Netherlands two years after it started.
Materials and Methods

Surveyed EDs

We conducted an observational non-interventional study. In January 2008 a one-page survey form was sent to all medical directors of EDs in the Netherlands. Those directors who did not respond were contacted at least once by phone. The survey was carried out over a 3-month period. Data analysis was descriptive, and performed with Microsoft Office Excel 2007. No statistical analysis was performed.

The questionnaire

The original questionnaire consisted of eight dichotomous questions to address the daily clinical practice of management of severe sepsis and septic shock.

Data presentation and statistical analysis

The questionnaires retrieved were analyzed by means of Microsoft Excel database. Results are presented as proportions of participating EDs.

Results

Responding EDs

We received completed questionnaires from 61% (65 of 107) of the hospital locations. The participating EDs included departments in university hospitals (n=5 of 8 =62%), and city or community hospitals (n=60 of 99 = 61%).

The questionnaire

The questions were answered as follows (Table 1):

Discussion

Our objective was to collect information about the management of patients with severe sepsis or septic shock on Dutch EDs. This had not been done before in the Netherlands. The response of hospitals was relatively high (61%).

Early identification and initiation of adequate therapy are essential for surviving severe sepsis or septic shock [7, 8]. In sharp contrast to this, we have demonstrated that almost half the responding EDs were not aware of the SSC. Furthermore, more than half the respondents did not use sepsis identification criteria and in most departments members of staff (both ED nurses and physicians) are not formally trained in the management of sepsis. According to ED directors, written guidelines for the initiation of the pathway to early goal-directed therapy (EGDT) are available in only 22% of the hospitals contacted. However, if sepsis is recognized, lactate is measured in 83%, cultures are taken in 95% and antibiotics given in 85% of patients in participating EDs. These findings suggest that if recognized adequate treatment is initiated in septic patients in most cases. However, it is likely that that septic patients are insufficiently recognized causing delay in optimal treatment. According to our data, university hospitals may perform better than non-university hospitals, despite being less aware of the SSC.

In an independent review of the literature, experts in the field have examined recent pathogenic, diagnostic, and therapeutic advances in severe sepsis and septic shock for adults, with particular relevance to emergency practice [9]. Recommendations are provided for therapies that have been shown to improve outcomes, including early goal-directed therapy, early and appropriate antimicrobials, source control, recombinant human activated protein C, corticosteroids, and low tidal volume mechanical ventilation.

Successful programmes to optimize guideline implementation
have been published by hospitals in Spain [10]. The educational programmes consisted of training physicians and nursing staff from the emergency department, wards, and ICU, in the definition, recognition, and treatment of severe sepsis and septic shock as outlined in the guidelines. Patients in the post-intervention cohort had a lower risk of hospital mortality (44.0% vs 39.7%; P = 0.04). The compliance with process-of-care variables also improved after the intervention in the sepsis resuscitation bundle (5.3% [95% confidence interval [CI], 4%-7%] vs. 10.0% [95% CI, 8%-12%]; P < .001) and in the sepsis management bundle (10.9% [95% CI, 9%-13%] vs. 15.7% [95% CI, 14%-18%]; P = .001).

Other interventions have been suggested to promote the early recognition of sepsis. These include scoring systems and score cards to identify patients with disturbances of vital signs (Figure 1) [11]. High alarm scores this could lead to immediately calling a rapid response team. Both early recognition of deterioration of vital signs in hospitalized patients and optimal treatment of sepsis, have been selected as nationwide projects to reduce hospital mortality based on the national patient safety programmes 2008-2012 [12]. ED nurses and physicians could cooperate with critical care teams based on these calling criteria. In addition, to achieve change in the early recognition of severe sepsis, it seems logical to invite ED nurses and physicians into hospital change teams to promote cooperation, be able to address organizational hurdles to change together, and to evaluate performance from initial diagnosis to final outcome.

The results of this study should be interpreted with due caution. As is the case with any questionnaire, respondents may answer according to what they assume the enquirer would like to hear. This makes the results of a questionnaire not fully reliable. The response was fairly good, although not 100%. Consequently, we cannot extrapolate the situation in the Netherlands from our findings. In addition we did not independently confirm the data provided. Finally, all the respondents were ED medical directors. This may have caused bias towards real life treatment of sepsis patients.

**Conclusion**

Evaluating six years after publication of EGDT by Rivers and co-workers in severe sepsis and septic shock and more than two years after the start of the SSC in the Netherlands, we found that Dutch EDs seem to be insufficiently involved in the early recognition of sepsis and initial optimal treatment. As national programmes for another four years will be rolled out in 2009, we plan to re-evaluate the ED performance in years to come. Based on Dutch epidemiological data, the role of Emergency Medicine is of importance to improve outcome in sepsis as sepsis presentation on admission in the emergency department is common. We feel there is room for improvement. Further cooperation of health care professionals from EDs and ICUs is warranted.

**Acknowledgments**

We thank the medical directors of the emergency medicine departments that participated for their efforts. We thank members of ED staff of the Albert Schweitzer hospital for their support.

**Conflict of interest**

All authors state that there are no conflicts of interest. They have no financial and personal relationships with other people, or organisations, that could inappropriately influence (bias) their work, except for Arthur RH van Zanten, MD PhD, who is presently international liaison officer for Surviving Sepsis Campaign Netherlands and Chairperson of the Sepsis Expert group of the National Patient Safety Programme.
Management of severe sepsis and septic shock in the emergency department: current practice in the Netherlands

References