Sepsis and septic shock can affect anyone at any age or life stage and is a major cause of avoidable morbidity and mortality. Prevalence of sepsis internationally is estimated at 300 per 100,000, which equates to around 200,000 cases in the UK per year; severe sepsis has a mortality rate of 24%. In the UK every year an estimated 37,000 patients will die as a result of sepsis, while 65,000 will survive with severe long-term complications such as amputation, irreversible lung damage and cognitive dysfunction (Shanin et al, 2012). Early treatment of sepsis is vital to prevent its progression to severe sepsis or septic shock. However, the condition can present in various ways so is difficult to diagnose. To aid diagnosis, international consensus definitions were recently amended to focus on physiological dysfunction such as hypotension, tachypnoea and altered mental state (Singer et al, 2016).

The NCEPOD study
The aim of the NCEPOD (2015) study was to identify and examine the factors in the care pathway for patients with sepsis. The study period was 6-20 May 2014; patients were nominated by study contacts in critical care units and on critical care outreach teams (CCOTs) if they were:

- Aged 16 or over;
- Seen by CCOT or equivalent, or admitted directly to a critical care unit;
- Presumed or suspected to have sepsis;
- Had two or more of the following:
  - Temperature >38.3°C or <36°C;
  - Pulse >90 beats per minute;
  - Respiratory rate >20 breaths per minute;
  - Acutely altered mental status;
  - Systolic blood pressure <90mmHg or mean arterial pressure <70mmHg, or a systolic blood pressure decrease of >40mmHg;
  - Blood glucose >7.7mmol/L in the absence of diabetes;
  - White blood cell count >12,000uL or <4,000uL.

In total, 3,363 patients from 549 hospitals met the inclusion criteria. Of these, 551 sets of healthcare records were examined by the reviewers. A clinician questionnaire

In this article...
- What sepsis is and why it must be recognised early
- Problem areas identified in the care of patients with sepsis
- How nurses can improve the care they provide

5 key points
1. Sepsis is a cause of avoidable deaths in hospital
2. Sepsis is difficult to manage
3. Sepsis affects approximately 200,000 people in the UK every year
4. All patients, whether in pre-hospital or hospital care, should have all physiological vital signs monitored using a recognised early warning score
5. All hospitals should have an up-to-date protocol for the early identification and management of people with sepsis

Sepsis is the body’s response to an overwhelming infection, shown by changes in temperature, respiratory rate and heart rate. It can affect people in any setting; over 70% of cases are believed to arise in the community so it is important for primary and community care professionals to be vigilant and able to recognise symptoms.

Early treatment of sepsis is vital to prevent its progression to severe sepsis or septic shock. However, the condition can present in various ways so is difficult to diagnose. To aid diagnosis, international consensus definitions were recently amended to focus on physiological dysfunction such as hypotension, tachypnoea and altered mental state (Singer et al, 2016).

Sepsis causes many preventable deaths, but health professionals can help to reduce these by knowing how to identify the condition early.
was sent to the consultant responsible for the patient’s care to collect data about the patient from presentation with sepsis to discharge, death or at 30 days, while an organisational questionnaire was sent to the hospital’s NCEPOD local reporter. Data on sepsis policies and protocols, and the availability of key services were obtained.

NCEPOD’s (2015) report identified 21 recommendations in total; the main five are outlined in Table 1.

Facilities, equipment and tools

In total, 549 hospitals – including district general, university teaching, tertiary specialist, community and independent hospitals – submitted data to the study. Of these, 201 reported having accident and emergency departments, most of which were open 24 hours a day, seven days a week. Only 66% (n=360) of these hospitals reported having a protocol or care pathway for the recognition and management of sepsis; such bundles improve patient outcomes (Rivers et al, 2001). Of these 360 hospitals, 80% had developed their guidelines using national and international guidance available but 20% of hospitals had developed their own. In the hospitals with protocols, most reported training staff about sepsis but most of the training was in A&E.

A CCOT was available in 199 of the 223 hospitals with critical care facilities and in just under of half of these the CCOT service was provided 24/7. Hospitals were asked whether they used a track and trigger tool to identify patients who were deteriorating; 99% said they did. In 233 of 350 hospitals that responded, the patient was referred to the CCOT or critical care when the tool was triggered. However, one in five hospitals with no critical care facilities on site had no formal arrangements for transferring deteriorating patients to other hospitals when they needed critical care intervention.

In total, 28% (112 out of 400) hospitals reported using a sepsis response kit (box, trolley or bag); these help ensure the sepsis bundle is delivered in as short a time as possible (NCEPOD, 2015). Just over half of all hospitals reported having a lead clinician sepsis champion responsible for quality improvement activity for sepsis, and just over 10% had a designated sepsis nurse.

Sepsis audit and serious incident reporting was poor. Many organisations could not state what sepsis-related incidents had occurred and <50% of those that responded conducted an audit.

Patients and pre-hospital care

Most patients in the study were aged over 60 years; 56% were male. On admission, 513 of 569 people had comorbidities. Where smoking history was known (541 patients), >60% of patients had a history of it and almost a third of those diagnosed with sepsis had had sepsis in the past. Over 50% of patients were admitted to hospital via ambulance to A&E, about 20% were referred direct by GPs to A&E or acute admission departments, and just over 10% of patients self-presented to A&E.

GP records were reviewed and 54 sets of records analysed. Of these patients, 50% had been reviewed by GPs at home, 25% in the surgery and the rest by an out-of-hours service, practice nurse telephone consultation or during a nursing home visit. Documentation was inadequate in many cases (NCEPOD, 2015) and included missing physiological vital signs – for around half of patients no temperature or blood pressure data was recorded. There was no evidence of GPs using an early warning scoring system. In 39% of cases in primary care, there was room for improvement.

When patients arrived in A&E, 91% were triaged in a timely manner but 50% were reviewed by a senior clinician within an appropriate timeframe. There were inconsistencies in recording physiological vital signs – a complete set of observations was recorded in only 41% of patients. Consideration of the source of infection was recorded in only 46% of all cases. Reviewers said A&E care could improve in:

- Investigations;
- Treatment planning;
- Monitoring planning of patients who had sepsis.

Admission to hospital

Just over half of patients were admitted to hospital out of normal working hours. The more severe the sepsis, the more likely the patient was to be admitted to higher care areas such as high-dependency or intensive care units. Almost a fifth (14%) of patients experienced a delay in admission, the main reason being lack of beds. The delay affected the outcome of 19% of patients.

In total, 18% of patients were not reviewed by a consultant; the Royal College of Physicians’ (2012) states this must be done with all emergency admissions as soon as possible or within 14 hours of arrival. The care of >60% of patients was changed after a consultant review.

Hospital-acquired infections

In this study, 23% (n=115) of patients developed sepsis because of a hospital-acquired infection, with most related to the respiratory tract (chest infection, aspiration pneumonia or hospital-acquired pneumonia). Of the 115, 63% appeared to acquire their infection after an invasive procedure. In just over 11% of patients it was thought the infection could have been preventable.

Early warning scoring systems were

| TABLE 1. MANAGING SEPSIS: FIVE KEY RECOMMENDATIONS |
| Recommendation | Responsible person(s)/organisation(s) |
| Hospitals should have formal protocols for the early identification and immediate management of patients with sepsis. This should be available to all staff and they should be trained in its use | Medical directors |
| On arrival in accident and emergency a full set of physiological observations should be undertaken | Emergency medicine doctors, clinical directors, nursing directors |
| Early warning scores should be used in both primary and secondary care | GPs, ambulance trusts, NHS England, royal colleges |
| Patients diagnosed with sepsis will benefit from management on a care bundle. This should be audited with the aim of achieving 100% compliance | Medical directors, clinical directors, commissioners |
| As in other NCEPOD and national reports, hospitals must ensure staff and resources enable the following: | Medical directors, clinical directors, commissioners |
| - Review of acutely ill patients by a consultant within a maximum of 14 hours after admission | |
| - Formal arrangements for handover | |
| - Access to critical care facilities if required | |
| - Hospitals with critical care facilities should have a critical care outreach service or equivalent 24/7 | |

Source: National Confidential Enquiry into Patient Outcome and Death (2015)
used in 86% of patients who developed hospital-acquired infections. However, it was felt physiological observations should have been more frequent in patients with sepsis and that about a quarter of patients could have had their infections identified and treatment commenced sooner.

First identification of sepsis
There appeared to be a delay in recognising:
» Sepsis in 36% of affected patients;
» Severe sepsis in 52% of affected patients;
» Septic shock in 33% of affected patients.
The mean time delay in identifying sepsis was nine hours. Reasons included:
» Incorrect calculation of early warning scores;
» Missed by reviewing clinician;
» Lack of senior review.
The most common reason for delay was considered to be that clinicians did not consider sepsis at patient review.

Physiological vital signs were recorded in 97% of patients at the time of sepsis identification but only 53% recorded the alert, voice, pain, unresponsive scale, 92% temperature, 88% blood pressure, 84% respiratory rate and 94% heart rate. Blood gases were taken but the time frame varied: for 77% of patients it was within an hour, for 9% within 1-4 hours and for the remainder it varied, including 25% after 24 hours.

Management of sepsis
There are six pillars of sepsis management, known as The Sepsis Six (Daniels et al, 2011), which were examined in depth:
» Administer high-flow oxygen: 80% of patients required oxygen therapy. Of those with sepsis, who reviewers thought required oxygen, 90% received it promptly, 7% received it with a delay and the remainder never received it;
» Blood cultures and consider infective source: just over 75% of patients had blood cultures taken but <20% had any other specimen cultures taken;
» Administer intravenous antibiotic: antibiotic administration is vital and with every hour delay, non-survival increases by 8% (Kumar et al, 2006). Only 63% of patients received antibiotics in the first hour; 31% after 1-6 hours and 1% waited more than 12 hours. Microbiologists were not always involved in the decision-making processes of patients with sepsis;
» Give intravenous fluid resuscitation: fluid resuscitation was required in 89% of patients; 83% received it promptly but 5% never received fluids. Fluid balance charts were examined and reviewers deemed in 46% of cases, how they were maintained could be improved;
» Check haemoglobin and serial lactates: lactates were measured in only 62% of patients but haemoglobin was measured in 94%;
» Commence hourly urine output measurement: this was not always done accurately due to the poor completion of fluid balance charts.

CCOTs and rapid response teams have been shown to reduce hospital mortality and morbidity (Hillman, 2002). In this study, 79% of patients were referred to such teams; of those who were not, just under half were admitted directly to ICU.

Most CCOT referrals (84%) were considered to be timely; the remainder were not timely due to a range of issues including inaccurate calculations of early warning scores, failure to respond to high early warning scores and insufficient monitoring of observations.

When patients had been identified as having sepsis they received written information about it in only 6% of hospitals.

Complication of sepsis and discharge planning
Over a fifth of patients were discharged with evidence of complications and, of these, just over half had a worsened physical function. Discharge was delayed in 19% of them and after discharge 10% of patients were readmitted to hospital. Only 36% of hospitals provided any follow-up and, although 80% of patients had follow-up appointments, 20% did not. There was no evidence that GPs had been informed of the admission in around a quarter of cases and sepsis was not mentioned in the discharge summaries of just under half of patients.

Conclusion
In reviewing the overall quality of care of patients with sepsis, it was thought that just over a third received good care during admission; 6% received care that was less than satisfactory. NCEPOD (2015) considers the issues with care are around management, awareness and decision making by nurses and doctors, rather than the organisation of services or lack of equipment.

Sepsis is a killer and unless health professionals can recognise it and act accordingly, people will continue to be harmed or die. Box 1 summarises what nurses can do to improve the pathway for patients who have sepsis. Health professionals must ensure they are aware of up-to-date sepsis guidelines – the best and possibly easiest way is to visit The UK Sepsis Trust’s website (www.sepsistrust.org).

References


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» Treatment for early-onset neonatal sepsis
Bit.ly/NTNeonatalSepsis

For more articles on infection control, go to nursingtimes.net/infection