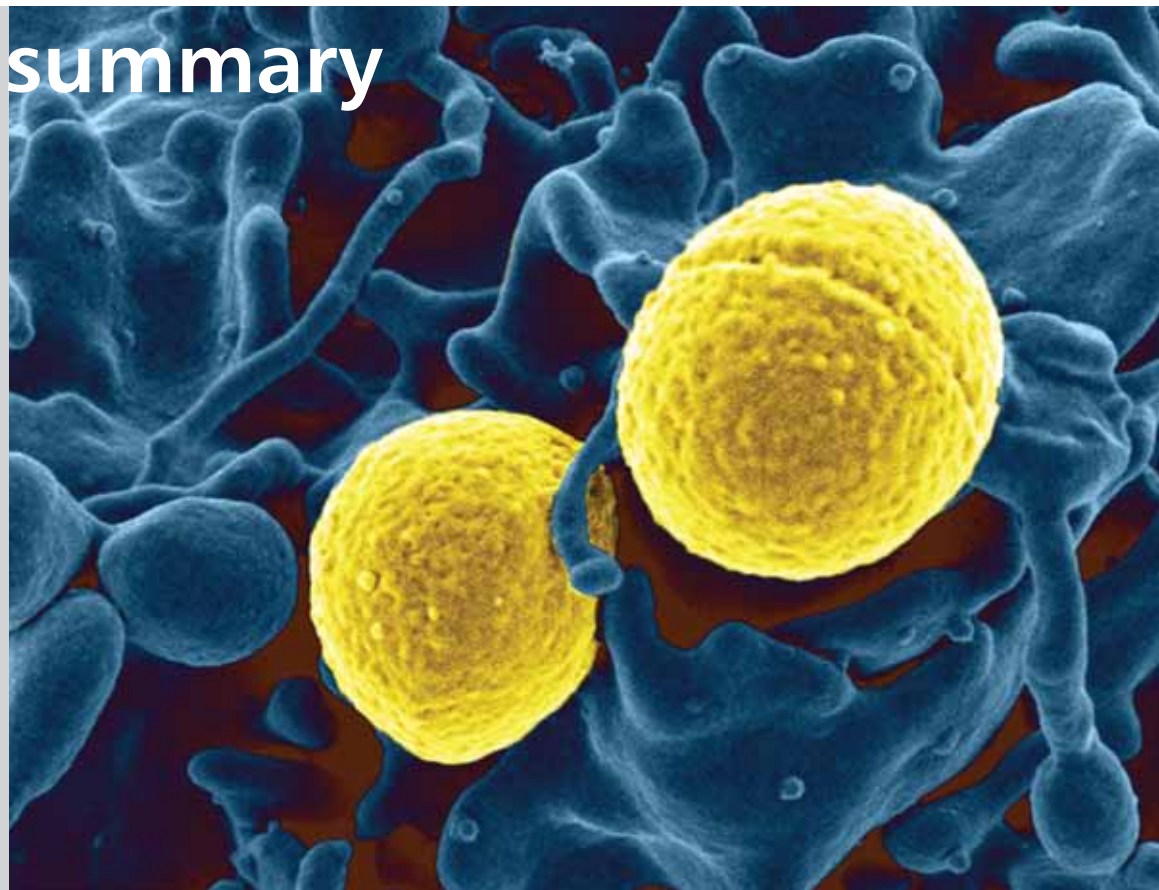


Just Say Sepsis!

A review of the process of care received
by patients with sepsis

summary



Just Say Sepsis!

A review of the process of care received by patients with sepsis

A report by the National Confidential Enquiry into Patient Outcome and Death
(2015)

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Principal recommendations

All hospitals should have a formal protocol for the early identification and immediate management of patients with sepsis. The protocol should be easily available to all clinical staff, who should receive training in its use. Compliance with the protocol should be regularly audited. This protocol should be updated in line with changes to national and international guidelines and local antimicrobial policies.

(Medical Directors)

An early warning score, such as the National Early Warning Score (NEWS) should be used in both primary care and secondary care for patients where sepsis is suspected. This will aid the recognition of the severity of sepsis and can be used to prioritise urgency of care. *(General Practitioners, Ambulance Trusts, Health Boards, NHSE, Clinical Directors, Royal Colleges)*

On arrival in the emergency department a full set of vital signs, as stated in the Royal College of Emergency Medicine standards for sepsis and septic shock should be undertaken. *(Emergency Medicine Physicians, Clinical Directors, Nursing Directors)*

In line with previous NCEPOD and other national reports' recommendations on recognising and caring for the acutely deteriorating patients, hospitals should ensure that their staffing and resources enable:

- a. All acutely ill patients to be reviewed by a consultant within the recommended national timeframes (max of 14 hours after admission)
- b. Formal arrangements for handover
- c. Access to critical care facilities if escalation is required; and
- d. Hospitals with critical care facilities to provide a Critical Care Outreach service (or equivalent) 24/7. *(Medical Directors, Nursing Directors, Commissioners)*

All patients diagnosed with sepsis should benefit from management on a care bundle as part of their care pathway. The implementation of this bundle should be audited and reported on regularly. Trusts/Health Boards should aim to reach 100% compliance and this should be encouraged by local and national commissioning arrangements. *(Medical Directors, Clinical Directors, Commissioners)*

See the full list of recommendations on page 15

Introduction

Sepsis is defined as an overwhelming response to infection in which the immune system initiates a potentially damaging systemic inflammatory response syndrome (SIRS) which can manifest in a number of physiological changes, recognised by worsening vital signs or 'SIRS criteria' (temperature, respiratory rate, heart rate). Severe sepsis is defined as sepsis leading to dysfunction of one or more organ systems according to current criteria.¹ This year, international consensus definitions will be amended to focus on physiological changes of organ dysfunction, including hypotension, tachypnoea and altered mental state.² Sepsis is already recognised as difficult to diagnose and it can only be hoped that a new definition will aid this process. However, whichever definition is used it is the wider consideration given to sepsis by healthcare professionals that is important.

Over 70% of cases of sepsis are believed to arise in the community.³ General practitioners and other pre-hospital services present key opportunities for prompt recognition and treatment of sepsis. Patients requiring hospital care may be admitted through emergency departments or admissions units, where the same issue of prompt recognition is equally important. In 2011, the Royal College of Emergency Medicine conducted an audit of compliance with sepsis management standards in emergency departments. Compliance was found to be suboptimal at 27-47%.⁴ A repeat audit in 2013-14 showed mixed results with marginal improvement.⁵

Sepsis can also occur in patients already in hospital who acquire infections and whose condition deteriorates. In 2005 NCEPOD reported that acutely ill patients were languishing in wards not being recognised nor escalated quickly enough.⁶ Since then there have been National Institute for Health Excellence and Care (NICE) guidelines produced (CG50)⁷ and work undertaken by the National Patient Safety Agency (NPSA as it was) around recognition of the critically ill patient.⁸ Sepsis is part of that severely ill/deteriorating patient scenario and it is relevant to all

specialties. When a patient has worsening vital signs they need to be recognised and acted upon and whilst early warning scores such as NEWS are increasingly used⁹, the possibility of sepsis should form part of that process. In 2010, the Scottish Trauma Audit Group (STAG) conducted an audit of sepsis within acute hospital settings. 1.7% of new admissions developed criteria for sepsis within 2 days of attendance; 34% of these patients met the criteria for severe sepsis, with a mortality of 24% in this group.¹⁰

Treatment of the infection in patients with sepsis is paramount. In 2010, the International Surviving Sepsis Campaign (SSC) published results in over 15,000 episodes showing that delivery of early antibiotics (at that stage within 3 hours) was independently associated with survival, but was achieved in only 67% of cases.¹¹ The recommendation has since been changed to delivery of antibiotics within 1 hour of severe sepsis being identified.¹ However, the importance of administering antimicrobials in an era when doctors are being advised not to over-prescribe them is somewhat confusing and this is an area that needs attention to ensure that patients are treated effectively but that there is robust antimicrobial stewardship.^{12,13}

One systematic issue that hinders the knowledge about sepsis is its limited coding. Within the United Kingdom there is believed to be an underestimate of the incidence of sepsis as coding guidelines prioritise the source of infection over sepsis as a primary coded term. The incidence of severe sepsis depends on how acute organ dysfunction is defined and on whether that dysfunction is attributed to an underlying infection. Organ dysfunction is often defined by the need and provision of supportive therapy (e.g. mechanical ventilation), and epidemiologic studies thus only count the cases in which treatment is undertaken. This under reporting of sepsis will mean that as a condition it will be under resourced, and there will be limitations in the opportunity to audit it and learn from the cases at mortality reviews. In the UK an estimated 37,000 patients die with

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sepsis per year¹⁴ and a further estimate of 65,000 people per year survive episodes of severe sepsis, often with serious long-term complications: amputation, muscular contraction, irreversible damage to lungs, heart and kidneys, neuro-psychiatric disorders such as cognitive dysfunction and post-traumatic stress disorder. Early recognition is therefore vital.

There is an increasing focus on sepsis from health and political organisations with a will to improve the care of patients with sepsis. NHS England has identified tackling sepsis as a clinical priority for improving patient outcomes for 2015/16.¹⁵ Sepsis has been linked to a new CQUIN in England.¹⁶ NICE are currently developing sepsis guidelines.¹⁷ A new study is assessing the 'Size of Sepsis in Wales'¹⁸ following on from a point-prevalence study in 2014.¹⁹ In 2014 MBRRACE-UK published a themed confidential enquiry which reviewed maternal mortality and morbidity due to sepsis.²⁰ In 2013 the Parliamentary and Health service

Ombudsman published her first clinical report "Time to Act" identifying common themes in 10 case studies of patients who died following sepsis.²¹ This report identified failings throughout the patient pathway: from carrying out a timely initial assessment and identifying the source of infection to adequate monitoring and timely initiation of treatment. This NCEPOD study similarly looks in detail at individual cases to identify common themes. 2013 also saw the formation of the All Party Parliamentary Group (APPG) on sepsis which has recently published 10 recommendations in a report highlighting similar themes to those presented here.²²

Sepsis is a major cause of avoidable mortality and morbidity. This study, whilst considering the plethora of other work in this important area, sets out to identify in greater detail, remediable factors which if addressed would improve the quality of care of patients with sepsis.

Method and Data Returns

Method

Study Advisory Group

The Study Advisory Group comprised a multidisciplinary group of senior clinicians from the following specialties: acute medicine, emergency medicine, general surgery, obstetrics and gynaecology, microbiology, critical care medicine, pathology, public health strategy, general practice, critical care outreach nursing and patient representation.

Study aim

The aim of the study was to identify and explore remediable factors in the process of care for patients with sepsis.

Objectives

- To examine organisational structures, processes, protocols and care pathways for sepsis recognition and management in hospitals from admission through to discharge or death.
- To identify avoidable and remediable factors in the management of the care for a representative sample of adult patients with sepsis, throughout the patient pathway from presentation to primary care (if applicable), throughout secondary care to discharge or death, focusing on the following areas of care:
 - * Evaluation of the use of systems and processes that are in place within hospitals to facilitate timely identification, escalation and appropriate treatment of infection, including transfer to high dependency and intensive care units where appropriate
 - * Examining the recognition of sepsis and early signs of septic shock across the entire patient pathway
 - * Investigating the appropriate management of sepsis
 - * Reviewing whether there was a multidisciplinary team approach
 - * Assessing the adequacy of communication with families and carers, as could be ascertained from the case notes
 - * Examining the management of the end of life pathway and ceilings of treatment

Hospital participation

National Health Service hospitals in England, Wales and Northern Ireland were expected to participate as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey. Within each hospital, a named contact, referred to as the NCEPOD Local Reporter, acted as a link between NCEPOD and the hospital staff, facilitating case identification, dissemination of questionnaires and data collation.

Population

Adult patients, ≥ 16 years old, identified as being seen by the Critical Care Outreach Team or equivalent, or who were admitted directly to critical care during the study period with a diagnosis of sepsis, based on presence of infection, documented or suspected, and two or more of the following:

- Fever ($> 38.3^{\circ}\text{C}$)/hypothermia (core temperature $< 36^{\circ}\text{C}$)
- Heart rate $> 90/\text{min} - 1$ or more than two standard deviations above the normal value for age
- Tachypnoea (respiratory rate > 20 breaths/minute)
- Acutely altered mental status
- Arterial hypotension (systolic blood pressure < 90 mmHg, mean arterial pressure < 70 mmHg, or a systolic blood pressure decrease > 40 mmHg or less than two standard deviations below normal for age)
- Hyperglycemia (plasma glucose > 140 mg/dL or 7.7 mmol/L) in the absence of diabetes
- Leukocytosis (white blood cell count $> 12,000 \mu\text{L}^{-1}$) or Leukopenia (white blood cell count $< 4000 \mu\text{L}^{-1}$) (or normal white blood cell count with $> 10\%$ immature forms)

Adapted from: Signs & symptoms of infection highlighted in Surviving Sepsis Campaign Sepsis Screening Tool.¹

From the cases identified, a sample of 5 cases per hospital was randomly selected to be included in the study.

Exclusions

- Immunosuppressed neutropaenic patients on chemotherapy, immunosuppressant drugs or patients with solid organ transplant
- Pregnant women up to 6 weeks post-partum (covered by MBRRACE-UK maternal sepsis morbidity study)²⁰
- Patients on an end of life care pathway at the time of diagnosis, or a consultant-led decision made not to escalate (prior to entry into the study)
- Patients who developed sepsis after 48 hours on critical care

Case identification

During the two-week data collection period, 6th-20th May 2014, all patients who met the inclusion criteria were identified prospectively by nominated study contacts in critical care and on the Critical Care Outreach Team.

Whilst it was assumed that prospectively identifying patients with sepsis is more effective than relying on a retrospective identification through ICD10 coding, it is possible that the Study Contacts on critical care and the Critical Care Outreach Team may not have identified every possible patient that was eligible for the study. However, this would not have affected the sampling as the peer reviewed sample was limited to a maximum of five cases per hospital anyway. This study is a snapshot of the care provided to patients with sepsis.

Furthermore, this study was designed to examine the care of patients who were more unwell with sepsis, by only including patients who were either admitted to critical care or who were reviewed by the Critical Care Outreach Team. The study was not therefore able to comment on the care of patients who died in the community or in the emergency department, or who died before being reviewed by the Critical Care Outreach Team. Nor can comment be made on those patients who were never escalated to the Critical Care Outreach Team or critical care, either because they had timely interventions and did not deteriorate sufficiently or because they had treatment limitation decisions made early in their pathway or those patients who were never recognised as having sepsis.

Questionnaires and case notes

Two questionnaires were disseminated to collect data for this study; a clinician questionnaire relating to each patient included and an organisational questionnaire for each hospital participating in the study, regardless of whether they had patients included in the study. Questionnaires were designed with input from the Study Advisory Group.

Clinician questionnaire

This questionnaire was sent to the named consultant responsible for the patient prior to admission to critical care/ review by the Critical Care Outreach Team. If the consultant was not the most suitable person to complete the questionnaire then they were asked to identify a more appropriate consultant. This questionnaire was used to collect data on the care of the patient throughout their pathway of care from presentation with sepsis to death, discharge or remaining in hospital 30 days after admission.

Organisational questionnaire

The organisational questionnaire was sent to the NCEPOD Local Reporter to be completed with the help of relevant specialty leads. Data were requested on the policies and protocols in place at each hospital, on the availability of services, facilities and staffing relevant to patients with sepsis. Information was also collected on any sepsis care quality improvement initiatives.

In addition to the acute hospitals to which patients with sepsis would be admitted for treatment, community and independent hospitals were also included in the organisational part of the study, despite the fact that they may not have patients with sepsis admitted to them. This was to see if there were organisational structures in place to manage the initial care of patients who may develop sepsis as an inpatient.

Case notes

Photocopied case note extracts were requested for each case that was to be peer reviewed. For the entire admission:

- All inpatient annotations/medical notes
- Nursing notes
- Critical care notes
- Operation/procedure notes
- Anaesthetic charts
- Observation charts
- Haematology/biochemistry/microbiology results
- Fluid balance charts
- Drug charts
- Consent forms
- Discharge letter/summary
- Autopsy report if applicable

General practitioner (GP) case notes

For cases where it was recorded on the clinician questionnaire that the patient had been seen by their GP in relation to the hospital admission for sepsis (regardless of whether or not the GP referred the patient to hospital), the details of the GP were extracted from the case notes and copies of the GP case notes for the two-week period prior to the hospital admission were requested.

Peer review

A multidisciplinary group of Reviewers was recruited to peer review the case notes and associated clinician questionnaires. The group of Reviewers comprised consultants, associate specialists, trainees and clinical nurse specialists, from the following specialties: acute medicine, emergency medicine, general medicine, nephrology, critical care outreach, anaesthesia, intensive care medicine, respiratory medicine, microbiology and general and plastic surgery. In addition general practitioners were recruited to review the GP case notes separately.

Questionnaires and case notes were anonymised by the non-clinical staff at NCEPOD prior to peer review. After being anonymised each case was reviewed by at least one Reviewer within a multidisciplinary group. At regular intervals throughout the meeting, the Chair allowed a period of discussion for each Reviewer to summarise their cases and ask for opinions from other specialties or raise aspects of the case for discussion.

Reviewers answered a number of specific questions by direct entry into a database, and were also encouraged to enter free text commentary at various points.

The grading system below was used by the Reviewers to grade the overall care each patient received:

Good practice: A standard that you would accept from yourself, your trainees and your institution.

Room for improvement: Aspects of **clinical** care that could have been better.

Room for improvement: Aspects of **organisational** care that could have been better.

Room for improvement: Aspects of both **clinical and organisational** care that could have been better.

Less than satisfactory: Several aspects of clinical and/or organisational care that were well below that you would accept from yourself, your trainees and your institution.

Insufficient data: Insufficient information submitted to NCEPOD to assess the quality of care.

Quality and confidentiality

Each case was given a unique NCEPOD number. The data from all questionnaires received were electronically scanned into a preset database. Prior to any analysis taking place, the dataset was cleaned to ensure that there were no duplicate records and that erroneous data had not been entered during scanning. Any fields containing data that could not be validated were removed. Section 251 approval had been granted for this study.

Data analysis

Following cleaning of the quantitative data, descriptive data summaries have been produced. The qualitative data collected from the Reviewers' opinions and free text answers in the clinician questionnaires were coded, where applicable, according to content to allow quantitative analysis. The data were reviewed by NCEPOD Clinical Co-ordinators, a Clinical Researcher and a Researcher, to identify the nature and frequency of recurring themes.

Case studies have been used throughout this report to illustrate particular themes.

All data were analysed using Microsoft Access™ and Excel™ by the research staff at NCEPOD.

The findings of this report were reviewed by the Study Advisory Group, Reviewers, NCEPOD Clinical Co-ordinators and the NCEPOD Steering Group prior to publication.

Data returns

In total 3,363 patients from 305 hospitals were identified as meeting the study inclusion criteria during the two-week case identification period (Figure 1). When the sampling criterion of 5 cases per hospital was applied, 884 cases were selected for inclusion. A total of 710/884 (80.3%) completed clinician questionnaires and 657 sets of case notes were returned to NCEPOD. The Reviewers were able

to assess 551 cases, the remainder of the returned case note extracts were either too incomplete for assessment or were returned after the final deadline and last case reviewer meeting. There were 129 cases identified where the patient saw their GP in relation to the admission (which did not necessarily lead to a referral to hospital). Of these, 60 sets of GP notes were received and 54 were suitable for review.

Study sample denominator by chapter

Within this study the denominator will change for each chapter and occasionally within each chapter. This is because data have been taken from different sources depending on the analysis required. For example, in some cases the data presented will be a total from a question taken from the clinician questionnaire only, whereas some analysis may have required the clinician questionnaire and the Reviewers’ view taken from the case notes.

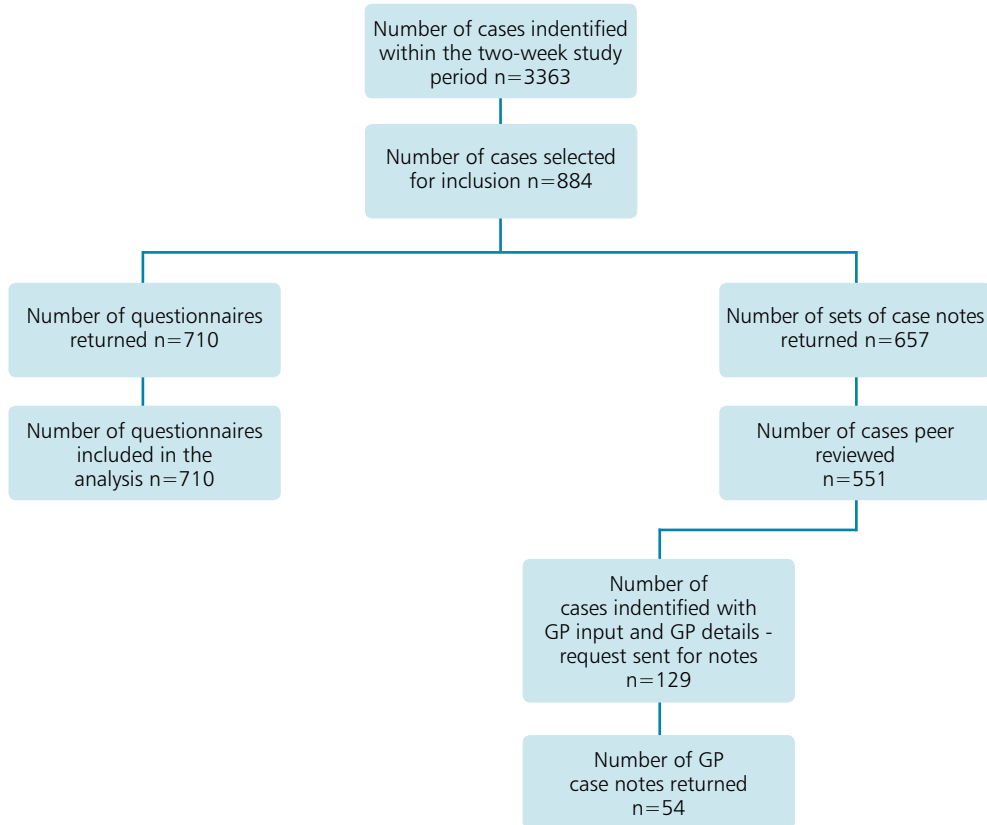


Figure 1 Data returns

Key Findings

Organisational data

- 184/544 (33.8%) hospitals in this study had no formal sepsis protocol
- 309/343 (90.1%) hospitals with sepsis protocols had based them on published guidelines
- Most hospitals with protocols (305/321; 95%) stipulated that action should be taken within one hour of diagnosis of sepsis
- Of hospitals with protocols for recognition and management of sepsis, there was no formal education in the use of the protocol on general wards for medical staff in 65/305 (21.3%) and nursing staff in 86/314 (27.4%)
- In 518/532 (97.4%) hospitals, the hospital protocol policies and guidelines were immediately available on the hospital intranet
- The majority of hospitals without sepsis protocols (154/165; 93.3%) did have protocols for the identification of the deteriorating patient
- 95/186 (51.1%) acute hospitals stated that there was a system in place for receiving a pre-alert for patients arriving to the emergency department with sepsis
- The vast majority (530/538; 98.5%) of hospitals have track and trigger systems for monitoring sick patients and these were uniformly linked to escalation protocols (516/527; 97.9%)
- 199/223 (89.2%) hospitals with critical care facilities had a Critical Care Outreach Team or equivalent and 96/196 (49%) of these were available 24/7
- One in five hospitals (57/258; 22.1%) without critical care facilities did not have formal arrangements for the transfer of patients needing critical care
- 55/215 (25.6%) acute hospitals utilised specialised proformas to identify and monitor patients with sepsis
- 63/212 (29.7%) acute hospitals stated that there was no policy in place covering staff handovers. However, 270/287 (94.1%) hospitals with a policy set aside time for the formal handover of patients between doctors' shifts
- The vast majority of acute hospitals (224/226; 99%) had an antimicrobial policy and although 139/204 (68.1%) of acute hospitals had daily microbiology ward rounds on ICU (level 3), only 20/194 (10.3%) and 13/196 (6.6%) of acute hospitals reported having daily microbiology ward rounds on general medical or surgical wards (respectively).
- Only 29/519 (5.6%) hospitals in the study had leaflets to give to patients to provide information about sepsis
- Only 78/215 (36.3%) acute hospitals had any form of follow-up service for patients with sepsis
- Half of the hospitals in the study (166/322; 51.6%) had appointed a lead clinician for sepsis
- Less than half of acute hospitals (90/204; 44%) were carrying out audit of the timely treatment of severe sepsis
- 43/217 (20%) hospitals had a means of centrally recording incidents of severe sepsis

Patient population and pre-hospital care

- One quarter of patients (192/702; 27.4%) in this study had been admitted previously with an episode of sepsis
- 1 in 8 patients (67/536; 12.5%) self-referred to hospital with sepsis
- In only 8/85 (9.4%) patients seen by a GP (where the reviewers could make answer) were pre-alerts sent to warn hospitals of the arrival of a patient with sepsis
- Both the secondary care Reviewers assessing hospital case notes and the GP Reviewers reviewing the GP notes found that there was a poor adherence to the recording of vital signs by GPs assessing patients. Less than half of patients had their temperature (25/54) or blood pressure (23/54) taken
- Evidence of safety netting was present in 9/54 cases (last visit), 10/26 cases (2nd to last visit) and 5/11 cases (3rd to last visit)
- For just over half (55/101) of the patients referred to hospital from the GP, the referral letter was included in the case note record
- There was room for improvement in 86/221 (38.9%) in the care provided to patients in the primary care setting
- No early warning score was used in any of the GP case notes reviewed
- Deficiencies in record keeping were present in both primary and secondary care
- The commonest reason for delay in arriving at the hospital emergency department was because the patient did not present to a clinician early enough (66/111; 59.4%)
- 267/294 (90.8%) patients admitted via the emergency department had appropriately timed triage assessment
- 112/279 (40.1%) patients did not have a timely review by a senior clinician
- There was inconsistency in the recording of vital signs in the emergency department with 66/369 (17.8%) having no vital signs recorded in their case notes

- A possible source of infection was only recorded at triage in 148/321 (46.1%) of patients admitted via the emergency department
- Reviewers considered that there was room for improvement in the emergency department in investigations (95/369; 25.7%), treatment planning (117/369; 31.7%) and monitoring plan (136/369; 36.9%)

Admission to hospital

- In the Reviewers' opinion, 493/530 (93.0%) patients were admitted to the correct location
- In the Reviewers' opinion, 49/361 (13.6%) of patients were delayed in their admission to a definitive hospital bed. The principal reason for delay (16/30) was a lack of beds
- The delay in admission to hospital affected the outcome in 7/37 patients
- 80/446 (17.9%) patients were not reviewed by a consultant within an adequate time frame according to Reviewers
- 116/571 (20.3%) patients in this study were not seen by a consultant within 14 hours, even for those who arrived in hospital with sepsis (95/471; 20%)
- 281/457 (61.5%) patients had changes made to their care following consultant review

Patients with hospital-acquired infections

- 115/498 (23%) patients acquired their infection whilst in hospital. In half of these patients 73/115 (63.5%) the infection was diagnosed following an invasive procedure
- A surgical site bundle was utilised in 30/73 (41.1%) invasive procedures
- In 10/88 (11.4%) patients with hospital-acquired infection, the Reviewers stated that the infection was preventable
- 23/95 (24.2%) patients could have had their infection identified sooner and 23/63 (36.8%) should have commenced treatment sooner in the opinion of Reviewers

First identification of sepsis

- There was a delay in identifying sepsis in 182/505 (36%) of cases, severe sepsis in 167/324 (51.5%) cases and septic shock in 63/193 (32.6%) cases according to the Reviewers
- According to the Reviewers 128/479 (26.7%) patients had an EWS screening tool used to aid the diagnosis of sepsis
- The use of a screening tool/ EWS was associated with fewer delays in identifying severe sepsis (55% without vs. 35% with)
- Only 52.9% (218/412) patients had their GCS/AVPU assessed at the time of diagnosis
- Only 322/522 (61.7%) patients had a record in the notes that lactate had been measured
- Investigations considered essential in the diagnosis of sepsis were missed in 198/506 (39.1%) patients and delayed in 190/496 (38.3%)

Initial management of sepsis

- Half of the patients with sepsis were managed by acute medical teams (270/539; 50%)
- The Reviewers considered that escalation/commencement of treatment was not timely in 98/504 (19.4%) patients
- One in three patients (207/525; 39.4%) were started on a sepsis care bundle
- Management on a care bundle was associated with fewer delays in the treatment of patients with sepsis
- 71/412 (17.2%) patients were not given or had delayed fluid administration
- There was room for improvement in the patient's fluid management in 203/447 (45.4%) cases
- In 62.6% (226/361) of patients antimicrobials were administered within one hour of diagnosis
- According to Reviewers, there was an avoidable delay in the administration of antimicrobials in 114/391 (29.2%) patients
- The Reviewers felt that the delay in the administration of antimicrobials affected the outcome in 44.3% (43/97) of those patients who did not receive antibiotics in a timely manner
- The correct dose of antimicrobial was prescribed in 405/414 (97.8%) of patients
- A microbiologist was consulted on the suitability of therapy in half (244/471; 51.8%) of the patients
- Escalation was considered in 358/420 (85.2%) patients. De-escalation was considered in 289/389; 74.3%) and the duration of therapy considered in 329/413 (79.7%) patients
- Following review antimicrobial therapy was modified in 360/489 (73.6%) of patients in this group
- A pathogen was identified in 198/481 (41.2%) patients. The commonest pathogens were E coli, other coliforms and streptococcus
- Clinicians responsible for the patient considered that the choice of antimicrobial was not made in line with local hospital policy in 193/593 (32.5%) cases
- A source of infection was identified in 434/493 (88%) of cases and in 137/478 (28.7%) of these cases was the source amenable to a procedure for control
- In 16/46 patients more could have been done to identify the source
- In patients in whom a source was amenable to control, that control was delayed in 55/129 (42.6%)
- Delay in source control affected the outcome in 33/47 patients
- The Critical Care Outreach Team arrived promptly on 237/267 (88.8%) occasions
- Critical care services responded in an appropriate time frame in 222/238 (93.3%) referrals

Complications of sepsis and discharge planning

- 71/331 (21.5%) patients had evidence of complications at discharge
- The most common complication was worsened physical function (38/71; 53.5%)
- 31/306 (10.1%) patients were readmitted to hospital following an episode of sepsis
- No follow-up appointment was made for 61/333 (18.3%) patients
- According to Reviewers there was no evidence that the GP was informed of the admission in 72/294 (24.5%) cases
- Sepsis was not mentioned on the discharge summary in 226/490 (46.1%) of cases
- There was evidence of insufficient information being given to patients on discharge in 24/133 cases
- The discharge was delayed in 68/352 (19.3%) cases
- The decision to withdraw treatment was made by a clinician of suitable seniority in 87/90 cases
- For those placed on end of life care pathways (32/135; 23.7%), 100% were found to be appropriate
- An autopsy was performed in 15/124 (12.1%) patients who died
- Sepsis was included on the death certificate in 42/103 (40.8%) patients who died. Of those where it was not included Reviewers considered that it should have been in 48/59 (2 not answered)
- Cases were documented as being discussed at M&M meetings in 69/108 (63.9%) patients who died

Recommendations

1. All hospitals should have a formal protocol for the early identification and immediate management of patients with sepsis. The protocol should be easily available to all clinical staff, who should receive training in its use. Compliance with the protocol should be regularly audited. This protocol should be updated in line with changes to national and international guidelines and local antimicrobial policies. *(Medical Directors)*
2. Training in the recognition and management of sepsis in primary and secondary care should be included in educational materials for healthcare professionals undertaking new posts. Where appropriate this training should include the use of a standardised hospital protocol *(Medical Directors, Nursing Directors, Postgraduate Deaneries, Health Education England, Royal Colleges)*
3. A Clinical Lead in sepsis should be appointed in every Trust/Health Board to champion best practice and take responsibility for the clinical governance of patients with sepsis. This Lead should also work closely with those responsible for antimicrobial stewardship in their hospital(s). *(Medical Directors, Nursing Directors, Trust Chief Executives)*
4. Trusts/Health Boards should use a standardised sepsis proforma to aid the identification, coding, treatment and ongoing management of patients with sepsis (some examples are available at sepsistrust.org and survivingsepsis.org). To ensure continuity of care, this proforma should be compatible, where possible with any similar proforma or system used in primary care and should permit the data to be shared electronically. *(Medical Directors, Primary Care Practitioners, Commissioners)*
5. An early warning score, such as the National Early Warning Score (NEWS) should be used in both primary care and secondary care for patients where sepsis is suspected. This will aid the recognition of the severity of sepsis and can be used to prioritise urgency of care. *(General Practitioners, Ambulance Trusts, Health Boards, NHSE, Clinical Directors, Royal Colleges)*
6. Primary care providers should ensure that robust safety netting arrangements are in place for those patients who are suspected to be at risk of sepsis. *(General Practitioners)*
7. To facilitate the transition from primary to secondary care, a standard method of referral should be introduced in primary care for patients who are in need of a hospital admission for, or thought to be at risk of, sepsis. This should include a full set of observations/vital signs/risks/relevant history (such as previous sepsis) and any early warning scores used. *(Primary Care Practitioners, Commissioners)*
8. On arrival in the emergency department a full set of vital signs, as stated in the Royal College of Emergency Medicine standards for sepsis and septic shock should be undertaken. *(Emergency Medicine Physicians, Clinical Directors, Nursing Directors)*
9. Where sepsis is suspected, early consideration should be given to the likely source of infection and the ongoing management plan recorded. Once identified, control of the source of infection should be undertaken as soon as possible. Appropriate staffing and hospital facilities (including theatre/interventional radiology) should be available to allow this to occur. *(Medical Directors, Clinical Directors)*
10. The importance of early identification and control of the source of sepsis should be emphasised to all clinicians, and be reinforced in any future guidelines or tools for the management of sepsis. *(International Sepsis Forum, UK Sepsis Trust, NICE, Health Education England, Postgraduate Deaneries, Royal Colleges)*

RECOMMENDATIONS

11. In line with previous NCEPOD and other national reports' recommendations on recognising and caring for the acutely deteriorating patients, hospitals should ensure that their staffing and resources enable:
 - a. All acutely ill patients to be reviewed by a consultant within the recommended national timeframes (max of 14 hours after admission)
 - b. Formal arrangements for handover
 - c. Access to critical care facilities if escalation is required; and
 - d. Hospitals with critical care facilities to provide a Critical Care Outreach service (or equivalent) 24/7. *(Medical Directors, Nursing Directors, Commissioners)*
12. All patients diagnosed with sepsis should benefit from management on a care bundle as part of their care pathway. The implementation of this bundle should be audited and reported on regularly. Trusts/Health Boards should aim to reach 100% compliance and this should be encouraged by local and national commissioning arrangements. *(Medical Directors, Clinical Directors, Commissioners)*
13. For any invasive procedure a surgical site bundle should be employed as specified in NICE Clinical Guideline 74. *(Medical Directors, Clinical Directors)*
14. All healthcare providers should ensure that antimicrobial policies are in place including prescription, review and administration of antimicrobials as part of an antimicrobial stewardship process. These policies must be accessible, adhered to and frequently reviewed with training provided in their use. *(Medical Directors, Commissioners, General Practitioners, Postgraduate Deaneries, Health Education England)*
15. There should be senior microbiology input into the management of all patients identified with sepsis. This input should be available 24/7 and sought early in the care pathway. *(Medical Directors, Sepsis Leads, Clinical Directors)*
16. A booklet that provides patients and their relatives with easy to understand information on the recognition of sepsis, its long-term complications, recovery and risk of recurrence should be available from all healthcare providers and be provided to patients with sepsis at discharge from hospital. Some examples can be found at the UK Sepsis Trust (sepsistrust.org) and ICU Steps (icusteps.org). *(Medical Directors, Commissioners)*
17. As for all acutely ill patients who are admitted to critical care, a follow-up service for patients with sepsis should be provided by the hospital which includes support and rehabilitation services, as recommended in NICE Clinical Guideline 83 and the Faculty of Intensive Care Medicine and Intensive Care Society Guidelines for the Provision of Intensive Care Services (GPICS). *(Medical Directors, Clinical Directors, Sepsis Leads)*
18. All patients discharged following a diagnosis of sepsis should have sepsis recorded on the discharge summary provided to the general practitioner so that it can be recorded in the patient's GP record. *(All Hospitals Doctors, General Practitioners)*
19. For patients who die with sepsis, the care provided should always be discussed at a hospital multidisciplinary mortality meeting to encourage learning, and, where the source of sepsis has not been identified, an autopsy should be undertaken. *(Medical Directors, Clinical Directors, Clinical Governance Leads, Sepsis Leads, All Clinical Staff)*
20. When diagnosed, sepsis should always be included on the death certificate, in addition to the underlying source of infection. *(All Doctors including Sepsis Leads)*
21. The use of national coding for sepsis must be improved in order to aid clinical audit, national reporting and shared learning. Use of a standardised proforma as described in recommendation 4 should help improve this process, and may help in the development of a national registry. *(Chief Executives, Medical Directors, Clinical Governance Leads, Sepsis Leads)*

Overall quality of care

The Reviewers were asked to comment on the overall quality of care received by patients in the study. Just over one third of the study population were considered to have received good care during their admission. Most commonly in the group of patients who were judged to have received less than good care, it was considered that there was room for improvement in clinical aspects of their care rather than organisational factors. This suggests that the deficiencies are more in the management, awareness and decision making of the doctors and nurses caring for these patients rather than systematic deficiencies in process or the organisation of services or equipment (Table 9.1, Figure 9.1).

Table 9.1 Overall quality of care as rated by the Reviewers

| Overall quality of care | Number of patients | % |
|---------------------------------------|--------------------|------|
| Good practice | 198 | 36.5 |
| Room for improvement (clinical) | 149 | 27.4 |
| Room for improvement (organisational) | 39 | 7.2 |
| Room for improvement (both) | 123 | 22.7 |
| Less than satisfactory | 34 | 6.3 |
| Subtotal | 543 | |
| Insufficient data | 8 | |
| Total | 551 | |

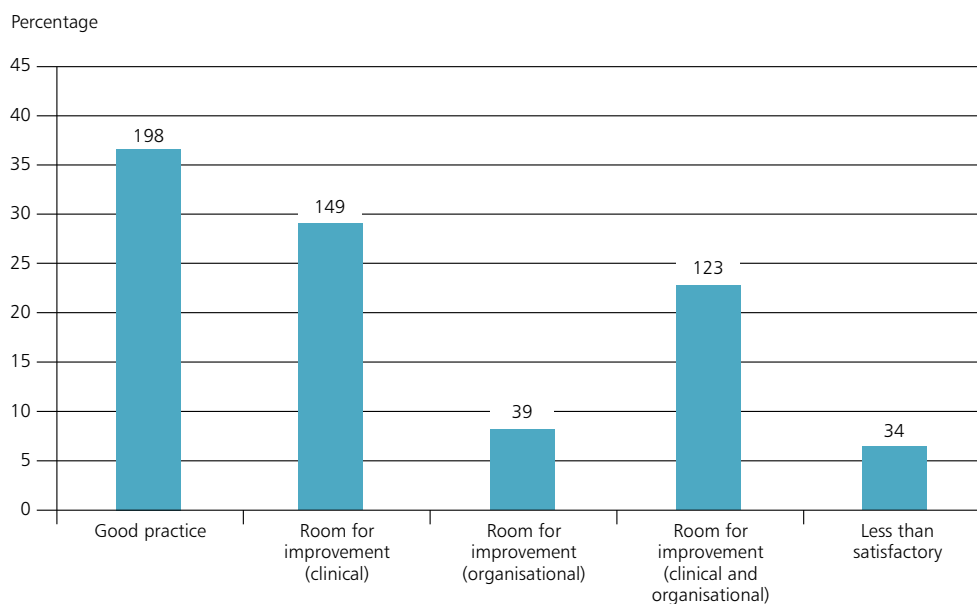


Figure 9.1 Overall quality of care

Summary

This study set out to identify and explore avoidable and remediable factors in the process of care for patients with known or suspected sepsis. From the cases identified, the Reviewers were able to assess 551 cases. Of these, 54 sets of general practitioner (GP) notes were received and suitable for review.

This study confirmed that there is huge variability in the clinical presentation of sepsis. Patients seen in the community present diagnostic dilemmas and whilst the difficulty is recognised, it was of note that there was poor recording of clinical observations by primary and secondary care providers that may have assisted with both the immediate management and handover between primary and secondary care. Half of the patients referred to hospital by GPs had no referral letter. The use of pre-alerts was only apparent in 8 patients, although 50% of hospitals reported they were available, and in the Emergency Department (ED) 40% of patients did not have a timely review by a senior clinician.

The importance of source control is often overlooked and it was noted that a possible source of infection was only recorded at triage in 46% of patients admitted via the ED. And in those patients in whom a source was amenable to control, that control was delayed in 43% of cases which could have affected the outcome in 26/41 patients in the view of the case Reviewers.

Following admission to hospital, 20% of the patients in this study were not seen by a consultant within 14 hours. In view of the fact that 61.5% patients had changes made to their care following consultant review, it is paramount that the resources are in place to ensure prompt consultant review.

One quarter of the patients in this study acquired their infection whilst in hospital. In half of these patients the infection was diagnosed following an invasive procedure. A surgical site bundle was only utilised in 43/73 invasive

procedures. In 10/88 patients with hospital-acquired infection, the Reviewers felt that the infection was preventable.

The Reviewers considered that there was a delay in identifying sepsis in 182/505 (36%) cases, severe sepsis in 167/324 (51%) and septic shock in 63/193 (32%), and identified that good documentation of sepsis was associated with more timely diagnosis. Despite the presence of protocols, investigations considered essential in the diagnosis of sepsis were missed in 39% of patients and delayed in 39%. Management on a care bundle reduced delays in the treatment of patients with sepsis. However, only 39.4% of patients were started on a sepsis care bundle. This study highlights the absolute requirement for hospitals accepting emergency admission to have a formal protocol for the early identification and immediate management of patients with sepsis. Only 55/215 (25.6%) acute hospitals used standard proformas to identify and monitor patients with sepsis, and less than half (90/204; 44%) audited the timely treatment of severe sepsis against their own protocols. It is recognised that if clinical management is to improve, clinical leadership is important. However, only half of the hospitals in the study (166/322; 52%) had appointed a lead clinician for sepsis.

This is a group of patients who benefit from the use of antimicrobials, but with the current awareness of over use of antimicrobials, antimicrobial stewardship is important; not only in the management of sepsis but also the in broader environment of healthcare. It was of note that a microbiologist was consulted on the suitability of therapy in only 52% of patients. This was also reflected in the organisational data. Senior microbiological input is essential in the management of patients with sepsis to aid the appropriateness of antimicrobial usage.

Morbidity following sepsis is common and 22% patients had evidence of complications at discharge. There was little evidence of information being given to sepsis patients on the disease and its consequences.

SUMMARY

For those patients who died, an autopsy was only performed in 12.1% of cases, sepsis was only included on the death certificate in 40.8% and only 63.8% of cases were discussed at mortality and morbidity reviews, missing opportunities to learn from the care provided.

Throughout the patient pathway areas for improvement were identified and the Reviewers were of the opinion that good care was delivered in only 36% of cases. Early recognition, better documentation and prompt treatment of sepsis would all lead to improved care for this group of patients. Using the word 'sepsis' as soon as it is considered would also raise awareness amongst healthcare professionals and patients.

References

1. Dellinger RP, Levy MM and Rhodes A et al. Surviving Sepsis Campaign: international guidelines for management of severe sepsis and septic shock: 2012. *Crit Care Med.* 2013; 41: 580-637
2. International Sepsis Forum. <http://internationalsepsisforum.com>
3. Esteban A, Frutos-Vivar F and Ferguson ND et al. Sepsis incidence and outcome: Contrasting the intensive care unit with the hospital ward. *Crit Care Med.* 2007; 35(5): 1284-1289.
4. The College of Emergency Medicine. Sepsis Audit. 2011 <http://www.rcem.ac.uk/Shop-Floor/Clinical%20Audit/Previous%20Audits>
5. The College of Emergency Medicine. Sepsis and Septic Shock Audit. 2014 <http://www.rcem.ac.uk/Shop-Floor/Clinical%20Audit/Previous%20Audits>
6. National Confidential Enquiry into Patient Outcome and Death (NCEPOD). An acute problem? (2005) <http://www.ncepod.org.uk/2005aap.htm>
7. National Institute for Health and Care Excellence (CG50). Acutely ill patients in hospital: Recognition of and response to acute illness in adults in hospital. 2007 <https://www.nice.org.uk/guidance/cg50>
8. The fifth report from the Patient Safety Observatory. Safer care for the acutely ill patient: learning from serious incidents. NPSA 2007
9. 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. <https://www.rcplondon.ac.uk/sites/default/files/documents/national-early-warning-score-standardising-assessment-acute-illness-severity-nhs.pdf>
10. SEPSIS Management in Scotland: A Report by the Scottish Trauma Audit Group. 2010. <http://www.stag.scot.nhs.uk/SEPSIS/Main.html>
11. Levy MM, Dellinger RP, Townsend SR et al. The Surviving Sepsis Campaign: results of an international guideline based performance improvement program targeting severe sepsis. *Crit Care Med.* 2010; 38: 367-74
12. National Institute for Health and Care Excellence (NG15). Antimicrobial stewardship: systems and processes for effective antimicrobial medicine use. 2015 www.nice.org.uk/guidance/ng15
13. NHSE anti microbial patient safety alert – addressing antimicrobial resistance through implementation of an antimicrobial stewardship programme. August 2015. NHS England <http://www.england.nhs.uk/wp-content/uploads/2015/08/psa-amr-stewardship-prog.pdf>
14. Shahin J, Harrison DA and Rowan KM. Relation between volume and outcome for patients with severe sepsis in United Kingdom: retrospective cohort study. *BMJ.* 2012; 344: e3394–4.
15. The forward view into action: planning for 2015/16. NHS England <http://www.england.nhs.uk/wp-content/uploads/2014/12/forward-view-plning.pdf>
16. Commissioning for Quality and Innovation (CQUIN) Guidance for 2015/16 <http://www.england.nhs.uk/wp-content/uploads/2015/03/9-cquin-guid-2015-16.pdf>
17. NICE clinical guideline development group for sepsis <https://www.nice.org.uk/guidance/indevelopment/gid-cgwave0686>

REFERENCES

18. Welsh Intensive Care Society. The size of sepsis in Wales: point prevalence study of sepsis in the acute hospital v3.1. 2015
<http://welshintensivecaresociety.org/wp-content/uploads/2014/03/Size-of-sepsis-in-Wales-protocol-version-3.1.pdf>
19. Szakmany T, Ellis G and Lundin R et al. Size of sepsis in Wales: feasibility pilot. *Crit Care Med.* 2014; 42(12): pA1446
20. Knight M, Kenyon S, Brocklehurst P, Neilson J, Shakespeare J, Kurinczuk JJ (Eds.) on behalf of MBRRACEUK. Saving Lives, Improving Mothers' Care - Lessons learned to inform future maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–12. Oxford: National Perinatal Epidemiology Unit, University of Oxford 2014
<https://www.npeu.ox.ac.uk/downloads/files/mbrance-uk/reports/Saving%20Lives%20Improving%20Mothers%20Care%20report%202014%20Full.pdf>
21. Parliamentary and Health Service Ombudsman. TIME TO ACT Severe sepsis: rapid diagnosis and treatment saves lives. 2013
http://www.ombudsman.org.uk/__data/assets/pdf_file/0004/22666/FINAL_Sepsis_Report_web.pdf
22. All Party Parliamentary Group (APPG) on sepsis. October 2015

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