The College of Emergency Medicine

THE UK SEPSIS TRUST

A toolkit for Emergency Departments

Contents

About this toolkit

This clinical toolkit has been developed jointly by the College of Emergency Medicine and the UK Sepsis Trust. It is designed to provide operational solutions to the complexities challenging the reliable identification and management of sepsis, and complements clinical toolkits designed for other clinical areas. We acknowledge use of some content from the Acute Medicine Toolkit developed by the UK Sepsis Trust & Royal College of Physicians.

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Introduction: Emergency Department management of sepsis

Staff working in Emergency Departments (ED) should be familiar with the significant morbidity and mortality associated with sepsis and possess the knowledge and skills to recognize it early and initiate resuscitation and treatment. The ED provides a key role in identifying patients with sepsis, followed by risk stratification for severe sepsis and septic shock, initiating resuscitation and treatment, and ensuring the correct onward management of patients identified with sepsis.

EDs are vital to the success of collaborative care pathways for the seamless management of patients with sepsis from the prehospital environment, through the ED, and to admission in either a ward bed or the Critical Care Unit. Sepsis responds well to early treatment and, if required, rapid escalation of therapy.

Background

The overall mortality rate for patients admitted with severe sepsis is 35% - approximately 5 times higher than for ST elevation myocardial infarction and stroke - and is responsible for approximately 37,000 deaths and 100,000 hospital admissions in the United Kingdom (UK) per year[1]. The majority of these patients will arrive via the ED. In the United States, the number of patients transported by Emergency Medical Services with sepsis now outnumbers those with heart attack or stroke[2]. In 2007 in the UK, sepsis was found to account for 12% of early inpatient deaths after ED admission: this is likely to have been an underestimate due to a further 26% of deaths coded as of respiratory cause[3]. Hospitalizations for sepsis have more than doubled over the last 10 years[4,5].

Severe sepsis is a time-critical condition. In the most severe cases, septic shock, for every hour that appropriate antibiotic administration is delayed, there is an 8% increase in mortality[6]. The Sepsis Six is an initial resuscitation bundle designed to offer basic intervention within the first hour. In a prospective observational study, it was independently associated with survival suggesting that, if it alone were responsible for outcome differences, the number needed to treat (NNT) to prevent one death is 4.6[7]. This compares to an NNT of 42 for Aspirin in major heart attack and 45-90 for PCI in ST elevation myocardial infarction.

Sepsis is poorly recognized and treated. A 24-month, large scale prospective improvement programme across 30 countries measuring the delivery of the Severe Sepsis Resuscitation Bundle showed compliance rising from 10 to just 21% in self-selected centres[8]. More recently in 2013 in the UK, the College of Emergency Medicine (CEM) audited performance against self-imposed standards for the management of severe sepsis and septic shock and identified similarly concerning results, with antibiotics administered on average in only 32% of patients within the first hour from time of arrival in the ED[9].

Professional responsibility & accountability

CEM is committed to continued and sustainable improvement in the management of patients with sepsis, and has produced a 'Sepsis Pack' which is available here.

NHS England has established sepsis as a future indicator in both Domains 1 and 5 of the National Outcomes Framework, and issued a stage 2 alert on sepsis in September 2014. It signposts to clinical toolkits such as this, to education programmes, examples of good practice and other available resources. NHS England is working with the UK Sepsis Trust and professional body stakeholders to identify and accredit exemplar centres from which others can learn.

In her report of September 2013 entitled 'A Time to Act', the Parliamentary and Health Service Ombudsman called upon the NHS and the Department of Health to act rapidly to reduce unnecessary deaths from sepsis. As a direct result of this work, NICE will produce a clinical guideline and Quality Standard against sepsis, the latter carrying statute for implementation.

We will learn valuable lessons from the report arising from the recent survey on sepsis conducted by the National Confidential Enquiry into Patient Outcome and Death (NCEPOD). Until that time, it is the responsibility of those commissioning services from, designing clinical systems for, and working within EDs that their efforts focus on early recognition, urgent intervention using existing consensus guidelines from the UK Sepsis Trust and Surviving Sepsis Campaign, and timely escalation for patients with sepsis.

Delivering excellent sepsis care

Determining actions specific to severity of condition

Sepsis arises when the body's response to infection causes systemic effects that manifest as two or more of the **Systemic Inflammatory Response Syndrome (SIRS)** criteria (Box 1) triggered by a new infection[10]. Some patients will develop end-organ dysfunction, denoting severe sepsis (Box 2). Septic shock is a subset of severe sepsis, identified by sepsis with hypoperfusion resistant to fluid therapy (Box 2).

Box 1: Systemic Inflammatory Response Syndrome (SIRS)

SIRS is present if there **at least 2 of the following present**:

Temperature >38.3 ^{0}C or <36.0^{0}C

Pulse >90/min

RR >20/min

New confusion/drowsiness

WBC >12 or <4.0 x 10^9/L

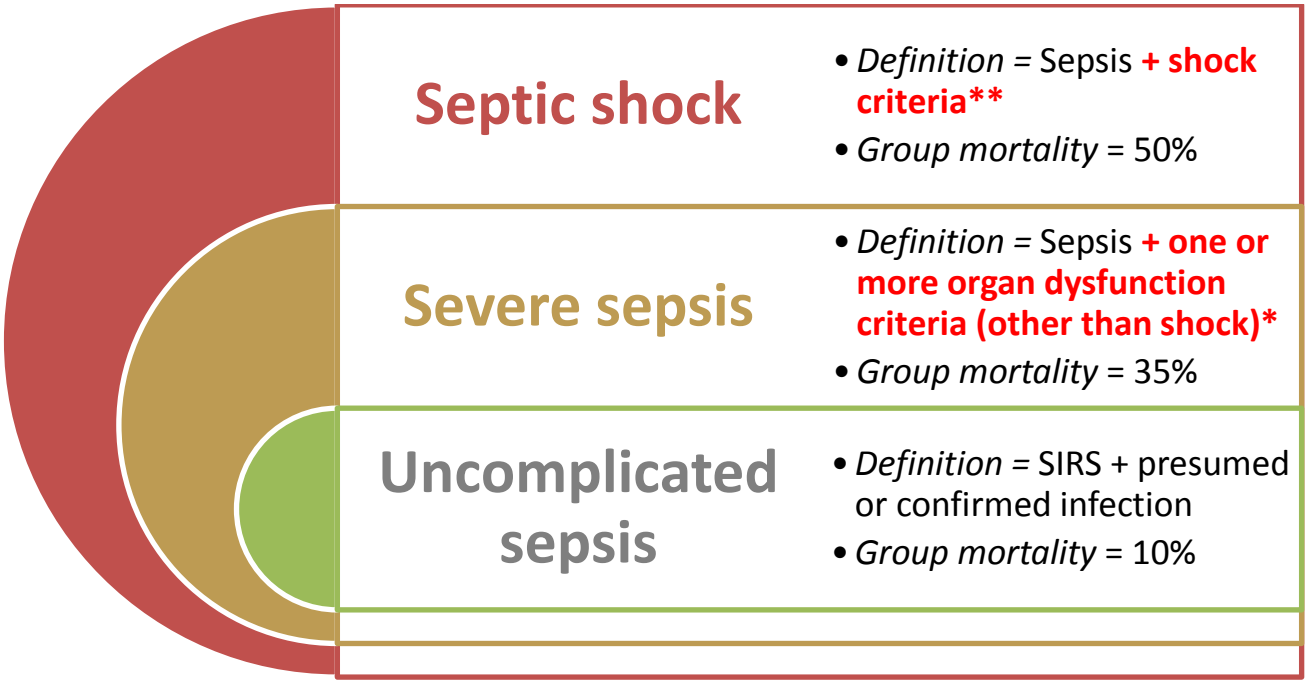
Blood glucose >7.7 mmol/L (non-diabetic patients)

Organizations should be explicit about whether the intent is to initiate standardized care in patients once severe sepsis (including septic shock) has developed, or in all patients including those with uncomplicated sepsis who still represent a high risk population.

International guidelines recommend the application of standards of care including first-hour antibiotics to patients with severe sepsis and septic shock. Whilst evidence to support early intervention in uncomplicated sepsis is scant, some would view it as artificial to delay therapy until an arbitrary threshold of organ dysfunction is reached, particularly in the

context of interventions being relatively non-invasive and highly cost-effective. Whichever strategy an organization adopts, it is key that the decision is clear and communicated to all staff.

Box 2: Defining the severity of Sepsis



*Organ dysfunction criteria

- Bilateral lung infiltrates + new need for oxygen to maintain saturations >90%, ***or*** Bilateral lung infiltrates with PaO_2/FiO_2 ratio <300 (mmHg) or 39.9 (kPa)
- Lactate >2.0mmol/L
- Serum creatinine >176.8µmol/L or urine output <0.5mL/kg/hr for 2 successive hours
- INR >1.5 or aPTT >60s
- Platelet count <100 x 10^9/L
- Bilirubin >34.2µmol/L

**Shock criteria

- Lactate >4mmol/l at any time point
- Hypotension persisting after 30ml/kg intravenous fluid, defined as:
  - Systolic Blood Pressure <90mmHg,
  - Mean Blood Pressure <65mmHg, ***or*** a fall of >40mmHg from the patient's usual Systolic Blood Pressure

Describing the solutions – how can we be good at treating sepsis?

1. Early Recognition

Sepsis is identified through the presence of SIRS (*Box 1*). SIRS in the presence of infection is sepsis. Sepsis can be sub-classified according to severity: uncomplicated sepsis, severe sepsis or septic shock (*Box 2*).

A high degree of vigilance is required for early identification of the septic patient. Personnel tasked with patient triage, early assessment and the early investigation of undifferentiated patients should be trained in sepsis recognition. All patients presenting with physiological disturbances that could meet the SIRS criteria, or with signs and symptoms compatible with an infective illness, should be formally screened for sepsis. At each opportunity, a binary decision should be reached for all patients screened: this patient could have sepsis, or this patient does not have sepsis.

Suspicion of an infective cause is all that is required i.e. ED staff do not need positive cultures or swabs or other investigations. The most common causes are respiratory, abdominal and urinary but staff must also be aware that there are many other causes. A comprehensive list is beyond the scope of this document but must be included in training.

1.1 Recognition strategies determined by route of entry

Opportunities for sepsis identification will vary according to the route by which a patient has presented, and this toolkit will complement other toolkits for prehospital care, prehospital Emergency Medicine, NHS Pathways/111, primary and community care and Acute Medicine.

A) Patients arriving by ambulance using pre-alert

The clinical toolkit for prehospital services will recommend that Paramedics and Community First Responders be trained to screen for sepsis using the NEWS track-and-trigger scoring system. Supported by guidance from the Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and by prehospital screening tools, practitioners may pre-alert receiving EDs. Pathways should be developed through collaborative workshops involving ED staff, ambulance service staff, patient representatives, managers and commissioners.

Patients pre-alerted as suspected severe sepsis should be routed directly to the Resuscitation area and assessed immediately. The aim of the initial assessment is to assess for the presence of sepsis and to then risk stratify the severity accordingly. A Sepsis Team should be available to see these patients. An example of a Sepsis Team and their roles within the ED is given in the UK Sepsis Trust Toolkits Appendix 'Change management and the Sepsis Team'.

B) Patients arriving to the ED having been sent via NHS Pathways/111, primary and community care

These patients will already be suspected of having sepsis. It is therefore the duty of the ED staff to ensure that the patient is seen immediately, ideally in the Resuscitation area, where they can undergo sepsis screening similar to A) above.

C) Patients arriving by ambulance without pre-alert, 'walk-ins' and patients referred directly to an inpatient specialty team.

Sepsis is a time-critical condition and EDs must have a system in place to escalate patients with suspected sepsis emergently. During Triage and/ or initial assessment in the ED, all patients who may have sepsis should undergo screening for the presence of SIRS and, if present, the patient should be risk stratified accordingly.

As well as the general impression at the time of Triage/ initial assessment, the presence of abnormal observations should be enough to initiate immediate escalation and sepsis screening. Some EDs use Early Warning Scores (such as NEWS) and the ED must decide the lowest score that will trigger escalation and a sepsis screen. As yet unpublished data suggests that 94% of patients who were later found to have severe sepsis or septic shock presented to the ED with a NEWS of 3 or higher (positive likelihood ratio 4.3, and 6.49 if NEWS 4 or higher). Sepsis screening should also be initiated when end organ dysfunction could be present, such as hyperlactataemia or abnormal blood results.

1.2 The use of a two-part screening process to determine severity

Sepsis screening should be done as a two-part process; screening for SIRS and screening for the level of severity of sepsis, or **Sepsis Risk Stratification**. As soon as sepsis is confirmed, Sepsis Risk Stratification should be performed. During Sepsis Risk Stratification, as soon as severe sepsis or septic shock is confirmed, treatment should be started without waiting for the results of any further tests.

In some cases, the exclusion or diagnosis of SIRS and/ or sepsis will only be possible with blood test results from the laboratory or after two hours of urine output monitoring. The time taken to receive results can be significantly reduced by use of a set of **point-of-care-tests (POCTs)**. It should therefore be the aim of every ED to assess capacity and need for each of the POCTs required to exclude, diagnose and/or risk stratify sepsis as quickly as possible, and for all patients with suspected but as yet unconfirmed sepsis to have urine output monitoring.

Every ED should decide on the maximum time that they are prepared to withhold treatment, in full or in part, whilst waiting for blood test results. When particular tests routinely exceed this time, POCT alternatives should be explored. Standards will be recommended in toolkits for microbiology services and for other laboratory services, but due to the high mortality of sepsis and the success of early treatment, it is recommended that, if confirmation of SIRS is likely to be delayed pending laboratory tests, Sepsis Risk Stratification should go ahead regardless.

Box 3: SIRS screening and Sepsis Risk Stratification

A - Screening for SIRS

SIRS is confirmed if ANY TWO of the following are present:

Immediate

- New onset of Confusion or Altered Mental State
- Temperature >38.3 or <36 degrees Celsius
- Heart Rate >90 beats per minute
- Respiratory Rate (counted over 60seconds) >20 breaths per minute

POCT (commonly available)

- Blood Glucose >7.7mmol/L in the absence of known diabetes

Laboratory (unless POCT available)

- WCC >12 or <4 $x10^9$/L

B - Sepsis Risk Stratification

Commence Sepsis Six IMMEDIATELY if ANY ONE of the following are present:

Immediate

- SBP <90mmHg or >40mmHg fall from baseline
- MAP <65mmHg
- Heart rate >130 per minute*
- New need for supplemental oxygen to maintain saturations >90% should prompt emergent chest radiograph
- Respiratory rate >25 per minute*
- AVPU = V, P or U*

POCT (commonly available)

- PaO_2/ FiO_2 ratio <300 (mmHg) or <39.9 (kPa)
- Lactate >2.0mmol/L

Radiology (only if clinically indicated, e.g. SpO_2 < 90%)

- Bilateral pulmonary infiltrates AND new need for supplemental oxygen to maintain oxygen saturations >90%

Laboratory (unless POCT available)

- Creatinine >176.8µmol/L
- INR >1.5
- aPTT >60s
- Platelet count <100 $x10^9$/L
- Bilirubin >34.2µmol/L

Urine output monitoring

- Urine output <0.5mL/kg for two consecutive hours

*See overleaf

1.3 Red Flag Sepsis

*The Sepsis Risk Stratification tool detailed above is modified from the Surviving Sepsis Campaign's Evaluation for Severe Sepsis Screening Tool (2005). It adds a heart rate of >130, an AVPU score less than 'Alert' and a respiratory rate of >25. These three parameters are individually allocated a score of 3 in the National Early Warning Score, and will help to identify patients with severe sepsis who are awaiting confirmatory laboratory or radiographic tests. Their inclusion in Sepsis Risk Stratification is recommended in order to avoid unnecessary delay in initiating life-saving therapy in patients with sepsis with threatened cardiovascular or respiratory compromise. The inclusions correspond with 'Red Flag Sepsis' criteria in the prehospital sepsis screening tool.

For 'Red Flag Sepsis' patients: i.e. those who qualify as severe sepsis only via one of the three surrogate criteria described above; if subsequent blood results are not confirmatory for severe sepsis then a senior competent decision maker should consider alternative diagnoses and review the need for ongoing antimicrobial therapy and other aspects of the severe sepsis pathway.

Case Study 1

A 32 year old woman presents to the ED with dysuria and loin pain for three days. She has a temperature of 38.8 degrees and a tachycardia of 105 beats per minutes. The triage nurse is concerned by these observations and ensures that she is seen immediately by the ED registrar for sepsis screening.

The ED registrar confirms the presence of SIRS and suspects that she has pyelonephritis. She arranges for the patient to be closely monitored, gains IV access and sends off blood tests including blood cultures, 'U&Es', coagulation screen and LFTs. She also sends a venous blood gas sample as the ED blood gas machine measures serum lactate.

The nurse looking after the patient informs the registrar that the lactate has been reported as 3.6 mmol/l. The ED registrar diagnoses severe sepsis and instigates treatment immediately, following the 'Sepsis Six'.

The ED team should process-map patient pathways for patients arriving with possible sepsis. Points of repetition, unnecessary steps and functional bottlenecks where progress is delayed by competition for available resources should be identified and addressed.

Once a patient is suspected of having sepsis, the patient should be seen immediately, ideally in the Resuscitation area of the ED, and sepsis screening started.

A full set of observations should be performed, including blood glucose (BM) and urine output, ideally with continuous monitoring of heart rate, respiratory rate, blood pressure and oxygen saturations. A serum lactate should be measured from a venous or capillary sample, or as part of an arterial blood gas sample. IV access should be obtained but must not delay blood sampling if difficult.

In addition to blood cultures, a full set of screening blood tests should be sampled immediately to satisfy the diagnostic criteria above. Investigations such as a chest x-ray, urinalysis and culture of urine and any other relevant specimens, and/ or bedside ultrasound examinations should be requested and reported as appropriate to rule in or rule out possible sources of infection.

Case Study 2

A normally fit and active 72 year old man who takes medication for his hypertension only, is brought to the ED by his wife. She is concerned that he has recently had a productive cough and this morning appears to be confused. His oxygen saturations are low at 85% but all other observations are normal. The triage nurse is concerned and asks the ED consultant to see the patient next.

The ED consultant is unable to confirm sepsis as the patient does not meet SIRS criteria and the WCC will not be available for at least another hour. The ED consultant therefore performs a Sepsis Risk Stratification regardless, suspecting a chest infection.

The ED blood gas machine is being serviced and so the ABG sample is sent to the laboratory.

The patient is monitored and placed on high flow oxygen which improves his oxygen saturations to 94%. A portable chest x-ray is taken which shows bilateral infiltrates.

The ED consultant decides that the patient is very likely to have severe sepsis and instigates treatment immediately, pending the laboratory results. He asks that the urine output be monitored and makes a note to check the blood results in 45 minutes.

1.4 Lactate

The lactate level in sepsis is highly predictive of death[11] (see Box 4) and poor outcomes and, when initially elevated, the degree of reduction following resuscitation ('lactate clearance') predicts survival[12]. A significant proportion of patients with sepsis who have normal blood pressure have elevated serum lactate and outcomes for these patients with 'cryptic shock' are as poor as for those with overt septic shock[13].

When cryptic shock has been identified from a venous or capillary lactate sample, this should be corroborated with an arterial sample to exclude error arising from regional perfusion abnormalities. A capillary or venous lactate from a correctly calibrated device which is normal is reassuring as a stand-alone.

Consideration should be given to the routine use of serum lactate at triage or initial assessment of all patients admitted to the Majors or Resuscitation areas (or equivalent).

Box 4: The relationship of lactate level in sepsis to mortality

Lactate	Mortality
<2	15%
2-4	25%
>4	38%

From: Trzeciak S, Dellinger RP, Chansky ME, Arnold RC, Schorr C, Milcarek B, *et al*. *Intensive Care Med* 2007, 33(6):970-7

Case Study 3

A normally well 28 year-old man self-presented to the ED with shortness of breath and a productive cough. He had a temperature of 38.5 degrees. Despite all other observations being normal, the triage nurse was concerned and moved him to the Majors area and arranged for the ED technician to gain IV access and send bloods.

The ED technician cannulated him and performed routine bloods including blood cultures because of his high temperature. A venous blood gas, which includes serum lactate, was performed routinely as is the protocol for all patients in Majors. The lactate was 4.3mmol/L.

From his training on a multi-disciplinary sepsis course, the ED technician recognized the seriousness of this result and informed the ED doctor, requesting that the patient be seen immediately. The ED technician went to fetch the 'Sepsis Trolley' and the patient's named nurse stopped what she was doing to assist the doctor and get ready to draw up antibiotics and give fluids as necessary.

1.5 Recording findings

Following initial assessment, and once any necessary investigations have been completed, an initial assessment diagnosis should be recorded using ONLY the following terms:

Septic shock

Severe Sepsis

Red Flag Sepsis

Uncomplicated sepsis

No current evidence of sepsis

'Sepsis' as a stand-alone term is not acceptable: documentation must record acuity as described.

2. Urgent Intervention

The key immediate interventions that increase survival are described in a bundle termed the **Sepsis Six** (Box 5). This bundle has been shown to be associated with significant mortality reductions when applied within the first hour[8].

Box 5: The Sepsis Six

1. Administer high-flow oxygen
2. Take blood cultures and consider infective source
3. Administer intravenous antibiotics
4. Give intravenous fluid resuscitation
5. Check haemoglobin and serial lactates
6. Commence hourly urine output measurement

Source: http://sepsistrust.org

This bundle should be initiated immediately on diagnosis or suspicion of severe sepsis. The Sepsis Six should be completed within one hour of initial identification, without waiting for the results of further investigations, and should complement, not detract from, the criteria and standards for the management of severe sepsis and septic shock set by CEM.

Following delivery of the Sepsis Six, patients should be placed on a standardized pathway of care to ensure optimal sepsis management regardless of the time of day or experience of the staff.

The Sepsis Six recommends that up to 30 mL/kg of crystalloid fluid be rapidly delivered in divided aliquots to patients with sepsis who have evidence of hypoperfusion (defined in Box 2). Some patients with initial hypoperfusion may respond rapidly to smaller volumes. There is strong evidence that expedient delivery of 'basic' aspects of care limits the maximum acuity of intervention required - early resuscitation can prevent the requirement for invasive monitoring and vasoactive support[14].

Should blood pressure, heart rate, urine output and lactate return to normal levels following fluid resuscitation, a management plan should be documented that includes timings of planned clinical review and escalation criteria. Attention should be focused on urgent ongoing resuscitation and wider management including control of any source amenable to drainage or removal within 12 hours.

Those with persistent haemodynamic deficit following fluid resuscitation of 30mL/kg, including patients with persistently high lactate or low urine output, require more invasive strategies for ongoing resuscitation. The physiological targets and parameters for Early Goal Directed Therapy according to the original protocol[9] studied by Rivers has been brought into question recently[15], but few would argue the need to consider invasive monitoring and haemodynamic support for patients who do not respond to initial fluid resuscitation. The central tenets of advanced haemodynamic support in this group are to adequately restore circulating volume, use vasopressors to correct hypotension, and to assess cardiac output and oxygen delivery.

EDs should ensure that equipment and resources are immediately available to provide advanced haemodynamic support. Where skills are available within the ED to site central venous catheters, or to undertake dynamic ultrasound assessment of the vena cava, then ED staff may initiate targeted volume resuscitation and, where necessary, initiate vasopressor support where skills permit. The CEM noradrenaline infusion reference guide is available at www.collemergencymed.ac.uk/Shop-Floor/Clinical Standards/Sepsis.

Where skills are not available, or where Critical Care personnel are immediately available and more directly skilled in the provision of invasive monitoring and vasoactive infusions, Critical Care must be involved promptly to ensure that there is no delay in instituting advanced resuscitation. All patients in whom advanced resuscitation has been commenced will require ongoing care, according to response, in a Level 1 facility as a minimum.

3. Timely Escalation

The All Party Parliamentary Group (APPG) on sepsis has recently made a recommendation that organizations should give 'consideration to the development of Sepsis Teams'[16]. Comparisons with heart attack and stroke, where teams are available to be mobilized when prehospital services pre-alert a suspected case, would make this seem obvious. At the very least, there should be nominated medical and nursing leads for sepsis within each ED, and care pathways should identify a tier of resident staff who should assume direct responsibility for coordinating care when a patient with sepsis is identified.

A pragmatic solution to the pressing need to identify specific teams to manage patients with sepsis may lie in existing resources - for example, Critical Care Outreach, Patient at Risk and Medical Emergency Teams. It can be argued that sepsis is a core component of their existing workload. However, these already pressured teams should not be assumed to have capacity to undertake the necessary monitoring and improvement programmes - the fact that resources need allocating to improve outcomes from sepsis is inescapable.

Care pathways should include an observation and review schedule and guidance as to which parameters imply treatment success or failure with an easy-to-follow directive informing when senior and/ or intensive care review is required.

It is vital that patients with severe sepsis should be reviewed at the earliest opportunity by the most senior available doctor. The CEM standard is that all patients with severe sepsis and septic shock have senior (ST4 or above) medical review within 60 minutes of arrival.

Many patients with sepsis will have multiple co-morbidities, and may be elderly or frail. For such patients, decisions should be taken at senior level (in consultation with the patient and their family as appropriate) regarding the appropriateness of escalation of care to level 2 ('High Dependency', where a single organ system requires support excluding a need for invasive ventilation) or level 3 ('Intensive Care', where invasive respiratory support or more than one organ system support is required). Where possible, these decisions should be made and documented prior to the point at which the acuity of the patient's condition has deteriorated - this will not always be feasible.

3.1 Suggested clinical guidelines for the management of patients attending with or developing sepsis in an Emergency Department

Sepsis (uncomplicated)

- A documented decision to initiate the Sepsis Six or not
- Review by a senior doctor (ST4 or above) within 60 minutes of diagnosis
- Hourly observations whilst in the ED
- Repeat lactate measurement within 2 hours from baseline in order to identify development of cryptic shock (hypoperfusion with normotension)
- Escalate immediately if severe sepsis or septic shock develop (including patients with normal blood pressure but elevated lactate, known as 'cryptic shock')
- If admitted, arrangements to be made for review by consultant from admitting team within 14 hours
- If discharged home, safety-netting advice and advice regarding how to re-access healthcare if patient subjectively deteriorates should be provided and documented

Severe Sepsis or 'Red Flag' sepsis pending confirmatory tests

- Sepsis Six to be completed as soon as possible, but always within 60 minutes
- Review by a senior doctor (ST4 or above) within 60 minutes of arrival
- Continuous monitoring or observations every 30 minutes whilst in ED in accordance with NEWS frequency of monitoring and escalation policy
- Repeat lactate measurement within 2 hours
- Escalate immediately if septic shock (including cryptic shock) develops or if organ dysfunction requires need for Critical Care (e.g. acute kidney injury with anuria or acidosis)
- Arrangements made to ensure repeat laboratory blood tests within 14 hours, unless observations indicate earlier need (e.g. reducing urine output, jaundice, bleeding)
- Review by admitting consultant within 14 hours

Septic Shock

- Initiation of the Sepsis Six to be completed as soon as possible, but always within 60 minutes
- Review by a senior doctor (ST4 or above) immediately
- Emergency Medicine Consultant to be informed when on duty
- Immediate referral by ED staff to Critical Care Outreach (or equivalent) team
- Personnel assembled with skills to initiate invasive monitoring and/or vasoactive infusions where necessary within 60 minutes of recognition
- Where ventilatory support is required, attendance of appropriately skilled personnel within 30 minutes of recognition

Pathways should also describe where septic patients should be nursed and clearly state the escalation status and any ceilings of care for each patient. It should be stressed that although patients may not be determined suitable for full resuscitation or invasive ventilation, treatment limits of non-invasive ventilation, inotropes, vasopressors, or intensive fluid management may be set.

Whenever there has been physician review of patients with sepsis, there should be a documented schedule for when repeat lactate measurement and medical review are planned and what the escalation/ de-escalation parameters are.

Exemplar standards for the emergency management of sepsis

The ED has a key role to play in early sepsis management. It is where rapid identification of the septic patient must occur and it is where important decisions must be made about the appropriate destination for ongoing care and for referral to other specialties and services e.g. to Critical Care, or to Radiology or Surgery for drainage of collections. The delivery of excellent sepsis care demands that clinical pathways describe how patients arrive and are managed in the ED, for example prehospital services or walk-in patients; what support services are available in the ED; and to where the patient will be discharged such as the Critical Care unit or the ward. In designing a clinical pathway, construction of both high level and low level process maps is a helpful starting point.

The standards below are those which have been identified by the UK Sepsis Trust and the APPG for sepsis as important in the management of sepsis with specific relevance to the ED. They are the 'Exemplar Standards' which organizations should deliver. Achieving these standards will place an ED well on the road to the provision of excellent sepsis care.

1 Clear guidance, policies and clinical pathways to be in place for the management of sepsis, severe sepsis and septic shock. Standards for recognition, intervention and escalation must be included.

2 All patients with physiological derangement, an elevated NEWS score above trigger threshold, or with clinical suspicion of infection to be screened for the presence of sepsis, severe sepsis or septic shock and to have a serum lactate within 30 minutes of arrival.

3 Clinical pathways to include initiation of all investigations necessary to confirm or exclude organ dysfunction (see Box 2) and to include criteria for escalation/ de-escalation of care.

4 The Sepsis Six to be used as a delivery method for early sepsis care and to be delivered within 1 hour post diagnosis in ≥95% of cases.

5 On diagnosis of sepsis, the patient should not be transported to a different clinical area prior to completion of Sepsis Six, unless emergency surgery/ specialist intervention or escalation of treatment is required.

6 24 hour availability of microbiology advice on initiation or escalation of antimicrobial therapy in complex cases or where the source of infection is unclear.

7 Definitive, documented decision made about the presence/ absence of sepsis and the level of severity at time of admission to hospital from the ED.

8 Mandatory annual sepsis training for all clinical members of ED staff.

9 A minimum of 80% of permanent staff to have received appropriate sepsis training at any one time point, audited at least biannually.

10 A nominated Medical and Nursing Lead within the ED who are part of and contribute to the organization's Sepsis Group.

11 Interdisciplinary meetings to be undertaken between the ED and prehospital service staff together with managers and commissioners as appropriate, with remit to refine care pathways for sepsis and ensure compatibility between clinical areas. This work should be undertaken within the remit of, or fed back to, the

organization's Sepsis Group.

12 Regular case reviews to be undertaken with Critical Care staff to identify elements of the clinical pathway which work well and opportunities for improvement. This work should be undertaken within the remit of, or fed back to, the organization's Sepsis Group.

13 Sepsis should be on the organization's Risk Register, with an identified Board level person with responsibility for sepsis. The mortality rate from sepsis and pneumonia should be on the monthly quality dashboard.

14 Mandatory prospective data collection and continuous audit on patients with sepsis, measuring the delay to intervention, treatment and outcomes.

15 Voluntary reporting of performance data into the public domain.

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