

Improving the outcomes of patients presenting with sepsis in secondary care

KEY WORDS

- » Escalation
- » Recognition
- » Resuscitation
- » Sepsis

The Sepsis Trust (2019) estimates there are at least 250,000 cases of sepsis in the UK and an associated 52,000 deaths. They go on to suggest that 14,000 of these deaths could be prevented through better recognition, early resuscitation and early escalation. The national confidential enquiry into patient outcomes and death found that Sepsis diagnosis were delayed due to inadequate local training and that even when it was diagnosed in a timely manor, lifesaving interventions were still being omitted (NHS England, 2015). This small pilot aimed at addressing these shortcomings, by providing local training and utilising resources available from the Sepsis Trust.

Patients with wounds are at a greater risk for developing sepsis, which is why all wound care specialists should become ambassadors of sepsis education, raising awareness among other healthcare professionals as well as patients and their families. Sepsis is a potentially life-threatening condition which is caused by the body's abnormal response to an infection (Sepsis Trust, 2019). It occurs when the body's immune and coagulation systems are activated but are amplified and dysfunctional, which can lead to tissue damage, organ dysfunction or organ failure with a high associated mortality, even when treated promptly (Sepsis Alliance, 2019; National Institute for Health and Care Excellence [NICE], 2016). If a patient demonstrates organ dysfunction, organ failure or tissue hypoperfusion, the condition is termed severe sepsis (NICE, 2016).

A patient with sepsis who develops hypotension and is not responding to fluid replacement, is said to have septic shock, a life-threatening emergency that may require vasopressor support in the intensive care unit (ICU) (NICE, 2016; Seymour et al, 2019). The Sepsis Trust (2019) estimates that there are at least 250,000 cases of sepsis in the UK and an associated 52,000 deaths. They go on to suggest that 14,000 of these deaths could be prevented through better recognition, early resuscitation and early escalation.

The direct and indirect annual cost of sepsis to the NHS is staggering — at circa £7.76 billion (York Health Economics Consortium [YHEC], 2017). Along with the financial impact, we must also consider the life-changing after-effects reported by sepsis survivors, which include a reduced quality of life and permanent cognitive or psychological sequelae (Prescott, 2018; Iwashyna et al, 2010). The key to reducing mortality, morbidity and cost is, as the Sepsis Trust suggest, through early identification, resuscitation and escalation of this devastating condition. NHS England (2015) recommends that all healthcare professionals receive support and adequate local training to accomplish this. To date, however, there remains no consensus as to what this training should incorporate nor the format in which it should be delivered.

Chih-Huang et al (2011) concluded in their multicentre randomised-controlled study that medical simulation can improve participant's knowledge in the early recognition and management of severe sepsis. They recommend that any course should incorporate didactic lectures and this be followed by a simulation experience to reinforce the learning. This view was shared by Nguyen et al (2008) who also demonstrated that implementation of early goal-directed therapy and resuscitation bundles such as the Sepsis Six are

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BOX 1. NEWS2 measures the following physiological parameters on a score from 0–5

- Respiration rate
- Oxygen saturation
- Systolic blood pressure
- Pulse rate
- Level of consciousness or new confusion
- Temperature.

Sepsis should be considered in any patient with a NEWS2 score of 5 or more

limited by clinician knowledge. They suggest that didactic lectures, skills workshops and simulated case scenarios when utilised together improved uptake, knowledge and confidence in participants, even those with limited clinical experience. It was, therefore, felt that a multimodal approach would be best suited to the training of our new and recently qualified nursing staff. A small pilot teaching program was devised, with pre- and post-teaching assessment questionnaires utilised, to ascertain if the participant's knowledge had improved within the three key domains of recognition, resuscitation and escalation.

METHODS

The training day focused on improving identification, resuscitation and staff confidence with regards to early escalation of suspected sepsis to a senior clinician. Dr C Hogan (Infectious Diseases Consultant and Sepsis Lead for the Trust) opened with an excellent lecture that gave the participants an overview of sepsis. The teaching included: an explanation and definition of sepsis, the pathophysiological processes of sepsis and the salient points that would be reinforced through the morning's workshops. The six participants were then split into three groups which rotated around four interactive, hands-on workshops.

WORKSHOP 1: RECOGNITION / NEWS2

The signs of sepsis can be subtle and this workshop used case-based discussions to examine the nuances of sepsis recognition. It was emphasised that the National Early Warning Score 2 (NEWS2) can offer a useful adjunct to clinical acumen and experience (Skills for Health, 2019). The NEWS2 examines a patient's physiological parameters and attributes a score, dependent on the level of derangement, the higher the attributed score, the greater the physiological derangement and the greater the need for support, review and escalation. The physiological parameters measured are oxygen saturation, blood pressure (systolic), heart rate, respiratory rate, and consciousness (*Box 1*). A score is allocated to each parameter as they are measured, with the magnitude of the score reflecting how extremely the parameter varies from the norm. If a patient's physiological parameter is normal it is scored 0, sepsis should be

considered in any patient with a NEWS2 score of 5 or more and they should be further screened for sepsis using a screening tool advocated by the Sepsis Trust (2019). The tool has since been redesigned but the principles remain the same (*Figure 1*). We emphasised that irrespective of the NEWS2 score, if a clinician has concern for sepsis the use of a sepsis screening tool will help to identify cases that may otherwise be missed. The NEWS2 score will also help guide clinicians as to the level of seniority required for review of the patient, this is often agreed within local policy.

WORKSHOP 2: RED/AMBER FLAGS AND THE SEPSIS TRUST'S SCREENING TOOL

Participants were presented with laminated cards, each contained an abnormal physiological range or presentation and corresponded to either a red or amber flag, used in the early identification of sepsis. The participants had to separate these into which 'flag' they thought each represented, i.e. either red or amber. No participating team identified these with 100% accuracy and this was used to reinforce the complexity of sepsis identification. It was highlighted that in a busy ward environment, this task would be made all the more difficult. We then presented two scenarios taken from clinical practice and asked the staff if they thought the patient had sepsis or if they would use the screening tool. It became apparent that staff felt supported in using the tool, however, they were surprised at the subtle presentations of sepsis that the tool helped identify. We reinforced that the screening tool is an excellent aide memoir, however, it does not replace clinical experience, expertise or judgement. The staff felt much more confident after the session in using the tool and expressed that having time to practice filling it in and having experts to discuss the process was beneficial.

WORKSHOP 3: BARRIERS TO ESCALATION

The aim of this workshop was for participants to understand the importance of escalating possible cases of sepsis. It provided practical solutions in overcoming barriers to escalation and enabled participants to recognise the barriers early in the patient's journey. The workshop was taught through informal discussion rather than case-based

SEPSIS SCREENING TOOL ACUTE ASSESSMENT AGE 12+

PATIENT DETAILS: DATE: TIME:
 NAME: DESIGNATION: SIGNATURE:

01 START THIS CHART IF THE PATIENT LOOKS UNWELL OR NEWS-2 HAS TRIGGERED
 RISK FACTORS FOR SEPSIS INCLUDE:
 Age > 75 Recent trauma / surgery / invasive procedure
 Impaired immunity (e.g. diabetes, steroids, chemotherapy) Indwelling lines / IVDU / broken skin

02 COULD THIS BE DUE TO AN INFECTION?
 LIKELY SOURCE: Respiratory Urine Skin / joint / wound Indwelling device
 Brain Surgical Other

03 ANY RED FLAG PRESENT?
 Objective evidence of new or altered mental state
 Systolic BP ≤ 90 mmHg (or drop of >40 from normal)
 Heart rate ≥ 130 per minute
 Respiratory rate ≥ 25 per minute
 Needs O₂ to keep SpO₂ ≥ 92% (88% in COPD)
 Non-blanching rash / mottled / ashen / cyanotic
 Lactate ≥ 2 mmol/l
 Recent chemotherapy
 Not passed urine in 18 hours (<0.5ml/kg/hr if catheterised)

04 ANY AMBER FLAG PRESENT?
 Relatives concerned about mental status
 Acute deterioration in functional ability
 Immunosuppressed
 Trauma / surgery / procedure in last 8 weeks
 Respiratory rate 21-24
 Systolic BP 91-100 mmHg
 Heart rate 91-130 or new dysrhythmia
 Temperature <36°C
 Clinical signs of wound infection

RED FLAG SEPSIS
 START SEPSIS SIX

FURTHER REVIEW REQUIRED:
 YES - SEND BLOODS AND REVIEW RESULTS
 - ENSURE SENIOR CLINICAL REVIEW within 1HR
 TIME OF REVIEW: ■■■ : ■■■
 ANTIBIOTICS REQUIRED, ■ Yes ■ No

NO AMBER FLAGS = ROUTINE CARE / CONSIDER OTHER DIAGNOSIS

SEPSIS SCREENING TOOL - THE SEPSIS SIX AGE 12+

PATIENT DETAILS: DATE: TIME:
 NAME: DESIGNATION: SIGNATURE:

COMPLETE ALL ACTIONS WITHIN ONE HOUR

01 ENSURE SENIOR CLINICIAN ATTENDS TIME
 NAME: GRADE: : :

02 OXYGEN IF REQUIRED TIME
 START IF O₂ SATURATIONS LESS THAN 92% - AIM FOR O₂ SATURATIONS OF 94-98%
 IF AT RISK OF HYPERCARBIA AIM FOR SATURATIONS OF 88-92%
 : :

03 OBTAIN IV ACCESS, TAKE BLOODS TIME
 BLOOD CULTURES, BLOOD GLUCOSE, LACTATE, FBC, U&Es, CRP AND CLOTTING
 LUMBAR PUNCTURE IF INDICATED
 : :

04 GIVE IV ANTIBIOTICS TIME
 MAXIMUM DOSE BROAD SPECTRUM THERAPY
 CONSIDER LOCAL POLICY / ALLERGY STATUS / ANTIVIRALS
 : :

05 GIVE IV FLUIDS TIME
 GIVE FLUID BOLUS OF 20 ml/kg if age <16, 500ml if 16+
 NICE RECOMMENDS USING LACTATE TO GUIDE FURTHER FLUID THERAPY
 : :

06 MONITOR TIME
 USE NEWS-2. MEASURE URINARY OUTPUT. THIS MAY REQUIRE A URINARY CATHETER. REPEAT LACTATE
 AT LEAST ONCE PER HOUR IF INITIAL LACTATE ELEVATED OR IF CLINICAL CONDITION CHANGES
 : :

RED FLAGS AFTER ONE HOUR - ESCALATE TO CONSULTANT NOW

RECORD ADDITIONAL NOTES HERE:
 e.g. allergy status, arrival of specialist teams, variance from Sepsis Six

Figure 1. The recently updated Sepsis screening tool for adults (Sepsis Trust, 2019)

learning. They were provided with a laminated card designed to fit within their ID badge-holder which detailed escalation bleep numbers, as well as the escalation guidance table from the NEWS2 and trust policy. The participants had an understanding of the importance of escalation; however, they were unaware of some vital underpinning guidelines produced by the NICE, e.g. NG51 and CG50 (NICE, 15; 16). Some participants also had difficulties in identifying patient groups who may be at risk of developing sepsis, this was discussed and the guidelines produced by NICE provided. Generally, we found that participants were proactive at identifying barriers to escalation within their specific clinical areas, but were unable to propose

robust solutions to overcome these. Following this workshop, participants were much more aware of the importance of escalation and the underlying NICE guidance. They felt more empowered to voice their concerns when trying to escalate deteriorating patients. It reinforced that escalation is not a criticism of care but it is an integral part of advocating for the patient.

WORKSHOP 4: PUTTING THE SEPSIS SIX INTO ACTION

‘Putting the Sepsis Six into action’ workshop was also a scenario-based station. Staff members were presented with a clinical case and each presenter worked through an A-E assessment, incorporating the Sepsis Six pathway (Table 1). The pathway was divided into the ‘3 IN’ of the Sepsis Six: IV fluids, antibiotics and high flow oxygen and the ‘3 OUT’: blood cultures, fluid balance and lactate.

Staff members found the ‘3 IN’ and ‘3 OUT’ a useful method in facilitating memory recall of the pathway. Throughout the session the importance of early treatment was linked to the beneficial impact this has on mortality, in order to motivate and encourage uptake. Staff members responded well to the teaching, as it included a clinical scenario that was familiar to all and provided practical management

	3 ‘IN’ (given to the patient)	3 ‘OUT’ (taken from the patient)
1	Give O ₂ to keep sats above 94%	Take blood cultures
2	Give IV antibiotics	Measure urine output
3	Give a fluid challenge	Measure (serial) lactate

	Pre-workshop	Post-workshop	Difference
How confident are you on who should be screened for sepsis?	3.4	4.4	1
How confident are you in identifying a patient with sepsis	3.6	4.5	0.9
How confident are you in escalating a patient with sepsis	4.1	4.8	0.7
How would you rate your overall knowledge of sepsis	2.9	4.1	1.2
How would you rate your understanding of the Sepsis Six	3.3	4.8	1.5

solutions. Feedback from staff demonstrated an increased confidence when dealing with the septic patient and a deeper understanding of the pathway and its individual components.

SIMULATION

The afternoon was used to reinforce the mornings teaching, through application of knowledge, in the simulation suite. The 'Laerdal SimMan, essential bleeding mannequin' was used to provide a realistic, lifelike experience. Manual observations were reinforced and the elements discussed in the workshops tested. Three case scenarios were utilised, these were, a patient with dementia and subtle hyperactive delirium, a chest sepsis and finally a surgical patient, where multiple barriers to escalation tested the participants professionalism and skills; it included overcoming situations such as demands placed on the nursing staff by a busy surgical Registrar and an incompetent, disinterested FY1. The participants, newly emboldened, by the mornings teaching, rose to the challenges admirably. The learning opportunities came in the debrief room afterwards, where facilitated discussion enabled all involved to reflect on the scenarios.

RESULTS

Participants were asked to score their confidence, knowledge and understanding from 1–5, with 5 being fully proficient and 1 indicating, little to no understanding of the concept (Table 2).

The results demonstrate a positive trend towards increased confidence, knowledge and

understanding. The comments from participants on the day were very positive. The interactivity, variety of teaching modalities and the in-depth discussions within the workshops, were purported as delineating confusable concepts and enabled participants to take this into everyday clinical practice. One of the participants reported back to the group 4 weeks later, stating she continues to use the teaching in her everyday practice and was very grateful for the opportunity to have undertaken the training. Whilst this is a very small pilot group, the positive trend towards improvement in participants knowledge, understanding and confidence is encouraging, as is the 4-week follow up. Further audit is recommended however, there appears to be sufficient positive data to run the course again for a larger cohort.

CONCLUSION

Patients with wounds are at higher risk of developing sepsis. 14,000 deaths per year could be prevented with better recognition, resuscitation and escalation. Education delivered locally is essential in improving the mortality and morbidity associated with sepsis. This small pilot appears to support the use of didactic lectures, skills workshops and simulated case scenarios together, to improve participant's confidence, knowledge and understanding in the three domains of recognition, resuscitation and escalation. Structured training programmes can improve the patient's journey through the early recognition of sepsis and identification of barriers to escalation and in so doing, empowers participants to foresee, potential disaster and avert it. WUK

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