

Sepsis- what is the role for acute medicine?

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Introduction

Sepsis- the life-threatening response of the body to an infection- is one of the more common reasons for presentation to an Acute Medical Unit, and a major health and economic burden to our healthcare system, with an estimated 37,000 deaths occurring annually in the U.K. In the United States, recent evidence suggests that the incidence of sepsis has been rising by between 8 and 13% per annum over the last decade, and that it is now higher than that of Acute Coronary Syndrome.¹ Across Europe, the cost of a hospital admission for sepsis (due to the frequent need for prolonged Critical Care admission) has been estimated at between 25,000 and 55,000 Euros.² For the NHS, this means an estimated expenditure of £2.5 billion per year.

We- collectively as a healthcare system- are not good at treating sepsis reliably. While overall compliance with the Surviving Sepsis Campaign's Resuscitation Bundle in Europe was 18.4%,³ we are poor even at delivering the basics. The College of Emergency Medicine (CEM) recently audited practice and found only 27% of patients to have received intravenous antibiotics and 40% to have received intravenous fluids within the first hour.⁴ Individual centres in the U.K have reported similarly low compliance rates.⁵

To improve upon this lack of reliability, and to improve outcomes for patients, will demand a system-wide approach and an organizational culture of suspecting sepsis. Acute Physicians, both on the Acute Medical Unit and in an 'outreach' capacity will have a central role in driving these improvements.

The role of Acute Medicine

Of course, sepsis is not primarily an Emergency Department problem. The CEM audit identified 4,469 cases over a 6 month period across 74% of Emergency Departments (EDs) in England and Wales, suggesting that only around 14% of the estimated 100,000 cases of severe sepsis occurring annually in the UK are identified in Emergency Departments, though voluntary reporting means that this is likely to have been an underestimate. A *post hoc* analysis of data collected by the Surviving Sepsis Campaign revealed that over 50% of patients admitted to Intensive Care Units in Europe were

admitted from the 'wards' (non-ED, non-Critical Care),⁶ with almost 65% of cases arising from sources of infection more likely to be seen on medical than surgical wards.

It is probable, therefore, that Acute Medical Units in the UK see a minimum of 10-15,000 cases of severe sepsis annually and likely many more. Acute Physicians play a pivotal role in directing care for these patients. Particularly in the elderly, for whom the incidence of sepsis is far higher,¹ diagnosis of the syndrome and the source of any underlying infection may present a challenge. Symptoms may be non specific and the differential diagnosis (particularly in patients with multiple co-morbidities) may be extensive.

Championing a culture of suspicion of sepsis when faced with multiple clinical pathways which are competing for a clinician's attention is vital. Sepsis is a common cause of in-patient deterioration and the team should be educated that screening for sepsis is a core element of the assessment of a deteriorating patient.

The problem for the U.K is compounded by a relative lack of Intensive Care beds in comparison with other countries in Europe and the United States- Germany, for example, has 10 times the number of beds per head of population.⁷ Patients here are more likely to spend longer on wards and to become sicker while awaiting admission to Intensive Care. It is essential, therefore, that we implement systems which will improve the reliability of identification of patients with sepsis, the delivery of basic care elements, and escalation of care to senior staff members and teams.

At Acute Medicine's core is the prompt recognition and reversal of deterioration. In no condition is this more important than in sepsis. Acute Physicians are well placed to drive earlier identification and rapid and appropriate delivery of life-saving interventions including fluid challenges, antibiotics and source control. Uniquely outside Critical Care, Acute Physicians also possess many of the skills necessary to implement invasive monitoring and more aggressive forms of physiological support. With delays in transfer to Critical Care and a lack of capacity identified, acute medicine represents a key interface between the 'wards' and Critical Care.

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It's widely accepted that reliable delivery of the most basic interventions (appropriate intravenous antibiotics and fluids, for example) is more effective in improving outcomes than the late delivery of appropriate Critical Care. This has led many organizations to adopt operational solutions to the Surviving Sepsis Campaign (SSC) bundles such as (in the U.K) the Sepsis Six, which has been associated with a 46.6% relative mortality reduction.⁸ This is fortunate, since it is also accepted that few Acute Medical Units would have the skills and resources necessary to fulfil the full SSC Resuscitation Bundle.⁹ In the SSC's improvement programme,³ the only care elements which were individually associated with improved survival were the sampling of blood cultures before antibiotics, delivery of broad spectrum antibiotics and general Critical Care interventions such as 'gentle' ventilation and maintenance of normal blood sugars.

In 2006, a landmark paper demonstrated that each hour's delay of administration of antibiotics to patients with septic shock was associated with a 7.6% greater risk of death.¹⁰ Two recent prospective studies support this,^{8,11} and the Surviving Sepsis Campaign improvement programme showed an Odds Ratio for death of 0.86 in patients receiving antibiotics within the first three hours following presentation.³

In addition to improving outcomes, improving the reliability of delivery of basic interventions in sepsis is likely to be highly cost-effective. The Sepsis Six was associated with a reduction in length of Critical Care stay of 2 days and a reduction of 3.4 days in hospital stay.⁸ In one Spanish before-and-after study, delivery of the Surviving Sepsis guidelines was associated with 6 fewer days in hospital and 2.5 fewer Critical Care bed days for patients.¹² Similarly, the failure to administer antibiotics or administration of inappropriate antibiotics in severe sepsis was shown to be associated with a 2 day increase in length of stay.¹³

With the focus being on mortality and length of stay, little is known about the impact of early intervention on reducing the need for Intensive Care admission or reducing the impact or incidence of long term complications. The long-term effects of sepsis are both physical and psychological. Unusually, the psychological effects are somewhat better understood and documented. In Intensive Care Unit

survivors, Post-Traumatic Stress Disorder occurs in 22%, and for those surviving an Intensive Care Unit admission with sepsis, the incidence of moderate to severe cognitive dysfunction is 16.8%.¹⁴

Physical sequelae include the loss of digits and limbs, muscular contractions limiting movement, breathlessness due to lung damage, heart failure and kidney failure. The incidence of each of these is not known, but it is clear that patients surviving sepsis have significantly greater long-term physical disability than patients surviving other causes of Intensive Care admission.¹⁵ In a similar manner to the impact of early, appropriate antibiotics on mortality, there appears to be a stepwise increase in the occurrence of acute kidney injury for each hour's delay in the administration of antibiotics:¹⁶ it would seem logical, therefore, that early intervention in the Acute Medical Unit might not only save lives, but perhaps also reduce rates of Intensive Care admission, durations of stay, and long term sequelae.

Driving change

To achieve reliable delivery of basic interventions will demand new strategies and clinical and organizational leadership. Operational solutions to care pathways, such as the Sepsis Six, play a part; but are themselves reliant upon reliable recognition. An organizational culture of sepsis awareness is essential, together with systems to ensure that screening is performed in patients at risk of sepsis, such as those with elevated Early Warning Scores. Electronic observations, and automated interrogation of pathology systems, may come to transform our rates of early recognition. For patients admitted to the Acute Medical Unit with sepsis, collaborative systems akin to those used in acute coronary syndrome and stroke become essential. Training of G.Ps and Paramedics in suspecting and recognizing sepsis, and the provision of resources to support such system-wide approaches through the creation of commissioned pathways for unplanned care, will be necessary to fully transform the way in which we manage sepsis.

Acute Physicians are well placed to drive these changes and to work together with Critical Care to transform the way in which patients with sepsis are managed across entire systems.

Who knows, in the future, sepsis management may become a speciality in its own right.

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