

NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

Health and social care directorate

Quality standards and indicators

Briefing paper

Quality standard topic: Sepsis

Output: Prioritised quality improvement areas for development.

Date of Quality Standards Advisory Committee meeting: 05 January 2017

Contents

1	Introduction	2
2	Overview	2
3	Summary of suggestions	6
4	Suggested improvement areas	8
	Appendix 1: Review flowchart	33
	Appendix 2: Suggestions from stakeholder engagement exercise – registered stakeholders	34

1 Introduction

This briefing paper presents a structured overview of potential quality improvement areas for sepsis. It provides the committee with a basis for discussing and prioritising quality improvement areas for development into draft quality statements and measures for public consultation.

1.1 Structure

This briefing paper includes a brief description of the topic, a summary of each of the suggested quality improvement areas and supporting information.

If relevant, recommendations selected from the key development source below are included to help the committee in considering potential statements and measures.

1.2 Development source

The key development source(s) referenced in this briefing paper is:

- [Sepsis: recognition, diagnosis and early management](#) (2016) NICE guideline NG51. No review schedule presented

2 Overview

2.1 Focus of quality standard

This quality standard covers the recognition, diagnosis and early management of sepsis for all populations.

2.2 Definition

Sepsis is defined as a life-threatening organ dysfunction due to a dysregulated host response to infection. Septic shock is defined as persisting hypotension requiring vasopressors to maintain a mean arterial pressure (MAP) of 65 mmHg or more and having a serum lactate level of greater than 2 mmol/l despite adequate volume resuscitation.

Sepsis is a clinical syndrome caused by the body's immune and coagulation systems being switched on by an infection. Sepsis shock is a life-threatening condition that is characterised by low blood pressure despite adequate fluid replacement, and organ dysfunction or failure. Sepsis is a leading cause of death in people of all ages.

2.3 Incidence and prevalence

The international prevalence of sepsis is estimated at 300 per 100,000, suggesting that there are around 200,000 cases a year in the UK¹.

Both a [UK Parliamentary and Health Service Ombudsman enquiry](#) and UK [National Confidential Enquiry into Patient Outcome and Death](#) have recently highlighted sepsis as being a leading cause of avoidable death that kills more people than breast, bowel and prostate cancer combined.

Sepsis is a major cause of avoidable death in hospitals. Survival from sepsis-induced hypotension is over 75% if it is recognised promptly, but every hour's delay causes a fall by over 7%, implying that the mortality increases by about 30%¹.

2.4 Management

Sepsis should be considered as an immediate life-threatening condition that needs to be recognised and treated as an emergency. Clinicians and healthcare professionals of all kinds, at all levels of seniority and in all clinical settings often find sepsis difficult to diagnose with certainty. Although people with sepsis may have a history of infection, fever is not present in all cases. In the same way that healthcare professionals consider "could this pain be cardiac in origin?" when presented with someone of any age with chest pain, "could this be sepsis?" should be the first consideration for anyone presenting with a possible infection.

2.5 Resource impact assessment

The resource impact report for [NG51](#) encourages organisations to evaluate their own practices against the recommendations to assess the local resource impact. A [template](#) was produced to help organisations estimate the local impact of implementing the guideline.

The resource impact report highlights the UK Sepsis Trust estimate that improved management of sepsis could lead to a saving of £170 million each year for the NHS and £1.25 million each year in a typical medium-sized general hospital.

The report identified that in order to deliver these savings some additional upfront resources may be needed, which could result in additional costs in some areas. The relevant areas for the quality standard are:

- Identifying people with suspected sepsis (section 4.1)
- Managing suspected sepsis outside acute hospital settings (section 4.2)
- Managing and treating suspected sepsis in acute hospital settings (section 4.3)

¹ National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

The resource implications for these areas are discussed in more detail in the relevant section of the briefing paper.

2.6 *National outcome frameworks*

Tables 1 and 2 show the outcomes, overarching indicators and improvement areas from the frameworks that the quality standard could contribute to achieving.

Table 1 [NHS outcomes framework 2016–17](#)

Domain	Overarching indicators and improvement areas
1 Preventing people from dying prematurely	Overarching indicators 1a Potential Years of Life Lost (PYLL) from causes considered amenable to healthcare i Adults ii Children and young people 1c Neonatal mortality and stillbirths Improvement areas Reducing mortality in children 1.6 i Infant mortality* ii Neonatal mortality and stillbirths
3 Helping people to recover from episodes of ill health or following injury	Overarching indicators 3b Emergency readmissions within 30 days of discharge from hospital*
4 Ensuring that people have a positive experience of care	Overarching indicators 4a Patient experience of primary care i GP services ii GP Out-of-hours services 4b Patient experience of hospital care 4c <i>Friends and family test</i> 4d <i>Patient experience characterised as poor or worse</i> i <i>Primary care</i> ii <i>Hospital care</i> Improvement areas Improving hospitals' responsiveness to personal needs 4.2 Responsiveness to inpatients' personal needs Improving people's experience of accident and emergency services 4.3 Patient experience of A&E services Improving access to primary care services 4.4 Access to i GP services Improving children and young people's experience of healthcare 4.8 <i>Children and young people's experience of inpatient services</i>
5 Treating and caring for people in a safe environment	Overarching indicators 5a <i>Deaths attributable to problems in healthcare</i>

and protecting them from avoidable harm	<i>5b Severe harm attributable to problems in healthcare</i> Improvement areas Improving the culture of safety reporting 5.6 Patient safety incidents reported
Alignment with Adult Social Care Outcomes Framework and/or Public Health Outcomes Framework * Indicator is shared Indicators in italics in development	

Table 2 [Public health outcomes framework for England, 2016–2019](#)

Domain	Objectives and indicators
4 Healthcare public health and preventing premature mortality	Objective Reduced numbers of people living with preventable ill health and people dying prematurely, whilst reducing the gap between communities Indicators 4.01 Infant mortality* 4.03 Mortality rate from causes considered preventable** 4.11 Emergency readmissions within 30 days of discharge from hospital*
Alignment with Adult Social Care Outcomes Framework and/or NHS Outcomes Framework * Indicator is shared ** Indicator is complementary	

3 Summary of suggestions

3.1 Responses

In total 17 stakeholders responded to the 2-week engagement exercise 04/11/16 – 18/11/16.

Stakeholders were asked to suggest up to 5 areas for quality improvement. Specialist committee members were also invited to provide suggestions. The responses have been merged and summarised in table 3 for further consideration by the committee.

Full details of all the suggestions provided are given in appendix 1 for information.

Table 3 Summary of suggested quality improvement areas

Suggested area for improvement	Stakeholders
Identifying people with suspected sepsis - early identification - face-to-face assessment	APPGS, CVU, FICM/ICS, ICNARC, RCGP, RCN, SCM, UKS
Managing suspected sepsis outside acute hospital settings	RCGP, SCM
Managing and treating suspected sepsis in acute hospital settings - use of intravenous fluid - senior clinician review	CVU, NuTFT, SCM
Antibiotic treatment in people with suspected sepsis	APPGS, ICNARC, NCD, NuTFT, QTS, SCM
Finding the source of infection in people with suspected sepsis	SCM
Information and support	CVU, ICNARC, NCD, NuTFT, QTS, RCN, SCM
Additional areas - antimicrobial stewardship - infection prevention and control - national registry of sepsis - neonatal sepsis - procalcitonin testing - phenotype and genotype testing - sepsis six - training and education	APPGS, BIA, ICNARC, NCD NuTFT, RCGP, RCN, RD, SCM, TFS, UKS

APPGS, All-Party Parliamentary Group on Sepsis
BIA, British Infection Association
CVU, Cardiff and Vale University Local Health Board
FICM/ICS, Faculty of Intensive Care Medicine/Intensive Care Society Joint Standards Committee
ICNARC , Intensive Care National Audit & Research Centre
NCD, National Clinical Director, NHS England
NuTFT, Newcastle upon Tyne Hospitals NHS Foundation Trust
QTS, Quinolone Toxicity Support UK
RCGP, Royal College of General Practitioners
RCN, Royal College of Nursing
RD, Roche Diagnostics Ltd
SCM, Specialist Committee Member
TFS, Thermo Fisher Scientific
UKS, The UK Sepsis Trust

3.2 *Identification of current practice evidence*

Bibliographic databases were searched to identify examples of current practice in UK health and social care settings; 15 papers were identified for sepsis. In addition, 3 papers were suggested by stakeholders at topic engagement.

Of these papers, 3 have been included in this report and are included in the current practice sections where relevant. Appendix 3 outlines the search process.

4 Suggested improvement areas

4.1 *Identifying people with suspected sepsis*

4.1.1 Summary of suggestions

Early identification

Stakeholders highlighted that there is a need to standardise how sepsis is identified, such as using screening tools, early warning scores, diagnostic markers and risk stratification. They also suggested that there should be a better awareness of sepsis given current rates of late diagnosis, particularly in high risk populations such as women who are pregnant. Early identification can reduce avoidable deaths by ensuring timely treatment takes place.

Face-to-face assessment

A stakeholder felt that structured observations are needed in a face-to-face format (usually by a GP) to identify people with suspected sepsis. Taking these structured observations will also help to prioritise the urgency of care, and ensure the appropriate treatment is given.

4.1.2 Selected recommendations from development source

Table 4 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 4 to help inform the committee's discussion.

Table 4 Specific areas for quality improvement

Suggested quality improvement area	Suggested source guidance recommendations
Early identification	Identifying people with suspected sepsis NICE NG51 Recommendations 1.1.1 to 1.1.11 Stratifying risk of severe illness or death from sepsis NICE NG51 Recommendation 1.4.1
Face-to-face assessment	Face-to-face assessment of people with suspected sepsis NICE NG51 Recommendations 1.3.1 to 1.3.8

Early identification

NICE NG51 – Recommendation 1.1.1

Think 'could this be sepsis?' if a person presents with signs or symptoms that indicate possible infection.

NICE NG51 – Recommendation 1.1.2

Take into account that people with sepsis may have non-specific, non-localised presentations, for example feeling very unwell, and may not have a high temperature.

NICE NG51 – Recommendation 1.1.3

Pay particular attention to concerns expressed by the person and their family or carers, for example changes from usual behaviour.

NICE NG51 – Recommendation 1.1.4

Assess people who might have sepsis with extra care if they cannot give a good history (for example, people with English as a second language or people with communication problems).

NICE NG51 – Recommendation 1.1.5

Assess people with any suspected infection to identify:

- possible source of infection
- factors that increase risk of sepsis (see section 1.2)
- any indications of clinical concern, such as new onset abnormalities of behaviour, circulation or respiration.

NICE NG51 – Recommendation 1.1.6

Identify factors that increase risk of sepsis (see section 1.2) or indications of clinical concern such as new onset abnormalities of behaviour, circulation or respiration when deciding during a remote assessment whether to offer a face-to-face-assessment and if so, on the urgency of face-to-face assessment.

NICE NG51 – Recommendation 1.1.7

Use a structured set of observations (see section 1.3) to assess people in a face-to-face setting to stratify risk (see section 1.4) if sepsis is suspected.

NICE NG51 – Recommendation 1.1.8

CONFIDENTIAL

Consider using an early warning score to assess people with suspected sepsis in acute hospital settings.

NICE NG51 – Recommendation 1.1.9

Suspect neutropenic sepsis in patients having anticancer treatment who become unwell. [This recommendation is from NICE's guideline on [neutropenic sepsis](#).]

NICE NG51 – Recommendation 1.1.10

Refer patients with suspected neutropenic sepsis immediately for assessment in secondary or tertiary care. [This recommendation is from NICE's guideline on [neutropenic sepsis](#).]

NICE NG51 – Recommendation 1.1.11

Treat people with neutropenic sepsis in line with NICE's guideline on [neutropenic sepsis](#).

NICE NG51 – Recommendation 1.4.1

Use the person's history and physical examination results to grade risk of severe illness or death from sepsis using criteria based on age.

Face-to-face assessment

NICE NG51 – Recommendation 1.3.1

Assess temperature, heart rate, respiratory rate, blood pressure, level of consciousness and oxygen saturation in young people and adults with suspected sepsis.

NICE NG51 – Recommendation 1.3.2

Assess temperature, heart rate, respiratory rate, level of consciousness, oxygen saturation and capillary refill time in children under 12 years with suspected sepsis.

NICE NG51 – Recommendation 1.3.3

Measure blood pressure of children under 5 years if heart rate or capillary refill time is abnormal and facilities to measure blood pressure, including a correctly-sized blood pressure cuff, are available.

NICE NG51 – Recommendation 1.3.4

Measure blood pressure of children aged 5 to 11 years who might have sepsis if facilities to measure blood pressure, including a correctly-sized cuff, are available.

NICE NG51 – Recommendation 1.3.5

Only measure blood pressure in children under 12 years in community settings if facilities to measure blood pressure, including a correctly-sized cuff, are available and taking a measurement does not cause a delay in assessment or treatment.

NICE NG51 – Recommendation 1.3.6

Measure oxygen saturation in community settings if equipment is available and taking a measurement does not cause a delay in assessment or treatment.

NICE NG51 – Recommendation 1.3.7

Examine people with suspected sepsis for mottled or ashen appearance, cyanosis of the skin, lips or tongue, non-blanching rash of the skin, any breach of skin integrity (for example, cuts, burns or skin infections) or other rash indicating potential infection.

NICE NG51 – Recommendation 1.3.8

Ask the person, parent or carer about frequency of urination in the past 18 hours.

4.1.3 Current UK practice

Early identification

The National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report Sepsis: Just Say Sepsis², highlights the processes of care for people aged 16 years old or over with sepsis. It found that at an organisational level 66% of hospitals reported that they had a sepsis protocol to help with the early identification and management of sepsis. Around 27% of these had been taken directly from national guidance, 60% modified version of national guidance and 19% were locally developed³. It also found that nearly 98% of hospitals had an early warning score which was linked to an escalation protocol. However, in primary care no evidence was found that demonstrated an early warning score had been used.

Face-to-face assessment

When reviewing primary care the NCEPOD² found that in an assessment physiological vital signs were not consistently recorded. Figure 1 from the NCEPOD shows the vital signs that were recorded in primary care amongst 54 people who were later admitted with sepsis. NICE guideline NG51 recommends that all of these should be recorded.

² National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

³ The source of protocols may have been classed in more than one category.

Figure 1. Assessment of vital signs

Last visit	Assessment done		
	Yes	No	Total
Heart rate	33	21	54
Blood pressure	23	31	54
Respiratory rate	10	44	54
Temperature	25	29	54
Mental state	8	46	54
Blood glucose	2	52	54
Other	16	38	54

4.1.4 Resource impact assessment

The “think sepsis” approach may result in additional pressure on GP services as more telephone triage and face-to-face appointments may be needed. While referrals based on symptoms and risk are appropriate, much of this additional activity is likely to result in health professionals deciding that sepsis is not suspected, or that there is a low risk of progression to severe illness or death.

4.2 *Managing suspected sepsis outside acute hospital settings*

4.2.1 Summary of suggestions

Stakeholders highlighted that when people are identified as having suspected sepsis outside of acute hospital care, communication between services is often poor. This can lead to delays in treatment.

4.2.2 Selected recommendations from development source

Table 5 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 5 to help inform the committee's discussion.

Table 5 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Managing suspected sepsis outside acute hospital settings	Managing suspected sepsis outside acute hospital settings NICE NG51 Recommendations 1.5.1 to 1.5.3

Managing suspected sepsis outside acute hospital settings

NICE NG51 – Recommendation 1.5.1

Refer all people with suspected sepsis outside acute hospital settings for emergency medical care⁴ by the most appropriate means of transport (usually 999 ambulance) if:

- they meet any high risk criteria (see tables 1, 2 and 3) **or**
- they are aged under 17 years and their immunity is impaired by drugs or illness and they have any moderate to high risk criteria.

NICE NG51 – Recommendation 1.5.2

Assess all people with suspected sepsis outside acute hospital settings with any moderate to high risk criteria to:

- make a definitive diagnosis of their condition
- decide whether they can be treated safely outside hospital

⁴ Emergency care requires facilities for resuscitation to be available and depending on local services may be emergency department, medical admissions unit and for children may be paediatric ambulatory unit or paediatric medical admissions unit.

If a definitive diagnosis is not reached or the person cannot be treated safely outside an acute hospital setting, refer them urgently for emergency care.

NICE NG51 – Recommendation 1.5.3

Provide people with suspected sepsis, who do not have any high or moderate to high risk criteria information about symptoms to monitor and how to access medical care if they are concerned.

4.2.3 Current UK practice

The NCEPOD⁵ found that in the treating clinician's opinion 18% of people were delayed from presentation in to hospital admission. This accounted for 122 people, of which 11.7% were due to the delays by the GP. The largest contributing factor for delay was that people did not seek medical help early enough (59.5%). In 90.6% of cases no pre-alert was sent.

Variation from the accepted standard of care in timely referral to critical care was identified in 5 of 10 case studies where people had died from sepsis in the parliamentary and health service ombudsman report, Time to Act⁶.

4.2.4 Resource impact assessment

The “think sepsis” approach recommended in the guideline may result in increased referrals from outside of hospital settings if people with a potential infection are recommended to seek urgent care. This change could lead to additional A&E attendances and urgent ambulance calls.

Any increase in activity would lead to additional costs across the healthcare system. The rapid identification of sepsis is likely to mean reduced mortality and morbidity, leading to offsetting savings.

⁵ National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

⁶ Parliamentary and Health Service Ombudsman (2013). [Time to act Severe sepsis: rapid diagnosis and treatment saves lives](#)

4.3 *Managing and treating suspected sepsis in acute hospital settings*

4.3.1 Summary of suggestions

Use of intravenous fluid

Stakeholders suggested early intervention with fluids can help to restore cardiovascular stability for high risk patients.

Senior clinician review

Stakeholders highlighted that management of people with suspected or confirmed sepsis should be reviewed by a senior clinical decision maker. This will ensure appropriate treatment and tests are authorised.

4.3.2 Selected recommendations from development source

Table 6 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 6 to help inform the committee's discussion.

Table 6 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Use of intravenous fluid	Intravenous fluids in people with suspected sepsis NICE NG51 Recommendations 1.8.1 to 1.8.8
Senior clinician review	Managing and treating suspected sepsis in acute hospital settings 1.6.1, 1.6.10, 1.6.14, 1.6.16, 1.6.25, 1.6.29, 1.6.31, 1.6.41 and 1.6.45

Use of intravenous fluid

NICE NG51 Recommendation 1.8.1

If patients over 16 years need intravenous fluid resuscitation, use crystalloids that contain sodium in the range 130–154 mmol/litre with a bolus of 500 ml over less than 15 minutes.

NICE NG51 Recommendation 1.8.2

If children and young people up to 16 years need intravenous fluid resuscitation, use glucose-free crystalloids that contain sodium in the range 130–154 mmol/litre, with a bolus of 20 ml/kg over less than 10 minutes. Take into account pre-existing conditions (for example, cardiac disease or kidney disease), because smaller fluid volumes may be needed.

NICE NG51 Recommendation 1.8.3

If neonates need intravenous fluid resuscitation, use glucose-free crystalloids that contain sodium in the range 130–154 mmol/litre, with a bolus of 10–20 ml/kg over less than 10 minutes.

NICE NG51 Recommendation 1.8.4

Reassess the patient after completion of the intravenous fluid bolus, and if no improvement give a second bolus. If there is no improvement after a second bolus alert a consultant to attend.

NICE NG51 Recommendation 1.8.5

Use a pump, or syringe if no pump is available, to deliver intravenous fluids for resuscitation to children under 12 years with suspected sepsis who need fluids in bolus form.

NICE NG51 Recommendation 1.8.6

If using a pump or flow controller to deliver intravenous fluids for resuscitation to people over 12 years with suspected sepsis who need fluids in bolus form ensure device is capable of delivering fluid at required rate for example at least 2000 ml/hour in adults.

NICE NG51 Recommendation 1.8.7

Do not use starch based solutions or hydroxyethyl starches for fluid resuscitation for people with sepsis. [This recommendation is adapted from NICE's guidelines on [intravenous fluid therapy in adults in hospital](#) and [intravenous fluid therapy in children and young people in hospital](#).]

NICE NG51 Recommendation 1.8.7

Consider human albumin solution 4–5% for fluid resuscitation only in patients with sepsis and shock. [This recommendation is adapted from NICE's guideline on [intravenous fluid therapy in adults in hospital](#)

Senior clinician review

NICE NG51 Recommendation 1.6.1

CONFIDENTIAL

For adults, children and young people aged 12 years and over who have suspected sepsis and 1 or more high risk criteria:

- arrange for immediate review by the senior clinical decision maker⁷ to assess the person and think about alternative diagnoses to sepsis

NICE NG51 Recommendation 1.6.10

For adults, children and young people aged 12 years and over with suspected sepsis who meet 2 or more moderate to high risk criteria, have lactate of less than 2 mmol/litre, no evidence of acute kidney injury⁸ and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker⁷ within 3 hours of meeting 2 or more moderate to high risk criteria in an acute hospital setting for consideration of antibiotics.

NICE NG51 Recommendation 1.6.14

For adults, children and young people aged 12 years and over with suspected sepsis who meet only 1 moderate to high risk criterion, have lactate of less than 2 mmol/litre, no evidence of acute kidney injury⁸ and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker⁷ within 3 hours of meeting moderate to high criterion in an acute hospital setting for consideration of antibiotics.

NICE NG51 Recommendation 1.6.16

For children aged 5–11 years who have suspected sepsis and 1 or more high risk criteria:

- arrange for immediate review by the senior clinical decision maker⁹ to assess the child and think about alternative diagnoses to sepsis

⁷ A 'senior clinical decision maker' for people aged 18 years or over should be someone who is authorised to prescribe antibiotics, such as a doctor of grade CT3/ST3 or above or equivalent, such as an advanced nurse practitioner with antibiotic prescribing responsibilities, depending on local arrangements. A 'senior decision maker' for people aged 12–17 years is a paediatric or emergency care qualified doctor of grade ST4 or above or equivalent.

⁸ For definition of acute kidney injury, see NICE's guideline on acute kidney injury.

⁹ A 'senior clinical decision maker' for children aged 5–11 years is a paediatric or emergency care doctor of grade ST4 or above or equivalent.

NICE NG51 Recommendation 1.6.25

For children aged 5–11 years with suspected sepsis who meet 2 or more moderate to high risk criteria, have lactate of less than 2 mmol/litre, and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker⁹ within 3 hours of meeting 2 or more moderate to high risk criteria in an acute hospital setting for consideration of antibiotics.

NICE NG51 Recommendation 1.6.29

For children aged 5–11 years with suspected sepsis who meet only 1 moderate to high risk criterion, and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker⁹ within 3 hours of meeting a moderate to high risk criterion in an acute hospital setting for consideration of antibiotics.

NICE NG51 Recommendation 1.6.31

For children aged under 5 years who have suspected sepsis and 1 or more high risk criteria:

- arrange for immediate review by the senior clinical decision maker¹⁰ to assess the child and think about alternative diagnoses to sepsis (for example bronchiolitis)

NICE NG51 Recommendation 1.6.41

For children aged under 5 years with suspected sepsis who meet 2 or more moderate to high risk criteria, have lactate of less than 2 mmol/litre, and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker¹⁰ within 3 hours of meeting 2 or more moderate to high risk criteria in an acute hospital setting for consideration of antibiotics.

NICE NG51 Recommendation 1.6.45

¹⁰ A 'senior clinical decision maker' for children aged under 5 years is a paediatric qualified doctor of grade ST4 or above.

For children aged under 5 years with suspected sepsis who meet only 1 moderate to high risk criterion and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker¹⁰ within 3 hours of meeting a moderate to high risk criterion in an acute hospital setting for consideration of antibiotics.

4.3.3 Current UK practice

Use of intravenous fluid

Time to Act¹¹ identified there is variance from the standards of clinical care with shortcomings in the use of large-volume fluid therapy for basic resuscitation in 7 out of the 10 cases studies where people had died from sepsis.

When assessing the initial management of sepsis (usually in acute/general medicine) the NCEPOD¹² found that when required delivery of fluids for resuscitation was administered promptly in 83% (341/412) of cases. However reviewers also found that there was room for improvement in 45.4% of cases, with the top reason being in the documentation of fluid balance (52%). This could have affected the clinical outcome of 1 in 5 people.

Senior clinician review

Time to Act¹¹ identified there was variance from the standards of clinical care with appropriate and timely senior medical input in 6 out of the 10 cases studies where people had died from sepsis.

When assessing the appropriateness of the grade of clinician who assessed people with sepsis in the emergency department, the NCEPOD¹² found that 96% of staff who triaged were appropriate and 89% of people were reviewed by a clinician of the appropriate seniority. However the report also identified that 40% of people did not have a timely review by a senior clinician in the emergency department.

4.3.4 Resource impact assessment

The senior clinician review recommendations highlighted give the type and grade of medical staff that should see people with suspected sepsis, how quickly this should happen, and when a consultant should be brought in to discuss the case or see the

¹¹ Parliamentary and Health Service Ombudsman (2013). [Time to act Severe sepsis: rapid diagnosis and treatment saves lives](#)

¹² National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

CONFIDENTIAL

person with sepsis. The grade of senior clinical decision maker needed is different for different populations.

There may be a resource impact if current staffing levels and skill mix are not enough to meet these recommendations. This should be assessed locally. This is expected to be a particular pressure for out of hour's services at some smaller hospitals.

4.4 *Antibiotic treatment in people with suspected sepsis*

4.4.1 Summary of suggestions

Stakeholders highlighted the need to administer antibiotics in the treatment of sepsis and the use of microbiological samples to determine which antibiotics should be administered, including administering them in a timely manner. Ensuring antibiotics are prescribed can help to prevent antimicrobial resistance and improve clinical outcomes.

4.4.2 Selected recommendations from development source

Table 7 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 7 to help inform the committee's discussion.

Table 7 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Antibiotic treatment in people with suspected sepsis	Antibiotic treatment in people with suspected sepsis NICE NG51 Recommendations 1.7.2 to 1.7.13

Antibiotic treatment in people with suspected sepsis

NICE NG51 Recommendation 1.7.2

Ensure urgent assessment mechanisms are in place to deliver antibiotics when any high risk criteria are met in secondary care (within 1 hour of meeting a high risk criterion in an acute hospital setting).

NICE NG51 Recommendation 1.7.3

Ensure GPs and ambulance services have mechanisms in place to give antibiotics for people with high risk criteria in pre-hospital settings in locations where transfer time is more than 1 hour.

NICE NG51 Recommendation 1.7.4

For patients in hospital who have suspected infections, take microbiological samples before prescribing an antimicrobial and review the prescription when the results are available. For people with suspected sepsis take blood cultures before antibiotics are given.

NICE NG51 Recommendation 1.7.5

If meningococcal disease is specifically suspected (fever and purpuric rash) give appropriate doses of parenteral benzyl penicillin in community settings and intravenous ceftriaxone in hospital settings.

NICE NG51 Recommendation 1.7.6

For all people with suspected sepsis where the source of infection is clear use existing local antimicrobial guidance.

NICE NG51 Recommendation 1.7.7

For people aged 18 years and over who need an empirical intravenous antimicrobial for a suspected infection but who have no confirmed diagnosis, use an intravenous antimicrobial from the agreed local formulary and in line with local (where available) or national guidelines.

NICE NG51 Recommendation 1.7.8

For people aged up to 17 years (for neonates see recommendation 1.7.12) with suspected community acquired sepsis of any cause give ceftriaxone 80 mg/kg once a day with a maximum dose of 4 g daily at any age.

NICE NG51 Recommendation 1.7.9

For people aged up to 17 years with suspected sepsis who are already in hospital, or who are known to have previously been infected with or colonised with ceftriaxone-resistant bacteria, consult local guidelines for choice of antibiotic.

NICE NG51 Recommendation 1.7.10

For children younger than 3 months, give an additional antibiotic active against listeria (for example, ampicillin or amoxicillin).

NICE NG51 Recommendation 1.7.11

Treat neonates presenting in hospital with suspected sepsis in their first 72 hours with intravenous benzylpenicillin and gentamicin.

NICE NG51 Recommendation 1.7.12

Treat neonates who are more than 40 weeks corrected gestational age who present with community acquired sepsis with ceftriaxone 50 mg/kg unless already receiving an intravenous calcium infusion at the time. If 40 weeks corrected gestational age or below or receiving an intravenous calcium infusion use cefotaxime 50 mg/kg every 6 to 12 hours, depending on the age of the neonate.

NICE NG51 Recommendation 1.7.13

Follow the recommendations in NICE's guideline on [antimicrobial stewardship: systems and processes for effective antimicrobial medicine](#) when prescribing and using antibiotics to treat people with suspected or confirmed sepsis.

4.4.3 Current UK practice

In its key findings NCEPOD¹³ found that there was an avoidable delay in the administration of antimicrobials in 29% of cases of sepsis. The delay in the administration of antimicrobials affected the clinical outcome in 44% of these. However, the review found that the correct dose of antibiotics was prescribed in 98% of cases.

4.4.4 Resource impact assessment

The increased use of antibiotics was considered as a potential area of additional local costs in the resource impact work for [NG51](#), but was excluded because of the low unit cost of the drugs (estimated cost of broad spectrum antibiotics £5 for 7 day course). It was not identified as an area that would have a significant resource impact (>£1m in England each year).

¹³ National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

4.5 *Finding the source of infection in people with suspected sepsis*

4.5.1 Summary of suggestions

A stakeholder highlighted the importance of healthcare professionals identifying the source of infection in people with suspected sepsis to facilitate early source control such as surgical drainage.

4.5.2 Selected recommendations from development source

Table 8 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 8 to help inform the committee's discussion.

Table 8 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Finding the source of infection in people with suspected sepsis	Finding the source of infection in people with suspected sepsis NICE NG51 Recommendations 1.10.1, 1.10.2, 1.10.5, 1.10.6 and 1.10.7

Finding the source of infection in people with suspected sepsis

NICE NG51 Recommendation 1.10.1

Carry out a thorough clinical examination to look for sources of infection, including sources that might need surgical drainage, as part of the initial assessment.

NICE NG51 Recommendation 1.10.2

Tailor investigations of the sources of infection to the person's clinical history and findings on examination.

NICE NG51 Recommendation 1.10.5

Involve the adult or paediatric surgical and gynaecological teams early on if intra-abdominal or pelvic infection is suspected in case surgical treatment is needed.

NICE NG51 Recommendation 1.10.6

Do not perform a lumbar puncture without consultant instruction if any of the following contraindications are present:

- signs suggesting raised intracranial pressure or reduced or fluctuating level of consciousness (Glasgow Coma Scale score less than 9 or a drop of 3 points or more)
- relative bradycardia and hypertension
- focal neurological signs
- abnormal posture or posturing
- unequal, dilated or poorly responsive pupils
- papilloedema
- abnormal 'doll's eye' movements
- shock
- extensive or spreading purpura
- after convulsions until stabilised
- coagulation abnormalities or coagulation results outside the normal range or platelet count below 100×10^9 /litre or receiving anticoagulant therapy
- local superficial infection at the lumbar puncture site
- respiratory insufficiency in children.

NICE NG51 Recommendation 1.10.7

Perform lumbar puncture in the following children with suspected sepsis (unless contraindicated, see contraindications in recommendation 1.10.6):

- infants younger than 1 month
- all infants aged 1–3 months who appear unwell
- infants aged 1–3 months with a white blood cell count less than 5×10^9 /litre or greater than 15×10^9 /litre.

4.5.3 Current UK practice

In Time to Act¹⁴, variance from the standards of clinical care were identified with shortcomings in investigations to determine the source of infection in 6 out of the 10 cases studies where people had died from sepsis.

Only 23% of hospitals included identifying the source of infection in the care bundle or protocols for sepsis according to the NCEPOD¹⁵. The review also identified that the source of infection was documented in 46% of people at triage, but in 78% of people at a senior review. For cases where the source was not recorded there was evidence for diagnosis of source in 49% of cases at triage and 23% of cases at senior review.

¹⁴ Parliamentary and Health Service Ombudsman (2013). [Time to act Severe sepsis: rapid diagnosis and treatment saves lives](#)

¹⁵ National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

4.5.4 Resource impact assessment

This area was not included in the resource impact report for NG51. It was not identified as an area that would have a significant resource impact (>£1m in England each year).

4.6 *Information and support*

4.6.1 Summary of suggestions

Stakeholders highlighted that information is required to increase awareness of sepsis. This information should cover what symptoms to look for in the general population, information to be provided if you have had suspected but not confirmed sepsis, information if you have been discharged following a diagnosis of sepsis, and information for family members and/or carers. This information is needed to improve public awareness and because many people experience long term effects of sepsis.

4.6.2 Selected recommendations from development source

Table 9 below highlights recommendations that have been provisionally selected from the development source that may support potential statement development. These are presented in full after table 9 to help inform the committee's discussion.

Table 9 Specific areas for quality improvement

Suggested quality improvement area	Selected source guidance recommendations
Information and support	People who have sepsis and their families and carers NICE NG51 Recommendations 1.11.1 to 1.11.4 Information at discharge for people assessed for suspected sepsis, but not diagnosed with sepsis NICE NG51 Recommendations 1.11.5 and 1.11.6 Information at discharge for people at increased risk of sepsis NICE NG51 Recommendation 1.11.7 Information at discharge for people who have had sepsis NICE NG51 Recommendations 1.11.8 to 1.11.12

Information and support

NICE NG51 Recommendation 1.11.1

Ensure a care team member is nominated to give information to families and carers, particularly in emergency situations such as in the emergency department. This should include:

- an explanation that the person has sepsis, and what this means
- an explanation of any investigations and the management plan

CONFIDENTIAL

- regular and timely updates on treatment, care and progress.

NICE NG51 Recommendation 1.11.2

Ensure information is given without using medical jargon. Check regularly that people understand the information and explanations they are given.

NICE NG51 Recommendation 1.11.3

Give people with sepsis and their family members and carers opportunities to ask questions about diagnosis, treatment options, prognosis and complications. Be willing to repeat any information as needed.

NICE NG51 Recommendation 1.11.4

Give people with sepsis and their families and carers information about national charities and support groups that provide information about sepsis and the causes of sepsis.

NICE NG51 Recommendation 1.11.5

Give people who have been assessed for sepsis but have been discharged without a diagnosis of sepsis (and their family or carers, if appropriate) verbal and written information about:

- what sepsis is, and why it was suspected
- what tests and investigations have been done
- instructions about which symptoms to monitor
- when to get medical attention if their illness continues
- how to get medical attention if they need to seek help urgently.

NICE NG51 Recommendation 1.11.6

Confirm that people understand the information they have been given, and what actions they should take to get help if they need it.

NICE NG51 Recommendation 1.11.7

Ensure people who are at increased risk of sepsis (for example after surgery) are told before discharge about symptoms that should prompt them to get medical attention and how to get it.

See NICE's guideline on [neutropenic sepsis](#) for information for people with neutropenic sepsis (recommendation 1.1.1.1).

NICE NG51 Recommendation 1.11.8

CONFIDENTIAL

Ensure people and their families and carers if appropriate have been informed that they have had sepsis.

NICE NG51 Recommendation 1.11.9

Ensure discharge notifications to GPs include the diagnosis of sepsis.

NICE NG51 Recommendation 1.11.10

Give people who have had sepsis (and their families and carers, when appropriate) opportunities to discuss their concerns. These may include:

- why they developed sepsis
- whether they are likely to develop sepsis again
- if more investigations are necessary
- details of any community care needed, for example, related to peripherally inserted central venous catheters (PICC) lines or other intravenous catheters
- what they should expect during recovery
- arrangements for follow-up, including specific critical care follow up if relevant
- possible short-term and long-term problems.

NICE NG51 Recommendation 1.11.11

Give people who have had sepsis and their families and carers information about national charities and support groups that provide information about sepsis and causes of sepsis.

NICE NG51 Recommendation 1.11.12

Advise carers they have a legal right to have a carer's assessment of their needs, and give them information on how they can get this.

4.6.3 Current UK practice

Information and support

According to the NCEPOD¹⁶ among hospitals, fewer than 6% of people were provided with printed information about sepsis. However sufficient information was given to people with sepsis in 82% of cases.

¹⁶ National Confidential Enquiry into Patient Outcome and Death (2015). [Sepsis: Just say sepsis](#)

4.6.4 Resource impact assessment

This area was not included in the resource impact report for NG51. It was not identified as an area that would have a significant resource impact (>£1m in England each year).

4.7 *Additional areas*

Summary of suggestions

The improvement areas below were suggested as part of the stakeholder engagement exercise. However they were felt to be either unsuitable for development as quality statements, outside the remit of this particular quality standard referral or require further discussion by the committee to establish potential for statement development.

There will be an opportunity for the committee to discuss these areas at the end of the session on 05 January 2017.

Antimicrobial stewardship

A stakeholder felt given there is increasing resistance to antibiotics the quality standard should reflect the importance of antimicrobial stewardship. However NICE have already produced a quality standard on [antimicrobial stewardship](#) which addresses this improvement area.

Infection prevention and control

A stakeholder highlighted the need to prevent avoidable cases of sepsis in the community. The source guidance for this quality standard [Sepsis: recognition, diagnosis and early management](#) does not provide recommendations on the primary prevention of sepsis. There is also a quality standard, [infection prevention and control](#), which addresses the prevention and control of infection for people receiving healthcare in primary, community and secondary care settings.

National registry of sepsis

Stakeholders highlighted the requirement for a national registry of sepsis to improve data collection. A national registry would need to ensure GP metrics are available for performance measurement as well as improving the standardisation of coding in secondary care. The source guidance for this quality standard [Sepsis: recognition, diagnosis and early management](#) does not provide recommendations on this area, and a national registry is not within the remit of quality standards.

Neonatal sepsis

A stakeholder felt that neonatal sepsis should be included in the quality standard, given the relationship this has to mortality and morbidity, and the difference between it and paediatric sepsis. While neonatal sepsis recommendations are made within the guidance, they refer to the management of neonatal infection. The [neonatal infection](#) quality standard covers use of antibiotics to prevent and treat infection in newborn babies.

Procalcitonin testing

Stakeholders suggested that further research is needed for the use of procalcitonin testing for the diagnosis and monitoring of sepsis after NICE diagnostics guidance [DG18](#) found that there was not enough evidence to recommend that these tests are used in the NHS. NICE has already recommended further research and data collection to show the impact of adding procalcitonin testing to standard clinical practice in the NHS as part of the guidance.

Phenotype and genotype testing

A stakeholder suggested the use of phenotype and genotype testing in order to improve the precision in managing sepsis. This not currently covered by NICE guidance.

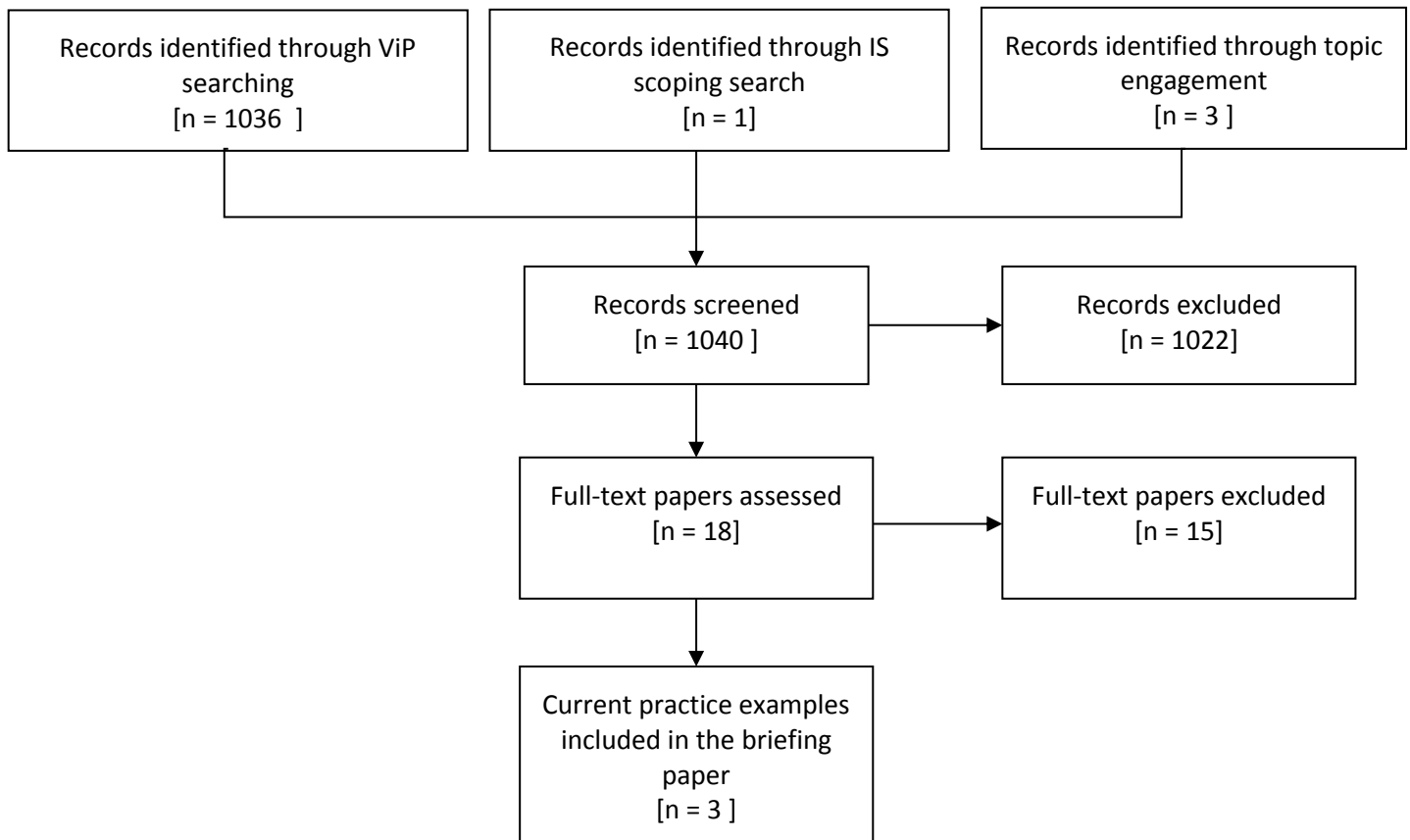
Sepsis six

Stakeholders highlighted the 'Sepsis Six' as a pathway which is fully compatible with NICE, as it covers the entire care bundle of management of sepsis. However this is not explicitly referenced in the source guidance for this quality standard [Sepsis: recognition, diagnosis and early management](#).

Training and education

Stakeholders highlighted the need for healthcare professionals to be able to promptly identify sepsis, including those who work in primary, secondary and community care. Therefore training should be provided to improve the recognition of sepsis among healthcare professionals. However training and educations are outside the remit of quality standards as it is expected all healthcare professionals involve in patient centred care will be appropriately trained.

Appendix 1: Review flowchart



Appendix 2: Suggestions from stakeholder engagement exercise – registered stakeholders

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
4.1 Identifying people with suspected sepsis					
001	All-Party Parliamentary Group on Sepsis	NEWS and improved recognition systems	The All-Parliamentary Group on Sepsis would welcome a further focus on NEWS and using this to support recognition of sepsis in patients. The APPG has been campaigning for improved recognition of sepsis, and methods that will help healthcare professionals to do this. Electronic observation and data capture systems (to trigger and review) is one aspect that is worth further scrutiny.	NG51 highlights the need to listen to patients and their relatives, evaluate for risk factors and identify patients who look unwell in seeking those at risk of sepsis. The national CQuIN on sepsis recommends that patients triggering on NEWS (or local equivalent) be screened. Health professionals in, and increasingly outside, acute Trusts are familiar with the use of NEWS and policies to escalate care rely on NEWS as a trigger.	CQuIN 2016-17 RCP NEWS publications
002	Cardiff and Vale University Local Health Board	Key area for quality improvement 1 Development of a standardised process of screening for acutely unwell patients with suspected sepsis	The true magnitude of sepsis cannot be accurately assessed without the use of standard screening tools and data collection	Failure to use a standardised approach across the NHS in all UK countries will perpetuate inaccuracies when comparing the incidence and outcomes from sepsis	2015 NCEPOD report “Just say Sepsis”
003	Cardiff and Vale University	Key area for quality improvement 2	Compliance with delivery of timely care can be shown to improve	Currently, there is significant unwarranted variation in the recognition, diagnosis and	2015 NCEPOD report “Just say Sepsis”

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
	Local Health Board	Development of a standardised approach for delivery of timely, appropriate care to high-risk (i.e. Red Flag) sepsis and septic shock, from Primary Care through to acute hospital settings	sepsis outcomes. NHS organisations need to ensure their care processes are sufficiently robust to prevent avoidable harm and death through failure to deliver timely, appropriate care to high-risk sepsis patients	management of high-risk sepsis patients. This is unacceptable.	NICE guidance NG51 UK Parliamentary and Health Service Ombudsman reports on sepsis 2013
004	Faculty of Intensive Care Medicine/Intensive Care Society Joint Standards Committee	Sepsis scoring and grading	The definition of sepsis changed in early 2016 with a move away from the previous SIRS / SEPSIS definition	Any new framework needs to be clear about which definition is being used going forward. There is a potential for confusion with the older system as this still appears in most teaching and texts.	The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) JAMA 2016: 315;801-810
005	Intensive Care National Audit & Research Centre (ICNARC)	Public/primary care awareness of sepsis	Some evidence that some cases of sepsis may be preventable	https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf	
006	Intensive Care National Audit & Research Centre (ICNARC)	Early recognition of sepsis (particularly in patients on hospital wards)	Acute hospital (and longer-term) mortality associated with severity of sepsis (number/type of organ dysfunctions associated with infection)	http://journals.lww.com/ccmjjournal/Abstract/publishahead/Differences_in_Impact_of_Definitinal_Elements_on.96880.aspx_using_data_from_national_clinical_audit_of_adult_critical_care	National Early Warning Score (NEWS) encompasses quick Sequential Organ Failure Assessment (qSOFA) promoted for early recognition of sepsis (note: qSOFA requires further validation)

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					[ICNARC currently audits high risk sepsis admissions to critical care units from the ward to identify potential issues with recognition on the ward]
007	RCGP	Improved recording of physiological variables when decision making.	NICE CG 51 uses a basket of physiological variables in addition to other signs and symptoms to guide decision making in patients with infection. Measurement of physiological variables needs to become part of patient assessment and better recorded. (SS)	NCEPOD1 notes that GP recording of vital signs is poorly documented. This was also the conclusion of a short presentation at RCGP conference (Lee 2016) (SS)	Prehospital vital signs recorded by GPs Vital signs Temperature 26%, BP 25%, Pulse 31%, Respiratory Rate 6%, (SS)
008	RCN	Key area for quality improvement 2 Recognition of different models used by different organisations	The NICE guidelines needs to continue to recognise that different models are used by different organisations to recognise sepsis - this must be taken into account in a national guideline to enable effective implementation.	A number of different models are in place across the UK to identify and measure sepsis with local adaptation occurring. This needs to be recognised and the broad principles adopted in the guideline	Please see NICE Guidelines NG51: Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
009	RCN	Key area for quality improvement 3 Assessment of sepsis using standardised approach	The new definition of sepsis means that identifying sepsis should be clear. However Quick Sepsis Related Organ Failure Assessment (qSOFA) has been suggested but it is not being implemented as standard. An adaption of the National Early Warning Score (NEWS) chart may be the way forward in terms of escalating to the appropriate person.	NEWS has been implemented into acute trusts since its production in 2012. It would be relatively simple to action this and it would avoid separate papers and further education and training. Minimal input would be required. A similar approach in using the Paediatric Early Warning Signs (PEWS) documents should also be considered.	In the NCEPOD study it was found that the use of a screening tool such as NEWS was associated with fewer delays in identifying severe sepsis. As NEWS should be the first tool used in the acutely ill adult this could lead onto a set of actions. http://www.ncepod.org.uk/2015sepsis.html
010	SCM1	Key area for quality improvement 2 Structured sets of observations	Structured observations have been recommended by NICE Sepsis to stratify risk in patients with possible sepsis. Structured sets of observations help in the identification of sick patients, and those who are deteriorating. Can also help to prioritise the urgency of care	It is not common practice for GPs to take full sets of observations NCEPOD found on review of cases seen by GPs that in 1/3 not one of temperature, pulse, BP and respiratory rate were recorded In Time to Act concerns raised re the adequacy of clinical assessment in primary care	NICE Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51 NCEPOD recommendation http://www.ncepod.org.uk/2015sepsis.html Royal College Physicians NEWS https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					Improving Outcomes for Patients with Sepsis https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf Ombudsmans Report: Time to Act http://www.ombudsman.org.uk/__data/assets/pdf_file/0004/22666/FINAL_Sepsis_Report_web.pdf
011	SCM1	Key area for quality improvement 3 Immunisation preventing infection	Flu kills pregnant patients due to the changes in the immunological status. MBRRACE-UK (Mothers and Babies: reducing risks through audits and confidential enquiries across the UK) in 2014 of women who had died in pregnancy, almost a quarter had died from sepsis and 1:11 had died from flu. Estimated more than half of these women's deaths could have been prevented by flu jab Rapid rise in Men W recently and	Sepsis is one of the most common causes of death in pregnancy Women who are pregnant, have given birth or had a termination of pregnancy or miscarriage in the past 6 weeks are in a high risk group for sepsis. Women who are pregnant still die from flu Recent increase in meningitis W but poor uptake of men ACWY in teenagers	NICE Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51 PHE: Guidance on the prevention and management of meningococcal meningitis and septicaemia in higher education institutions https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/5

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			particularly virulent (PHE report Nov 2016)		65770/PHE_10023_MenA CWY_HEI_Guidelines_13_WEB.pdf MBRACE report; link to report and govt recommendations https://www.gov.uk/government/news/report-reveals-36-women-died-from-flu-in-3-years RCOG Bacterial Sepsis in Pregnancy https://www.rcog.org.uk/globalassets/documents/guidelines/gtg_64a.pdf Improving Outcomes for Patients with Sepsis https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf
012	SCM1	Additional developmental areas of emergent practice	NEWS: National Early Warning Scores are commonly used in secondary care but more	Use across all health care settings has been recommended by the Royal College of Physicians. Research Recommendation by NICE	NICE Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			evidence needs to be found to support their use out of hospitals		Royal College Physicians NEWS https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news
013	SCM3	Key area for quality improvement 1 Recognition of sepsis in primary care, walk in centres and other community settings	Sepsis is difficult to diagnose with certainty. Although people with sepsis may have a history of infection, fever is not present in all cases. The signs and symptoms of sepsis can be very non-specific and can be missed if clinicians do not think 'could this be sepsis?'.		
014	SCM3	Key area for quality improvement 2 Recognition of sepsis in EDs and MAUs	To reduce avoidable deaths, people with sepsis need to be recognised early and treatment initiated. Healthcare workers should consider sepsis as an immediate life-threatening condition that should be recognised and treated as an emergency		
015	SCM3	Key area for quality improvement 3 Recognition of sepsis in hospitalised in patients	To reduce avoidable deaths, people with sepsis need to be recognised early and treatment initiated. Healthcare workers should consider sepsis as an immediate life-threatening		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			condition that should be recognised and treated as an emergency		
016	SCM4	Key area for quality improvement 2	Recognition of Sepsis using diagnostic markers in suspected cases.	The UK Parliamentary and Health Ombudsman inquiry 'Time to Act' found failures in the recognition of sepsis in those who died from this process	The non-specific signs and symptoms of sepsis undoubtedly contributes to the late recognition of patients who may have sepsis. The targeted use of appropriate diagnostic markers will help to identify patients at an earlier stage and may allow better detection of the condition and subsequent earlier treatment.
017	SCM5	SEPSIS SCREENING TOOL	Since the publication of the International Sepsis Definition (Singer et al 2016) and the NICE Sepsis Guidelines, there are currently a lot of confusion and variation on how sepsis is screened in clinical practice.	There is a need for a standardised approach to screening patients for sepsis. Health Education England Report (2016) suggests lack of training and education for health care professionals. There are also issues around recognition of sepsis both in primary and secondary care (NCEPOD 2015). Having variation in processes between hospitals/trusts creates more challenges and confusion. Furthermore, the generalisability of audit and research also becomes questionable and difficult to	Health Education England (2016) Getting it right: The current state of sepsis education and training for healthcare staff across England NCEPOD (2015) Just say Sepsis Report

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				interpret when different approaches have been undertaken to detect sepsis.	
018	SCM5	Key area for quality improvement 2 Inclusion of NEWS SCORE for sepsis screening	Early warning scores are calculated when observations are taken routinely in hospitals. There is a drive for standardised national early warning system to detect deteriorating patients. NEWS is widely used and envisaged to be the system used in both primary and secondary care nationally.	This will help standardise the process nationally. The education and training received by staff will be transferable when they move to different hospital/trust. This will also help improve communication between or within primary and secondary care.	NCEPOD (2015) Just say Sepsis Report Royal College of Physicians (2012) National Early Warning Score: Standardising the assessment of acute-illness severity in the NHS
019	The UK Sepsis Trust	NEWS	The UKST would recommend a further focus on NEWS.	NG51 highlights the need to listen to patients and their relatives, evaluate for risk factors and identify patients who look unwell in seeking those at risk of sepsis. The national CQuIN on sepsis recommends that patients triggering on NEWS (or local equivalent) be screened. This therefore is a good area to focus on as a key area for improvement.	CQuIN 2016-17 RCP NEWS publications
4.2. Managing suspected sepsis outside acute hospital settings					
020	RCGP	Out of Hospital systems	There are numerous reports of poor identification and communication regarding the patient sick with sepsis. We know that for those with septic	NCEPOD1, Ombudsman reports ^{2,3} and Case reviews ⁴ all identify elements where communication between GPs identifying sepsis and hospital/ ambulance service has been poor. This has contributed to delay in individuals receiving care.	Currently there is no evidence that improved communication and systems for communicating concern regarding sepsis patients

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			shock antibiotic and fluid therapies are time critical (SS)	Consideration for use of C reactive protein measurements in primary and community care. Currently some GP practices are using CRPs to help make the decision to use antibiotics (SS)	delivers better outcomes but that it is involved in poor outcomes seems to be a message from the numerous reports. NICE supporting the development of pathways of care for people with potential sepsis could be extremely valuable. (SS)
021	SCM1	Key area for quality improvement 4 Improve handover of care of patients between various health settings	NICE Sepsis recommends all people with suspected sepsis outside acute hospital should be referred for emergency medical care by the 'most appropriate means of transport. NICE sepsis also recommends a 'pre alert of secondary care when any high risk criteria are met in a person with suspected sepsis outside of an acute hospital	The treatment of sepsis is time critical so effective handover will facilitate management NCEPOD found that only 6% of cases they examined were pre alerts sent to hospital The Ombudsman found evidence of poor communication between teams affecting patient care	NICE Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51 NCEPOD recommendation http://www.ncepod.org.uk/2015sepsis.html Improving Outcomes for Patients with Sepsis

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf Ombudsmans Report: Time to Act http://www.ombudsman.org.uk/__data/assets/pdf_file/0004/22666/FINAL_Sepsis_Report_web.pdf
4.3 Managing and treating suspected sepsis in acute hospital settings					
022	Newcastle upon Tyne Hospitals NHS Foundation Trust	Senior clinician review.	To ensure delivery of the Sepsis 6 and improve the fluid management of patients.	Over resuscitation has been associated with poor outcomes.	
023	SCM2	Key area for quality improvement 1	Hospital setting Recommendation 1.6.1 (and for all age ranges) Arrange for immediate review by senior clinical decision maker to assess those who meet high risk criteria	To ensure that high risk patients are reviewed promptly and appropriate treatment/tests authorised.	
024	SCM2	Key area for quality improvement 3	Hospital setting Recommendation 1.6.2 (and for all age ranges) Give iv fluid without delay within 1 hour	To ensure appropriate treatment for sepsis and to see how patients respond to fluid resuscitation.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			of identifying they meet any high risk criteria in hospital setting		
025	SCM4	Key area for quality improvement 4	Time to restore cardiovascular stability in patients with septic shock. Administration of fluids and vasopressors in appropriate patients to restore cardiovascular stability.	The UK Parliamentary and Health Ombudsman inquiry 'Time to Act' found failures in the treatment of sepsis in those who died from this process. Sepsis is a condition that can compromise cardiovascular stability and oxygen delivery leading to multi-organ failure and death. Early interventions to re-establish cardiovascular stability would seem to improve outcome for these high risk patients.	NICE Sepsis NG51. Evidence for improved outcomes in patients who are hypotensive or have hyperlactatemia (Lactate >2). The Royal College of Emergency medicine original National Sepsis Audit (2011/12) demonstrated significant shortfalls and delays in recognising patients with sepsis presenting to the emergency department in UK hospitals. www.rcem.ac.uk
4.4 Antibiotic treatment in people with suspected sepsis					
026	All-Party Parliamentary Group on Sepsis	Blood cultures	The All-Party Parliamentary Group is aware that blood cultures are an important part of the Sepsis Six and are referenced within the NICE Guideline on	Best practice taking of blood cultures will improve sepsis treatment and ensure patients receive the best care. There is wide	UKST blood culture toolkit

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			Sepsis. Best practice blood culture use will also help reduce the use of broad spectrum antibiotics, linking into work on appropriate sepsis recognition and treatment as well as the wider AMR strategy.	variation in practice and awareness of best practice in hospitals.	
027	Intensive Care National Audit & Research Centre (ICNARC)	Prompt, effective resuscitation and treatment of sepsis	Improved outcomes observed over time [Note: effective resuscitation and treatment e.g. appropriate antibiotic use]	Data from national clinical audit of adult critical care reveal improvements in outcome over time but potential for further improvements when compared internationally.	http://journals.lww.com/ccmjournal/Abstract/publishahead/Differences_in_Impact_of_Definitional_Elements_on.96880.aspx [ICNARC currently audits hospital mortality for all sepsis admissions to critical care]
028	NCD		The importance of prompt treatment for sepsis aligned to the work on AMR - so "Start smart, then focus". This is detailed in the 2017-19 CQUIN on Reducing the impact of serious infections. It also fits with the new national initiative to reduce bloodstream infections announced by the Secretary of State last week.		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
029	Newcastle upon Tyne Hospitals NHS Foundation Trust	Microbiology review.	As above.	To reduce prolonged courses of broad spectrum antibiotics.	
030	Quinolone Toxicity Support UK	Key area for quality improvement 1: 1.6.1. give a broad-spectrum antimicrobial at the maximum recommended dose without delay ...in line with recommendations in section 1.7	The fluoroquinolone group has a mechanism of action that is unique among the broad-spectrum antibiotics. Section 1.7 and the anti-microbial stewardship section need to warn against using this particular group except in extreme life and death cases.	The fluoroquinolone group of broad-spectrum antibiotics are eukaryotic DNA gyrase and topoisomerase inhibitors very similar to many antineoplastic agents and thus share similar toxicity profiles (1). They disrupt mitochondrial DNA (and therefore mitochondrial function) and energy production; cause oxidative injury and cellular death (2); deplete magnesium and disrupt cellular enzymatic function(3.) and probably inhibit or disrupt the CNS GABA receptor.(4).	1). http://www.ncbi.nlm.nih.gov/pubmed/8913349 "Delayed Cytotoxicity and Cleavage of Mitochondrial DNA in Ciprofloxacin-Treated Mammalian Cells" published in Molecular Pharmacology in 1996. Lawrence et al. 2). Simonin MA etal. Pefloxacin-Induced Achilles Tendon Toxicity in Rodents: Biochemical Changes in Proteoglycan Synthesis and Oxidative Damage to CollagenAntimicrobial Agents and Chemotherapy, April 2000, p. 867-872, Vol. 44, No. 4 3.) Stahlmann R. etal; Effects of magnesium deficiency on joint

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					cartilage in immature Beagle dogsimmunohistochemistry, electron microscopy, and mineral concentrations, Archives of Toxicology. Jan. 2000 73(11,12) 4). De Sano A. etal; Adverse Reactions to Fluoroquinolones. An Overview on Mechanistic Aspects Current Medicinal Chemistry 2001, 8, 371-384 371
031	Quinolone Toxicity Support UK	Key area for quality improvement 2: 1.7.2 Ensure urgent assessment mechanisms are in place to deliver antibiotics ... (Also) 1.7.3 Ensure GPs and ambulance services have mechanisms in place to give antibiotics ...	As in improvement 1., out-of-hospital professionals need to be aware that a fluoroquinolone antibiotic should not be used at this stage. Because of the toxicity profiles outlined in improvement 1 above, other effective broad-spectrum antibiotics should always be used. The fluoroquinolone group should be reserved for absolute life or death cases where there is no other alternative.	The lack of immediate side effects or adverse reactions has led to a complacency in the medical profession about the dangers of fluoroquinolones. The 'lottery' of who might be affected and when, can in part be explained by whether a patient has previously been exposed to a fluoroquinolone, or another fluoride or fluorine containing drug. Also, whether a person already has a compromised immune system may make a difference. Some people seem to be able to tolerate many courses of a fluoroquinolone	For example, my husband has MS and has suffered many CAUTIs over the years. He was given Ciprofloxacin on one occasion (2 x 500mg daily for 7 days) and after 5 tablets begged me not to give him any more because of agonising all-over pain. I read the PIL and was alarmed at the words 'tendon rupture'. I then searched the Internet and found what he was

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				yet others may become severely ill after just a few tablets.	experiencing wasn't unusual and may get much worse. I also realised he'd had a full 7 day course about 8 months previously with no ill effects. He had experienced a urosepsis episode the year before (woke up vomiting old blood) which was successfully treated with Co-Amoxyclav and gentimycin. I had never heard of fluoroquinolones until he was so badly affected. We had certainly never been warned about them by a medical professional. Hundreds of similar stories of how people found themselves damaged after being given a fluoroquinolone at home or in A&E can be found on Internet support sites (e.g. https://floxiehope.com or www.quintoxsupport.co.uk

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					)
032	Quinolone Toxicity Support UK	Key area for quality improvement 3: 1.7.4 For patients in hospital who have suspected infections, take microbiological samples before prescribing an antimicrobial and review the prescription when the results are available. For people with suspected sepsis take blood cultures before antibiotics are given. And:- from Antimicrobial Stewardship 1 Recommendations 1.1.31 Prescribers should take time to discuss with the patient and/or their family members or carers (as appropriate) (4).	It's very important that microbiological samples are taken to establish which antimicrobial will be the best option. It's also very important that prescribers DO take the time to discuss the options with the patient or their representative. If a fluoroquinolone is deemed to be the best antibiotic to give in the circumstances, then the prescriber MUST be fully aware of the long term damage which may possibly follow immediately or later. The prescriber must also take the time to advise the patient of these possible dangers to enable the patient to make informed decisions about their care (4).	The FDA in the USA have recently (25th July 2016) announced that "It's important that both health care providers and patients are aware of both the risks and benefits of fluoroquinolones and make an informed decision about their use." (1.). This decision followed a high profile inquiry (Nov 5th 2015) at which about 35 sufferers of Fluoroquinolone Toxicity Syndrome gave testimonial evidence. (2). Earlier in the year (May 12, 2016), a drug safety communication was issued advising that fluoro-quinolones should be reserved for certain conditions only when there are no other options available due to potentially permanent, disabling side effects which can occur simultaneously(3).	1). http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm513183.htm Also detailed view at http://www.fda.gov/Safety/MedWatch/SafetyInformation/ucm515122.htm plus next pages. 2). http://www.fda.gov/AdvisoryCommittees/Calendar/ucm465275.htm also: http://www.medscape.com/viewarticle/854067 3). http://www.fda.gov/Drugs/DrugSafety/ucm500143.htm 4). https://www.nice.org.uk/about/nice-communities/public-involvement/your-care

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
033	Quinolone Toxicity Support UK	Additional developmental areas of emergent practice: From anti-microbial stewardship: 1.1.35 When a decision to prescribe an antimicrobial has been made, take into account the benefits and harms for an individual patient associated with the particular antimicrobial...	The immediate benefits of giving a fluoroquinolone, which can effectively counter most bacteria, must be considered against the long-term danger that the patient's life may well be later ruined by the delayed manifestation of toxic effects.	The FDA announcement also draws attention to the fact that "... the risk of these serious side effects generally outweighs the benefits .." and I repeat that they say "It's important that both health care providers and patients are aware of both the risks and benefits of fluoroquinolones and make an informed decision about their use." (1).	1). http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm513183.htm also: http://www.fda.gov/Drugs/DrugSafety/ucm511530.htm
034	SCM1	Key area for quality improvement 5 Microbiological samples should be taken before the administration of antibiotics	Cultures of microbiological specimens can facilitate the use of narrow spectrum antibiotics NICE recommend the consideration of urine analysis and Chest XR in all people with suspected sepsis	Antibiotic stewardship However not appropriate in all cases eg if meningococcal disease suspected or if transfer to hospital will take over 1 hour	NICE Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51 NICE antimicrobial stewardship https://www.nice.org.uk/guidance/QS121/chapter/Quality-statement-4-Microbiological-samples Improving Outcomes for Patients with Sepsis https://www.england.nhs.uk/wp-

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf
035	SCM2	Key area for quality improvement 2	Recommendation 1.6.1 (and for all age ranges) Give broad spectrum antimicrobial within 1 hour of identifying they meet any high risk criteria in hospital setting 1.7.3 Ensure GPs and ambulance services have mechanisms in place to give antibiotics for people with high risk criteria in pre-hospital settings in locations where transfer time is more than 1 hour.	To ensure prompt treatment for sepsis. The patient may have developed sepsis many hours previously, which is why it is important that the antibiotics are given quickly once in hospital (or on transfer to hospital if longer than an hour)	
036	SCM3	Key area for quality improvement 4 Administration of intravenous antibiotics within 1 hour of diagnosis of sepsis	For each hour delay in administering antibiotics in septic shock, mortality increases by 7.6%	There is a balance between the need to recognise and treat sepsis early and the need to avoid widespread antimicrobial resistance	Effective antimicrobial administration within the first hour of documented hypotension was associated with increased survival to hospital discharge in adult patients with septic shock Kumar A, Crit care Med 2006 Delayed administration of initial and first appropriate antimicrobial therapy beyond 3 hours from

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					recognition of severe sepsis and septic shock were independent risk factors for mortality in pediatric patients. Although we were not able to affirm the Surviving Sepsis Campaign recommendation to administer empiric antimicrobials within 1 hour of recognition of severe sepsis or septic shock in this pediatric cohort, it is evident that delays (> 3 hr) should be avoided. Weiss Crit care med 2014
037	SCM4	Key area for quality improvement 3	Time to antibiotic administration in patients with high risk of death from sepsis.	The NICE GDG reviewed the evidence for early intervention with antibiotics in patients with sepsis and septic shock. The evidence suggests that sepsis is a time sensitive condition with early intervention leading to better outcomes in patients with 'high risk' sepsis. Early administration of antibiotics is one of the key interventions for improving outcome from sepsis and septic shock. Studies from European studies support the critical time sensitive nature of this intervention.	NICE Sepsis NG51. Evidence for early administration of antibiotics. The Royal College of Emergency medicine original National Sepsis Audit (2011/12) demonstrated significant shortfalls and delays in recognising patients with

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					sepsis presenting to the emergency department in UK hospitals. www.rcem.ac.uk
4.5 Finding the source of infection in people with suspected sepsis					
038	SCM4	Key area for quality improvement 5	Appropriateness and timeliness of imaging in patients with Sepsis to facilitate early source control. As part of the initial assessment in a patient with suspected sepsis it is recommended that clinicians look for a source of infection, including sources that might need surgical drainage.	The UK Parliamentary and Health Ombudsman inquiry 'Time to Act' found failures in the recognition and treatment of sepsis in those who died from this process.	NICE Sepsis NG51. Source of Infection.
4.6 Information and support					
039	Cardiff and Vale University Local Health Board	Key area for quality improvement 3 Development of support services for sepsis survivors with Post-Sepsis Syndrome	Post-Sepsis Syndrome affects 20% of survivors, but there is little in the way of awareness of the problem by health professionals. There is scant provision for the support and care of people with this syndrome, resulting in delays and failures to return to appropriate functional status. This can prevent people from returning to work, etc.	By supporting sepsis survivors, they can be restored to an appropriate functional status sooner. This will reduce future demands on NHS resources and state support for ongoing disability, while potentially enabling earlier return to work where appropriate.	UK Sepsis Trust http://sepsistrust.org/public/recovering-from-sepsis/ ICU Steps https://icusteps.org/home/nice-sepsis-guidelines

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
040	Intensive Care National Audit & Research Centre (ICNARC)	Longer-term sequelae of sepsis	Evidence suggests that sepsis continues to impact survival (and quality of survival), longer-term, potentially for many years	http://www.hqip.org.uk/resources/sepsis-patients-risk-ncepod-2015-report/	- [Resources permitting: record linkage of HES to the national clinical audit of adult critical care - co-ordinated by ICNARC - would enable longer-term survival for all sepsis admissions to critical care to be regularly audited] ad hoc audit of the quality of survival of sepsis admissions to critical care could be established]
041	NCD		Giving parents info about sepsis 'routinely' - there are strong calls from bereaved families to include info on sepsis in the woman-held maternity records and in the parent-held 'red book' (and electronic equivalent) on child health. Three areas in the South have put this in. It would be great if it were standardised across the country. I believe CCGs have the final say in what goes into these in their locality. NHS England South West have the details about this, and the info leaflet was developed by them with the family		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			of a deceased child and with the UK Sepsis Trust. The original leaflet was called SAM after the child who died. It was then adapted with UK Sepsis TRust into one called (I think) Spotting Serious Illness in Children.		
042	NCD		Where someone has been assessed for sepsis and thought not to have it e.g. a child with a fever who has no red or amber flag criteria, to routinely use safety-netting by giving information to the patient/parents either in writing or electronically. System1, one of the GP software systems, has a pop-up about sepsis when a GP starts to enter relevant info, and enables the GP to download and print a safety-netting leaflet, or give the parents access to it electronically via a QR reader. This should be systematic for all GPs.		
043	Newcastle upon Tyne Hospitals NHS Foundation Trust	Patient information.	Leaflets in primary and secondary care to increase awareness of the symptoms of Sepsis, what to look out for if discharged with possible infection and what to expect		Patient leaflet following Sepsis has been a standard suggested by the NCEPOD report 2016.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			following discharge with confirmed Sepsis.		
044	Quinolone Toxicity Support UK	Key area for quality improvement 4: Information at discharge for people who have had sepsis 1.11.9 Ensure discharge notifications to GPs include the diagnosis of sepsis.	If a fluoroquinolone antibiotic has been used, then the information given to GPs should include warnings to be alert for ADRs manifesting themselves over the next few months. These can include any of the side effects listed on the SmPC but are most often associated with tendon and muscle pain, headaches and anxiety, gastric and neuropathy symptoms.	The above toxicity profiles affect patients at a cellular level long after the drug has left the body. This leads to the common occurrence of ADRs presenting up to months after the antibiotic was given. Also, ADRs usually present as several symptoms occurring together(1). It's not difficult to see that many doctors (and patients) never associate the ADRs with the fluoroquinolone and so under-reporting is a huge problem (2). MHRA drug analysis prints (3). show ADR reports for fluoroquinolones at Aug 21st 2016 to be 8248 with 160 fatalities. If this is only 10-15%, there may possibly be over 70,000 affected people in the country. They may have been given a diagnosis of CFS, fibromyalgia, ME, Candida etc. as their doctors have no idea what the actual cause of their symptoms could be .	1).Fluoroquinolone-induced serious, persistent, multisymptom adverse effects published BMJ 2015 http://casereports.bmj.com/content/2015/bcr-2015-209821.full Golomb et al. MHRA have confirmed that yellow card under-reporting is believed to be about 10-15% 2). "You noted in your email that you thought that reactions to ciprofloxacin may well be under-reported. I can confirm that there is a known level of 'under-reporting' for spontaneous reporting systems such as the UK's Yellow Card Scheme. It has been estimated from various surveys that only 10-15% of serious ADRs are reported". (email from MHRA to me Jan 21st

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					2016, copy available). 3). (http://www.mhra.gov.uk/drug-analysis-prints) show ADR reports for fluoroquinolones up to Aug 21st 2016 to be 8248 with 160 fatalities. This is up from 7106 ADRs with 143 fatalities on Jan 25th 2016. N.B. under reporting is believed to be around 10-15%.
045	Quinolone Toxicity Support UK	Key area for quality improvement 5: 1.11.10 Give people who have had sepsis (and their families and carers, when appropriate) opportunities to discuss their concerns.	If a fluoroquinolone antibiotic is used, then the information given to patients and their families and or carers should include warnings to be alert for ADRs manifesting themselves over the next few months. These can include any of the side effects listed on the PIL (a copy of which should be handed to the patient) but are most often associated with tendon and muscle pain, headaches and anxiety, gastric and neuropathy symptoms.	The FDA, in their July 25 th 2016 announcement, acknowledged that ADRs might not be apparent for some months(1).	1). "(The) FDA safety review found that both oral and injectable fluoroquinolones are associated with disabling side effects involving tendons, muscles, joints, nerves and the central nervous system. These side effects can occur hours to weeks after exposure to fluoroquinolones and may potentially be permanent." http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm513183 .

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					htm
046	RCN	Key area for quality improvement 4 Pathway for patients at high risk of developing sepsis	Problems in recognition of symptoms by an individual who may not have the background of the patient's condition can lead to delays in treatment.	Patients being transferred to a different clinical area within the organisation should have a 'fact sheet' about signs and symptoms to be aware of and what action needs to be taken – including contact details for health professionals with specific responsibilities for Sepsis management. Patients discharged from hospital after having invasive procedures or 'risk' procedures, should be able to access health professionals with expertise in Sepsis management for advice if vague symptoms of infection occur within a certain time frame (up to 5 days). This would be preferable than using out of hours such as NHS 111 as symptoms are vague and non- specific with early signs of infection.	www.ncepod.org.uk/2015sepsis.html Outcome can be effected in patients that delay in admission to hospital.
047	RCN	Key area for quality improvement 4 Post sepsis support	Patients discharged from hospital have a range of symptoms and problems. These range from physical issues such as hair loss and fatigue to psychological effects such as post-traumatic stress disorder (PTSD).	It is clear that there are limited services that offer support post sepsis and very little information in regard to this topic. Although there is little evidence relating specifically to sepsis there is evidence in relation to Post Intensive Care Syndrome which could be further explored in terms of what post sepsis advice and information needs to be shared with the patient and family and also with the GP services as it is	http://www.myicucare.org/Thrive/Pages/Post-intensive-Care-Syndrome.aspx http://icusteps.org/

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				the GP that is likely to see the patients for post sepsis health concerns.	
048	SCM2	Key area for quality improvement 4	1.11.15 and 1.11.17 Give people who have been assessed for sepsis but have been discharged without a diagnosis of sepsis (and their family or carers, if appropriate) verbal and written information – plus those at high risk of sepsis	Safety netting information for those discharged without diagnosis of sepsis. People who die with sepsis sometimes have sought help but the healthcare professional has not identified sepsis. Sepsis can progress very quickly. It is vital patients and families are informed about what to look for if the illness gets worse and when to seek further help.	NCEPOD Just Say Sepsis Report 2015 recommendation 6
049	SCM5	Key area for quality improvement 3 SUPPORT AND FOLLOW UP FOR PATIENTS WITH SEPSIS	Evidence suggests that there is high risk of post-traumatic stress disorder among patients who have been critically ill with sepsis. Patients also suffer from health issues such as chronic pain, fatigue, depression and deteriorating cognitive function after survival.	Although limited (36% respondent in NCEPOD, 2016), there are follow up services for patients who were admitted to Intensive Care. Such provision is not available to patients who were not admitted to ICU. Morbidity following sepsis is common and 22% patients had evidence of complications at discharge in NCEPOD (2016). Patient's own General Practitioners should also be made aware of the critical illness. There are also issues around who is most appropriate to follow up and manage these patients. Critical care team may not have adequate skills/knowledge on rehab and long term health and on the other hand, GPs may have limited understanding on critical care.	Iwashyna et al (2010) Long term cognitive impairment and functional disability among survivors of sepsis. JAMA. 304(16): 1787-1794 NICE (NG15) 2009 Rehabilitation after critical illness

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
050	SCM5	Key area for quality improvement 4 INFORMATION FOR PATIENT AND RELATIVES	Public awareness on sepsis is low and requires intervention.	Similar to points mentioned above. It is also vital particularly for patients who are at low risk to understand when to seek medical help.	
4.7 Additional areas					
051	All-Party Parliamentary Group on Sepsis	The Sepsis Six as best practice	The Sepsis Six has been proven to be an effective mechanism for treatment of sepsis and 96% of hospitals in England as well as those in 14 other countries use this pathway. Whilst the Sepsis Six is not specifically referenced in the NICE Guideline on sepsis, the pathway is set out and is fully compatible with NICE guidance. We believe that that the Sepsis Six should be highlighted in further detail in the NICE Quality Standard.	There is evidence that shows where the pathway is followed precisely lives can be saved, and whilst a large percentage of hospitals say they follow this pathway there is variation across the country as to how well this pathway is followed and it is important to highlight the Sepsis Six as best practice. The pathway is embedded in health professionals' psyche and language.	NCEPOD Report Daniels et al EMJ 2011
052	All-Party Parliamentary Group on Sepsis	Focus on healthcare professional awareness and education on sepsis – linked to sepsis leadership in hospitals	It is vital that healthcare professionals are aware of sepsis and able to quickly identify sepsis. Whilst healthcare professional awareness was referenced in the NICE Guideline the group feels	There is wide variation across England as to how quickly and well healthcare professionals are able to diagnose and treat sepsis. It is vital that this discrepancy is addressed and all healthcare professionals know to think, could this be sepsis.	NCEPOD report Parliamentary and Health Service Ombudsman report 2013

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			that this area needs a further focus. Healthcare sepsis leadership at Trusts is key and something that the APPG has been calling for for some time.	Resources are available from the UK Sepsis Trust, RCGP and HEE. Organisations should monitor levels of staff training and ensure steps are taken to improve and maintain this. Leadership is important as change need to be driven at a Trust level.	
053	All-Party Parliamentary Group on Sepsis	National registry on sepsis	The All-Party Parliamentary Group on Sepsis and the UK Sepsis Trust have been calling for a national registry on sepsis for some time. A national registry would enable better data collection on sepsis, the number of cases in England, the number of deaths and also number of survivors and the lasting effects that they live with following sepsis.	Current data collection in England, whilst it is improving, remains patchy. Without good data it is impossible to make accurate improvements and save and improve lives cost to sepsis. A national registry would help address this.	Building on research recommendation in NICE Clinical Guideline
054	British Infection Association	Key area for quality improvement 2	Antimicrobial stewardship	There is increasing resistance to antibiotics worldwide which is likely to impact upon our future antibiotic options for treatment.	This standard needs to be combined clearly with the sepsis standard to ensure the use of a sepsis standard does not inadvertently lead to increased use of antibiotics.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
055	Intensive Care National Audit & Research Centre (ICNARC)	Re-thinking sepsis	Sepsis is an heterogenous syndrome which both genotype and phenotype data indicate can potentially be divided into more homogenous groups (or individuals) yielding potential for higher precision health care	Phenotype data – http://journals.lww.com/ccmjournal/Abstract/publishahead/Differences_in_Impact_of_Definitional_Elements_on.96880.aspx	
056	NCD		Ensure all healthcare staff have education about sepsis - when to suspect it and when you do, how to get the patient properly assessed and treated promptly. Its likely the CCG Improvement Assessment Framework will include this as a standard from 2017. HEE has just published a wide range of educational materials about sepsis and UK Sepsis Trust has educational materials specifically for different clinical arenas including primary care and care homes.		
057	NCD		) Having the same approach to sepsis across a geographical patch - for example in South Central they are using the same NEWS and SBAR approach and thresholds for diagnosing sepsis across the ambulance service, the acute trusts and GP out of hours		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			services. This is important given the recent changes in sepsis definitions, the content of the recent NICE guidance and some hospitals relying on historic approaches such as using SIRS		
058	Newcastle upon Tyne Hospitals NHS Foundation Trust	Ensuring delivery of the Sepsis 6 bundle	Currently, the focus is on antibiotics administration but the evidence lies with the delivery of the entire bundle and cultures will ensure rational use of broad spectrum antibiotics. A focus on Sepsis 6 delivery would be an important recommendation and target.	Multiple audits both locally, regionally, nationally and internationally have highlighted the challenge of Sepsis 6 delivery but it has also been shown to improve outcome. There are concerns about the use of broad spectrum antibiotics and the taking of cultures as part of the Sepsis 6 will reduce this and also enable escalation in spectrum if necessary.	Antibiotic CQUIN 2016/2017.
059	RCGP	Preventing avoidable cases of sepsis in the community.		a. Long term care facilities infection control There are significant gaps in the quality of research and evidence in infection prevention in long term care facilities The focus is often on oral hygiene and less on prevention of urinary tract infections. External quality assurance of infection control standards are vital with the Care Quality Commission monitoring. b. Budgetary cuts to District nursing and Incontinence services At present there appears to be shortages of community continence services to help	www.ncbi.nlm.nih.gov/pmc/articles/PMC3627497/ .

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				patients in the community and in long term care facilities. Long term catheters or other tubes in a person's body continue to provide a constant nidus for infection. The reduction in community nursing budgets coupled with the increased care of the dying ta home are putting severe strain on the services (MH)	
060	RCGP	Preventing avoidable cases of sepsis in the community.		Continues from previous comment... c. Care support cuts in the community Austerity measures affecting local councils budgets are severely restricting the care for many people in the community and appear to be delaying home adaptations for people with a disability with the potential to increase pressure sores. 1. National vaccine shortages During this year's flu campaign there is a national shortage of both pneumococcal and shingles vaccination so that many people were unable to receive these additional vaccinations at the time of their flu jab. 2. Low uptake of flu vaccination In 2015-6 in children aged 5-6 years the overall uptake was 53.6% www.gov.uk/government/uploads/system/uploads/attachment_data/file/544542/Childhood_Influenza_Vaccination_Programme_Report_2015_2016.pdf. Flu uptake amongst	Infection Prevention in Long-Term Care: A Systematic Review of Randomized and Non-Randomized Trials www.ncbi.nlm.nih.gov/pmc/articles/PMC3627497/.

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				community health staff could be improved and coverage needs to be monitored. (MH)	
061	RCGP	GP education	GPs need to understand the important signs that relate to sepsis and the sick patient. (SS)	We know that GPs, have limited exposure to formal learning regarding sepsis and that for a number the learning is limited to hospital practice Without improved dissemination of the key signs for sepsis and sick patients identified in NICE CG51 and Sepsis 3 definitions we will reduce their impact and ability to improve timely access to sepsis care. (SS)	RCGP Survey to assess educational provision and need for sepsis recognition and management in primary care (May 2016) 36.7% of GPs had not had training in sepsis (n551) 36.8% of those trained had not had training within the last 3 years(n343) 41% of those detailing their trained had received training as part of hospital placements(n79) (SS)
062	RCGP	Audit tools and GP Metrics	Currently there are no GP metrics to measure performance in patient assessment using the NICE Guidance CG51. This makes the measurement of impact and the allocation of	Without an appropriate tool we struggle to show improvement or justify the allocation of resource	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			resources to primary care challenging. (SS)	(SS)	(SS)
063	RCN	Key area for quality improvement 1 Inclusion of neonatal sepsis	It would be helpful to include a section on neonatal sepsis. It should be recognised that this is not the same as paediatric sepsis and has differing presentation.	Neonatal sepsis is recognised as an important outcome for mortality and morbidity.	Please see NICE Guidelines NG51: Sepsis: recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51
064	Roche Diagnostics Ltd	Inclusion of Procalcitonin Testing	The current topic overview does not list Diagnostic Guidance 18 "Procalcitonin testing for diagnosing and monitoring sepsis (ADVIA Centaur BRAHMS PCT assay, BRAHMS PCT Sensitive Kryptor assay, Elecsys BRAHMS PCT assay, LIAISON BRAHMS PCT assay and VIDAS BRAHMS PCT assay)" as a key development source.	The conclusion in the aforementioned guidance was that there was not enough evidence to recommend routine use of the tests in the NHS. However, the guidance did state (section 5.64): "Base-case analyses indicate that procalcitonin testing with standard clinical practice dominates standard clinical practice alone for all populations, that is, it was both cost saving and more effective." Furthermore, section 5.65 states "The cost savings ranged from £368 for children with suspected bacterial infection presenting to the emergency department (lower clinical extreme) to £3268 for adults with confirmed or highly-suspected sepsis in an intensive care unit setting (lower clinical extreme)."	NICE Diagnostic Guidance 18: https://www.nice.org.uk/guidance/dg18 Recent evidence supports the use of procalcitonin testing e.g. Tran, N., Lima K., Caynak R., et al. Evaluation of procalcitonin-directed treatment of sepsis in paediatric intensive care patients. Critical Care Medicine 2016; 44 (12) (Suppl. 1): 422 Watanabe, Y., Oikawa, N., Hariu, M., et al. Ability of procalcitonin to diagnose

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
					bacterial infection and bacteria types compared with blood culture findings. International Journal of General Medicine 2016; 9: 325–331. http://doi.org/10.2147/IJG.M.S115277 The following NHS centres (shared commercially in confidence) can provide more advice on the use of procalcitonin testing to support sepsis diagnosis: Manchester Royal Infirmary Biochemistry Section Clinical Science Bld2 Hywel Dda University Health Board Igor Otahal, ITU Consultant - igor.otahal@wales.nhs.uk Sian Hancock, Consultant Clinical Scientist - sian.hancock@wales.nhs.uk
065	SCM1	Key area for quality improvement 1	Sepsis may present with very non specific and non localised	NICE recommend that all health care staff and students involved in assessing patients'	NICE Sepsis: recognition, diagnosis and early

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
		Earlier recognition of sepsis: education	symptoms with no temperature so awareness needs to be raised. It can be difficult to diagnose with certainty and clinicians need to 'think sepsis' Over 70% of cases of sepsis are thought to arise in community so primary care has significant role. Safety netting also important both written and verbal as sepsis may develop over time	clinical condition are given regular, appropriate training in identifying patients who might have sepsis NCEPOD 'Just Say Sepsis' 2015 highlighted sepsis as a major cause of avoidable death Impact on NHS of long hospital admissions; if sepsis can be diagnosed earlier would hope that admissions shorter and less likely to need intensive care	management https://www.nice.org.uk/guidance/ng51 NCEPOD 'Just Say Sepsis' http://www.ncepod.org.uk/2015sepsis.html Improving Outcomes for Patients with Sepsis https://www.england.nhs.uk/wp-content/uploads/2015/08/Sepsis-Action-Plan-23.12.15-v1.pdf
066	SCM2	Key area for quality improvement 5	Training: 1.12.1 Ensure all healthcare staff and students involved in assessing people's clinical condition are given regular, appropriate training in identifying people who might have sepsis. This includes primary, community care and hospital staff including those working in care homes. 1.12.2 Ensure all healthcare professionals involved in triage or early management are given regular appropriate training in	It is difficult to identify patients with sepsis, which is why it is vital that all healthcare professionals are trained in sepsis identification.	NCEPOD Just Say Sepsis Report 2015 recommendation 2

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			identifying, assessing and managing sepsis.		
067	SCM3	Key area for quality improvement 5 Review by a senior doctor within 2-4 hours	Suboptimal healthcare delivery significantly reduces the likelihood of survival in children with meningococcal disease. Improved training of medical and nursing staff, adherence to published protocols, and increased supervision by consultants may improve the outcome for these children and also those with other life threatening illnesses.		Ninis N, BMJ 2005
068	SCM4	Key area for quality improvement 1	Improved recognition of 'sepsis' as a clinical entity by clinical staff on both the general wards and emergency departments. Time to recognition is key to delivering time critical interventions in critically ill patients with sepsis. A national UK 'Sepsis' education programme should be developed in a similar way to the ALS & ATLS courses highlighting the importance of recognition and early intervention. Evidence that the appropriate staff have received 'sepsis'	The UK Parliamentary and Health Ombudsman inquiry 'Time to Act' found failures in the recognition of sepsis in those who died from this process.	The Royal College of Emergency medicine original National Sepsis Audit (2011/12) demonstrated significant shortfalls and delays in recognising patients with sepsis presenting to the emergency department in UK hospitals. www.rcem.ac.uk

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
			education should be a key quality improvement marker.		
069	SCM4	Additional developmental areas of emergent practice	National outcome data for patients with suspected/ confirmed sepsis should be developed to allow hospitals to benchmark their performance. These national databases have been shown to improve outcome by driving quality improvements eg. TARN in Trauma care. These datasets should include non-critical care patients and should be in addition to the ICNARC dataset currently collected.	The UK Parliamentary and Health Ombudsman inquiry 'Time to Act' found failures in the recognition and treatment of sepsis in those who died from this process.	
070	SCM5	Key area for quality improvement 5 Guidance on CODING related to sepsis	For accurate collection of sepsis data.	Sepsis is not coded correctly. NCEPOD (2015) highlighted that only 20% of respondents reported they had a system in place to record incidents of sepsis and its severity. Sepsis was not mentioned on the discharge summary in 46.1% of cases and sepsis was included on the death certificate in only 40.8% of patients who died from it.	NCEPOD (2015) Just Say Sepsis Report
071	SCM5	Additional evidence sources for consideration	We should seek for further evidence on the use of Procalcitonin in diagnosis of sepsis. There is a UK based trial being currently proposed.		

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
072	The UK Sepsis Trust	The Sepsis Six as best practice, and the aspects within the Sepsis Six	The Sepsis Six has been proven to be an effective mechanism for treatment of sepsis. The Sepsis Six was developed in 2006 by a group of physicians and nurses who are part of the UK Sepsis Trust (Daniels, Nutbeam, Laver). The UK Sepsis Trust recommends this as best practice and believes it should be more formally recognised given that 96% of hospitals in England as well as those in 14 other countries use this pathway. The Sepsis Six is fully compatible with NG51	There is evidence that shows where the Sepsis Six pathway is followed precisely lives can be saved. It is vital that the Sepsis Six is officially recognised as best practice as this will simplify implementation of this pathway across the UK.	Daniels et al EMJ 2011 NCEPOD Report
073	The UK Sepsis Trust	Focus on healthcare professional awareness and education on sepsis	The UK Sepsis Trust has been campaigning and working with Health Education England around improving healthcare professional awareness on sepsis. Unless healthcare professionals are properly educated sepsis best practice will never be achieved and lives will continue to be lost unnecessarily.	There is wide variation across England as to how quickly and well healthcare professionals are able to recognise and treat sepsis, this remains an area that needs a further focus. Resources are available from the UK Sepsis Trust, RCGP and HEE. Organisations should monitor levels of staff training and ensure steps are taken to improve and maintain this.	

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
074	The UK Sepsis Trust	National registry on sepsis	The UK Sepsis Trust have been calling for a national registry on sepsis for some time. A national registry would enable better data collection on sepsis, meaning better monitoring and improvements could be made.	Without good data it is impossible to make accurate improvements and save and improve lives cost to sepsis. A national registry would help address this. UK Sepsis Trust is piloting an evaluation around whether registry data can be populated from existing data resources.	Building on research recommendation in NICE Clinical Guideline
075	The UK Sepsis Trust	Standards for "leadership" sepsis roles within Trusts	This is important as leadership roles at a Trust level will invite real change on the ground. Without sepsis leadership roles it is increasingly likely that best practice will fail to be driven, and lasting change needs to be the focus at all levels.	Whilst sepsis leadership roles are recommended, there is currently not enough focus on what these should look like, or enough of a spotlight shone on the reason as to why they are needed. This needs further addressing if real change is going to happen.	
076	Thermo Fisher Scientific	BRAHMS Procalcitonin for as part of the panel of blood tests (1.6.1)	There is good evidence that BRAHMS Procalcitonin is the earliest indicator of bacterial infection, rising within 6 hours of insult. The biomarker can be used for the differential diagnosis of bacterial from viral infection and is superior to the routinely used CRP. The marker was assessed by NICE and although generally favourable, there was too little UK specific evidence to recommend the test at that time.	My only comment (although in 3 different populations) relates to use of Procalcitonin as part of the armoury of blood tests used when infection is suspected. There is clear evidence around the inappropriate prescription of antibiotics leading to poorer outcomes in patients without infection. PCT is a safe early marker used extensively across Europe and beyond to aid in the differential diagnosis of bacterial infection, and more commonly used to improve antibiotic stewardship. It's not going to replace clinical judgement but it can help	The UK joint specialist societies guideline on the diagnosis and management of acute meningitis and meningococcal sepsis in immunocompetent adults recommends the use of BRAHMS Procalcitonin. http://www.journalofinfection.com/article/S0163-4453(16)00024-4/pdf

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
				better guide which patients should, or perhaps more accurately should not, be receiving antibiotics. And it's more than just saving on the cost of antibiotics, the true cost includes the rise of antimicrobial resistance and the cost of HCAI outbreak.	The largest meta-analysis to date again illustrates the value of the biomarker– “Procalcitonin as a diagnostic marker for sepsis: a systematic review and meta-analysis” Wacker et al. Lancet Infect Dis 2013; 13: 426–35. http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(12)70323-7/abstract “In Critically Ill Patients, Serum Procalcitonin Is More Useful in Differentiating between Sepsis and SIRS than CRP, IL-6, or LBP” Critical Care Research and Practice, Volume 2011 (2011), Article ID 594645, http://dx.doi.org/10.1155/2011/594645

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
077	Thermo Fisher Scientific	There is good evidence that BRAHMS Procalcitonin is the earliest indicator of bacterial infection, rising within 6 hours of insult. The biomarker can be used for the differential diagnosis of bacterial from viral infection and is superior to the routinely used CRP. The marker was assessed by NICE and although generally favourable, there was too little UK specific evidence to recommend the test at that time.	My only comment (although in 3 different populations) relates to use of Procalcitonin as part of the armoury of blood tests used when infection is suspected. There is clear evidence around the inappropriate prescription of antibiotics leading to poorer outcomes in patients without infection. PCT is a safe early marker used extensively across Europe and beyond to aid in the differential diagnosis of bacterial infection, and more commonly used to improve antibiotic stewardship. It's not going to replace clinical judgement but it can help better guide which patients should, or perhaps more accurately should not, be receiving antibiotics. And it's more than just saving on the cost of antibiotics, the true cost includes the rise of antimicrobial resistance and the cost of HCAI outbreak.	The UK joint specialist societies guideline on the diagnosis and management of acute meningitis and meningococcal sepsis in immunocompetent adults recommends the use of BRAHMS Procalcitonin. http://www.journalofinfection.com/article/S0163-4453(16)00024-4/pdf The largest meta-analysis to date again illustrates the value of the biomarker– “Procalcitonin as a diagnostic marker for sepsis: a systematic review and meta-analysis” Wacker et al. Lancet Infect Dis 2013; 13: 426–35. http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(12)70323-7/abstract “In Critically Ill Patients, Serum Procalcitonin Is More Useful in Differentiating between Sepsis and SIRS than CRP, IL-6, or LBP” Critical Care Research and Practice, Volume 2011 (2011), Article ID 594645, http://dx.doi.org/10.1155/2011/594645	There is good evidence that BRAHMS Procalcitonin is the earliest indicator of bacterial infection, rising within 6 hours of insult. The biomarker can be used for the differential diagnosis of bacterial from viral infection and is superior to the routinely used CRP. The marker was assessed by NICE and although generally favourable, there was too little UK specific evidence to recommend the test at that time.
078	Thermo Fisher Scientific	BRAHMS Procalcitonin for as part of the panel of blood tests (1.6.16)	As 1.6.1		As 1.6.1

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
079	Thermo Fisher Scientific	BRAHMS Procalcitonin for as part of the panel of blood tests (1.6.31)	As 1.6.1	It's difficult to find tangible evidence that it's highly desirable to avoid inappropriate antibiotics in children. It does appear to have a significant effect on the gut flora, whether this leads to higher risk of obesity, chronic conditions etc, it would take a massive study to determine. But it does appear that prudent use on antibiotics in children is sensible and if you can wait 20 minutes for a test that can better inform whether to withhold antibiotics then that must be a significant improvement	As 1.6.1 Also, recent European Validation of the 'Step by Step' approach for young febrile infants. The authors validated a novel scoring algorithm for febrile patients presenting at ED, they demonstrated Procalcitonin was important in helping identify patients with an invasive bacterial infection. Gomez et al, Paediatrics, Aug 2016, http://pediatrics.aappublications.org/content/138/2/e20154381.long https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4836077/pdf/12916_2016_Article_605.pdf Antibiotics, obesity and the link to microbes - what are we doing to our children? Olli Turta and Samuli Rautava*

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
080	British Infection Association	Key area for quality improvement 1 Sepsis	Sepsis	Sepsis is already established an important quality standard, as supported by our organisation	There are new definitions of sepsis and septic shock as published in 2016 which require review in the formulation of new pathways http://jamanetwork.com/journals/jama/fullarticle/2492881
General					
081	MSD	Had no comments to make			
082	National Sepsis Academic Health & Science Networks Cluster	Please see proforma			
083	NHSE Paediatric Medicine CRG	Key area for quality improvement 1	Inclusion of all relevant associated NICE guidance	Not all relevant associated NICE guidance is included in the document	The quality standard needs to make sure relevant parts of the NICE meningococcal guideline GC102 also needs to be considered in sections 3.2 and 3.3. The NICE neonatal sepsis guideline CG149 should be included in section 3.3.

CONFIDENTIAL

ID	Stakeholder	Suggested key area for quality improvement	Why is this important?	Why is this a key area for quality improvement?	Supporting information
084	SCM3	Additional evidence sources for consideration	NICE guidance: Management of bacterial meningitis and meningococcal septicaemia in children and young people		