Sepsis: recognition, diagnosis and management

NICE guideline: short version

Draft for consultation, January, 2016

This guideline covers the recognition, diagnosis and early management of sepsis for all populations. The guideline committee identified that the key issues to be included were: recognition and early assessment, diagnostic and prognostic value of blood markers for sepsis, initial treatment, escalating care, identifying the source of infection, early monitoring, information and support for patients and carers and training and education.

Who is it for?

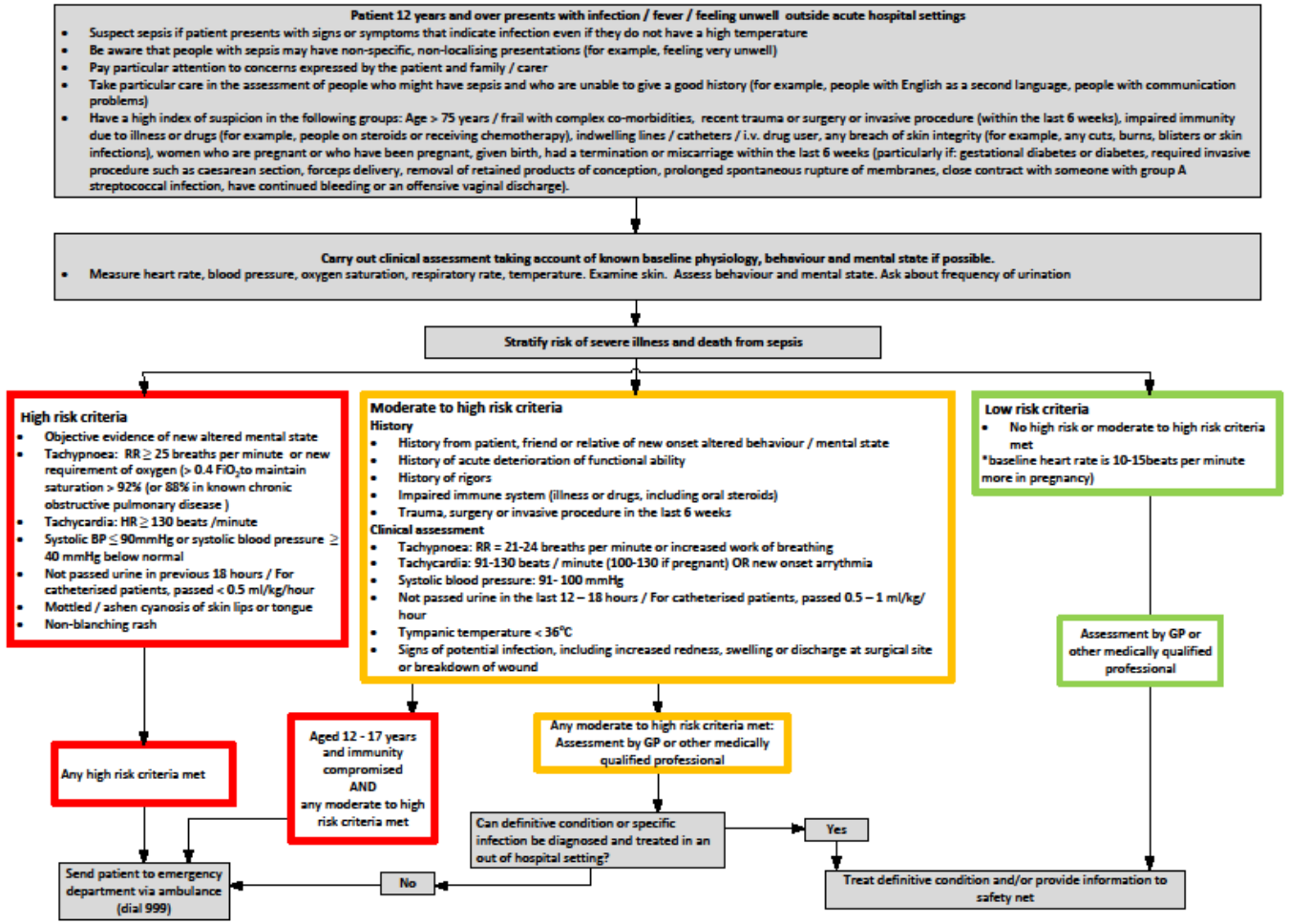
- People with sepsis, their families and carers.
- Healthcare professionals working in primary, secondary and tertiary care.

This version of the guideline contains the recommendations, context and recommendations for research. Information about how the guideline was developed is on the guideline's page on the NICE website. This includes the guideline committee's discussion and the evidence reviews (in the full guideline), the scope, and details of the committee and any declarations of interest.

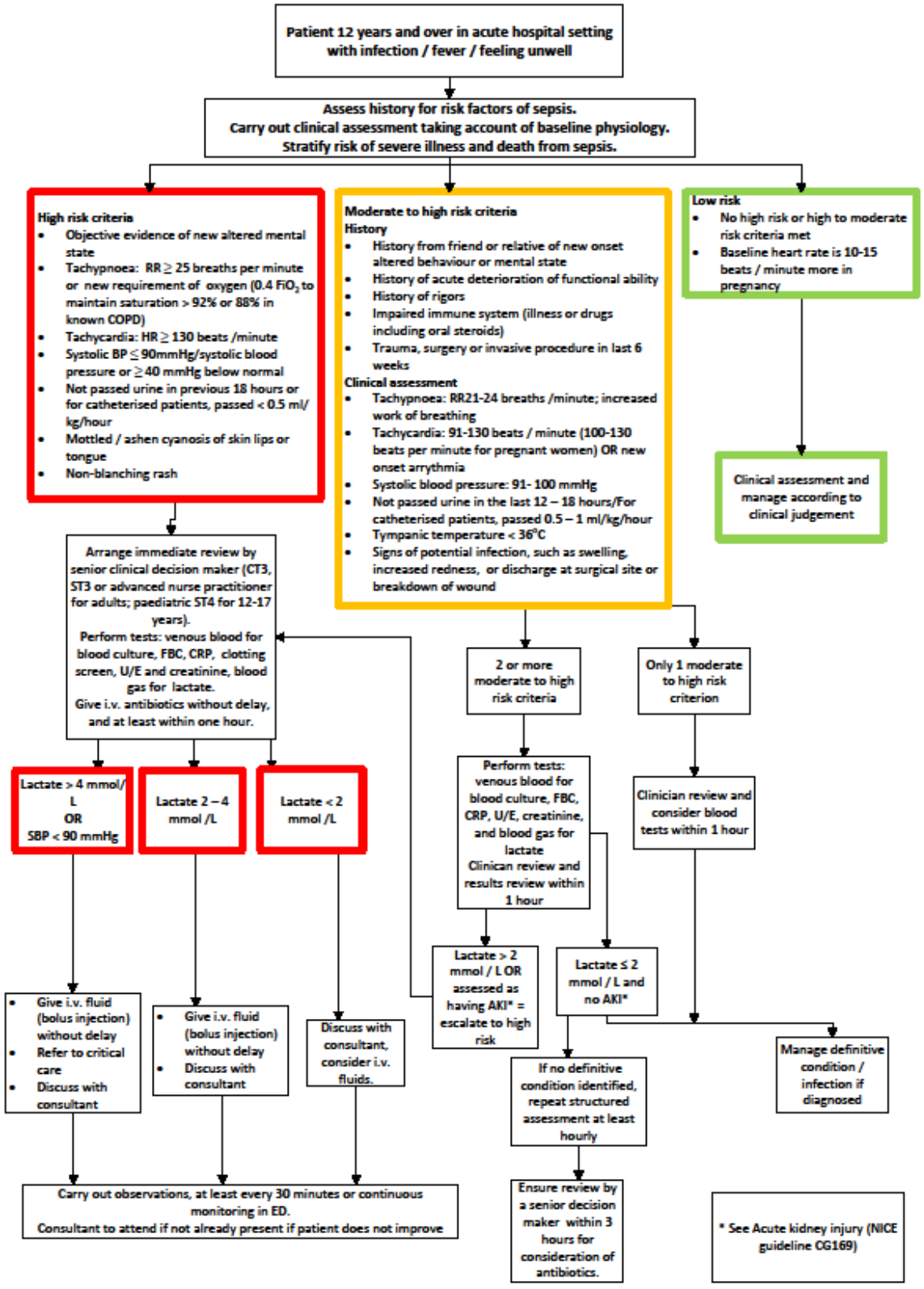
Contents

Algorithms

Managing adults and children and young people 12 years and over with suspected sepsis outside acute hospital settings

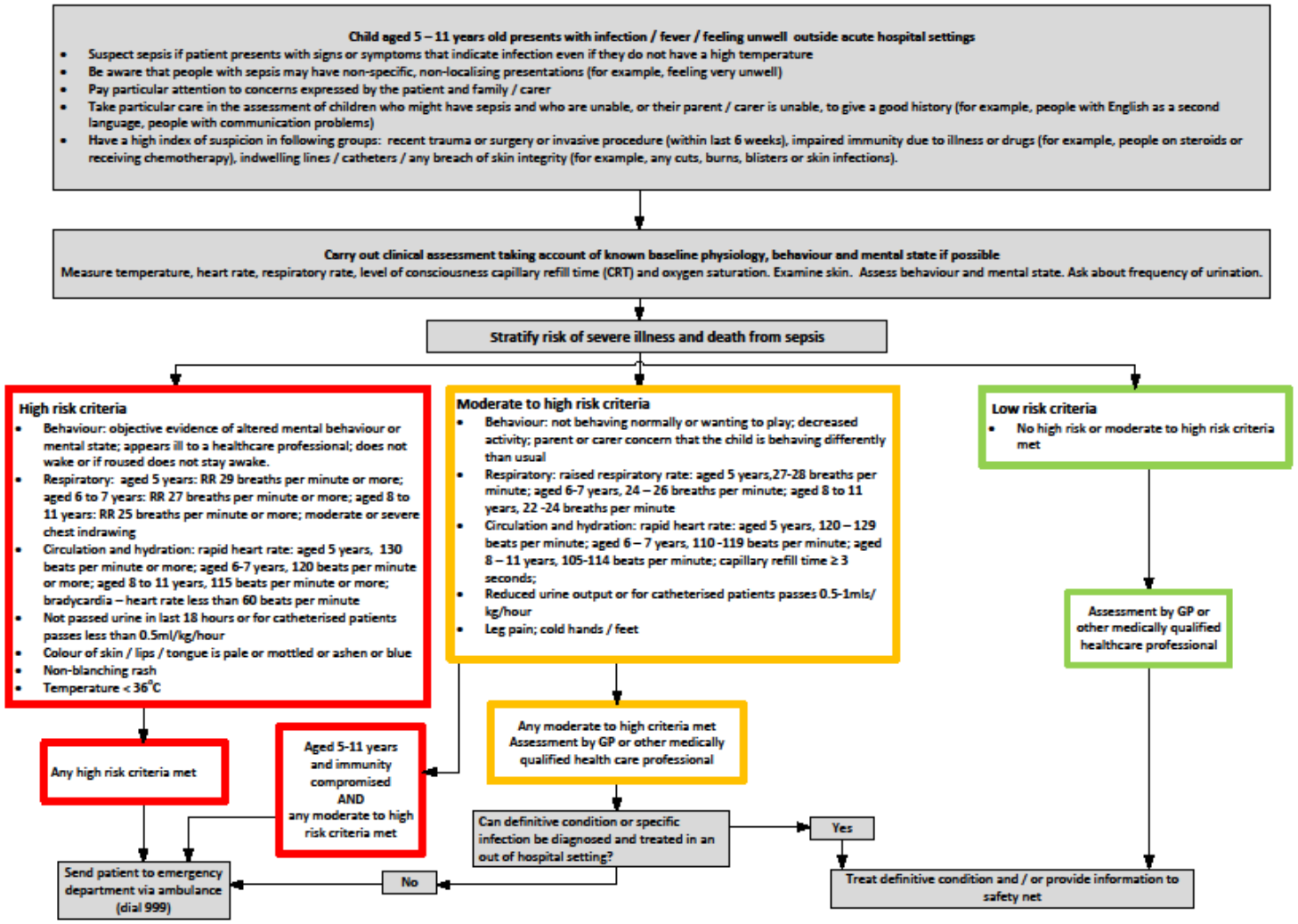


Managing adults and children and young people 12 years and over with suspected sepsis in acute hospital setting

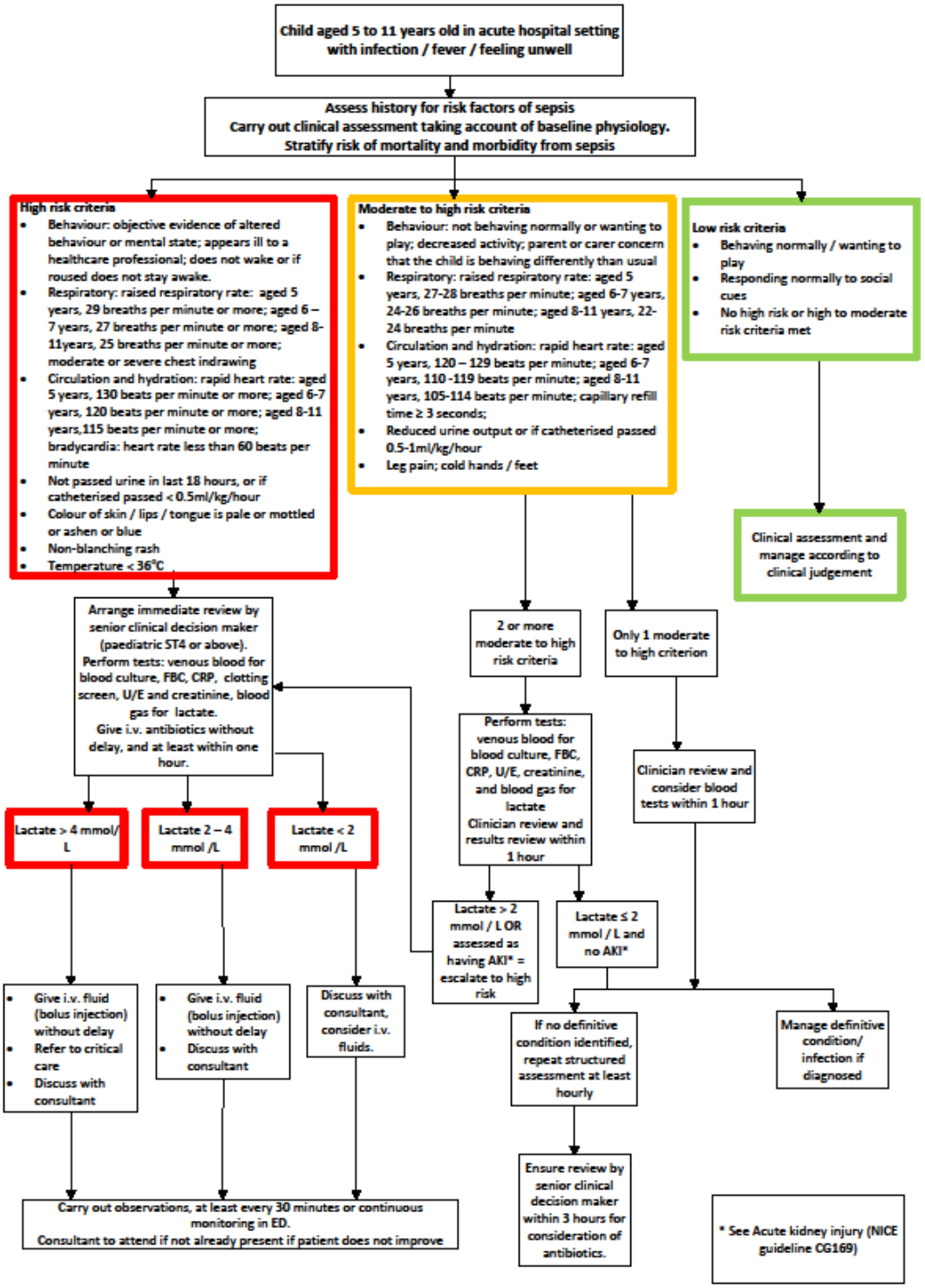


1

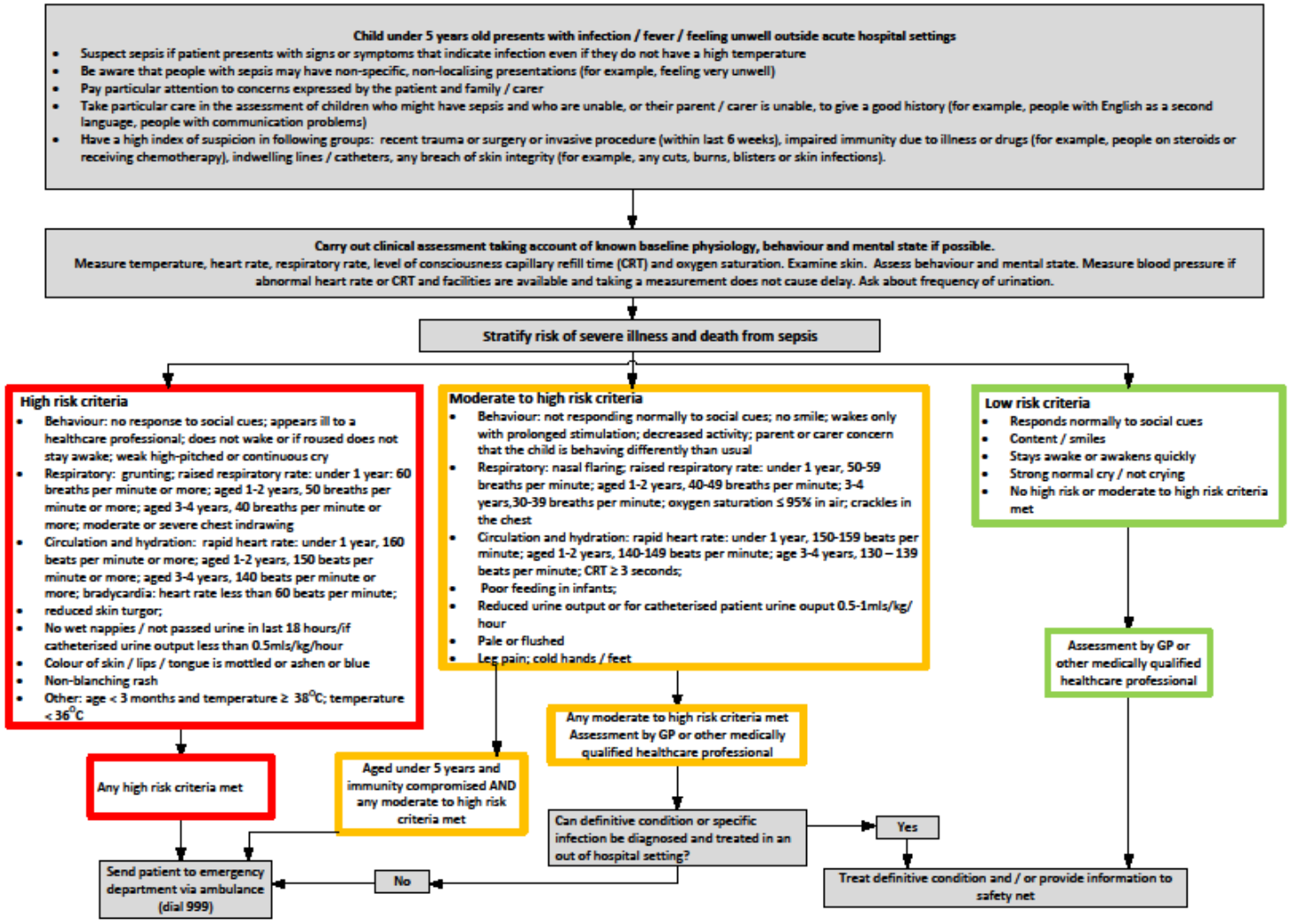
Managing children aged 5-11 years and over with suspected sepsis outside acute hospital settings



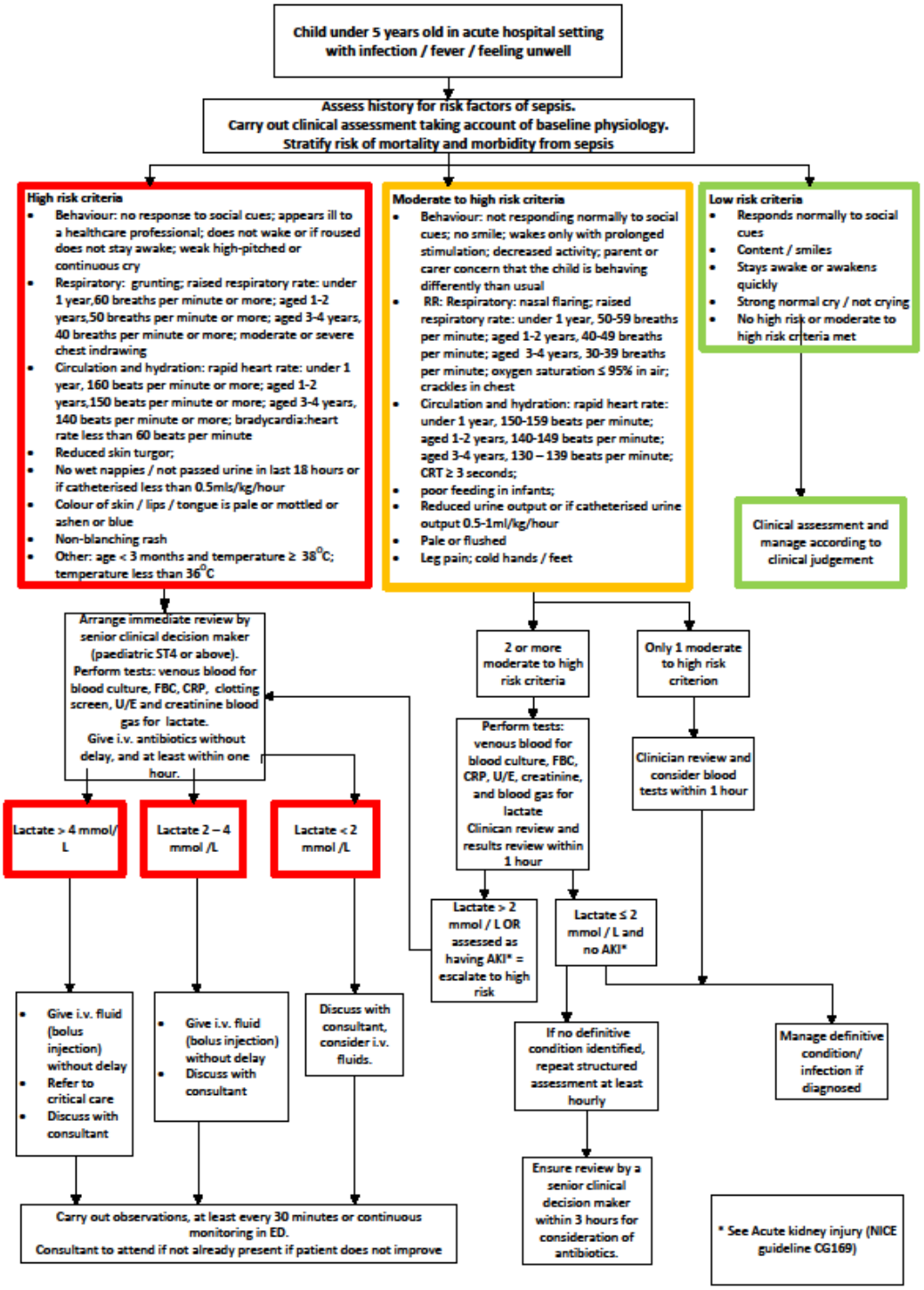
Managing children aged 5-11 years and over with suspected sepsis in acute hospital setting



Managing children aged under 5 years with suspected sepsis outside acute hospital settings



Managing children aged under 5 years with suspected sepsis in acute hospital setting



Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Identifying sepsis and people at increased risk of sepsis

1.1.1 Suspect sepsis if a person presents with signs or symptoms that indicate possible infection, even if they do not have a high temperature.

1.1.2 Take into account that people with sepsis may have non-specific, non-localised presentations, for example feeling very unwell.

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

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).

1.1.5 Take into account that people in the groups below are at higher risk of developing sepsis:

- the very young (under 1 year) and older people (over 75 years) or very frail people
- people who have impaired immune systems because of illness or drugs, including:

  - people being treated for cancer with chemotherapy
  - people who have impaired immune function (for example, people with diabetes, people who have had a splenectomy, or people with sickle cell disease)
  - people taking long-term steroids
  - people taking immunosuppressant drugs to treat non-malignant disorders such as rheumatoid arthritis
- people who have had surgery, or other invasive procedures, in the past 6 weeks
- people with any breach of skin integrity (for example, cuts, burns, blisters or skin infections)
- people who misuse drugs intravenously
- people with indwelling lines or catheters.

1.1.6 Take into account that 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. In particular, women who:

- have gestational diabetes or diabetes
- needed invasive procedures (for example, caesarean section, forceps delivery, removal of retained products of conception)
- had prolonged spontaneous rupture of membranes
- have been in close contact with people with group A streptococcal infection
- have continued bleeding or an offensive vaginal discharge.

1.1.7 Take into account the following risk factors for early-onset neonatal infection:

- invasive group B streptococcal infection in a previous baby
- maternal group B streptococcal colonisation, bacteriuria or infection in the current pregnancy
- prelabour rupture of membranes

- preterm birth following spontaneous labour (before 37 weeks' gestation)
- suspected or confirmed rupture of membranes for more than 18 hours in a preterm birth
- intrapartum fever higher than 38°C, or confirmed or suspected chorioamnionitis
- parenteral antibiotic treatment given to the woman for confirmed or suspected invasive bacterial infection (such as septicaemia) at any time during labour, or in the 24-hour periods before and after the birth (this does not refer to intrapartum antibiotic prophylaxis).
- suspected or confirmed infection in another baby in the case of a multiple pregnancy.

[This recommendation is from NICE's guideline on neonatal infection.]

1.2 Assessing people for suspected sepsis

1.2.1 Use a structured set of observations (see recommendations 1.2.2 and 1.2.3) when assessing people who might have sepsis. Consider using an early warning score in hospital settings .

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

1.2.3 Assess temperature, heart rate, respiratory rate, level of consciousness, oxygen saturation and capillary refill time in children under 12 years with suspected sepsis. [This recommendation is adapted from NICE's guideline on fever in under 5s.]

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

[This recommendation is adapted from NICE's guideline on fever in under 5s.]

1.2.5 Measure blood pressure of children aged 5 to 11 years who might have sepsis if facilities to measure blood pressure, including correct cuff, are available.

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

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

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

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

1.3 Stratifying risk

1.3.1 Use the person's history and physical examination results to grade risk of severe illness or death from sepsis using criteria based on age (see tables 1, 2 and 3).

Adults and children and young people aged 12 years and over

Table 1 Risk stratification tool for adults and children and young people aged 12 years and over with suspected sepsis

	High risk criteria	Moderate to high risk criteria	Low risk criteria

History	Objective evidence of new altered mental state	History from patient, friend or relative of new onset of altered behaviour or mental state History of acute deterioration of functional ability History of rigors Impaired immune system (illness or drugs including oral steroids) Trauma, surgery or invasive procedures in the past 6 weeks	Normal behaviour
Respiratory	Raised respiratory rate: 25 breaths per minute or more New need for oxygen (more than 40% FiO_2) to maintain saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)	Raised respiratory rate: 21–24 breaths per minute or increased work of breathing	No high risk or moderate to high risk criteria met
Blood pressure	Systolic blood pressure 90 mmHg or less or systolic blood pressure more than 40 mmHg below normal	Systolic blood pressure 91–100 mmHg	No high risk or moderate to high risk criteria met
Circulation and hydration	Raised heart rate: more than130 beats per minute Not passed urine in previous 18 hours. For catheterised patients, passed less than 0.5 ml/kg of urine per hour	Raised heart rate 91–130 beats per minute (for pregnant women 100 -130 beats per minute) or new onset arrhythmia Not passed urine in the last 12–18 hours For catheterised	No high risk or moderate to high risk criteria met * typical heart rate in pregnancy is 10-15 beats per minute more than normal

		patients, passed 0.5–1 ml/kg of urine per hour	
Temperature	-	Tympanic temperature less than 36°C	-
Skin	Mottled or ashen, with cyanosis of skin, lips or tongue Non-blanching rash of skin	Signs of potential infection, including redness, swelling or discharge at surgical site or breakdown of wound	No non-blanching rash

1.3.2 Recognise that adults and children and young people aged 12 years and over with any of the symptoms or signs below are at high risk of severe illness or death from sepsis:

- objective evidence of new altered mental state
- respiratory rate of 25 breaths per minute or above, or new need for 40% oxygen to maintain oxygen saturation more than 92% (or more than 88% in known chronic obstructive pulmonary disease)
- heart rate of 130 beats per minute or above
- systolic blood pressure of 90 mmHg or less, or systolic blood pressure more than 40 mmHg below normal
- not passed urine in previous 18 hours (for catheterised patients, passed less than 0.5 ml/kg/hour)
- mottled or ashen complexion, with cyanosis of the skin, lips or tongue
- non-blanching rash of the skin, lips or tongue.

1.3.3 Recognise that adults and children and young people aged 12 years and over with any of the symptoms or signs below are at moderate to high risk of severe illness or death from sepsis:

- history of new-onset changed behaviour or change in mental state, as reported by the person, a friend or relative

- history of acute deterioration of functional ability
- history of rigors
- impaired immune system (illness or drugs, including oral steroids)
- trauma, surgery or invasive procedure in the last 6 weeks
- respiratory rate of 21–24 breaths per minute, or increased work of breathing
- heart rate of 91–130 beats per minute or new-onset arrhythmia or if pregnant heart rate of 100-130 beats per minute
- systolic blood pressure of 91–100 mmHg
- not passed urine in the past 12–18 hours (for catheterised patients, passed 0.5–1 ml/kg/hour)
- tympanic temperature less than 36°C
- signs of potential infection, including increased redness, swelling or discharge at a surgical site, or breakdown of a wound.

1.3.4 Consider adults and children and young people aged 12 years and over who do not meet any high or moderate to high risk criteria to be at low risk of severe illness or death from sepsis.

Children aged 5–11 years

Table 2 Risk stratification tool for children aged 5–11 years with suspected sepsis

	High risk criteria	**Moderate to high risk criteria**	**Low risk criteria**
Behaviour	Objective evidence of altered behaviour or mental state Appears ill to a healthcare professional Does not wake or if roused does not stay awake	Not behaving normally or wanting to play Decreased activity Parent or carer concern that the child is behaving differently from usual	Behaving normally, wanting to play Responds normally to social cues
Respiratory	Raised respiratory rate: Aged 5 years, 29 breaths per minute or more Aged 6–7 years, 27 breaths per minute or more Aged 8–11 years, 25 breaths per minute or more Moderate or severe chest indrawing	Raised respiratory rate: Aged 5 years, 27–28 breaths per minute Aged 6–7 years, 24–26 breaths per minute Aged 8–11 years, 22–24 breaths per minute	No high risk or moderate to high risk criteria met
Circulation and hydration	Rapid heart rate: Aged 5 years, 130 beats per minute or more Aged 6–7 years, 120 beats per minute or more Aged 8–11 years, 115 beats per minute or more Heart rate less than 60 beats per minute Not passed urine in last 18 hours For catheterised patients, passed less than 0.5 ml/kg of urine per hour	Rapid heart rate: Aged 5 years, 120–129 beats per minute Aged 6–7 years, 110–119 beats per minute Aged 8–11 years, 105–114 beats per minute Capillary refill time of 3 seconds or more Reduced urine output For catheterised patients, passed 0.5–1 ml/kg of urine per hour	No high risk or moderate to high risk criteria met
Skin	Colour of skin, lips or tongue is pale, mottled,		

	ashen or blue Non-blanching rash		
Other	Temperature less than 36°C	Leg pain Cold hands or feet	No high risk or moderate to high risk criteria met

1.3.5 Recognise that children aged 5–11 years with any of the symptoms or signs below are at high risk of severe illness or death from sepsis:

- has objective evidence of altered behaviour or mental, or appears ill to a healthcare professional, or does not wake (or if roused, does not stay awake)
- respiratory rate:
  - aged 5 years, 29 breaths per minute or more
  - aged 6–7 years, 27 breaths per minute or more
  - aged 8–11 years, 25 breaths per minute or more
  - or moderate or severe chest indrawing
- heart rate:
  - aged 5 years, 130 beats per minute or more
  - aged 6–7 years, 120 beats per minute or more
  - aged 8–11 years, 115 beats per minute or more
  - or heart rate less than 60 beats per minute at any age
- not passed urine in last 18 hours or for catheterised patients, passed less than 0.5 ml/kg of urine per hour
- colour of skin, lips or tongue is pale, mottled, ashen or blue
- non-blanching rash
- has temperature less than 36°C .

1.3.6 Recognise that children aged 5–11 years with any of the symptoms or signs below are at moderate to high risk of severe illness or death from sepsis:

- not responding normally to social cues or decreased activity, or parent or carer concern that the child is behaving differently from usual
- respiratory rate:
  - aged 5 years, 27–28 breaths per minute
  - aged 6–7 years, 24–26 breaths per minute
  - aged 8–11 years, 22–24 breaths per minute
- heart rate:
  - aged 5 years, 120–129 beats per minute
  - aged 6–7 years, 110–119 beats per minute
  - aged 8–11 years, 105–114 beats per minute
  - or capillary refill time of 3 seconds or more
- reduced urine output or for catheterised patients, passed 0.5–1 ml/kg of urine per hour
- have leg pain or cold hands and feet.

1.3.7 Consider children aged 5–11 years who do not meet any high or moderate to high risk criteria to be at low risk of severe illness or death from sepsis.

Children aged under 5 years

Table 3 Risk stratification tool for children aged under 5 years with suspected sepsis

This table is adapted from NICE's guideline on fever in under 5s.

	High risk criteria	Moderate to high risk criteria	Low risk criteria

Behaviour	No response to social cues Appears ill to a healthcare professional Does not wake, or if roused does not stay awake Weak high-pitched or continuous cry	Not responding normally to social cues No smile Wakes only with prolonged stimulation Decreased activity Parent or carer concern that child is behaving differently from usual	Responds normally to social cues Content or smiles Stays awake or awakens quickly Strong normal cry or not crying
Respiratory	Grunting Raised respiratory rate: Under 1 year, 60 breaths per minute or more 1–2 years, 50 breaths per minute or more 3–4 years, 40 breaths per minute or more Moderate or severe chest indrawing	Nasal flaring Raised respiratory rate: Under 1 year 50–59 breaths per minute 1–2 years, 40–49 breaths per minute 3–4 years, 35–39 breaths per minute Oxygen saturation of less than 95% in air Crackles in the chest	No high risk or moderate to high risk criteria met
Circulation and hydration	Rapid heart rate Under 1 year, 160 beats per minute or more 1–2 years, 150 beats per minute or more 3–4 years, 140 beats per minute or more Bradycardia: heart rate less than 60 beats per minute Reduced skin turgor No wet nappies or not passed urine in past 18 hours For catheterised patients, passed less than 0.5 ml/kg of urine per hour	Rapid heart rate: Under 1 year, 150-159 beats per minute 1–2 years, 140-149 beats per minute 3–4 years, 130–139 beats per minute Capillary refill time of3 seconds or more Poor feeding in infants Reduced urine output For catheterised patients, passed 0.5–1 ml/kg of urine per hour	No high risk or moderate to high risk criteria met
Skin	Colour of lips, skin or tongue is pale, mottled, ashen or blue Non-blanching rash	Pale, pallor or flushed Pallor reported by carer	Normal colour

Other	Age <3 months and temperature 38°C or more Temperature less than 36°C Cold hands or feet	Age 3–6 months temperature 39°C or more Leg pain Cold hands or feet	No high risk or high to moderate risk criteria met

1.3.8 Recognise that children aged under 5 years with any of the symptoms or signs below are at high risk of severe illness or death from sepsis:

- no response to social cues
- appears ill to a healthcare professional
- does not wake, or if roused does not stay awake
- weak, high-pitched or continuous cry
- grunting
- heart rate:
  - aged under 1 year, 160 beats per minute or more
  - aged 1–2 years, 150 beats per minute or more
  - aged 3–4 years, 140 beats per minute or more
  - heart rate less than 60 beats per minute at any age
- reduced skin turgor
- no wet nappies or not passed urine in past 18 hours or for catheterised children, passed less than 0.5 ml/kg of urine per hour
- respiratory rate:
  - aged under 1 year, 60 breaths per minute or more
  - aged 1–2 years, 50 breaths per minute or more
  - aged 3–4 years, 40 breaths per minute or more
- moderate or severe chest indrawing
- colour of skin, lips or tongue is pale, mottled, ashen or blue
- other symptoms and signs:
  - age under 3 months and temperature 38°C or more
  - non-blanching rash

  - temperature less than 36°C ,

[This recommendation is adapted from NICE's guideline on fever in under 5s]

1.3.9 Recognise that children aged under 5 years with any of the symptoms or signs below are at moderate to high risk of severe illness or death from sepsis:

- not responding normally to social cues
- no smile
- wakes only with prolonged stimulation
- decreased activity
- parent or carer concern that the child is behaving differently from usual
- nasal flaring
- respiratory rate:
  - aged under 1 year, 50−59 breaths per minute
  - aged 1–2 years, 40−49 breaths per minute
  - aged 3–4 years, 35−39 breaths per minute
- oxygen saturation 95% or less in air
- crackles in the chest
- heart rate:
  - aged under 1 year, 150−159 beats per minute
  - aged 1–2 years, 140−149 beats per minute
  - aged 3–4 years 130−139 beats per minute
- capillary refill time of 3 seconds or more
- poor feeding in infants
- reduced urine output or for catheterised patients, passed 0.5–1 ml/kg of urine per hour
- is pale or flushed or has pallor of skin, lips or tongue reported by parent or carer
- other symptoms and signs: age 3–6 months and temperature 39°C or over, leg pain, cold hands or feet.

[This recommendation is adapted from NICE's guideline on fever in under 5s]

1.3.10 Consider children aged under 5 years who do not meet any high or moderate to high risk criteria to be at low risk of severe illness or death from sepsis. [This recommendation is adapted from NICE's guideline on fever in under 5s]

Children, young people and adults with suspected sepsis

Temperature

1.3.11 Do not use a person's temperature as the sole predictor of sepsis.

1.3.12 Do not rely on fever or hypothermia to rule sepsis either in or out.

1.3.13 Ask the person with suspected sepsis and their family or carers about any recent fever or rigors

1.3.14 Take into account that some groups of people with sepsis may not develop a raised temperature. These include:

- people who are older or very frail
- people having treatment for cancer
- people severely ill with sepsis
- young infants or children.

1.3.15 Take into account that a rise in temperature can be a physiological response for example after surgery or trauma.

Heart rate in suspected sepsis

1.3.16 Interpret the heart rate of a person with suspected sepsis in context, taking into account that:

- baseline heart rate may be lower in young people and adults who are fit
- baseline heart rate in pregnancy is 10–15 beats per minute more than normal

- older people with an infection may not develop an increased heart rate
- older people may develop a new arrhythmia in response to infection rather than an increased heart rate
- heart rate response may be affected by medicines such as beta-blockers.

Blood pressure in suspected sepsis

1.3.17 Interpret blood pressure in the context of a person's previous blood pressure, if known.

Confusion, mental state and cognitive state in suspected sepsis

1.3.18 Interpret a person's mental state in the context of their normal function and treat changes as being significant.

1.3.19 Be aware that changes in cognitive function may be subtle and assessment should include history from patient and family or carers.

1.3.20 Take into account that changes in cognitive function may present as changes in behaviour or irritability in both children and in adults with dementia.

1.3.21 Take into account that changes in cognitive function in older people may present as acute changes in functional abilities.

Oxygen saturation

1.3.22 Take into account that if peripheral oxygen saturation is difficult to measure in a person with suspected sepsis, this may indicate poor peripheral circulation because of shock.

1.4 Managing suspected sepsis outside acute hospital settings

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

- they meet any high risk criteria (see table 1) or
- they are aged under 17 years, and their immunity is compromised and they have any moderate to high risk criteria.

1.4.2 Arrange review by a GP or other doctor within 1 hour when any moderate to high risk criteria in a person with suspected sepsis are identified by a non-medical practitioner outside an acute hospital setting.

1.4.3 Assess (by GP or other doctor) all people with suspected sepsis outside acute hospital settings with any moderate to high risk criteria for:

- definitive diagnosis of their condition
- whether they can be treated safely outside hospital.

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

1.4.4 Arrange review by a GP or other doctor for a person with suspected sepsis but no high or moderate to high risk criteria if they have had their first assessment by a non-medical practitioner outside an acute hospital setting.

1.5 Managing and treating sepsis in hospital

Adults and children and young people aged 12 years and over who meet 1 or more high risk criteria

1.5.1 For adults and 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 maker[1]
- carry out a venous blood test for the following:
  - blood culture
  - full blood count
  - C-reactive protein
  - urea and electrolytes
  - creatinine
  - clotting screen
  - blood gas to include lactate measurement
- give a broad-spectrum antimicrobial at the maximum recommended dose as soon as possible (within 1 hour of identifying that they meet any high risk criteria) in line with recommendations in section 1.6
- discuss with consultant.

1.5.2 For adults and children and young people aged 12 years and over with suspected sepsis and any high risk criteria and lactate over 4 mmol, or blood pressure less than 90 mmHg:

- give fluids as soon as possible (within 1 hour of identifying that they meet any high risk criteria) in line with recommendations in section 1.7 **and**

[1]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 an advanced nurse practitioner with antibiotic prescribing rights, depending on local arrangements. A 'senior decision maker' for people aged 12–17 years is a paediatric qualified doctor of grade ST4 or above.

- refer to critical care for review of central venous access and initiation of inotropes or vasopressors and admission to critical care.

1.5.3 For adults and children and young people aged 12 years and over with suspected sepsis and any high risk criteria and lactate between 2 and 4 mmol/litre:

- give fluids as soon as possible (within 1 hour of identifying that they meet any high risk criteria) in line with recommendations in section 1.7.

1.5.4 For adults and children and young people aged 12 years and over with suspected sepsis and any high risk criteria and lactate below 2 mmol/litre:

- consider giving fluids (in line with recommendations in section 1.7).

1.5.5 Monitor people with suspected sepsis who meet any high risk criteria continuously, or a minimum of once every 30 minutes depending on setting. Physiological track and trigger systems should be used to monitor all adult patients in acute hospital settings. [This recommendation is from NICE's guideline on acutely ill patients in hospital]

1.5.6 Monitor the mental state of adults and children and young people aged 12 years and over with suspected sepsis. Consider using a scale such as the Glasgow Coma Score (GCS) or AVPU ('alert, voice, pain, unresponsive') scale.

1.5.7 Alert a consultant to attend in person if an adult or child or young person aged 12 years or over with suspected sepsis and any high risk criteria fails to respond within 1 hour of initial antibiotic and/or intravenous fluid resuscitation. Failure to respond is indicated by any of:

- systolic blood pressure persistently below 90 mmHg
- reduced level of consciousness despite resuscitation
- respiratory rate over 30 breaths per minute
- lactate not reduced by more than 20% within 1 hour.

Adults and children and young people aged 12 years and over who meet 2 or more moderate to high risk criteria

1.5.8 For adults and children and young people aged 12 years and over with suspected sepsis and 2 or more moderate to high risk criteria, carry out a venous blood test for the following:

- blood culture
- full blood count
- C-reactive protein
- urea and electrolytes
- creatinine
- blood gas to include lactate measurement
- arrange for a clinician[2] to review the person's condition and test results within 1 hour of meeting 2 or more moderate to high risk criteria.

1.5.9 For adults and children and young people aged 12 years and over with suspected sepsis who meet 2 or more moderate to high risk criteria and have lactate over 2 mmol/litre or evidence of acute kidney injury[3], treat as high risk and follow recommendations 1.5.1–1.5.7.

1.5.10 For adults and 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 injury[3] and in whom a definitive condition cannot be identified:

[2] A 'clinician' should be a medically qualified practitioner who has antibiotic prescribing rights
[3] For definition of acute kidney injury, see Acute kidney injury (NICE guideline CG169)].

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

1.5.11 For adults and children and young people aged 12 years and over with suspected sepsis who meet 2 moderate to high risk criteria, have lactate of less than 2 mmol/litre, no evidence of acute kidney injury[4]and in whom a definitive condition or infection can be identified and treated:

- manage the definitive condition
- if appropriate, discharge with information (see recommendations 1.10.5 and 1.10.6) depending on the setting.

Adults and children and young people aged 12 years and over who meet only 1 moderate to high risk criterion

1.5.12 For adults and children and young people aged 12 years and over with suspected sepsis who meet only 1 moderate to high risk criterion:

- arrange clinician[5] review within 1 hour of meeting criterion for clinical assessment
- perform blood tests if indicated.

1.5.13 For adults and children and young people aged 12 years and over with suspected sepsis who meet only 1 moderate to high risk criterion and in whom a definitive condition can be identified and treated:

- manage the definitive condition
- if appropriate, discharge with information depending on setting (see recommendations 1.10.5 and 1.10.6).

[4] For definition of acute kidney injury, see Acute kidney injury (NICE guideline CG169)].
[5] A 'clinician' should be a medically qualified practitioner who has antibiotic prescribing rights

1.5.14 For adults and 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 injury[6] and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker within 3 hours of meeting moderate to high criterion for consideration of antibiotics.

Adults and children and young people aged 12 years and over with no high risk or moderate to high risk criteria

1.5.15 Arrange clinical assessment[7] of adults and children and young people aged 12 years and over who have suspected sepsis and no high risk or moderate to high risk criteria and manage according to clinical judgement.

Children aged 5–11 years who meet 1 or more high risk criteria

1.5.16 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 maker[8]
- carry out a venous blood test for the following:
  - blood culture
  - full blood count
  - C-reactive protein
  - urea and electrolytes
  - creatinine
  - clotting screen

[6] For definition of acute kidney injury, see NICE's guideline on acute kidney injury.
[7] Clinical assessment should be carried out by a medically qualified practitioner who has antibiotic prescribing rights
[8] A 'senior clinical decision maker' for children aged 5– 11 years is a paediatric qualified doctor of grade ST4 or above.

  - blood gas for glucose and lactate
- give a broad-spectrum antimicrobial (see section 1.6) at the maximum recommended dose as soon as possible (within 1 hour of identifying that they meet any high risk criteria)
- discuss with consultant.

1.5.17 For children aged 5–11 years with suspected sepsis and any high risk criteria and lactate over 4 mmol:

- give fluids as soon as possible (within 1 hour of identifying that they meet any high risk criteria in line with recommendations in section 1.7 **and**
- refer to critical care for review of central access and initiation of inotropes or vasopressors and admission to critical care.

1.5.18 For children aged 5–11 years with suspected sepsis and any high risk criteria and lactate between 2 and 4 mmol/litre:

- give fluids as soon as possible (within 1 hour of identifying that they meet any high risk criteria) in line with recommendations in section 1.7.

1.5.19 For children aged 5–11 years with suspected sepsis and any high risk criteria and lactate below 2 mmol/litre:

- consider giving fluids in line with recommendations in section 1.7.

1.5.20 Monitor children with suspected sepsis who meet any high risk criteria continuously, or a minimum of once every 30 minutes depending on setting. Physiological track and trigger systems should be used to monitor all children in acute hospital settings.[This recommendation is adapted from NICE's guideline on acutely ill patients in hospital.]

1.5.21 Monitor the mental state of children aged 5-11 years with suspected sepsis Consider using the Glasgow Coma Score (GCS) or AVPU (‘alert, voice, pain, unresponsive’) scale.

1.5.22 Alert a consultant to attend in person if a child aged 5–11 years with suspected sepsis and any high risk criteria fails to respond within 1 hour of initial antibiotic and/or intravenous fluid resuscitation. Failure to respond is indicated by any of:

- reduced level of consciousness despite resuscitation,
- heart rate or respiratory rate fulfil high risk criteria
- lactate remains over 2 mmol/litre after 1 hour.

Children aged 5–11 years who meet 2 or more moderate to high risk criteria

1.5.23 For children aged 5–11 years with suspected sepsis and 2 or more moderate to high risk criteria:

- carry out a venous blood test for the following:
  - blood culture
  - full blood count
  - C-reactive protein
  - urea and electrolytes
  - creatinine
  - blood gas for glucose and lactate
- arrange for a clinician to review the person’s condition and test results within 1 hour of meeting 2 or more moderate to high risk criteria.

1.5.24 For children aged 5–11 years with suspected sepsis who meet 2 or more moderate to high risk criteria and have lactate over 2 mmol/litre or evidence of acute kidney injury[9], treat as high risk and follow recommendations 1.5.16–1.5.22.

[9] For definition of acute kidney injury, see NICE’s guideline on acute kidney injury.

1.5.25 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, no evidence of acute kidney injury[10] and in whom a definitive condition cannot be identified:

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

1.5.26 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, no evidence of acute kidney injury[11] and in whom a definitive condition or infection can be identified and treated:

- manage the definitive condition, and
- if appropriate, discharge with information depending on setting (see recommendations 1.10.5 and 1.10.6).

Children aged 5–11 years who meet only 1 moderate to high risk criterion

1.5.27 For children aged 5–11 years with suspected sepsis who meet only 1 moderate to high risk criterion:

- arrange clinician[12] review within 1 hour of meeting 1 moderate to high risk criterion for clinical assessment **and**
- perform blood tests if indicated.

1.5.28 For children aged 5–11 years with suspected sepsis who meet only 1 moderate to high risk criterion and in whom a definitive condition can be identified and treated:

- manage the definitive condition

[10] For definition of acute kidney injury, see NICE's guideline on acute kidney injury.
[11] For definition of acute kidney injury, see NICE's guideline on acute kidney injury.
[12] A 'clinician' should be a medically qualified practitioner who has antibiotic prescribing rights.

- if appropriate, discharge with information depending on setting (see recommendations 1.10.5 and 1.10.6).

1.5.29 For children aged 5–11 years 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 injury[13] and in whom a definitive condition cannot be identified:

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

Children aged 5–11 years with no high risk or moderate to high risk criteria

1.5.30 Arrange clinical assessment[14] of children aged 5–11 years who have suspected sepsis and no high risk or moderate to high risk criteria and manage according to clinical judgement.

Children aged under 5 years

Children aged under 5 years who meet 1 or more high risk criteria

1.5.31 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 maker[15]
- carry out a venous blood test for the following:
  - blood culture
  - full blood count
  - C-reactive protein
  - urea and electrolytes

[13] For definition of acute kidney injury, see Acute kidney injury (NICE guideline CG169)].
[14] This could be by a medically qualified practitioner with prescribing rights.
[15] A 'senior clinical decision maker' for children aged under 5 years is a paediatric qualified doctor of grade ST4 or above.

  - creatinine
  - clotting screen
  - blood gas for glucose and lactate
- give parenteral antibiotics (within 1 hour of identifying that they meet any high risk criteria; see section 1.6).
- discuss with consultant.

1.5.32 For children aged under 5 years with suspected sepsis and any high risk criteria and lactate over 4 mmol:

- give fluids (in line with recommendations in section 1.7) **and**
- refer to critical care for review of central access and initiation of inotropes or vasopressors and admission to critical care.

1.5.33 For children aged under 5 years with suspected sepsis and any high risk criteria and lactate between 2 and 4 mmol/litre:

- give fluids as soon as possible (within 1 hour of identifying that they meet any high risk criteria) in line with recommendations in section 1.7.

1.5.34 For children aged under 5 years with suspected sepsis and any high risk criteria and lactate below 2 mmol/litre, consider giving fluids in line with recommendations in section 1.7.

1.5.35 Monitor children aged under 5 years with suspected sepsis who meet any high risk criteria continuously, or a minimum of once every 30 minutes depending on setting. Physiological track and trigger systems should be used to monitor all children in acute hospital settings. [This recommendation is adapted from NICE's guideline on acutely ill patients in hospital.]

1.5.36 Monitor the mental state of children under 5 years with suspected sepsis. Consider using the Glasgow Coma Score (GCS) or AVPU ('alert, voice, pain, unresponsive') scale.

1.5.37 Alert a consultant to attend in person if a child aged under 5 years with suspected sepsis and any high risk criteria fails to respond within 1 hour of initial antibiotic and/or intravenous fluid resuscitation. Failure to respond is indicated by any of:

- reduced level of consciousness despite resuscitation
- heart rate or respiratory rate fulfil high risk criteria
- lactate over 2 mmol/litre after 1 hour.

1.5.38 Give parenteral antibiotics to infants aged under 3 months as follows:

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

[This recommendation is from NICE's guideline on fever in under 5s.]

Children aged under 5 years who meet 2 or more moderate to high risk criteria

1.5.39 For children aged under 5 years with suspected sepsis and 2 or more moderate to high risk criteria carry out a venous blood test for the following:

- blood culture
- full blood count
- C-reactive protein
- urea and electrolytes
- creatinine
- blood gas for glucose and lactate

- arrange for a clinician[16] to review the person's condition and test results within 1 hour of meeting 2 or more moderate to high risk criteria.

1.5.40 For children aged under 5 years with suspected sepsis who meet 2 or more moderate to high risk criteria and have lactate over 2 mmol/litre or evidence of acute kidney injury, treat as high risk and follow recommendations 1.5.31 to 1.5.38.

1.5.41 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, no evidence of acute kidney injury and in whom a definitive condition cannot be identified:

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

1.5.42 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, no evidence of acute kidney injury and in whom a definitive condition or infection can be identified and treated:

- manage the definitive condition **and**
- if appropriate, discharge with information (see recommendations 1.10.5 and 1.10.6) depending on the setting.

Children aged under 5 years who meet only 1 moderate to high risk criterion

1.5.43 For children aged under 5 years with suspected sepsis who meet only 1 moderate to high risk criterion:

- arrange clinician review within 1 hour of meeting a moderate to high risk criterion for clinical assessment **and**

[16] A 'clinician' should be a medically qualified practitioner who has antibiotic prescribing rights

- perform blood tests if indicated.

1.5.44 For children aged under 5 years with suspected sepsis who meet only 1 moderate to high risk criterion and in whom a definitive condition can be identified and treated:

- manage the definitive condition
- if appropriate, discharge with information depending on setting (see recommendations 1.10.5 and 1.10.6).

1.5.45 For children aged under 5 years 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 injury[17] and in whom a definitive condition cannot be identified:

- repeat structured assessment at least hourly
- ensure review by a senior clinical decision maker within 3 hours for consideration of antibiotics.

Children aged under 5 years with no high risk or moderate to high risk criteria

1.5.46 Arrange clinical assessment[18] of children aged under 5 years who have suspected sepsis and no high risk or moderate to high risk criteria and manage according to clinical judgement.

1.6 Antibiotic treatment

1.6.1 Pre-alert secondary care (through GP or ambulance service) when any high risk criteria are met in a person with suspected sepsis outside of a hospital, and transfer them immediately.

1.6.2 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).

[17] For definition of acute kidney injury, see Acute kidney injury (NICE guideline CG169)].
[18] Clinical assessment should be carried out by a medically qualified practitioner who has antibiotic prescribing rights

1.6.3 Ensure GPs and ambulance services have mechanisms in place to give antibiotics in the pre-hospital setting if transfer time is likely to be more than 1 hour.

1.6.4 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. [This recommendation is adapted from NICE's guideline on antimicrobial stewardship.]

1.6.5 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. [This recommendation is adapted from NICE's guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s.]

1.6.6 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 . [This recommendation is adapted from NICE's guideline on antimicrobial stewardship.]

1.6.7 For people aged up to 17 years with suspected community acquired sepsis of any cause give ceftriaxone 80 mg/kg once a day with a maximum dose of 4g daily at any age. [This recommendation is adapted from NICE's guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s.]

1.6.8 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 ceftriaxone-resistant bacteria, consult local guidelines for choice of antibiotic.

1.6.9 For children younger than 3 months, give an additional antibiotic active against listeria (for example, ampicillin or amoxicillin). [This recommendation is adapted from NICE's guideline on fever in under 5s.]

1.6.10 Treat neonates presenting in hospital with suspected sepsis with intravenous benzylpenicillin and gentamicin. [This recommendation is from NICE's guideline on neonatal infection.]

1.6.11 Treat neonates who are more than 40 weeks postmenstrual 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 postmenstrual age or below or receiving an intravenous calcium infusion use cefotaxime 50 mg/kg.

1.7 Fluids

1.7.1 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. [This recommendation is from NICE's guideline on intravenous fluid therapy in over 16s in hospital.]

1.7.2 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. [This recommendation is from NICE's guideline on intravenous fluid therapy in over 16s in hospital]

1.7.3 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. [This recommendation is from NICE's guideline on intravenous fluid therapy in children and young people in hospital.]

1.7.4 Reassess patient after completion of the intravenous fluid bolus, and if no improvement give second bolus. If there is no

improvement after second bolus alert consultant to attend (in line with recommendations 1.5.7, 1.5.22 and 1.5.37).

1.7.5 Use a pump, or syringe if no pump is available, to deliver fluids for resuscitation to people with suspected sepsis who need fluids in bolus form.

1.7.6 Do not use tetrastarch for fluid resuscitation for people with sepsis. [This recommendation is adapted from NICE's guideline on intravenous fluid therapy in over 16s in hospital.]

1.7.7 Consider human albumin solution 4–5% for fluid resuscitation only in patients with sepsis with shock. [This recommendation is adapted from NICE's guideline on intravenous fluid therapy in over 16s in hospital.]

1.8 Using oxygen

1.8.1 Give oxygen to achieve a target saturation of 94−98% for adult patients or 88−92% for those at risk of hypercapnic respiratory failure.

1.8.2 Oxygen should be given to children with suspected sepsis who have signs of shock or oxygen saturation (SpO_2) of less than 92% when breathing air. Treatment with oxygen should also be considered for children with an SpO_2 of greater than 92%, as clinically indicated. [This recommendation is adapted from NICE's guideline on fever in under 5s.].

1.9 Finding the source of infection

1.9.1 Carry out a thorough clinical examination to look for sources of infection.

1.9.2 Tailor investigations to the person's clinical history and findings on examination.

1.9.3 Consider urine analysis and chest X-ray in all people aged over 5 years with suspected sepsis.

1.9.4 Consider imaging of the abdomen and pelvis if no likely source is identified after clinical examination and initial tests.

1.9.5 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.

1.9.6 Do not perform a lumbar puncture 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 $100x10^9$/litre or receiving anticoagulant therapy
- local superficial infection at the lumbar puncture site
- respiratory insufficiency in children.

[This recommendation is adapted from NICE’s guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s.]

1.9.7 Perform lumbar puncture in the following children with suspected sepsis (unless contraindicated, please see contraindications in recommendation 1.9.6):

- 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.

[This recommendation is adapted from NICE's guideline on fever in under 5s.]

1.10 Information and support for people with sepsis and their families and carers

People who have sepsis and their families and carers

1.10.1 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
- regular and timely updates on treatment, care and progress.

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

1.10.3 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.

1.10.4 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.

Information at discharge for people assessed for possible sepsis, but not diagnosed with sepsis

1.10.5 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.

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

Information at discharge for people at increased risk of sepsis

1.10.7 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.

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

Information at discharge for people who have had sepsis

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

1.10.9 Ensure discharge notifications to GPs include the diagnosis of sepsis.

1.10.10 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.

1.10.11 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.

1.10.12 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.

See NICE's guideline on rehabilitation after critical illness in adults for recommendations on rehabilitation and follow up after critical illness.

See NICE's guideline on meningitis (bacterial) and meningococcal septicaemia in under 16s for follow up of people who have had meningococcal septicaemia.

1.11 Training and education

1.11.1 Ensure all healthcare staff and professionals are given regular appropriate training in sepsis recognition. This includes:

- ambulance clinicians
- allied health professionals
- medical students and doctors of all grades
- healthcare assistants
- midwives
- nurses
- operating department assistants
- receptionists in a clinical setting.

1.11.2 Ensure all healthcare professionals are given regular appropriate training in identifying, assessing and managing sepsis. This should include:

- risk stratification strategies
- local protocols for early treatments, including antibiotics and fluids
- criteria for escalation to critical care.

[The following sentence is for post-consultation versions only] You can also see this guideline in the NICE pathway on [pathway title].

To find out what NICE has said on topics related to this guideline, see our web page on [add and link topic page title or titles].

Context

Sepsis is a clinical syndrome caused by the body's immune and coagulation systems being switched on by an infection. Sepsis with shock is a life-threatening condition that is characterised by low blood pressure despite adequate fluid replacement, and organ dysfunction or failure. Sepsis is an important cause of death in people of all ages. Both a UK Parliamentary and Health Service Ombudsman enquiry (2013) and a UK National Confidential Enquiry into Patient Outcome and Death (NCEPOD, 2015) highlighted sepsis as being a leading cause of avoidable death that kills more people than breast, bowel and prostate cancer combined.

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 are usually very non-specific and can be missed if clinicians do not think 'could this be sepsis?'.

Detailed guidelines exist for the management of sepsis in adult and paediatric intensive care units, and by intensive care clinicians called to other settings. To reduce avoidable deaths, people with sepsis need to be recognised early

and treatment initiated. This guideline aims to ensure healthcare systems in all clinical settings consider sepsis as an immediate life-threatening condition that should be recognised and treated as an emergency. The guideline outlines the immediate actions needed for those with suspicion of sepsis and who are at highest risk of morbidity and mortality from sepsis. It provides a framework for risk assessment, treatment and follow-up or 'safety-netting' of people not needing immediate resuscitation. The intention of this guideline is to ensure that all people with sepsis due to any cause are recognised and initial treatment initiated before definitive treatment on other specific pathways is instituted.

At the time of writing, the terminology around sepsis is changing and new international consensus definitions are imminent. Previous terminology included terms SIRS (systematic inflammatory response syndrome), severe sepsis and septic shock. The guideline recommendations do not use the terms SIRS or severe sepsis, but use the term 'sepsis' and recommends actions according to clinical parameters.

There is significant overlap between this guideline and other NICE guidance, in particular the care of acutely ill patients in hospital (Acutely ill patients in hospital), the assessment and initial management of fever in under 5s, bacterial meningitis and meningococcal septicaemia (Meningitis (bacterial) and meningococcal septicaemia in under 16s), neutropenic sepsis, antibiotics for prevention and treatment of neonatal infection, and pneumonia in adults.

Recommendations for research

The guideline committee has made the following recommendations for research.

1 Creation of a UK sepsis registry

A UK sepsis registry should be established to collect clinical and epidemiological data to provide information to support clinical audit and to inform the research agenda.

Why this is important

The lack of robust UK based epidemiological studies and a lack of coordinated service evaluation within the NHS has been clear throughout the guideline development process. The development of a UK register would allow collection of information about where sepsis is being treated, patient interventions and patient outcomes. This would support audit, provide comparative information for clinicians about performance of institutions and provide population based statistics on epidemiology of sepsis. Complex healthcare interventions, such as trauma services, have benefited greatly from robust, standardised and centralised registries that have gathered epidemiological, service evaluation and outcome data. Subsequent improvements in services have then been developed in a data driven strategy. The mortality and morbidity and service complexity associated with severe infection justifies a similar investment in an NHS registry for patients with severe infection, gathering data on all patients meeting the NICE high risk criteria.

2 A complex service evaluation of implementation of NICE Sepsis guideline

What effect will the NICE sepsis guideline have on patient care processes and outcomes in the UK over the next 5 years?

Why this is important

Implementation of NICE's guideline on sepsis will be a challenge to the NHS. A robust evaluation of how NHS service providers adhere to the recommended care processes needs to be carried out over the next 5 years.

A complex evaluation is needed to understand the effect of guidelines on services and on patient outcomes. Evaluation should include assessment of costs and cost effectiveness, the use of a universal audit tool for sepsis patient care that includes evaluation of pre-hospital and secondary care and monitoring of broad spectrum antibiotic use, development of multi-resistant organisms and incidence of antibiotic-related infection such as *C. difficile*.

3 Use of biomarkers to diagnose and initiate treatment

What is the clinical and cost effectiveness of procalcitonin (PCT) point-of-care tests at initial triage for diagnosis of serious infection and the initiation of appropriate antibiotic therapy?

Why this is important

There is an urgent clinical need for accurate biomarkers of serious bacterial infection (SBI) which provide early diagnosis of SBI, and prompt clinical interventions to improve outcomes. The current tests used in the NHS (white cell count and C-reactive protein) are non-specific and not sensitive enough. Biomarker-guided initiation and termination of antibiotic therapy might be an effective strategy to reduce unnecessary antibiotic use and help prevent further multidrug resistance. The NICE diagnostic guidance on procalcitonin for diagnosing and monitoring sepsis has shown there is not enough evidence in this area.

4 Validation of clinical early warning scores in pre-hospital and emergency care settings

Can early warning scores for example NEWS (national early warning scores for adults) and PEWS (paediatric early warning score) be used to improve the detection of sepsis and facilitate prompt and appropriate clinical response in pre-hospital settings and in emergency departments?

Why this is important

Delay in detecting and treating sepsis increases mortality. Early detection and appropriate management will reduce morbidity and mortality and will reduce NHS costs by reducing critical care admissions, inappropriate antimicrobial use and length of hospital stay. No high quality data exist on the validation or use of early warning scores in pre-hospital settings or in the emergency department settings. The use of scores might improve communication between pre-hospital settings and hospital settings and allow recognition of people who need more urgent assessment.

5 Derivation of clinical decision rules in suspected sepsis

Is it possible to derive and validate a set of clinical decision rules or a predictive tool to rule out sepsis which can be applied to patients presenting to hospital; with suspected sepsis?

Why this is important

In primary care and emergency departments people with suspected sepsis are often seen by relatively inexperienced doctors. Many of these people will be in low and medium risk groups but evidence is lacking as to who can be sent home safely and who needs intravenous or oral antibiotics. The consequences of getting the decision making wrong can be catastrophic and therefore many patients are potentially over-investigated and admitted inappropriately. Current guidance is dependent on use of individual variables informed by low quality evidence.

ISBN