Sepsis

"I think Lisa's got that septicaemia thing that was on the news."

Twenty month old Lisa was happily driving Thomas the Tank Engine along my couch while making 'choo-choo' sounds. I have to confess, at that stage septicaemia wasn't top of my differential list!

"I don't know doctor, maybe I'm making a fuss, but I just don't feel right."

John was 55 and had only 2 entries in his notes during the past 8 years. Probably not a fusser then!

He didn't really have many symptoms – a bit achy, a bit of a cough, but he had a temperature of 39°C, a marked tachycardia and his blood pressure was 80/40. He was indeed 'not right'– it turned out that he had strep. pneumonia and septicaemia.

Two consecutive patients: if only it was that easy to separate the sick from the healthy each time!

Sepsis statistics

- Each year in the UK, there are 100 000 admissions to hospital and 37 000 deaths from sepsis (J of Antimicrobial Chemo 2011;66(Supp ii):11).
- In the UK, more people die of sepsis each year than of breast, bowel and prostate cancer combined.

NICE guidance on sepsis published in July 2016 highlights the challenges of spotting sepsis: signs and symptoms can be very non-specific, so a high index of suspicion is needed. If clinicians do not ask themselves 'Could this be sepsis?', the opportunity to intervene and avoid death may be missed.

In hospitals, there are now clear protocols for recognising and managing sepsis. In primary care, our job is in some ways much harder, because people present at an earlier stage in most illnesses, when the signs are subtler.

NICE did not recommend the use of early warning sepsis scores in primary care (although such tools are available, e.g. from The UK Sepsis Trust). It did recommend clear assessment of risk factors for sepsis and documenting key observations - not just the obvious ones such as pulse and blood pressure, but also skin changes, urine output and, perhaps most challenging, assessing mental state to look for subtle changes in behaviour or function.

NICE guidance on sepsis

The key messages from the NICE guidance on sepsis are (NG 51, 2016):

- Be very mindful of sepsis and consider it in anyone presenting with symptoms or signs of possible infection.
- **Many factors increase the risk of sepsis –** these include young or old age, pregnancy and skin wounds, including from surgery. Extra caution should be used in these people.
- Careful history and examination, with close attention to vital signs, mental state, skin colour and urine output is needed. **Remember that people with sepsis may not have a fever!**
- **Stratify risk** (based on the observations outlined later) into **moderate-high risk** or **high risk** of severe illness/death from sepsis.
- Many observations may be normal even in the presence of sepsis – for example, people may not have a fever. Take any single abnormal observation seriously.
- **If any single high risk criteria is present, admit urgently** (usually by 999 ambulance).
- **If a single moderate-high risk criteria is present, it may be possible to manage the person in primary care, but only if a definitive diagnosis can be made.** Very careful safety netting is required. In those with impaired immunity from drugs (including oral steroids) or disease (including diabetes), urgent admission may be indicated.

I have summarised the guidance, including the risk factors, features used to stratify risk (with the cut offs for each age group) and management, overleaf.

NICE guidelines on sepsis (NICE NG51, 2016)

- **Always ask yourself 'Could this be sepsis?' in people presenting with signs and symptoms of infection.**
- If yes, use the risk factors below, and your clinical judgement, to decide if sepsis is a real possibility (if you are doing telephone triage this may only be symptoms such as 'feeling more breathless' or the carer reporting someone is more confused).
- If sepsis is a real possibility, assess the patient (see 'assessment' section below). Using the information gathered during assessment, stratify the risk of severe illness/death using the charts overleaf, and manage accordingly.

Remember, people may have non-specific, non-localised presentations (e.g. just feeling very unwell, subtle changes in behaviour) and **may not have a fever**. In those who can't give a good history (age, communication problems, memory issues), take extra care.

Risk factors for sepsis

General risk factors for sepsis

Age
- Under 1.
- Over 75y.
- Frail people of any age.

Impaired immune system
- **Diseases** that impair immune system, including diabetes, asplenic patients, sickle cell disease.
- **Drugs** that impair the immune system: long-term oral steroids, other Immunosuppressant drugs (e.g. for rheumatoid arthritis) and cancer chemotherapy.

Skin breaches
- Surgery/invasive procedure in last 6w.
- Indwelling lines/catheters.
- Wounds (burns, cuts, skin infections).
- Intravenous drug misusers.

Pregnancy and 6w post-partum

Pregnant women, and those who have given birth in the past 6w, are at high risk of sepsis. This includes after miscarriage and termination of pregnancy.
- Invasive procedure (including forceps delivery, caesarean delivery, removal of retained product of conception).
- Prolonged rupture of membranes.
- Have had close contact with someone with a grp A haemolytic strep infection (e.g. scarlet fever).
- Impaired immunity due to illness or drugs (including diabetes and gestational diabetes).
- Continued vaginal bleeding/offensive vaginal discharge.

Neonates

Maternal factors
- Invasive grp B infection in previous baby.
- Maternal grp B strep colonisation, bacteriuria or infection in this pregnancy.
- Maternal intrapartum fever (>38°C).
- Maternal parenteral antibiotics given for suspected invasive bacterial infection (e.g. sepsis) during labour/24h after birth (not prophylactic antibiotics).

Infant factors
- Premature rupture of membrane.
- Preterm birth (<37w).
- If preterm birth, suspected/confirmed rupture of membranes more than 18h.
- Confirmed/suspected chorioamnionitis.
- In a multiple pregnancy, suspected infection in another baby.

Assessment

➢ **Use the tables overleaf to stratify risk of sepsis and appropriate action to take.**

Measure the following:
- Temperature.
- Pulse.
- Respiratory rate and oxygen sats.
- BP if ≥12y, capillary refill time if <12y.
- Skin colour (pallor, cyanosis, mottling).

Ask about:
- Mental state (behaviour, functioning).
- Recent fevers or rigors.
- Frequency of urination in past 18h.

Examine patient:
- Look for possible source of infection (including any skin wounds or rash).
- Don't forget to check the urine!

Warnings and cautions with vital signs

Temperature	• **Temperature may be normal, low or high.** • The very young, the old, the frail and those having cancer treatment may not mount a fever response.
Heart rate	• Very fit people: remember 'normal' may be lower than the figures quoted in the very fit. • Pregnancy: baseline pulse is 10-15bpm higher. • Older people: pulse rate may not rise in response to infection, but may develop a new arrhythmia.
BP	• When interpreting BP, be aware of what is 'normal for them'. • In children and young people, a normal BP does not exclude sepsis.
Mental state	• Look for changes from normal cognitive state/functioning. Changes may be subtle: ask family members. • In children, and in adults with dementia, changes in cognitive state may present as irritability or changes in behaviours (and in dementia, functional ability).
Oxygen	• Peripheral oxygen saturations may be difficult to measure in sepsis because of peripheral shut down.

Once you have decided someone needs admission (see overleaf): refer immediately (usually 999)

Oxygen
- Adults: give oxygen if needed to achieve sats of 94-98% (88-92% if risk of hypercapnic respiratory failure (e.g. COPD)).
- Children: give oxygen to children if saturations ≤90%.

Antibiotics
- If meningococcal sepsis is suspected (fever and purpuric rash), give parenteral antibiotics (usually benzylpenicillin) in the community, but do not let this delay transfer to hospital.
- For all types of sepsis, if transfer to hospital will take >1h, GPs/ambulance services should have mechanisms in place to give antibiotics in the community.

Stratifying risk of severe illness/death if sepsis suspected (NICE NG51, 2016)

From 12 years of age (including adults)

MODERATE-HIGH risk of severe illness/death					HIGH risk of severe illness/death		
History of new change in behaviour/mental state History of acute deterioration in functional ability				Mental state	Objective evidence of new altered mental state		
Signs of potential infection (redness, swelling or discharge at surgical site or breakdown of wound				Skin	Mottled/ashen skin or cyanosis (skin/lips/tongue) Non-blanching rash		
Not passed urine for 12-18h				Urine output	Not passed urine for 18h		
Impaired immunity (illness/drugs incl. oral steroids) Trauma, surgery or invasive procedure in past 6w				Medical history			
Temp	Respiration	BP	Pulse	Vital signs	Pulse	BP	Respiration
<36C	RR 21-24	SBP 91-100	P 91-130 (Pregnant: 100-130) or new arrhythmia		P ≥130	SBP ≤90 or SBP >40 below normal	RR≥25
If ANY moderate-high risk criteria: Can definitive diagnosis be **made & treated?** **If yes: treat if safe to do so: safety-net clearly.** **If no: admit urgently (999).**					**If ANY high risk criteria:** **admit urgently (999)**		

CHILDREN 0-11y

MODERATE-HIGH risk of severe illness/death					HIGH risk of severe illness/death			
Not responding normally to social cues Decreased activity Parental/carer concern child is behaving differently **And if 0-5y:** No smile Wakes only with prolonged stimulation				Mental state	Appears ill to a healthcare professional Does not wake or if roused does not stay awake **And if 0-5y:** Weak high-pitched/continuous cry No response to social cues			
Leg pain Cold hands or feet **And if 0-5y:** Pale or flushed				Skin	Mottled or ashen skin Cyanosis of skin, lips or tongue Non-blanching rash			
Reduced urine output				Urine output				
Temp	Cap refil	O_2 sats	Resp rate	Pulse	Vital signs	Pulse	Resp rate	O_2 sats	Temp
No criteria except >39°C if 3-6m	Capillary refill time ≥3sec	90-92% or nasal flaring	50-59	150-159	Under 1y	<60 or ≥160	≥60	<90% grunting or apnoea	<36°C at any age (or if <3m ≥38°C)
			40-49	140-149	1-2y	<60 or ≥150	≥50		
			35-39	130-139	3-4y	<60 or ≥140	≥40		
		90-92%	24-28	120-129	5y	<60 or ≥130	≥29	<90%	
			24-26	110-119	6-7y	<60 or ≥120	≥27		
			22-24	105-114	8-11y	<60 or ≥115	≥25		
If ANY moderate-high risk criteria: **If IMPAIRED IMMUNITY - admit urgently (999).** **IF NORMAL IMMUNITY -** Can a definitive diagnosis be made & treated? **If yes: treat if safe to do so: safety-net clearly.** **If no: admit urgently (999).**					**If ANY high risk criteria:** **admit urgently (999)**			

LOW RISK (but take any single abnormal sign seriously)	<1y	1-2y	3-4y	5y	6-7y	8-11y	≥12y
RR	<50	<40	<35	<24	<24	<22	<21
Pulse (Note: if under 12y, pulse <60 is a high risk criteria)	<150	<140	<130	<120	<110	<105	<91

These guidelines are not without their challenges:

- The criteria for children are based on age, but do bear in mind children vary hugely in size!
- Can I remember that for an 8 year old a respiratory rate of 22 is normal, 22-24 is moderate-high risk, and 27 and more is high risk? No! But I can remember the upper limits of normal (in the green table) which may be most useful when screening people for sepsis!

But as NICE reminds us: if we don't ask ourselves 'Could this be sepsis?' in those presenting with signs and symptoms indicating possible infection, we may well miss it – the symptoms can be subtle, and fever may be absent!

TH	**Sepsis** • The NICE guidance on sepsis reminds us of the challenges in spotting the diagnosis. • Always think 'Could this be sepsis?' in those who present with features that could be an infection. • Look for risk factors for sepsis (which include extremities of age, frailty, pregnancy and skin wounds, including from surgery) and use your clinical judgement, based on whatever information you have, to decide if sepsis is a real possibility. (If you are doing telephone triage, this may only be symptoms such as 'feeling more breathless' or the carer reporting someone is more confused.) • If sepsis is a real possibility, take a careful history and examination, paying close attention to vital signs, mental state, skin colour and urine output. • Remember people may have non-specific, non-localised presentations (e.g. just feeling very unwell, subtle changes in behaviour) and **may not have a fever**. In those who can't give a good history (age, communication problems, memory issues), take extra care. • After thorough assessment, stratify risk based on these factors into moderate-high risk or high risk of severe illness/death from sepsis. • If any single high risk criteria is present, admit urgently. • If a single moderate-high risk criteria is present, it may be possible to manage the person in primary care, but only if a definitive diagnosis can be made. Very careful safety netting is required. • In those with impaired immunity, urgent admission may be indicated, even in the absence of high risk features.
FI	*How often do you document the vital signs suggested by NICE?* *Do you have a sats monitor? Does it work on small children?* *Can you remember the cut offs for each age for vital signs? Would it help to photocopy this article and pin it on the wall in your consulting room?*
OR	
MN	My notes