Sepsis

Dr Catherine Mitchell

November 2018

Introduction

- The Burden of Sepsis
- The New Sepsis Definitions
- NICE guidelines July 2016
- Sepsis Management
- Antibiotic Choice
- Antimicrobial Stewardship
- Post Sepsis Syndrome

Mortality Risk?

- 59yr old with large inferior STEMI?
- 27yr old man with multi regional trauma (GCS 6)
- 65yr old lady with bleeding ulcer BP 90/60
- 74yr old lady p65, BP 105/60, RR 24 temp 25 initial SpO2 85% air

  (i.e red flag sepsis)?
- 32yr old lady with DKA

  (pH 6.9 HCOx3 9)

Mortality Risk?

- 59yr old with large inferior STEMI? 5%
- 27yr old man with multi regional trauma (GCS 6) 7%
- 65yr old lady with bleeding ulcer BP 90/60 11%
- 74yr old lady p65, BP 105/60, RR 24 temp 25 initial SpO2 85% air (i.e red flag sepsis)? 25%
- 32yr old lady with DKA (pH 6.9 HCOx3 9) <1%

Every year in the UK there are 150,000 cases of Sepsis, resulting in a staggering 44,000 deaths – more than bowel, breast and prostate cancer combined.

The UK Sepsis Trust (UKST) was established as a charity in 2012 with the objective of saving 12,500 lives every year. We are committed to changing the way the NHS deals with Sepsis, to increasing public awareness and supporting those affected by Sepsis. Every penny you donate is valuable in helping us achieve our goals, together we can help to mend Sepsis.

Understanding Sepsis

Sepsis is a life threatening condition that arises when the body's response to an infection injures its own tissues and organs. Sepsis leads to shock, multiple organ failure and death especially if not recognized early and treated promptly.

What is Sepsis?

Do I have sepsis?

About us

We are a UK based grassroots charity passionate about mending sepsis. Our core team are driven as they continue to work in hospitals while committing pro-bono to advancing the sepsis agenda. Learn more about what we do at UKST.

Who we are

What we do

Who we are

At the UK Sepsis Trust, we recognise the scale and significance of the impact of severe sepsis on sufferers and their families. Although many patients return to a normal life, those who survive the condition may experience longstanding physical effects, and some suffer from psychological difficulties resulting from their prolonged illness.

Thousands dying of sepsis because of poor NHS care: Delays in diagnosis means chances to save lives are being missed

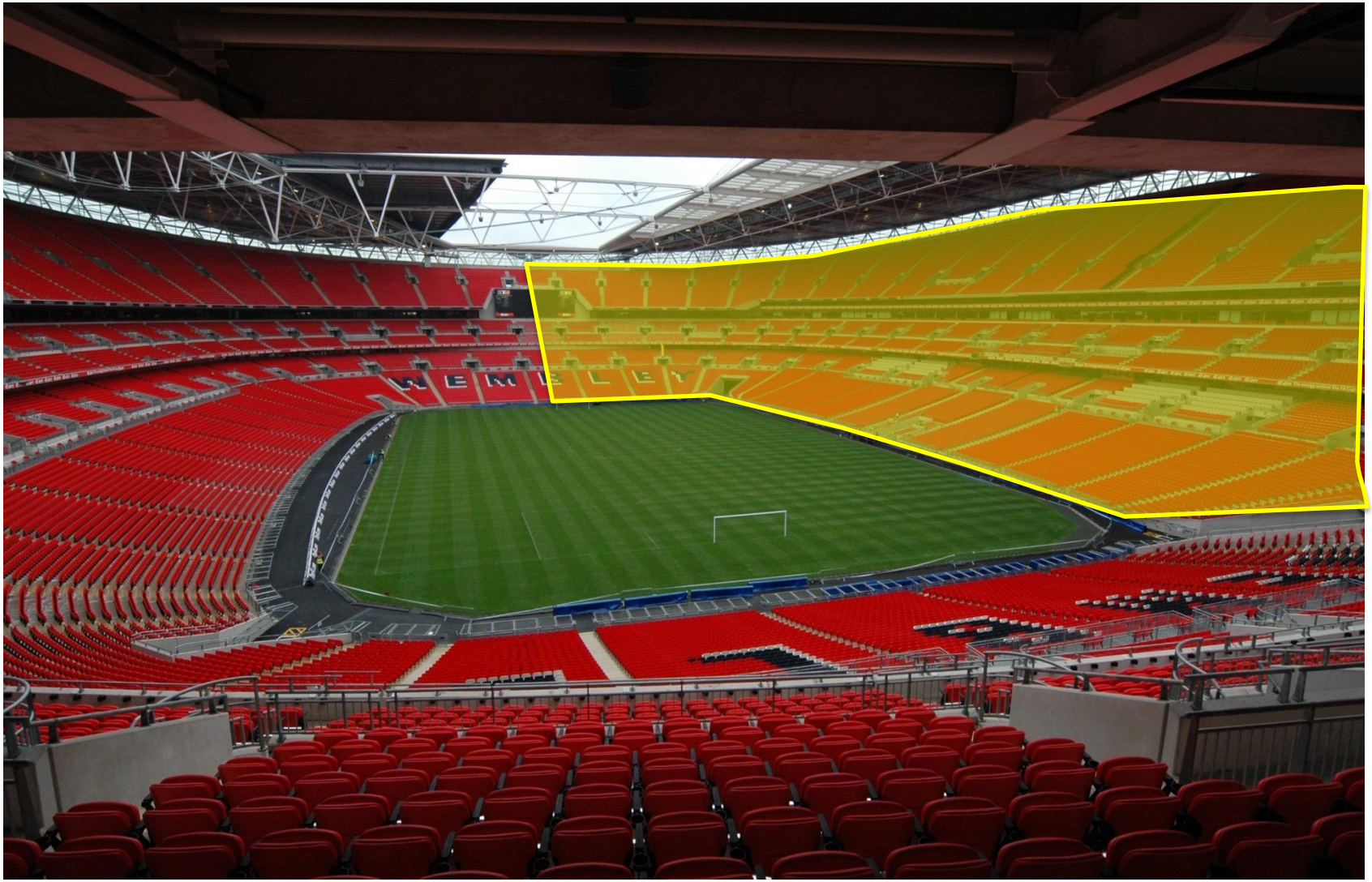
- The delays are causing almost 13,000 deaths a year, say experts
- They also cost the health service money through longer stays
- Health ombudsman said 'it is time for the NHS to act'

By JENNY HOPE FOR THE DAILY MAIL

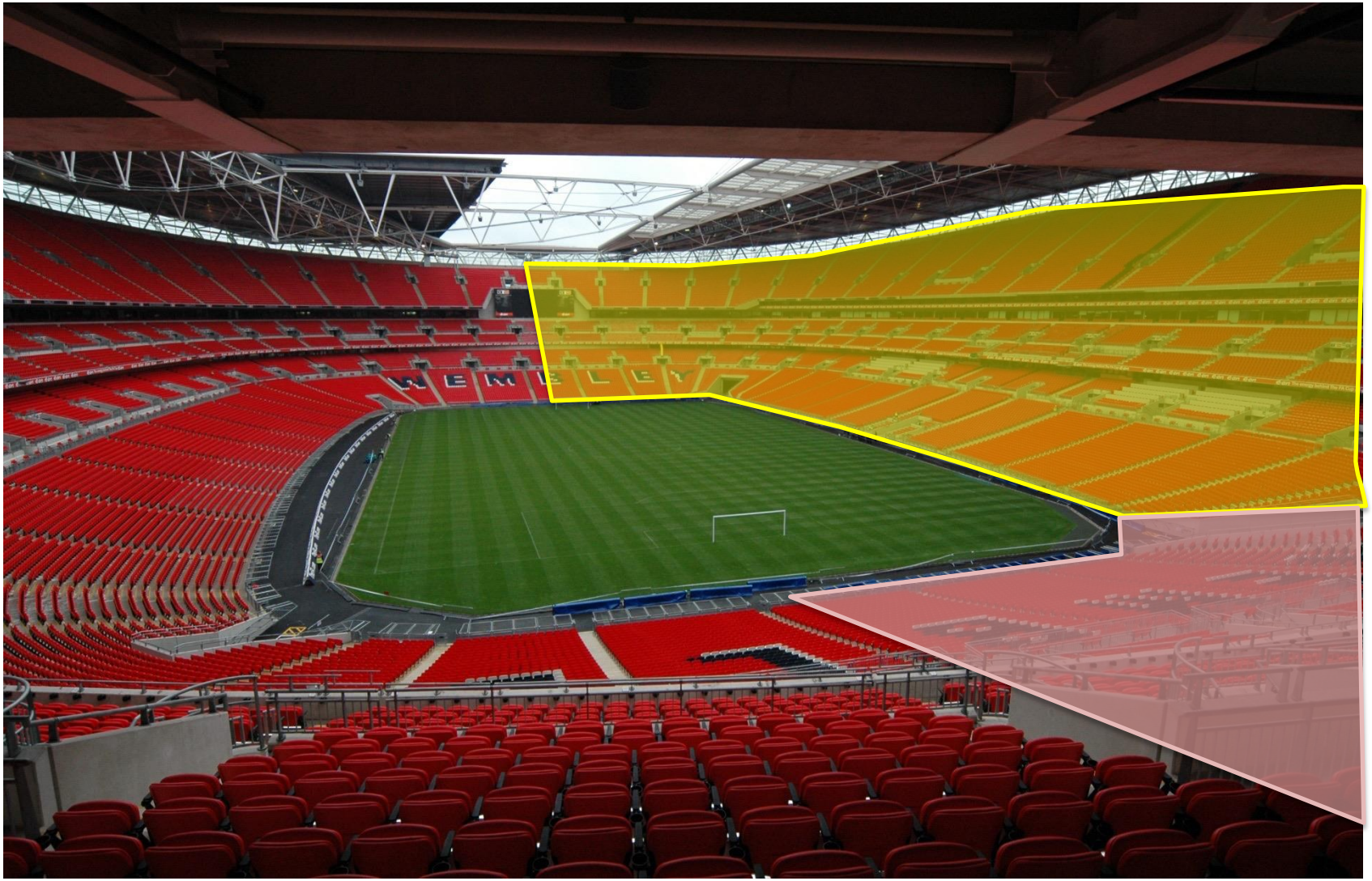
PUBLISHED: 23:57, 12 September 2013 | UPDATED: 23:58, 12 September 2013

Wembley stadium – capacity 90,000

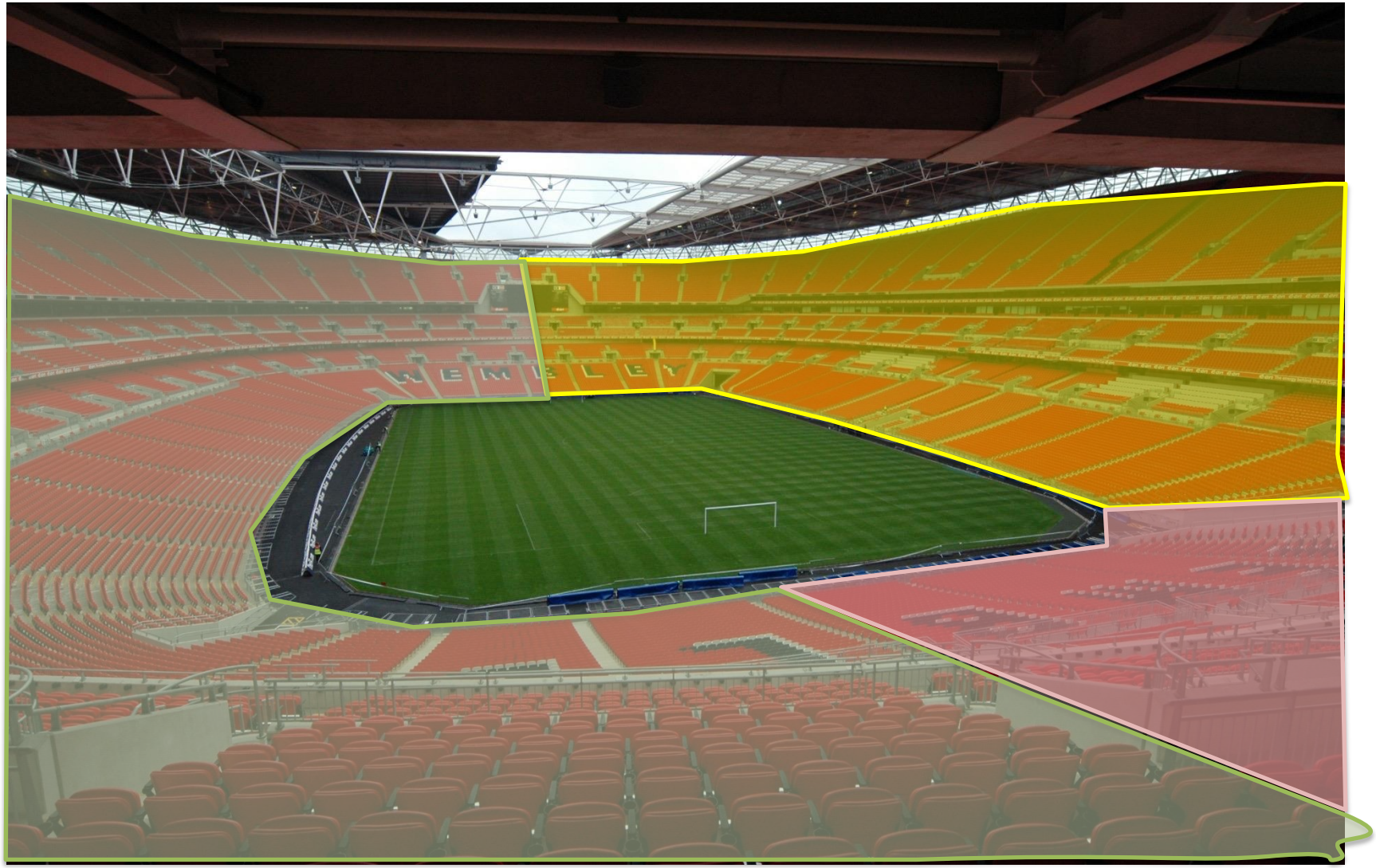
Lung Cancer – 35,895 in 2014



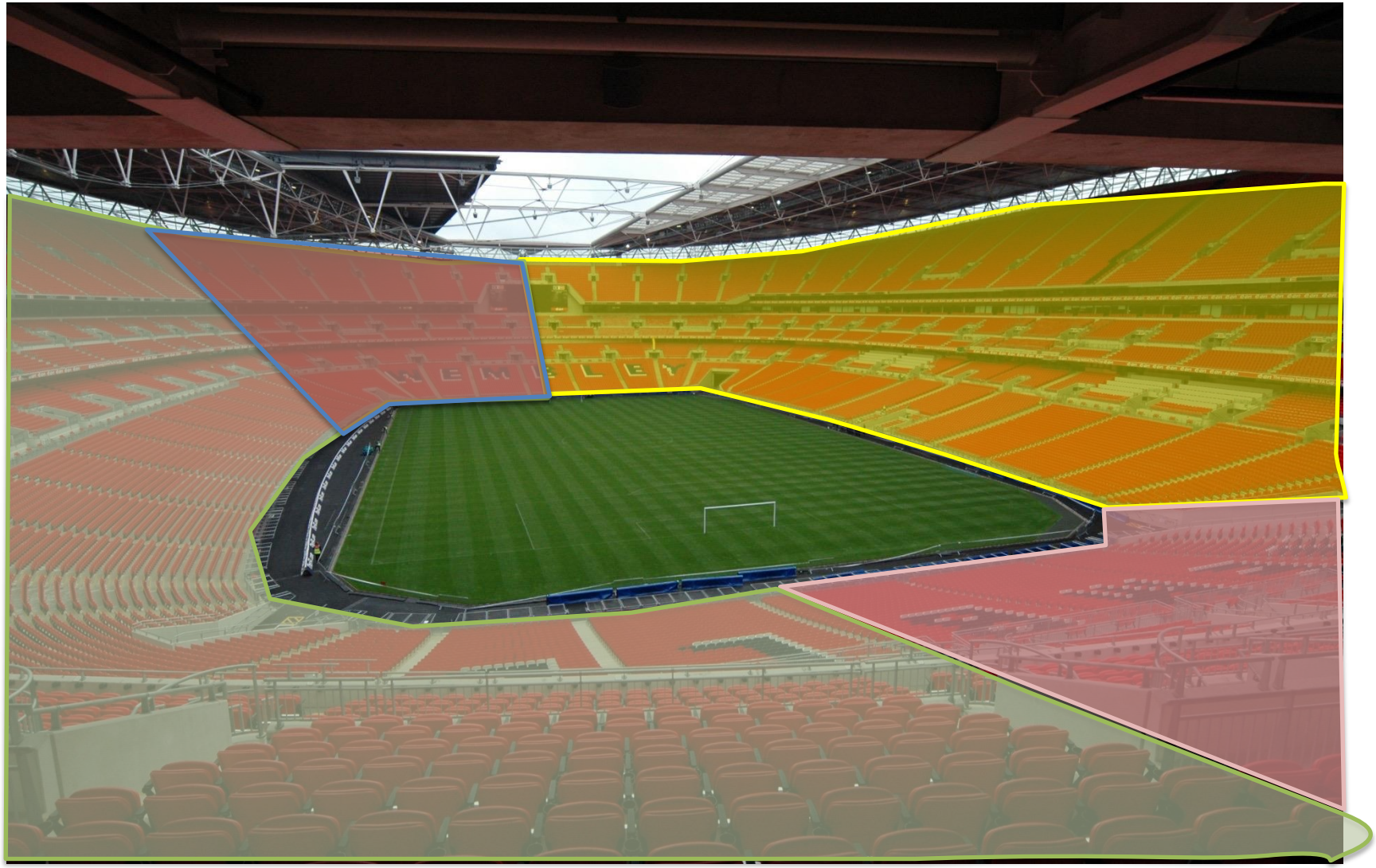
Breast Cancer – 11,443 in 2014



Sepsis– 44,000 Annually



Sepsis– 13,000 ? Preventable



Define Sepsis

- Technical definition

- Definition in lay terms

All Change….

February 23, 2016, Vol 315, No. 8 >

< Previous Article Next Article >

Special Communication | February 23, 2016

CARING FOR THE CRITICALLY ILL PATIENT

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) FREE

Mervyn Singer, MD, FRCP[1]; Clifford S. Deutschman, MD, MS[2]; Christopher Warren Seymour, MD, MSc[3]; Manu Shankar-Hari, MSc, MD, FFICM[4]; Djillali Annane, MD, PhD[5]; Michael Bauer, MD[6]; Rinaldo Bellomo, MD[7]; Gordon R. Bernard, MD[8]; Jean-Daniel Chiche, MD, PhD[9]; Craig M. Coopersmith, MD[10]; Richard S. Hotchkiss, MD[11]; Mitchell M. Levy, MD[12]; John C. Marshall, MD[13]; Greg S. Martin, MD, MSc[14]; Steven M. Opal, MD[12]; Gordon D. Rubenfeld, MD, MS[15,16]; Tom van der Poll, MD, PhD[17]; Jean-Louis Vincent, MD, PhD[18]; Derek C. Angus, MD, MPH[19,20]

[+] Author Affiliations

JAMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287.

Text Size: A A A

Article | Figures | Tables | References | Responses | CME

‘New’ Sepsis

- ‘Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection’

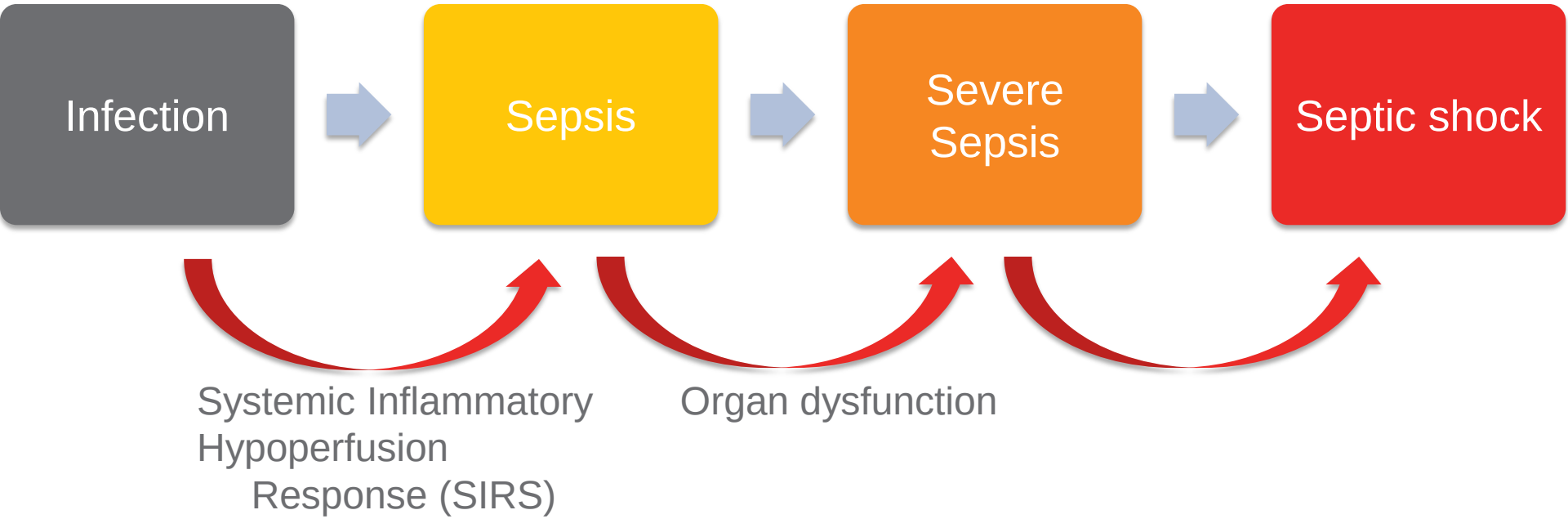
- In lay terms, sepsis is a life-threatening condition that arises when the body’s response to an infection injures its own tissues and organs.

Septic Shock

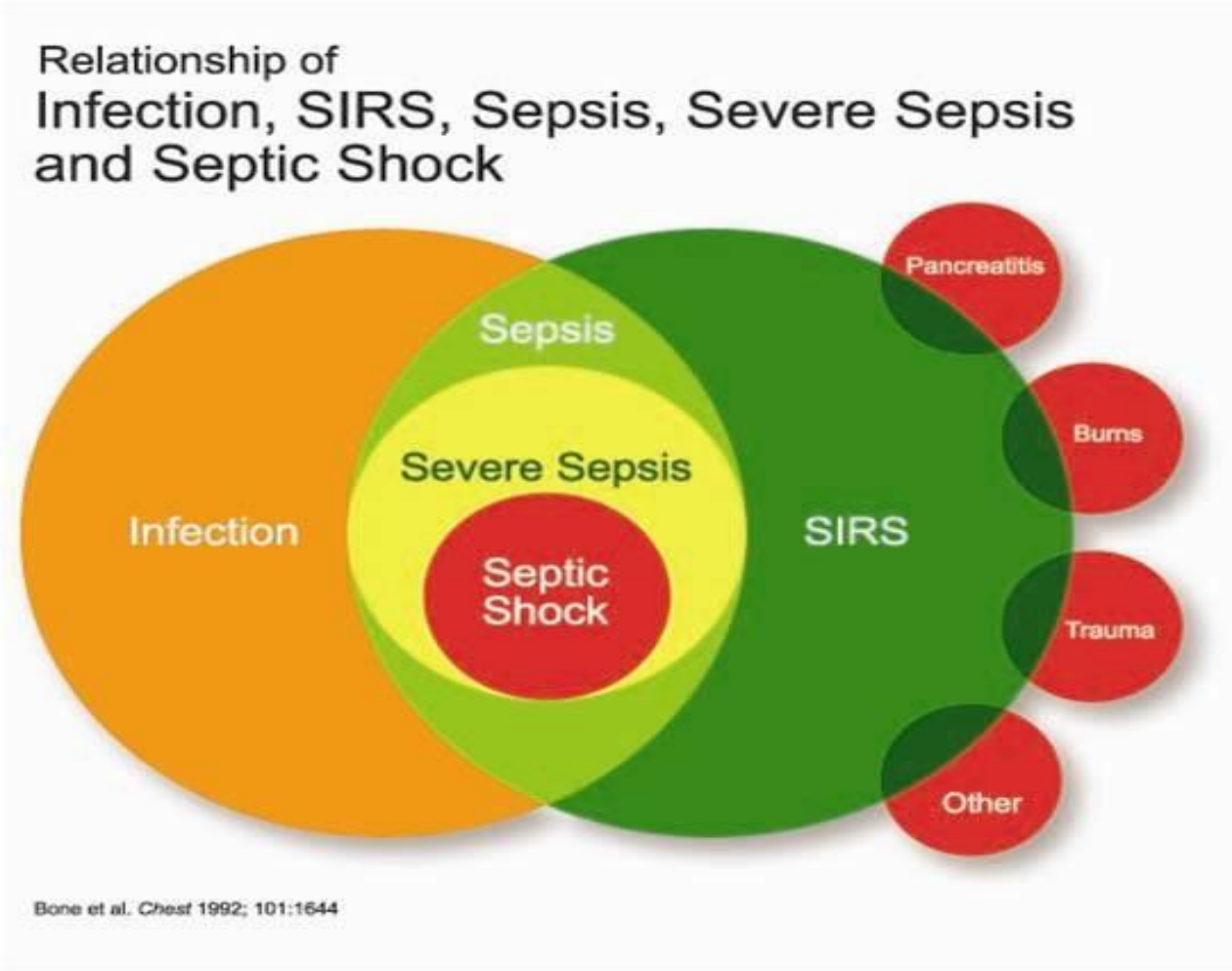
- Patients with septic shock can be identified with a clinical construct of sepsis with persisting hypotension requiring vasopressors to maintain MAP ≥65 mm Hg and having a serum lactate level >2 mmol/L (18 mg/dL) despite adequate volume resuscitation.
- With these criteria, hospital mortality is in excess of 40%.

‘Old’ Sepsis

‘A Systemic Inflammatory Response Caused By Infection’



‘Old’ Sepsis


Relationship of
Infection, SIRS, Sepsis, Severe Sepsis and Septic Shock
Infection
Sepsis
Severe Sepsis
Septic Shock
SIRS
Pancreatitis
Burns
Trauma
Other
Bone et al. Chest 1992; 101:1644

qSOFA and SOFA

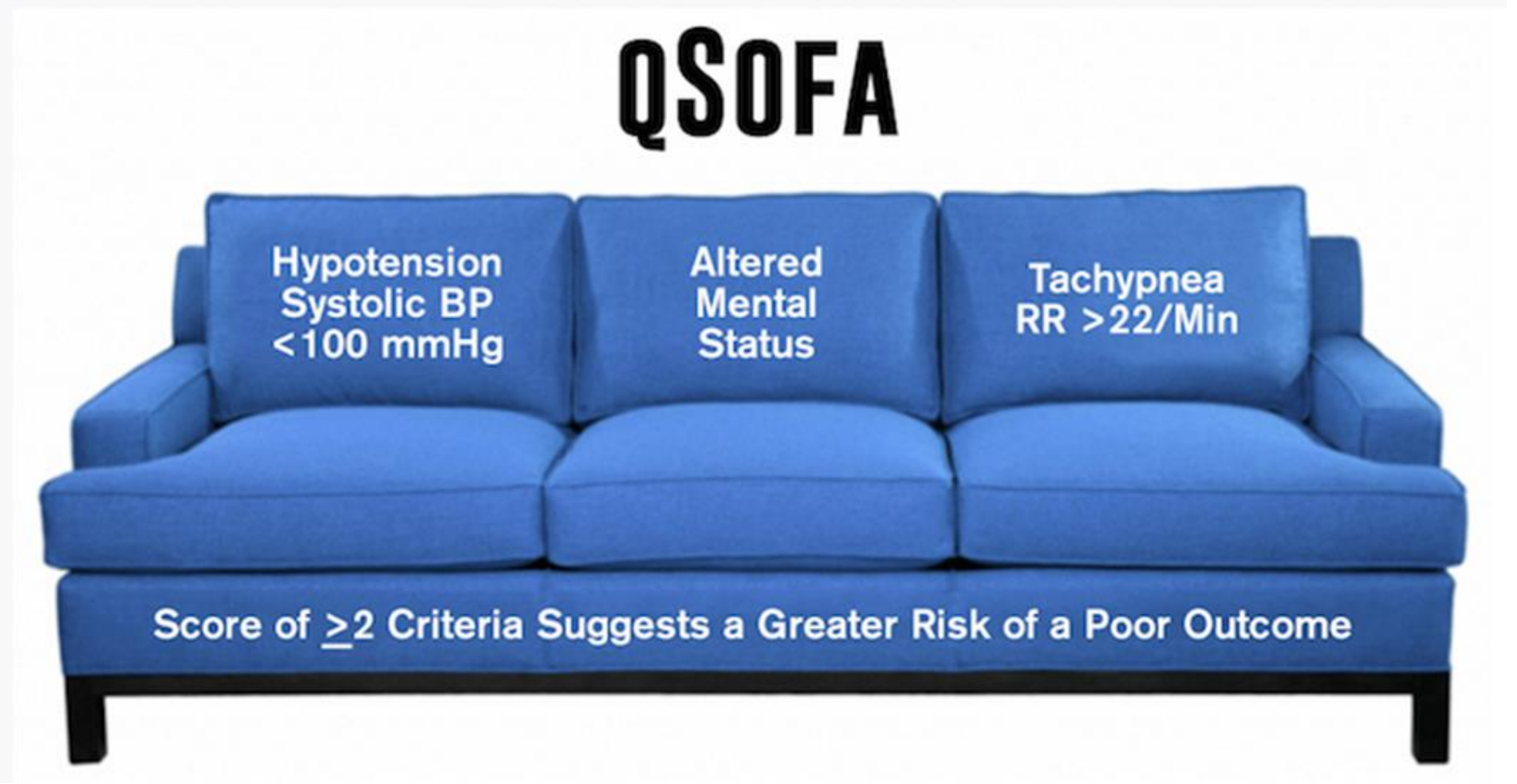
qSOFA

- Quick Sepsis related Organ Failure Assessment
- Patients with a suspected infection who are likely to have a prolonged ICU stay or die in hospital can be promptly identified with qSOFA

- Altered mental state
- Systolic BP≤100mmHg
- Resp rate ≥22/min

SOFA

- Organ dysfunction = an acute change in total SOFA score ≥2 points consequent to infection.
- The baseline SOFA score can be assumed to be zero in patients not known to have pre existing organ dysfunction.
- A SOFA score ≥2 reflects an overall mortality risk of approximately 10% in a general hospital population with suspected infection.


QSOFA
Hypotension
Systolic BP
<100 mmHg
Altered
Mental
Status
Tachypnea
RR >22/Min
Score of ≥2 Criteria Suggests a Greater Risk of a Poor Outcome

qSOFA Summary

- Sepsis is change in SOFA Score of 2 or more due to infection
- Mortality 10%
- qSOFA can be used to identify these patients quickly and easily

- Septic Shock
- MAP<65mmHg and Lactate>2mmol/l
- Mortality 40%

Singer M et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). JAMA 2016; 315(8): 801 – 810

qSOFA or Red Flag

qSOFA

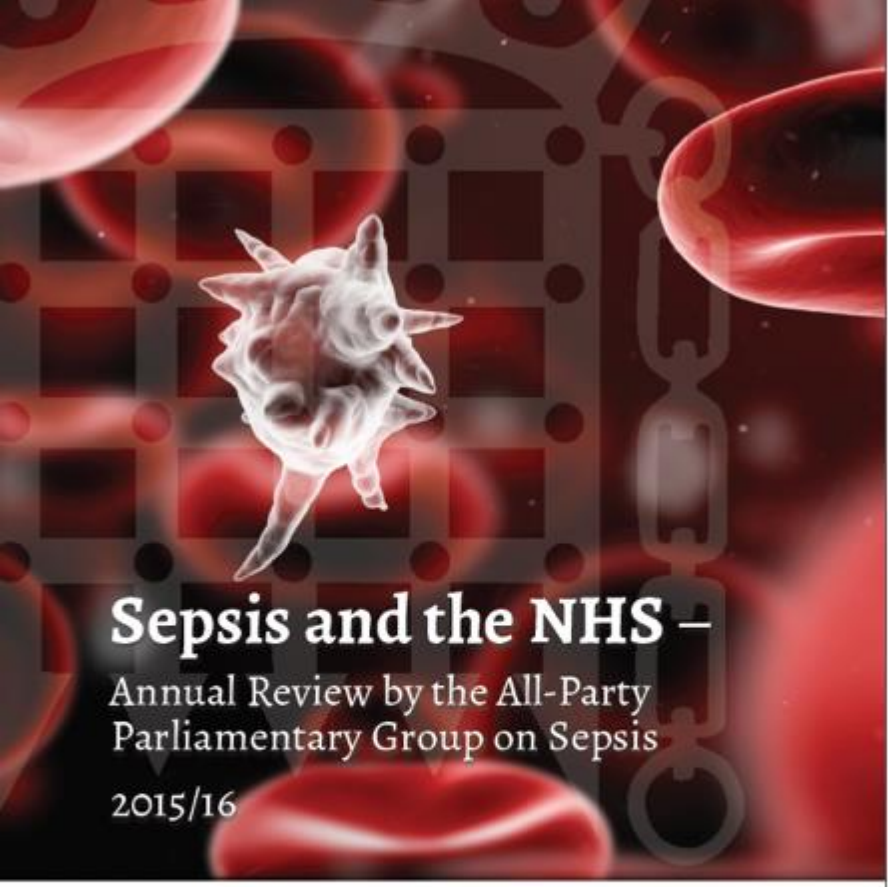
- GCS < 15
- SysBP <100mmHg
- RR > 22

Red Flag

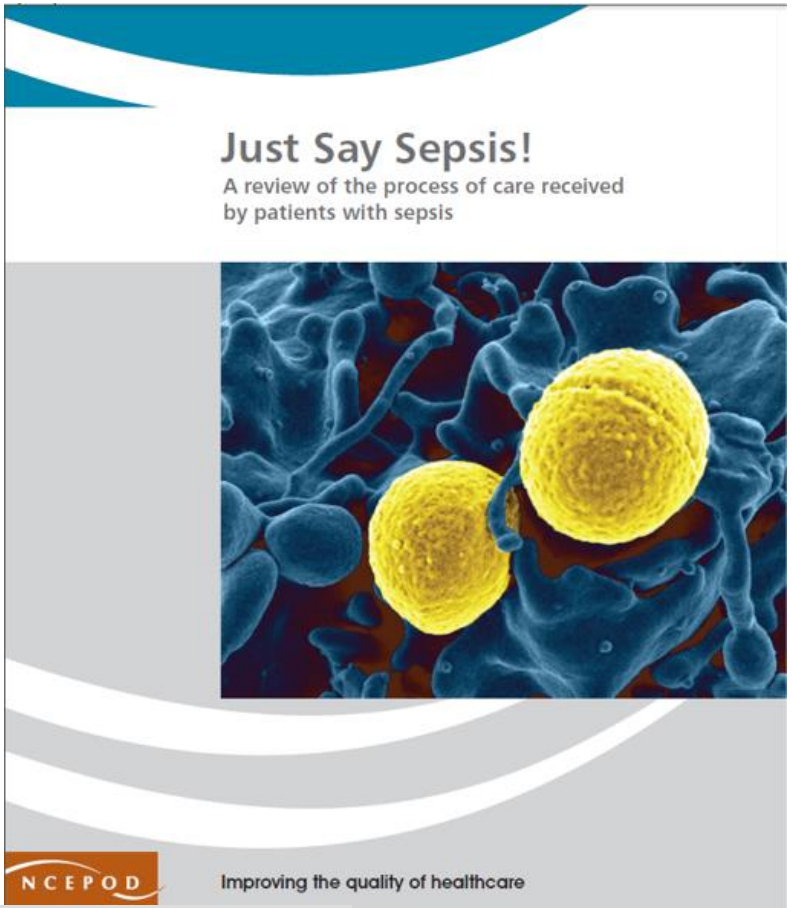
- SysBP < 90 mmHg
- Lactate > 2mmol/l
- HR> 130 bpm
- RR > 25 pm
- O2sats < 91%
- V/P/U on AVPU
- Purpuric rash
- Not passed urine 18hrs / <0.5mls/Kg/hr
- Neutrophils <0.5

Uptake of qSOFA

The NICE guidance says: “The Guideline Development Group were aware that qSOFA did not identify about 20% of people at risk of mortality and the moderate to high risk criteria in the [NICE] guideline do result in a wider group being assessed but not getting immediate antibiotics.”



appg ALL-PARTY PARLIAMENTARY GROUP ON SEPSIS



NHS
National Institute for Health and Clinical Excellence

Treat sepsis 'the same as heart attacks'

By Smitha Mundasad
Health reporter

13 July 2016 | Health

Share

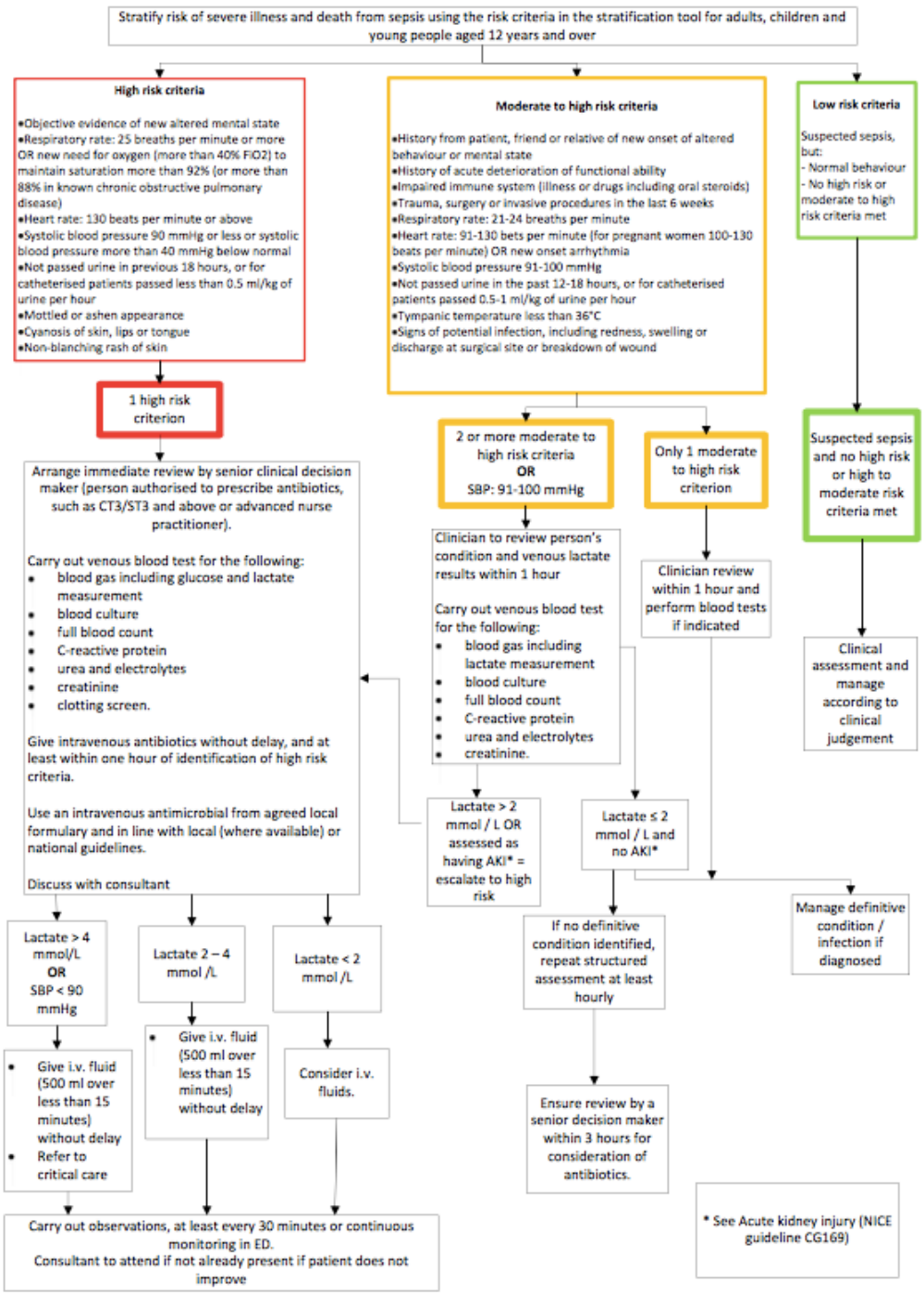
Suspected sepsis in patients must be treated as an emergency in the same way as heart attacks are, England's health watchdog says.

National Institute of Health and Care Excellence guidance urges medics to consider sepsis early on when treating any patients unwell with infections.

The problem, **caused when the body's immune system overreacts to infection**, leads to 44,000 UK deaths a year.

But experts estimate between 5,000 and 13,000 could be avoided.

Managing suspected sepsis in adults and young people aged 18 years and over - in an acute hospital setting



Sepsis: recognition, diagnosis and early management

NICE guideline [NG51] Published date: July 2016 Last updated: July 2016 Uptake of this guidance

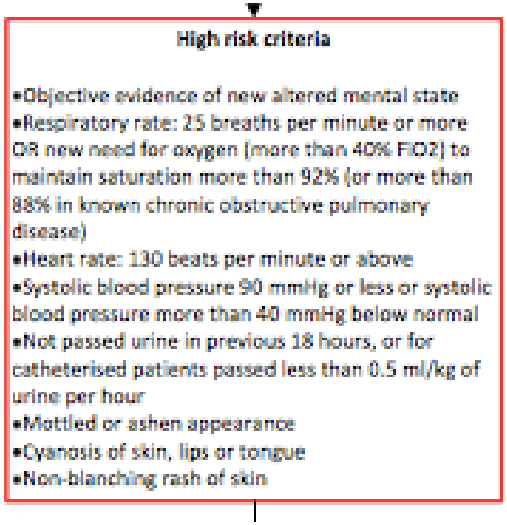
Guidance

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.

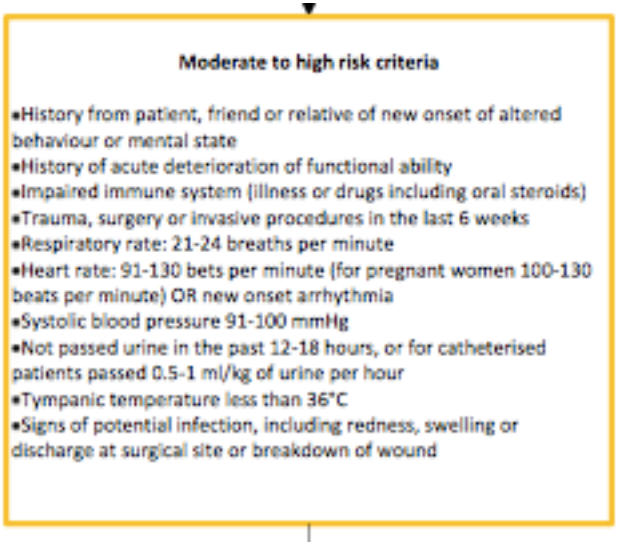
In July 2016, the accompanying algorithms and risk tables had some minor typographical errors corrected. Also, references to systolic blood pressure levels wrongly included in some algorithms for children were removed.

High Risk Criteria

- Altered mental state includes new confusion
- Respiratory rate > 25 per minute or need for new Oxygen to keep saturations at target level
- Heart rate > 130 Beats per minute
- Systolic blood pressure < 90 mmHg or > 40 mmHg drop from normalNot passed urine in last 18 hours
- If catheterised < 0.5 ml/kg urine per hour
- Lactate > 2 mmols/l
- Mottled or Ashen, Cyanosis of skin, lips or tongue
- Non blanching rash

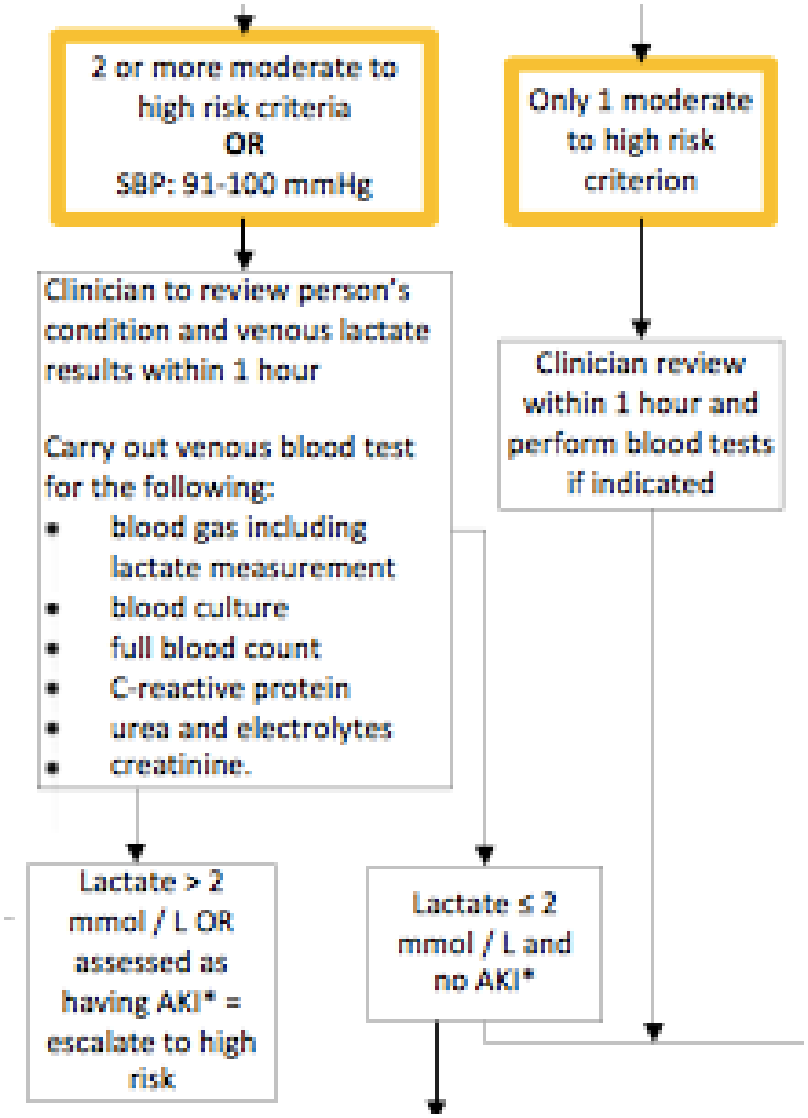


Lan



Moderate to high risk Criteria

- History of new onset altered behaviour or n
- Acute deterioration
- Impaired immune system
- Trauma, surgery or invasive procedure in last 6 weeks
- Respiratory Rate 21 – 24 breaths per minuteHeart Rate 91 – 130 beats per minute or new onset arrhythmia
- Systolic BP 91 – 100 mmHg
- Not passed urine in past 12 – 18 hours
- If catheterised 0.5 – 1 ml/kg urine per hour
- Tympanic Temperature < 36^{O}C
- Signs of potential infection


2 or more moderate to high risk criteria
OR
SBP: 91-100 mmHg
Only 1 moderate to high risk criterion
Clinician to review person's condition and venous lactate results within 1 hour
Carry out venous blood test for the following:
blood gas including lactate measurement
blood culture
full blood count
C-reactive protein
urea and electrolytes
creatinine.
Clinician review within 1 hour and perform blood tests if indicated
Lactate > 2 mmol / L OR assessed as having AKI* = escalate to high risk
Lactate ≤ 2 mmol / L and no AKI*

INFO FOR PUBLIC

INFO FOR PROFESSIONALS

DONATE NOW
It's fast, easy & simple

26th February, 2016

INTERIM STATEMENT REGARDING THE NEW INTERNATIONAL CONSENSUS DEFINITIONS OF SEPSIS

- Replace SIRS with NEWS
- Continue with ‘Red Flag’ Sepsis
- Use new definition (SOFA > 2) for Research/QI purposes
- Confirmed by NICE guidance July 2016

What is the NEWS?

The Royal College of Physicians developed NEWS in 2012,
NEWS is based on a simple aggregate scoring system where a score is allocated to physiological measurements, already recorded in routine practice.

Six simple physiological parameters form the basis of the scoring system:

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

National Early Warning Score (NEWS)*

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
Respiration Rate	≤8		9 - 11	12 - 20		21 - 24	≥25
Oxygen Saturations	≤91	92 - 93	94 - 95	≥96			
Any Supplemental Oxygen		Yes		No			
Temperature	≤35.0		35.1 - 36.0	36.1 - 38.0	38.1 - 39.0	≥39.1	
Systolic BP	≤90	91 - 100	101 - 110	111 - 219			≥220
Heart Rate	≤40		41 - 50	51 - 90	91 - 110	111 - 130	≥131
Level of Consciousness				A			V, P, or U

*The NEWS initiative flowed from the Royal College of Physicians' NEWS Development and Implementation Group (NEWSDIG) report, and was jointly developed and funded in collaboration with the Royal College of Physicians, Royal College of Nursing, National Outreach Forum and NHS Training for Innovation

Please see next page for explanatory text about this chart.

Royal College of Physicians

NHS Training for Innovation

NEWS - National Early Warning Score

- It was research based, and more sensitive than scores used at the time to aid early recognition of deteriorating patients.
- Common language across primary/secondary care interface
- Standardise the way patients were scored.
- Lots of tools available to support the use of the score, including an observation chart, escalation plan and e learning package all obtainable from the Royal College of Physicians website.
- The escalation plan emphasised the
  - Urgency for clinical response
  - Clinical competence of those responding
  - Environment for on going care

NEWS

"We recommend that the NEWS should also be implemented in pre-hospital assessment of acutely ill patients by "first responders" e.g. the ambulance services, primary care and community hospitals, to improve the communication of acute illness severity to receiving hospitals."

Royal College of Physicians 2011

NEWS ⟶ NEWS2

NEWS2 has been developed following a review of NEWS in 2015. Particular attention was paid to the following themes

1. Determining how the NEWS could be used to **better identify patients likely to have sepsis** who were at immediate risk of serious clinical deterioration and required urgent clinical intervention.

2. Highlighting that a **NEWS score of 5 or more is a key threshold** for an urgent clinical alert and response.

3. **Improving the recording of the use of oxygen** and the NEWS scoring of recommended oxygen saturations **in patients with hypercapnic respiratory failure** (most often due to COPD).

4. **Recognising the importance of new-onset confusion**, disorientation, delirium or any acute reduction in the Glasgow Coma Scale (GCS) score as a sign of potentially serious clinical deterioration, by including new confusion as part of the AVPU scoring scale (which becomes ACVPU).

NEWS2

Physiological parameter	Score 3	2	1	0	1	2	3
Respiration rate (per minute)	≤8		9–11	12–20		21–24	≥25
SpO_2 Scale 1 (%)	≤91	*92–93	94–95	≥96			
SpO_2 Scale 2 (%)	≤83	84–85	86–87	88–92 ≥93 on air	93–94 on oxygen	95–96 on oxygen	≥97 on oxygen
Air or oxygen?		*Oxygen		Air			
Systolic blood pressure (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulse (per minute)	≤40		41–50	51–90	91–110	111–130	≥131
Consciousness				Alert			CVPU
Temperature (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Pre Hospital

ELSEVIER

Resuscitation

Volume 89, April 2015, Pages 31-35

Rapid Response Systems

Validation of the National Early Warning Score in the prehospital setting ☆

Daniel J. Silcock [a], Alasdair R. Corfield [a], Paul A. Gowens [b], Kevin D. Rooney [a, c]

A prehospital NEWS may facilitate earlier recognition of deteriorating patients, early involvement of senior Emergency Department staff and earlier critical care referral/admission.

Prehospital care

Can the prehospital National Early Warning Score identify patients most at risk from subsequent deterioration?

Joanna Shaw,[1] Rachael T Fothergill,[1,2] Sophie Clark,[1] Fionna Moore[1]

Findings suggest that the NEWS could successfully be used by ambulance services to identify patients most at risk from subsequent deterioration.

Primary Care

- Whilst NEWS has yet to be validated in primary care, its use in assessing patients with, or at risk of Sepsis in Secondary care is well evidenced.
- NEWS2 provides an updated score with recommendations of its use in the assessment of suspected Sepsis.
- NEWS2 does not replace clinical judgement but can be used as an adjunct to patient assessment in general practice.
- NEWS2 provides a common language for expressing concern between GPs, Ambulance and secondary care colleagues, allowing for deterioration to be tracked and resources prioritised.

Inpatient Sepsis Screening & Action Tool

THE UK SEPSIS TRUST

To be applied to all non-pregnant adults who are clearly unwell with any abnormal observations

NHS Lancashire Teaching Hospitals NHS Foundation Trust

Patient details (affix label):

Staff member completing form:
Date (DD/MM/YY):
Name (print):
Designation:
Signature:

Important:
Consider ceiling of care. Is escalation clinically appropriate? No ☐ Discuss with patient / relative / senior and consider individual patient care needs ☐ Initials ☐ Discontinue sepsis pathway

1. Is NEWS ≥5 or 3 in any 1 parameter?
AND/OR does patient look sick? ☐

N → Low risk of sepsis. Use standard protocols, review if deteriorates.

Y ↓

2. Could this be due to an infection? Tick

- Yes, but source unclear at present ☐
- Respiratory ☐
- Urinary Tract Infection ☐
- Abdominal ☐
- Cellulitis/ septic arthritis/ infected wound ☐
- Device-related infection ☐
- Meningitis ☐
- Oral Cavity ☐
- Other (specify):

N ↓

Y ↓

3. ONE Red Flag/High risk criteria present?
Responds only to voice or pain/ unresponsive ☐
Systolic B.P ≤ 90 mmHg (or drop >40 from normal) ☐
Heart rate > 130 per minute ☐
Respiratory rate ≥ 25 per minute ☐
Needs oxygen to keep SpO_2 ≥92% ☐
Non-blanching rash, mottled/ ashen/ cyanotic ☐
Not passed urine in last 18 hours ☐
Urine output less than 0.5 ml/kg/hr ☐
Lactate ≥2 mmol/l ☐
Recent chemotherapy ☐

N ↑

4. Any Amber Flag/Moderate risk criteria? Tick

- Relatives concerned about mental status ☐
- Acute deterioration in functional ability ☐
- Immunosuppressed ☐
- Trauma/ surgery/ procedure in last 6 weeks ☐
- Respiratory Rate 21-24 or breathing hard ☐
- Heart Rate 91-130 or new arrhythmia ☐
- Systolic BP 91-100 mmHg ☐
- Not passed urine in last 12-18 hours ☐
- Temperature < 36ºC ☐
- Clinical signs of wound, device or skin infection ☐

Y ↓

	Time complete	Initials
Send bloods *If 2 criteria present, consider if 1* *To include FBC, U&Es, CRP, LFTs, clotting*		
Contact ST3+ doctor to review *USE SBAR! Must review results within 1 hour*		
Time clinician attended		

↓

Is AKI present? (tick) YES ☐ NO ☐

Y ↓

	Time complete	Initials
Clinician to make antimicrobial Prescribing decision within 3h		

Y ↓

Red Flag Sepsis!! Start Sepsis 6 pathway NOW (see overleaf)

This is time critical, immediate action is required.

THE UK SEPSIS TRUST

Inpatient Sepsis Screening & Action Tool

To be applied to all non-pregnant adults

who are clearly unwell with any abnormal observations

NHS
Lancashire Teaching Hospitals
NHS Foundation Trust

Patient details (affix label):

Staff member completing form:

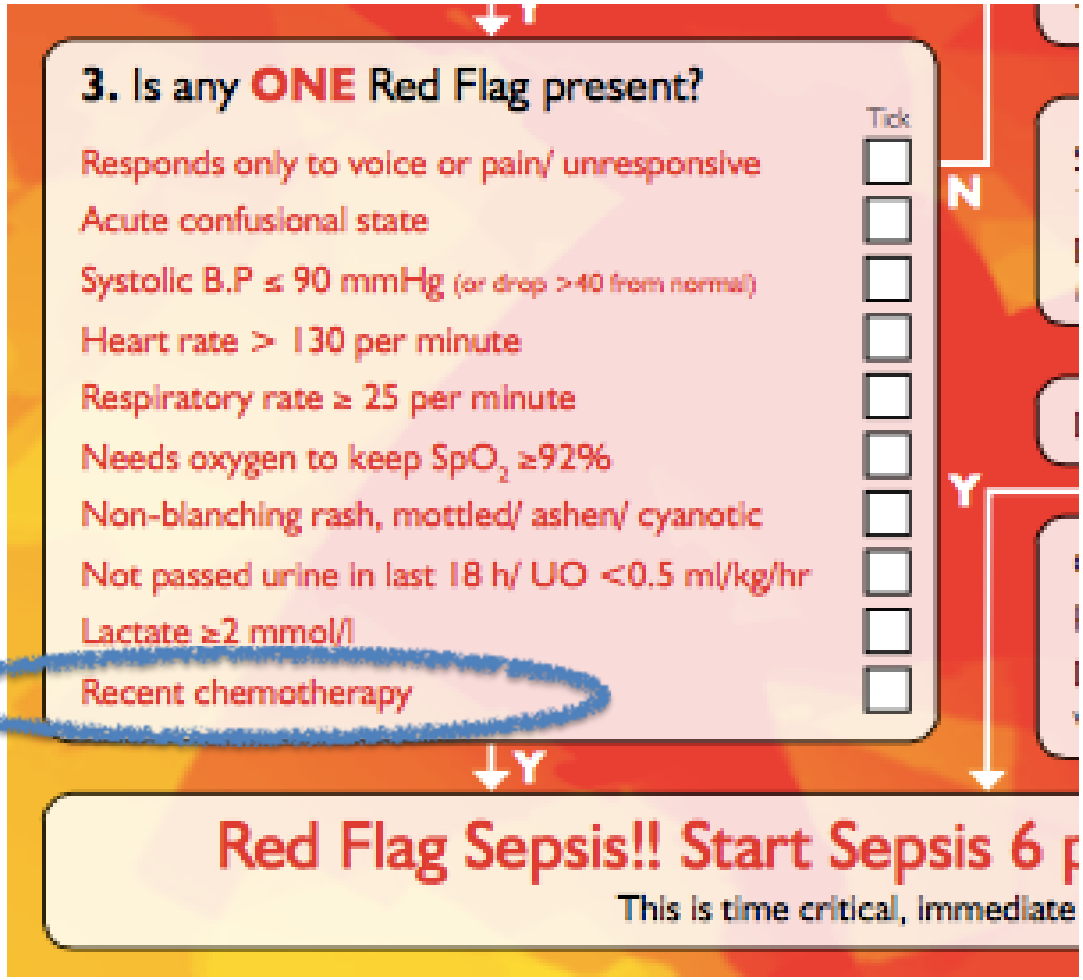
Date (DD/MM/YY):

Name (print):

Designation:

Signature:

Important:
Consider ceiling of care. Is escalation clinically appropriate? No ☐ Discuss with patient / relative / senior and consider individual patient care needs ☐ Initials ☐ Discontinue sepsis pathway


3. Is any ONE Red Flag present?
Tick
Responds only to voice or pain/ unresponsive
Acute confusional state
Systolic B.P ≤ 90 mmHg (or drop >40 from normal)
Heart rate > 130 per minute
Respiratory rate ≥ 25 per minute
Needs oxygen to keep SpO2 ≥92%
Non-blanching rash, mottled/ ashen/ cyanotic
Not passed urine in last 18 h/ UO <0.5 ml/kg/hr
Lactate ≥2 mmol/l
Recent chemotherapy
N
Y
Y
Red Flag Sepsis!! Start Sepsis 6
This is time critical, immediate

Sepsis Six Pathway

THE UK SEPSIS TRUST

Lancashire Teaching Hospitals NHS
NHS Foundation Trust

To be applied to all adult patients with suspected or confirmed Red Flag Sepsis

Make a treatment escalation plan and decide on CPR status

Inform consultant *(use SBAR)* patient has Red Flag Sepsis

Time zero | Consultant informed? | Initials

Action (complete ALL within 1 hour) — Reason not done/variance

1. Administer oxygen

Aim to keep saturations > 94%
(88-92% if at risk of CO_2 retention e.g. COPD)

Time complete | Initials | Reason not done/variance

2. Take blood cultures

Take as per trust guidelines. Culture other sites as clinically indicated e.g. sputum, wound swabs, PICC, CSF, urine etc.

CXR and urinalysis for all adults

Time complete | Initials | Reason not done/variance

3. Give IV antibiotics

According to Trust protocol
Consider allergies prior to administration

Time complete | Initials | Reason not done/variance

4. Give IV fluids

If hypotensive/ lactate >2mmol/l, 500 ml stat.
May be repeated if clinically indicated-
do not exceed 30ml/kg
(As per trust IV fluid guidelines)

Time complete | Initials | Reason not done/variance

5. Check serial lactates and routine bloods

Routine Bloods - FBC, U&E, CRP, LFT's Clotting
Corroborate high VBG lactate with arterial sample
If lactate >4mmol/l, call Critical Care and recheck after each 10ml/kg fluid challenge

Time complete | Initials | Reason not done/variance | Not applicable- Initial lactate ☐

6. Measure urine output

May require urinary catheter
Ensure fluid balance chart commenced
& completed hourly

Time complete | Initials | Reason not done/variance

If after delivering the Sepsis Six, patient still has:

- systolic B.P <90 mmHg
- reduced level of consciousness despite resuscitation
- respiratory rate over 25 breaths per minute
- lactate not reducing

Or if patient is clearly critically ill at any time

Then call Critical Care Outreach / Hospital @ Night team immediately!!

Antimicrobial Guidelines:
See Trust Guidelines for details on the Intranet page

Critical Care Doctor bleep 3186 RPH, Chorley
Critical Care Outreach bleep 3388 RPH, 3456 Chorley
Hospital @ Night bleep 9090 RPH, Chorley

Remember your Sepsis 6

<u>Give 3</u>

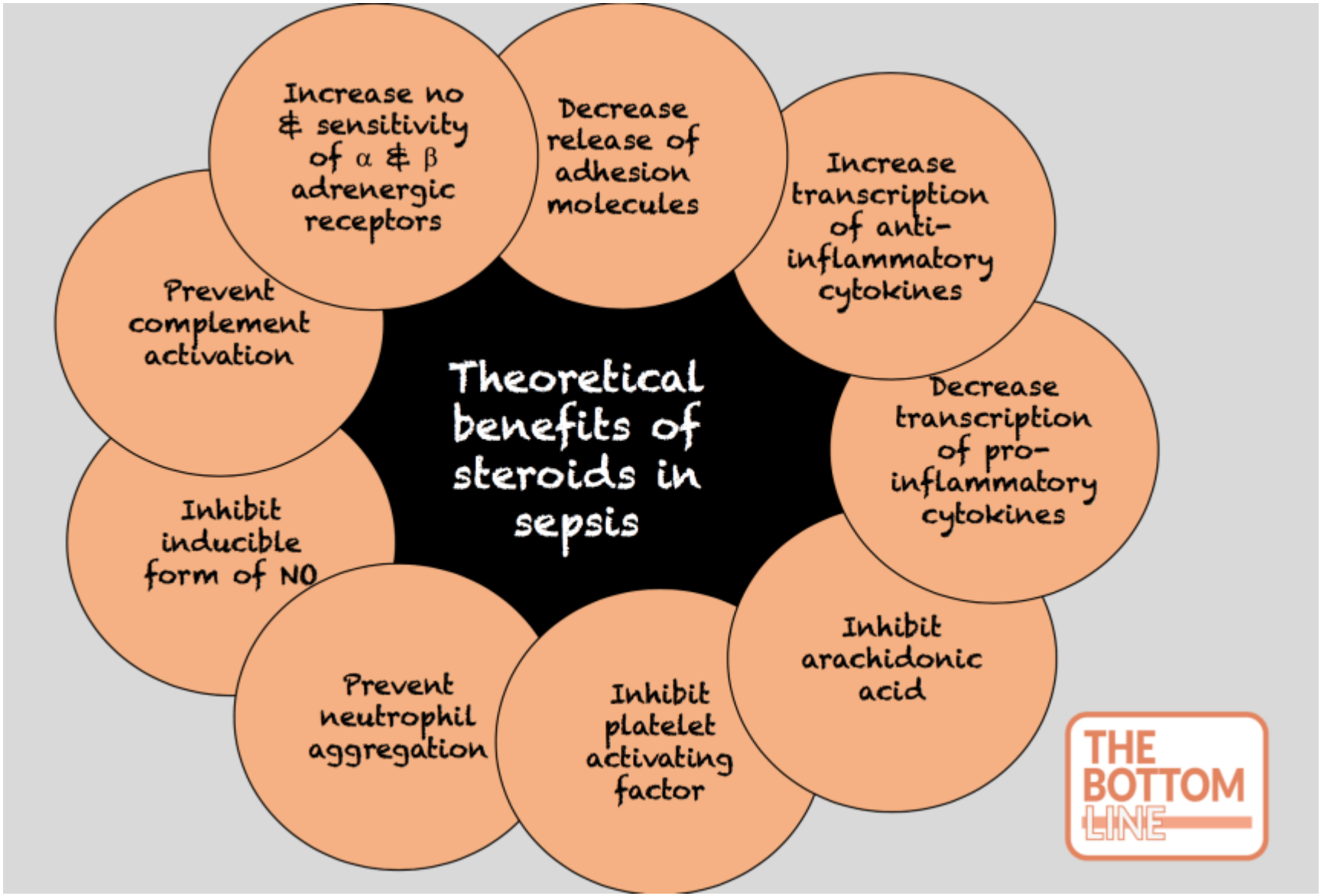
- **Oxygen**
  - to maintain target saturations
- **Antibiotics**
  - given IV within 60 minutes, follow trust guidelines
- **IV Fluid resuscitation**

<u>Take 3</u>

- **Blood Cultures**
  - consider source control and take specimens, include other possible sources sputum etc
- **Lactate and Routine bloods**
  - CRP, U&E's, Coagulation
- **Hourly Urine Output**

Prioritise to get them done in 60 minutes!

Should we Pump up the Juice (Steroids) in Septic Shock?


Theoretical benefits of steroids in sepsis
Increase no & sensitivity of α & β adrenergic receptors
Decrease release of adhesion molecules
Increase transcription of anti-inflammatory cytokines
Decrease transcription of pro-inflammatory cytokines
Inhibit arachidonic acid
Inhibit platelet activating factor
Prevent neutrophil aggregation
Inhibit inducible form of NO
Prevent complement activation
THE BOTTOM LINE

8 September 2018

thebmj

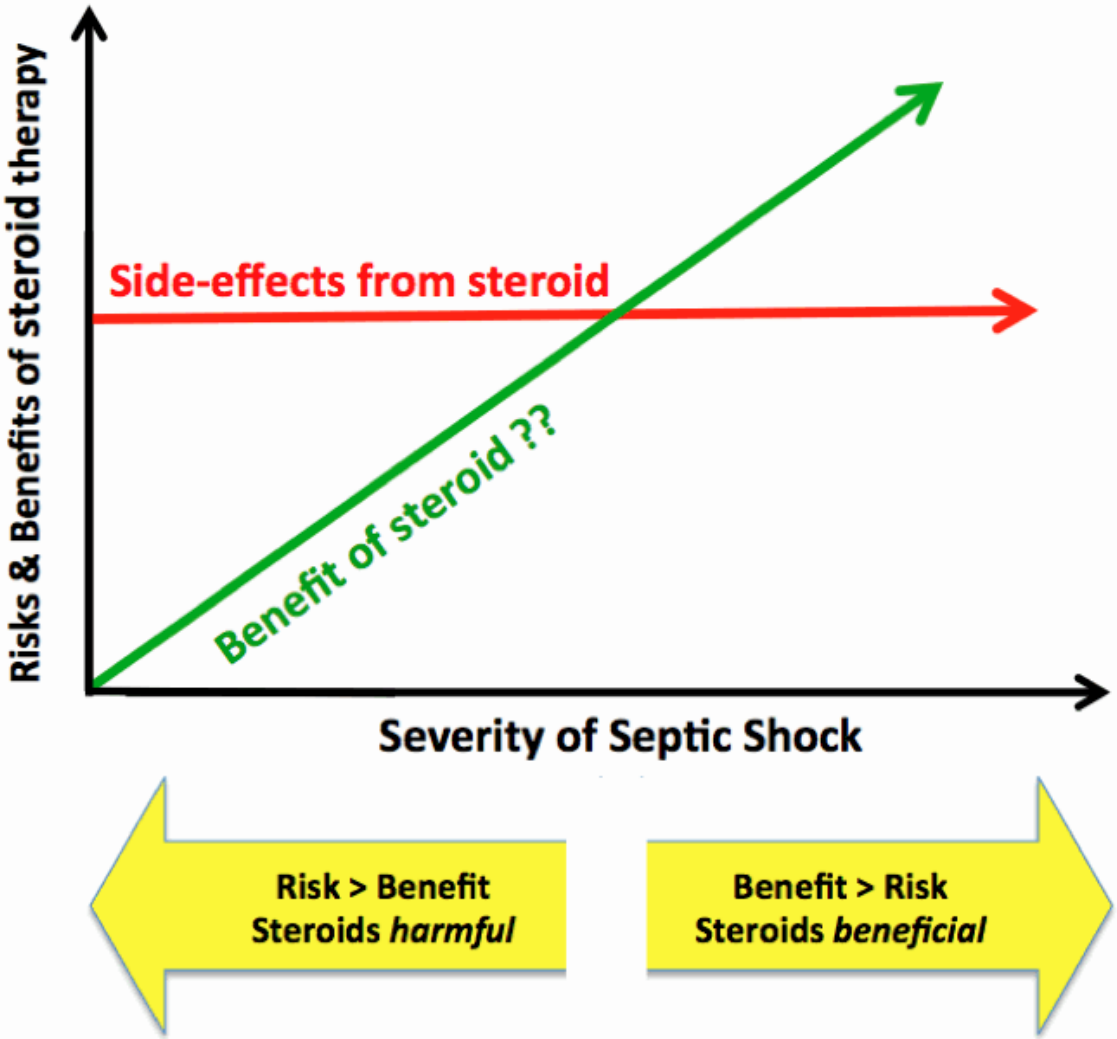
Do corticosteroids reduce risk of death?

Corticosteroid therapy for sepsis

- Most guidelines do not advise use of steroids to treat sepsis in absence of shock
- 2 new trials had differing conclusions
- Steroids may reduce risk of death and neuromuscular weakness by a small amount
- Very weak recommendation for steroids use is sepsis

Francois et all (2018) Corticosteroids therapy for sepsis: a clinical practice guidelines BMJ 362:k3284

Risk vs. benefit of stress-dose steroids in septic shock?



Antibiotics for Sepsis

RED Flag/High Risk sepsis no source identified:

Cefuroxime 1.5g IV tds AND Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od

If Penicillin allergy (anaphylaxis)/MRSA/Central Line

Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od AND Teicoplanin 6mg/kg based on ABW rounded to nearest 200mg (max 1g) IV 12 hourly for 3 doses then od

If unable to rule out intra-abdominal focus ADD

Metronidazole 500 mg IV tds/400mg PO tds to above regimens

If unable to rule out CAP ADD

Clarithromycin 500mg IV/PO bd to above regimens

Antibiotics for Sepsis

RED Flag/High Risk sepsis no source identified:

Cefuroxime 1.5g IV tds AND Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od

If Penicillin allergy (anaphylaxis)/MRSA/Central Line

Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od AND Teicoplanin 6mg/kg based on ABW rounded to nearest 200mg (max 1g) IV 12 hourly for 3 doses then od

If unable to rule out intra-abdominal focus ADD

Metronidazole 500 mg IV tds/400mg PO tds to above regimens

If unable to rule out CAP ADD

Clarithromycin 500mg IV/PO bd to above regimens

Antibiotics for Sepsis

RED Flag/High Risk sepsis no source identified:

Cefuroxime 1.5g IV tds AND Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od

If Penicillin allergy (anaphylaxis)/MRSA/Central Line

Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od AND Teicoplanin 6mg/kg based on ABW rounded to nearest 200mg (max 1g) IV 12 hourly for 3 doses then od

If unable to rule out intra-abdominal focus ADD

Metronidazole 500 mg IV tds/400mg PO tds to above regimens

If unable to rule out CAP ADD

Clarithromycin 500mg IV/PO bd to above regimens

Antibiotics for Sepsis

RED Flag/High Risk sepsis no source identified:

Cefuroxime 1.5g IV tds AND Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od

If Penicillin allergy (anaphylaxis)/MRSA/Central Line

Gentamicin* 5mg/kg IV based on ABW/CBW (max 500mg) od AND Teicoplanin 6mg/kg based on ABW rounded to nearest 200mg (max 1g) IV 12 hourly for 3 doses then od

If unable to rule out intra-abdominal focus ADD

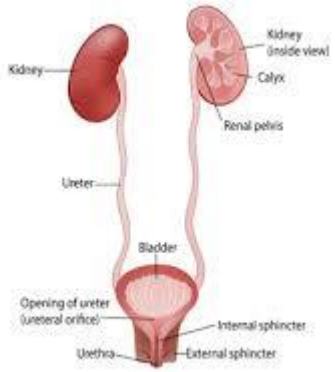
Metronidazole 500 mg IV tds/400mg PO tds to above regimens

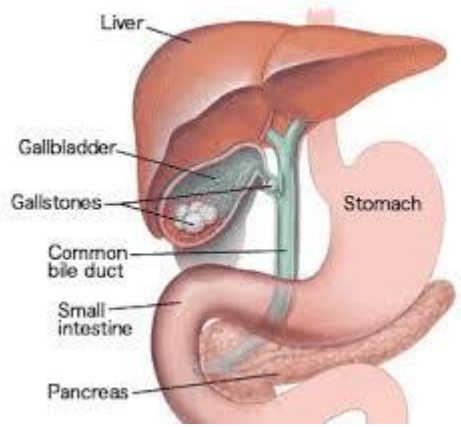
If unable to rule out CAP ADD

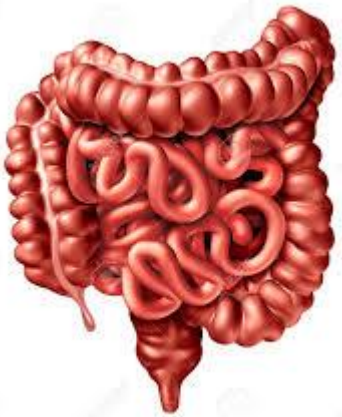
Clarithromycin 500mg IV/PO bd to above regimens

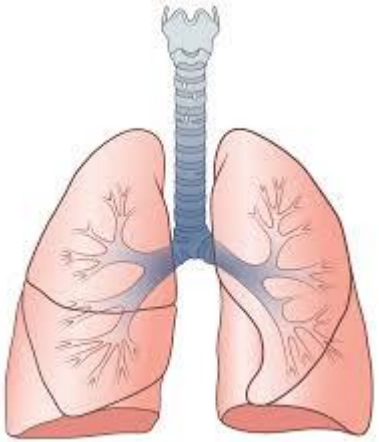
Why these antibiotics?

- No source identified so need to cover common ones:









CEFUROXIME

- *Staphylococcus aureus* (not MRSA)
- Some coagulase negative *Staphylcocci*
- Group A/B/C/G *Streptococcus*

Skin organisms

- Coliforms (not ESBL and multi resistant)
- Not *Enterococcus sp*
- Not *Pseudomonas sp*
- Respiratory pathogens

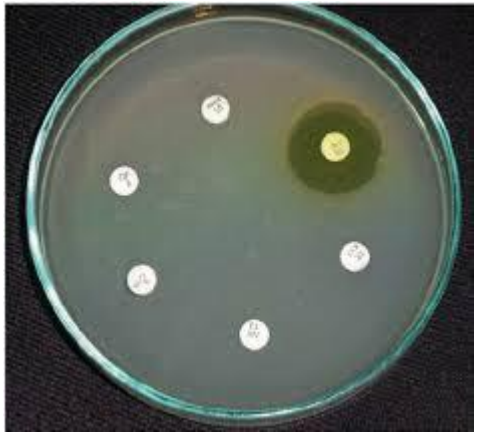
Bowel organisms

GENTAMICIN

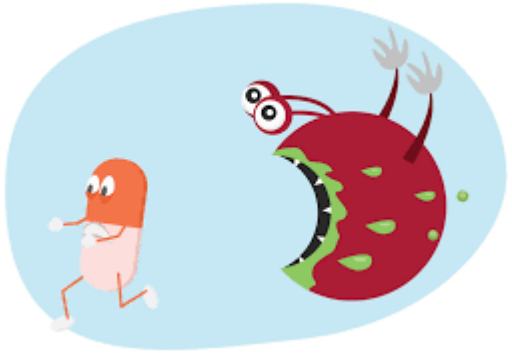
Gram negative organisms

These both are generally associated with bowel flora

- Resistant coliforms/ESBL
- *Pseudomonas sp*



GENTAMICIN

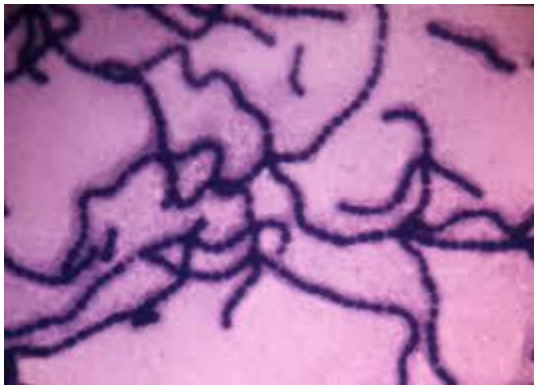


- History of multidrug resistant organisms
- History of multiple antibiotic courses

- Red flag sepsis

- Part of penicillin allergy regimen

TEICOPLANIN



Generally skin flora/cause skin and soft tissue infections

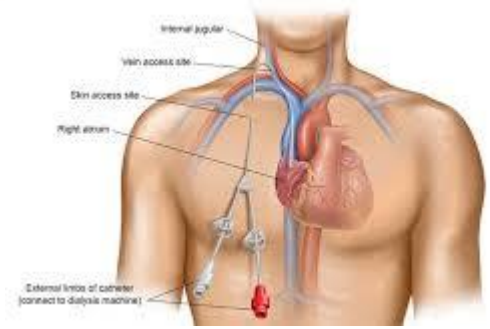
- *Staphylococcus aureus*
- MRSA
- Most Coagulase negative *Staphylcocci*
- Streptococci
- Enterococci (not VRE)

Bowel flora, can be found in sites like ulcers

TEICOPLANIN

Part of penicillin allergy regimen

History of MRSA

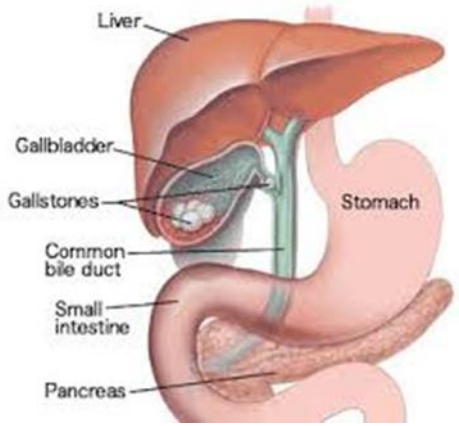


Central line

METRONIDAZOLE

ADD IF:

? Intra abdo



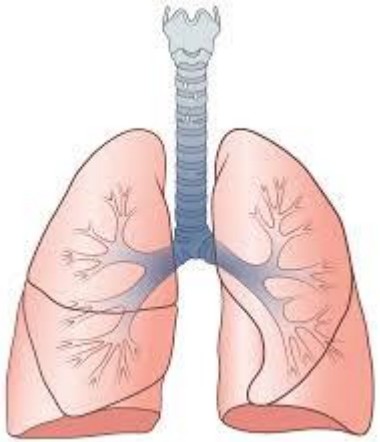
COVERS:

ANAEROBES

bugs that don’t like oxygen

CLARITHROMYCIN

- CANT RULE OUT CAP?



- COVERS:
  - *Legionella sp*
  - *Mycoplasma pneumoniae*
  - *Streptococcus pneumoniae*

Neutropenic Sepsis

Piperacillin-Tazobactam 4.5g IV qds

2nd line:
ADD **Gentamicin**
unless recent platinum based chemotherapy or urological malignancy/urinary obstruction in which case:
Meropenem

Neutropenic Sepsis

Piperacillin-Tazobactam 4.5g IV qds

Penicillin allergy (not anaphylaxis)

Meropenem 1g IV tds

Penicillin allergy (anaphylaxis)

Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter AND Ciprofloxacin 400mg IV bd AND Metronidazole 500mg IV td

If high probability of line infection or Known MRSA

ADD to the above regimen Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter if not already receiving.

Neutropenic Sepsis

Piperacillin-Tazobactam 4.5g IV qds

Penicillin allergy (not anaphylaxis)

Meropenem 1g IV tds

Penicillin allergy (anaphylaxis)

Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter AND Ciprofloxacin 400mg IV bd AND Metronidazole 500mg IV tds

If high probability of line infection or Known MRSA

ADD to the above regimen Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter if not already receiving.

Neutropenic Sepsis

Piperacillin-Tazobactam 4.5g IV qds

Penicillin allergy (not anaphylaxis)

Meropenem 1g IV tds

Penicillin allergy (anaphylaxis)

Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter AND Ciprofloxacin 400mg IV bd AND Metronidazole 500mg IV tds

If high probability of line infection or Known MRSA

ADD to the above regimen Teicoplanin 12mg/kg based on ABW rounded up to nearest 200mg (max 1g) IV bd for 3 doses, then od thereafter if not already receiving.

PIPERACILLIN-TAZOBACTAM

- BROAD SPECTRUM
- *Pseudomonas aeruginosa*
- Anaerobes
- Resistant coliforms
- Not MRSA
- Not ESBL resistant coliforms

MEROPENEM

- Resistant (ESBL) coliforms
- Anaerobes
- *Pseudomonas aeruginosa*
- NOT Carbapenemase producing Coliforms (CPC/CPE)(Really resistant bugs)

	1	2
Amoxi		R
Trimetho		R
Gentamicin		R
Cefalexin		R
Co-amoxiclav		R
Pip/Tazoba		R
Colistin		R
Fosfo		S
Meropenem	R	R
Temocillin		R
Ceftolozane-tazobactam		R
Ceftazidime/avibactam		S

CIPROFLOXACIN

Part of penicillin allergy regimen (Teicoplanin, Ciprofloxacin, Metronidazole)

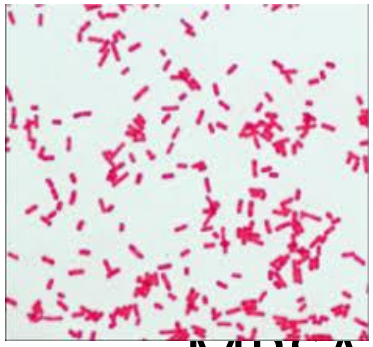
- Gram negatives:
  - Coliforms
  - Some multi resistant (ESBL) coliforms
  - Most *Pseudomonas aeruginosa*
  - Complements Teicoplanin (Gram positive) and Metronidazole (anaerobes)

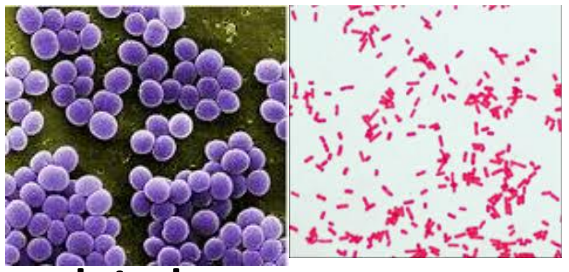
Oral Switch: Neutropenic sepsis

Ciprofloxacin 750mg bd AND Coamoxiclav 625mg tds

Gram negatives including Pseudomonas

Some Gram negatives
Gram positives
including anaerobes





MRSA: Discuss with microbiology

ORAL SWITCH:Neutropenic sepsis

- Penicillin allergy:

Ciprofloxacin 750mg bd AND Clindamycin 450mg qds

Gram negatives including Pseudomonas

Gram positives including anaerobes

ORAL SWITCH

- Duration

Duration

Continue inpatient empiric antibiotic therapy in all patients who have unresponsive fever unless an alternative cause of fever is likely.
Discontinue empiric antibiotic therapy in patients whose neutropenic sepsis has responded to treatment, irrespective of neutrophil count and consider oral switch.
Typical duration- 5-7 days including IV.

SUMMARY

- Antibiotics chosen to provide cover for most likely causative organisms

- Sepsis:

  Cefuroxime +/- gentamicin

- Neutropenic sepsis:

  Piperacillin-tazobactam

thebmj

BMJ 2016;354:i4209 doi: 10.1136/bmj.i4209

FEATURE

Will new sepsis guidance prompt a surge in unnecessary use of antibiotics?

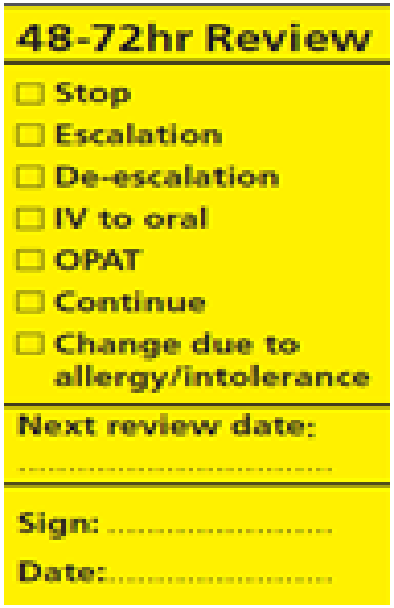
A series of patients dying unnecessarily from sepsis has increased public pressure on doctors to get better at spotting it. But some are concerned that NICE guidance may lead to many patients being given antibiotics "just in case." **Ingrid Torjesen** reports

Antimicrobial Stewardship

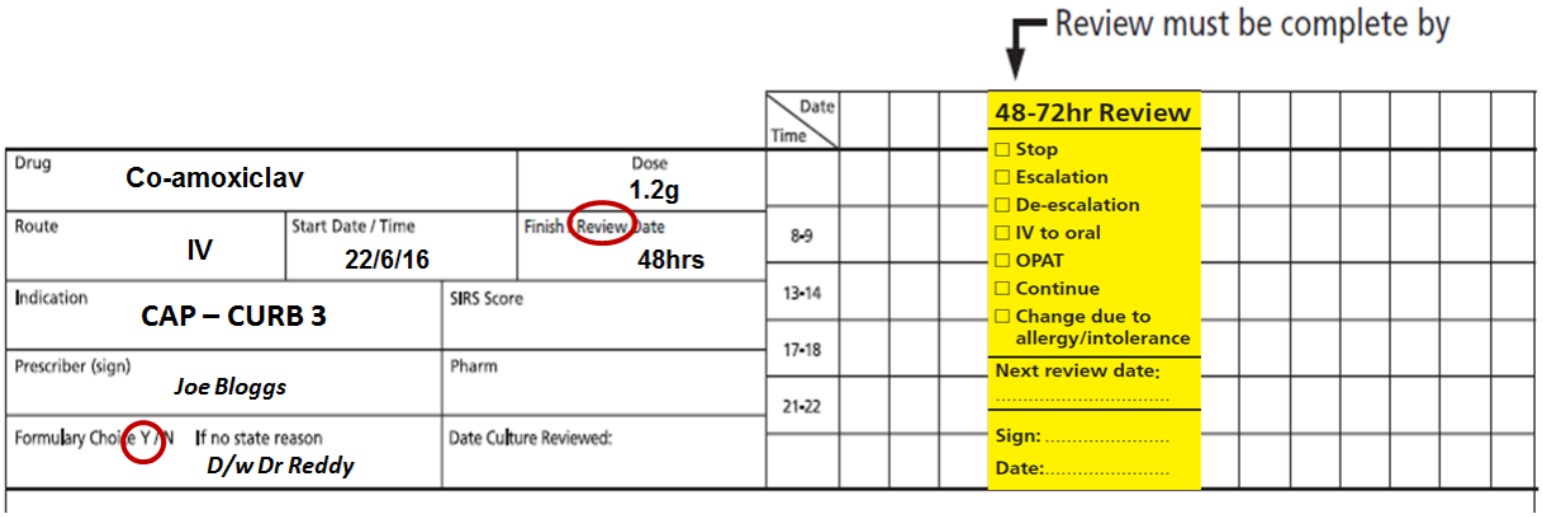
- Prompt treatment of sepsis does improve outcomes but what about the unintended consequences
  - Antimicrobial resistance
  - Allergic reactions
  - Affect on gut flora
  - Increased risk of C. Difficile
  - Macrolides (clarithromycin and azithromycin) linked to cardiac conduction defects
  - Nephrotoxicity
  - Drug interactions
  - Interfere with diagnosis - endocarditis, joint infections

Antimicrobial stewardship

- Source Control is essential
- Tazocin resistance increased by 10% (5-15%)
- Step Down Abx
- Switch to appropriate Abx as per trust guidance
- Discuss with Microbiology



Antimicrobial Stewardship



NCEPOD 2015:Recommendations

- Formal protocol and monitoring of compliance
- Education for healthcare professionals
- Standardised sepsis proforma to aid identification, coding, treatment and on going management
- NEWS and escalation plan
- Source control ASAP
- Timely, documented senior review
- Care bundle approach
- Senior microbiology input
- Discussion at M&M
- Follow up post discharge/communication with GP/patient and relatives

What are we doing at RPH

Guidelines

Education

Patient Information

What are we doing at RPH - Education

1. E-learning package for all
2. E-learning now part of licence to care
3. Pocket cards
4. Sepsis champion events
5. Paediatric e-learning
6. Grand round events

What are we doing at RPH – Patient Information

1. Sepsis written discharge information
2. Education re sepsis and death certificates
3. Community events
4. Health Mela
5. LTHT leading nationally to identify a sign for “sepsis” for hard of hearing. Working in partnership with UK Sepsis Trust

Sepsis CQUIN for Admission Areas

ED, EDU, MAU, Child Health, Obstetrics

Suspected infection and NEWS >4.

- Complete set of vital signs recorded (with time and date documented.)
- NEWS calculated and documented (must be calculated at least once an hour if taking multiple obs.)
- Lactate with bloods (make sure if ordering bloods you order lactate level, or ensure its included on ABG.)

Red Flags and/or Septic shock present?

- Treatment with Abx within **60** mins. (from the first set of obs when sepsis is indicated, documentation of time abx given is important.) of Red Flags or Septic Shock

Antimicrobial Stewardship

- Antibiotics to be reviewed within 3 days evidenced by clear documentation

Sepsis CQUIN for all Inpatient areas

Suspected infection and NEWS >4

- Complete set of vital signs recorded(with time and date documented.)
- NEWS calculated and documented (must be calculated at least once an hour if taking multiple obs.)
- Lactate with bloods (make sure if ordering bloods you order lactate level or ensure its included on ABG.)

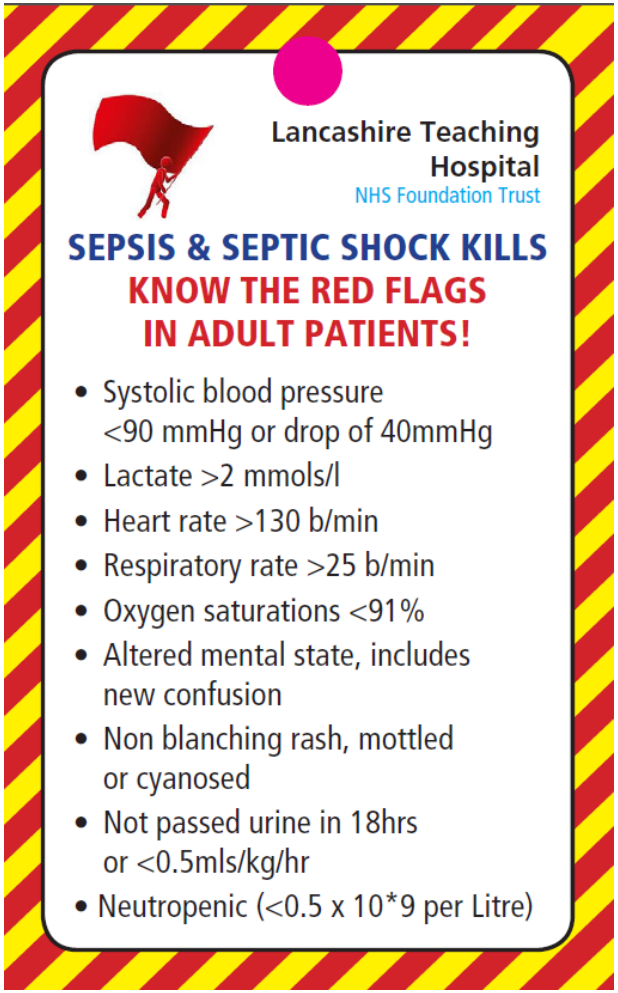
Red Flags and /or septic Shock present

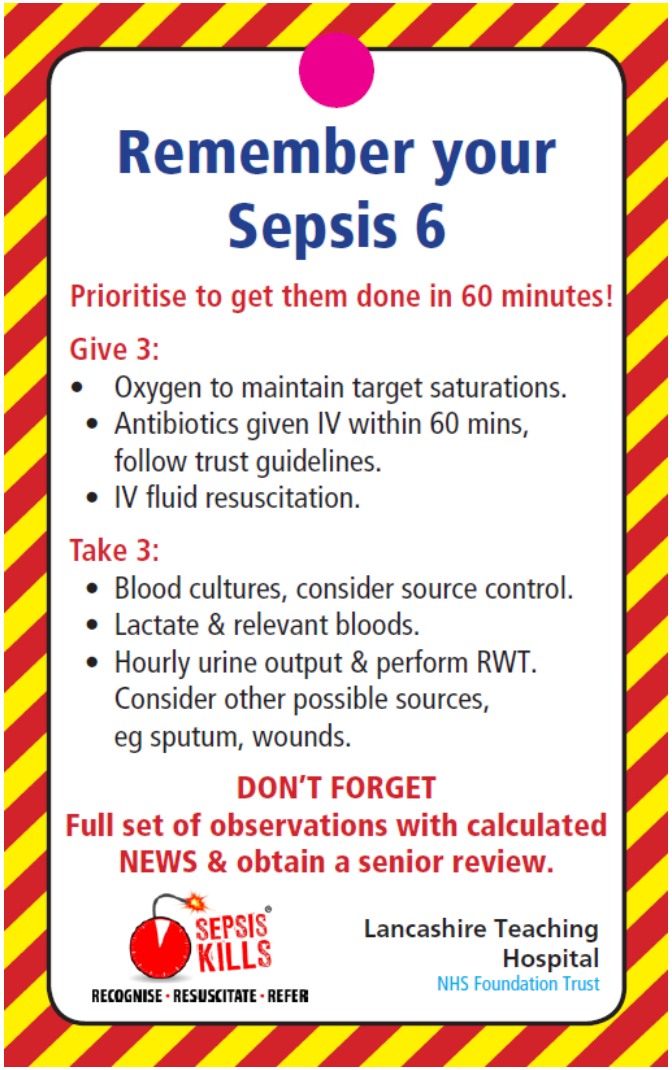
- Treatment with Abx within **90** mins (from the first set of obs when sepsis is indicated, documentation of time Abx given is important.) of Red Flags or Septic Shock

Antimicrobial stewardship

- Antibiotics to be reviewed within 3 days evidence documentation

Pocket Cards





Post Sepsis Syndrome

What is post sepsis syndrome?

- For many patients leaving hospital following sepsis, this is not the end of their recovery
- Some experience symptoms which can leave them feeling their normal day to day activities are difficult
- **Post Sepsis Syndrome (PSS) describes a group of physical, psychological and emotional symptoms which can occur following sepsis**

Physical problems that patients can experience during recovery

- **Fatigue**
- **Muscle weakness**
- **Breathlessness**
- **Swollen limbs**
- **Joint and muscle pains**
- **Hair loss**
- **Dry / flaking skin and nails**
- **Excessive sweating**
- **Poor temperature regulation**
- **Reduced kidney function**
- **Changes in sensation in limbs**
- **Repeated infections**
- **Changes in vision**
- **Reduced appetite/Taste changes**
- **Seizures**

Psychological problems that patients can experience during recovery.

- **Anxiety**
- **Fear of sepsis recurring**
- **Depression**
- **Flashbacks/Nightmares**
- **Insomnia**
- **New cognitive problems**
- **Poor concentration**
- **Short term memory loss**
- **PTSD**
- **ICU psychosis**

Understanding Sepsis Recovery

- Each patient will have a unique recovery process. Some patients will still be on their journey to recovery, despite being medically fit to go home.

- PSS affects around 50% of patients
- Can last for 6-18 months

- Certain factors can influence how quick they recover, such as:
  - Age
  - Co morbidities
  - Length of stay

- Limited information about who it affects, doesn't just appear to be ICU patients

Sepsis survivors survey

The UK Sepsis Trust conducted a survey to capture the experience of sepsis survivors.

It was carried out via Survey Monkey and was accessed via sepsis social media groups and platforms.

Limitations of the survey:

- Participants were self selected
- Responses subjective

Response:

- Nearly 900 responses in just 4 weeks

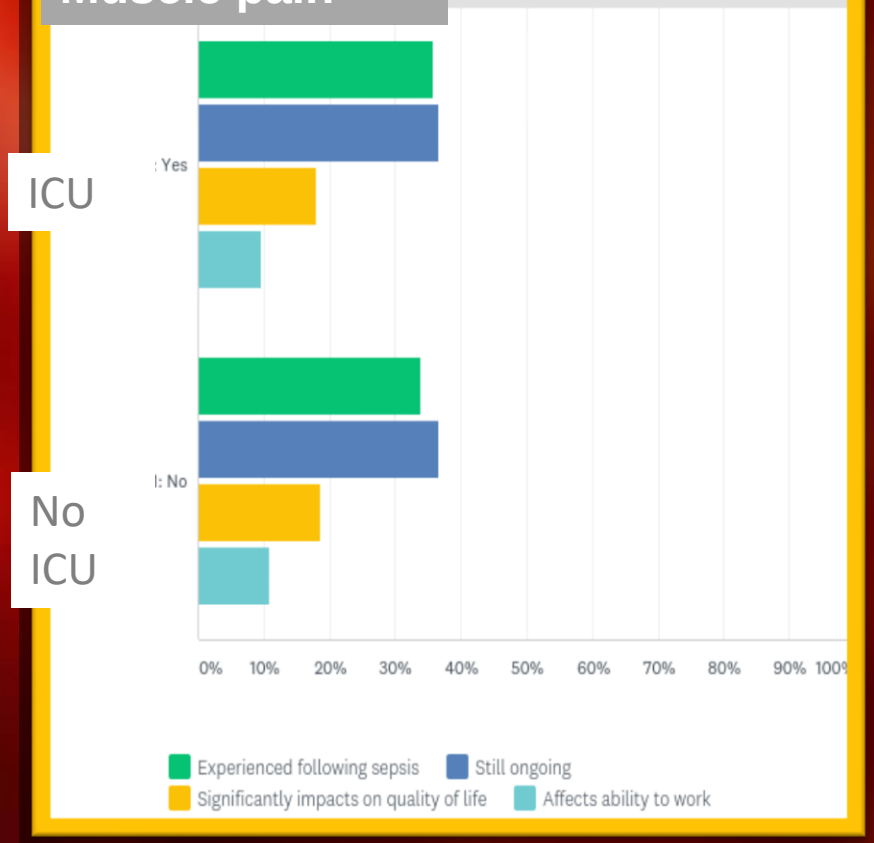
SEPSIS SURVIVORS SURVEY

THE UK SEPSIS TRUST

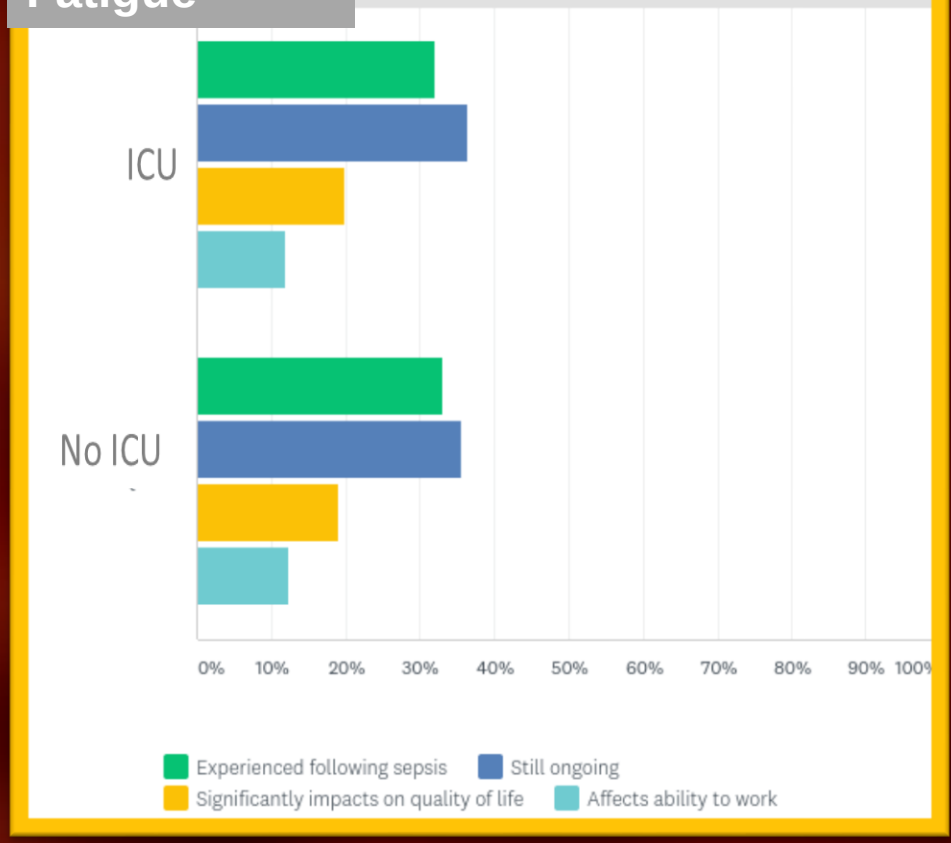
They then divided the results into those who had been treated in Intensive Care and those who had not.

Have you experienced any of the following **physical** problems during your recovery from sepsis?

Muscle pain



Fatigue

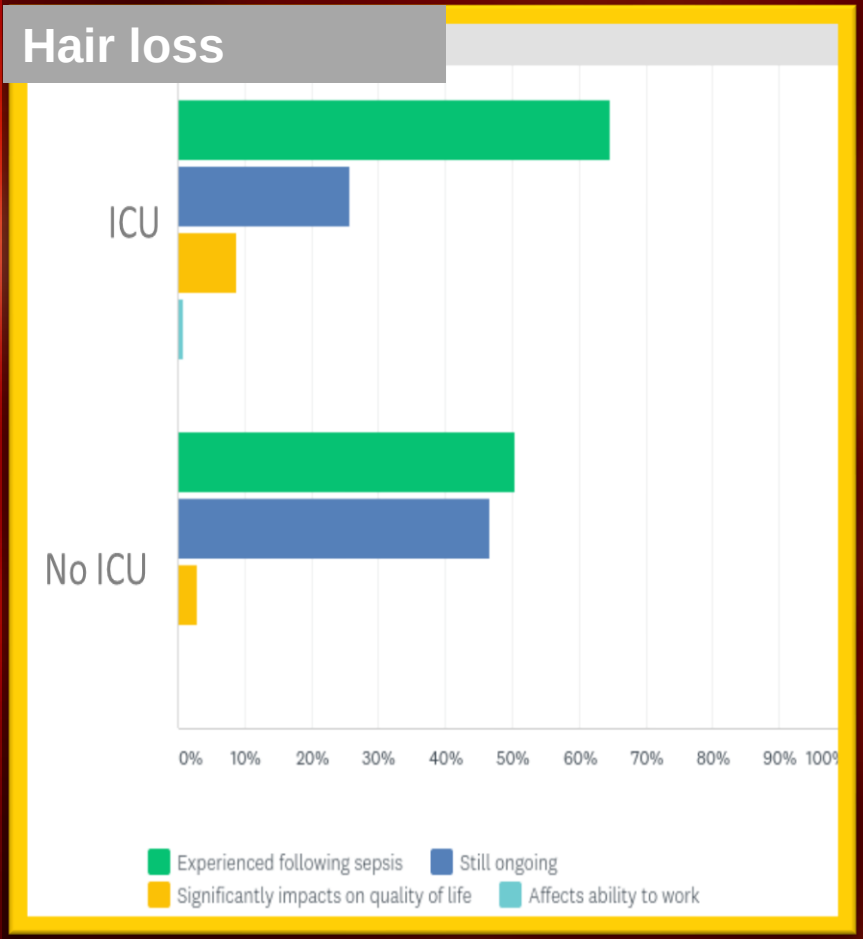


SEPSIS SURVIVORS SURVEY

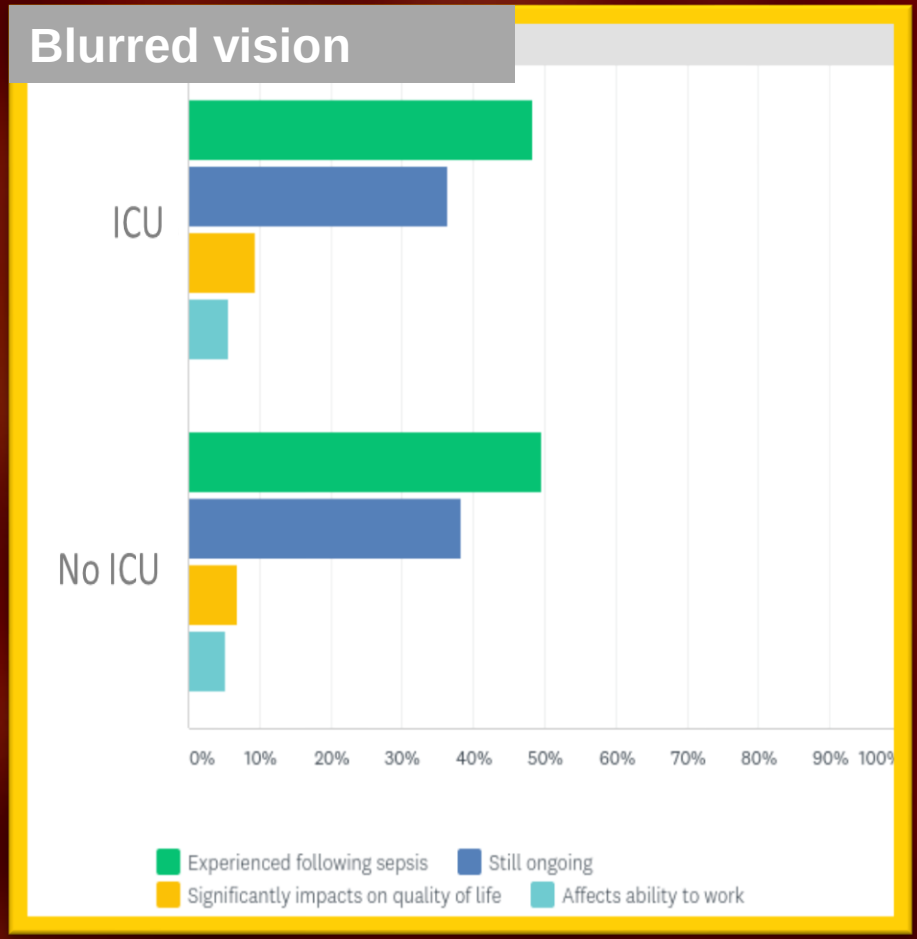
THE UK SEPSIS TRUST

Have you experienced any of the following **physical** problems during your recovery from sepsis?

Hair loss



Blurred vision



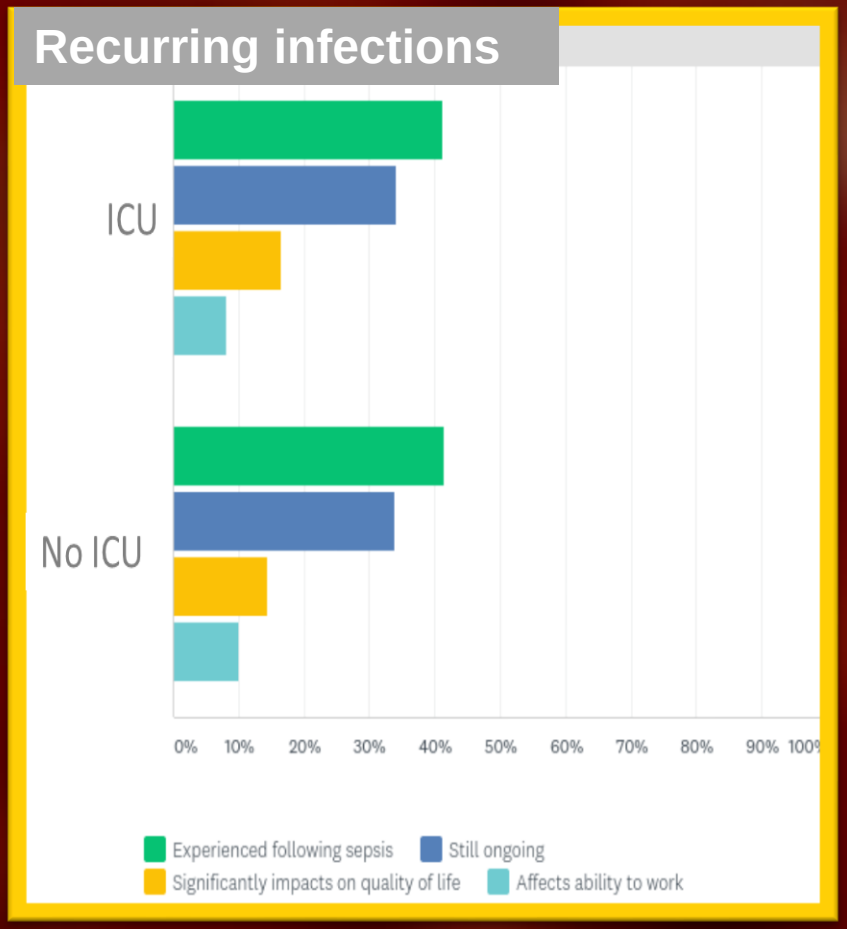
Lancashire Teaching Hospitals NHS

SEPSIS SURVIVORS SURVEY

THE UK SEPSIS TRUST

Have you experienced any of the following **physical** problems during your recovery from sepsis?

Text.



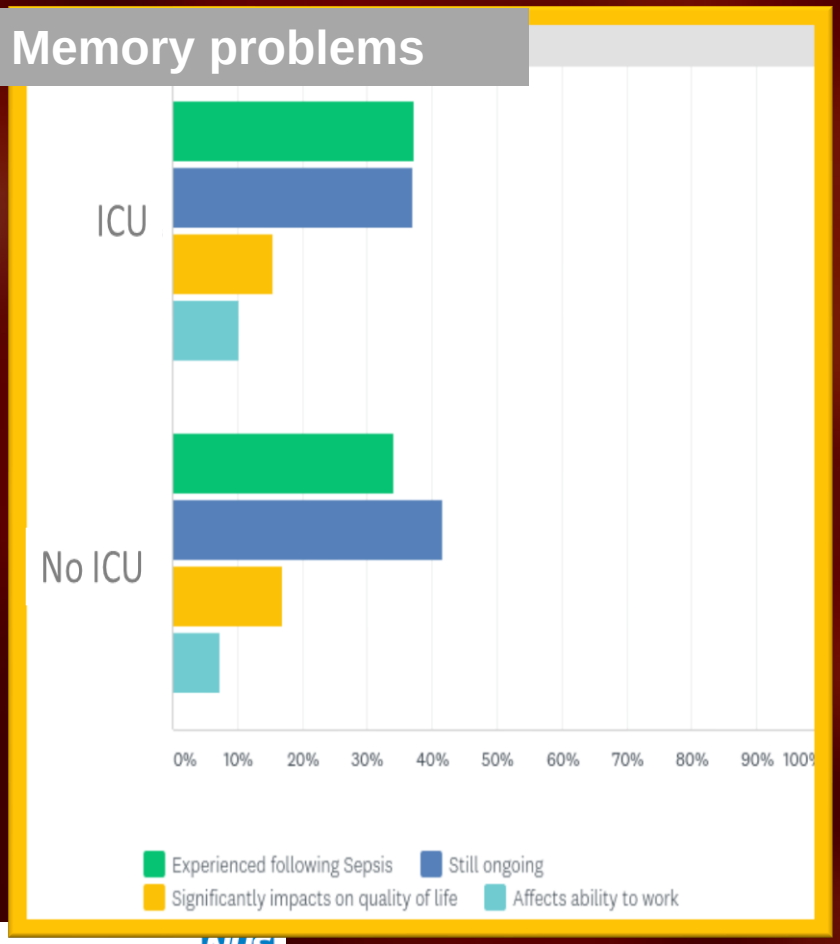
Lancashire Teaching Hospitals NHS

SEPSIS SURVIVORS SURVEY

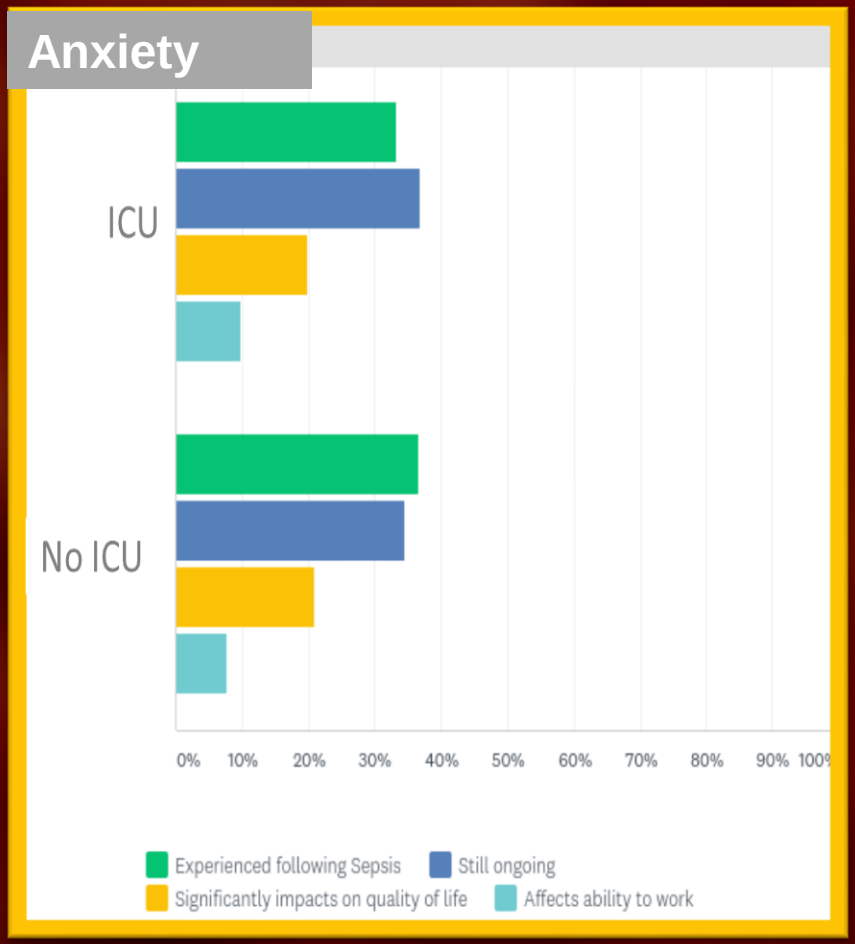
THE UK SEPSIS TRUST

Have you experienced any of the following **psychological/emotional** problems since you had sepsis?

Memory problems



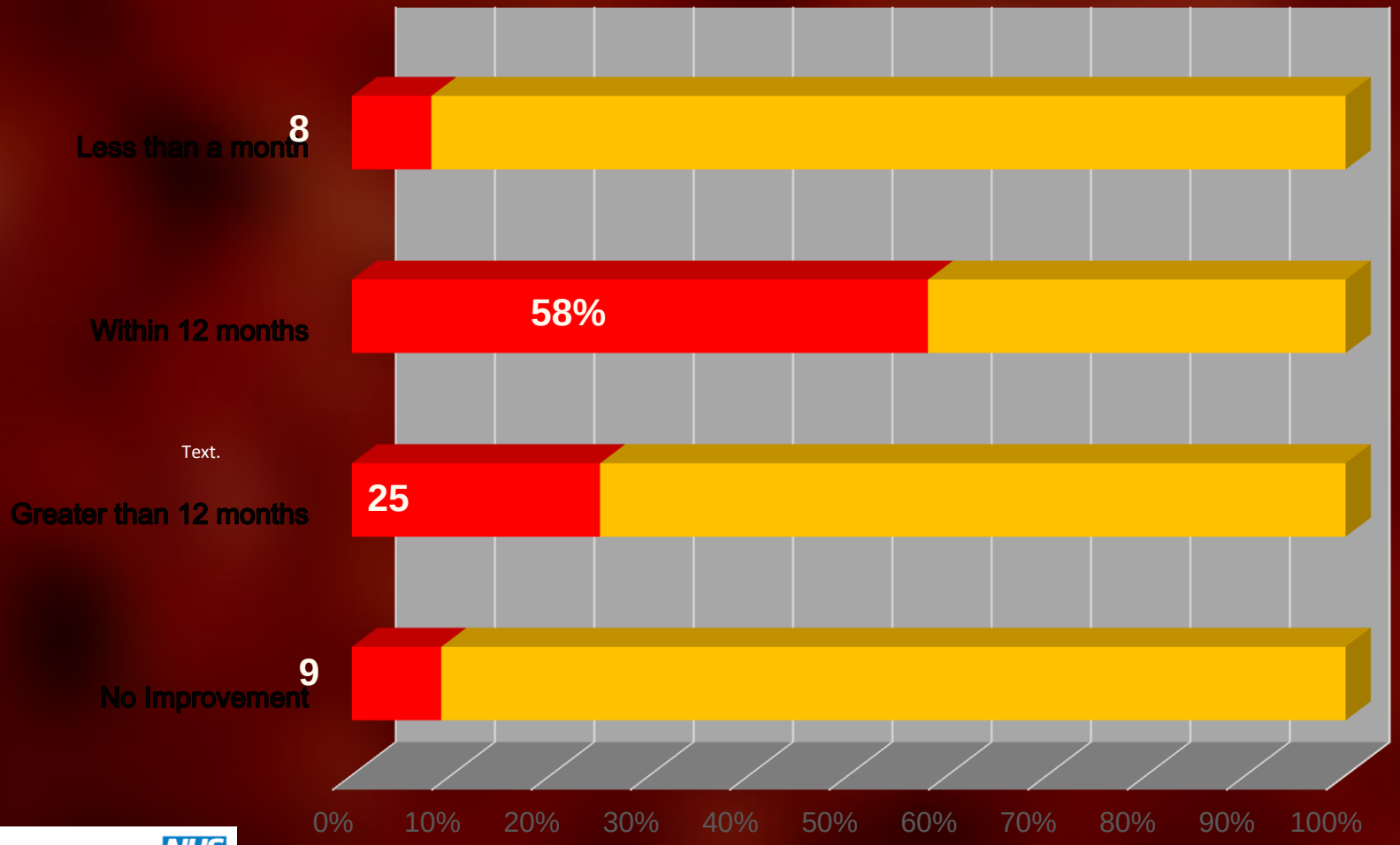
Anxiety



SEPSIS SURVIVORS SURVEY

THE UK SEPSIS TRUST

How long was it until you started to feel better?



Lancashire Teaching Hospitals NHS

What did the results show?

It is clear that the problems experienced by both groups are very similar.

This could suggest the problems experienced are not just caused by Post Intensive Care Syndrome (PICS).

The UK Sepsis Trust state these results are in line with the type of contact they have with people during their recovery.

Management of PSS

Needs better recognition to:

- Help patients manage and support their recovery
- Direct them to the right professional help eg: physiotherapy, psychology etc…

PSS can have a significant impact on a patient's well being and ability to function on a day to day basis. A failure to recognise PSS can lead to a delayed recovery

What may help sepsis Survivors?

Having an explanation of what sepsis is.

- Information on what they may expect during recovery to be done whilst in hospital.
- Written advice leaflets
- Healthcare professionals to have a knowledge of sepsis and its recovery.
- Access to follow up and treatment if required. Which may include:
  - Physiotherapy
  - Psychological services
  - Fatigue management
  - Dietary advice

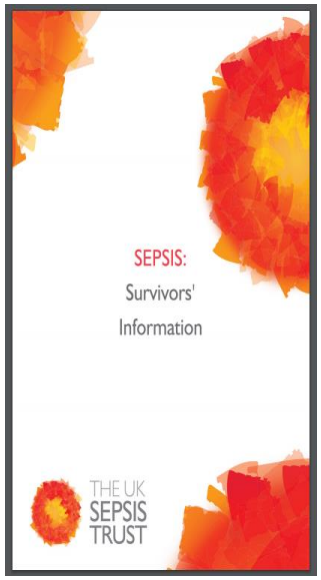
What may help sepsis Survivors?

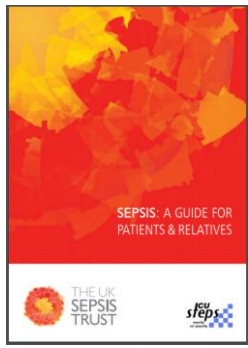
- Accurate communication with GPs from the acute trust around the diagnosis of sepsis
- Appropriate follow up of patients post sepsis – national guidance suggests all patients should be followed up for a minimum of 3 months
- Easy access to support services for patients

Better recognition of post sepsis syndrome

Support for sepsis survivors from the UK Sepsis Trust

- Information on their website: *sepsistrust.org*
- They have information booklets.
- They have a Support Team – 3 qualified nurses.
- Freephone telephone helpline and multimedia support.
- They have UKST Regional Support Groups, there is now one in Clitheroe.





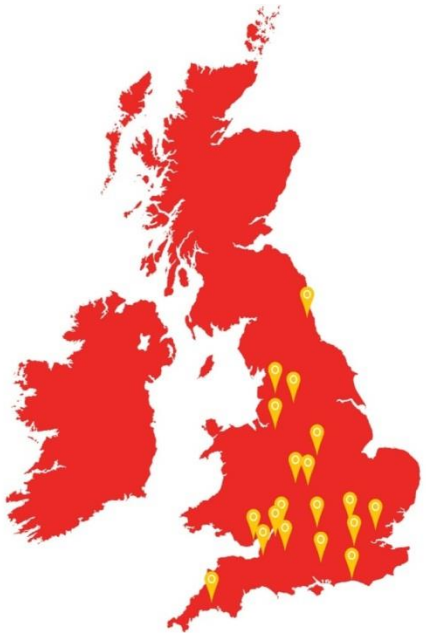
Support groups

These groups offer those affected by sepsis a platform to n
who understand how they are feeling and can share practic

THE UK SEPSIS TRUST

They run using a model which includes:

- Peer support from people who understand how they're feeling.
- Lead volunteer - usually sepsis survivor.
- Healthcare professional from that region.
- Usually every 10-12 week.



HAVE YOU BEEN AFFECTED BY SEPSIS?

People can be affected by sepsis in many ways. You or someone close to you may have had sepsis, or you may have lost a loved one. Whatever your circumstances, come and join us.

Lancashire Sepsis Support Group

Monday 22nd October 2018
6 - 8pm

Trinity Methodist Church
Wesleyan Row
Parson Lane
Clitheroe
BB7 2JY

For more information please contact us
on 0808 800 0029 or support@sepsistrust.org

THE UK SEPSIS TRUST

Post-Discharge Management of Sepsis Patients

- 71/331 (21.5%) patients had evidence of complications at discharge
- 31/306 (10.1%) patients were readmitted to hospital following an episode of sepsis
- Sepsis was not mentioned on the discharge summary in 226/490 (46.1%) of cases
- There was evidence of insufficient information being given to patients on discharge in 24/133 cases

Clinical Coding Documentation

- **Don't Use**
  - Impression
  - Likely
  - ?
  - Possible
  - Suspected
  - Differential
  - DD ΔΔ
- **Do Use**
  - Diagnosis Δ
  - Probable
  - Treat as Tx as
  - Presumed
  - Working diagnosis
  - Or Symptom if no firm diagnosis

MANY THANKS

oliver.jones@sepsistrust.org
larry@sepsistrust.org

0808 800 0029

SEPSIS

THE UK SEPSIS TRUST

TOGETHER WE CAN
SAVE 14,000 LIVES