Sepsis

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2014
Who has heard this before?
What is sepsis?

- Body’s localized responses to an infection or trauma escalates out of control → systematic and imbalance
  - inflammation, coagulation & fibrinolysis
    → organ dysfunction → death.

- Bacteria  Viral  Fungal  Tissue injury  Severe Injury
  Burns  Trauma

- Complications from invasive surgery
Definitions

- **Systemic Inflammatory Response Syndrome (SIRS)**
  Two or more of the following -
  1. Core temp >38-3°C or <36°C
  2. Elevated heart rate (>90 bpm)
  3. Resp rate > 20 bpm
  4. WBC count>12,000/mm³ or <4,000mm³ immature neutrophils

- **Sepsis**
  Known or suspected infection + ≥ 2 SIRS criteria

- **Severe Sepsis**
  Sepsis with organ dysfunction, hypoperfusion or hypotension

- **Septic Shock**
  Severe Sepsis with acute circulatory failure and persistent hypotension despite adequate volume replacement
Have you ever had SIRS?

YES  NO
**Infection**

- Invasion of normally sterile tissues
- Inflammatory response to microorganisms
“Except on few occasions the patient appears to die of the body’s response to infection rather than from it”

Sir William Osler - 1904
The Evolution of Modern Medicine
Who is at risk?

- Young and old
- Immunocompromised
- Critically ill
- Major surgery
- Trauma
Incidence

Mortality

Sepsis
The patient has an Infection

Severe Sepsis
Infection and Organ Dysfunction

Septic Shock

20%

Severe Sepsis
1 out of 5 Patients Die

55%

Septic Shock
1 out of 2 Patients Die
Sites of Infection

- Lung: 54%
- Abdom: 20%
- Others: 16%
- Urinary: 10%

IDENTIFYING ACUTE ORGAN DYSFUNCTION

- Altered Consciousness
- Confusion
- Fearful

- Tachypnoea
  - PaO₂ <70 mm Hg
  - SaO₂ <90%
  - FiO₂ ≤50

- Jaundice
  - ↑ Enzymes
  - ↓ Albumin
  - ↑ Fluid leaking

- Tachycardia
- Hypotension
- Poor capillary refill

- Oliguria
- Anuria
  - ↑ Creatinine
  - ↑ Positive fluid balance

- Platelets
  - ↓
  - ↑ PT/APTT
  - ↑ Bruising
  - ↑ Bleeding

- PaO₂ <70 mm Hg
- SaO₂ <90%
- FiO₂ ≤50
What is the patient telling you?

Look beneath the symptoms.
Which lady is sick?
Which lady has a headache?
How do we know?

“Nurses are in the unique position of observing their patients, they are often the first to see the subtle changes”. Hudak 2006
Inspect - use your skills & senses!

Nothing is above suspicion!!

Look Listen and Feel – don’t forget smell
Warning Signs

- Complete and systematic frequent assessment
- Early warnings
  - changes in respiration rate
temperature, heart rate & WCC

- Changes in GCS, urine output (0.5ml/kg/hr)
Sepsis in Australia & NZ hospitals

- 10 out of 100 cases severe sepsis
- Median 6 day stay in ICU
- ICU mortality 22%
- Hospital mortality 30%

ICM 2009 ANZCIS Clinical Trials Group
Sepsis in Australia & NZ hospitals

- 8 out of 100 cases severe sepsis
- Median 6 day stay in ICU
- ICU mortality 20%
- Hospital mortality 22%

ICM 2013 ANZCIS Clinical Trials Group
Perfect representation of a patient in ICU
What it is like for the patient with Severe Sepsis
Symptoms of Swine flu

- Systemic: Fever
- Psychological: Lethargy, Lack of appetite
- Nasopharynx: Runny nose, Sore throat
- Respiratory: Coughing
- Intestinal: Diarrhea
- Gastric: Nausea, Vomiting

YOU LITTLE BASTARD.
YOU’VE KILLED US ALL.
Prevention
Mrs G

Presentation
“\textit{A 54-yr \textbf{♀} presented to the emergency department with a 1 day history of fever, chills and dyspnoea. On examination she was agitated, cold clammy & shut down. On auscultation she had decreased breath sounds and bronchial breathing.....}”

Observations

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<tr>
<th></th>
<th>Temp</th>
<th>HR</th>
<th>RR</th>
<th>BP</th>
<th>Mean BP</th>
<th>SaO₂</th>
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<tbody>
<tr>
<td><strong>Observations</strong></td>
<td></td>
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<tr>
<td><strong>Temp</strong></td>
<td>39.8°</td>
<td>149</td>
<td>36</td>
<td>80/45</td>
<td>50</td>
<td>85%</td>
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<td><strong>HR</strong></td>
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<td><strong>BP</strong></td>
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<td><strong>Mean BP</strong></td>
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<td><strong>SaO₂</strong></td>
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Biochemistry

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<tbody>
<tr>
<td><strong>pH</strong></td>
<td>7.28</td>
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<tr>
<td><strong>PaO\textsubscript{2}</strong></td>
<td>68 mmHg (on 15LO\textsubscript{2})</td>
</tr>
<tr>
<td><strong>CO\textsubscript{2}</strong></td>
<td>28 mmHg</td>
</tr>
<tr>
<td><strong>WBC</strong></td>
<td>18,500 cells/mm\textsuperscript{3}</td>
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<tr>
<td><strong>K</strong></td>
<td>5.6 m/mol/L</td>
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<tr>
<td><strong>Creatinine</strong></td>
<td>180 µmol/L</td>
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<tr>
<td><strong>Lactate</strong></td>
<td>4.2 mmol/L</td>
</tr>
<tr>
<td><strong>Platelets</strong></td>
<td>95,000 cells/mm\textsuperscript{3}</td>
</tr>
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Treatment

Bloods and blood cultures were drawn for analysis. A chest x-ray showed bilateral pneumonia. An IV was inserted with difficulty appropriate antibiotics commenced.

Despite adequate fluid replacement, urine output has been <0.5 mls/Kg/hr for the last 3 hour and has remained hypotensive, BP 90/40 (mean 53 mmHg)

Further fluids, BiPap
Case Study

Blood cultures returned positive for *Streptococcus* & *pneumococcus pneumonia*

What is her Mortality Rate?
Early Recognition