Types of Shock

- Hypovolemic Shock
  Low blood volume decreasing cardiac output.

- Septic or Distributive Shock
  Decrease in vascular tone.

- Cardiogenic Shock/OBstructive Shock
  Decrease cardiac function or Obstruction of blood flow.

- Anaphylactic Shock
  A form of distributive shock as a result of allergen

- Hypoxic/Respiratory Shock
  Respiratory failure or acute change in neurologic status leading to respiratory failure

Cycle of Shock

1. Hypovolemic
2. Septic
3. Cardiogenic
4. Anaphylactic
5. Hypoxic

- Blood Flow (C.O.)↓
- Blood Pressure↓
- Neurologic, Respiratory, and Cardiovascular function↓

Multiorgan failure:
- Blood Flow or Pressure↓
- Organ perfusion↓

Death

UNTREATED SHOCK IS 100% FATAL

Efficacy of Early Antibiotic Administration

2151 Septic Shock Pts at 10 Hosp
Kumar CC Med June 2006

Improved survival for septic patients with effective Antibiotic administration:
- 7.6% ↑ in mortality for each hour delay
- 83% survival ½ hr
- 80% survival 1 hr
- 60% survival 6 hr
- 35% survival 12 hr
- 10% survival 24 hr
ENHANCE: single-arm, open-label, international study of 2378 adult patients with severe sepsis who received Xigris

- APC infusion started ≤ 24 hrs. from onset of acute organ dysfunction
- APC infusion started ≥ 24 hrs. from onset of acute organ dysfunction

Day One*
N=430

Day Two**
N=432

Effect of Early Administration of Activated Protein C
Mortality of 862 pts with APACHE II ≥ 25 Based on Time to Treatment

Mortality (%) 50% pt 50% pt

Mortality (%) 33% 41%
P=0.019

Why a STaRRT Program at Your Facility?
- A standardized and systematic approach to critical illness will lead to:
  - Early Recognition
  - Early Initiation of Best Practice

Improved Outcomes!

How to Implement a STaRRT Program at Your Facility

Education

Recognition of Critical illness
- Sometimes obvious, but frequently subtle
- Tachypnea—almost always present, non specific, but very sensitive
- Hypotension—not necessarily present or not detected

Protocol Development & Education for the STaRRT Program

- Shock resuscitation algorithms: in pre-hospital; emergency department; general ward; ICU
- 500 health care providers received standardized teaching, slide presentation, interactive classes, exam and Mock Shock Alerts
- Activation criteria cards given to all healthcare workers and posters placed in all units
- Ongoing education based on needs assessment

The Ten Signs of Vitality

- Essential physiologic signs of life
- Essential assessment for treatment of critical illness
- Early assessment and intervention will:
  - Decrease morbidity & mortality
  - Reduce unexpected cardiac arrests
### Classic Vital Signs

- Temperature
- Pulse
- Blood pressure
- Respiration

![Florence Nightingale](The_Lady-in-Chief_Florence_Nightingale)

### New Vital Signs

- Pain – the fifth vital sign (American Pain Society 1995)
- Level of consciousness (LOC)
- O₂ saturation
- Urine output
- Capillary refill
- ScVO₂ / SVO₂

### Communication

**Significant Clinical Alteration**

- Complete assessment of the 9 Signs of Vitality
- Use **SBAR** communication:
  - **S** = situation
  - **B** = background
  - **A** = assessment (9 SOV)
  - **R** = recommendation
- Patient’s chart available for information and orders

### The Ten Signs of Vitality – 10 SOV

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Level of consciousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>Oxygen saturation</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>Urine output</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Capillary refill</td>
</tr>
<tr>
<td>Pain</td>
<td>ScVO₂ / SVO₂</td>
</tr>
</tbody>
</table>

### ALL SHOCK

Leads to cardiogenic shock

### Skin Manifestations of Shock: Livedo reticularis
**STaRRT Alert Inclusion Criteria**

**Hypotension** SBP < 90, MAP < 60 with one or more of the following:

1. Temperature ≤ 36°C or 96.8°F
2. RR > 20 bpm
3. Altered mental status

and not corrected with one liter rapidly infused crystalloid:

4. Cool extremities or skin mottling, cap refill > 3 sec
5. Oliguria < 30 cc/hour
6. Lactic Acid > 2.0 or base excess (BE) < -5 mmol/L

**Normotension** with three or more of the following:

- Anxiety, apathy, agitation, lethargy or coma
- Respirations > 20 bpm
- Lactic acid > 2.0 or BE < -5 mmol/L
- Cool extremities or skin mottling
- Oliguria < 30 cc/hour
- Temperature < 36°C

**Activation Criteria (continued)**

- Primary respiratory failure: RR > 30, with ↑ O2 requirement
- Significant deterioration neurological status: ↓ GCS > 2 or GCS of ≤ 8 or RR < 8 and SaO2 < 90

**STaRRT Resuscitation Goals**

- SaO2 > 92%
- Decreased work of breathing
- MAP > 70
- UO > 30 cc/hr
- Improved skin perfusion (cap ≤ 3 sec)
- SvO2 > 60 or ScvO2 > 70

**Standardized Best Practice:**

**V. I. P. P. S.** Approach to Bedside Management of Shock

Weil MH; Shubin H. JAMA 1969 Jan 13

- Ventilation/oxygenation
- Infusion of VOL
- Pressors / Pump
- Pharmacy
- Specific

**For All Critical Illness**

- **After VIPPS**
  - Insulin for tight glucose control
  - DVT prophylaxis
  - GI prophylaxis
  - Lower TV ventilation 8cc/kg
  - HOB > 30°
  - Kinetic therapy
  - Sedation vacation/weaning protocol
  - Duodenal feeding, ASAP
Other Protocols

- SVT protocol
- Cardiogenic shock
- Anaphylactic shock
- Sedation
- Ventilator/weaning
- DVT/GI prophylaxis
- Insulin infusion

Median Treatment Intervals

Shock Alert vs. Mortality

2 Liters Fluid Intervention vs. Mortality

Antibiotic Administration vs. Mortality
Septic Patients Only

ICU Admission vs. Mortality
**APACHE III Scores & Total Mortality %**

- Year 0
- Year 1
- Year 2
- Year 3
- Year 4
- Year 5

**Mortality by Shock Type**

- Hypovolemic
- Septic

- A comprehensive educational program and a protocolized systems approach to early identification of critical illness results in:
  - Rapid initiation of protocol driven goal directed treatment
  - Decreases the time to the initiation of fluids, antibiotics, intensivist involvement and ICU arrival
  - Decreases time to hemodynamic optimization
  - Decreases organ failure
  - Decreases mortality

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