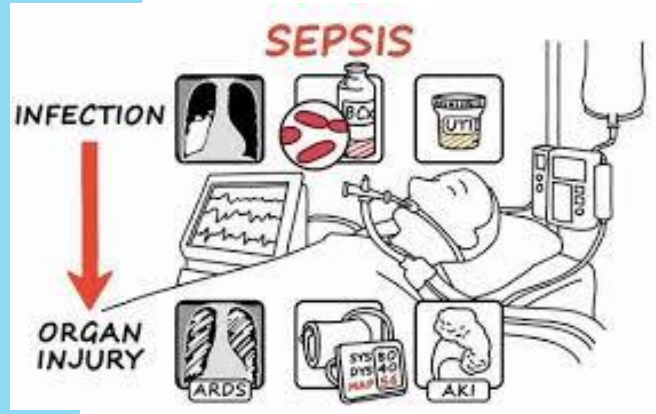
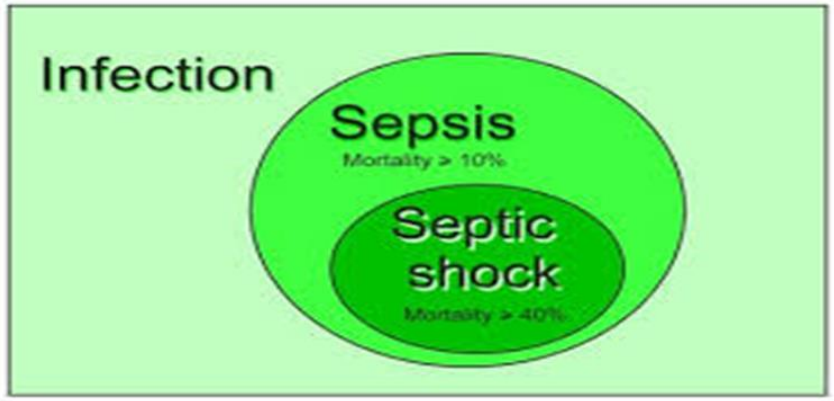
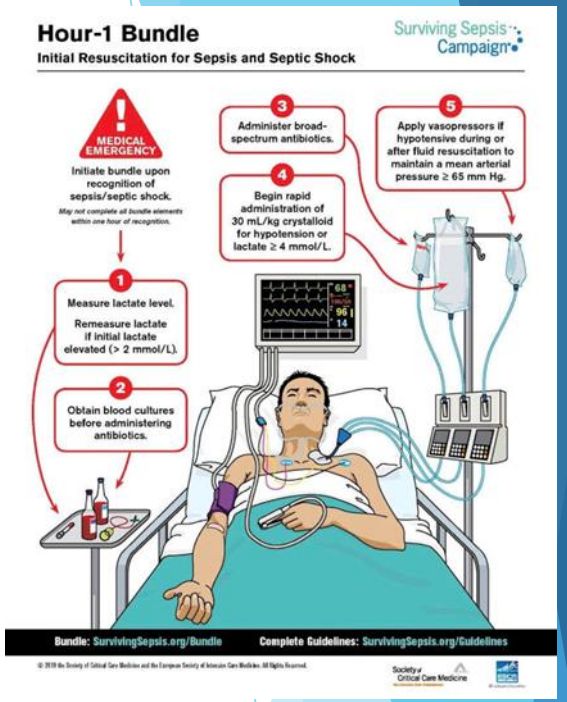


Sepsis challenges





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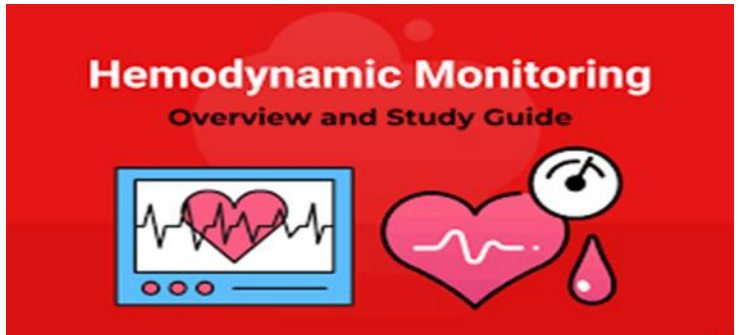
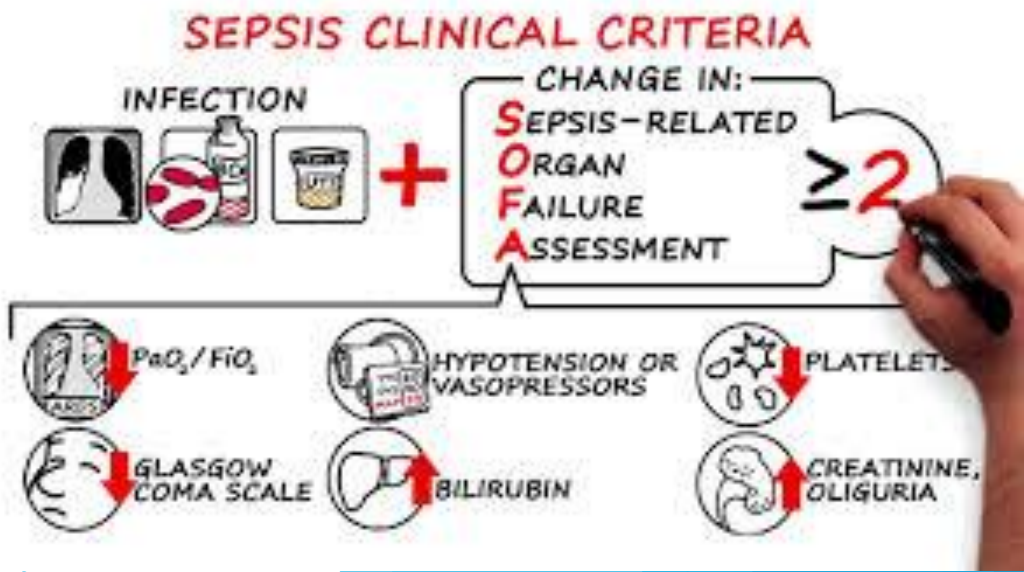
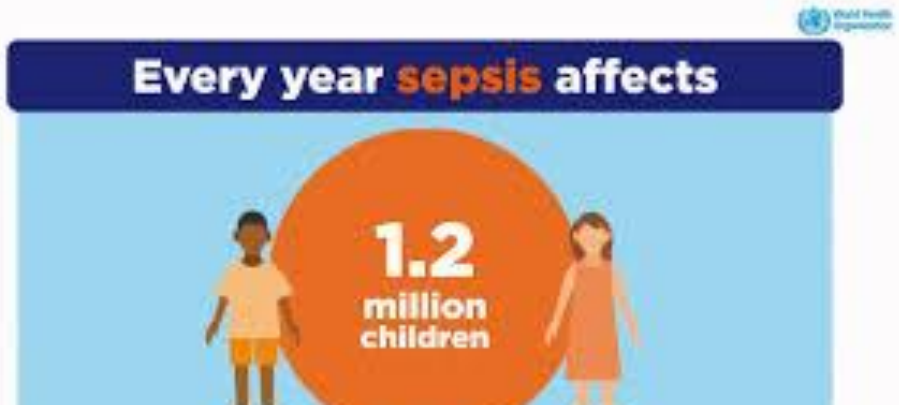
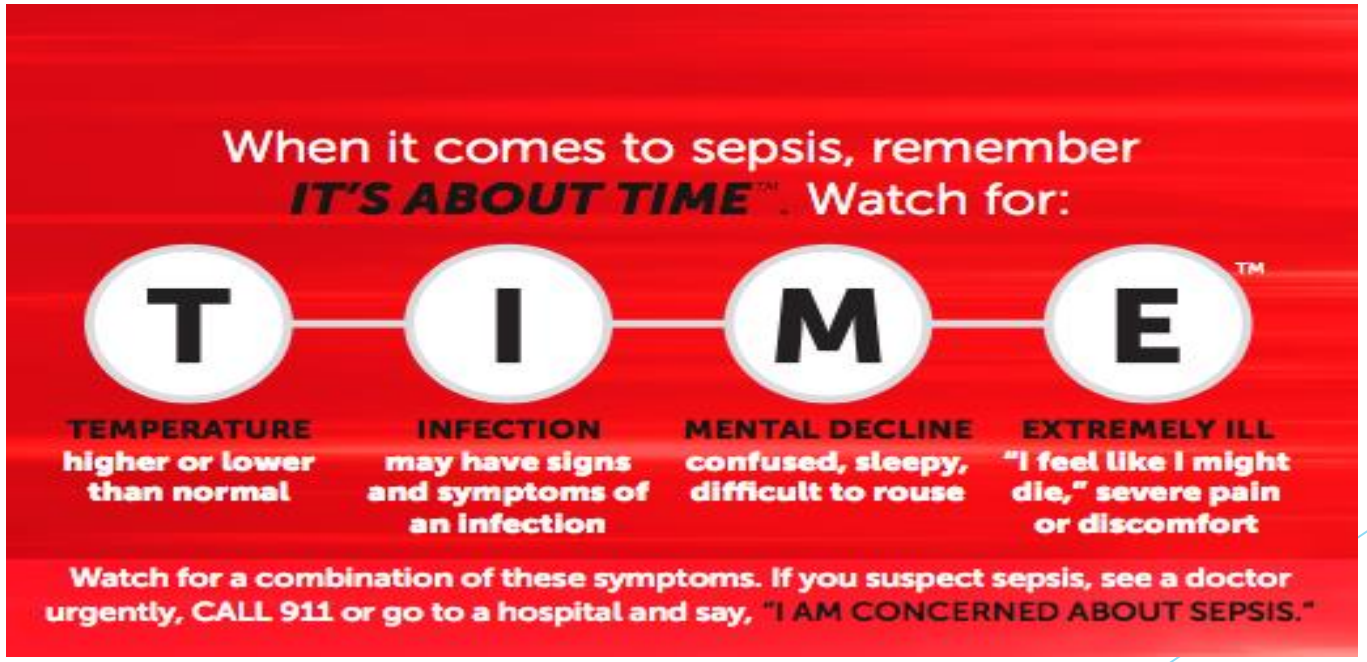




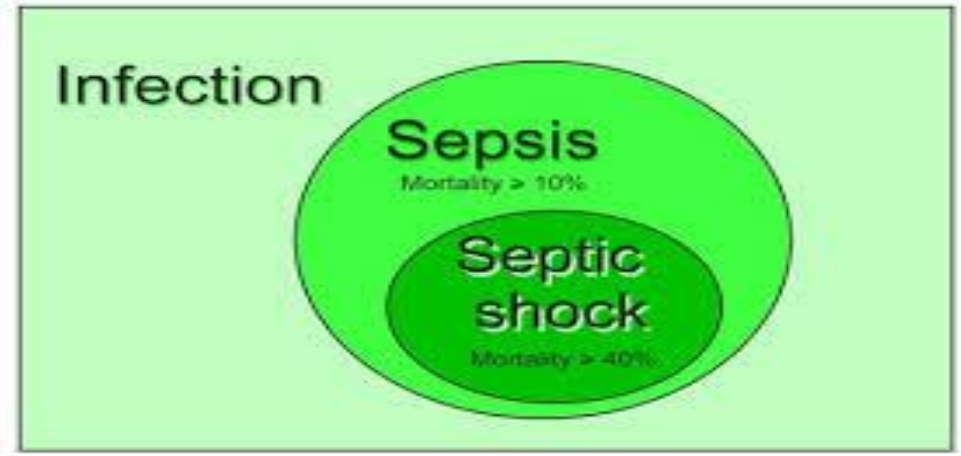
- Sepsis is a leading cause of morbidity, mortality, and healthcare utilization for children worldwide.
- Globally, an estimated 22 cases of childhood sepsis per 100,000 person-years and 2202 cases of neonatal sepsis per 100,000 live births occur, translating into 1.2 million cases of childhood sepsis per year .
- More than 4% of all hospitalized patients less than 18 years and ~ 8% of patients admitted to PICUs in high-income countries have sepsis
- Mortality for children with sepsis ranges from 4% to as high as 50%.

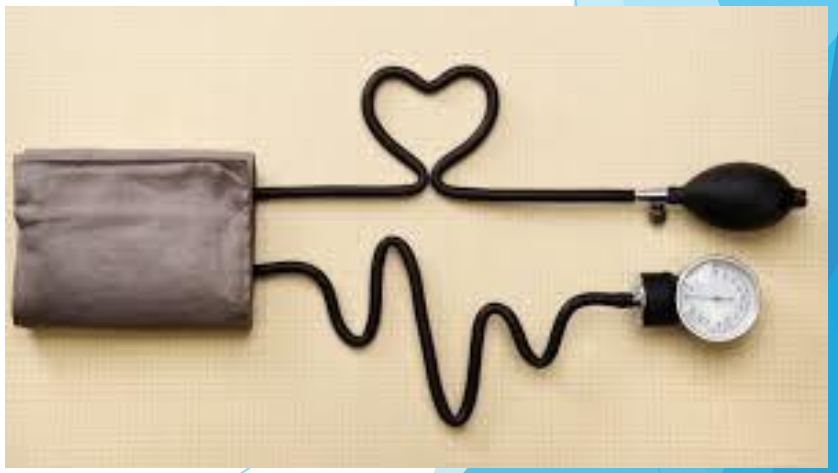


Early identification and appropriate management and resuscitation are critical to optimizing outcomes for children with sepsis.



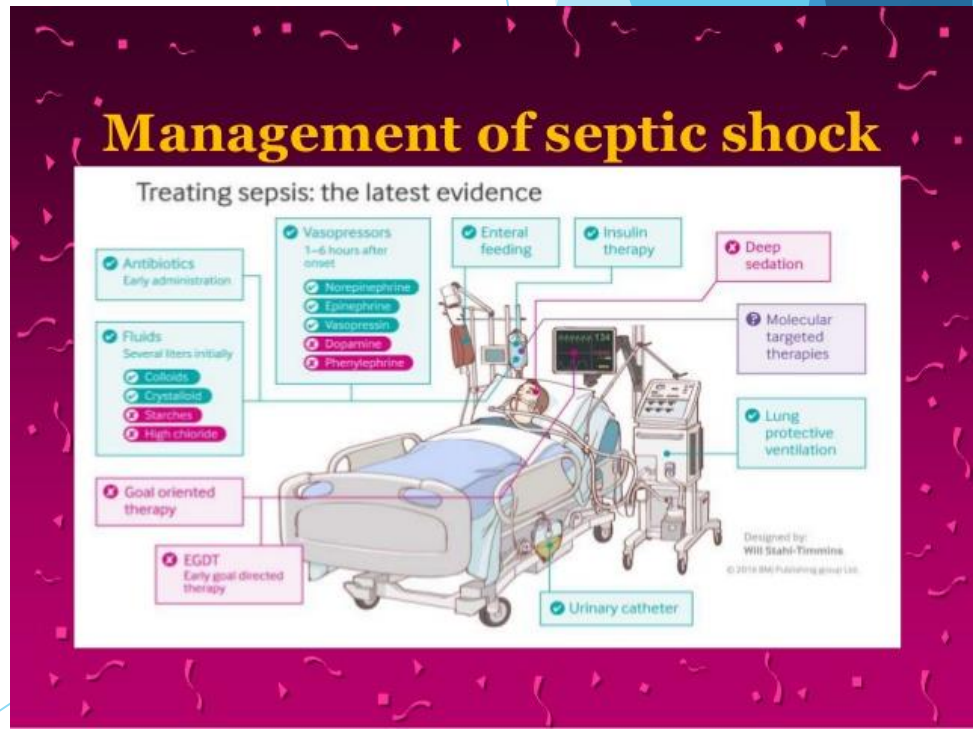
- “sepsis” defined as life-threatening organ dysfunction caused by a dysregulated host response to infection and “septic shock” the subset of sepsis with circulatory and cellular/metabolic dysfunction (including hypotension, need a vasoactive medication, or impaired perfusion) associated with a higher risk of mortality.





5 important step in sepsis and septic shock managment

- (1) recognition and management of infection,
- (2) hemodynamics and resuscitation,
- (3) ventilation,
- (4) endocrine and metabolic therapies, and
- (5) adjunctive therapies.

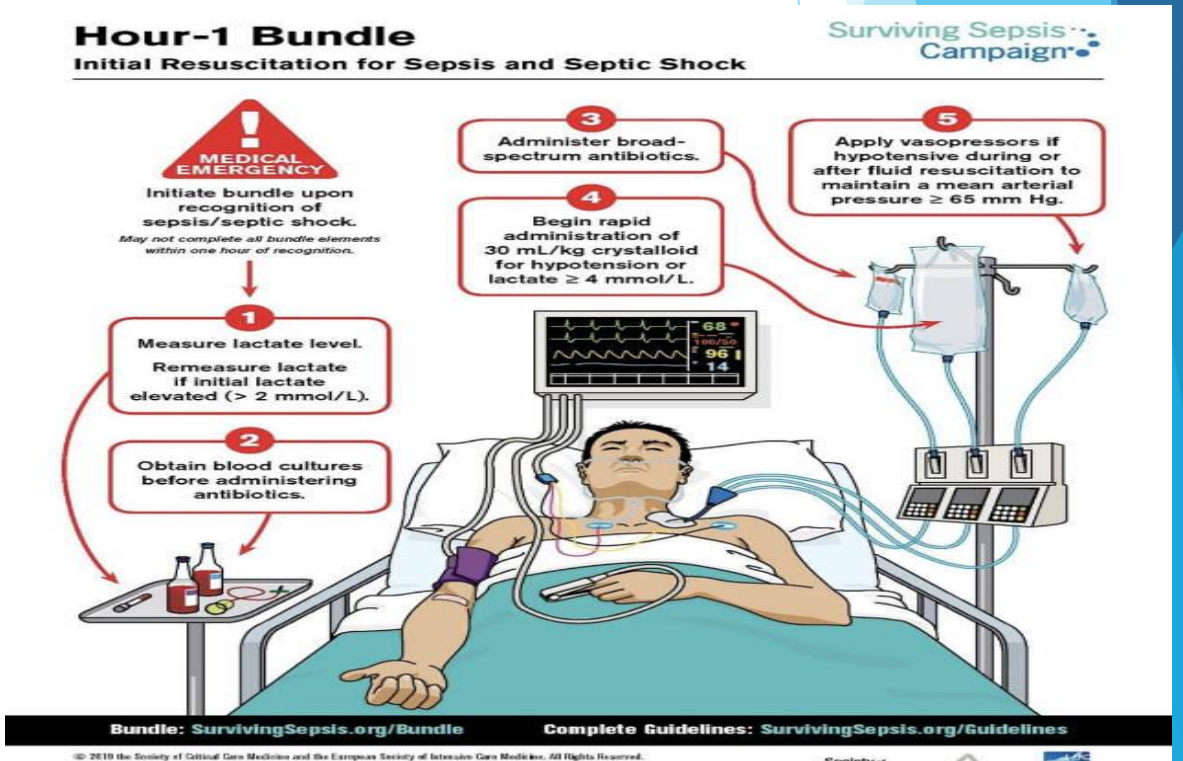


Screening, diagnosis, and systematic management of sepsis

- *In children who present as acutely unwell, implementing systematic screening for timely recognition of septic shock and other sepsis-associated organ dysfunction must be done .*
- Earlier recognition will lead to more timely initiation of therapy, which will translate to improved morbidity and/or mortality.
- Sepsis quality improvement (QI) programs should be consider.

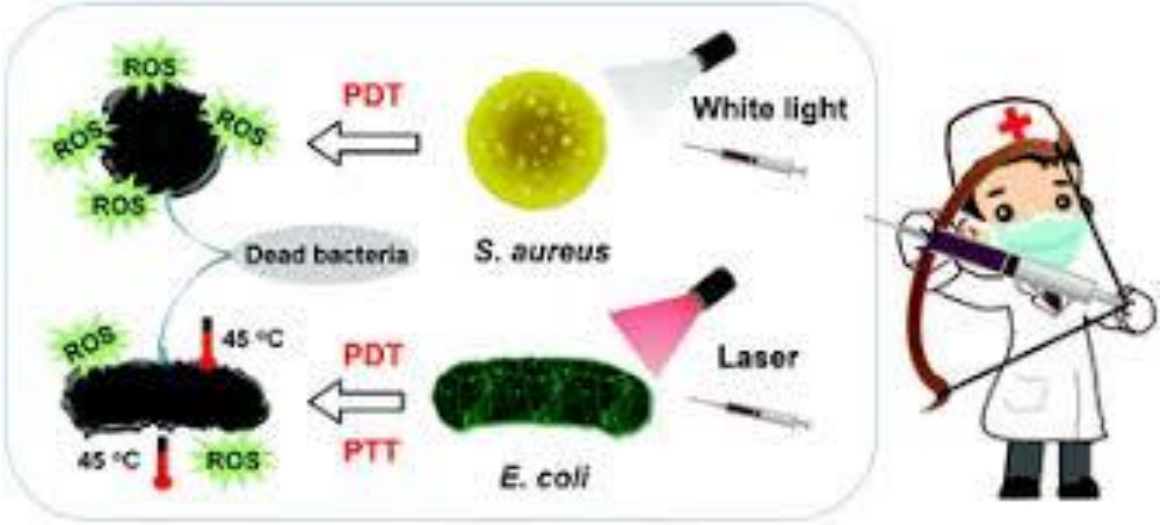
- *A protocol/guideline for management of children with septic shock or other sepsis-associated organ dysfunction must be available (*timely delivery of a "bundle of therapies" e.g., blood culture, fluid bolus, and antibiotics).

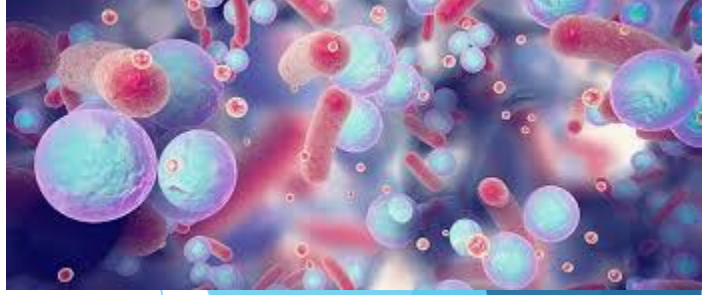
- New molecular technologies are becoming available to facilitate earlier and faster microbiological diagnoses.



Antimicrobial therapy

- *In children with septic shock, starting antimicrobial therapy as soon as possible is recommended.*
- Antimicrobials are the primary medical therapy that directly targets the underlying cause of sepsis.
- *Empiric broad-spectrum therapy with one or more antimicrobials to cover all likely pathogens are recommended.*

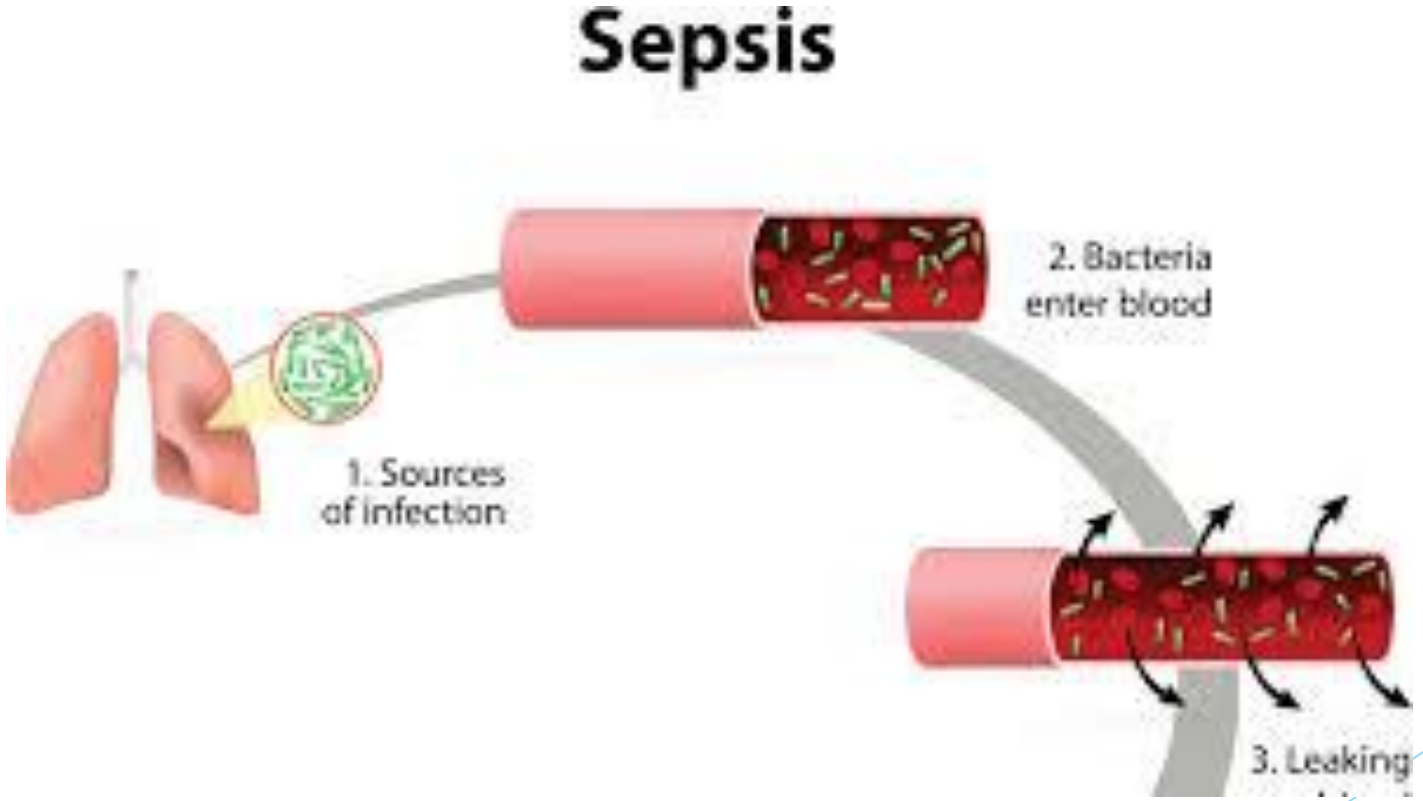




- *In children with immune compromise and/or at high risk for multidrug-resistant pathogens, we suggest using empiric multi-drug therapy when septic shock or other sepsis-associated organ dysfunction is present/suspected.*
- *Daily assessment (e.g., clinical, laboratory assessment) for de-escalation of antimicrobial therapy should be considered.*
- *Duration of antimicrobial therapy should be tailored according to the site of infection, microbial etiology, response to treatment, and ability to achieve source control.*

Source control

- *Source control intervention should be implemented as soon as possible after a diagnosis of an infection is made .*



Fluid therapy

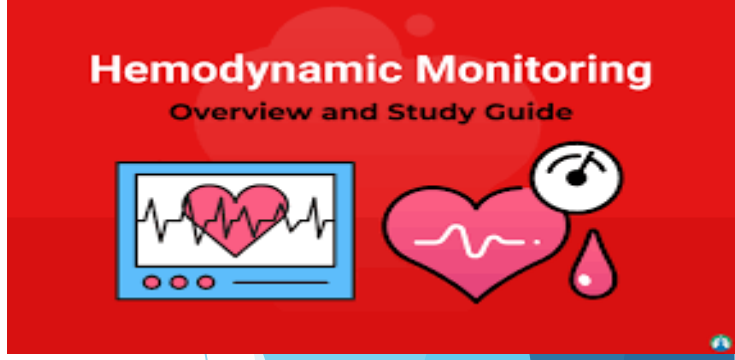
- *In healthcare systems with availability of intensive care, administering up to 40-60 mL/kg in bolus fluid (10-20 mL/kg per bolus) over the first hour, titrated to clinical markers of cardiac output is suggested and discontinued if signs of fluid overload develop.*
- *In healthcare systems with no availability of intensive care and in the absence of hypotension, bolus fluid administration is not suggested.*

If hypotension is present, administering up to 40 mL/kg in bolus fluid (10-20 mL/kg per bolus) over the first hour with titration to clinical markers of cardiac output (such as: heart rate, blood pressure, capillary refill time, level of consciousness, and urine output *) is suggested.*

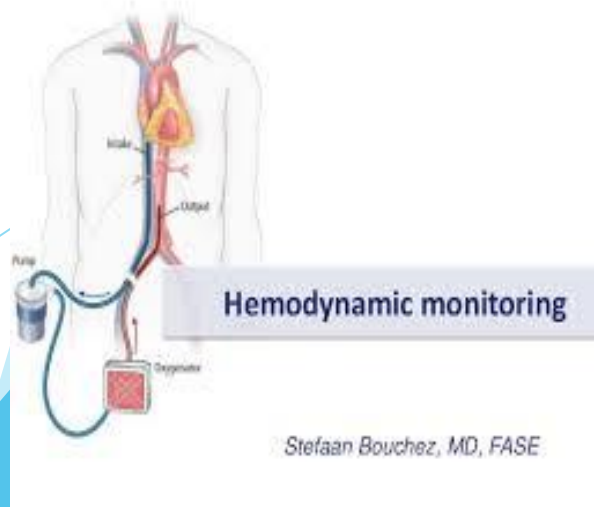
Fluid therapy

- *Using balanced/buffered crystalloids, rather than 0.9% saline Or albumin, for the initial resuscitation of children with septic shock or other sepsis-associated organ dysfunction is recommended.*

Hemodynamic monitoring

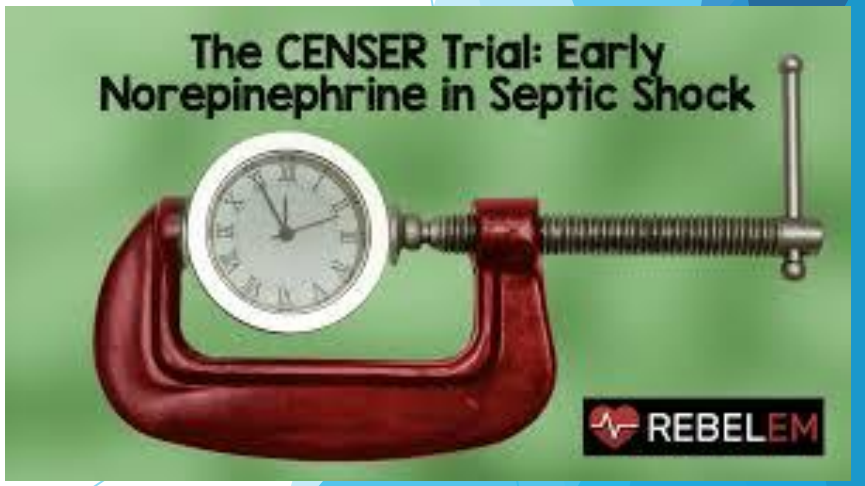


- *It is recommended that mean arterial blood pressure (MAP) maintend at the 5th or 50th percentile for age or greater than 50th percentile for age in children with septic shock and other sepsis-associated organ dysfunction.*
- Advanced hemodynamic monitoring may include cardiac output/cardiac index, systemic vascular resistance, or central venous oxygen saturation (Scvo2).
- If advanced hemodynamic monitoring not available extremity temperature, capillary refill, pulse strength, diastolic blood pressure, and pulse pressure may be helpful.
- *Using trends in blood lactate levels, in addition to clinical assessment, to guide resuscitation of children with septic shock is helpful.*



Vasoactive medications

- *Using epinephrine or norepinephrine as the first-line vasoactive infusion guided by clinician preference, individual patient physiology, and local system factors rather than dopamine is suggested .*
- A *dilute concentration of the initial vasoactive medication through a peripheral vein if central venous access is not readily accessible is administered.*



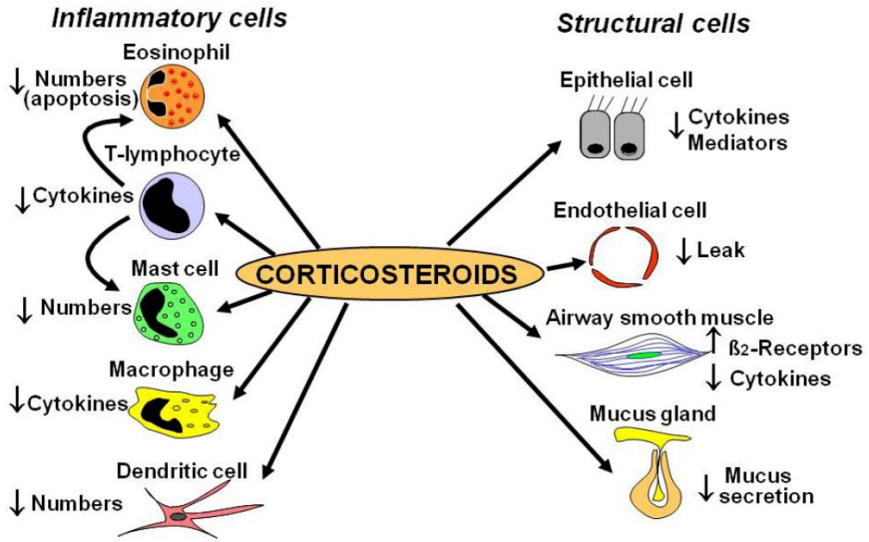
Ventilation

- *Intubation of children with fluid-refractory, catecholamine-resistant septic shock without respiratory failure is suggested.*

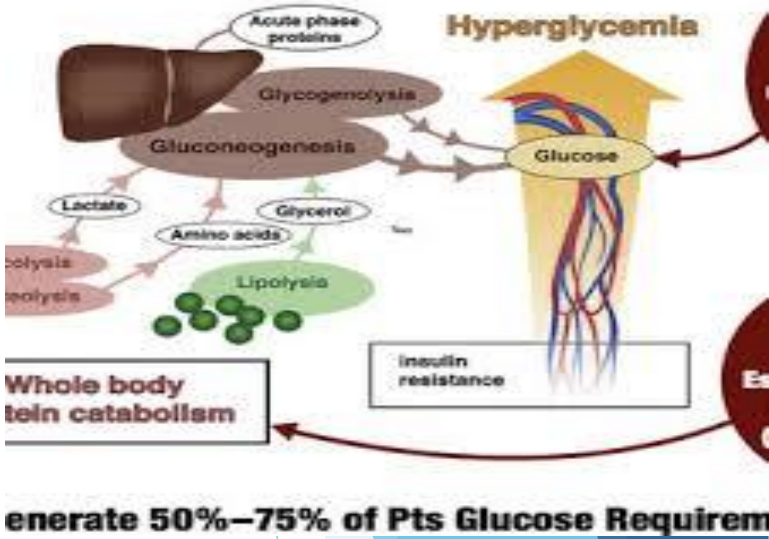
- *A trial of noninvasive mechanical ventilation (over invasive mechanical ventilation) in children with sepsis-induced pediatric ARDS (PARDS) without a clear indication for intubation and who are responding to initial resuscitation is suggested.*

Corticosteroids

- *Using IV hydrocortisone to treat children with septic shock if fluid resuscitation and vasopressor therapy are able to restore hemodynamic stability is not suggested.*



metabolic and *antipyretic therapy*



- *There are consensus to target blood glucose levels below 180 mg/dL (10 mmol/L) .*

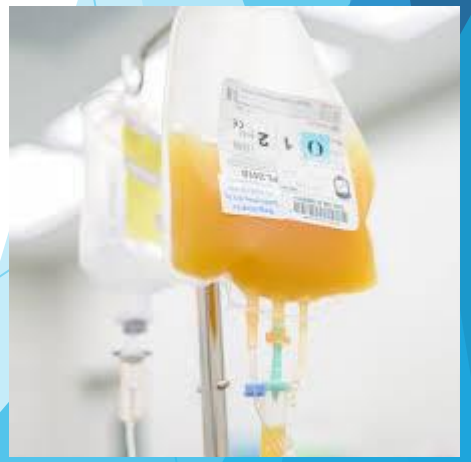
- *Either antipyretic therapy or a permissive approach to fever in children with septic shock or other sepsis-associated organ dysfunction are suggested.*

Nutrition

- *There is a preference to commence early enteral nutrition within 48 h of admission in children with septic shock ,who have no contraindications to enteral nutrition and to increase enteral nutrition in a stepwise fashion until nutritional goals are met.*
- *Supplementation with specialized lipid emulsions in children with septic shock is not suggested.*
- *Measurements of gastric residual volumes (GRVs) in children with septic shock is not suggested.*
- *Routine use of prokinetic agents* such as metoclopramide and erythromycin *for the treatment of feeding intolerance in children with septic shock is not suggested.*
- *Routine use of inselenium , glutamine supplementation, arginine , zinc supplementation , ascorbic acid (vitamin C) , thiamine , acute repletion of vitamin D deficiency , children with septic shock is not suggested.*

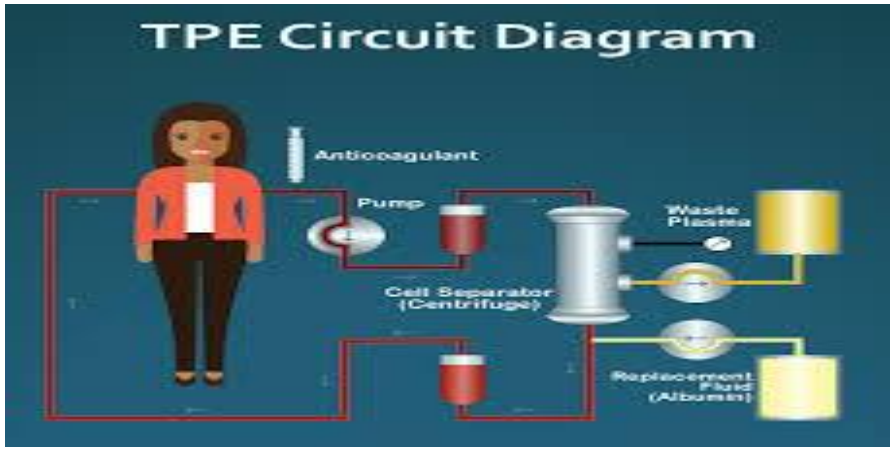
Blood products

- *No suggestion for transfusion of RBCs if the blood hemoglobin concentration is greater than or equal to 7 g/dL in hemodynamically stabilized children with septic shock or other sepsis-associated organ dysfunction.*
- No *suggestion for prophylactic platelet transfusion based solely on platelet levels in nonbleeding children with septic shock or other sepsis-associated organ dysfunction and thrombocytopenia .*
- No *suggestion for prophylactic plasma transfusion in nonbleeding children with septic shock or other sepsis-associated organ dysfunction and coagulation abnormalities.*



Plasma exchange

- *It is not suggested to use plasma exchange (PLEX) in children with septic shock or other sepsis-associated organ dysfunction without thrombocytopenia-associated multiple organ failure (TAMOF).*
- *There are no suggestion for or against the use of PLEX in children with septic shock or other sepsis-associated organ dysfunction with thrombocytopenia-associated multiple organ failure (TAMOF).*



Immunoglobulins

- *Routine use of IV immune globulin (IVIG) in children with septic shock or other sepsis-associated organ dysfunction* is not recommended.
- Selected patients may benefit from such treatment.

Prophylaxis

- Stress ulcer prophylaxis should not be routinely administered to children with septic shock , it may increase risk of adverse effects, such as pneumonia or C. difficile infection.
- Individual patients should be assessed for the presence of risk factors of clinically important gastrointestinal bleeding. These include multiple organ dysfunction, prolonged mechanical ventilation (> 48 h), coagulopathy, persistent shock, and treatment with corticosteroids and nonsteroidal anti-inflammatory agents .

- *Routine deep vein thrombosis (DVT) prophylaxis (mechanical or pharmacologic) in critically ill children with septic shock is not suggested, but potential benefits may outweigh risks and costs in specific populations.*