

Sepsis or Septic Shock

Setting: **Emergency Department** Population: **Pediatric** Keywords: **hypotension, septicemia, infection**

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Clinical Description

Care of the emergency department pediatric patient seeking treatment for sepsis or associated septic shock.

Key Information

- Outcomes are improved by early identification of sepsis and the immediate initiation of evidence-based therapy following sepsis recognition, including aggressive fluid resuscitation and antimicrobial therapy.
 - Infants and children may be septic without an elevated temperature; a complete history, physical examination and clinical judgement are important for early recognition and intervention.
 - Blood pressure alone is not a reliable indicator of successful resuscitation in infants and children. Other parameters, such as capillary refill and end-organ perfusion should be evaluated; shock may occur long before hypotension occurs.
 - Elevated lactic acid levels may indicate tissue hypoxia and poorer outcomes.
 - ARDS (acute respiratory distress syndrome) is highly associated with sepsis, whether it is the cause or result of sepsis. Suspect ARDS (acute respiratory distress syndrome) if PFR (ratio of partial pressure of arterial oxygen to fractional inspired oxygen) is less than 300 mmHg.
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Threats to Life, Limb or Function

- acute renal failure
 - ARDS (acute respiratory distress syndrome)
 - DIC (disseminated intravascular coagulation)
 - failure to recognize sepsis
 - multiple-organ-dysfunction syndrome
 - sepsis-associated encephalopathy
 - septic shock
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Clinical Goals

By transition of care

A. The patient will demonstrate achievement of the following goals:

- Goal: Acute Signs/Symptoms are Managed
- Goal: Acceptable Pain Level Achieved

B. Patient, family or significant other will teach back or demonstrate education topics and points:

Correlate Health Status

Correlate health status to:

- history, comorbidity, congenital anomaly
- age, developmental level
- sex, gender identity
- baseline assessment data
- physiologic status
- response to medication and interventions
- psychosocial status, social determinants of health
- barriers to accessing care and services
- child and family/caregiver:
 - health literacy
 - cultural and spiritual preferences
- safety risks
- family interaction
- plan for transition of care

Sepsis or Septic Shock

Presentation

- chills, rigors
- cry high-pitched (infant)
- feeding pattern or tolerance altered (infant)
- fontanel full or bulging (infant)
- level of consciousness altered
- mental status altered
- muscle tone altered (infant)
- peripheral perfusion altered
- poor arousal or response to social cues
- tachycardia
- tachypnea
- temperature variation (increased or decreased)

Associated Signs/Symptoms

- abdominal distension
- anorexia
- arthralgia, myalgia
- cough
- cyanosis
- diaphoresis
- diarrhea
- dysuria
- edema
- fatigue
- hypotension
- nuchal rigidity
- pain
- pallor
- petechiae, purpura
- rash
- shortness of breath
- urinary frequency
- urine output decreased
- vomiting

- work of breathing increased

Potential Causes

- bone or joint infection
- endocarditis
- implanted device infection
- intra-abdominal infection
- meningitis
- respiratory infection, pneumonia
- skin or soft tissue infection
- urinary tract infection
- wound infection

Initial Assessment

- airway patency
- cardiovascular status
- fluid status
- gastrointestinal status
- musculoskeletal status
- neurologic status
- pain evaluation
- respiratory status
- skin and soft tissue status

History

- allergies
- comorbidities
- immunization status
- last menstrual period (females of childbearing age)
- medications
- feeding pattern and tolerance

- hospitalizations
- infant birth history (prolonged rupture of membranes, maternal infection or fever)
- recent antimicrobial therapy
- recent infection or exposure
- recent injury or trauma
- recent procedure or surgery
- recent travel
- symptom onset

Laboratory Studies

- albumin, pre-albumin
- amylase
- ABG (arterial blood gas)
- blood glucose level
- BUN (blood urea nitrogen)
- CBC (complete blood count) with differential
- cerebrospinal fluid analysis
- coagulation studies abnormal
- CRP (C-reactive protein)
- cultures and gram stain
- lipase
- liver function tests
- procalcitonin level
- serum creatinine
- serum electrolytes
- serum lactate
- urinalysis

Diagnostics

- CT (computed tomography) scan
- ECG (electrocardiogram)
- lumbar puncture

- ultrasound (abdomen, chest)
- x-ray (abdomen, chest)

Potential Additional Testing

- pregnancy test (females of childbearing age)

Problem Intervention(s)

Provide Respiratory Support

- Assess and monitor airway, breathing and circulation for effective oxygenation and ventilation; maintain close surveillance for deterioration.
- Maintain open and patent airway with use of positioning, airway adjuncts and secretion clearance.
- Position to minimize the risk of aspiration, ventilation/perfusion mismatch and breathlessness.
- Minimize oxygen consumption and demand; limit activity, reduce fever and utilize breathing techniques.
- Provide oxygen therapy judiciously; titrate to prevent hyperoxemia.
- Implement noninvasive or invasive positive pressure ventilation.
- Facilitate lung-protection measures, such as limited ventilator tidal volume and plateau pressure; implement positive end-expiratory pressure.

Provide Hemodynamic Support

- Provide prompt fluid therapy to improve blood flow, perfusion and tissue oxygenation.
- Evaluate and address responsiveness to fluid resuscitation during and following each bolus; include blood pressure, peripheral perfusion, breath sounds, mentation and level of consciousness.
- Anticipate use of vasoactive agent to support microperfusion and oxygen delivery; titrate to response.
- Anticipate corticosteroid administration for refractory shock or for suspected or proven absolute adrenal insufficiency.
- Monitor cardiovascular status; observe for, and address, cardiac dysrhythmia.
- Monitor and manage electrolyte imbalances, especially hypocalcemia and hyperkalemia.
- Monitor and address end-organ dysfunction; consider using a standardized tool to assess for organ failure.

Minimize and Manage Infection

- Anticipate antimicrobial therapy administration; do not delay in the presence of high suspicion or clinical indicators.
- Obtain cultures prior to initiating antimicrobial therapy when possible.
- Determine and address underlying source of infection aggressively; consider vascular access device, invasive devices, meningitis, pneumonia or wound.
- Initiate precautions to prevent the spread of infection.
- Monitor blood glucose level and maintain glycemic control.

Promote Comfort and Manage Pain

- Use a consistent pain assessment tool; evaluate pain and treatment response at regular intervals.
- Involve patient and family in the management plan.
- Provide nonpharmacologic strategies, such as positioning, quiet and calm environment and minimal stimulation.
- Consider pharmacologic measures, such as an analgesic, antipyretic or antianxiety agent.
- Evaluate risk for opioid use.

Facilitate Procedures

- Initiate and maintain NPO (nothing by mouth) status.
- Prepare for or assist with procedure, such as urinary catheter placement, gastric decompression, lumbar puncture, cultures, debridement, incision and drainage, thoracentesis or thoracostomy.
- Anticipate and prepare for surgical intervention.

Provide Psychosocial Support

- Proactively provide information; encourage questions and address concerns.
- Provide calm, reassuring presence.
- Recognize, identify and allow expression of emotions.
- Promote parent/caregiver presence at bedside.
- Offer choices to enhance a sense of control.
- Honor spiritual and cultural preferences.
- Recognize and utilize personal coping strategies.
- Consider conversation around goals of care; involve palliative care team, if available.

Teaching Focus

- symptom/problem overview
 - risk factors/triggers
 - self-management
 - assistive device
 - diagnostic test
 - diet modification
 - medical device/equipment use
 - medication administration
 - opioid medication management
 - orthopaedic device
 - safe medication disposal
 - smoking cessation
 - wound care
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Population-Specific Considerations

Forensics and Legal

- Utilize local, state/province, federal requirements and hospital policy and protocols to manage patient care involving forensics, protective services, workman's compensation and mandatory reportable events and illness.

Human Trafficking

- Human trafficking victims most frequently seek healthcare services from Emergency Departments. Healthcare professionals, alert to signs of trafficking, can guide supportive care for victims.
- Trafficked individuals may be male or female and engaged in sex work or other forced labor. High-risk signs requiring more direct questioning about exploitation include, among others, current employment in a high-risk industry, prior sexually transmitted infections, recent immigration and other vulnerable and minority populations, as well as children who are homeless, runaways or in foster care.

Age-Related

- Infants are particularly prone to hypothermia. Hypothermia may indicate serious infection.
- Information from parents or primary caregiver is very important, as they know the child's baseline status.

Pregnancy

- Beyond 20 weeks gestation, supine position should be avoided. Maternal position should be lateral or lateral tilt to prevent compression of the inferior vena cava and aorta by the pregnant uterus.
- Maternal stabilization and resuscitation are the primary priorities.
- Assessment of fetal status, a secondary assessment, should include fetal heart rate, contraction activity and presence of maternal-fetal hemorrhage.
- Normal physiologic changes during pregnancy should be considered when treating a pregnant patient with sepsis. Hemodynamic parameters should be carefully monitored.
- Infection during pregnancy can result in the increased production of prostaglandins, which may lead to preterm labor.

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