SEPSIS/SEPTICEMIA

Sepsis is a syndrome characterized by clinical signs and symptoms of severe infection that may progress to septicemia and septic shock. Septicemia implies the presence of an infection of the blood caused by rapidly multiplying microorganisms or their toxins, which can result in profound physiological changes and systemic sepsis. The pathogens can be bacteria, fungi, viruses, or rickettsiae. The most common causes of septicemia are Gram-negative bacteria (and endotoxins), staphylococci, and Candida. If the defense system of the body is not effective in controlling the invading microorganisms, septic shock may result, characterized by altered hemodynamics, impaired cellular function, and multiple system failure.

Patients at highest risk for bacteremia and septic shock include the elderly, infants, and immunosuppressed patients with chronic diseases (e.g., diabetes); postoperative patients; and those with ventilators, invasive lines, and catheters. Early signs and symptoms may be vague, and sepsis can develop subtly until sudden, overwhelming septic shock is present, affecting multiple organ systems.

CARE SETTING
Although severely ill patients may require admission to an intensive care unit (ICU), this plan addresses care on an inpatient acute medical-surgical unit.

RELATED CONCERNS
AIDS
Chronic obstructive pulmonary disease (COPD) and asthma
Disaster considerations
Fluid and electrolyte imbalances
Metabolic acidosis (primary base bicarbonate deficiency)
Peritonitis
Pneumonia, microbial
Psychosocial aspects of care
Pulmonary tuberculosis (TB)
Renal Failure: Acute
Surgical Intervention
Total nutritional support: parenteral/enteral feeding
Ventilatory assistance (mechanical)

Patient Assessment Database
Data depend on the type, location, duration of the infective process and organ involvement.

ACTIVITY/REST
May report:
Fatigue, malaise

May exhibit:
Mental status changes, e.g., withdrawn, lethargic
Respiration/heart rate increased with activity

CIRCULATION
May exhibit:
Blood pressure (BP) normal/slightly low-normal range (as long as cardiac output remains elevated); profound hypotension (late stage)
Peripheral pulses bounding, rapid (hyperdynamic phase); weak/thready/easily obliterated, extreme tachycardia (shock)
Heart sounds: Dysrhythmias and development of S3 suggest myocardial dysfunction, effects of acidosis/electrolyte imbalance
Skin warm, dry, flushed (vasodilation); or pale, cold, clammy, mottled (vasoconstriction)

ELIMINATION
May exhibit:
Urinary output decreased, concentrated; progressing to oliguria, anuria
Urine cloudy, malodorous
FOOD/FLUID

May report: Loss of appetite; nausea/vomiting
May exhibit: Weight loss, decreased subcutaneous fat/muscle mass (malnutrition)
Diminished/absent bowel sounds
Extremity and generalized edema

NEUROSENSORY

May report: Headache; dizziness, fainting
May exhibit: Restlessness, apprehension, confusion, disorientation, delirium/coma

PAIN/DISCOMFORT

May report: Abdominal tenderness, localized pain/discomfort
Generalized urticaria/pruritus

RESPIRATION

May report: Shortness of breath
May exhibit: Tachypnea with decreased respiratory depth, dyspnea; rapid labored respirations
Basilar crackles, rhonchi, wheezes (presence of pneumonia; developing pulmonary complications/onset of cardiac decompensation)

SAFETY

May report: History of recent/current infection, viral illness; cancer therapies, use of corticosteroids/other immunosuppressant medications
May exhibit: Temperature: Usually elevated (101°F or higher) but may be normal in elderly or compromised patient; occasionally subnormal (lower than 98.6°F)
Shaking chills
Poor/delayed wound healing, purulent drainage, localized erythema
Muscular erythematous rash, petechiae; oozing/bleeding from invasive line sites, wounds, mucous membranes

SEXUALITY

May report: Perineal pruritus
Recent childbirth/abortion
May exhibit: Maceration of vulva, purulent vaginal drainage

TEACHING/LEARNING

May report: Chronic/debilitating health problems, e.g., liver, renal, cardiac disease; cancer, diabetes mellitus (DM), alcoholism
History of splenectomy
Recent surgery/invasive procedures, traumatic wounds
Antibiotic use (recent or long-term)

Discharge plan considerations: DRG projected mean length of inpatient stay: 5.5 days
May require assistance with wound care/supplies, treatments, self-care and homemaker tasks
Refer to section at end of plan for postdischarge considerations.

DIAGNOSTIC STUDIES

Cultures (wound, sputum, urine, blood): May identify organism(s) causing the sepsis. Sensitivity determines most effective drug choices. Catheter/intravascular line tips may need to be removed and cultured if the portal of entry is unknown. Note: Diagnosis does not require positive blood cultures because up to 40% of patients who develop septic shock do not display an identified bacterium by culture.

Complete blood count (CBC): Hematocrit (Hct) level may be elevated in hypovolemic states because of hemoconcentration. Leukopenia (decreased white blood cells [WBCs]) occurs early, followed by a rebound leukocytosis (15,000–30,000) with increased bands (shift to the left), indicating rapid production of immature WBCs. Neutrophils (also called granulocytes, poly, or polymorphonuclear neutrophils [PMNs]) may be elevated or depressed. Counts below 500/mL indicate immune system exhaustion.
**Serum electrolytes:** Various imbalances may occur because of acidosis, fluid shifts, and altered renal function.

**Clotting studies:**
- **Platelets:** Decreased levels (thrombocytopenia) can occur because of platelet aggregation.
- **Prothrombin time (PT)/activated partial thromboplastin time (aPTT):** May be prolonged, indicating coagulopathy associated with liver ischemia, circulating toxins, shock state.

**Serum lactate:** Elevated in metabolic acidosis, liver dysfunction, shock.

**Serum glucose:** Hyperglycemia occurs, reflecting gluconeogenesis and glycogenolysis in the liver in response to cellular starvation/alteration in metabolism.

**Blood urea nitrogen (BUN)/Creatinine (Cr):** Increased levels are associated with dehydration, renal impairment/failure, and liver dysfunction/failure.

**Arterial blood gases (ABGs):** Respiratory alkalosis and hypoxemia may occur early. In later states, hypoxemia, respiratory acidosis, lactic and metabolic acidosis occur because of failure of compensatory mechanisms.

**Urinalysis:** Presence of WBCs/bacteria suggests infection. Protein and red blood cells (RBCs) are often present.

**X-rays:** Abdominal and lower chest films indicating free air in the abdomen may suggest infection due to perforated abdominal/pelvic organ.

**Electrocardiogram (ECG):** May show ST-segment and T-wave changes and dysrhythmia resembling myocardial infarction.

**NURSING PRIORITIES**
1. Eliminate infection.
2. Support tissue perfusion/circulatory volume.
3. Prevent complications.
4. Provide information about disease process, prognosis, and treatment needs.

**DISCHARGE GOALS**
1. Infection eliminated/controlled.
2. Homeostasis maintained.
4. Disease process, prognosis, and therapeutic regimen understood.
5. Plan in place to meet needs after discharge.

---

**NURSING DIAGNOSIS:** Infection, risk for [progression of sepsis to septic shock, development of opportunistic infections]

**Risk factors may include**
- Compromised immune system
- Failure to recognize/treat infection and/or exercise proper preventive measures
- Invasive procedures, environmental exposure (nosocomial)

**Possibly evidenced by**
[Not applicable; presence of signs and symptoms establishes an actual diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Infection Status (NOC)**
- Achieve timely healing, be free of purulent secretions/drainage or erythema, and be afebrile.
<table>
<thead>
<tr>
<th>ACTIONS/INTERVENTIONS</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infection Control (NIC)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Independent</strong></td>
<td></td>
</tr>
<tr>
<td>Provide isolation/monitor visitors as indicated.</td>
<td></td>
</tr>
<tr>
<td>Wash hands with antibacterial soap before/after each care activity, even if gloves are used.</td>
<td>Body substance isolation (BSI) should be used for all infectious patients. Wound/linen isolation and handwashing may be all that is required for draining wounds. Patients with diseases transmitted through air may also need airborne and droplet precautions. Reverse isolation/restriction of visitors may be needed to protect the immunosuppressed patient.</td>
</tr>
<tr>
<td>Encourage/provide frequent position changes, deep-breathing/coughing exercises.</td>
<td></td>
</tr>
<tr>
<td>Encourage patient to cover mouth and nose with tissue during coughs/sneezes. Place in private room, if indicated. Wear mask when providing direct care as appropriate.</td>
<td>Good pulmonary toilet may reduce respiratory compromise.</td>
</tr>
<tr>
<td>Limit use of invasive devices/procedures when possible. Remove lines/devices when infection is present and replace if necessary.</td>
<td>Prevents spread of infection via airborne droplets.</td>
</tr>
<tr>
<td>Inspect wounds/site of invasive devices daily, paying particular attention to parenteral nutrition lines. Document signs of local inflammation/infection, changes in character of wound drainage, sputum, or urine.</td>
<td>Reduces number of sites for entry of opportunistic organisms.</td>
</tr>
<tr>
<td>Investigate reports of pain out of proportion to visible signs.</td>
<td>May provide clue to portal of entry, type of primary infecting organism(s), as well as early identification of secondary infections. Note: High nutrient content of total parenteral nutrition (TPN) provides excellent medium for bacterial growth.</td>
</tr>
<tr>
<td>Maintain sterile technique when changing dressings, suctioning, providing site care, e.g., invasive line, urinary catheter.</td>
<td>Pressure-like pain over area of cellulitis may indicate development of necrotizing fasciitis due to group A beta-hemolytic streptococci (GABS), necessitating prompt intervention.</td>
</tr>
<tr>
<td>Wear gloves/gowns when caring for open wounds/anticipating direct contact with secretions or excretions.</td>
<td>Prevents introduction of bacteria, reducing risk of nosocomial infection.</td>
</tr>
<tr>
<td>Dispose of soiled dressings/materials in double bag.</td>
<td>Reduces contamination/cross-contamination.</td>
</tr>
<tr>
<td>ACTIONS/INTERVENTIONS</td>
<td>RATIONALE</td>
</tr>
<tr>
<td>-----------------------</td>
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</tr>
<tr>
<td><strong>Infection Control (NIC)</strong></td>
<td>Fever (101°F–105°F/38.5°C–40°C) is the result of endotoxin effect on the hypothalamus and pyrogen-released endorphins. Hypothermia (lower than 96°F/36°C) is a grave sign reflecting advancing shock state, decreased tissue perfusion, and/or failure of the body’s ability to mount a febrile response.</td>
</tr>
<tr>
<td><strong>Independent</strong></td>
<td>Observe for shaking chills and profuse diaphoresis. Chills often precede temperature spikes in presence of generalized infection.</td>
</tr>
<tr>
<td>Monitor temperature trends.</td>
<td>Monitor for signs of deterioration of condition/failure to improve with therapy. May reflect inappropriate/inadequate antibiotic therapy or overgrowth of resistant or opportunistic organisms.</td>
</tr>
<tr>
<td>Inspect oral cavity for white plaques (thrush). Investigate reports of vaginal/perineal itching or burning.</td>
<td>Depression of immune system and use of antibiotics increase risk of secondary infections, particularly yeast.</td>
</tr>
<tr>
<td><strong>Collaborative</strong></td>
<td>Identification of portal of entry and organism causing the septicemia is crucial to effective treatment.</td>
</tr>
<tr>
<td>Obtain specimens of urine, blood, sputum, wound, invasive lines/tubes as indicated for Gram stain, culture, and sensitivity.</td>
<td>The normal ratio of neutrophils to total WBCs is at least 50%; however, when WBC count is markedly decreased, calculating the absolute neutrophil count is more pertinent to evaluating immune status. Likewise, an initial elevation of band cells reflects the body’s attempt to mount a response to the infection, whereas a decline indicates decompensation.</td>
</tr>
<tr>
<td>Monitor laboratory studies, e.g., WBC count with neutrophil and band counts.</td>
<td>Specific antibiotics are determined by culture and sensitivity results, but therapy is usually initiated before obtaining results, using broad-spectrum antibiotics and/or based on most likely infecting organisms. Concomitant use of antimicrobials is often beneficial, but dosage must be balanced against renal function/clearance. Note: Vancomycin is drug of choice for MRSA because ciprofloxacin (Cipro) is losing effectiveness and generating widespread resistance.</td>
</tr>
<tr>
<td>Administer medications as indicated: Anti-infective agents: broad-spectrum antibiotics, e.g., methicillin; Gram-negative agents, e.g., ticarcillin disodium (Ticar); Gram-positive, e.g., nafcillin (Nafcil), vancomycin (Vancocin); aminoglycosides, e.g., tobramycin (Nebcin), gentamicin (Garamycin); cephalosporins, e.g., cefotaxime (Claforan); Immune globulins as appropriate. May boost/provide temporary immunity to general infection or specific illness, e.g., varicella zoster, rabies.</td>
<td></td>
</tr>
<tr>
<td>Assist with/prepare for incision and drainage of wound, irrigation, application of warm/moist soaks, as indicated. Facilitates removal of purulent material/necrotic tissue and promotes healing.</td>
<td>Exposure to increased ambient oxygen tension enhances oxygen delivery to cells to combat anaerobic infections.</td>
</tr>
<tr>
<td>Prepare for hyperbaric therapy as appropriate.</td>
<td></td>
</tr>
</tbody>
</table>
**NURSING DIAGNOSIS: Hyperthermia**

**May be related to**
- Increased metabolic rate, illness
- Dehydration
- Direct effect of circulating endotoxins on the hypothalamus, altering temperature regulation

**Possibly evidenced by**
- Increase in body temperature higher than normal range
- Flushed skin, warm to touch
- Increased respiratory rate, tachycardia

**DESired OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Thermoregulation (NOC)**
- Demonstrate temperature within normal range, be free of chills.
- Experience no associated complications

**ACTIONS/INTERVENTIONS**

<table>
<thead>
<tr>
<th>Fever Treatment (NIC)</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent</strong></td>
<td>Temperature of 102°F–106°F (38.9°C–41.1°C) suggests acute infectious disease process. Fever pattern may aid in diagnosis; e.g., sustained or continuous fever curves lasting more than 24 hr suggest pneumococcal pneumonia, scarlet or typhoid fever; remittent fever (varying only a few degrees in either direction) reflects pulmonary infections; intermittent curves or fever that returns to normal once in 24-hr period suggests septic episode, septic endocarditis, or tuberculosis (TB). Chills often precede temperature spikes. <strong>Note:</strong> Use of antipyretics alters fever patterns and may be restricted until diagnosis is made or if fever remains higher that 102°F (38.9°C).</td>
</tr>
<tr>
<td>Monitor patient temperature (degree and pattern); note shaking chills/profuse diaphoresis.</td>
<td></td>
</tr>
<tr>
<td>Monitor environmental temperature; limit/add bed linens as indicated.</td>
<td>Room temperature/number of blankets should be altered to maintain near-normal body temperature.</td>
</tr>
<tr>
<td>Provide tepid sponge baths; avoid use of alcohol.</td>
<td>May help reduce fever. <strong>Note:</strong> Use of ice water/alcohol may cause chills, actually elevating temperature. In addition, alcohol is very drying to skin.</td>
</tr>
</tbody>
</table>

| **Collaborative** | |
| Administer antipyretics, e.g., acetylsalicylic acid (ASA) (aspirin), acetaminophen (Tylenol). | Used to reduce fever by its central action on the hypothalamus; fever should be controlled in patients who are neutropenic or asplenic. However, fever may be beneficial in limiting growth of organisms and enhancing autodestruction of infected cells. |
| Provide cooling blanket. | Used to reduce fever, usually higher than 104°F–105°F (39.5°C–40°C), when brain damage/seizures can occur. |
NURSING DIAGNOSIS: Tissue Perfusion, risk for ineffective

Risk factors may include
Relative/actual hypovolemia
Reduction of arterial/venous blood flow: selective vasoconstriction, vascular occlusion (intimal damage/microemboli)

Possibly evidenced by
[Not applicable; presence of signs and symptoms establishes an actual diagnosis.]

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:
Circulation Status (NOC)
Display adequate perfusion as evidenced by stable vital signs, palpable peripheral pulses, skin warm and dry, usual level of mentation, individually appropriate urinary output, and active bowel sounds.

ACTIONS/INTERVENTIONS
Shock Prevention (NIC)
Independent
Maintain bedrest; assist with care activities.
Monitor trends in BP, especially noting progressive hypotension and widening pulse pressure.
Monitor heart rate, rhythm. Note dysrhythmias.
Note quality/strength of peripheral pulses.
Assess respiratory rate, depth, and quality. Note onset of severe dyspnea.

RATIONALE
Decreases myocardial workload and O₂ consumption, maximizing effectiveness of tissue perfusion.

Hypotension develops as microorganisms invade the bloodstream, stimulating release or activation of chemical and hormonal substances, which initially results in peripheral vasodilation, decreased systemic vascular resistance (SVR), and relative hypovolemia. As shock progresses, cardiac output becomes severely depressed because of major alterations in contractility and preload/afterload, producing profound hypotension.

Tachycardia occurs because of sympathetic nervous system stimulation secondary to stress response and to compensate for the relative hypovolemia and hypotension. Cardiac dysrhythmias can occur as a result of hypoxia, acid-base/electrolyte imbalance, and/or low-flow perfusion state.

Initially the pulse is strong/bounding because of increased cardiac output (CO). Pulse may become weak/thready because of sustained hypotension, decreased cardiac output, and peripheral vasoconstriction if the shock state progresses.

Increased respirations occur in response to direct effects of endotoxins on the respiratory center in the brain, as well as developing hypoxia, stress, and fever. Respiration can become shallow as respiratory insufficiency develops, creating risk of acute respiratory failure. (Refer to ND: Gas Exchange, risk for impaired)
<table>
<thead>
<tr>
<th>ACTIONS/INTERVENTIONS</th>
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</thead>
<tbody>
<tr>
<td><strong>Shock Prevention (NIC)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Independent</strong></td>
<td></td>
</tr>
<tr>
<td>Investigate changes in sensorium, e.g.,</td>
<td>Changes reflect alterations in cerebral perfusion, hypoxemia, and/or acidosis.</td>
</tr>
<tr>
<td>mental cloudiness, agitation, restlessness,</td>
<td></td>
</tr>
<tr>
<td>personality changes, delirium, stupor,</td>
<td></td>
</tr>
<tr>
<td>coma.</td>
<td></td>
</tr>
<tr>
<td>Assess skin for changes in color,</td>
<td>Compensatory mechanisms of vasodilation results in warm, dry, pink skin, which is characteristic of hyperperfusion in hyperdynamic phase of early septic shock. If shock state progresses, compensatory vasoconstriction occurs, shunting blood to vital organs, reducing peripheral blood flow, and creating cool, clammy, pale/dusk skin.</td>
</tr>
<tr>
<td>temperature, moisture.</td>
<td></td>
</tr>
</tbody>
</table>
| Record hourly urinary output and specific | Decreasing urinary output with increased specific gravity indicates diminished renal perfusion related to fluid shifts and selective vasoconstriction. There may be transient polyuria during hyperdynamic phase (while cardiac output is elevated), but this may progress to oliguria. 
*Note: Acute renal failure may herald development of hemolytic uremic syndrome (HUS) resulting from *Escherichia coli* infection (other manifestations include hemolytic anemia and thrombocytopenia.)* |
| gravity.                                 |                                                                                                                                                                                                            |
| Auscultate bowel sounds.                  |                                                                                                                                                                                                            |
| Monitor gastric pH as indicated.          | Reduced blood flow to the mesentery (splanchic vasoconstriction) decreases peristalsis and may lead to paralytic ileus or possibly trigger multiple organ dysfunction syndrome (MODS).                                      |
| Monitor for signs of bleeding, e.g.,      | Stress of illness and use of steroids increase risk of gastric mucosal erosion/bleeding.                                                                                                                      |
| oozing from puncture sites/suture lines,  |                                                                                                                                                                                                            |
| petechiae, ecchymoses, hematuria,         | Verous stasis and infectious process may result in the development of thrombosis.                                                                                                                           |
| epistaxis, hemoptysis, hematemesis.       |                                                                                                                                                                                                            |
| Evaluate lower extremities for local      | Coagulopathy/disseminated intravascular coagulation (DIC) may occur related to accelerated clotting in the microcirculation (activation of chemical mediators, vascular insufficiency, and cell destruction), creating a life-threatening hemorrhagic situation/multiple emboli. |
| tissue swelling, erythema, positive       |                                                                                                                                                                                                            |
| Homans’ sign.                            |                                                                                                                                                                                                            |
| Collaborative                            |                                                                                                                                                                                                            |
| Administer parenteral fluids. (Refer to  | Massive doses of antibiotics are often ordered. These have potentially toxic effects when hepatic/renal perfusion is compromised.                                                                         |
| ND: Fluid Volume, risk for deficient,     |                                                                                                                                                                                                            |
| following.)                              | To maintain tissue perfusion, large amounts of fluid may be required to support circulating volume.                                                                                                         |
### ACTIONS/INTERVENTIONS

**Shock Prevention (NIC)**

**Collaborative**

Administer drugs as indicated:
- Corticosteroids;
- NaHCO₃;
- Antacids, e.g., aluminum hydroxide (Amphojel).

Monitor laboratory studies, e.g., ABGs, lactate levels.

Administer supplemental O₂.

Maintain body temperature, using adjunctive aids as necessary. (Refer to ND: Hyperthermia)

Assist with measurement of partial pressure of CO₂ in the gastric mucosa (PrCO₂) as indicated.

Prepare for/transfer to critical care setting as indicated.

### RATIONALE

Although steroid therapy remains controversial, steroids may be given for the potential advantages of decreased capillary permeability, increased renal perfusion, and inhibition of microemboli formation.

Impaired tissue perfusion and production of lactate result in metabolic acidosis, requiring base of replacement therapy.

Decreases potential for gastric bleeding related to stress response/altered perfusion.

Development of respiratory/metabolic acidosis reflects loss of compensatory mechanisms, e.g., decreased renal perfusion/hydrogen excretion, and accumulation of lactic acid due to circulatory shunting and stagnation.

Maximizes oxygen available for cellular uptake.

Temperature elevations increase metabolic/oxygen demands beyond cellular resources, hastening tissue ischemia/cellular destruction.

Gastric tonometry may be useful in diagnosing hypoperfusion of the gut before ischemic injury occurs, thus reducing risk of developing MODS.

Progressive deterioration requires more aggressive therapy (e.g., hemodynamic monitoring and vasoactive drugs).

---

### NURSING DIAGNOSIS: Fluid Volume, risk for deficient

**Risk factors may include**
- Marked increase in vascular compartment/massive vasodilation
- Capillary permeability/fluid leaks into the interstitial space (third spacing)

**Possibly evidenced by**

[Not applicable; presence of signs and symptoms establishes an actual diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Hydration (NOC)**

Maintain adequate circulatory volume as evidenced by vital signs within patient’s normal range, palpable peripheral pulses of good quality, and individually appropriate urinary output.
### ACTIONS/INTERVENTIONS

<table>
<thead>
<tr>
<th>Shock Prevention (NIC)</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent</strong></td>
<td>Decreasing urinary output with a high specific gravity suggests relative hypovolemia associated with vasodilation. Continued positive fluid balance with corresponding weight gain may indicate third spacing and tissue edema, suggesting need to alter fluid therapy/replacement components. <em>Note:</em> Excessive diarrhea may lead to a negative fluid balance.</td>
</tr>
<tr>
<td>Measure/record urinary output and specific gravity. Note cumulative intake and output (I&amp;O) imbalances (including insensible losses), and correlate with daily weight. Encourage oral fluids to tolerance.</td>
<td>Reduction in the circulating fluid volume reduces BP/CVP, initiating compensatory mechanisms of tachycardia to improve cardiac output and increase systemic BP.</td>
</tr>
<tr>
<td>Monitor BP and heart rate (HR). Measure central venous pressure (CVP) is used.</td>
<td>Weak, easily obliterated pulses suggest hypovolemia.</td>
</tr>
<tr>
<td>Palpate peripheral pulses.</td>
<td>Hypovolemia/third spacing of fluid gives rise to signs of dehydration.</td>
</tr>
<tr>
<td>Assess for dry mucous membranes, poor skin turgor, and thirst.</td>
<td>Fluid losses from the vascular compartment into the interstitial space create tissue edema.</td>
</tr>
<tr>
<td>Observe for dependent/peripheral edema in sacrum, scrotum, back, legs.</td>
<td></td>
</tr>
<tr>
<td><strong>Collaborative</strong></td>
<td>Large volumes of fluid may be required to overcome relative hypovolemia (peripheral vasodilation), replace losses from increased capillary permeability (e.g., sequestration of fluid in the peritoneal cavity) and increased insensible sources (e.g., fever/diaphoresis).</td>
</tr>
<tr>
<td>Administer IV fluids, e.g., crystalloids (D,W, normal saline[NS]) and colloids (albumin, fresh frozen plasma) as indicated.</td>
<td></td>
</tr>
<tr>
<td>Monitor laboratory values, e.g.:</td>
<td></td>
</tr>
<tr>
<td>Hct/RBC count;</td>
<td></td>
</tr>
<tr>
<td>BUN/Cr.</td>
<td></td>
</tr>
<tr>
<td>Monitor cardiac output as indicated.</td>
<td></td>
</tr>
</tbody>
</table>

Evaluates changes in hydration/blood viscosity.

Moderate elevations of BUN reflect dehydration, high values of BUN/Cr may indicate renal dysfunction/failure.

CO (and other functional parameters, such as cardiac index, preload/afterload, contractility, and cardiac work) can be measured noninvasively using thoracic electrical bioimpedance (TEB) technique. Useful in determining therapeutic needs/effectiveness.
**NURSING DIAGNOSIS:** Gas Exchange, risk for impaired

**Risk factors may include**
- Altered O2 supply: effects of endotoxins on the respiratory center in the medulla (resulting in hyperventilation/acidosis; hypoventilation
- Altered blood flow (changes in vascular resistance), alveolar-capillary membrane changes (increased capillary permeability leading to pulmonary congestion)
- Interference with O2 delivery/utilization in the tissues (endotoxin-induced damage to the cells/capillaries)

**Possibly evidenced by**
[Not applicable; presence of signs and symptoms establishes an actual diagnosis.]

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Respiratory Status: Gas Exchange (NOC)**
- Display ABGs and respiratory rate within patient’s normal range, with breath sounds clear and chest x-ray clear/improving.
- Experience no dyspnea/cyanosis.

**ACTIONS/INTERVENTIONS**

<table>
<thead>
<tr>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Respiratory Monitoring (NIC)</strong></td>
</tr>
<tr>
<td><strong>Independent</strong></td>
</tr>
<tr>
<td>Maintain patient airway. Place patient in position of comfort with head of bed elevated.</td>
</tr>
<tr>
<td>Enhances lung expansion, respiratory effort.</td>
</tr>
<tr>
<td>Monitor respiratory rate and depth. Note use of accessory muscles/work of breathing.</td>
</tr>
<tr>
<td>Rapid/shallow respirations occur because of hypoxemia, stress, and circulating endotoxins. Hypoventilation and dyspnea reflect ineffective compensatory mechanisms and are an indication that ventilatory support is needed.</td>
</tr>
<tr>
<td>Auscultate breath sounds. Note crackles, wheezes, areas of decreased/absent ventilation.</td>
</tr>
<tr>
<td>Respiratory distress and the presence of adventitious sounds are indicators of pulmonary congestion/interstitial edema, atelectasis. Note: Respiratory complications, including pneumonia and adult respiratory distress syndrome (ARDS), are a prime cause of death.</td>
</tr>
<tr>
<td>Note presence of circumoral cyanosis.</td>
</tr>
<tr>
<td>Reflects inadequate systemic oxygenation/hypoxemia.</td>
</tr>
<tr>
<td>Investigate alterations in sensorium: agitation, confusion, personality changes, delirium, stupor, coma.</td>
</tr>
<tr>
<td>Cerebral function is very sensitive to decreases in oxygenation (e.g., hypoxemia, reduced perfusion).</td>
</tr>
<tr>
<td>Note cough and purulent sputum production.</td>
</tr>
<tr>
<td>Pneumonia is a common nosocomial infection that can occur by aspiration of oropharyngeal organisms or spread from other sites.</td>
</tr>
<tr>
<td>Reposition frequently. Encourage coughing and deep-breathing exercises. Suction as indicated.</td>
</tr>
<tr>
<td>Good pulmonary toilet is necessary for reducing ventilation/perfusion imbalance and for mobilizing and facilitating removal of secretions to maximize gas exchange.</td>
</tr>
</tbody>
</table>
**Respiratory Monitoring (NIC)**

**Collaborative**

Monitor ABGs/pulse oximetry.

Administer supplemental O₂ via appropriate route, e.g., nasal cannula, mask, high-flow rebreathing mask.

Review serial chest x-rays.

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Hypoxemia is related to decreased ventilation and pulmonary changes (e.g., interstitial edema, atelectasis, and pulmonary shunting) and increased oxygen demands caused by fever or infection. Respiratory acidosis (pH below 7.35 and PaCO₂ higher than 40 mm Hg) occurs because of hypoventilation and ventilation-perfusion imbalance. As septic condition worsens, metabolic acidosis (pH below 7.35 and HCO₃ less than 22–24 mEq/L) develops as a result of buildup of lactic acid from anaerobic metabolism.

Necessary for correction of hypoxemia with failing respiratory effort/progressing acidosis. Note: Intubation/mechanical ventilation may be required if respiratory failure develops.

Changes reflect progression/resolution of pulmonary complications, e.g., infiltrates/edema. Note: Changes in chest x-ray are usually 1–2 hr behind the clinical picture.

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**NURSING DIAGNOSIS: Knowledge, deficient [Learning Need] regarding illness, prognosis, treatment, self-care, and discharge needs**

May be related to
- Lack of exposure/recall; information misinterpretation
- Cognitive limitation

Possibly evidenced by
- Questions/request for information, statement of misconception
- Inaccurate follow-through of instructions, development of preventable complications

**DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:**

**Knowledge: Infection Control (NOC)**
- Verbalize understanding of disease process, prognosis, and potential complications.
- Correctly perform necessary procedures and explain reasons for the actions.
- Initiate necessary lifestyle changes.
- Verbalize understanding of therapeutic needs.
- Participate in treatment regimen.
### ACTIONS/INTERVENTIONS

#### Teaching: Disease Process (NIC)

**Independent**

- Review disease process and future expectations.
- Review individual risk factors and mode of transmission/portal of entry of infections.
- Provide information about drug therapy, interactions, side effects, and importance of adherence to regimen.
- Discuss need for good nutritional intake/balanced diet.
- Encourage adequate rest periods with scheduled activities.
- Review necessity of personal hygiene and environmental cleanliness, proper cooking techniques/food storage.
- Discuss proper use or avoidance of tampons with women, as indicated.
- Identify signs/symptoms requiring medical evaluation, e.g., persistent temperature elevation(s), tachycardia, syncope, rashes of unknown origin, unexplained fatigue, anorexia, increased thirst, and changes in bladder function.
- Stress importance of prophylactic immunization/antibiotic therapy as needed.

#### RATIONALE

- Provides knowledge base from which patient can make informed choices.
- Steroid therapy, kidney/liver dysfunction, neoplastic disease, rheumatic heart disease, valve dysfunction, and diabetes may predispose to septicemia. Awareness of means of infection transmission provides opportunity to plan for/institute protective measures.
- Promotes understanding of and enhances cooperation in treatment/prophylaxis, and reduces risk of recurrence and complications.
- Necessary for optimal healing and general well-being.
- Helps control environmental exposure by diminishing the number of pathogens present. *Note:* Undercooked meat increases risk of exposure to *E. coli*.
- Superabsorbent tampons/infrequent changing potentiates risk of *Staphylococcus aureus* infection (toxic shock syndrome).
- Early recognition of developing/recurring infection allows for timely intervention and reduces risk for progression to life-threatening situation.
- Used for prevention of infection dependent on individual risk factors, e.g., age, presence of chronic disease, immunosuppression.

### POTENTIAL CONSIDERATIONS following acute hospitalization (dependent on patient’s age, physical condition/presence of complications, personal resources, and life responsibilities)

- Infection, risk for recurrence/opportunistic—stasis of body fluids, decreased hemoglobin, leukopenia, suppressed inflammatory response, use of anti-infective agents, increased environmental exposure, malnutrition.
- Nutrition: imbalanced, less than body requirements—increased energy needs (hypermetabolic state), anorexia, continuing gastrointestinal (GI) dysfunction, side effects of medication.
- Self-Care deficit/Home Maintenance, impaired—decreased strength/endurance, pain/discomfort, inadequate support systems, unfamiliarity with neighborhood resources.