Abdominal Pain RRG

RRG: M-05-RRG (ISC)
Link to Codes

MCG Health
Inpatient & Surgical Care
30th Edition

Clinical Indications for Admission

Observation Care	Inpatient Care
• Observation care is indicated for **1 or more** of the following: ◦ Vital sign abnormality ◦ Suspected condition requiring continued monitoring or testing beyond emergency department care (eg, ectopic pregnancy, toxic megacolon, appendicitis, bowel ischemia) ◦ Pain persists despite emergency department care. ◦ Patient ability to maintain hydration unclear ◦ Finding on examination (eg, increasing tenderness, focal abdominal finding) or diagnostic testing (eg, air fluid level on x-ray) warranting continued evaluation ◦ Immunosuppressed patient (eg, for serial examinations and continued monitoring beyond emergency department care)	• Admission is indicated for **1 or more** of the following: ◦ Hemodynamic instability ◦ Pain persists despite observation care (ie, pain too severe for next level of care) ◦ Peritoneal signs ◦ Evaluation requires patient to not eat or drink for extended period (eg, beyond observation care) ◦ Inability to maintain oral hydration (eg, needs IV fluid support) that persists despite observation care ◦ Severe electrolyte abnormalities requiring inpatient care

See* Abdominal Pain *ISC Optimal Recovery Guideline for complete guideline and further supporting content such as Supplemental Medicare Criteria (ie, CMS' Two-Midnight Rule exceptions), Alternatives to Admission or Procedure,

Optimal Recovery Course, and Evidence Summary.

Level of Care Criteria

For patient conditions requiring more than routine inpatient care, documentation of need may be done using the [**Level of Care**] chart.

Intensive Care	Intermediate Care	Telemetry Care
• ICU admission may be indicated when need is demonstrated by **1 or more** of the following: − Vital sign abnormalities, including **1 or more** of the following[A]: ▪ Systolic arterial blood pressure less than 90 mm Hg, or 20 mm Hg below patient's usual pressure in adult or child older than 10 years ▪ Systolic arterial blood pressure less than 60 mm Hg in neonate (younger than 1 month), 70 mm Hg in infant (1 month to 1 year of age), or less than the sum of 70 mm Hg plus twice the patient's age in child 2 to 10 years of age ▪ Mean arterial pressure less than 65 mm Hg in adult or child age 10 years or older[B] MAP Calculator ▪ Mean arterial pressure[B] drop of greater than 30 mm Hg from baseline attributable to cardiovascular dysfunction (eg, cardiogenic shock) MAP Calculator ▪ Pulse less than 45 or greater than 130 beats per minute in adult ▪ Pulse less than 40 or greater than 140 beats per minute in adolescent age 16 years or older ▪ Pulse less than 70 or greater than 150 beats per minute in child 2 to 15 years of age ▪ Pulse less than 90 or greater than 160 beats per minute in infant younger than 2	• Intermediate care admission may be indicated after intensive care treatment (eg, as "step-down" care) or to provide higher level of care than general hospital ward (eg, as "step-up" care in absence of intensive care admission needs) (see Intensive Care Guidelines ISC), as indicated by **1 or more** of the following[J]: − Intermediate level monitoring or care needed, as indicated by **1 or more** of the following: ▪ Care requiring nurse to patient ratio of 1:2 or 1:3 (eg, complex wound management, postoperative high-risk patient, profound neuromuscular weakness) ▪ Frequent (but less frequent than hourly) monitoring, such as vital signs, vascular checks, or neurologic checks ▪ Stable chronic mechanical ventilator or long-term weaning needs ▪ Noninvasive ventilation[F][K] ▪ High-flow oxygen therapy[L] ▪ Peritoneal dialysis ▪ Frequent pulmonary therapy with endotracheal suctioning (nonintubated or chronic tracheostomy patient)	• Telemetry care admission[M][N][O] may be indicated for **1 or more** of the following: − Suspected or proven acute ischemic cardiac event, including **1 or more** of the following: ▪ Acute coronary syndrome ▪ Post-acute MI ▪ Suspected vasospastic angina (to establish diagnosis with ST monitoring) ▪ Suspected MI (until it is ruled out) ▪ Newly diagnosed left main coronary artery lesion (until revascularization) − Cardiac rhythm disorder or conduction abnormality, including **1 or more** of the following: ▪ Dangerous arrhythmia diagnosed or suspected (until controlled or diagnosed as not requiring intervention) ▪ New-onset or recurrent atrial tachyarrhythmia ▪ Wolff-Parkinson-White syndrome with rapid conduction (until controlled by antiarrhythmic agent or ablation) ▪ Symptomatic Bradycardia [P] ▪ Chronic atrial fibrillation with medical condition that may

years

- Laboratory findings (new), including **1 or more** of the following:
  - Pulse oximetry or arterial oxygen saturation less than 90%, or partial pressure of oxygen less than 60 mm Hg (8.0 kPa) despite oxygen supplementation[C]
  - Rising partial pressure of carbon dioxide with acute or uncompensated respiratory acidosis
  - Arterial pH less than 7.2 or greater than 7.65
  - Serum sodium less than 110 mEq/L (mmol/L) or greater than 160 mEq/L (mmol/L)
  - Serum sodium less than 125 mEq/L (mmol/L) with Altered mental status, seizure, or respiratory arrest
  - Serum sodium more than 145 mEq/L (mmol/L) with Altered mental status, seizure, diabetes insipidus requiring close monitoring of fluid balance and resuscitation, or severe dehydration requiring large-volume fluid resuscitation
  - Serum potassium less than 2 mEq/L (mmol/L) or greater than 7 mEq/L (mmol/L)
  - Serum potassium less than 2.5 mEq/L (mmol/L) with severe clinical or ECG manifestations (eg, paralysis, cardiac arrhythmia, delayed depolarization, flat T-waves, or U-waves)
  - Serum potassium greater than 6.5 mEq/L (mmol/L) with ECG changes of hyperkalemia (eg, peaked T-waves, widened QRS, cardiac arrhythmia; for patient with permanent pacemaker: widened paced QRS, increased pacemaker stimulus to QRS interval, or failure to capture)
  - Rapid diuresis for fluid overload
  - Electrolyte, metabolic, or other problem requiring frequent laboratory testing or treatment adjustments
  - Monitoring of continuous high-level epidural anesthesia
  - Monitoring after toxic ingestion with risk for neurologic, cardiac, or respiratory compromise
  - Titration of IV vasodilator or antiarrhythmic agents
  - Low-dose inotropic or vasodilator therapy without need for frequent titration
  - Continuous pulse oximetry monitoring
  - Short-term electroencephalographic monitoring
  - Patient who requires short-term inpatient monitoring (eg, cardiac, wound site, perfusion)
- **Gastroenterology** diagnoses or procedures, including **1 or more** of the following:
  - Gastrointestinal bleeding with Hemodynamic stability
  - Recent variceal bleeding with Hemodynamic stability and no evidence of active bleeding
  - Monitoring after transcutaneous shunt procedures for variceal bleeding
  - Acute liver failure with Hemodynamic stability
  - Mild hepatic encephalopathy (eg, stage 1 (confused) or stage 2 (lethargic))
  - affect ventricular rate (eg, autonomic dysfunction)[Q]
  - High-risk ECG findings (eg, bifascicular block, abnormal QT interval, ventricular pre-excitation, other conduction abnormality)
  - Firing of implantable cardioverter-defibrillator[R]
  - Suspected pacemaker or implantable cardioverter-defibrillator malfunction[S]
- New administration or adjustment of treatment affecting cardiac rhythm or conduction, including **1 or more** of the following:
  - New administration or adjustment of antiarrhythmic drug[T]
  - New administration or adjustment of rate control therapy for atrial tachyarrhythmia
  - New administration or adjustment of negative chronotropic agent (eg, beta-blocker) in patient with baseline Bradycardia
  - New administration or adjustment of QTc-prolonging medications[U]
  - New wearable (external) cardioverter-defibrillator for indication anticipated to be temporary (eg, myocarditis, untreated heart failure meeting implantable cardioverter-defibrillator criteria but expected to improve with therapy, indication for implantable cardioverter-defibrillator with temporary

- Calcium[D] greater than 14 mg/dL (3.5 mmol/L) or ionized calcium greater than 10.0 mg/dL (2.50 mmol/L)
- Calcium[D] greater than 12 mg/dL (3.0 mmol/L) or ionized calcium greater than 8.0 mg/dL (2.0 mmol/L) with Altered mental status, severe volume depletion requiring large-volume IV fluid resuscitation, Hypotension, significant arrhythmia, heart block, or digitalis toxicity
- Serum phosphorus less than 1 mg/dL (0.32 mmol/L)
- Toxic drug level or poisoning causing or likely to cause neurologic abnormalities or Hemodynamic instability
- Less severe or other laboratory abnormalities (eg, hyperphosphatemia, hypomagnesemia, or hypermagnesemia) contributing to **1 or more** of the following:
  - Seizure
  - Altered mental status
  - Muscle weakness or severe spasms
  - Arrhythmias
  - Hemodynamic instability
  - Other significant clinical manifestations

− ECG (or cardiac monitoring) findings, including **1 or more** of the following:

- Inherently unstable or life-threatening arrhythmia (eg, sustained ventricular tachycardia, ventricular fibrillation, asystole)
- Arrhythmia causing Hypotension (eg, Bradycardia, Tachycardia)
- Complete heart block causing Hypotension
- Other findings indicative of need for intensive care (eg, acute cardiac ischemia, myocardial infarction)
- Acute pancreatitis with Hemodynamic stability requiring fluid resuscitation or frequent electrolyte monitoring because of major fluid shifts
- Gastroenteritis with Hemodynamic stability and ongoing fluid loss requiring large volume fluid resuscitation and frequent electrolyte monitoring

contraindication to implantation, bridge to transplant or other advanced heart failure therapy)

− Following cardiac or major thoracic procedure, including **1 or more** of the following:

- Cardiac surgery (first 48 to 72 hours unless complications occur)
- Noncardiac thoracic surgery (eg, pulmonary lobectomy; first 48 to 72 hours unless complications occur)
- Nonurgent percutaneous coronary intervention with complications or suboptimal results (for at least 24 hours or until complication is resolved)
- Short-term monitoring after cardiac procedure, as indicated by **1 or more** of the following[V]:
  - Electrophysiologic studies
  - Implantable cardioverter-defibrillator placement
  - Nonurgent percutaneous coronary intervention without complications until sheath is pulled
  - Temporary pacemaker placement (until removed or permanent pacemaker placed)
  - Permanent pacemaker placement
  - Arrhythmia ablation (up to 24 hours for complex ablations (eg, pulmonary vein

− Physical findings, including **1 or more** of the following:
- Threatened airway
- Altered mental status that is severe or persistent
- Repeated or prolonged seizures
- New-onset anuria (urine output less than 0.1 mL/kg/hour over 4 hours)
- Cyanosis (new)
- Cardiac tamponade
- Status post respiratory or cardiac arrest
- Findings consistent with abdominal emergency (eg, peritoneal signs)

− Imaging findings, such as dissecting aneurysm or ruptured viscus

− Severe burns, as indicated by **1 or more** of the following[E]:
- Hemodynamic instability
- Hypotension or requirement for aggressive fluid resuscitation
- Inhalation injury
- Respiratory insufficiency with requirement for high-flow oxygen, mechanical ventilation, or extracorporeal membrane oxygenation
- Need for intubation or mechanical ventilation due to high risk of airway obstruction (eg, laryngeal injury seen on fiberoptic laryngoscopy, oropharyngeal burn, soot in nares or oropharynx, deep circular neck burn, stridor, change in voice, or facial burn with extensive burn involving total body surface area of 40% or greater in adult or 60% or greater in child)
- Need for intubation or mechanical ventilation due to reduced level of consciousness (eg, Glasgow coma scale less than 8) GCS Calculator
- Requirement for frequent or intensive debridement and dressing changes
- Serious chemical burn

isolation), atrioventricular nodal ablations, or serious comorbidities)
- Implantation of ventricular assist device
- Transcatheter procedures (eg, aortic valve replacement, valvuloplasty, atrial or ventricular septal defect closure)
- Percutaneous left atrial appendage closure (6 hours if performed under general anesthesia, shorter duration if performed under moderate sedation)

- Short-term monitoring of suspected cardiac contusion (eg, chest trauma with new abnormality (ST elevation, tachyarrhythmia, bundle branch block) on ECG)[W]

− Electrical injury and **1 or more** of the following:
- Loss of consciousness
- Dysrhythmia
- New ECG abnormality
- Troponin elevation
- Direct lightning injury

− Cardiac disease, including **1 or more** of the following:
- Acute myocarditis or pericarditis
- Acute decompensated heart failure[X]
- Takotsubo cardiomyopathy (aka stress cardiomyopathy or apical ballooning syndrome)

- High-voltage (eg, 1000 volts or more) electrical burn
- Carbon monoxide poisoning
- Cyanide toxicity
- Infant younger than 1 year
- Multiple comorbidities
- Severe infection or sepsis (eg, skin and soft tissue, pneumonia, urinary infection)
- Life-threatening cardiac, renal, pulmonary, or neurologic dysfunction
- Concomitant trauma, organ failure, arrhythmia, or other medical condition requiring ICU care

− Specific intervention or monitoring needed, as indicated by **1 or more** of the following:

- New need for assisted ventilation, invasive or noninvasive[F]
- New need for intubation (eg, to protect airway)
- New tracheostomy (less than 48 hours old)
- Hourly vital signs or neurologic checks
- Pulmonary artery line monitoring needed (eg, for refractory heart failure, diagnostic uncertainty (eg, uncertain fluid status), guidance of device selection and utilization of mechanical circulatory support, assessment of pulmonary arterial pressure and vasodilator responses in pulmonary hypertension, and other select conditions)
- Continuous arterial line monitoring needed
- Continuous IV vasoactive medications
- Continuous IV antiarrhythmics
- Large volume IV fluid resuscitation (eg, greater than 6 L per day)
- Large or rapid transfusion needs (eg, more than 6 units within 24 hours)
- High-risk IV treatment, such as thrombolysis, hypertonic saline, or mannitol infusion
- Infectious endocarditis
- Patient admitted with ventricular assist device (for cardiac or noncardiac problems)

− Drug overdose or poisoning with substance that causes Bradycardia, arrhythmia, QT prolongation, or QRS widening (eg, greater than 120 msec) (eg, beta-blockers, methadone, phenothiazines, sympathomimetic agents, cyclic antidepressants, digitalis, antiarrhythmic drugs)[U]

- Short-term cardiac monitoring after therapeutic or diagnostic procedure requiring conscious sedation or anesthesia
- Acute cerebrovascular event[Y]
- Short-term cardiac monitoring during treatment with medications that increase risk of arrhythmia or Bradycardia (eg, lidocaine infusion for pain, neostigmine infusion for treatment of acute colonic pseudo-obstruction, phenytoin infusion for seizure without status epilepticus)

− Uncorrected electrolyte abnormalities associated with increased risk of dangerous arrhythmia (until corrected), as indicated by **1 or more** of the following:

- Hyperkalemia with attributable ECG changes
- Potassium less than 3.0 mEq/L (mmol/L)
- Potassium greater than or equal to 6.0 mEq/L (mmol/L) but less than 6.5 mEq/L (mmol/L) in patient with acute kidney injury, acute illness, or anticipated rapid rise in potassium

- Rapid desensitization or graded drug provocation challenge for high-risk hypersensitivity reaction to required medication (eg, penicillin, aspirin, monoclonal antibody)
- Acute cardiac pacing
- Temporary mechanical circulatory support (eg, aortic balloon pump, ventricular assist device)
- Extracorporeal membrane oxygenation device
- Pericardiocentesis
- Hemodialysis in unstable patient
- Continuous renal replacement therapy (eg, continuous venovenous hemodialysis)
- Continuous fluid removal via hemofiltration (eg, continuous venovenous hemofiltration)
- Peritoneal dialysis initiation
- Emergency bronchoscopic therapy (eg, for hemoptysis)
- Emergency endoscopic therapy for bleeding
- Balloon tamponade for variceal bleeding
- Intracranial pressure monitoring or tissue oxygen monitoring
- Ventriculostomy monitoring
- Treatment of ongoing seizures
- Induced hypothermia or coma
- Ongoing frequent testing and treatment for acute conditions, including **1 or more** of the following:
    - Correction of severe metabolic acidosis or alkalosis
    - Frequent glucose checks (ie, more frequent than performable at lower level of care)
    - Severe fluid overload
    - Cerebral edema
    - Monitoring or suctioning for respiratory insufficiency or acidosis
    - Potassium 6.5 mEq/L (mmol/L) or greater
    - Magnesium less than 1.3 mEq/L (0.65 mmol/L)
    - Magnesium greater than 6 mEq/L (3 mmol/L) or prolonged PR, QRS, or QT attributed to hypermagnesemia
    - Calcium[Z] less than 8.6 mg/dL (2.15 mmol/L) or ionized calcium less than 4.65 mg/dL (1.16 mmol/L) with acute symptoms requiring IV repletion (eg, convulsions, severe muscle spasms, cardiac conduction disturbance)
    - Prolonged QT attributed to hypokalemia, hypomagnesemia, or hypocalcemia
    - Other clinically significant electrolyte abnormality associated with increased risk of arrhythmia

☐ Unexplained syncope or other neurologic event suspected of being due to arrhythmia or of cardiac origin, as indicated by **1 or more** of the following:

- Hemodynamic instability
- Outflow tract obstruction (eg, hypertrophic cardiomyopathy)
- Structural abnormality (eg, certain congenital heart defects, ventricular dysfunction, cardiomyopathy)
- Valvular disease (eg, aortic stenosis, prosthetic valve dysfunction)
- Myocarditis
- Patient reported palpitations or tachycardia preceding syncope
- Syncope occurring during exercise

- Monitoring for active bleeding
- Other need for treatment or monitoring not available outside the ICU

Systemic conditions, including **1 or more** of the following:

- Severe electrolyte or metabolic disturbance causing or likely to cause **1 or more** of the following:
  - Life-threatening cardiac dysrhythmia
  - Respiratory insufficiency
  - Altered mental status
  - Seizures
  - Hemodynamic instability
  - Muscular weakness
- Severe Hypothermia, as indicated by **1 or more** of the following:
  - Temperature 89.6 degrees F (32 degrees C) or lower
  - Temperature 95 degrees F (35 degrees C) or lower and severe organ dysfunction, as indicated by **1 or more** of the following:
    - Altered mental status
    - Hemodynamic instability
    - Respiratory depression
    - Pulmonary edema
    - Arrhythmia (eg, Bradycardia, atrial fibrillation, ventricular fibrillation)
    - Acute kidney injury (stage 2) or Acute renal failure (stage 3 acute kidney injury)
    - Other new end organ dysfunction attributable to hypothermia
- Heatstroke and **1 or more** of the following[G]:
- Syncope sudden and without prodrome
- Syncope while supine
- Suspected dysfunction of implantable pacemaker or defibrillator
- History of Dangerous arrhythmia
- History of previous syncope due to arrhythmia
- Use of medication known to cause Dangerous arrhythmia
- Family history of sudden death
- Presentation consistent with acute coronary syndrome (eg, chest pain, cardiac ischemia)
- Multiple syncopal episodes within last 6 months
- Known channelopathy (eg, long QT syndrome, Brugada syndrome, or catecholaminergic paroxysmal ventricular tachycardia)
- High-risk ECG findings (eg, bifascicular block, Bradycardia, abnormal QT interval, ventricular pre-excitation, other conduction abnormality)

- Hemodynamic instability
- Altered mental status
- Seizures
- Rhabdomyolysis
- Acute kidney injury (stage 2) or Acute renal failure (stage 3 acute kidney injury)
- Acute liver injury (eg, new INR elevation of 1.5 or greater; aspartate aminotransferase, alanine aminotransferase, or gamma-glutamyl transpeptidase greater than 100 units/L (1.67 mckat/L); new direct bilirubin greater than 2 mg/dL (34 micromoles/L); or new total bilirubin greater than 5 mg/dL (86 micromoles/L) attributable to hyperthermia)
- Disseminated intravascular coagulation
- Diffuse pulmonary infiltrates with Hypoxemia (eg, acute respiratory distress syndrome) attributable to hyperthermia

- Environmental injuries, such as electrical injuries, or near drowning
- Anaphylaxis with respiratory compromise, Hypotension, or other end organ dysfunction
- Confirmed or suspected malignant hyperthermia as evidenced by exposure to volatile anesthetic agent or succinylcholine and **1 or more** of the following[H]:
    - Hypermetabolism as evidenced by inappropriately increased CO_2 production, O_2 consumption, or acute mixed metabolic and respiratory acidosis
    - Unexplained Tachycardia

- Cardiac tachyarrhythmias, ectopic ventricular beats, or ventricular bigeminy
- Masseter spasm
- Muscle rigidity
- Rapid increase in core body temperature
- Acute rise in serum potassium, creatine kinase, or myoglobin

- Neuroleptic malignant syndrome as evidenced by exposure to neuroleptic drug (eg, phenothiazine, butyrophenone) or dopamine-depleting drug (eg, alpha-methyltyrosine), or withdrawal of dopaminergic agent (eg, levodopa, amantadine) and **1 or more** of the following[H]:
  - Muscle rigidity
  - Akathisia (uncontrollable movement)
  - Hyperthermia
  - Altered mental status
  - Dysautonomia (eg, fluctuating blood pressure, tachycardia, hypersalivation, diaphoresis)
  - Hemodynamic instability
  - Acute rise in creatine kinase
  - Rhabdomyolysis
- Serotonin syndrome (serotonin toxicity) as evidenced by exposure to medication(s) that increases level of serotonin in CNS (eg, some antidepressants including serotonin reuptake inhibitors, monoamine oxidase inhibitors, opioids, stimulants, triptans, antiseizure medications, linezolid) and **1 or more** of the following:
  - Significant neurologic finding (eg, agitation, hypomania, hallucinations, Altered mental status, seizures)
  - Significant autonomic nervous system-related hyperactivity

(eg, Hemodynamic instability, hypertension, blood pressure fluctuation, sweating, hyperthermia, tachycardia, vomiting, diarrhea)
- Significant musculoskeletal findings (eg, rigidity, myoclonus, hyperreflexia, tremor, rhabdomyolysis, elevated creatinine kinase)

- Severe alcohol withdrawal with **1 or more** of the following:
  - Hemodynamic instability
  - Cardiac arrhythmias of immediate concern
  - Uncontrolled seizures
  - Respiratory depression with need for, or high likelihood of requiring, mechanical ventilation
  - Need for anesthetic agent to control agitation (eg, dexmedetomidine, propofol, ketamine, IV phenobarbital)
  - Delirium tremens as evidenced by **ALL** of the following:
    - Cessation of, or reduction in, heavy and prolonged alcohol use
    - Delirium (eg, fluctuating disturbance in attention, awareness, orientation, language)
    - Signs or symptoms of alcohol withdrawal, as indicated by **2 or more** of the following:
      - Autonomic hyperactivity (diaphoresis,

tachycardia, hypertension)
- Tremor
- Nausea or vomiting
- Hallucinations
- Increased anxiety
- Psychomotor agitation
- Generalized tonic-clonic seizures

− **Gastroenterology** diagnoses or procedures, including **1 or more** of the following:
- Acute diverticulitis with **1 or more** of the following:
  - Active GI bleeding (eg, transfusion requirement greater than 2 units of packed red blood cells)
  - Coagulopathy
  - Hemodynamic instability
  - Vital sign abnormality due to infection (eg, peritonitis)
  - Sepsis with end organ dysfunction or failure
- Esophageal or gastric perforation
- Severe caustic esophageal or gastric injury (eg, endoscopic findings of necrosis or perforation, concomitant airway injury with risk of upper airway obstruction)
- Liver disease with **1 or more** of the following:
  - Severe hepatic encephalopathy (eg, stage 3 (somnolent) or higher)
  - Cerebral edema
  - Type 1 hepatorenal syndrome
  - Other cirrhosis-associated causes of renal failure (eg, severe hypovolemia, acute

tubular necrosis, abdominal compartment syndrome)
- Hemodynamic instability
- Respiratory insufficiency due to severe ascites
- Severe electrolyte abnormalities
- Vital sign abnormality or end organ failure due to infection (eg, bacterial peritonitis)
- Need for hemodynamic monitoring (eg, comorbid heart failure, valvular heart disease)
- Need for mechanical ventilation

- Acute liver failure when aggressive intervention or transplant is anticipated
- Gallbladder or bile duct inflammation (eg, cholangitis or cholecystitis) with **1 or more** of the following:
  - Concomitant severe pancreatitis
  - Hemodynamic instability
  - Sepsis with end organ dysfunction or failure
- Gastroenteritis with **1 or more** of the following:
  - Hemodynamic instability
  - Altered mental status that is severe or persistent
  - Toxic megacolon
  - Unstable comorbid condition
  - Need for hemodynamic monitoring (eg, comorbid heart failure, valvular heart disease)
  - Need for vasopressor agent
  - Acute end organ dysfunction or failure (eg, worsening renal function or cardiomyopathy due to hemolytic uremic syndrome, sepsis, or severe dehydration)
- Gastrointestinal hemorrhage (upper or lower) with **1 or more** of the following:
  - Active ongoing bleeding

- Transfusion requirement greater than 2 units of packed red blood cells
- Child with greater than 20% of blood volume loss
- Bleeding ulcer, visible blood vessel, or bleeding (or recently bleeding) esophageal varices seen on endoscopy
- Hypotension
- Syncope
- Coagulopathy
- Hepatic cirrhosis
- Altered mental status
- Unstable comorbid condition or end organ dysfunction
- Ischemia due to poor perfusion
- Transfusion-related acute lung injury (TRALI) or transfusion-related circulatory overload (TACO)
- Need for invasive (eg, pulmonary artery catheter) hemodynamic monitoring (eg, for patient with severe heart failure or valvular disease with uncertain fluid status)
- Need for intravenous vasopressor agent
- Need for intubation and mechanical ventilation (eg, for airway protection due to excessive hematemesis or for hemodynamic instability)

- Gastrointestinal obstruction with **1 or more** of the following:
  - Hypotension
  - Need for aggressive fluid resuscitation
  - Evidence for bowel ischemia (eg, metabolic lactic acidosis, absent bowel sounds)
  - Bowel perforation

- Sepsis with end organ dysfunction or failure

- Severe pancreatitis, as indicated by **1 or more** of the following:
  - Requirement for aggressive fluid resuscitation
  - Severe electrolyte abnormality
  - Hypotension
  - Need for intravenous vasopressor agent
  - Persistent tachycardia greater than 120 beats per minute
  - Patient at high risk of rapid deterioration, including **1 or more** of the following:
    - Calculated Apache II score greater than 8[l]
    - Age older than 55 years
    - BMI greater than 30
       BMI Calculator
    - Greater than 30% pancreatic necrosis on CT scan
    - Admission hematocrit greater than 47% (0.47)
  - Organ failure, as indicated by **1 or more** of the following:
    - Serum creatinine greater than 1.9 mg/dL (168 micromoles/L) after initial rehydration
    - Urine output less than 50 mL/hour
    - Requirement for mechanical ventilation
    - Arterial partial pressure of oxygen less than 60 mm Hg (8.0 kPa) despite supplemental oxygen

- PaO_2/FiO_2 ratio less than 300 mm Hg
- Expanding pseudocyst
- Infected pancreas
- Need for pain control (eg, IV opioids) not performable at lower level of care
- Pleural effusion
- Encephalopathy
- Severe active comorbidities (eg, liver disease)
- Severe deterioration following admission to floor or intermediate unit, as evidenced by **1 or more** of the following:
  - Worsening renal failure (eg, rising BUN or creatinine, urine output less than 0.5 mL/kg/hour for more than 6 hours)
  - Persistent systemic inflammatory response syndrome (SIRS) criteria (temperature below 96.8 degrees F (36 degrees C) or above 100.4 degrees F (38 degrees C), pulse greater than 90 beats per minute, respiratory rate greater than 20 breaths per minute, white blood cell count lower than 4000/mm^3 (4 $x10^9$/L) or greater than 12,000/mm^3 (12 $x10^9$/L)) despite adequate fluid resuscitation
  - C-reactive protein greater than 15 mg/dL

(150 mg/L) ◦ Imaging findings of pancreatic or peripancreatic necrosis consistent with evolving severe pancreatitis ◦ Worsening hypoxia or pulmonary complications requiring invasive or noninvasive ventilation ▪ Toxic megacolon (eg, from inflammatory bowel disease, ischemic bowel, infection) ▪ Abdominal compartment syndrome requiring close monitoring or intervention, as indicated by **ALL** of the following: • Sustained intra-abdominal pressure (eg, bladder pressure) greater than 20 mm Hg • New organ dysfunction or failure (eg, respiratory failure, Hemodynamic instability, Acute kidney injury (stage 2), Acute renal failure (stage 3 acute kidney injury), intestinal ischemia) attributable to increased intra-abdominal pressure		

Hospitalization

Goal Length of Stay: 2 days

Note: Goal Length of Stay assumes optimal recovery, decision making, and care. Patients may be discharged to a lower level of care (either later than or sooner than the goal) when it is appropriate for their clinical status and care needs.

Discharge Readiness

- Discharge readiness is indicated by patient meeting Recovery Milestones, including **ALL** of the following:
  - **Hemodynamic stability**
  - **Pain absent or managed**
  - **Etiology or finding requiring continued inpatient treatment absent**
  - **Ambulatory or acceptable for next level of care[AA]**
  - **Oral hydration[BB]**
  - **Oral medications or regimen acceptable for next level of care**
  - **Oral diet or acceptable for next level of care**
  - **Discharge plans and education understood**

See Abdominal Pain Optimal Recovery Course ISC for full optimal recovery management information.

Extended Stay

Minimal (a few hours to 1 day), Brief (1 to 3 days), Moderate (4 to 7 days), and Prolonged (more than 7 days).

- Extended stay beyond goal length of stay may be needed for:
  - Failure to meet discharge criteria (recovery milestones within final day in Optimal Recovery Course)
    - Expect brief stay extension.
  - Surgery (eg, colectomy, revascularization procedure) needed
    - Stay extension varies depending on condition.
    - See appropriate surgical guideline.
  - Persistent abdominal pain with suspected significant intra-abdominal process
    - Anticipate further diagnostic or surgical intervention.
    - Expect brief stay extension.
  - Diagnosed condition requiring continued stay (eg, pancreatitis, ischemic bowel, GI bleeding, complicated diverticulitis, neutropenic enterocolitis)
    - Stay extension varies depending on condition.
    - See appropriate guideline.
  - Other complication or condition, including:
    - Anemia
      - Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
        - Hemodynamic stability
        - Active blood loss absent
        - Signs and symptoms of anemia absent or acceptable for next level of care
        - Mental status normal or at baseline
        - Hgb/Hct level stable and acceptable for next level of care
        - Etiology of anemia requiring inpatient care absent
    - Arrhythmia
      - Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
        - Hemodynamic stability
        - Arrhythmia evaluation completed
        - Reversible causes of arrhythmia eliminated or mitigated
        - Specific antiarrhythmia treatment initiated as appropriate

- Anticoagulation requirements addressed (or anticoagulation not required). See Anticoagulation Requirement: Common Complications and Conditions ISC for further information.

− Electrolyte disorder

- Extended stay beyond goal length of stay for primary condition may be needed until **1 or more** of the following is present:
  - Electrolyte abnormality manageable at next level of care[CC]
  - No electrolyte abnormality, as indicated by **ALL** of the following:
    - Potassium greater than 3.5 mEq/L (mmol/L) and less than 5.0 mEq/L (mmol/L)
    - Sodium greater than 135 mEq/L (mmol/L) and less than 145 mEq/L (mmol/L)
    - Calcium greater than 8.5 mg/dL (2.13 mmol/L) and less than 10.5 mg/dL (2.63 mmol/L)
    - Phosphorus greater than 2.5 mg/dL (0.81 mmol/L) and less than 5.0 mg/dL (1.62 mmol/L)
    - Magnesium greater than 1.5 mEq/L (0.75 mmol/L) and less than 3.0 mEq/L (1.5 mmol/L)

− Fever

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Hemodynamic stability
  - Hypoxemia absent
  - Tachypnea absent
  - − Temperature status acceptable, as indicated by **1 or more** of the following:
    - Temperature less than 100.5 degrees F (38.1 degrees C) (oral)
    - Temperature as expected for disease process and acceptable for next level of care
  - Cultures negative or infection identified and under adequate treatment
  - No condition, organ dysfunction (eg, renal failure), or laboratory finding (eg, acidosis) identified that requires inpatient care
  - Behavior or mental status abnormalities absent or manageable at next level of care. See Mental Status Change: Common Complications and Conditions ISC for further information.
  - Adequate diet tolerated
  - Medical comorbidities absent or manageable at next level of care

− Gastrointestinal bleeding

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Hemodynamic stability
  - Bleeding absent
  - Stable Hgb/Hct
  - Platelet count, prothrombin time, and partial thromboplastin time acceptable for next level of care
  - Surgical or other acute intervention not needed
  - Mental status at baseline
  - Oral hydration and diet tolerated

− Hyperglycemia and diabetes control

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Hemodynamic stability
  - Mental status at baseline
  - No precipitating cause identified, or cause manageable at next level of care
  - Acidosis absent
  - Blood glucose under acceptable control

- Dehydration absent
- Electrolyte abnormalities absent or acceptable for next level of care
- Renal function at baseline or acceptable for next level of care
- Outpatient diabetic medication regimen established
- Oral hydration
- Oral medications or regimen acceptable for next level of care
- Oral diet or acceptable for next level of care

− Mental status change

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Underlying medical etiology of mental status change absent, or manageable at next level of care
  - Danger to self or others absent or manageable at next level of care
  - Behavioral crisis management, including physical restraint or emergent pharmacologic treatment of agitation, not required or available at next level of care
  - Substance or alcohol withdrawal absent or manageable at next level of care
  - Behavioral symptoms (eg, agitation, somnolence, inappropriate behavior) absent or manageable at next level of care

− Psychiatric disorders

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Danger to self or others absent or manageable at next level of care
  - Behavior crisis management, including physical or chemical restraints, not required or available at next level of care
  - Behavioral symptoms (eg, agitation, somnolence, inappropriate behavior) absent or manageable at next level of care
  - Functional status is sufficient to participate at available next level of care.
  - Patient and supports understand follow-up treatment and crisis plan.
  - Provider and supports are sufficiently available at next level of care.
  - Patient can participate (eg, verify absence of plan for harm) in needed monitoring.

− Respiratory insufficiency

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Suctioning, pulmonary toilet, or other therapy not needed or available at next level of care
  - Respiratory insufficiency resolved or manageable at next level of care
  - Anticoagulation treatment not needed or available at next level of care

− Urinary complications

- Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
  - Hemodynamic stability
  - Mental status at baseline
  - Antibiotic regimen for next level of care established
  - Voiding adequately or with urinary catheter, percutaneous suprapubic tube, or plan for intermittent self-catheterization, and management regimen performable at next level of care
  - Urine output adequate
  - Renal function at baseline or acceptable for next level of care
  - Pain absent or managed
  - Oral intake adequate
  - Afebrile or temperature acceptable for next level of care

- Venous thrombosis and pulmonary embolism
  - Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
    - Hemodynamic stability
    - Dyspnea absent
    - New oxygen requirement absent or supplementation can be performed at next level of care
    - Tachypnea absent
    - Dangerous arrhythmia absent
    - No bleeding or evidence of new emboli
    - Pain absent or managed
    - No evidence of cardiac dysfunction (eg, right ventricular heart failure)
    - Lower extremity examination at baseline, stable, or improved
    - Anticoagulation tolerated (eg, no allergic reaction)
    - Outpatient anticoagulation plan established
- Wound and skin care
  - Extended stay beyond goal length of stay for primary condition may be needed until **ALL** of the following are present:
    - Hemodynamic stability
    - Volume status acceptable (eg, not dehydrated)
    - Mental status at baseline
    - Hypoxemia absent
    - Tachypnea absent
    - Fistulas, tunneling, or infection absent or manageable at next level of care
    - Surgical management requiring inpatient care absent
    - Afebrile or temperature appropriate for next level of care
    - Pain absent or managed
    - Wound care needs manageable at next level of care
    - Drain absent or drain care manageable at next level of care
    - Wound hematoma or seroma absent or manageable at next level of care

See Common Complications and Conditions ISC for further information.

See* Abdominal Pain *ISC Optimal Recovery Guideline for complete guideline and further supporting content such as Supplemental Medicare Criteria (ie, CMS' Two-Midnight Rule exceptions), Alternatives to Admission or Procedure, Optimal Recovery Course, and Evidence Summary.

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.

Footnotes

[A] Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture. [A in Context Link 1]

[B] The mean arterial pressure (MAP) takes into account both systolic and diastolic blood pressure readings. [B in Context Link 1, 2]

[C] Pulse oximetry (SpO_2) may underestimate arterial saturation (SaO_2), especially in people with dark skin pigmentation, thick skin, cold body temperature, or who are wearing colored nail polish, and thus may not accurately detect hypoxemia. Where appropriate, pulse oximetry should be measured after warming fingers or removing nail polish. Pulse oximetry results should be assessed within the context of the patient's clinical presentation, and performance of an arterial blood gas considered for a more accurate assessment of oxygenation if indicated. Specific target values may require adjustment when care is delivered at high altitude. [C in Context Link 1]

[D] An ionized calcium level may be more accurate than a total serum calcium level, especially in the setting of acidosis, renal failure, multiple transfusions, hypoalbuminemia, or the presence of a paraprotein. [D in Context Link 1, 2]

[E] A dedicated burn unit is recommended. [E in Context Link 1]

[F] Ventilatory assistance includes noninvasive methods (eg, high-flow nasal cannula (HFNC), CPAP, BPAP) and invasive methods (intubation with mechanical ventilation). [F in Context Link 1, 2]

[G] The definition of heatstroke commonly includes a core body temperature of 104 degrees F (40 degrees C); however, hyperthermia-related organ failure may occur at lower temperatures. [G in Context Link 1]

[H] Expert advice in management of malignant hyperthermia or neuroleptic malignant syndrome is available from the Malignant Hyperthermia Association of the United States through their website at www.mhaus.org/healthcare-professionals/managing-a-crisis/ or at their 24-hour hotline 1-800-644-9737. [H in Context Link 1, 2]

[I] A calculator is available at www.mdcalc.com/apache-ii-score. [I in Context Link 1]

[J] The Intermediate Care guideline should not be used independently but in conjunction with the appropriate Inpatient & Surgical Care or General Recovery Care guideline. [J in Context Link 1]

[K] Noninvasive ventilation may be administered in some intermediate care units depending on unit capabilities, staffing, and policies. [K in Context Link 1]

[L] A specialty society guideline recommends the use of high-flow nasal oxygen over conventional oxygen therapy for patients with acute hypoxic respiratory failure because it decreases the risk of subsequent intubation and mechanical ventilation. High-flow oxygen is also recommended over conventional oxygen therapy for postextubation hypoxic respiratory failure due to a slightly lower likelihood for reintubation and improved patient comfort. [L in Context Link 1]

[M] For the purposes of the Inpatient & Surgical Care guidelines, telemetry care is defined as inpatient ECG monitoring not performed in an intensive or intermediate care unit. It is presumed that the patient meets clinical indications for admission or continued hospital stay, as the presence of a diagnosis or clinical situation listed in the Telemetry Care Guidelines does not necessarily indicate a need for inpatient care and monitoring. Telemetry care includes arrhythmia monitoring and may include continuous ST-segment ischemia monitoring and monitoring for QTc prolongation. [M in Context Link 1]

[N] The continued need for telemetry care monitoring, including ST-segment monitoring and QTc prolongation monitoring, should be reassessed at least daily. Indications for telemetry care are often time-limited. Inappropriate use of telemetry care can be reduced by incorporating indication-based ordering into electronic ordering systems, excluding telemetry care from order sets when monitoring is not usually indicated, daily reviewing telemetry care orders and need for ongoing monitoring, using automated advisories suggesting discontinuation based on diagnosis and duration of telemetry, and educating the healthcare team on appropriate telemetry care indications. [N in Context Link 1]

[O] The Telemetry Care guideline should not be used independently but in conjunction with the appropriate Inpatient & Surgical Care or General Recovery Care guideline. [O in Context Link 1]

[P] Telemetry care monitoring is not indicated for patients with Bradycardia who are hemodynamically stable and admitted for another reason. [P in Context Link 1]

[Q] Telemetry care monitoring is not indicated for patients with chronic atrial fibrillation admitted for a reason other than arrhythmia or rate and who are hemodynamically stable. [Q in Context Link 1]

[R] Appropriate defibrillator detection and firing require monitoring until treatment of the inciting event. Inappropriate firing requires monitoring until the device is interrogated. [R in Context Link 1]

[S] Telemetry care monitoring is not indicated for patients with a presumably functional defibrillator or pacemaker who are admitted for another reason. [S in Context Link 1]

[T] The initiation of certain antiarrhythmic medications may require continuous ECG monitoring because of proarrhythmic effects. [T in Context Link 1]

[U] Lists of agents associated with QT prolongation may be found at www.crediblemeds.org. [U in Context Link 1, 2]

[V] Routine uncomplicated cardiac procedures, such as coronary angiography, do not require cardiac monitoring once the femoral sheath is pulled post procedure. [V in Context Link 1]

[W] The majority of life-threatening arrhythmias or heart failure episodes caused by cardiac contusion occur within 48 hours of chest trauma. [W in Context Link 1]

[X] Patients admitted with acute heart failure have multiple risk factors for arrhythmia, including diuretic-induced electrolyte abnormalities, myocardial injury, hypoxemia, and structural heart disease. [X in Context Link 1]

[Y] Dedicated intermediate-level stroke care units that incorporate rehabilitation are recommended over a telemetry care unit for acute ischemic stroke, if available. Specialty society guidelines recommend long-term telemetry (eg, 2 to 4 weeks) for patients with acute transient ischemic attack or stroke in whom a cardioembolic source is suspected and who are candidates for anticoagulation. Absent other indications (eg, unstable arrhythmia), this does not require extended inpatient care, as monitoring is usually performed in the outpatient setting using wearable or implantable monitors. [Y in Context Link 1]

[Z] An ionized calcium level may be more accurate than a total serum calcium level, especially in the setting of acidosis, renal failure, multiple transfusions, or hypoalbuminemia or in the presence of a paraprotein. [Z in Context Link 1]

[AA] Patient is ambulatory or near baseline activity. [AA in Context Link 1]

[BB] Some patients may have their hydration needs met via alternative means (eg, percutaneous endoscopic gastrostomy tube). [BB in Context Link 1]

[CC] Patients with chronic disease (eg, renal failure with potassium greater than 5 mEq/L (mmol/L) or liver disease with sodium less than 135 mEq/L (mmol/L)) with chronically abnormal electrolytes are often manageable on an outpatient basis. [CC in Context Link 1]

Definitions

Acute kidney injury (stage 2)

- Acute kidney injury (stage 2) with significant clinical findings, as indicated by **ALL** of the following(1)(2)(3):
  - Acute[A] kidney injury (stage 2), as indicated by **1 or more** of the following[B]:
    - Acute[A] rise in serum creatinine between 2 and 2.9 times its baseline value[C] (increase of 3 times baseline would qualify as stage 3 acute kidney injury)
    - Decreased urine output,[D] as indicated by **ALL** of the following:
      - Assessment of urine output appropriate (eg, adequate volume status, no urinary obstruction)
      - Urine output less than 0.5 mL/kg/hr for 12 hours
  - Significant clinical findings, as indicated by **1 or more** of the following[B]:
    - Hemodynamic instability
    - Worsening clinical status despite observation care (eg, rising creatinine or urine output remains less than 0.5 mL/kg/hr)
    - Altered mental status
    - Cardiac arrhythmias of immediate concern
    - Severe hypertension (SBP greater than 180 mm Hg or DBP greater than 120 mm Hg in adults or greater than the 95th percentile for age, gender, and height plus 30 mm Hg in pediatric patients)(4)(5)
    - Significant respiratory findings (eg, pulmonary edema) that are severe (eg, Hypoxemia) or persist despite observation care
    - Clinically significant electrolyte abnormality that is severe (eg, hyperkalemia with severe ECG findings)[E] or persists despite observation care
    - Clinically significant metabolic abnormality (eg, metabolic acidosis) that is severe or persists despite observation care

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Footnotes

A. A specialty society practice guideline defines acute kidney injury as a change in renal function that is known or presumed to have occurred over the previous 7 days.(1)
B. In determining the stage of acute kidney injury (eg, stage 2 vs stage 3), patients should be staged according to the criteria that give them the highest stage.(1)
C. If the baseline serum creatinine is not known, absent known or suspected chronic kidney disease, a baseline serum creatinine can be approximated by assuming an estimated GFR of 75 mL/min/1.73m^2 (1.25 mL/sec/1.73m^2).(1) eGFR - Adult Calculator eGFR - Pediatric Calculator
D. The use of urine output as an indicator of acute kidney injury is important, as change in urine output can occur before a noticeable rise in creatinine.(1)(3) It is also suggested that urine output can identify patients with acute kidney injury that may otherwise be missed.(1)(3) However, urine output as a metric is only valid under the appropriate conditions. For example, the patient must not be hypovolemic, there must not be urinary obstruction, and the collection and measurement of urinary output must be complete and accurate.(1)(3) Use of urinary output to define acute kidney injury can be inaccurate in obese patients due to the nonlinear relationship between body weight and urine output. For example, in a 100-kg (220-lb) patient, urine output of 45 mL/hr over 12 hours (adequate output) would qualify as stage 2 acute kidney injury.(1)(3)
E. ECG findings include peaked T-waves, PR interval greater than 0.20 seconds, QRS interval greater than 0.12 seconds, and arrhythmia.(6)(7)

Acute renal failure (stage 3 acute kidney injury)

- Acute[A] kidney injury (stage 3),[B] as indicated by **1 or more** of the following[C](1)(2)(3):
  - Acute[A] rise in serum creatinine to 3 times its baseline value[D] or higher
  - Acute[A] rise in serum creatinine to at least 1.5 times its baseline value[D] (increase of 50%) and serum creatinine is greater than 4 mg/dL (354 micromoles/L)
  - In child younger than 18 years, estimated GFR less than 35 mL/min/1.73m^2 (0.58 mL/sec/1.73m^2) eGFR - Pediatric Calculator and **1 or more** of the following:
    - Acute[A] rise in serum creatinine to at least 1.5 times its baseline value[D] (increase of 50%)
    - Within past 48 hours, rise in serum creatinine greater than 0.3 mg/dL (26.5 micromoles/L)
  - Decreased urine output,[E] as indicated by **ALL** of the following:
    - Assessment of urine output appropriate (eg, adequate volume status, no urinary obstruction)
    - Oligoanuria, as indicated by **1 or more** of the following:
      - Urine output less than 0.3 mL/kg/hr for 24 hours
      - Anuria (urine output less than 0.1 mL/kg/hr) for 12 hours
  - Initiation of renal replacement therapy required(4)

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2. Weisbord SD, Palevsky PM. Prevention and management of acute kidney injury. In: Yu AS, Chertow GM, Luyckx VA, Marsden PA, Skorecki K, Taal MW, editors. Brenner and Rector's The Kidney. 11th ed. Philadelphia, PA: Elsevier; 2020:940-977.e15.
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Footnotes

A. A specialty society practice guideline defines acute kidney injury as a change in renal function that is known or presumed to have occurred over the previous 7 days.(1)
B. For purposes of these criteria, the term acute renal failure can be viewed as stage 3 acute kidney injury in the KDIGO classification system.(1) Of note, in the ICD-10 diagnostic coding system (main coding scheme used in labeling diagnoses), the relevant codes covering the clinical entity of significant acute kidney injury use the term acute kidney failure (eg, code N17.9).
C. In determining the stage of acute kidney injury (eg, stage 2 vs stage 3), patients should be staged according to the criteria that give them the highest stage.(1)
D. If the baseline serum creatinine is not known, absent known or suspected chronic kidney disease, a baseline serum creatinine can be approximated by assuming an estimated GFR of 75 mL/min/1.73m^2 (1.25 mL/sec/1.73m^2).(1) eGFR - Adult Calculator eGFR - Pediatric Calculator
E. The use of urine output as an indicator of acute kidney injury is important, as change in urine output can occur before a noticeable rise in creatinine.(1)(3) It is also suggested that urine output can identify patients with acute kidney injury that may otherwise be missed.(1)(3) However, urine output as a metric is only valid under the appropriate conditions. For example, the patient must not be hypovolemic, there must not be urinary obstruction, and the collection and measurement of urinary output must be complete and accurate.(1)(3) Use of urinary output to define acute kidney injury can be inaccurate in obese patients due to the nonlinear relationship between body weight and urine output. For example, in a 100-kg (220-lb) patient, urine output of 45 mL/hr over 12 hours (adequate output) would qualify as stage 2 acute kidney injury.(1)(3)

Altered mental status

- Altered mental status (ie, different from baseline), as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Confusional state (eg, disorientation, difficulty following commands, deficit in attention)
  - Lethargy (eg, awake or arousable, but with drowsiness; reduced awareness of self and environment)
  - Obtundation (ie, arousable only with strong stimuli, lessened interest in environment, slowed responses to stimulation)
  - Stupor (ie, may be arousable but patient does not return to normal baseline level of awareness)
  - Coma (ie, not arousable)

References

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Altered mental status that is severe or persistent

- Altered mental status (ie, different from baseline) that is severe or persistent, as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Confusional state (eg, disorientation, difficulty following commands, deficit in attention) that persists despite appropriate treatment (eg, of underlying cause, despite observation care)
  - Lethargy (eg, awake or arousable, but with drowsiness; reduced awareness of self and environment) that persists despite appropriate treatment (eg, of underlying cause, despite observation care)
  - Obtundation (ie, arousable only with strong stimuli, lessened interest in environment, slowed responses to stimulation)

- Stupor (ie, may be arousable but patient does not return to normal baseline level of awareness)
- Coma (ie, not arousable)

References

1. Maher PJ. Confusion. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:126-131.e1.
2. Lei C, Smith C. Depressed consciousness and coma. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:117-125.e1.
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Bradycardia

- Bradycardia[A], as indicated by **1 or more** of the following(1)(2)(3):
  - Heart rate less than 50 beats per minute in adult (age 18 years or older)[B]
  - Heart rate less than 55 beats per minute in adolescent 13 to 17 years of age
  - Heart rate less than 60 beats per minute in child or adolescent 6 to 12 years of age
  - Heart rate less than 65 beats per minute in child 3 to 5 years of age
  - Heart rate less than 70 beats per minute in child 1 to 2 years of age
  - Heart rate less than 80 beats per minute in infant 6 to 11 months of age
  - Heart rate less than 90 beats per minute in infant 3 to 5 months of age

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Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. An evidence-based specialty society guideline has defined bradycardia in adults as less than 50 beats per minute.(1)

Cardiac arrhythmias of immediate concern

- Cardiac arrhythmias or findings of immediate concern, as indicated by **1 or more** of the following(1)(2)(3):
  - Heart rhythms that are inherently dangerous or unstable, as indicated by **1 or more** of the following(4)(5)(6):

- Resuscitated ventricular fibrillation or cardiac arrest
- Ventricular escape rhythm
- Sustained ventricular tachycardia (30 seconds or more of ventricular rhythm at greater than 100 beats per minute)
- Nonsustained ventricular tachycardia and **1 or more** of the following:
  - Suspected cardiac ischemia as cause or consequence of ventricular tachycardia
  - Acute myocarditis

- Unstable cardiac conduction defects, as indicated by **1 or more** of the following(7)(8):
  - Type II second-degree atrioventricular block
  - Third-degree atrioventricular block
  - New-onset left bundle branch block with suspected myocardial ischemia(9)
- Any heart rhythm and **1 or more** of the following(5)(8)(10)(11)(12)(13):
  - Continuous long-term ECG monitoring needed (eg, initiation of drug requiring monitoring beyond observation care)
  - Patient has automatic implantable cardioverter-defibrillator that is repeatedly firing, malfunctioning, or in need of immediate adjustment of settings beyond scope of observation care.
- Heart rhythms of concern due to **1 or more** of the following(8):
  - Hypotension
  - Respiratory distress
  - Association with other significant symptoms (eg, syncope)(10)(11)

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Dangerous arrhythmia

- Dangerous arrhythmia, as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Heart rhythms that are inherently dangerous or unstable, as indicated by **1 or more** of the following(5)(6):
    - Resuscitated ventricular fibrillation or cardiac arrest
    - Ventricular escape rhythm
    - Sustained ventricular tachycardia (30 seconds or more of ventricular rhythm at greater than 100 beats per minute)
    - Nonsustained ventricular tachycardia and **1 or more** of the following:
      - Acute myocarditis
      - Myocardial ischemia
  - Unstable cardiac conduction defects, as indicated by **1 or more** of the following(7):
    - Type II second-degree atrioventricular block
    - Third-degree atrioventricular block
    - New-onset left bundle branch block with suspected myocardial ischemia
  - Heart rhythms of concern due to **1 or more** of the following(8):
    - Hypotension
    - Respiratory distress
    - Association with other significant symptoms (eg, syncope)(7)(9)(10)(11)

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Dangerous arrhythmia absent

- Dangerous arrhythmia absent, as indicated by absence of **ALL** of the following(1)(2)(3)(4)(5)(6)(7)(8)(9)(10):
  - Resuscitated ventricular fibrillation or cardiac arrest
  - Ventricular escape rhythm
  - Sustained ventricular tachycardia (30 seconds or more of ventricular rhythm at greater than 100 beats per minute)
  - Nonsustained ventricular tachycardia with myocarditis or ischemia
  - Type II second-degree atrioventricular block
  - Third-degree atrioventricular block
  - New-onset left bundle branch block with suspected myocardial ischemia
  - Heart rhythms of concern due to association with Hypotension, Respiratory distress, or other significant symptoms (eg, syncope)

References

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10. Zimetbaum P, Goldman L. Bradycardias and conduction system delays. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:317-322.

Hemodynamic instability

- Hemodynamic instability, as indicated by **1 or more** of the following:
  - Vital sign abnormality not corrected by appropriate treatment, as indicated by **1 or more** of the following[A]:
    - Tachycardia that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
    - Hypotension that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
    - Orthostatic hypotension that persists despite appropriate treatment (eg, treatment of underlying cause, despite observation care)[A]
  - Severe hypotension in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 80 mm Hg(1)[A]
    - Shock index greater than 1.0 (shock index is the heart rate divided by systolic blood pressure)[A](2)(3)(4)
    - Mean arterial pressure[B] less than 65 mm Hg MAP Calculator[A](1)(6)
    - IV inotropic or vasopressor medication required to maintain adequate blood pressure or perfusion(3)(6)
    - Hypoperfusion due to hypotension, as indicated by **ALL** of the following:
      - Hypotension
      - Evidence of hypoperfusion, as indicated by **1 or more** of the following:
        - Lactate of 2.0 mmol/L (18 mg/dL) or more secondary to hypotension (ie, hypoperfusion)[C](3)(6)(8)
        - Metabolic acidosis (arterial or venous[D] pH less than 7.35) not otherwise explained(3)(6)(8)
        - Significant end organ dysfunction due to hypotension (eg, Altered mental status, myocardial ischemia, 2-fold or higher acute increase in serum creatinine)(3)(6)
  - Severe hypotension in pediatric patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 80 mm Hg in child 6 to 17 years of age[A](14)
    - Systolic blood pressure less than 75 mm Hg in child 6 months to 5 years of age[A](14)
    - Shock index greater than 0.9 in child 13 to 17 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
    - Shock index greater than 1.0 in child 7 to 12 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
    - Shock index greater than 1.2 in child 4 to 6 years of age (shock index is the heart rate divided by systolic blood pressure)[A](2)(15)
    - IV inotropic or vasopressor medication required to maintain adequate blood pressure or perfusion(5)(6)
    - Hypoperfusion due to hypotension, as indicated by **ALL** of the following:
      - Hypotension
      - Evidence of hypoperfusion, as indicated by **1 or more** of the following:
        - Lactate of 2.0 mmol/L (18 mg/dL) or more secondary to hypotension (ie, hypoperfusion)[C](6)(8)
        - Metabolic acidosis (arterial or venous pH less than 7.35) not otherwise explained[D](5)(6)(14)
        - Significant end organ dysfunction due to hypotension (eg, Altered mental status, myocardial ischemia, 2-fold or higher acute increase in serum creatinine)(5)(6)(14)

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Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.(3)(5)
C. There are numerous causes of an elevated lactate level. The most common are cardiogenic or hypovolemic shock, severe heart failure, severe trauma, or sepsis. However, there are also other etiologies to consider such as vigorous exercise, seizures, liver disease, or medication use (eg, metformin, beta2-agonists); therefore, interpretation of elevated lactate levels requires consideration of the clinical context (eg, well-appearing post exercise vs hypotensive). The severity and persistence of the elevation can sometimes be helpful in this differentiation. In most instances of lactic acidosis, blood pH is less than 7.35, with a serum bicarbonate level of 20 mEq/L (mmol/L) or lower. However, a coexisting respiratory or metabolic alkalosis can mask these findings.(7)(8)
D. Analyses have concluded that venous and arterial pH measurements are highly correlated, with small differences between them that are usually not clinically significant.(9)(10)(11)(12)(13) If a mixed acid-base disorder is suspected, an arterial blood gas is indicated.(10)

Hemodynamic stability

- Hemodynamic stability, as indicated by **1 or more** of the following:
  - Hemodynamic abnormalities at baseline or acceptable for next level of care
  - Patient hemodynamically stable, as indicated by **ALL** of the following(1)(2):
    - Tachycardia absent
    - Hypotension absent
    - No evidence of inadequate perfusion (eg, no myocardial ischemia)
    - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)

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Hypotension

- Hypotension, as indicated by **1 or more** of the following:
  - Hypotension in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 90 mm Hg[A][B](1)
    - Mean arterial pressure[C] less than 70 mm Hg[A][B] MAP Calculator(1)(2)
    - Decrease in baseline systolic blood pressure of 30 mm Hg or more, with significant signs or symptoms due to lower blood pressure (eg, near syncope, syncope, chest pain)[A][B](1)
  - Hypotension in pediatric patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure less than 110 mm Hg in child 13 to 17 years of age[A][D](3)
    - Systolic blood pressure less than 100 mm Hg in child 6 to 12 years of age[A][D](3)
    - Systolic blood pressure less than 95 mm Hg in child 3 to 5 years of age[A][D](3)
    - Systolic blood pressure less than 90 mm Hg in child 1 or 2 years of age[A][D](3)
    - Systolic blood pressure less than 80 mm Hg in infant 6 to 11 months of age[A][D](3)
    - Systolic blood pressure less than 70 mm Hg in infant 3 to 5 months of age[A][D](3)
    - Systolic blood pressure less than 65 mm Hg in infant 1 or 2 months of age[A][D](3)

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Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. For example, an elderly patient with heart failure may be prescribed medication with the intentional goal of a reduced pressure. If the patient's baseline SBP is 92 mm Hg to 96 mm Hg, absent signs or symptoms of hypotension, an emergency department SBP of 86 mm Hg should not automatically be categorized as hypotensive. This would hold for mean arterial pressure (MAP) as well. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

C. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.

D. Interpretation of blood pressure requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline blood pressure, medications, and clinical impact. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term hypotension. Whether a blood pressure below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Hypotension absent

- Hypotension absent,[A] as indicated by **1 or more** of the following:
  - Hypotension absent in adult patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure greater than or equal to 90 mm Hg[A](1)
    - Mean arterial pressure[B] greater than or equal to 70 mm Hg MAP Calculator[A](1)(2)
    - Blood pressure at patient's baseline (eg, healthy adult with low systolic blood pressure), at intentional therapeutic goal (eg, patient with heart failure), or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)
  - Hypotension absent in pediatric patient, as indicated by **1 or more** of the following:
    - Systolic blood pressure greater than or equal to 110 mm Hg in child 13 to 17 years of age[A](3)
    - Systolic blood pressure greater than or equal to 100 mm Hg in child 6 to 12 years of age[A](3)
    - Systolic blood pressure greater than or equal to 95 mm Hg in child 3 to 5 years of age[A](3)
    - Systolic blood pressure greater than or equal to 90 mm Hg in child 1 or 2 years of age[A](3)
    - Systolic blood pressure greater than or equal to 80 mm Hg in infant 6 to 11 months of age[A](3)
    - Systolic blood pressure greater than or equal to 70 mm Hg in infant 3 to 5 months of age[A](3)
    - Systolic blood pressure greater than or equal to 65 mm Hg in infant 1 or 2 months of age[A](3)
    - Blood pressure at patient's baseline (eg, healthy child with low systolic blood pressure), at intentional therapeutic goal, or acceptable for next level of care (eg, blood pressure stable and no significant signs or symptoms due to low blood pressure)

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1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
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3. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. The mean arterial pressure (MAP) takes into account both SBP and DBP readings.

Hypothermia

- Hypothermia indicated by core (eg, rectal) body temperature less than or equal to 95 degrees F (35 degrees C)(1)

References

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Hypoxemia

- Hypoxemia, as indicated by **1 or more** of the following(1):
  - Patient without baseline need for supplemental oxygen with oxygen saturation (SpO_2) of less than 90% or arterial blood gas partial pressure of oxygen (PaO_2) of less than 60 mm Hg (8.0 kPa) on room air[A][B]
  - Patient without baseline need for supplemental oxygen who now requires supplemental oxygen to keep SpO_2 greater than 89% or PaO_2 greater than 59 mm Hg (7.9 kPa)[A]
  - Patient with baseline need for supplemental oxygen who now requires increased supplemental oxygen to maintain oxygenation at baseline or acceptable level

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Footnotes

A. Pulse oximetry (SpO_2) may underestimate arterial saturation (SaO_2), especially in people with dark skin pigmentation, thick skin, cold body temperature, or who are wearing colored nail polish, and thus may not accurately detect hypoxemia.(2) Where appropriate, pulse oximetry should be measured after warming fingers or removing nail polish. Pulse oximetry results should be assessed within the context of the patient's clinical presentation, and performance of an arterial blood gas considered for a more accurate assessment of oxygenation if indicated.(2) Specific target values may require adjustment when care is delivered at high altitude.(3)

B. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Hypoxemia absent

- Hypoxemia absent, as indicated by **1 or more** of the following(1):
  - Arterial oxygen saturation (SpO_2) of 90% or greater or arterial partial pressure of oxygen (PaO_2) of 60 mm Hg (8.0 kPa) or greater on room air[A][B]
  - Oxygen requirements are stable and arranged for at next level of care.

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1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Rojas-Camayo J, et al. Reference values for oxygen saturation from sea level to the highest human habitation in the Andes in acclimatised persons. Thorax 2018;73(8):776-778. DOI: 10.1136/thoraxjnl-2017-210598.

Footnotes

A. Specific target values (ie, 90% or 60 mm Hg (8.0 kPa)) may require adjustment when care is delivered at high altitude.(2)

B. Criteria based upon clinician-acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Immunosuppressed

- Immunosuppressed refers to a degree of immunocompromise that is clinically significant (eg, affects choice of antimicrobial agent due to possibility of atypical organism, necessitates additional isolation, or leads to clinically relevant increase in likelihood of severe infection)[A]; examples include(1)(2)(3)(4):
  - Neutropenia (absolute neutrophil count less than 500/mm^3 (0.5 x10^9/L), or expected to decrease to this level within the next 48 hours)
  - Drug-induced immunosuppression (ie, current usage); examples include:
    - Systemic corticosteroids[B](6)(7)(8)(9)
    - Immunosuppressive agent (eg, tacrolimus, azathioprine, methotrexate, cyclosporin)
    - Immunomodulatory therapy (eg, tumor necrosis factor inhibitor, interleukin inhibitor, monoclonal antibodies)
  - Poorly controlled diabetes mellitus (eg, HbA1c of 8.5% (69 mmol/mol) or higher)[C][D](10)(11)(12)(13)
  - Chronic kidney disease (ie, estimated GFR less than 60 mL/min/1.73m^2 (1.0 mL/sec/1.73m^2)) or end-stage renal disease (hemodialysis or peritoneal dialysis)[E](15)(16)(17)(18)(19)(20)
  - Cirrhosis[F](21)(22)(23)(24)(25)
  - Bone marrow suppression or dysfunction (eg, chemotherapy, radiation therapy, bone marrow fibrosis or infiltration with malignant cells)
  - Humoral (antibody, B-lymphocyte) immune dysfunction or deficiency (eg, common variable immune deficiency, specific antibody deficiency, chronic lymphocytic leukemia)(26)(27)
  - Cell-mediated (eg, T-lymphocyte, natural killer cell) immune dysfunction or deficiency (eg, severe combined immune deficiency, DiGeorge syndrome, Wiskott-Aldrich syndrome)
  - Phagocytic cell (neutrophil, macrophage) dysfunction (eg, chronic granulomatous disease, leukocyte adhesion deficiency)
  - Acquired immunodeficiencies (eg, HIV/AIDS, hematopoietic and lymphoid malignancies)
  - History of solid organ or hematopoietic stem cell transplant[G]
  - Asplenia (surgical or congenital) or functional hyposplenia (eg, sickle cell disease)[H](28)
  - Complement deficiency (eg, hereditary, due to protein loss (nephrotic syndrome))

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Footnotes

A. Examples are given for some of the mechanisms of immunocompromise; however, the list is not all-encompassing. The intent is to illustrate the degree of immunocompromise that may be clinically significant. The presence of a listed potentially immunocompromising factor does not always indicate clinically significant immunosuppression. For example, some findings, such as neutropenia, are usually indicative of significant immunocompromise, whereas others (eg, presence of diabetes, renal failure, or asplenia) may not necessarily indicate clinically important immunocompromise. The judgment as to the presence of clinically significant immunocompromise in a particular patient is also influenced by several variables, such as the nature of the suspected infection and the specific details of the patient's presentation, condition, and comorbidities. Patients may have more than one potential source of immunocompromise, increasing the likelihood of significant dysfunction (eg, poorly controlled diabetes and chronic kidney disease).
B. The minimum dose of systemic corticosteroid use associated with an increased risk of serious infection is not defined, but there is increasing risk with higher doses and longer duration of treatment.(5) Observational studies of patients with rheumatologic disease indicated, after statistical adjustment, that infection risk was increased with prolonged use of as little as 5 mg of prednisone-equivalent per day dosing, and also found that higher doses and longer duration increased risk.(6)(7)(8) An evidence-based specialty society guideline defines clinically important immunocompromise in adult pneumonia patients as those patients with an impaired immune response who are judged to be at elevated risk of infection by atypical or opportunistic organisms, so that there is a need to alter empirical antimicrobial therapy.(9) This same guideline states that corticosteroid use would lead to such an immune system impairment at doses of 20 mg of prednisone-equivalent per day or more for 14 days or more, or a course of treatment with a cumulative dose of 600 mg or more of prednisone-equivalent.(9)
C. It is generally agreed that the presence of diabetes is associated with an increased risk of infection, including infection leading to hospitalization.(2)(10)(11)(12)(13) At least some of this risk is attributed to the deleterious effects of diabetes on the immune system.(2)(10)(11)(12)(13) It has been found that the impact of diabetes can be higher in certain types of infections (eg, higher impact in cellulitis, osteomyelitis) and with a longer total duration of the diagnosis.(10)(11)(13)
D. There is no universally agreed upon HbA1c level that indicates "poor control." It has been found that the higher the HbA1c, the larger the impact on the immune system.(10)(11)(12)(13) Goal HbA1c can vary to some degree depending on the patient. Otherwise healthy adults and adolescents may have a target HbA1c of less than 7% (53 mmol/mol), whereas those who have complex comorbidities, impairment in cognition or activities of daily living, or a history of severe hypoglycemia may have a target of less than 8% (64 mmol/mol).(14) However, these targets are put forth with reduction of microvascular and macrovascular effects of diabetes in mind, not immune system effects.(14) In this way, there is no simple cutoff between adequate and poor control. Cohort studies, after statistical adjustment, have found that HbA1c levels above 8.0% to 8.5% (64 to 69 mmol/mol) are independently associated with hospitalization due to infection.(10)(11)(12)(13)
E. Patients with chronic kidney disease or end-stage renal disease have impaired immune system function, measured, for example, by higher rates of infection requiring hospitalization.(15)(16)(17) The degree of renal impairment correlates with the severity of immunocompromise.(15)(16)(17) The degree of proteinuria (eg, urine albumin to creatinine ratio) is also independently correlated with the severity of immune system dysfunction. These 2 factors are additive, in that patients with both reduced GFR and significant proteinuria are the most severely affected.(15)(16)(17) Patients with end-stage renal disease, in general, have more profound immune system dysfunction, with inadequate dialysis even more detrimental.(18)(19)(20)
F. Patients with cirrhosis of the liver are functionally immunocompromised due to a variety of mechanisms. This immunocompromise correlates with the severity of the cirrhosis and is called cirrhosis-associated immune dysfunction (CAID). Immune dysfunction is also worsened during periods of acute exacerbation of chronic liver disease.(21)(22)(23)(24)(25) CAID is particularly associated with bacterial infections, affecting both the frequency and severity of infection.(23)(24)(25)
G. Susceptibility to infection varies with the immunosuppressive agents used.(4)

H. Patients with asplenia or hyposplenia are at higher risk of infection with encapsulated organisms, such as *Streptococcus pneumoniae*, meningococcal infection, encapsulated strains of *Haemophilus influenzae*, and certain tick-borne diseases.(2)(28)

Orthostatic hypotension

- Orthostatic hypotension,[A][B] as indicated by **1 or more** of the following(1)(2)(3):
  - Fall in SBP of 20 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position
  - Fall in DBP of 10 mm Hg or more 1 to 3 minutes after patient sits or stands from recumbent position

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Footnotes

A. Concomitant measurements of the heart rate are important to measure to help diagnose subtypes of orthostatic hypotension (eg, the lack of a compensatory increase in heart rate is typical of autonomic failure and an exaggerated tachycardia may be reflective of volume depletion). However, the heart rate is not a component of the definition of orthostatic hypotension, which relies upon blood pressure alone.(1)(2)(3)

B. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

Peritoneal signs

- Peritoneal signs, as indicated by **1 or more** of the following(1)(2):
  - Rebound tenderness
  - Rigid abdomen
  - Involuntary guarding

References

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Respiratory distress

- Respiratory distress, as indicated by **ALL** of the following(1)(2)(3)(4):
  - Patient with **1 or more** of the following:
    - Dyspnea (difficulty breathing)
    - Tachypnea
    - Abnormal breathing pattern (eg, chest retractions)
    - Other evidence of difficulty breathing
  - Evidence of respiratory compromise, as indicated by **1 or more** of the following:
    - Hypoxemia
    - Altered mental status
    - Other evidence of respiratory compromise (eg, respiratory acidosis)

References

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Severe electrolyte abnormalities requiring inpatient care

- Severe electrolyte abnormalities requiring inpatient care, as indicated by **ALL** of the following(1)(2)(3):
  - Electrolyte abnormality is not at acceptable patient baseline (eg, treatment effect).
  - Severe abnormality, as indicated by **1 or more** of the following:
    - Sodium[A] less than 130 mEq/L (mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(4)(5)
    - Sodium[A] less than 135 mEq/L (mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, seizures)(4)(5)
    - Sodium greater than 150 mEq/L (mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(4)
    - Sodium greater than 145 mEq/L (mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, seizures)(4)
    - Potassium less than 2.5 mEq/L (mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(6)
    - Potassium less than 3 mEq/L (mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, ECG findings,[B] paresis, paralysis)(6)(7)
    - Potassium greater than 6.5 mEq/L (mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(6)
    - Potassium greater than 5 mEq/L (mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, ECG findings,[C] paresis, paralysis)(6)(7)(8)
    - Calcium[D] less than 7 mg/dL (1.75 mmol/L) or ionized calcium less than 3.2 mg/dL (0.8 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(9)(11)
    - Calcium[D] less than 8.6 mg/dL (2.15 mmol/L) or ionized calcium less than 4.65 mg/dL (1.16 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, seizures, arrhythmia, cardiac conduction disturbance)(9)(11)
    - Calcium[D] greater than 14 mg/dL (3.5 mmol/L) or ionized calcium greater than 10.0 mg/dL (2.50 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(10)(11)

- Calcium[D] greater than 12 mg/dL (3 mmol/L) or ionized calcium greater than 8.0 mg/dL (2.0 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, arrhythmia, cardiac conduction disturbance)(10)(11)
- Phosphorus less than 1 mg/dL (0.32 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(12)
- Phosphorus less than 1.5 mg/dL (0.48 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, seizures)(12)
- Phosphorus greater than 10 mg/dL (3.2 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(12)
- Phosphorus greater than 4.5 mg/dL (1.45 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, crush injury, Altered mental status, seizures, arrhythmia, cardiac conduction disturbance)(12)
- Magnesium less than 1 mg/dL (0.41 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(12)
- Magnesium less than 1.5 mg/dL (0.62 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, seizures, arrhythmia, cardiac conduction disturbance)(12)
- Magnesium greater than 4.9 mg/dL (2 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(12)
- Magnesium greater than 3.0 mg/dL (1.23 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, Altered mental status, arrhythmia, cardiac conduction disturbance)(12)
- Uric acid greater than 20 mg/dL (1.19 mmol/L) not corrected to near normal or near chronic baseline despite observation care treatment(13)
- Uric acid greater than 8 mg/dL (0.48 mmol/L) with new (or presumed new) severe finding requiring inpatient management (eg, arrhythmia, cardiac conduction disturbance, seizure)(13)

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Footnotes

A. In patients with hyperglycemia, a corrected serum sodium should inform decision making.(4)
B. ECG manifestations of hypokalemia include ST-segment depression, flattened T-waves, and increased U-wave prominence.(7)
C. ECG changes associated with hyperkalemia include peaked T-waves, prolonged PR interval, loss of P-waves, prolonged QRS interval, or sinus bradycardia. Other manifestations include second-degree or third-degree atrioventricular block or a junctional escape rhythm. The ultimate result of hyperkalemia can be ventricular fibrillation, pulseless electrical activity, or asystole. ECG changes are not a sensitive indicator of severe hyperkalemia; patients with severe hyperkalemia may have minimal or nondiagnostic abnormalities. While a normal ECG does not exclude hyperkalemia, it does confer a much lower risk of dangerous arrhythmia. Hyperkalemic patients with isolated T-wave abnormalities are at low risk of a serious adverse event overall, while patients with conduction abnormalities and other more severe ECG findings are at higher risk.(6)(7)(8)
D. An ionized calcium level may be more accurate than a total serum calcium level, especially in the setting of acidosis, renal failure, multiple transfusions, hypoalbuminemia, or the presence of a paraprotein.(9)(10)

Tachycardia

- Tachycardia,[A][B] as indicated by **1 or more** of the following:
  - Heart rate greater than 100 beats per minute in adult[A][B](1)
  - Heart rate greater than 85 beats per minute in child 13 to 17 years of age[A][C](2)
  - Heart rate greater than 95 beats per minute in child 6 to 12 years of age[A][C](2)
  - Heart rate greater than 110 beats per minute in child 1 to 5 years of age[A][C](2)
  - Heart rate greater than 120 beats per minute in infant 3 to 11 months of age[A][C](2)
  - Heart rate greater than 150 beats per minute in infant 1 or 2 months of age[A][C](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.
B. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. For example, an elderly patient on a beta-blocker medication with a baseline resting heart rate of 60 beats per minute may be clinically tachycardic at a heart rate of 94 beats per minute. Likewise, a patient who is upset, in pain, or nervous in the emergency department with a heart rate of 106 beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.
C. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. A patient who is upset, in pain, or nervous in the emergency department with an elevated heart rate may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as hypotension) may not be clinically important. The numeric values included in this definition

are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Tachycardia absent

- Tachycardia[A][B] absent, as indicated by **1 or more** of the following:
  - Heart rate less than or equal to 100 beats per minute in adult[A][B](1)
  - Heart rate less than or equal to 85 beats per minute in child 13 to 17 years of age[A][B](2)
  - Heart rate less than or equal to 95 beats per minute in child 6 to 12 years of age[A][B](2)
  - Heart rate less than or equal to 110 beats per minute in child 1 to 5 years of age[A][B](2)
  - Heart rate less than or equal to 120 beats per minute in infant 3 to 11 months of age[A][B](2)
  - Heart rate less than or equal to 150 beats per minute in infant 1 or 2 months of age[A][B](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of heart rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline heart rate, medications, and clinical impact. For example, an elderly patient on a beta-blocker medication with a baseline resting heart rate of 60 beats per minute may be clinically tachycardic at a heart rate of 94 beats per minute. Likewise, a patient who is upset, in pain, or nervous in the emergency department with a heart rate of 106 beats per minute may meet the technical definition of tachycardia, but this tachycardia (absent associated findings such as chest pain or hypotension) may not be clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachycardia. Whether a heart rate above or below the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment.

Tachypnea

- Tachypnea,[A][B] as indicated by **1 or more** of the following:
  - Respiratory rate greater than 20 breaths per minute in adult[A][B](1)
  - Respiratory rate greater than 18 breaths per minute in child 13 to 17 years of age[A][B](2)
  - Respiratory rate greater than 22 breaths per minute in child 6 to 12 years of age[A][B](2)
  - Respiratory rate greater than 25 breaths per minute in child 3 to 5 years of age[A][B](2)
  - Respiratory rate greater than 30 breaths per minute in child 1 or 2 years of age[A][B](2)
  - Respiratory rate greater than 40 breaths per minute in infant 6 to 11 months of age[A][B](2)
  - Respiratory rate greater than 45 breaths per minute in infant 3 to 5 months of age[A][B](2)

- Respiratory rate greater than 55 breaths per minute in infant 1 or 2 months of age[A][B](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of respiratory rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline respiratory rate and whether the respiratory rate is indicative of significant underlying respiratory or other pathology. A mildly increased respiratory rate (eg, 20 to 22 breaths per minute in an adult), absent other indications of serious illness (eg, hypoxemia, metabolic acidosis, decreased tidal volume, pain), may be transitory and not clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachypnea. Whether a respiratory rate above the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment. In addition, the measurement of the respiratory rate is subject to error. A medical textbook states that because there can be significant breath-to-breath variation in respiratory rate, the rate should be assessed for at least 30 seconds, preferably for a full minute.(1) This same textbook also states that new technologies designed to measure the respiratory rate have not proved to be clinically useful.(1)

Tachypnea absent

- Tachypnea[A][B] absent, as indicated by **1 or more** of the following:
  - Respiratory rate less than or equal to 20 breaths per minute in adult[A][B](1)
  - Respiratory rate less than or equal to 18 breaths per minute in child 13 to 17 years of age[A][B](2)
  - Respiratory rate less than or equal to 22 breaths per minute in child 6 to 12 years of age[A][B](2)
  - Respiratory rate less than or equal to 25 breaths per minute in child 3 to 5 years of age[A][B](2)
  - Respiratory rate less than or equal to 30 breaths per minute in child 1 or 2 years of age[A][B](2)
  - Respiratory rate less than or equal to 40 breaths per minute in infant 6 to 11 months of age[A][B](2)
  - Respiratory rate less than or equal to 45 breaths per minute in infant 3 to 5 months of age[A][B](2)
  - Respiratory rate less than or equal to 55 breaths per minute in infant 1 or 2 months of age[A][B](2)

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Footnotes

A. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

B. Interpretation of respiratory rate requires clinical judgment and consideration of several patient-specific factors, such as the patient's baseline respiratory rate and whether the respiratory rate is indicative of significant underlying respiratory or other pathology. A mildly increased respiratory rate (eg, 20 to 22 breaths per minute in an adult), absent other indications of serious illness (eg, hypoxemia, metabolic acidosis, decreased tidal volume, pain), may be transitory and not clinically important. The numeric values included in this definition are provided to allow for consistency in terms of a technical definition of the term tachypnea. Whether a respiratory rate above the technical threshold is clinically meaningful is a matter of persistence, context, and clinical judgment. In addition, the measurement of the respiratory rate is subject to error. A medical textbook states that because there can be significant breath-to-breath variation in respiratory rate, the rate should be assessed for at least 30 seconds, preferably for a full minute.(1) This same textbook also states that new technologies designed to measure the respiratory rate have not proved to be clinically useful.(1)

Vital sign abnormality

- Vital sign abnormality, as indicated by **ALL** of the following(1)(2):
  - Vital sign findings not as expected for chronic patient condition or baseline (eg, intentionally low blood pressure in heart failure)
  - Vital sign abnormality, as indicated by **1 or more** of the following:
    - Tachycardia
    - Hypotension
    - Orthostatic hypotension

References

1. Schriger DL. Approach to the patient with abnormal vital signs. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:32-35.
2. Anderson CC, Kapoor S, Mark TE. Pediatric parameters and equipment. In: Anderson CC, Kapoor S, Mark TE, editors. The Harriet Lane Handbook: A Manual for Pediatric House Officers. 23rd ed. Elsevier; 2024:i-iii.

Codes

ICD-10 Diagnosis: R10.0, R10.10, R10.11, R10.12, R10.13, R10.20, R10.21, R10.22, R10.23, R10.24, R10.30, R10.31, R10.32, R10.33, R10.811, R10.812, R10.813, R10.814, R10.815, R10.816, R10.817, R10.819, R10.821, R10.822, R10.823, R10.824, R10.825, R10.826, R10.827, R10.84, R10.85, R10.9 [Hide]

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