Neurology GRG

GRG: MG-N (ISC GRG)

MCG Health
General Recovery Care
30th Edition
Medical Admission Case Management GRG GRG

Note: An appropriate Optimal Recovery Guideline (ORG) should be identified and used whenever possible. This General Recovery Guideline (GRG) is intended to aid only in situations in which no ORG appears applicable.

Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Admission to Inpatient Care

- Hospital admission is needed for appropriate care of the patient because of **1 or more** of the following:
  - Encephalitis(1)(2)(3)(4)(5)
  - Severe CNS infection, as indicated by **1 or more** of the following(1):
    - Intracranial abscess(6)
    - Spinal abscess or myelitis (eg, transverse myelitis with acute flaccid paralysis, progressive weakness, or severe pain or numbness)(7)(8)(9)(10)(11)
    - Nonbacterial, nonviral CNS infection (eg, fungal, prion, or parasitic infection)(12)(13)(14)(15)

- Altered mental status that is severe or persistent (11)

− Mental status change and **1 or more** of the following:
  - Inadequate airway protection (eg, intubation needed)(16)(17)(18)
  - Etiology suspected that requires treatment beyond observation care (eg, Wernicke encephalopathy, myxedema coma)(16)(19)(20)(21)

− Cerebral aneurysm and **1 or more** of the following(22):
  - Need for IV antihypertensive or vasoactive agents(23)
  - Need for sedation and analgesia for suspected leak(23)
  - Need for external ventricular drainage or cerebral perfusion pressure monitoring
  - Need for emergent evaluation to determine need for surgical treatment beyond observation care(23)(24)(25)

− Clinically significant neurologic finding, as indicated by **ALL** of the following(26)(27)(28)(29)(30)(31)(32)(33)(34):
  - Finding is acute (not a chronic condition) or acutely worsened
  - Finding requires inpatient care, as indicated by **1 or more** of the following:
    - Finding is severe (eg, not appropriate for lower level of care due to safety concern)
    - Treatment, testing, or monitoring necessitates inpatient care
    - Reasonable suspicion that finding may acutely progress to a degree requiring inpatient care
  - Clinically significant finding, as indicated by **1 or more** of the following:
    - Aphasia(35)
    - Weakness(36)(37)(38)(39)(40)
    - Paralysis(31)(38)(41)(42)
    - Spasticity or dystonia (eg, severe pain)(27)
    - Amnesia(43)(44)
    - Involuntary movements(27)(45)
    - Vertigo
    - Visual loss(35)(40)(46)(47)
    - Ataxia(7)(31)(40)(48)
    - Other severe neurologic finding not treatable at alternative level of care(40)

- Guillain-Barre syndrome (example variants include: acute inflammatory demyelinating polyradiculoneuropathy (AIDP), acute motor axonal neuropathy (AMAN), and Miller Fisher syndrome)(32)(49)(50)

− Myasthenia gravis and **1 or more** of the following(49)(51):
  - Intensive treatment (eg, course of plasmapheresis) that cannot be performed at alternative level of care(52)
  - Inadequate airway protection(52)
  - Respiratory insufficiency (eg, need for assisted ventilation, presence of paradoxical breathing)(17)(52)(53)

− Multiple sclerosis or other demyelinating disease and[A] **1 or more** of the following(7)(47)(54)(55)(56):
  - Acute deterioration requiring inpatient treatment (eg, parenteral medication, plasmapheresis)
  - Severe pain requiring acute inpatient management
  - Respiratory insufficiency (eg, need for assisted ventilation)(17)
  - Inadequate airway protection(17)
  - Weakness that is progressive or severe (eg, inpatient care needed due to functional disability, concern for safety)(36)

- Intracranial hypertension (eg, pseudotumor cerebri) requiring inpatient care (eg, acute visual loss, inadequate oral intake)(57)(58)
- Intracranial mass or process (eg, edema) causing acute neurologic signs or symptoms (eg, Altered mental status, focal neurologic finding)(59)

− Parkinson disease and **1 or more** of the following(30)(60)(61):
  - Inadequate airway protection

- Dehydration that is severe or persistent
- Life-threatening agitation or behavior that persists beyond observation care
- Severe medication withdrawal effects (eg, freezing) requiring hospital-based treatment beyond observation care
- Parkinson hyperpyrexia syndrome (eg, following reduction or discontinuation of anti-parkinsonian medication), as indicated by **1 or more** of the following(30):
  - Muscle rigidity
  - Hyperthermia
  - Altered mental status
  - Hemodynamic instability
  - Elevated creatine kinase
- Other severe manifestation not treatable at alternative level of care

− Amyotrophic lateral sclerosis and **1 or more** of the following(17)(49):
- Acute complications (eg, aspiration pneumonia, severe cellulitis) requiring inpatient care (see other Optimal Recovery Guideline or General Recovery Guideline as appropriate)
- Dehydration that is severe or persistent
- Respiratory insufficiency (eg, need for assisted ventilation)(17)
- Inadequate airway protection

− Neuropathy or neuromuscular disease and **1 or more** of the following(31)(32)(37)(62):
- Severe functional disability (eg, interferes with ability to perform ADL, safety concerns at other than inpatient level of care)
- Inadequate airway protection
- Inadequate ventilation, as indicated by **1 or more** of the following(63):
  - Vital capacity less than 20 mL/kg of ideal body weight
  - Vital capacity less than 1 liter
  - Maximum inspiratory pressure greater than -30 cm H_2O (-2942 Pa)
  - Maximum expiratory pressure less than 40 cm H_2O (3923 Pa)
  - Nocturnal oxygen desaturation
  - Hypercarbia (PCO_2 greater than 40 mm Hg (5.3 kPa))-induced respiratory acidosis (pH less than 7.35)

- Cerebral venous thrombosis[B][C](34)(64)(65)
- Suspected or confirmed severe nerve toxin injury (eg, botulism)(67)(68)

− Neurologic trauma and **1 or more** of the following(69)(70):
- Respiratory insufficiency (eg, need for assisted ventilation)
- Intubation and mechanical ventilation for airway protection or therapeutic hyperventilation
- ICP monitoring and treatment
- Hyperosmolar therapy
- Stabilization and immobilization device placement (eg, braces, body jacket)
- Other treatment or monitoring needed that requires inpatient level of care

- Posterior reversible encephalopathy syndrome, as indicated by **ALL** of the following:
  - Acute or subacute symptoms (eg, headache, encephalopathy, Altered mental status, visual disturbance, focal finding, or seizure)(35)(71)
  - Risk factor (eg, chronic renal disease, autoimmune disorder, malignancy, immunotherapy, chemotherapy) or acute precipitating event (eg, acute renal failure, severe hypertension, sepsis, blood pressure fluctuation, radiation therapy, or eclampsia)(35)(71)
  - Brain imaging consistent with diagnosis (eg, bilateral vasogenic edema)(35)(71)

- Admission for ketogenic diet initiation needed, as indicated by **ALL** of the following(72)(73)(74):
  - Ketogenic diet appropriate, as indicated by **1 or more** of the following:
    - Refractory seizures despite use of 2 or more appropriate antiseizure medications[D][E](72)(73)(74)(75)(76)(77)
    - Refractory seizures despite use of 1 appropriate first-line antiseizure medication in patient with epilepsy syndrome highly responsive to ketogenic diet therapy (eg, epilepsy with myotonic-atonic seizures (also known as Doose syndrome))[E][F](73)(77)(78)
    - Seizure disorder due to glucose transporter type 1 (GLUT1) deficiency syndrome(72)(73)(74)(77)(79)
    - Seizure disorder due to pyruvate dehydrogenase deficiency(72)(73)(74)(79)
    - Infantile epileptic spasms syndrome (West syndrome)(73)(80)
    - Seizure disorder due to select mitochondrial epilepsy syndromes (eg, complex I mitochondrial disorder, Leigh syndrome)(81)(82)
  - Child 18 years of age or younger[G](72)(74)(79)(83)
  - Classic ketogenic diet or medium-chain triglyceride diet prescribed[H](74)(76)(79)
- Complications of neurologic devices (eg, ventricular shunt, neurostimulator) requiring inpatient care (eg, infection, monitoring for hydrocephalus)(86)(87)
- Isolation indicated that cannot be performed outside hospital setting
- **Neurology** condition, symptom, or finding for which observation care has failed or is not considered appropriate. See General Criteria: Observation Care ISC, General Admission Criteria GRG, or Pediatric General Admission Criteria GRG guideline as appropriate.

Supplemental Medicare Criteria

Note: These criteria are to be considered for Medicare patients if none of the standard Clinical Indications for Admission to Inpatient Care apply.

- Patient with Medicare coverage requires inpatient admission, as indicated by **1 or more** of the following(88):
  - Admitting clinician expects patient to require hospital care for less than 2 midnights but, based on complex medical factors documented in medical record, judges that inpatient care is necessary (case-by-case exception). The medical record must contain sufficient documentation to make clear the rationale for the exception.
  - Patient has need for intubation and mechanical ventilation that is new (ie, did not present to hospital already on mechanical ventilation).
  - Treatment plan for hospital admission includes procedure designated by CMS as inpatient only (ie, on Inpatient Only List).
  - Patient has already received medically necessary hospital care that meets 2-midnight benchmark (excluding activities such as triage/intake, delays in provision of care, or time added due to patient or family convenience). The medical record must contain sufficient documentation to make clear the medical necessity for hospital care across 2 or more midnights.

Alternatives to Admission

- Alternatives may include(1)(16)(19)(32)(34)(61)(62)(69):
  - Outpatient care in emergency department, observation care (see General Criteria: Observation Care ISC guideline as appropriate), rapid treatment site, urgent care center, or medical office
    - Lumbar puncture
    - Laboratory testing, including CBC, chemistries, blood glucose, renal and liver function, lactate, blood gas, and toxicology screen(16)(18)(19)
    - Genetic testing (eg, for Huntington disease, Tay-Sachs disease, hereditary ataxias)
    - Outpatient CT scan, MRI(89)(90)
    - Ambulatory EEG
    - Tilt table test, Holter monitoring, echocardiography, electrophysiologic study, audiometry, and electronystagmography
    - Outpatient adjustment and treatment of drug toxicity(91)
  - Home care

- Home assessment
- Physical therapy
- Home care for ADL and IADL
- Outpatient percutaneous endoscopic gastrostomy and enteral feeding
- Noninvasive or invasive ventilation(17)(92)
- Palliative care, including continuous care

- Recovery facility
  - Direct admission for patient with deficits not requiring inpatient care (eg, falls, inability to ambulate)
  - Noninvasive or invasive ventilation(17)
  - Palliative care, including respite care

Hospitalization

General Recovery Course

Stage	Level of Care	Clinical Status	Interventions
1	• ICU or intermediate care[I] • Social Determinants of Health Assessment • Discharge planning. See Discharge Planning Tool SR.	• **Clinical Indications met[J]**	• Inpatient interventions as needed
2	• Floor • Social Determinants of Health Assessment	• **No ICU or intermediate care needs**	• Inpatient interventions continue • Transition to oral routes
3	• **Activity level acceptable** • Social Determinants of Health Assessment • Floor to discharge • Complete discharge planning	• **Hemodynamic stability** • **Mental status at baseline or stable and appropriate for next level of care** • **Neurologic deficits absent or stable and appropriate for next level of care** • **Motor deficits absent or acceptable for next level of care** • **Seizures absent or managed** • **No infection, or status acceptable** • **Isolation not needed, or status acceptable** • **Respiratory status acceptable** • **Pain and nausea absent or adequately managed** • **General Discharge Criteria met**	• **Intake acceptable** • **No inpatient interventions needed**

(11)(17)(32)(54)(69)

Recovery Milestones are indicated in **bold**.

Benchmark Length of Stay (BLOS): Access diagnosis and procedure code-specific BLOS via Search functions.

Discharge Criteria

- Continued inpatient stay is needed until **1 or more** of the following are present:
  - Acceptable patient status for next level of care is achieved.
  - **ALL** of the following are present:
    - 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(93)(94):
        - Tachycardia absent
        - Hypotension absent
        - No evidence of inadequate perfusion (eg, no myocardial ischemia)
        - No other hemodynamic abnormalities (eg, no Orthostatic hypotension)
    - Mental status at baseline or stable and appropriate for next level of care
    - Neurologic deficits absent or stable and appropriate for next level of care
    - Motor deficits absent or acceptable for next level of care
    - Seizures absent or managed
    - No infection, or status acceptable, as indicated by **1 or more** of the following(95)(96)(97)(98)(99):
      - No infection present
      - Infection status acceptable for next level of care, as indicated by **ALL** of the following(100):
        - WBC count normal, stable, or declining with treatment
        - Adequate treatment performable at next level of care
        - Organism and sensitivities identified, or adequate clinical response to empiric therapy
        - Repeat cultures negative or not needed
    - Isolation not needed, or status acceptable, as indicated by **1 or more** of the following(101)(102)(103):
      - Isolation not needed, or performable at next level of care
      - Tuberculosis status acceptable, as indicated by **ALL** of the following(104):
        - Patient receiving standard multidrug tuberculosis regimen
        - Patient has demonstrated clinical stability or improvement.
        - Acid-fast testing status acceptable, as indicated by **1 or more** of the following:
          - Sputum smear acid-fast negative on 3 separate specimens[K]
          - Acid-fast positive but with **ALL** of the following:
            - Household contacts already exposed
            - No infant or immunosuppressed household contacts
            - Patient agreement to avoid exposing others
    - Respiratory status acceptable, as indicated by **ALL** of the following(105)(106)(107)(108):
      - Patient breathing comfortably (or near baseline) and able to protect airway (eg, able to handle secretions)
      - Tachypnea absent
      - Oxygen saturation greater than 90%, near baseline, or measurement not indicated for condition
      - Supplemental oxygen or respiratory treatments not needed or are performable at next level of care
      - Airflow measurements greater than 60% of predicted, at stable baseline, or measurement not indicated for condition

- Partial pressure of carbon dioxide and pH normal, at stable baseline, or measurement not indicated for condition

Pain and nausea absent or adequately managed, as indicated by **1 or more** of the following(109)(110)(111)(112)(113):

- No pain or nausea
- Minimal discomfort on oral medications
- Pain and nausea managed on regimen performable at next level of care

Activity level acceptable, as indicated by **1 or more** of the following:

- Patient ambulatory and can perform ADL as appropriate for age and development
- Activity at baseline
- Activity level acceptable for next level of care

Intake acceptable, as indicated by **1 or more** of the following(114):

- Oral hydration, medications, and diet
- Enteral hydration, medications, and diet
- Administration routes performable at next level of care

No inpatient interventions needed; examples include:

- Vital signs, neurologic signs, or vascular checks more often than feasible at next level of care
- Intracranial pressure monitoring
- Repeat lumbar puncture and CSF analysis to rule out acute infection or inflammation
- Ventricular shunt placement
- Urgent imaging needed

General Discharge Criteria GRG met or Pediatric General Discharge Criteria GRG met (if either is relevant or necessary for patient's condition)

Case Management

See Medical Admission Case Management GRG GRG for further information.

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Medical Admission Home Care GRG HC or Geriatric Admission Home Care GRG HC for further information.
  - Recovery facility care. See Medical Admission Recovery Facility Care GRG RFC or Geriatric Admission Recovery Facility Care GRG RFC for further information.
  - Inpatient rehabilitation facility. See Inpatient Rehabilitation Facility (IRF) Admission Recovery Facility Care GRG RFC for further information.

Evidence Summary

Criteria

The evidence for the clinical indications found in this guideline includes 60 published peer reviewed articles, 4 specialty society or other evidence-based guidelines, 1 Cochrane systematic review, and 20 book sections.

Rationale

Use of this MCG care guideline helps the clinician identify patient-specific complex clinical factors that make it reasonable to expect a necessity for hospital care across 2 or more midnights. The evidence-based clinical criteria assist the clinician in the decision to appropriately admit a patient to inpatient care. For Medicare enrollees, MCG care guidelines also support the clinician in the decision to appropriately admit a patient to inpatient care when there is not an expectation of 2 or more midnights of hospital care (eg, CMS' Two-Midnight Rule exceptions).

Use of these evidence-based clinical criteria to support decision making around the need for inpatient treatment is of clinical benefit to the patient and is crucial for quality patient care. Use of evidence-based clinical criteria ensures patients receive the most appropriate care for their specific condition, reduces unnecessary risks, promotes recovery, and provides a standard that can reduce disparities in care. Evidence-based clinical criteria not only help align treatment decisions with best practice, but they can also help reduce unwarranted variation in care by fostering consistency and equality in healthcare provision across regions and facilities. Appropriate use of the evidence-based clinical criteria in conjunction with the Supplemental Medicare Criteria ensures Medicare patients receive full access to Medicare benefits (eg, inpatient care), without risk of delay or decreased access, based on variables such as clinical severity of illness, length of provision of medically necessary hospital-level care, or satisfaction of specified Medicare criteria as directed by CMS. Use of these criteria will help ensure that the patient receives necessary care in the appropriate setting.

Related CMS Coverage Guidance

This guideline supplements but does not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

Code of Federal Regulations (CFR): 42 CFR 412.3(88); 42 CFR 419.22(115); 42 CFR 422.101(116)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(117); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(118); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(119); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(120)

Medicare Coverage Determinations: Medicare Coverage Database(121)

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Footnotes

[A] Examples of acute demyelinating diseases other than multiple sclerosis include acute disseminated encephalomyelitis, neuromyelitis optica (transverse myelitis with bilateral optic neuritis), Balo concentric sclerosis, and other rare demyelinating disorders.(7) [A in Context Link 1]

[B] Initial treatment is systemic anticoagulation with close observation for signs of progression, seizures, and elevated intracranial pressure.(64)(65) Patients with clot propagation despite anticoagulation may require endovascular intervention.(64) Decompressive craniectomy may be needed for impending herniation.(64) Septic cerebral venous thrombosis (most commonly cavernous sinus thrombosis) is a type of cerebral venous thrombosis that is associated with local infection (eg, sinusitis or mastoiditis). Treatment requires both anticoagulation and antibiotics.(65) [B in Context Link 1]

[C] A systematic review of relevant randomized controlled trials concluded that direct oral anticoagulants (DOACs) (ie, oral factor Xa and oral thrombin inhibitors) should not be standard treatment for patients with mechanical heart valves, atrial fibrillation with rheumatic mitral stenosis, or thrombotic antiphospholipid syndrome.(66) For these indications, use of a vitamin K antagonist (eg, warfarin) is preferred.(66) The review further concludes that the efficacy and safety of DOACs are uncertain in patients with left ventricular thrombus, catheter-associated deep venous thrombosis, or cerebral venous sinus thrombosis.(66) Concerning patients with end-stage renal disease, the review states that the choice of an anticoagulant should be individualized due to the lack of definitive data, balancing the pros and cons of DOAC-based and vitamin K antagonist-based anticoagulation.(66) Patients who are pregnant or breast-feeding should avoid DOACs pending further study concerning safety.(66) [C in Context Link 1]

[D] Drug-resistant epilepsy has been defined as the failure of adequate trials of 2 antiseizure medications that are appropriate for the seizure etiology, tolerated by the patient, and dosed correctly.(74) A meta-analysis of 4 studies, encompassing 385 pediatric patients with drug-resistant epilepsy randomized to a ketogenic diet or usual care found that those given ketogenic diets had a 3-fold increase in freedom from seizures and were 6 times more likely to have a 50% or greater reduction in their number of seizures.(75) [D in Context Link 1]

[E] Patients with refractory seizure disorders who have tried but cannot tolerate antiseizure medications due to side effects may also be considered candidates for initiation of the ketogenic diet.(74) [E in Context Link 1, 2]

[F] Other epilepsy conditions and syndromes with studies showing consistent benefit from ketogenic diets include Angelman syndrome, Dravet syndrome, febrile infection-related epilepsy syndrome, Ohtahara syndrome, tuberous sclerosis, Lennox-Gastaut syndrome, and Landau-Kleffner syndrome.(72) [F in Context Link 1]

[G] Adults are routinely started on ketogenic diet therapy as outpatients.(83) [G in Context Link 1]

[H] The 4 major ketogenic diets are the classic long-chain triglyceride, medium-chain triglyceride, modified Atkins, and Low Glycemic Index Treatment diets.(72) The majority of children are started on the classic long-chain triglyceride and medium-chain triglyceride diets in the inpatient setting for monitoring of ketosis and adverse side effects and for nutritional education.(72)(84)(85) A study of 158 pediatric patients initiating classic ketogenic diets as inpatients reported the following complications requiring intervention: severe hypoglycemia (28%), over-ketosis (6%), severe emesis requiring prolonged hospital stay (3%), hepatotoxicity (less than 1%), and acidosis (less than 1%).(85) The modified Atkins diet and the Low Glycemic Index Treatment diet are initiated in the outpatient setting if no other indication for admission is present.(72)(84) [H in Context Link 1]

[I] See Intensive, Intermediate, and Telemetry Care Guidelines ISC. [I in Context Link 1]

[J] See Clinical Indications for Admission to Inpatient Care in this guideline. [J in Context Link 1]

[K] Patients with drug-sensitive pulmonary tuberculosis are considered infectious until they have received 2 weeks of therapy with a clinical response and have no acid-fast bacilli detected on 3 sputum specimens obtained at least 8 hours apart.(101) For patients with confirmed pulmonary or laryngeal multidrug-resistant tuberculosis (ie, resistance to isoniazid and rifampin, with or without other drug resistances), a specialty society guideline recommends that sputum acid-fast smears be obtained at weekly intervals (eg, days 0, 7, and 14), with isolation maintained until 3 negative smears are confirmed.(103) Patients who will be returning to a homeless shelter, detention facility, or other congregate living situation should have 3 consecutive negative sputum smears for acid-fast bacilli prior to their return.(104) [K in Context Link 1]

Definitions

Activity level acceptable

- Activity level acceptable, as indicated by **1 or more** of the following:
  - Patient ambulatory and can perform ADL as appropriate for age and development
  - Activity at baseline
  - Activity level acceptable for next level of care

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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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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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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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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4. Holler-Managan YF. Neurologic evaluation. In: Kliegman RM, et al., editors. Nelson Textbook of Pediatrics. 22nd ed. Elsevier; 2025:3550-3560.

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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Dehydration that is severe or persistent

- Dehydration and **1 or more** of the following(1)(2)(3)(4):
  - Clinical findings of severe dehydration, as indicated by **1 or more** of the following:
    - Hemodynamic instability
    - Acute renal failure (stage 3 acute kidney injury)
    - Acute kidney injury (stage 2)
    - Serum sodium greater than 150 mEq/L (mmol/L)
  - Dehydration that is persistent, as indicated by **ALL** of the following:
    - Oral rehydration therapy not tolerated or insufficient to adequately correct dehydration
    - Dehydration persists despite appropriate treatment (eg, IV fluids, observation care)

References

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General Discharge Criteria met

- General Discharge Criteria met or Pediatric General Discharge Criteria met (if either is relevant or necessary for patient's condition)

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)

References

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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)

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.
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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)

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. Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
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. 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.
2. Puskarich MA, Jones AE. Shock. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:34-41.e1.
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.

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.

Intake acceptable

- Intake acceptable, as indicated by **1 or more** of the following(1):
  - Oral hydration, medications, and diet
  - Enteral hydration, medications, and diet
  - Administration routes performable at next level of care

References

1. Hoffer LJ, Bistrian BR, Driscoll DF. Enteral and parenteral nutrition. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2539-2546.

Isolation not needed, or status acceptable

- Isolation not needed, or status acceptable, as indicated by **1 or more** of the following(1)(2)(3):
  - Isolation not needed, or performable at next level of care
  - Tuberculosis status acceptable, as indicated by **ALL** of the following(4):
    - Patient receiving standard multidrug tuberculosis regimen
    - Patient has demonstrated clinical stability or improvement.
    - Acid-fast testing status acceptable, as indicated by **1 or more** of the following:
      - Sputum smear acid-fast negative on 3 separate specimens[A]
      - Acid-fast positive but with **ALL** of the following:
        - Household contacts already exposed
        - No infant or immunosuppressed household contacts
        - Patient agreement to avoid exposing others

References

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Footnotes

A. Patients with drug-sensitive pulmonary tuberculosis are considered infectious until they have received 2 weeks of therapy with a clinical response and have no acid-fast bacilli detected on 3 sputum specimens obtained at least 8 hours apart.(1) For patients with confirmed pulmonary or laryngeal multidrug-resistant tuberculosis (ie, resistance to isoniazid and rifampin, with or without other drug resistances), a specialty society guideline recommends that sputum acid-fast smears be obtained at weekly intervals (eg, days 0, 7, and 14), with isolation maintained until 3 negative smears are confirmed.(3) Patients who will be returning to a homeless shelter, detention facility, or other congregate living situation should have 3 consecutive negative sputum smears for acid-fast bacilli prior to their return.(4)

No infection, or status acceptable

- No infection, or status acceptable, as indicated by **1 or more** of the following(1)(2)(3)(4)(5):
  - No infection present
  - Infection status acceptable for next level of care, as indicated by **ALL** of the following(6):
    - WBC count normal, stable, or declining with treatment
    - Adequate treatment performable at next level of care
    - Organism and sensitivities identified, or adequate clinical response to empiric therapy
    - Repeat cultures negative or not needed

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No inpatient interventions needed

- No inpatient interventions needed; examples include:
  - Vital signs, neurologic signs, or vascular checks more often than feasible at next level of care
  - Intracranial pressure monitoring

- Repeat lumbar puncture and CSF analysis to rule out acute infection or inflammation
- Ventricular shunt placement
- Urgent imaging needed

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

References

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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.

Pain and nausea absent or adequately managed

- Pain and nausea absent or adequately managed, as indicated by **1 or more** of the following(1)(2)(3)(4)(5):
  - No pain or nausea
  - Minimal discomfort on oral medications
  - Pain and nausea managed on regimen performable at next level of care

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

1. Braithwaite SA, Wessel AL. Dyspnea. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:194-201.e2.
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Respiratory status acceptable

- Respiratory status acceptable, as indicated by **ALL** of the following(1)(2)(3)(4):
  - Patient breathing comfortably (or near baseline) and able to protect airway (eg, able to handle secretions)
  - Tachypnea absent
  - Oxygen saturation greater than 90%, near baseline, or measurement not indicated for condition
  - Supplemental oxygen or respiratory treatments not needed or are performable at next level of care
  - Airflow measurements greater than 60% of predicted, at stable baseline, or measurement not indicated for condition
  - Partial pressure of carbon dioxide and pH normal, at stable baseline, or measurement not indicated for condition

References

1. Braithwaite SA, Wessel AL. Dyspnea. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:194-201.e2.
2. Naureckas ET, Solway J. Disturbances of respiratory function. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine. 21st ed. McGraw Hill Education; 2022:2133-2139.
3. Matthay MA, Ware LB. Acute respiratory failure. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:642-652.
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Severe pain requiring acute inpatient management

- Severe pain requiring inpatient management, as indicated by **1 or more** of the following(1)(2)(3)(4):
  - Inpatient parenteral analgesic agent treatment required,[A] as indicated by **ALL** of the following:
    - Pain insufficiently responsive to nonpharmacologic and oral pharmacologic analgesia (eg, NSAID, oral opioid)
    - Need for parenteral treatment persists despite observation care (eg, adjustments in dosage, frequency, medication, route).
  - Pain control regimen for next level of care not established, as indicated by **ALL** of the following:
    - Regimen used to achieve sufficient pain control is not readily performable at next level of care.
    - Unable to convert patient to regimen performable at next level of care despite observation care (eg, adjustments in dosage, frequency, medication, route)
  - Suspected new or deteriorating disease process as etiology (eg, new site of metastatic disease) requiring inpatient evaluation and treatment (eg, urgent radiation therapy)(7)
  - Palliative procedure planned that necessitates inpatient care for assessment and monitoring needs (eg, celiac block, stent to relieve obstruction)

References

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Footnotes

A. Many validated instruments are available to quantify pain.(4)(5) A visual analog or numerical rating scale graded from 0 to 10 is often used; moderate pain correlates with a score of 4 to 6 and severe pain is 7 to 10.(4) Different scales may be more appropriate for different disease processes or patient populations.(5)(6)

Social Determinants of Health Assessment

- Risk of poor health outcomes may be increased by the presence of **1 or more** of the following social determinants of health(1)(2)(3):
  - Housing insecurity, as indicated by **1 or more** of the following:
    - Individual or caregiver's current living situation is **1 or more** of the following(4):
      - Does not have own housing (eg, staying in a hotel, shelter, or with others)
      - Has own housing (eg, house, apartment), but at risk of losing it in the future (ie, behind on rent or mortgage)
      - Has own housing (eg, house, apartment), but has lived in 3 or more places in past year
    - Current housing has **1 or more** of the following:

    - Electrical appliances (eg, stove, refrigerator) not working or unavailable
    - Insufficient heating or cooling
    - Insufficient ventilation
    - Lead paint or pipes
    - Mold
    - Pests (eg, bugs) or rodents
    - Smoke detectors not working or unavailable
- Food insecurity, as indicated by **1 or more** of the following(5):
    - In the past year, individual or caregiver ran out of food and did not have money to buy more food.
    - In the past year, individual or caregiver worried that they would run out of food before they received money to buy more food.
- Insufficient transportation, as indicated by **1 or more** of the following(6):
    - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of transportation.
    - In the past year, individual or caregiver missed nonmedical activities, work, or could not get things needed for daily living due to lack of transportation.
- Insufficient utilities, as indicated by **1 or more** of the following(7):
    - Utilities (eg, electricity, water, gas, or oil) are currently shut off or unavailable.
    - In the past year, electric, water, gas, or oil company threatened to shut off services.
- Personal safety risk, as indicated by **2 or more** of the following(5):
    - Individual is sometimes or frequently physically hurt by another person (including family member).
    - Individual is sometimes or frequently insulted or talked down to by another person (including family member).
    - Individual is sometimes or frequently threatened with physical harm by another person (including family member).
    - Individual is sometimes or frequently screamed or cursed at by another person (including family member).
- Insufficient dependent care, as indicated by **1 or more** of the following:
    - In the past year, individual or caregiver was unable to work due to lack of dependent care.
    - In the past year, individual or caregiver was unable to work more (additional) hours due to lack of dependent care.
    - In the past year, individual or caregiver missed medical appointments or could not get medications due to lack of dependent care.
    - In the past year, individual or caregiver missed nonmedical activities (eg, school, church, social activity) due to lack of dependent care.
- Depression risk, as indicated by **ALL** of the following(8):
    - In the past 2 weeks, individual had little interest or pleasure in normal activities on at least several days.
    - In the past 2 weeks, individual felt down, depressed, or hopeless on at least several days.

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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.
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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.

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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.
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