Neurosurgery or Procedure GRG

GRG: SG-NS (ISC GRG)

MCG Health
General Recovery Care
30th Edition
Surgical 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 Procedure

- Surgery or other procedure covered by this guideline is indicated for **1 or more** of the following:
  - Infratentorial craniotomy or craniectomy needed for biopsy, resection of tumor, nerve decompression, removal of foreign body, or other operation (eg, operation on brainstem, cerebellum)(1)(2)(3)(4)(5)(6)
  - Cranial mass operation needed (eg, pineal mass, acoustic neuroma, pituitary resection, cerebral cyst)(7)(8)(9)
  - Percutaneous CNS procedure needed on brain, ventricles, or meninges (eg, biopsy, puncture, or drainage)(1)(10)(11)
  - Cranial or intracranial vessel repair or occlusion needed(12)(13)(14)(15)(16)(17)(18)
  - Skull base surgery (eg, for removal of tumor or mass)(1)(19)(20)(21)

- Intraspinal vessel repair or occlusion needed(12)(22)(23)(24)

− Catheter-directed endovascular intervention (eg, embolization, stent, thrombectomy, catheter-directed thrombolysis, or flow diversion) needed, as indicated by **1 or more** of the following(22)(25):

  - Mechanical endovascular thrombectomy(26)(27)(28)(29)(30)
  - Intracranial arteriovenous malformation[A](1)(14)(32)(33)
  - Intracranial intra-arterial dissection that is hemorrhagic, or progresses despite anticoagulation or antiplatelet agent(15)(34)
  - Intracranial atherosclerotic disease and **ALL** of the following:
    - Severe atherosclerotic stenosis (70% to 99%)(35)
    - Failed medical management (recurrent ischemic events despite maximal medical management)(36)
    - Enrolled in a clinical trial[B]
  - Unruptured intracranial aneurysm and **1 or more** of the following(1)(40)(41)(42)(43):
    - Symptoms (eg, pain, cranial nerve palsy, seizures) attributable to aneurysm
    - Enlargement of aneurysm on successive imaging
    - Family history of ruptured intracranial aneurysm
  - Carotid-cavernous fistula(1)(22)(25)
  - Carotid-dural arteriovenous fistula(25)(44)
  - Cerebral venous thrombosis with neurologic deterioration despite anticoagulation[C](45)(46)(47)
  - Chronic subdural hematoma requiring middle meningeal artery embolization(48)(49)(50)
  - Vein of Galen malformation(51)(52)
  - Preoperative or palliative intracranial tumor embolization (eg, for meningioma, juvenile nasopharyngeal angiofibroma, or other vascular CNS tumor, or to decrease perioperative bleeding or tumor size)(25)(53)(54)

- Stereotactic procedure needed (eg, biopsy, drainage, resection)(1)(10)(33)(55)
- Spinal cord or canal operation needed (eg, nerve compression, cauda equina, tumor, myelomeningocele, spinal stimulation needed)(1)(56)(57)
- Vertebral fracture with spinal cord involvement repair needed(58)(59)
- Skull fracture repair needed(60)(61)(62)
- Skull reconstruction needed(12)(63)(64)
- Repair of dura or meninges(5)(12)(65)(66)
- Cranial facial reconstruction needed (eg, for craniosynostosis)(1)(67)
- Distraction osteogenesis procedure needed(68)(69)
- Cranial or peripheral nerve operation needed (eg, open sympathectomy, nerve repair, nerve decompression, cranial nerve stimulation)(1)(70)(71)

− Invasive EEG needed,[D] as indicated by **ALL** of the following(72)(73):

  - Medically refractory seizures, and surgical intervention under consideration[E]
  - Seizure focus requires additional localization due to **1 or more** of the following(74):
    - Eloquent cortex proximity to seizure focus requires further definition.(75)
    - Multiple areas of pathology responsible for focal seizures (eg, tuberous sclerosis, multiple cavernomas)(75)
    - Recurrent seizures following seizure surgery
    - Seizure focus is not sufficiently localized by noninvasive brain imaging (eg, high-resolution brain MRI, PET, or SPECT).(74)(75)
    - Seizure focus localization is discordant between noninvasive EEG and noninvasive brain imaging (eg, high-resolution brain MRI, PET, or SPECT).(74)(75)

- Neuroendoscopic procedure needed (eg, lavage, evacuation of hemorrhage, removal of foreign body)(7)(11)(22)
- Burr hole or craniostomy required (eg, evacuation or drainage of subdural)(76)(77)
- Cerebral extracranial-intracranial (EC-IC) direct bypass required for Moyamoya disease[F](80)(81)

- Implantation, removal, or replacement of intrathecal pump necessary(1)
- Deep brain stimulation needed, as indicated by **ALL** of the following[G](82)(83):
  - Diagnosis is appropriate for treatment with deep brain stimulation, as indicated by **1 or more** of the following:
    - Status dystonicus[H](84)(85)(86)(87)
    - Primary dystonia (also known as isolated idiopathic or inherited isolated dystonia)[I] or tardive dystonia,[J] as indicated by **ALL** of the following(85)(86)(87)(88)(90):
      - Dystonia is predominant source of impairment or disability (eg, not spasticity or ataxia)
      - Failure of optimal medical management (eg, botulinum toxin, levodopa trial)[K]
    - Epilepsy, as indicated by **ALL** of the following(91)(92)(93):
      - Focal-onset seizures with or without generalization
      - Seizures refractory to at least 2 different antiseizure medications
      - Surgical resection not feasible due to locus of seizure, failure of prior surgical resection, or patient preference
    - Essential tremor, as indicated by **ALL** of the following(94)(95)(96)(97)(98)(99):
      - Disability of one or more limbs from resting, positional, or kinetic tremor that affects safety, functional status, or quality of life
      - Tremor refractory to 3 months or more of standard medication[L]
    - Parkinson disease, as indicated by **ALL** of the following:
      - Idiopathic Parkinson disease(100)(101)(102)(103)(104)
      - Signs or symptoms appropriate for procedure, as indicated by **1 or more** of the following:
        - Motor fluctuations (ie, alterations between positive response to medication and re-emergence of suppressed Parkinson symptoms) that improve with trial of levodopa[M](100)(101)(102)(104)
        - Dyskinesia or tremor refractory to maximal tolerated medical therapy(100)(101)(102)
    - Obsessive-compulsive disorder (OCD), as indicated by **ALL** of the following(105)(106):
      - Adult age 18 years or older with severe OCD (Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) score of 24 or higher)(107)(108)(109)(110)
      - Symptoms persist despite adequate trials of 3 different medications (eg, escitalopram, citalopram, venlafaxine, mirtazapine, clomipramine)[N](107)(108)(110)
      - Failure of adequate trial of cognitive behavioral therapy (CBT) with exposure and response prevention (ERP) therapy (eg, 20 sessions or 1 year)(110)(111)
      - Duration of symptoms 5 years or longer(108)
  - No coagulopathy(112)
  - No contraindication to permanent hardware implantation (eg, chronic infection, immunocompromised)
  - No intracranial pathology on imaging studies that would contraindicate or complicate deep brain stimulation
  - No significant cognitive impairment(90)

☐ Ventricular (eg, ventriculoatrial) or other type of cerebrospinal fluid shunt or neurologic device or procedure needed (eg, ventriculostomy), including **1 or more** of the following(1)(113)(114)(115)(116)(117):

- Placement(1)(116)(117)(118)
- Repair or revision(116)(119)
- Removal(117)(120)
- Replacement(119)

Alternatives to Procedure

- Alternatives may include(1)(58):

- Antibiotics for infections or lesions(10)(120)(121)
- For primary or metastatic tumor: radiation, chemotherapy (including radiotherapy such as gamma knife), or thermal ablation(2)(122)(123)(124)
- Medical management or radiation for other (eg, some pituitary) lesions
- Medical management of nonpenetrating trauma or moribund patient
- For cerebral vein thrombosis: medical management with antithrombotics and anticoagulants(15)(46)
- For status dystonicus: medical management (eg, anticholinergic agents, clonidine, midazolam) or intrathecal baclofen(84)
- For Parkinson disease or dystonia: medical management (eg, levodopa, botulinum toxin injections)(88)
- For refractory epilepsy: resective or ablative epilepsy surgery, vagus nerve stimulation, or responsive neurostimulation(93)(125)
- For essential tremor: medical therapy (eg, beta-blocker, primidone, topiramate)[L](94)

Operative Status Criteria

Search by CPT® code for specific procedure Benchmark Length of Stay (BLOS).

Note: The definition of an ambulatory procedure depends on payer-provider contractual agreement or regulatory language (eg, CMS' Two-Midnight Rule). An ambulatory procedure may include one postoperative overnight stay in a facility; therefore, a Benchmark Length of Stay (BLOS) of ambulatory refers to patients discharged the day of or the day after the procedure. Depending on various patient and procedural factors, some patients undergoing a procedure with an ambulatory BLOS require inpatient care (eg, medical necessity for hospital-based care across 2 or more postoperative midnights).

The Ambulatory Surgery Exception Criteria GRG can help with this determination.

- Ambulatory: Benchmark Length of Stay (BLOS) = A
- Inpatient, as indicated by **1 or more** of the following:
  - Benchmark Length of Stay (BLOS) = 2 or more days postoperative (eg, medical necessity for hospital-based care across 2 or more postoperative midnights)
  - Procedure is usually performed on ambulatory basis, but inpatient stay is needed. See Ambulatory Surgery Exception Criteria GRG.
  - Medicare patient, and specific procedure is on CMS Inpatient Only List

Hospitalization

General Recovery Course

Stage	Level of Care	Clinical Status	Interventions
1	• ICU or intermediate care[O] • Social Determinants of Health Assessment • Discharge planning. See Discharge Planning Tool SR.	• **Clinical Indications met[P]** • Procedure completed	• 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**	• **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** • **Operative site and other wounds acceptable** • **Pain and nausea absent or adequately managed** • **Hemodynamic stability** • **Temperature status acceptable** • **No infection, or status acceptable** • **Surgical complications requiring inpatient care absent** • **No spinal surgery, or status acceptable** • **General Discharge Criteria met**	• **Intake acceptable** • **No inpatient interventions needed**

(1)(10)(13)(58)

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:
    - 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
    - Operative site and other wounds acceptable, as indicated by **1 or more** of the following(126):
      - Wounds absent
      - Wound site clean and intact, with minimal to no drainage and without signs of infection
      - Current wound care performable at next level of care
    - Pain and nausea absent or adequately managed, as indicated by **1 or more** of the following(127)(128)(129)(130)(131):
      - No pain or nausea
      - Minimal discomfort on oral medications
      - Pain and nausea managed on regimen performable at next level of care
    - 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(132)(133):
        - Tachycardia absent

- Hypotension absent
- No evidence of inadequate perfusion (eg, no myocardial ischemia)
- No other hemodynamic abnormalities (eg, no Orthostatic hypotension)

- Temperature status acceptable, as indicated by **1 or more** of the following(134)(135)(136):
  - Temperature less than 100.5 degrees F (38.1 degrees C) (oral) and greater than 96.8 degrees F (36 degrees C) (rectal)
  - Temperature as expected for disease process and appropriate for management at next level of care
- No infection, or status acceptable, as indicated by **1 or more** of the following(135)(136)(137)(138)(139):
  - No infection present
  - Infection status acceptable for next level of care, as indicated by **ALL** of the following(140):
    - 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
- Surgical complications requiring inpatient care absent
- No spinal surgery, or status acceptable, as indicated by **1 or more** of the following:
  - No spinal surgery performed
  - Status acceptable, as indicated by **ALL** of the following(141)(142)(143)(144):
    - No cerebrospinal fluid leak
    - No active bleeding at site
    - No severe respiratory abnormalities
    - Baseline voiding, or urinary catheter with management plan in place
    - Neurologic function at baseline or stable postoperatively
- 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(145):
  - 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
  - Urgent imaging
  - Monitoring while awaiting urgent CSF studies
  - Urgent cerebral angiogram
  - Need for repeat craniotomy for such conditions as subarachnoid bleeding, subdural hematoma, parenchymal hemorrhage, or CSF leak
- 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 Surgical Admission Case Management GRG GRG for further information.

Discharge Destination

- Post-hospital levels of admission may include:
  - Home.
  - Home healthcare. See Surgical Admission Home Care GRG HC or Geriatric Admission Home Care GRG HC for further information.
  - Recovery facility care. See Surgical 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 95 published peer reviewed articles, 12 specialty society or other evidence-based guidelines, 1 Cochrane systematic review, and 10 book sections.

Rationale

Use of this MCG care guideline helps the clinician identify, for a given procedure, which patient-specific factors and clinical conditions are appropriate for that procedure. The evidence-based clinical criteria assist the clinician in the decision to appropriately perform a procedure, evaluating whether the potential benefits of a procedure outweigh the potential risks. For Medicare enrollees, surgical MCG care guidelines also identify which procedures CMS has designated as inpatient only.

Use of these evidence-based clinical criteria to support decision making around the need for a given procedure is of benefit to the patient, as all procedures come with inherent risk that must be balanced by anticipated clinical benefit. Utilizing evidence-based clinical criteria enables a more accurate and patient-specific decision-making process. In addition, the use of evidence-based guidelines can help reduce unwarranted variation in care, such as divergent clinical thresholds to perform a procedure for clinically similar patients that vary across geographic regions, between facilities, and among individual clinicians.

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(146); 42 CFR 419.22(147); 42 CFR 422.101(148)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(149); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(150); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(151); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(152)

Medicare Coverage Determinations: Medicare Coverage Database(153)

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Footnotes

[A] Embolization of arteriovenous malformations may be performed as definitive treatment, or prior to surgical or radiosurgical intervention in order to reduce periprocedural morbidity and bleeding.(14)(31)(32) [A in Context Link 1]

[B] While intracranial atherosclerotic stenosis is a known risk factor for recurrent ischemic events, 3 randomized clinical trials investigating percutaneous transluminal angioplasty and stenting (PTAS) have failed to demonstrate a reduction in long-term ischemic events compared with aggressive medical management. Additionally, patients undergoing angioplasty and stenting experienced a higher rate of early complications (eg, reperfusion injury, vessel perforation).(37) Current subspecialty society guidelines do not routinely recommend angioplasty with stent or angioplasty alone for stroke prevention.(38)(39) A recent randomized, open-label, blinded endpoint clinical trial, published subsequent to those specialty society guidelines, investigated submaximal balloon angioplasty plus aggressive medical management (249 patients) or aggressive medical management alone (252 patients) in patients with 70% to 99% atherosclerotic stenosis and symptoms of a transient ischemic attack or ischemic stroke attributable to the stenosis. The primary outcome was a composite of any stroke or death within 30 days after enrollment or after balloon angioplasty of the qualifying lesion or any ischemic stroke or revascularization of the qualifying artery 30 days through 12 months after enrollment. The incidence of the primary outcome was lower in the balloon angioplasty group than the medical management group (4.4% vs 13.5%, hazard ratio 0.32 (95% confidence interval 0.16 to 0.63, p less than .001)).(35) A narrative review notes that while this trial suggests that submaximal balloon angioplasty demonstrated benefit as a secondary prevention strategy in patients with intracranial atherosclerotic disease, further trials are warranted before its findings can be fully implemented in clinical practice.(37) [B in Context Link 1]

[C] A study of 67 patients with cerebral venous thrombosis randomized to endovascular therapy (thrombectomy, catheter-directed thrombolysis, or both) vs standard therapy with anticoagulation found no difference in the primary outcome of recovery without disability, or in secondary outcomes of functional impairment and hemorrhagic complications.(45) However, the study was underpowered, with wide 95% confidence intervals around results, such that a benefit cannot be excluded. (45) A specialty society guideline recommends considering endovascular intervention for cerebral venous thrombosis in patients who deteriorate clinically (eg, worsening mental status, development of mass effect from venous infarction, intracranial hemorrhage with elevated intracranial pressure) despite aggressive anticoagulation treatment.(46) [C in Context Link 1]

[D] Invasive EEG uses depth electrodes or subdural (grid or strip electrocorticography) electrodes, either alone or in combination, to measure brain electrical activity, with better resolution and source localization than is possible with noninvasive scalp EEG.(72) [D in Context Link 1, 2]

[E] Medically refractory seizures are defined as seizures that persist despite treatment with at least 2 different, appropriately chosen antiseizure medications, titrated to full therapeutic dosages (ie, not discontinued due to side effects).(72)(74) [E in Context Link 1]

[F] Extracranial-intracranial bypass has not been shown to be effective for atherosclerotic disease.(78)(79) [F in Context Link 1]

[G] Deep brain stimulation involves implanting electrodes into diagnosis-specific brain regions (eg, subthalamic nucleus or globus pallidus internus for Parkinson disease, globus pallidus for dystonia, anterior nucleus of the thalamus for epilepsy) via a burr hole under the guidance of stereotactic neuroimaging and microelectrode recording. Implantation is generally performed in an awake patient using local anesthesia. The neurostimulator is then placed under the skin in the chest or abdomen under general anesthesia, with leads connecting it to the targeted electrodes through a subcutaneous tract. The stimulator is activated and programmed approximately 3 to 4 weeks after implantation, with settings determined by the diagnosis and individual patient response.(82)(83) [G in Context Link 1]

[H] Status dystonicus is a life-threatening condition characterized by severe dystonia and may manifest with bulbar weakness, respiratory compromise, painful spasms, hyperpyrexia, rhabdomyolysis, and metabolic derangement.(84)(85)(86)(87) [H in Context Link 1]

[I] A dystonia is considered primary when there is no identifiable acquired cause. Examples of primary dystonia include generalized and segmental dystonia, cervical dystonia (torticollis), and hemidystonia (ie, dystonia of the arm and leg on the same side).(88) The International Parkinson and Movement Disorders Society classification system Axis II etiologic categories of "inherited" and "idiopathic" dystonias align most closely with the previously described primary dystonia.(89) [I in Context Link 1]

[J] Tardive dystonia is a side effect of chronic use of antidopaminergic agents; when combined with other motor symptoms (eg, chorea, akathisia, or tics), a diagnosis of tardive dyskinesia is made. Deep brain stimulation is effective for tardive dystonia but is not recommended for most other acquired dystonias.(85)(86)(88) [J in Context Link 1]

[K] A trial of levodopa may identify patients with levodopa-responsive dystonia.(85)(86) [K in Context Link 1]

[L] A specialty society guideline recommends propranolol, primidone, and topiramate as efficacious and clinical useful agents for treatment of essential tremor.(94) Alternative agents that are considered likely efficacious and possibly useful include alprazolam and botulinum A toxin.(94) [L in Context Link 1, 2]

[M] Symptoms of motor fluctuations that do not respond to a trial of levodopa are unlikely to respond to deep brain stimulation.(100) [M in Context Link 1]

[N] An adequate trial is defined as a trial of the maximum tolerated dose for at least 12 weeks.(110) [N in Context Link 1]

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

[P] See Clinical Indications for Procedure in this guideline. [P 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

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 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.
2. Ramgopal S, Sepanski RJ, Martin-Gill C. Empirically derived age-based vital signs for children in the out-of-hospital setting. Annals of Emergency Medicine 2023;81(4):402-412. DOI: 10.1016/j.annemergmed.2022.09.019.

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)

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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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.

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.

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

References

1. Hooper DC, Shenoy ES, Elshaboury RH. Treatment and prophylaxis of bacterial infections. 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; 2022:1148-1163.
2. Blum FC, Biros MH. Fever in the adult patient. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:90-95.e1.
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4. Melia MT. Approach to fever or suspected infection in the normal host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1845-1851.
5. Sifri CD. Approach to fever and suspected infection in the immunocompromised host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1851-1862.
6. Singh M, Fernandez-Frackelton M. Bacteria. In: Walls RM, editor. Rosen's Emergency Medicine: Concepts and Clinical Practice. 10th ed. Elsevier; 2023:1586-1609.e3.

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
  - Urgent imaging
  - Monitoring while awaiting urgent CSF studies
  - Urgent cerebral angiogram
  - Need for repeat craniotomy for such conditions as subarachnoid bleeding, subdural hematoma, parenchymal hemorrhage, or CSF leak

No spinal surgery, or status acceptable

- No spinal surgery, or status acceptable, as indicated by **1 or more** of the following:
  - No spinal surgery performed
  - Status acceptable, as indicated by **ALL** of the following(1)(2)(3)(4):
    - No cerebrospinal fluid leak
    - No active bleeding at site
    - No severe respiratory abnormalities
    - Baseline voiding, or urinary catheter with management plan in place
    - Neurologic function at baseline or stable postoperatively

References

1. Divi SN, Okroj K, Patel AA. General complication in lumbar spine surgery. In: Patel VV, Kleck CJ, editors. Complications in Orthopaedics: Spine Surgery. Elsevier; 2025:160-166.
2. Barber J, Wick J, Klineberg EO. Complications in spine surgery: expected rates and classification. In: Steinmetz MP, Berven SH, Benzel EC, editors. Benzel's Spine Surgery. 5th ed. Elsevier; 2022:149-157.e1.
3. Kessler RA, Rasouli JJ, Shao J, Momim A, Steinmetz MP. Intraoperative crisis management in spine surgery: what to do when things go bad. In: Steinmetz MP, Berven SH, Benzel EC, editors. Benzel's Spine Surgery. 5th ed. Elsevier; 2022:785-794.e2.
4. Casper DS, Maslak JP, Pelle D. Posterior cervical decompressions: cervical laminectomy and laminoforaminotomy. In: Steinmetz MP, Berven SH, Benzel EC, editors. Benzel's Spine Surgery. 5th ed. Elsevier; 2022:935-937.e1.

Operative site and other wounds acceptable

- Operative site and other wounds acceptable, as indicated by **1 or more** of the following(1):
  - Wounds absent
  - Wound site clean and intact, with minimal to no drainage and without signs of infection
  - Current wound care performable at next level of care

References

1. Yepuri N, Pruekprasert N, Cooney RN. Surgical complications. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery. 21st ed. Elsevier; 2022:238-283.

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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3. Fang JC, O'Gara PT. History and physical examination: an evidence-based approach. In: Libby P, Bonow RO, Mann DL, Tomaselli GF, Bhatt DL, Solomon SD, editors. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine. 12th ed. Elsevier; 2022:123-140.

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

1. Swarm RA, et al. Adult Cancer Pain. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 21 Accessed at: https://www.nccn.org/. [accessed 2025 Jun 04]
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4. Berger MJ, et al. Antiemesis. NCCN Clinical Practice Guidelines in Oncology [Internet] National Comprehensive Cancer Network (NCCN). v. 2.2025; 2025 May 12 Accessed at: https://www.nccn.org/. [accessed 2025 May 19]
5. Fourth consensus guidelines for the management of postoperative nausea and vomiting: erratum. Anesthesia and Analgesia 2020;131(5):e241. DOI: 10.1213/ANE.0000000000005245.

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.

References

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8. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Medical Care 2003;41(11):1284-92. DOI: 10.1097/01.MLR.0000093487.78664.3C.

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.

Temperature status acceptable

- Temperature status acceptable, as indicated by **1 or more** of the following(1)(2)(3):
  - Temperature less than 100.5 degrees F (38.1 degrees C) (oral) and greater than 96.8 degrees F (36 degrees C) (rectal)
  - Temperature as expected for disease process and appropriate for management at next level of care

References

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2. Melia MT. Approach to fever or suspected infection in the normal host. In: Goldman L, Cooney KA, editors. Goldman-Cecil Medicine. 27th ed. Elsevier; 2024:1845-1851.
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