

Endovascular Intervention, Renal Artery or Renal Vein

ORG: M-310 (ISC)

[Link to Codes](#)

MCG Health
Inpatient & Surgical Care
30th Edition

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Care Planning - Inpatient Admission and Alternatives

Clinical Indications for Procedure

- Procedure is indicated for **1 or more** of the following: **NNNNNN**
 - ☐ Renal fibromuscular dysplasia requiring angioplasty, as indicated by **ALL** of the following^{[A][B](2)}:
 - Clinically important renal fibromuscular dysplasia suspected, as indicated by **1 or more** of the following:
 - Hypertension in patient age 30 years or younger⁽²⁾⁽⁷⁾⁽⁸⁾
 - Accelerated hypertension^{[C](2)(8)}
 - Malignant hypertension^{[D](2)(7)(8)}

- Treatment-resistant hypertension, as indicated by **1 or more** of the following:
 - Blood pressure greater than 130/80 mm Hg while on highest tolerated doses of 3 or more antihypertensive agents, including a diuretic(1)(2)(8)
 - Blood pressure controlled (130/80 mm Hg or lower) while on highest tolerated doses of 4 or more antihypertensive agents, including a diuretic(1)(7)(8)(17)
- Severe grade 3 hypertension (180/100 mm Hg or higher)(2)
- Renal artery dissection or infarction(2)
- Unilateral small kidney with no other known cause(2)(7)(8)
- Noninvasive imaging (eg, CTA, MRA, duplex ultrasound) consistent with renal fibromuscular dysplasia (eg, fibromuscular focal or multifocal renal artery disease)(2)(7)

☐ Renal artery aneurysm and **1 or more** of the following:

- Aneurysm 3 cm or more in size(4)(5)
- Enlarging aneurysm on serial imaging(4)(18)
- Ruptured aneurysm(5)
- Aneurysm in person with childbearing potential(2)(4)(5)
- Symptoms due to aneurysm (eg, hematuria, flank pain)(4)(5)
- Treatment-resistant hypertension, as indicated by **1 or more** of the following(1)(19):
 - Blood pressure greater than 130/80 mm Hg while on highest tolerated doses of 3 or more antihypertensive agents, including a diuretic
 - Blood pressure controlled (130/80 mm Hg or lower) while on highest tolerated doses of 4 or more antihypertensive agents, including a diuretic
- Aneurysm associated with dissection(4)(5)

☐ Renal artery dissection[E] and **1 or more** of the following(2):

- Progressive dissection over time(2)
- Aneurysm associated with dissection(2)
- Evidence of renal malperfusion (eg, viable tissue at risk) or infarction(2)
- Renal artery arteriovenous malformation or fistula with symptoms (eg, hematuria, flank pain, high-output cardiac failure)(5)
- Renal artery or renal vein thrombosis resistant to treatment (eg, anticoagulation) or causing clinically significant renovascular disorder (eg, treatment-resistant hypertension, decline in renal function)(6)(20)
- Vasculitis causing clinically significant renovascular disorder (eg, treatment-resistant hypertension, decline in renal function)(1)(21)(22)

☐ Atherosclerotic renal artery stenosis and **ALL** of the following(7):

- Significant renal artery stenosis, as indicated by **1 or more** of the following(7):
 - Renal artery stenosis of 70% or greater on MR or CT angiogram(7)(9)
 - Renal artery stenosis of 50% to 69% that is hemodynamically significant, as indicated by **1 or more** of the following(7)(9):
 - Mean pressure gradient greater than 10 mm Hg at rest or after vasodilator (eg, dopamine, papaverine) challenge[F](7)(9)
 - Systolic pressure gradient greater than 20 mm Hg at rest or after vasodilator challenge (eg, dopamine, papaverine)[F](7)(9)
 - Renal distal artery pressure to aortic pressure ratio less than 0.9(7)
 - Fractional flow reserve less than 0.8[G](9)
- Viable kidney (eg, renal size (pole-to-pole length) of 7 cm or greater, urinary albumin to creatinine ratio less than 200 mg/g (20 mg/mmol), renal resistive index[H] less than 0.8, renal cortex size of greater than 0.5 cm)(7)(24)(25)

☐ Endovascular intervention appropriate, as indicated by **1 or more** of the following(7)(9):

- Solitary kidney(7)
- Accelerated hypertension[C](9)

- Malignant hypertension[D](9)
- Treatment-resistant hypertension, as indicated by **1 or more** of the following(1)(7)(9):
 - Blood pressure greater than 130/80 mm Hg while on highest tolerated doses of 3 or more antihypertensive agents, including a diuretic
 - Blood pressure controlled (130/80 mm Hg or lower) while on highest tolerated doses of 4 or more antihypertensive agents, including a diuretic
- Hypertension with intolerance to antihypertensive medication (eg, due to side effects or drug-induced renal deterioration)(9)(24)
- Hypertension and unilateral small kidney (ie, less than average size or contralateral kidney, but greater than 7 cm viability threshold) with no other known cause(9)
- Progressively worsening renal function (eg, decline in glomerular filtration rate by 4 mL/min/1.73m² (0.07 mL/sec/1.73m²) or more per year)(7)(24)

☐ Acute kidney injury known or presumed to have occurred within the previous 7 days due to renal artery occlusion or stenosis, as indicated by **1 or more** of the following(24):

- Two-fold or greater rise in serum creatinine from baseline[I](26)
- Acute rise in serum creatinine to at least 1.5 times its baseline value and serum creatinine is greater than 4 mg/dL (354 micromoles/L)
- Urine output less than 0.5 mL/kg/hr for 12 hours despite adequate volume status[J](26)
- Recurrent congestive heart failure attributable to renal artery stenosis or otherwise unexplained, uncontrolled on optimal goal-directed medical therapy(9)
- Flash pulmonary edema (ie, sudden onset, no prior history of myocardial or coronary artery disease)(1)(7)(9)(24)
- Intolerance to angiotensin converting enzyme inhibitor or angiotensin receptor blocker
- Unstable angina uncontrolled on optimal goal-directed medical therapy(9)
- Renal transplant patient(25)
- New dialysis (less than 3 months) patient with nonfunctioning but possibly viable kidney(25)
- Renal vein compression (eg, nutcracker syndrome, hematoma leading to mechanical compression, tumor causing external compression)(13)(14)(28)
- Child age 18 years or younger with renovascular hypertension and lesion amenable to angioplasty(16)(29)(30)

☐ Renal artery stenosis in transplanted kidney and **1 or more** of the following:

- Worsening renal function due to renal artery stenosis(1)(10)(12)
- Threat of graft failure due to renal artery stenosis(11)(12)(31)
- Accelerated hypertension[C](12)(31)
- Malignant hypertension[D](12)
- Resistant hypertension, as indicated by **1 or more** of the following(1)(7)(9)(10)(11)(12):
 - Blood pressure greater than 130/80 mm Hg while on highest tolerated doses of 3 or more antihypertensive agents, including a diuretic
 - Blood pressure controlled (130/80 mm Hg or lower) while on highest tolerated doses of 4 or more antihypertensive agents, including a diuretic
- Indicated treatment causes clinically significant decline in renal function (eg, ACE inhibitor, ARB)(1)(31)
- Acute decompensation of heart failure (ie, caused or exacerbated by hypertension or renal insufficiency)(1)(12)(32)
- Acute myocardial ischemia caused or exacerbated by hypertension or renal insufficiency(12)(32)
- Flash pulmonary edema (ie, sudden onset, no prior history of myocardial or coronary artery disease)(12)(31)

Alternatives to Procedure

- Alternatives include:
 - Lifestyle interventions (dietary sodium restriction, increased physical activity, weight loss, postural hygiene)(15)(33)(34)
 - Optimal medical management (eg, antihypertensive therapy, control of dyslipidemia, and antiplatelet therapy)(1)(4)(7)(9)(24)

- o Catheter-directed thrombolytic therapy(6)
- o Open or laparoscopic surgical vascular repair(4)(16)(18)(35)
- o Ethanol embolization of ischemic foci(29)
- o Renal autotransplantation(36)

Operative Status Criteria

Goal Length of Stay: Ambulatory

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, MCG's ambulatory Goal Length of Stay (GLOS) attainment calculation reports the sum of same-day and next-day postoperative discharges. Depending on various patient and procedural factors, some patients undergoing a procedure with an ambulatory GLOS require inpatient care (eg, medical necessity for hospital-based care across 2 or more postoperative midnights). Some of these factors are described in the Extended Stay section of this guideline.

- Ambulatory
- Inpatient (eg, medical necessity for hospital-based care across 2 or more postoperative midnights)
- Inpatient (Medicare patient, and specific procedure is on CMS Inpatient Only List)

Hospitalization

Optimal Recovery Course

Day	Level of Care	Clinical Status	Activity	Routes	Interventions	Medications
1	• Social Determinants of Health Assessment • OR to recovery to discharge • Discharge planning	• Hemodynamic stability • Arterial puncture site without evidence of infection, aneurysm, or growing hematoma • Flank pain absent • Hematocrit stable • Blood pressure stable • Renal function stable • Urine output stable • Peripheral pulses unchanged • Discharge plans and education understood	• Bed rest post procedure • Ambulatory or acceptable for next level of care	• IV fluids for procedure • IV medications for procedure • Oral hydration[K] • Oral medications or regimen acceptable for next level of care • Oral diet or acceptable for next level of care	• Possible anticoagulation • Possible renal artery stent placement[B]	• Possible antiplatelet therapy

(2)(24)(37)N

Recovery Milestones are indicated in **bold**.

Goal Length of Stay: Ambulatory

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

Extended Stay

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

- Inpatient stay (eg, need for hospital-based care beyond postoperative day 1) may be needed for(38)(39):
 - Failure to meet discharge criteria (recovery milestones in Optimal Recovery Course)
 - Expect brief stay extension.
 - Complications of procedure (eg, puncture site bleeding, flank pain, arterial rupture, dissection, occlusion, thrombosis, infection)(40)
 - Expect brief stay extension.
 - Clinically active comorbid conditions requiring inpatient care (eg, heart failure, COPD, chronic liver disease, coagulable disorders)(38)(41)
 - Expect brief stay extension.
 - Thrombolytic therapy
 - Expect brief stay extension.
 - Hypertensive crisis(42)
 - Expect brief stay extension.

See Common Complications and Conditions [ISC](#) for further information.

Discharge

Discharge Planning

- Discharge planning includes[L]:
 - Assessment of needs and planning for care, including(44)(45):
 - Develop and modify treatment plan (involving multiple providers) as needed.
 - Evaluate and address preadmission functioning as needed.
 - Evaluate and address psychosocial status issues as indicated. See Psychosocial Assessment [SR](#) for further information.
 - Evaluate and address social determinants of health (eg, housing, food). See Social Determinants of Health Screening Tool [SR](#) for further information.
 - Evaluate and address patient or caregiver preferences as indicated.
 - Identify skilled services needed at next level of care, with specific attention to:
 - Cardiovascular status assessment(46)
 - Genitourinary status assessment(47)
 - Nutrition and hydration management(48)
 - Pain management(49)
 - Significant chronic condition exacerbation with need for clinical intervention and monitoring(50)
 - Early identification of anticipated discharge destination; options include(45)(51):
 - Home; considerations include:

- Home safety assessment. See Home Safety Assessment [SR](#) for further information.
- ☐ Patient safe to go home; examples include(52)(53)(54):
 - Medical status stable for patient's condition
 - Functional care can safely be provided with available resources.
 - Mental status stable for patient's condition
 - Medication availability confirmed and reconciliation complete
 - Patient/caregiver education completed with written discharge instructions provided
 - Community resources identified and referrals made, as needed
 - Home care arranged, if indicated
 - Necessary medical equipment delivery arranged or available in home, if indicated
 - Necessary medical supplies ordered, or patient/caregiver can obtain, if indicated
- Access to follow-up care
- Self-management ability if appropriate. See Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) Assessment [SR](#) for further information.
- Caregiver need, ability, and availability
- Post-acute skilled care or custodial care as indicated. See Discharge Planning Tool [SR](#) for further information.
- Transitions of care plan complete, including(45)(51)(55):
 - Patient and caregiver education complete.
 - See Teach-Back Tool [SR](#) for further information.
 - See Endovascular Intervention, Renal Artery or Renal Vein: Patient Education for Clinicians [SR](#) for further information.
- ☐ Medication reconciliation completion includes(56)(57):
 - Compare patient's discharge list of medications (prescribed and over-the-counter) against provider's admission or transfer orders.
 - Assess each medication for correlation to disease state or medical condition.
 - Report medication discrepancies to prescribing provider, attending physician, and primary care provider, and ensure accurate medication order is identified.
 - Provide reconciled medication list to all treating providers.
 - Confirm that patient or caregiver can acquire medication.
 - Educate patient and caregiver.
 - Provide complete medication list to patient and caregiver.
 - Importance of presenting personal medication list to all providers at each care transition, including all provider appointments
 - Reason, dosage, and timing of medication (eg, use "teach-back" techniques)(58)
 - Encourage communication between patient, caregiver, and pharmacy for obtaining prescriptions, setting up home medication delivery, and reviewing for drug-drug interactions.
 - See Medication Reconciliation Tool [SR](#) for further information.
- Plan communicated to patient, caregiver, and all members of care team, including(59):
 - Inpatient care and service providers
 - Primary care provider
 - All post-discharge care and service providers
- Appointments planned or scheduled, which may include(60):
 - Primary care provider(61)
 - Interventional cardiologist

- Interventional radiologist
- Nephrologist
- Specialists for management of comorbidities as needed
- Vascular surgeon
- Other
- Outpatient testing and procedure plans made, which may include:
 - Laboratory testing(50)
 - Ultrasound(62)
 - Other
- Referrals made for assistance or support, which may include:
 - Financial, for follow-up care, medication, and transportation(63)
 - Tobacco use treatment(64)(65)
 - Other
- Medical equipment and supplies coordinated (ie, delivered or delivery confirmed), which may include:
 - Blood pressure cuff(66)
 - Wound care equipment and supplies(67)(68)
 - Other

Discharge Destination

- Post-hospital levels of admission may include:
 - Home.
 - Home healthcare. See Home Care Indications for Admission Section [HC](#) in Endovascular Intervention, Renal Artery or Renal Vein guideline in Home Care.

Evidence Summary

Background

This guideline refers to percutaneous renal angioplasty with or without stenting.

Criteria

The evidence for the clinical indications found in this guideline includes 22 published peer reviewed articles, 7 specialty society or other evidence-based guidelines, and 3 book sections.

For fibromuscular dysplasia, specialty society guidelines and a narrative review support percutaneous transluminal renal angioplasty as the treatment of choice.(1) (2)(3) **(EG 2)**

For patients with renal artery aneurysm or dissection, an expert consensus document supports endovascular treatment for patients with renal artery dissection associated with evidence of renal malperfusion, progressive dissection over time, or a secondary aneurysm.(2) **(EG 2)** A specialty society guideline supports endovascular treatment of renal artery aneurysms that are 3 cm or larger in size or are associated with hypertension or symptoms of rupture, or any aneurysm in a person of childbearing potential.(4) **(EG 2)**

For patients with renal artery arteriovenous malformations or arteriovenous fistulae, a specialty society textbook supports endovascular intervention for symptoms, including hematuria, flank pain, or high-output cardiac failure.(5) **(EG 2)**

For renal artery or renal vein thrombosis, a nephrology textbook supports endovascular treatment for thromboses resistant to anticoagulation or with clinically significant renovascular disease (eg, hypertension, declining renal function).(6) **(EG 2)**

For renal artery stenosis, specialty society guidelines support renal angioplasty, with or without stent placement, for patients with associated worsening renal function, renovascular hypertension, flash pulmonary edema, or intractable heart failure when medical management has failed.(1)(7)(8) **(EG 2)** A specialty society guideline states that percutaneous revascularization of the renal artery may be an appropriate option for hemodynamically significant bilateral stenosis or unilateral stenosis in a single viable kidney.(9) **(EG 2)** For transplant renal artery stenosis, cohort studies support endovascular management to improve renal function or hypertension.(10)(11)(12) **(EG 2)**

For vasculitis causing a clinically significant renovascular disorder, a specialty society guideline and a narrative review support angioplasty treatment for patients with symptomatic Takayasu arteritis that has not responded to medical management.(1)(3) **(EG 2)**

For renal vein compression (eg, nutcracker syndrome), a systematic review and cohort studies support endovascular treatment as safe and effective at resolving symptoms.(13)(14)(15) **(EG 2)**

Length of Stay

Analysis of procedure data for a commercially insured population shows 68% of patients undergoing a renal artery or renal vein endovascular intervention were discharged the day of or the day after surgery.(37) **(EG 3)** Analysis of procedure data for a Medicare-insured population shows 66% of patients undergoing a renal artery or renal vein endovascular intervention were discharged the day of or the day after surgery.(37) **(EG 3)**

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(69); 42 CFR 419.22(70); 42 CFR 422.101(71)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 1 - Inpatient Hospital Services Covered Under Part A(72); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 6 - Hospital Services Covered Under Part B(73); CMS IOM Publication 100-02,

Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(74); CMS IOM Publication 100-08, Medicare Program Integrity Manual, Chapter 6, Section 6.5 - Medical Review of Inpatient Hospital Claims for Part A Payment(75)

Medicare Coverage Determinations: Medicare Coverage Database(76)

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Footnotes

[A] Fibromuscular dysplasia is an idiopathic, segmental, nonatherosclerotic and noninflammatory disease of unknown etiology affecting the musculature of arterial walls that leads to stenosis of small and medium-sized arteries.(2) [A in Context Link 1]

[B] Specialty society guidelines conclude that angioplasty alone is sufficient for treatment of arterial lesions in renal fibromuscular dysplasia and that stenting is reserved for primary renal artery dissection, renal artery aneurysm, or procedural complications such as flow-limiting dissection, pseudoaneurysm, or arterial rupture.(2)(16) [B in Context Link 1, 2]

[C] Accelerated hypertension is the sudden and persistent worsening of previously controlled hypertension.(7) [C in Context Link 1, 2, 3]

[D] Malignant hypertension is hypertension associated with evidence of acute end organ damage such as acute renal failure, acutely decompensated heart failure, new retinopathy, or new neurologic symptoms.(7) [D in Context Link 1, 2, 3]

[E] The majority of renal artery dissections are managed with medical therapy and surveillance imaging.(2) [E in Context Link 1, 2]

[F] Mean or systolic pressure gradients obtained during a vasodilator challenge are also referred to as "hyperemic" pressure gradients.(9) [F in Context Link 1, 2]

[G] Fractional flow reserve is the ratio of pressure distal to a stenosis relative to the pressure proximal to the stenosis. The lower the ratio, the more hemodynamically significant the stenosis.(9) [G in Context Link 1]

[H] The renal resistive index is measured by Doppler sonography in an intrarenal artery as the difference between the peak systolic and end-diastolic blood velocities divided by the peak systolic velocity.(23) [H in Context Link 1]

[I] 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/1.73m² (1.25 mL/sec/1.73m²). (26)  eGFR - Adult Calculator  eGFR - Pediatric Calculator [I in Context Link 1]

[J] 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.(26)(27) It is also suggested that urine output can identify patients with acute kidney injury that may otherwise be missed.(26)(27) 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.(26)(27) 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.(26)(27) [J in Context Link 1]

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

[L] Discharge instructions should be given in the patient's and caregiver's native language using trained language interpreters whenever possible.(43) [L in Context Link 1]

Definitions

Hemodynamic stability

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

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Hypotension 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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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.

Orthostatic hypotension

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

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Footnotes

- A. Concomitant measurements of the heart rate are important to measure to help diagnose subtypes of orthostatic hypotension (eg, the lack of a compensatory increase in heart rate is typical of autonomic failure and an exaggerated tachycardia may be reflective of volume depletion). However, the heart rate is not a component of the definition of orthostatic hypotension, which relies upon blood pressure alone.(1)(2)(3)
- B. Criteria based upon clinician acquired numeric values (eg, vital signs, oxygen saturation) should be used if they are accurate reflections of the patient's condition. Transitory findings (eg, abnormal only upon initial emergency department intake or only one time out of multiple readings) that rapidly improve with no or minimal treatment usually do not reflect disease severity or risk for deterioration. This does not imply that an initial or one-time reading cannot ever be applicable. The goal is to separate erroneous or incidental findings from those that truly represent the patient's clinical picture.

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 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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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.

Codes

ICD-10 Diagnosis: I15.0, I16.0, I16.1, I16.9, I1A.0, I70.1, I72.2, I77.3, I77.73, I82.3, N17.0, N17.8, N17.9, N26.1, N28.0, Q27.1, Q27.2, Q27.34, T86.11, T86.12, T86.13, T86.19 [Hide]

ICD-10 Procedure: 0479341, 047934Z, 047935Z, 047936Z, 047937Z, 04793D1, 04793DZ, 04793EZ, 04793FZ, 04793GZ, 04793Z1, 04793ZZ, 047A341, 047A34Z, 047A35Z, 047A36Z, 047A37Z, 047A3D1, 047A3DZ, 047A3EZ, 047A3FZ, 047A3GZ, 047A3Z1, 047A3ZZ, 06793DZ, 06793ZZ, 067B3DZ, 067B3ZZ [Hide]

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