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- [Skills](#)
- [Patient Education](#)

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- [Home](#)
- [Skills](#)
 - [View Skills](#)
- [Patient Education](#)

[Print Back to Search Results](#)

Skills

Related Information

Skills

- [Apical Pulse](#)
- [Assessment: Respirations](#)
- [Blood Pressure: Upper Extremity](#)
- [Blood Pressure: Lower Extremity](#)
- [Blood Pressure \(Systolic\): Palpation](#)

References

Related Book Chapter

- [Due to ongoing updates to Clinical Skills, the content in the book chapter \(PDF\) may differ from the online skill.](#)

Radial Pulse

- [Quick Sheet](#)
- [Extended Text](#)
- [Supplies](#)
- [Demos](#)
- [Illustrations](#)
- [Test](#)
- [Test Results](#)
- [CheckList](#)

ALERT

Anxiety can raise the pulse rate. If the patient's pulse rate is higher than expected, reassess it at the end of the physical assessment when the patient is more relaxed.

1. Perform hand hygiene before patient contact.
2. Verify the correct patient using two identifiers.
3. Assess the patient for risk factors for an abnormal radial pulse.
4. Assess the patient for signs and symptoms of altered cardiac function.
5. Determine the patient's previous baseline pulse rate from the patient's record.
6. Encourage the patient to relax as much as possible.
7. If the patient has been active and his or her condition permits, wait several minutes before assessing the pulse.
8. Perform hand hygiene.
9. Help the patient assume a supine or sitting position.
10. If the patient is supine, place his or her forearm straight alongside the body or across the lower chest or upper abdomen with the wrist extended straight (Figure 2). If the patient is sitting, bend the elbow 90 degrees and support the lower arm on a chair or the nurse's arm.
11. Place the tips of the first two or three fingers over the groove along the radial (or thumb) side of the patient's inner wrist (Figure 2). Slightly extend or flex the patient's wrist with the palm down until the pulse is strongest.
12. Lightly compress the artery against the radius, obliterating the pulse initially. Then ease the pressure so the pulse becomes easily palpable.
13. Determine the strength of the pulse (e.g., 0, 1+, 2+, 3+, 4+). Note whether the thrust of the vessel against the fingertips is absent, thready, weak, strong, or bounding (Box 1). If this is a repeat assessment, note any changes in the intensity of the pulse. **Use this subjective scale as accurately as possible, especially if the presence or absence of pulses is a concern. Consider having another nurse assess the patient at the same time.**
14. After palpating a regular pulse, note the position of the second hand on a wristwatch and then begin to count the rate. Begin counting with the first beat felt after the second hand has moved toward the next number on the dial; count as one, then two, and so on.
15. If the pulse is regular, count the rate for 30 seconds and multiply the total by 2.
16. If the pulse is irregular, count the rate for a full 60 seconds. Assess the pattern of irregularity.
17. Compare the radial pulses bilaterally. If a marked difference between the sides exists, assess the extremities for perfusion. Notify the practitioner if signs of decreased perfusion, including a change in skin color, edema, a change in skin temperature, and decreased pulse palpability, are present.
18. Help the patient to a comfortable position.
19. Discuss the findings with the patient as needed.
20. Assess, treat, and reassess pain.
21. Perform hand hygiene.
22. Document the procedure in the patient's record.

Ada Adapted from Perry, A.G., Potter, P.A., Ostendorf, W.R. (Eds.). (2018). *Clinical nursing skills & techniques* (9th ed.). St. Louis: Elsevier.

Clinical Review: Donna Grochow, MSN, RNC-NIC, WCC, February 2017

ALERT

Anxiety can raise the pulse rate. If the patient's pulse rate is higher than expected, reassess it at the end of the physical assessment when the patient is more relaxed.

OVERVIEW

The pulse is the palpable throbbing of blood flow. Because of the force of the blood exiting the heart, aortic distention creates a pulse wave that travels rapidly toward the extremities. When the pulse wave reaches a peripheral artery, the nurse can feel it by lightly palpating the artery against underlying bone or muscle. The number of pulsing sensations occurring during 1 minute is the pulse rate per minute.

Assessing the patient's peripheral pulse sites offers valuable data for determining the integrity of the cardiovascular system. An abnormally slow, rapid, or irregular pulse may indicate the cardiovascular system's inability to deliver adequate blood to the body.

The pulse can be assessed using any major artery ([Table 1](#)), but the radial artery is the most commonly used ([Figure 1](#)). During cardiovascular collapse, the radial pulse may not be palpable because of decreased blood pressure and decreased perfusion to the distal arteries. In cases of suspected cardiovascular collapse, a more central site (e.g., carotid artery) should be used for pulse evaluation. A central pulse will be the last pulse present during cardiac arrest.

SUPPLIES

[Click here for a list of supplies.](#)

PATIENT AND FAMILY EDUCATION

- Explain the equipment and the procedure to the patient and family.
- Teach a patient who takes prescribed cardiotoxic or antiarrhythmic medications to assess the radial pulse to detect adverse effects.
- Teach a patient starting a prescribed exercise regimen how to monitor the radial pulse to determine his or her response to exercise.
- Encourage questions and answer them as they arise.

ASSESSMENT AND PREPARATION

Assessment

1. Perform hand hygiene before patient contact.
2. Verify the correct patient using two identifiers.
3. Assess the patient for risk factors for an abnormal radial pulse.
 - a. Invasive cardiovascular diagnostic tests
 - b. Surgery of an extremity
 - c. Peripheral vascular disease
4. Assess the patient for signs and symptoms of altered cardiac function.
 - a. Dyspnea
 - b. Fatigue
 - c. Chest pain
 - d. Orthopnea
 - e. Syncope
 - f. Palpitations
 - g. Dependent edema

h. Cyanosis or pallor

5. Determine the patient's previous baseline pulse rate from the patient's record.

Preparation

1. Encourage the patient to relax as much as possible.
2. If the patient has been active and his or her condition permits, wait several minutes before assessing the pulse.

PROCEDURE

1. Perform hand hygiene.
2. Verify the correct patient using two identifiers.
3. Help the patient assume a supine or sitting position.
4. If the patient is supine, place his or her forearm straight alongside the body or across the lower chest or upper abdomen with the wrist extended straight ([Figure 2](#)). If the patient is sitting, bend the elbow 90 degrees and support the lower arm on a chair or the nurse's arm.
5. Place the tips of the first two or three fingers over the groove along the radial (or thumb) side of the patient's inner wrist ([Figure 2](#)). Slightly extend or flex the patient's wrist with the palm down until the pulse is strongest.

Rationale: The relaxed position of the lower arm and the extension of the wrist permit full exposure of the artery to palpation.

6. Lightly compress the artery against the radius, obliterating the pulse initially. Then ease the pressure so the pulse becomes easily palpable.

Rationale: Pulse assessment is more accurate when using moderate pressure. Too much pressure occludes the pulse, impairs blood flow, and may result in the nurse counting his or her own pulse rate.

7. Determine the strength of the pulse (e.g., 0, 1+, 2+, 3+, 4+). Note whether the thrust of the vessel against the fingertips is absent, thready, weak, strong, or bounding ([Box 1](#)). If this is a repeat assessment, note any changes in the intensity of the pulse.¹

Rationale: Strength reflects the volume of blood ejected against the arterial wall with each heart contraction. An accurate description of strength improves communication among nurses and other health care personnel.

Use this subjective scale as accurately as possible, especially if the presence or absence of pulses is a concern. Consider having another nurse assess the patient at the same time.

8. After palpating a regular pulse, note the position of the second hand on a wristwatch and then begin to count the rate. Begin counting with the first beat felt after the second hand has moved toward the next number on the dial; count as one, then two, and so on.

Rationale: The rate is determined accurately only after palpating the pulse. Timing begins with zero. The count of one is the first beat palpated after timing begins.

9. If the pulse is regular, count the rate for 30 seconds and multiply the total by 2.

10. If the pulse is irregular, count the rate for a full 60 seconds. Assess the pattern of irregularity.

Rationale: Inefficient contraction of the heart fails to transmit a pulse wave, resulting in an irregular pulse. A full minute assessment helps ensure an accurate estimate of beats per minute (bpm).

11. Compare the radial pulses bilaterally. If a marked difference between the sides exists, assess the extremities for perfusion. Notify the practitioner if signs of decreased perfusion, including a change in skin color, edema, a change in skin temperature, and decreased pulse palpability, are present.

12. Help the patient to a comfortable position.

13. Discuss the findings with the patient as needed.

14. Perform hand hygiene.

15. Document the procedure in the patient's record.

MONITORING AND CARE

1. If assessing a patient's pulse for the first time, establish the radial pulse as baseline if it is within the acceptable range.
2. Compare the pulse rate and character with the patient's previous baseline and the acceptable range for the patient's age.
3. Assess, treat, and reassess pain.

EXPECTED OUTCOMES

- Radial pulse is palpable and within normal range for the patient's age.
- Rhythm is regular.
- Radial pulse is strong, firm, and regular.

UNEXPECTED OUTCOMES

- Pulse is weak, difficult to palpate, or absent.
- Pulse rate for an adult is greater than 100 bpm (tachycardia).¹
- Pulse rate for an adult is less than 60 bpm (bradycardia).¹
- Pulse is irregular.

DOCUMENTATION

- Pulse rate
- Pulse rates before and after administration of specific therapies
- Pulse strength
- Abnormal findings
- Patient and family education
- Unexpected outcomes and related nursing interventions
- Pain assessment and management

PEDIATRIC CONSIDERATIONS

- An accurate radial pulse can be obtained in children older than 2 years of age.²

- Children often have a sinus arrhythmia, which is an irregular heartbeat that speeds up with inspiration and slows down with expiration.
- Breath holding in a child affects the pulse rate.

GERONTOLOGICAL CONSIDERATIONS

- Palpating the pulse of an older adult or obese patient can be difficult. A Doppler ultrasound stethoscope provides a more accurate reading.
- The arteries of an older adult often feel stiff and knotty because of decreased elasticity.
- In older adults, the heart rate takes longer to rise to meet sudden increased demands caused by stress, illness, or excitement. Once elevated, the pulse rate of an older adult takes longer to return to a normal resting rate.¹

HOME CARE CONSIDERATIONS

- If the patient will be required to take the pulse at home, begin training as soon possible. Have the patient give return demonstrations before discharge.
- Teach the patient and family the abnormal values that warrant practitioner notification.

REFERENCES

[Return to text](#)

1. Ball, J.W. and others. (Eds.). (2015). Vital signs and pain assessment. In *Seidel's physical examination handbook* (8th ed., pp. 9-18). St. Louis: Mosby.
2. Hockenberry, M.J., Wilson, D. (Eds.). (2015). Communication, physical, and developmental assessment. In *Wong's nursing care of infants and children* (10th ed., pp. 91-151). St. Louis: Mosby.

ADDITIONAL READING

American Heart Association (AHA). (2014). Bradycardia: Slow heart rate. Retrieved February 21, 2017, from http://www.heart.org/HEARTORG/Conditions/Arrhythmia/AboutArrhythmia/Bradycardia-Slow-Heart-Rate_UCM_302016_Article.jsp

Adapted from Perry, A.G., Potter, P.A., Ostendorf, W.R. (Eds.). (2018). *Clinical nursing skills & techniques* (9th ed.). St. Louis: Elsevier.

[Return to text](#)

- Wristwatch with second hand or digital display

[Click here to view: Video: Assessing Apical-Radial Pulse](#)

[Click here to view: Video: Assessing Radial Pulse](#)

Click image(s) to enlarge

Table 1 Pulse Sites

Table 1 Pulse Sites		
Site	Location	Rationale for Selection
Temporal	Over temporal bone of head, above and lateral to eyebrow	Easily accessible site to assess pulse in children
Carotid	Along medial edge of sternocleidomastoid muscle in neck	Easily accessible site to assess character of peripheral pulse; used during physiologic shock or cardiac arrest when other sites are not palpable
Apical	Fourth to fifth intercostal space at left midclavicular line	Site used to auscultate apical pulse
Brachial	Groove between biceps and triceps muscles at the antecubital fossa	Site used to auscultate upper-extremity blood pressure and assess status of circulation to lower arm
Radial	Radial or thumb side of forearm at wrist	Common site to assess character of peripheral pulse; assesses status of circulation to hand
Ulnar	Ulnar side of forearm at wrist	Site used to assess status of circulation to ulnar side of hand; used to perform Allen's test
Femoral	Below inguinal ligament, midway between symphysis pubis and anterior superior iliac spine	Site used to assess character of pulse during physiological shock or cardiac arrest when other pulses are not palpable; assesses status of circulation to the leg
Popliteal	Behind knee in popliteal fossa	Site used to auscultate lower-extremity blood pressure; assesses status of circulation to lower leg
Posterior tibial	Inner side of each ankle, below medial malleolus	Site used to assess status of circulation to foot
Dorsalis pedis	Along top of foot between extension tendons of great and first toe	Site used to assess status of circulation to foot

(From Perry, A.G., Potter, P.A., Ostendorf, W.R. [Eds.]. [2018]. *Clinical nursing skills & techniques* [9th ed.]. St. Louis: Elsevier.)

Figure 1



Palpating the radial pulse. (From Perry, A.G., Potter, P.A., Ostendorf, W.R. [Eds.]. [2018]. *Clinical nursing skills & techniques* [9th ed.]. St. Louis: Elsevier.)

Figure 2



A, Pulse check with patient's forearm at side with wrist extended. **B**, Hand placement for pulse check. (From Perry, A.G., Potter, P.A., Ostendorf, W.R. [Eds.]. [2018]. *Clinical nursing skills & techniques* [9th ed.]. St. Louis:

Elsevier.)

Box 1 Example of the Amplitude of the Pulse on a Scale of 0 to 4

Box 1	Example of the Amplitude of the Pulse on a Scale of 0 to 4
	0 = Absent, not palpable 1 = Diminished, difficult to palpate, thready, weak 2 = Expected, easy to palpate 3 = Full, increased 4 = Bounding, strong

Adapted from Ball, J.W. and others. (2015). Blood vessels. In *Seidel's guide to physical examination* (8th ed., pp. 332-349). St. Louis: Mosby.

This test attempt will not be recorded. To receive credit for any test, you must complete it from your eLearning lesson plan.

(Please select only one answer for each of the following questions)

1. A patient scheduled for discharge in the morning is eager to go home and has been pacing around the medical-surgical unit for the last hour. Which of the following actions should the nurse take before assessing patient's pulse?
 - A. Assess the patient's temperature and respirations.
 - B. Have the patient sit and rest for several minutes.
 - C. Give the patient pain medication.
 - D. Give the patient antianxiety medication.
2. A patient is sitting up in bed. The nurse has obtained a radial pulse in the patient's right arm. Which of the following interventions should the nurse perform next?
 - A. Contact the practitioner immediately.
 - B. Assess the carotid pulse for a pulse deficit.
 - C. Assess the pulse in the left arm.
 - D. Have the patient lie down.
3. The nurse knows that an assistant understands the proper technique for measuring the radial pulse when he or she takes which of the following actions?
 - A. Counts the pulse for 15 seconds and multiplies by 4.
 - B. Has the patient's arm elevated.
 - C. Helps the patient to a supine or sitting position.
 - D. Applies significant pressure to the pulse site.
4. Which of the following statements describes the correct method of assessing a radial pulse in a patient who has an irregular pulse?
 - A. Count the rate for a full 60 seconds.
 - B. Count the rate for 15 seconds and multiply by four.

- C. Count the rate for 30 seconds and multiply by two.
- D. Count the rate for 2 minutes.
5. A nurse is taking the radial pulse of a 26-month-old child who has been crying and holding her breath. The nurse knows that the child's actions can cause which of the following?
- A. A serious arrhythmia that needs immediate attention
- B. An irregular heart rhythm, which is not uncommon in young children
- C. A totally normal rhythm that is no cause for alarm
- D. Atrial fibrillation that puts the child at risk of a stroke
6. A patient is difficult to arouse, and the nurse is unable to obtain a radial pulse. After observing deep and regular breathing, the nurse should take which of the following actions?
- A. Call the practitioner.
- B. Check the ulnar pulse.
- C. Check the carotid pulse.
- D. Check the temporal pulse.

Complete the Test

Sorry, the test is not available to print.

S = Satisfactory | U = Unsatisfactory | NP = Not Performed

S U NP Comments

Performed hand hygiene before patient contact.

Verified the correct patient using two identifiers.

Assessed the patient for risk factors for an abnormal radial pulse.

Assessed the patient for signs and symptoms of altered cardiac function.

Determined the patient's previous baseline pulse rate from the patient's record.

Encouraged the patient to relax as much as possible.

If the patient had been active and his or her condition permitted, waited several minutes before assessing the pulse.

Performed hand hygiene.

Helped the patient assume a supine or sitting position.

If the patient was supine, placed his or her forearm straight alongside the body or across the lower chest or upper abdomen with the wrist extended straight. If the patient was sitting, bent the elbow 90 degrees and supported the lower arm on a chair or the nurse's arm.

Placed the tips of the first two or three fingers over the groove along the radial (or thumb) side of the patient's inner wrist. Slightly extended or flexed the patient's wrist with the palm down until the pulse was strongest.

Lightly compressed the artery against the radius, obliterating the pulse initially. Then eased the pressure so the pulse became easily palpable.

Determined the strength of the pulse (e.g., 0, 1+, 2+, 3+, 4+). Noted whether the thrust of the vessel against the fingertips was absent, thready, weak, strong, or bounding. If this was a repeat assessment, noted any changes in the intensity of the pulse.

S U NP Comments

After palpating a regular pulse, noted the position of the second hand on a wristwatch and then began to count the rate. Began counting with the first beat felt after the second hand had moved toward the next number on the dial; counted as one, then two, and so on.

If the pulse was regular, counted the rate for 30 seconds and multiplied the total by 2.

If the pulse was irregular, counted the rate for a full 60 seconds. Assessed the pattern of irregularity.

Compared the radial pulses bilaterally. If a marked difference between the sides existed, assessed the extremities for perfusion. Notified the practitioner if signs of decreased perfusion, including a change in skin color, edema, a change in skin temperature, and decreased pulse palpability, were present.

Helped the patient to a comfortable position.

Discussed the findings with the patient as needed.

Assessed, treated, and reassessed pain.

Performed hand hygiene.

Documented the procedure in the patient's record.

Learner: _____ Signature: _____

Evaluator: _____ Signature: _____

Date: ____ / ____ / _____

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