

TEMPERATURE, PULSE, AND RESPIRATION

Course

Principles of Health Science

Unit X

Vital Signs

Course

Health Science

Unit VI

CPR / AED & First Aid

Essential Question

Why is it important for health care providers to know how to accurately obtain vital signs?

TEKS

130.202 (c) 1A, 1B, 11A

130.204 (c) 1B, 1D, 8H

Prior Student Learning

Understanding of Anatomy and Physiology-The Cardiovascular and Respiratory Systems

Estimated time
4.5 Hours

Rationale

Vital signs are measurements of the body's most basic functions. The three main vital signs routinely monitored by healthcare providers include body temperature, pulse rate and respiration rate.

Objectives

Upon completion of this lesson, the student will be able to:

- Accurately measure an oral temperature, as well as radial pulse and respiration
- Evaluate a peer using skills check
- Illustrate, with a graph, temperature, pulse and respiration

Engage

Give each student the TPR Safety Sheet, a thermometer, and have a clock with a second hand in the classroom. Have students shake down the thermometer, place in their mouth under the tongue, and time for three minutes. As the students remove their thermometers and read their temperatures, record each temperature on the board. After recording all temperatures, have the students formulate a normal oral temperature range for the class. Compare the results with the textbook range of normal. Do the same for radial pulse and respiration.

Key Points

I. Vital signs include

- A. Temperature
- B. Pulse
- C. Respiration
- D. Blood Pressure

II. Temperature

- A. Refers to temperature inside the body or core body heat.
- B. Can be measured by four basic routes
 1. Oral
 2. Rectal
 3. Axillary
 4. Tympanic
- C. Several types of thermometers
 1. Electronic/Digital
 2. Glass
 3. Thermoscan for Tympanic measurement
- D. Normal temperature ranges
 1. Oral 97.6 degrees F. – 99.6 degrees F.
 2. Axillary 96.6 degrees F. – 98.6 degrees F.

3. Rectal 98.6 degrees F. – 100.6 degrees F.
 4. Tympanic: Manufacturer's guidelines suggest that the measurement is the same as rectal temperatures.
 5. Axillary is one degree Fahrenheit lower than Oral
 6. Rectal is one degree Fahrenheit higher than Oral
- E. Reading temperatures
1. By degree and tenth of a degree
 2. Place thermometer at eye level and look for silver line of mercury
 3. Never place fingers on bulb of thermometer as this might change the value
- F. Thermometers and routes
1. Probes for electronic and mercury-free ends are color coded for route.
 2. Red = rectal; Blue = oral/axillary
 3. If no color present, the route will be written on the thermometer
- G. Measurement of temperature
1. Use protective cover on each thermometer
 2. Tympanic probe placed in ear
 3. Rectal thermometer or probe placed in rectum one inch with lubrication applied before insertion.
 4. Oral thermometer placed in mouth under the tongue
 5. Do not take oral temperatures on
 - a. preschool children
 - b. patients with oxygen
 - c. delirious, confused, disoriented patients
 - d. comatose patients
 - e. patients with nasogastric tubes in place
 - f. patients who have had oral surgery
 - g. patients who are vomiting or are quite nauseated
 6. Do not take rectal temperatures on
 - a. infants or children unless a core temperature is needed
 - b. patients who have had rectal surgery
 - c. combative patients
- H. Duration of taking temperature
1. Tympanic – a couple of seconds – long enough to gently press a button.
 2. Oral and rectal (glass thermometer) – three minutes.
 3. Axillary glass thermometer) – 10 minutes
 4. Electronic temperatures – when beep sounds, temperature is obtained
- I. Abnormal temperatures
1. Fever, febrile, hyperthermia all indicate someone who has an elevated temperature (greater than 100 degrees Fahrenheit).
 2. High fever would include anything over 103 degrees Fahrenheit.
 3. Moderate fever would include anything 100 – 103 degrees Fahrenheit.

4. Hypothermia is subnormal temperature. This can be equally problematic for a person. Anything under 96 degrees Fahrenheit would indicate hypothermia.

III. Pulse

- A. Wave of blood produced by beating of heart and traveling along the artery
- B. Can feel at points where the artery is between finger tips and a bony area
- C. These areas are called pulse points and include
 1. Temporal
 2. Carotid
 3. Apical
 4. Brachial
 5. Radial
 6. Femoral
 7. Popliteal
 8. Dorsal Pedalis
- D. Measured by index, middle, and ring fingers over pulse point.
- E. Do not take with the thumb, since it has a pulse of its own.
- F. Count for 30 seconds and multiply by 2, or count for 60 seconds
- G. Normal range is 60 – 100 beats per minute. The area of 90-100 is a gray area in that a pulse should never constantly remain in this area.
- H. > than 100 = tachycardia
- I. < than 90 = bradycardia
- J. Quality of pulse is determined as well as rate
 1. Rhythm – regular or irregular
 2. Strength – Bounding or thready
- K. Circumstances affecting pulse rate
 1. Body temperature
 2. Emotions
 3. Activity level
 4. Health of heart
- L. Perfusion is the flow of blood throughout the body. Someone with sufficient perfusion has a strong enough heart beat to adequately oxygenate the body.

IV. Respiration

- A. Each breath includes inspiration and expiration.
- B. Measure by observing chest rise and fall.
- C. Measured in breaths per minute.
- D. Normal range = 12-24 breaths per minute.
- E. > than 24 = tachypnea – if breathing in great depth then called hyperpnea
- F. < than 12 = bradypnea
- G. Difficulty in breathing is called dyspnea
- H. Quality of breathing is determined as well as the rate of breathing
 1. Depth

2. Clarity of breath sounds
3. Pain with breathing
4. Difficulty breathing – use of accessory muscles – sternocleidomastoid and intercostal muscles

V. Procedure for taking TPRs

- A. If using glass thermometer, insert the thermometer. If axillary or rectal hold the thermometer throughout the time. If oral, insert the thermometer and proceed to take the pulse and respiration.
- B. If using electronic – take the temperature first, then proceed to the pulse and respiration.
- C. When taking the pulse and respiration, do not drop the wrist until both the pulse and respiration are taken. This way the person does not know when his/her respirations are being measured – insuring a more accurate measurement.
- D. When measuring axillary temperature, remove any clothing that could impede the accuracy of the temperature. Also clean the axilla if there is excessive deodorant or perspiration present.
- E. When measuring the rectal temperatures, always lubricate the thermometer with water-soluble gel before inserting into the rectum.
- F. Never touch the bulb end of the thermometer with the fingers.

VI. Charting

- A. Chart in order of TPR
- B. Do not write T =, P =, etc., simply 98.6 – 84 – 22.

VII. Instruct on the correct reading of a glass thermometer

- A. Read between the markings and numbers.
- B. Large lines indicate full degrees.
- C. Small lines are two-tenths of a degree.

Activity

- I. Practice the combined skill of taking temperature, pulse, and respiration by taking the TPR of each class member and record it on a sheet of paper in the format T-P-R and on a graphic sheet. See [Graphing TPRs](#).
- II. Check skill of taking oral temperature, pulse, and respiration by completing a peer evaluation with another classmate (Check 1 on Skill Examination Checklist).
- III. As students are waiting to test, they will complete Terminology and Abbreviations for Temperature, Pulse, and Respiration.

Teachers Note: Obtain a copy of a local facility's graphic sheet to use with graphing TPRs

- * May have HST II or HST III students help with vital signs skills
- * May also use HOSA Nursing Assistant Skills Sheets – www.hosa.org

IV. Complete the Vital Signs Case Study. Answers will vary, but they should indicate the student's ability to apply information.

Assessment

- I. Successful performance of the TPR skill test in 10 minutes
 - Instructor to use Check 2 or HOSA Nursing assistant skills rubric
- II. Successful completion of the written objective test.

Materials

Manikin with orifice for insertion of rectal thermometer
 Glass, electronic, and Thermoscan thermometers
 Lubricating jelly
 Protective covers for all thermometer types
 Clock
 Timer for test
 Skill checklist
 Container for thermometers
 Alcohol
 Graphic sheet used to chart vital signs (Obtain from your local hospital)
 Videos – Mosby's Nursing assistant Skills Video Series
 Sorrentino, Sheila A. *Mosby's Textbook for Nursing Assistants, 5th edition*. St. Louis, Mosby Year Book, 1999.
 Texas Department of Human Services Curriculum for Long Term Care Providers.

KEY: Test Vital Signs: TPR

Sorrentino, Sheila A. *Mosby's Textbook for Nursing Assistants, 6th edition*. St. Louis, Mosby Year Book, 1999.

<http://www.dads.state.tx.us/providers/NF/credentialing/NATCEP/cna.pdf>
 (Click on Nurse Aide Curriculum)

Accommodations for Learning Differences

For reinforcement, the student will take 15 TPRs of a biology class in the high school, analyzing each for any abnormality, and submitting their findings before the skills and written test. (oral temperatures)

For enrichment, the student will prepare and present a presentation on temperature, pulse, and respiration for an elementary class. See Presentation Rubric.

National and State Education Standards

National Health Science Cluster Standards

HLC 10.01 Technical Skills

Healthcare workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS

130.202 (c)(1)(A) convert units between systems of measurement;

130.202 (c)(1)(B) apply data from tables, charts, and graphs to provide solutions to health-related problems; and

130.202 (c)(11)(A) identify technological equipment used in each of the five systems and relate findings to identified societal risk factors.

130.204 (c)(1)(B) communicate using medical terminology;

130.204 (c)(1)(D) interpret complex technical material related to the health science industry; and

130.204 (c)(8)(H) demonstrate first aid, vital signs, cardiopulmonary resuscitation, and automated external defibrillator skills in a laboratory setting.

Texas College and Career Readiness Standards

English Language Arts

II. B. Understand new vocabulary and concepts and use them accurately in reading writing and speaking.

III. B. Develop effective speaking styles for both group and one on one situations.

IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.

Mathematics

IV. A. 1. Select and use the appropriate type of unit for the attribute being measured.

IV. B. 1. Convert from 1 measuring system to another

IV. B. 2. Convert within a single measurement system.

Social Studies

IV. B. 3. Gather, organize and display the results of data and research.

GRAPHING TEMPERATURE/PULSE/RESPIRATION

Using the graphic record that you received in this packet, chart the TPR of each of the students that you obtained when practicing the skill of measuring temperature, pulse, and respiration.

Each student will represent a time slot, as though you obtained TPR every four hours on the same patient. Connect the lines for each of the graphs. Can you draw any conclusions about the temperature, pulse, and respiration of each of your classmates?

Are all temperatures basically within the same range?

Using the graph, what would you say the normal range was for oral temperatures? What does your book say is the normal range?

Are the pulses basically within the same range? Using the graph, what would you say the normal range was for pulses? What does your book say the normal range is?

Are the respiratory rates within the same range? Using the graph, what would you say the normal range was for respiration? What does your book say the normal range is?

TEST: VITAL SIGNS: TEMPERATURE, PULSE, RESPIRATION

NAME: _____

Fill in the Blank: For each of the questions, write the correct answers in the corresponding blanks provided.

1. – 4. List the four vital signs of body function.

5. – 8. Give the four routes for measuring temperature.

9. What would you ask a patient before measuring his/her oral temperature?

_____ 10. The _____ should not be used to take the pulse because it has a pulse of its own.

_____ 11. Each _____ involves one inhalation and one exhalation.

_____ 12. The pulse should be taken one full minute if it is _____, a word meaning abnormal in rhythm.

_____ 13. Difficult, labored, or painful breathing is called _____.

_____ 14. Respirations and pulse are counted for _____ each, unless they are abnormal in rhythm or rate.

_____ 15. The speed of the heart beating or of breathing is called _____.

_____ 16. Faster than normal, shallow breathing is called _____.

_____ 17. Faster than normal, deep breathing is _____.

_____ 18. Slower than normal breathing is _____.

_____ 19. No breathing is _____.

_____ 20. Normal breathing is _____.

- _____ 21. A heartbeat greater than 100 beats per minute is _____.
- _____ 22. A heartbeat less than 60 beats per minute is _____.
- _____ 23. The normal respiratory range is _____.
- _____ 24. The normal oral temperature range is _____.
- _____ 25. We would expect a rectal temperature to be _____
_____ than an oral temperature.
- _____ 26. The normal adult pulse range is _____.
- _____ 27. How far is a rectal thermometer inserted?
- _____ 28. How long is an axillary thermometer left in place?
- _____ 29. – 30. You are taking vital signs of a 65-year-old woman. Her TPR is 95.7 ° - 56 – 22. Which, if any, of the vital signs would you report?
- _____ 31. The abbreviation SOB means _____.
- _____ 32. If taking a rectal temperature with a glass thermometer, you would choose the thermometer that is _____ in color.
- _____ 33. When taking a radial pulse, you would press on the _____ side of the wrist.
- _____ 34. Respirations gradually increasing in rapidity and volume, reaching a climax, and then gradually subsiding until they cease are known as _____.

Multiple Choice: For each of the following, select the best answer and write the letter in the space provided.

- _____ 35. An oral glass temperature is taken for
- a. 5 minutes
 - b. 3 minutes
 - c. 2 minutes
 - d. 10 minutes

- _____ 36. A rectal glass temperature is taken for
- 5 minutes
 - 3 minutes
 - 2 minutes
 - 10 minutes
- _____ 37. The most accurate temperature is the
- oral
 - axillary
 - rectal
 - tympanic
- _____ 38. A temperature of 103 – 105 degrees F. is
- normal oral
 - high fever
 - normal rectal
 - borderline fever
- _____ 39. A temperature below 96 degrees F. is
- normal axillary
 - below normal
 - normal oral
 - borderline fever
- _____ 40. A temperature of 100 – 103 degrees F. is
- normal oral
 - moderate fever
 - normal rectal
 - borderline fever
- _____ 41. A temperature of 99.6 degrees F. is
- normal oral
 - normal axillary
 - below normal
 - moderate fever
- _____ 42. If a person's heart doesn't always beat hard enough to produce a wave of blood, their pulse would be
- irregular
 - regular
 - bounding
 - thready

- _____ 43. The number of pulse, heartbeats, or respirations per minute is
- a. quality
 - b. rate
 - c. volume
 - d. vital signs
- _____ 44. Volume, strength of pulse beats
- a. quality
 - b. rate
 - c. vital signs
- _____ 45. On a Fahrenheit glass thermometer, how many degrees do the short lines indicate?
- a. 1 degree
 - b. 2 degrees
 - c. 0.1 degree
 - d. 0.2 degree
- _____ 46. If you count the chest rising 15 times in one minute, you would report
- a. 30 respirations per minute
 - b. 15 respirations per minute
 - c. 7 respirations per minute
- _____ 47. If you count nine respirations in 30 seconds, you would report
- a. 27 respirations per minute
 - b. 9 respirations per minute
 - c. 18 respirations per minute
- _____ 48. A popliteal pulse is found
- a. in the groin
 - b. behind the knee
 - c. on top of the foot
 - d. at the neck
- _____ 49. A femoral pulse is found
- a. in the groin
 - b. behind the knee
 - c. on top of the foot
 - d. at the neck
- _____ 50. A temporal pulse is found
- a. at the neck
 - b. at the side of the head
 - c. at the elbow
 - d. behind the ear

_____ 51. If a person has a blue cast to their nail beds and feels cold to the touch, we say they have

- a. a pulse deficit
- b. an irregular pulse rate
- c. poor perfusion
- d. a bounding pulse

_____ 52. Temperatures are not taken orally if a patient is receiving oxygen.

- a. true
- b. false

_____ 53. Temperatures are taken orally on children younger than 4-5 years of age.

- a. true
- b. false

_____ 54. Oral temperatures are not taken on someone who is delirious, restless, confused, or disoriented.

- a. true
- b. false

_____ 55. A rectal temperature is not taken when a person

- a. is unconscious
- b. needs a core body temperature measurement
- c. has a nasogastric tube
- d. has had rectal surgery

56. – 60 Record the temperature found on the glass thermometers placed in the classroom.

56.

57.

58.

59.

60.

KEY FOR TEST: VITAL SIGNS: TEMPERATURE, PULSE, RESPIRATION

2. – 4. Blood Pressure Temperature Pulse Respiration

5. – 8. Oral Rectal Axillary Tympanic

10. Have you had anything hot or cold to drink, smoked or chewed gum in the last 15 minutes?

10. Thumb

11. Respiration

12. Irregular

13. Dyspnea

14. 30 seconds

15. Rate

16. Tachypnea

17. Hyperpnea or Hyperventilation

18. Bradypnea

19. Apnea

20. Eupnea

21. Tachycardia

22. Bradycardia

23. 12-24 breaths per min.

24. 97-99 degrees F.

25. One degree higher

26. 60-100 beats per min.

27. 1 inch

28. 10 minutes

29-30 Temperature and pulse

31. Short of Breath

32. Red

33. Thumb

34. Cheyne-Stokes

35. B

36. B

37. C

38. B

39. B

40. B

41. A

42. A

43. B

44. A

45. D

46. B

47. C

48. B

49. A

50. A

51. C

52. A

53. F

54. A

55. D

TERMINOLOGY AND ABBREVIATIONS FOR TEMPERATURE, PULSE, AND RESPIRATION

For each of the following abbreviations and terms, make a flash card. With a partner, drill the terms.

Abbreviations:

SOB	q4h
qid	
—	tid
q	
—	bid
s	
—	hs
c	
TPR	prn
	Ad lib
B/P	—
	qod
V/S or VS	—
	qd

Terminology:

tachypnea	hyperventilation
bradypnea	dyspnea
tachycardia	fever
bradycardia	febrile
systole	afebrile
asystole	angina
eupnea	wheezing
apnea	rales
hyperpnea	rhonchi
bounding	orthopnea
thready	

Vital Signs Case Studies

Read the scenario and determine how the descriptions presented relate to the concepts learned about vital signs. Analyze your findings to arrive at a conclusion.

You have been assigned to observe with Ms. Roberts, the charge nurse on Medicine 3B. One patient is a young man, James Donaldson, who is obviously ill. Ms. Roberts tells you that his temperature is 102 degrees. He has a severe headache. There is no indication of a site infection. A final diagnosis has not yet been made. The attending physician, Dr. Sampson, comes by to see the patient and says, "I'll give him a prescription to make him more comfortable, but let's not start antibiotics for 12 hours." Analyze this information to explain the order.

While you were on duty in the Emergency Room, you observed an accident victim with a severe head injury. The skull was fractured and there appeared to be brain injury. His temperature was 105 degrees. Apply the information given to suggest a cause for this temperature elevation.

As you worked in the clinic, a patient came in with a blood pressure of 180/95, a temperature of 100 degrees, and a respiration of 30. What range of pulse rate would you expect to find? Explain your answer.