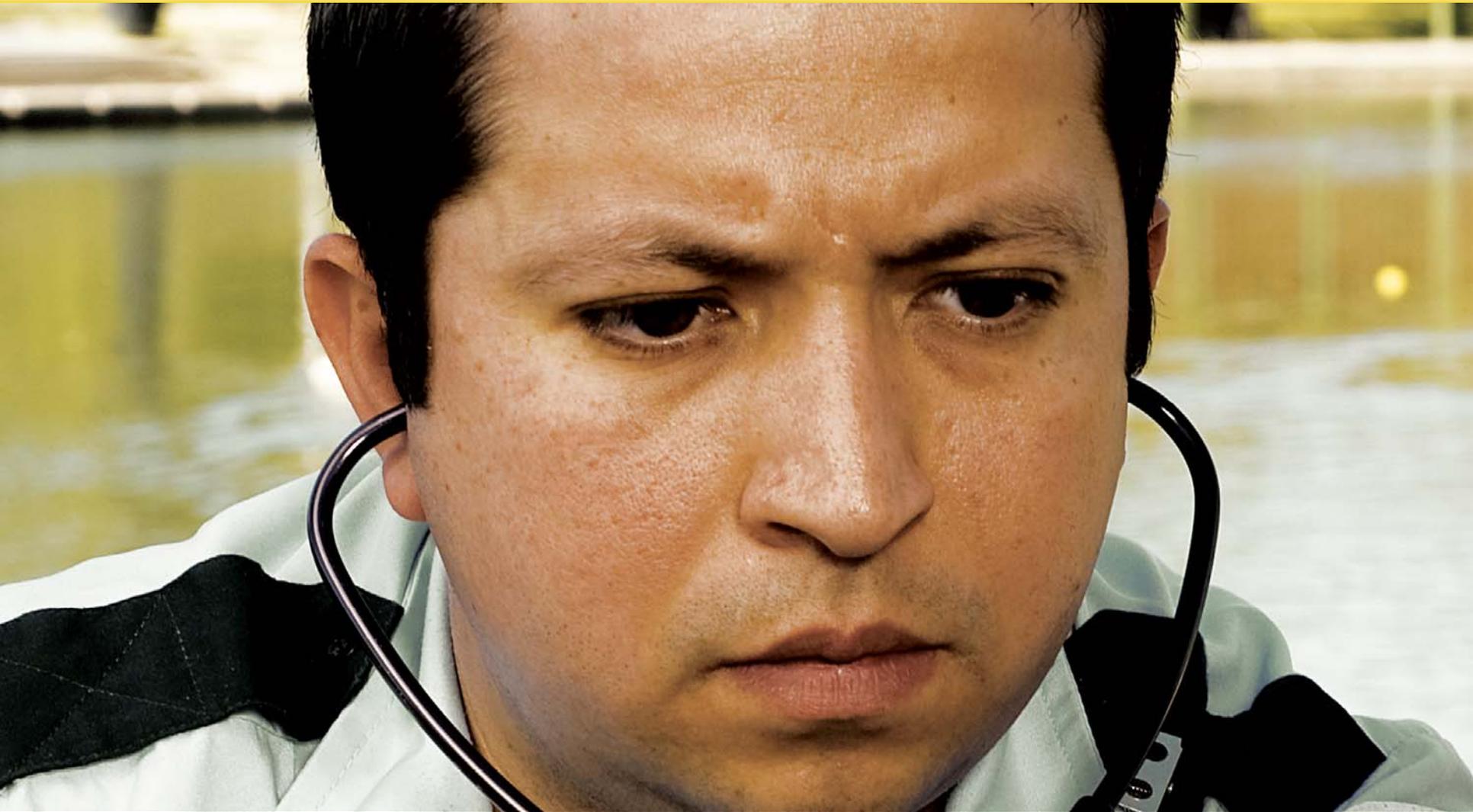


12

Vital Signs and Monitoring Devices



OBJECTIVES

- 12.1** Define key terms introduced in this chapter. Slides [13–15](#), [17](#), [21–22](#), [26](#), [28](#), [30](#), [32–33](#), [35](#), [44](#), [47–48](#), [50](#), [55](#), [60](#)
- 12.2** Identify the vital signs used in prehospital patient assessment. Slide [13](#)
- 12.3** Explain the use of vital signs in patient care decision making. Slide [11](#)

continued

OBJECTIVES

- 12.4** Integrate assessment of vital signs into the patient assessment process, according to the patient's condition and the situation. Slides [13–14](#)
- 12.5** Discuss the importance of documenting vital signs and the times they were obtained in the patient care record. Slides [31](#), [36](#), [59](#)

continued

OBJECTIVES

- 12.6** Demonstrate assessment of pulse, respirations, skin, pupils, blood pressure, oxygen saturation, and blood glucose. Slides [16](#), [25–30](#), [36](#), [38](#), [40–42](#), [44–46](#), [48–56](#), [59–65](#)
- 12.7** Integrate assessment of mental status and ongoing attention to the primary assessment while obtaining vital signs. Slides [11](#), [14](#)

continued

OBJECTIVES

- 12.8** Differentiate between vital signs that are within expected ranges for a given patient, and those that are not. Slides [18–20](#), [34](#), [39–40](#), [42–43](#), [46](#), [59](#), [61](#), [67](#)
- 12.9** Discuss situations in which assessing body temperature may be appropriate and acceptable methods of measuring body temperature. Slides [58–59](#)

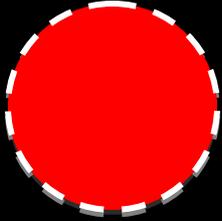
continued

OBJECTIVES

12.10 Compare and contrast the techniques of assessment and expected vital sign values for pediatric and adult patients. Slides [29](#), [41](#)

MULTIMEDIA

- [Slide 69 Health and Physical Assessment: Vital Signs Video](#)
- [Slide 70 Blood Pressure Assessment Video](#)



CORE CONCEPTS

- How to obtain vital signs, including pulse, respirations, blood pressure, skin, temperature, and pupils
- How to document vital signs on a prehospital care report
- How to use various monitoring devices

Topics

- Gathering the Vital Signs
- Vital Signs

Gathering the Vital Signs

Importance of Vital Signs

- Outward signs of what is going on inside the body
- Identify important conditions or trends in patient conditions
- Gathered on virtually every EMS patient
- Patient severity and treatment priorities may prevent acquisition

Vital Signs

What Are Vital Signs?

- Pulse
- Respiration
- Skin color, temperature, and condition
(plus capillary refill in infants and children)
- Pupils
- Blood pressure

continued

What Are Vital Signs?

- Baseline vital signs: first vital signs obtained
- Repeat vital signs: gain further information by establishing trends

Pulse

- Palpable pressure of heart beating, causing blood to move through arteries in waves

continued

Pulse

- Can be felt by placing fingertip over artery where it lies close to body's surface and crosses over bone



Pulse Rate

- Number of beats of heart per minute
- Varies among individuals

continued

Pulse Rate

- Normal rate for adult at rest is between 60 and 100 beats per minute
- Rate above 100 beats per minute is rapid
- Tachycardia—rapid pulse

continued

Pulse Rate

- Rate below 60 beats per minute is considered slow
- Bradycardia—slow pulse

continued

Pulse Rate

- Above 120 beats or below 50 beats per minute is considered a serious finding

Think About It

- What normal situations might account for a heart rate outside the normal range?

Pulse Quality

- Two factors determine pulse quality
 - Rhythm
 - Force

Pulse Rhythm

- Reflects regularity
 - Regular when intervals between beats are constant
 - Irregular when intervals are not constant

Pulse Force

- Pressure of pulse wave as it expands artery
 - Pulse should feel strong
 - Thready—when pulse feels weak and thin

Common Pulse Locations

- Radial
- Brachial
- Carotid

Radial Pulse

- Used in patients older than 1 year
- Wrist pulse

continued

Radial Pulse

- Found by placing first three fingers on thumb side of patient's wrist just above the crease



Brachial Pulse

- Used in patients younger than 1 year
- Upper arm pulse

continued

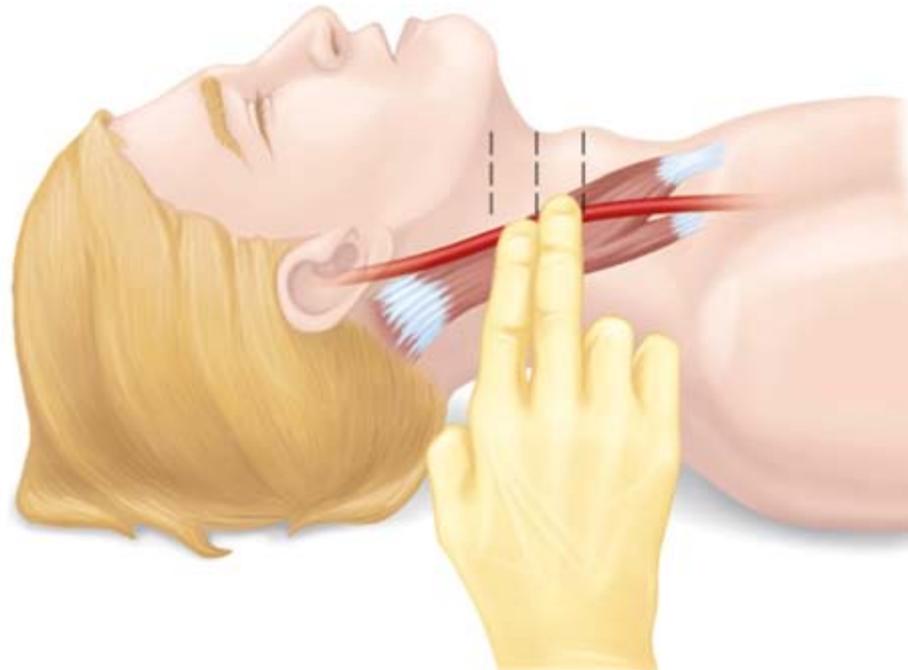
Brachial Pulse



- Found by placing three fingers on patient's anterior upper arm (between bicep and triceps muscle) just distal to armpit

Carotid Pulse

- Felt along large carotid artery on either side of the neck



Assessing Pulse

- Count pulsations for 30 seconds and multiply by 2
- If rate, rhythm, or force is not normal, continue with count for full 60 seconds
- Judge rhythm and force

Respirations

- With regard to vital signs, respiration means the act of breathing in and out
- Measurement includes both rate and quality

Respiratory Rate

- Respiratory rate—number of breaths the patient takes in 1 minute
- Rate of respiration is classified as normal, rapid, or slow

continued

Respiratory Rate

- Normal rate for adult at rest: 12–20 breaths per minute
- Age, sex, size, physical conditioning, and emotional state influence breathing rates
- Rates above 24 breaths per minute (rapid) or below 8 breaths per minute (slow) are potentially serious findings

Respiratory Quality

- Four categories
 - Normal
 - Shallow
 - Labored
 - Noisy

Assessing Respirations

- Count respirations after assessing pulse rate
- Count number of breaths taken over 30 seconds and multiply by 2
- Note rate, quality, and rhythm of respiration

Skin

- Color, temperature, and condition of skin can provide valuable information regarding circulation

Skin Color

- Best places to assess skin color
 - Nail beds
 - Inside of cheek
 - Inside of lower eyelids

continued

Skin Color

- Abnormal skin colors
 - Pale
 - Cyanotic (blue-gray)
 - Flushed (red)
 - Jaundiced (yellow)

Skin Temperature



- Feel patient's skin with back of hand
- Note if skin feels normal (warm), hot, cool, or cold

Skin: Pediatric Note

- For children under 6 years, also evaluate capillary refill



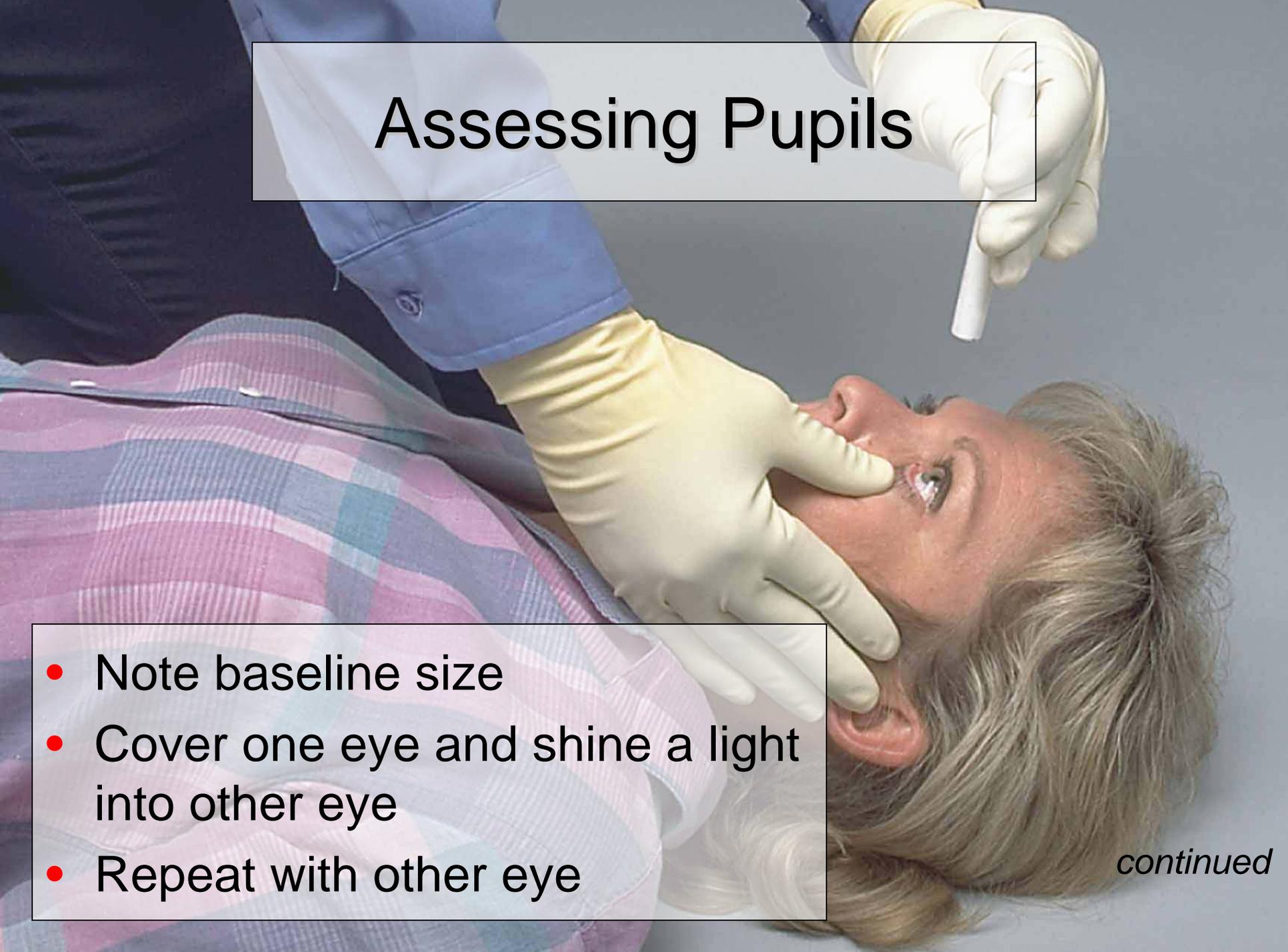
Evaluating Capillary Refill

- Press on nail bed or top of hand or foot and release
- Observe how long it takes normal pink color to return
- Normal—less than 2 seconds

Pupils

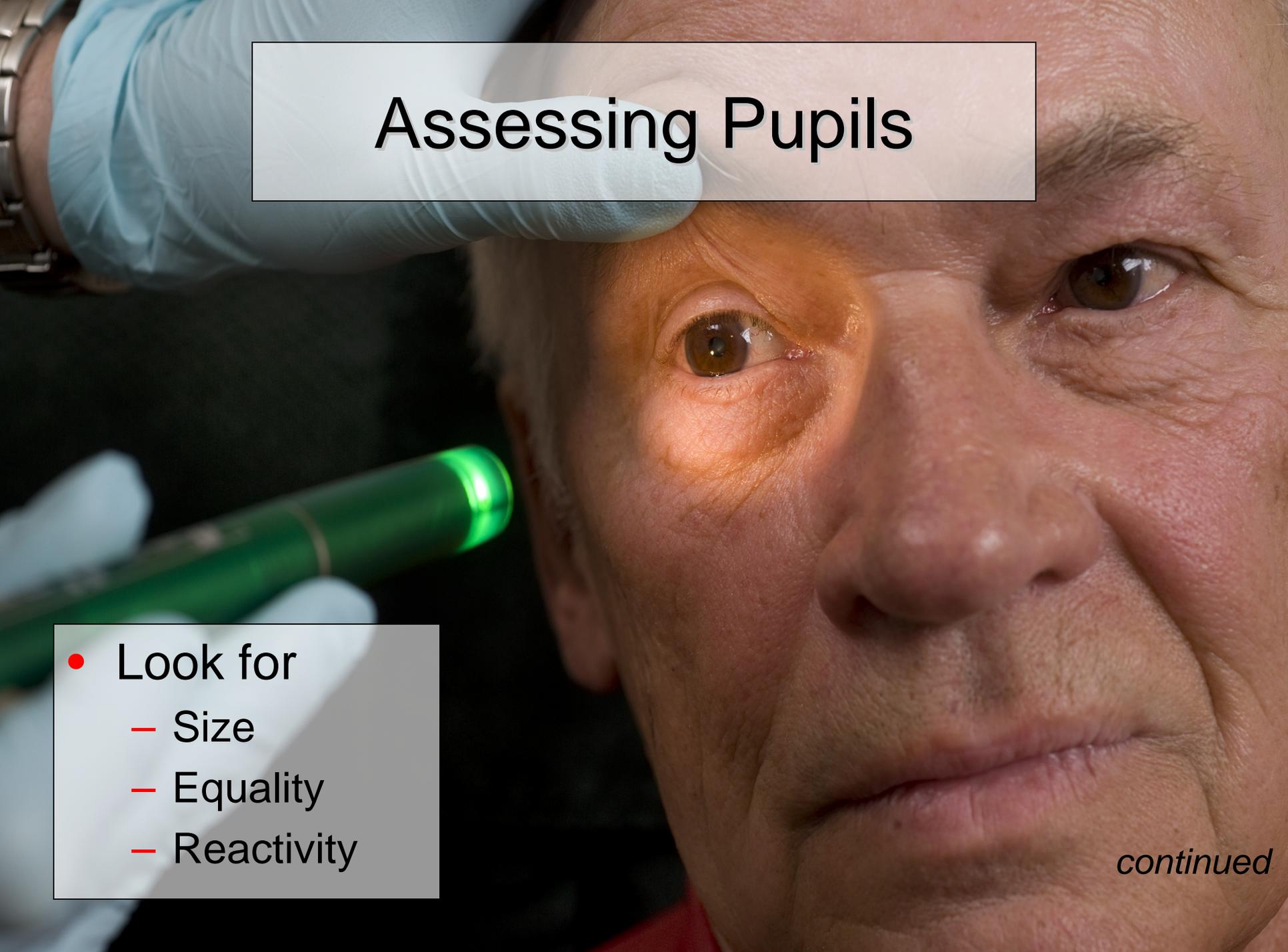
- Black center of eye
- Dim environment—pupil will dilate
- Bright environment—pupil will constrict

Assessing Pupils



- Note baseline size
- Cover one eye and shine a light into other eye
- Repeat with other eye

continued



Assessing Pupils

- Look for
 - Size
 - Equality
 - Reactivity

continued

Assessing Pupils



Constricted pupils



Dilated pupils



Unequal pupils

Blood Pressure

- Change is more significant than one measurement
- Normal pressure
 - Systolic no greater than 120 mmHg
 - Diastolic no greater than 80 mmHg

Measuring Blood Pressure

- Measured with a sphygmomanometer and stethoscope
- Cuff should cover two thirds of upper arm



continued

Measuring Blood Pressure

- Wrap cuff around patient's upper arm
- Lower edge of cuff placed about 1 inch above crease of elbow
- Center of bladder placed over brachial artery

Assessing Blood Pressure by Auscultation

- Position cuff and stethoscope
- Palpate brachial artery at crease of elbow
- Position stethoscope

continued

Assessing Blood Pressure by Auscultation

- Place diaphragm of stethoscope directly over brachial pulse or medial anterior elbow

continued

Assessing Blood Pressure by Auscultation

- Inflate cuff
- Listen and inflate until gauge reads 30 mm higher than the point the pulse sound disappeared

continued

Assessing Blood Pressure by Auscultation

- Obtain systolic pressure
 - Slowly release air from cuff
 - When you hear the first of these sounds, note the reading on gauge

continued

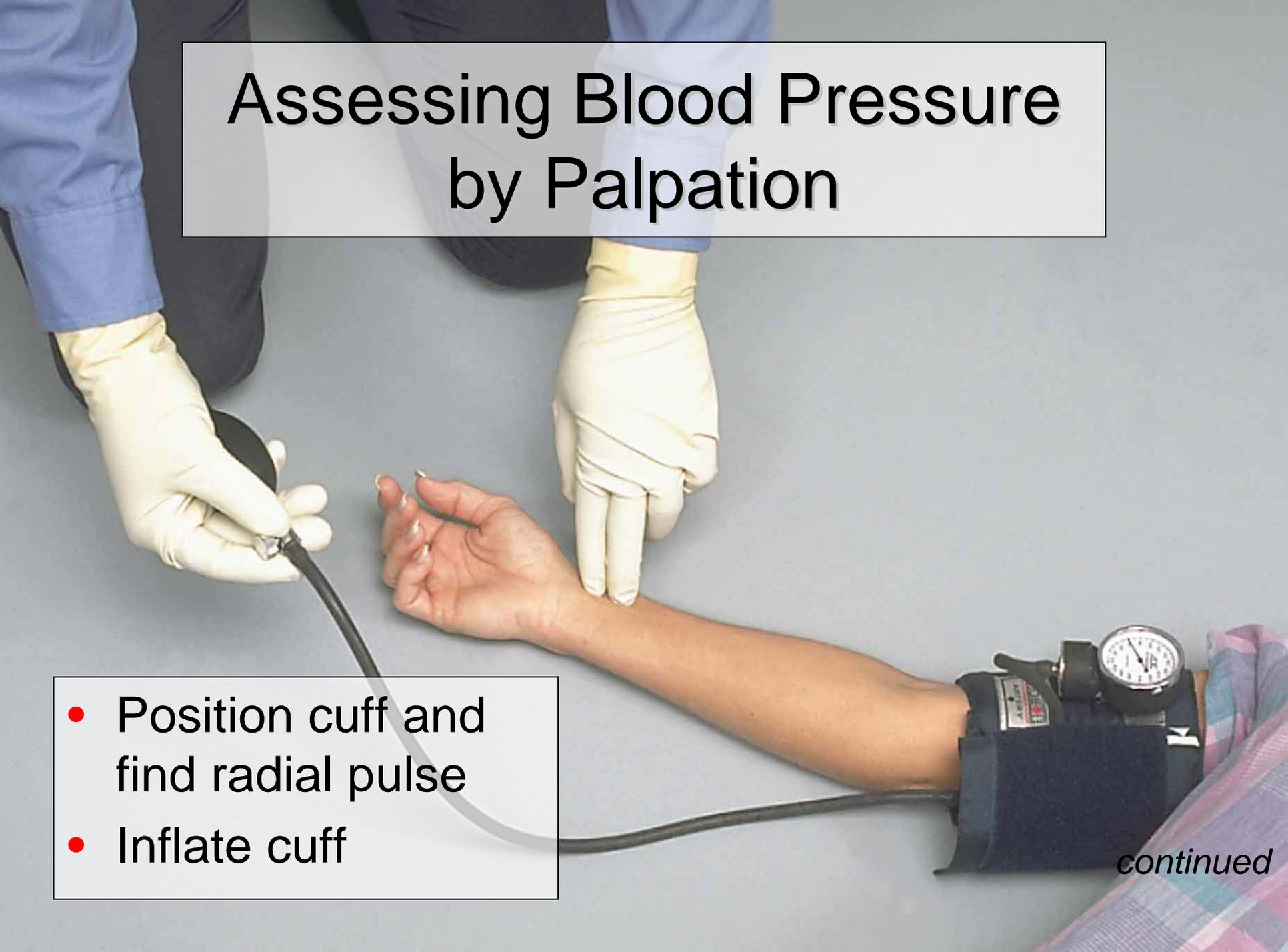
Assessing Blood Pressure by Auscultation

- Obtain diastolic pressure
 - Continue to deflate cuff
 - When sounds turn to dull, muffled thuds, the reading on the gauge is diastolic pressure

Assessing Blood Pressure by Palpation

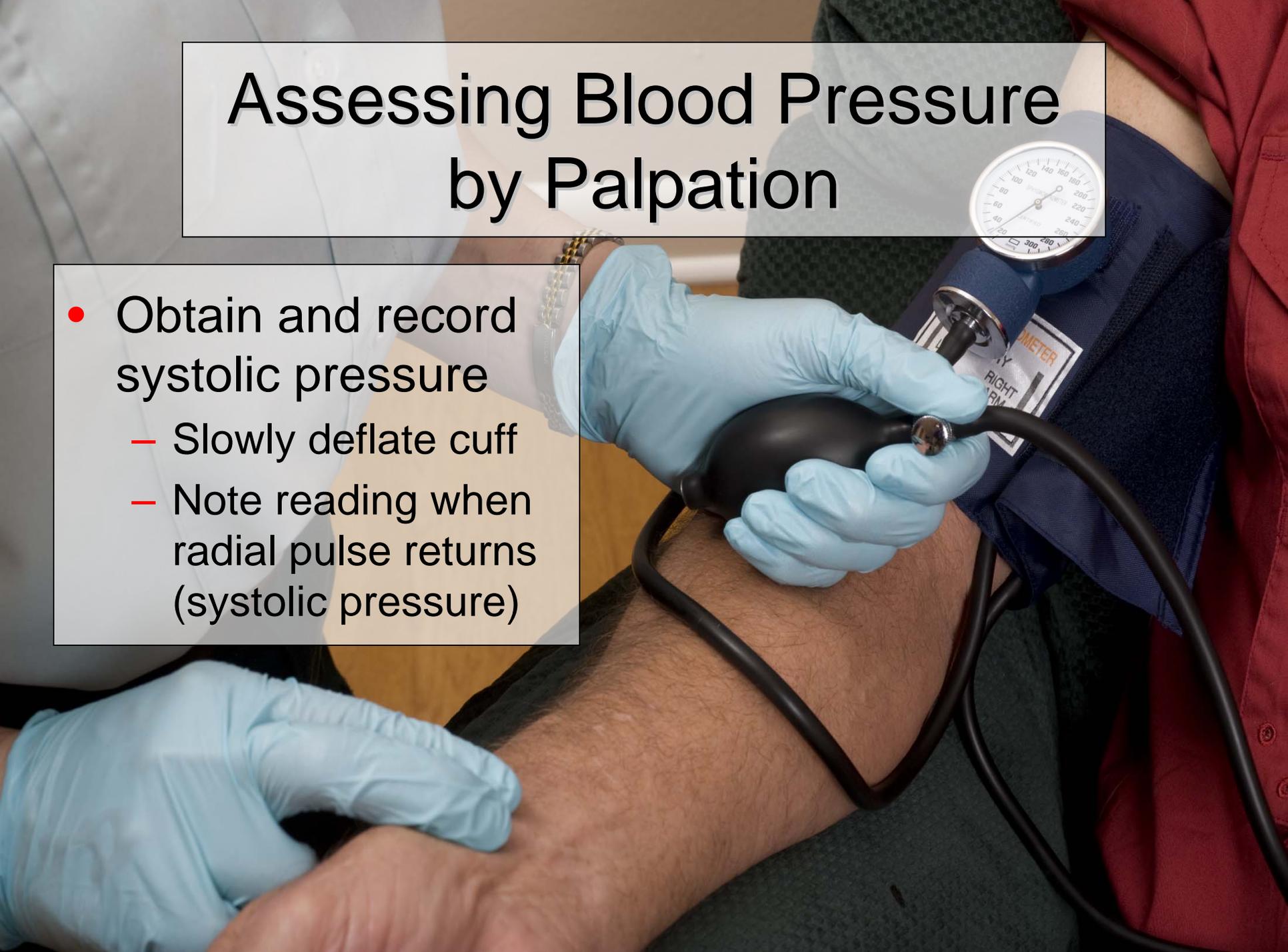
- Position cuff and find radial pulse
- Inflate cuff

continued



Assessing Blood Pressure by Palpation

- Obtain and record systolic pressure
 - Slowly deflate cuff
 - Note reading when radial pulse returns (systolic pressure)



Pediatric Note: Blood Pressure

- Difficult to obtain on infants and children younger than 3 years
- Use age/size-appropriate cuff

Temperature

- Narrow range of temperature allows chemical reactions and other activities to take place inside the body
- Core temperature reflects level of heat inside trunk

continued

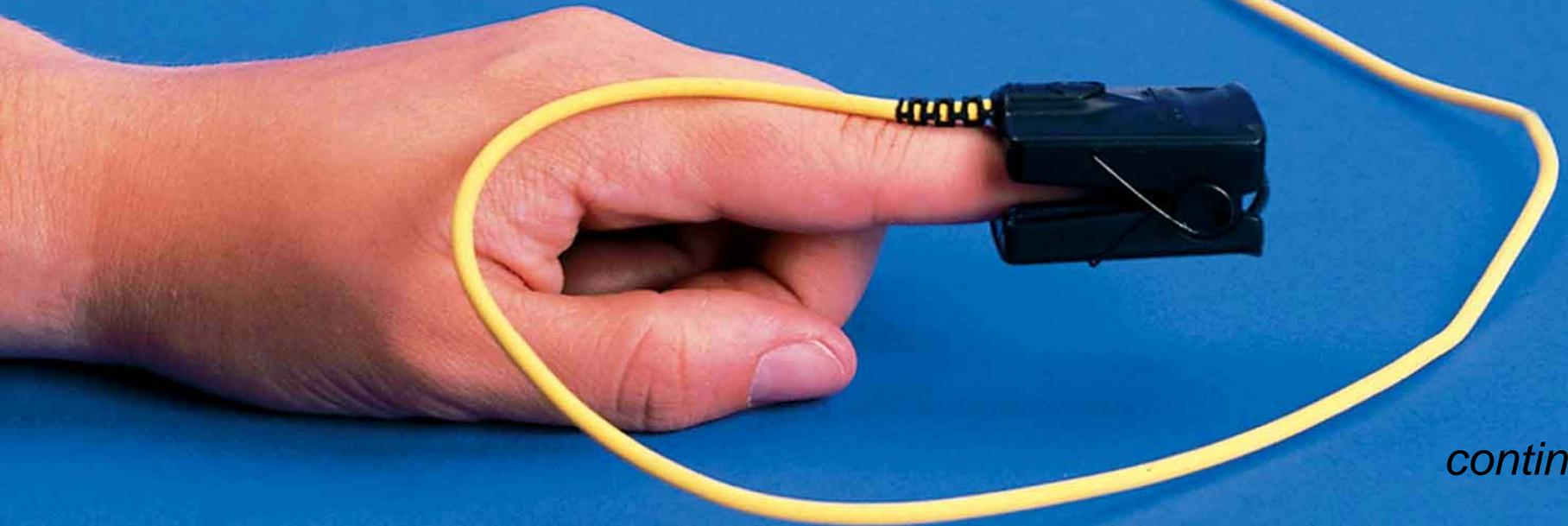
Temperature

- Normal temperature depends on
 - Time of day
 - Activity level
 - Age
 - Where measured



Oxygen Saturation

- Measurement of proportion of oxygen attached to hemoglobin
- Measured with pulse oximeter



continued

Oxygen Saturation

- Normal: 96%–100%
- Mild hypoxia: 91%– 95%
- Significant or moderate hypoxia: 86%–90%
- Severe hypoxia: 85% or less

continued

Oxygen Saturation

- Accuracy of reading can be affected by
 - Shock, hypothermia
 - Carbon monoxide, certain other uncommon types of poisoning
 - Excessive movement, nail polish, anemia

Blood Glucose

- Measures quantity of glucose in the bloodstream
- Can help identify some diabetic emergencies

Blood Glucose Monitor



MADE IN CHINA

Blood Glucose Measurement

- Permission from medical direction or by local protocol is required to perform blood glucose monitoring using a blood glucose meter
- Monitors must be calibrated and stored according to manufacturer's recommendations

Acquiring Blood Glucose Measurement

1. Prepare device, test strip, and lancet
2. Cleanse patient's finger with alcohol
3. Perform finger stick with lancet
4. Wipe away first drop of blood
5. Apply blood to test strip
6. Use glucose meter to analyze sample and provide reading

Blood Glucose Levels

- Normal level
 - Usually at least 60–80 mg/dL
 - No more than 120 or 140 mg/dL

Vital Signs: Pediatric Note

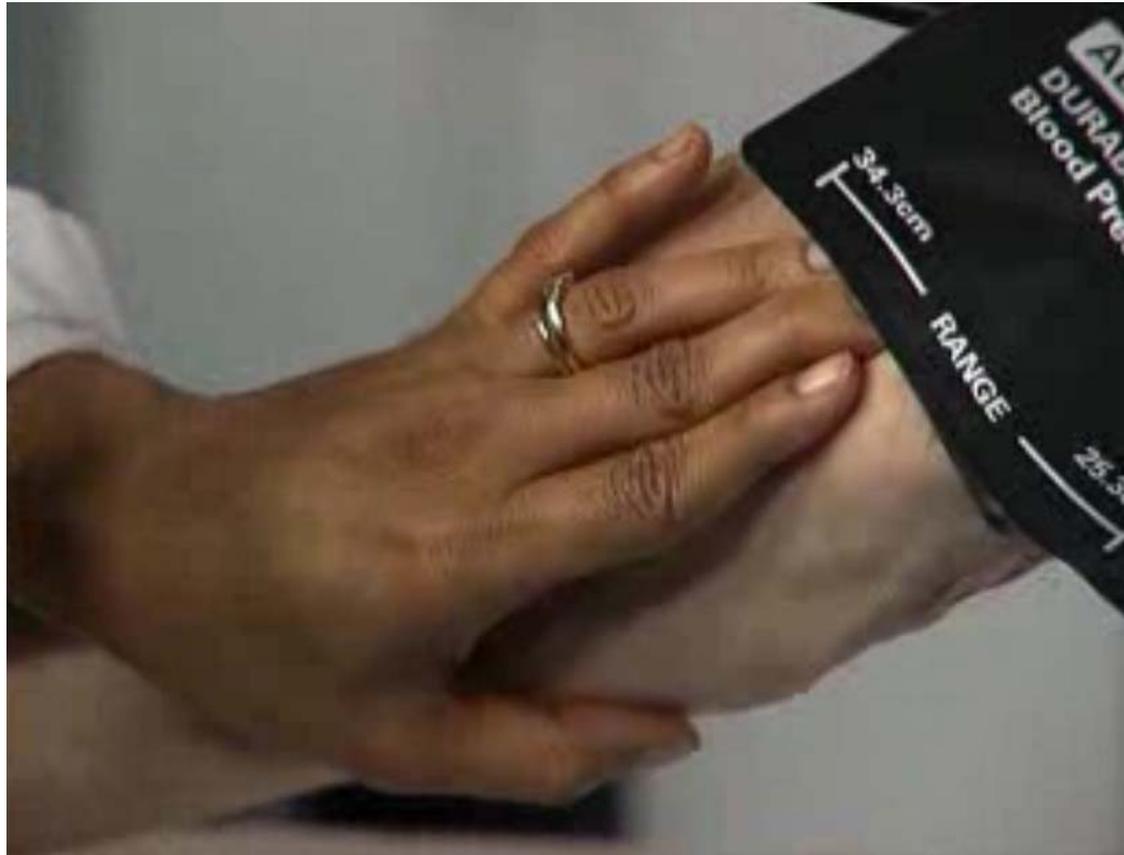
- Age is one of the most important factors determining normal range
- Infants and children: faster pulse and respiratory rates, and lower blood pressures than adults

Health and Physical Assessment: Vital Signs Video

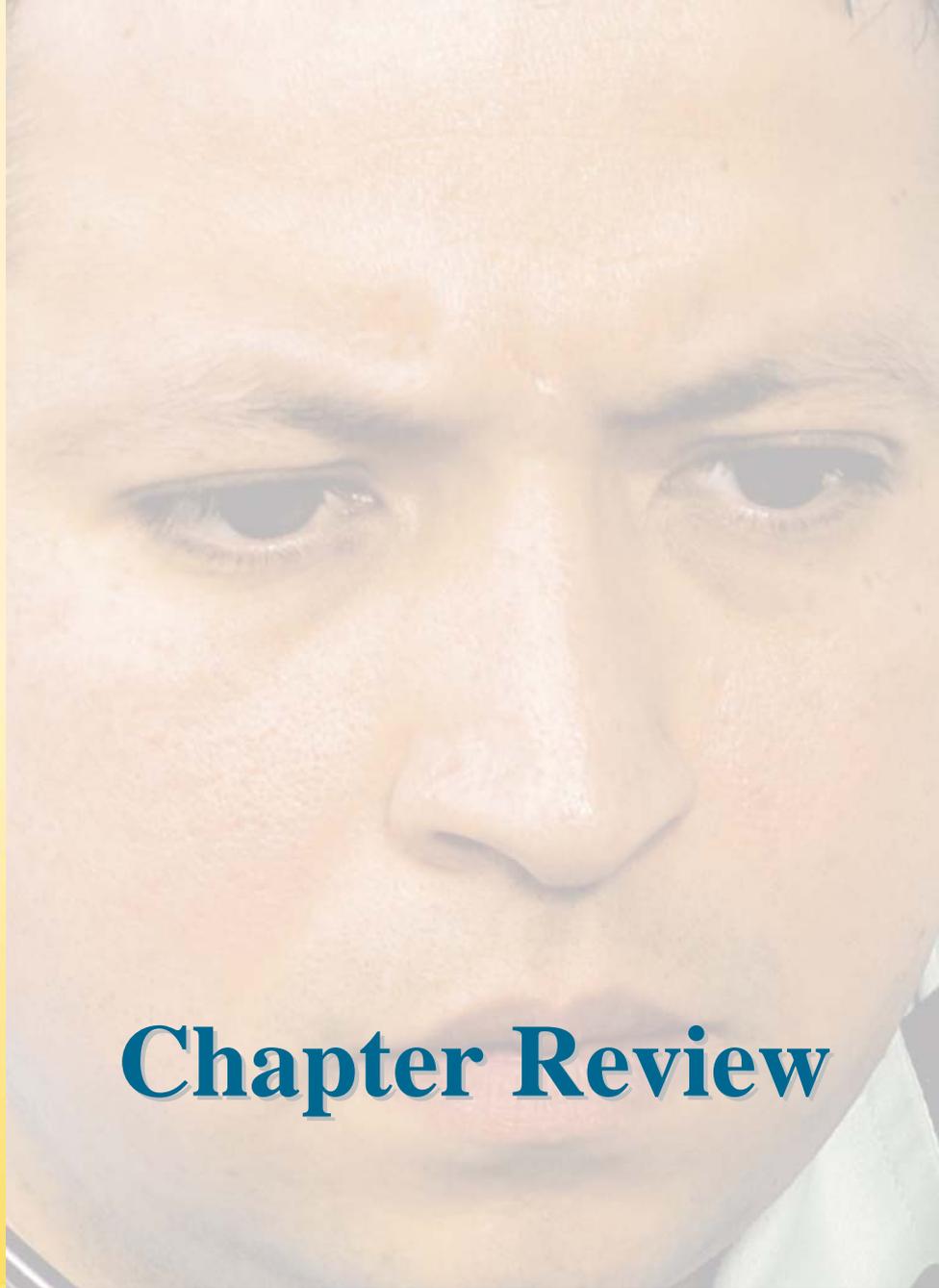


Click [here](#) to view a video on the subject of assessing vital signs.

Blood Pressure Assessment Video



Click [here](#) to view a video on the subject of assessing blood pressure.



Chapter Review

Chapter Review

- Can gain a great deal of information about patient's condition by taking complete set of baseline vital signs, including pulse, respirations, skin, pupils, and blood pressure.
- EMT must become familiar with normal ranges for pulse, respirations, and blood pressure in adults and children.

continued

Chapter Review

- Trends in patient's condition will become apparent only when vital signs are repeated, an important step in continuing assessment.
- How often you repeat vital signs will depend on patient's condition: at least every 15 minutes for stable patients and at least every 5 minutes for unstable patients.

Remember

- Consider if there is time to obtain vital signs or if you must wait to obtain them en route to the hospital.
- Consider when to apply a pulse oximeter. Should you apply it to a patient with difficulty breathing? Without difficulty breathing?

continued

Remember

- Consider whether abnormal vital signs are a result of an illness or injury or the result of some other factor.

Questions to Consider

- Name the vital signs.
- Explain why vital signs should be taken more than once.
- How much time should the EMT spend looking for a pulse when the radial pulse is absent or extremely weak?

continued

Questions to Consider

- How should you react when the blood pressure monitor gives a reading that is extremely different from previous readings?
- How can you get an accurate pulse oximeter reading on a patient with thick artificial nails?

Critical Thinking

- Sometimes a patient's heart will have an electrical problem and beat more than 200 times a minute. Why is the pulse so weak in such a patient?



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