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Original

Authorised Copy for:

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1. **Scope**

This Standard Operating Procedure (SOP) applies to the staff and students using the Riester Diplomat Presameter® Mercury Sphygmomanometer in the Pharmacy Practice Resource Unit (PPRU) at the Pharmacy Department, University of Malta.

2. **Objective**

To describe the procedure for the operation and maintenance of the Riester Diplomat Presameter® Mercury Sphygmomanometer.

3. **Definitions**

3.1. **Bladder**: Inflatable bag found inside the cuff.

3.2. **Blocking Lever**: Safety valve that prevents mercury from being released out of its storage reservoir during device transportation.

3.3. **Diastolic Blood Pressure (DBP)**: Minimum pressure in the arteries when the heart is at rest.

3.4. **Manometer**: A pressure-measuring device.

3.5. **Mercury Sphygmomanometer**: Device used to measure blood pressure. It consists of an inflatable cuff, a hand bulb with an air-release valve and a mercury column to display the obtained blood pressure readings.

3.6. **Systolic Blood Pressure (SBP)**: Maximum pressure exerted when the heart is contracting.

4. **Responsibility**

4.1. The members of the Department of Pharmacy (staff and students) are responsible for following this SOP.

4.2. The designated Laboratory Officer or Laboratory Assistant is responsible for ensuring that this SOP is followed.
5. Procedure

5.1. Operation

5.1.1. Open the lid of the device and raise it until it snaps in the proper upright position.
5.1.2. Flip the blocking lever to the left to allow the mercury to rise from its reservoir to the zero mark on the scale.
5.1.3. Connect the tube of the cuff to the tube of the manometer via the two connectors.
5.1.4. Bare patient’s left/right upper arm.
5.1.5. Place the cuff 2-3cm above the bend of the elbow on the bare left/right upper arm.
5.1.6. Check that the ø symbol is above the artery.
5.1.7. Close the cuff by means of the velcro fastener if using a velcro-type cuff.
5.1.8. Insert the metal hook into the appropriate metal bar if using a hook-type cuff.
5.1.9. Check that two fingers can still be inserted between the arm and the cuff.
5.1.10. Instruct the patient to lay his or her arm on a table with palm turned upwards and to keep still during the measurement.
5.1.11. Place the stethoscope chest piece below the cuff so that the membrane of the chest piece is resting against the inside of the bicep, where the artery is located (refer to SOP/PD/203_02).
5.1.12. Hold the bulb with its tubing facing upwards.
5.1.13. Rotate the air-release valve clockwise to check that it is closed.
5.1.14. Squeeze the hand bulb until the cuff pressure is 20-30 mmHg higher than the maximum expected blood pressure.
5.1.15. Read the values from the scale by comparing the column of mercury, which rises during the pumping process, with the graduated scale.
5.1.16. Gently rotate the air-release valve anticlockwise to slowly start to release the air from the cuff. The cuff will deflate at a rate of 2-3 mmHg/second.
5.1.17. Check that the mercury display is moving along the scale at a rate of 1-1.5 graduations/second.
5.1.18. Record the level of the mercury column when the first rhythmical thumping sound is heard. This corresponds to the SBP.
5.1.19. Record the level of the mercury column when the thumping sound stops. This corresponds to the DBP.
5.1.20. Open the air-release valve completely to deflate the cuff.
5.1.21. Carefully tilt the device to the left until no more mercury is visible.
5.1.22. Flip the blocking lever to the right.
5.1.23. Securely close the lid of the device.

5.2. Maintenance

5.2.1. Wipe the manometer, the cuff, the bladder, the adjoining tubes and the bulb with a moist cloth.
5.2.2. Disinfect the cuff in cold water together with an added disinfectant, after removing the bladder.
5.2.3. Disinfect the bladder and the tubes with a moist cloth containing ethanol.
5.2.4. Service the device periodically by an authorised supplier.
5.2.5. If the glass tube needs to be cleaned:

5.2.5.1. Check that the blocking lever is in the closed position (right).
5.2.5.2. Lift the sliding piece at the lower end of the glass tube.
5.2.5.3. Remove the glass tube.
5.2.5.4. Clean the glass tube using the supplied wire cleaner.
5.2.5.5. Place the glass tube in the lower and upper holders accordingly.

5.2.6. If precision of the device needs to be checked:

5.2.6.1. Remove the tube from the manometer.
5.2.6.2. Flip the blocking lever to the left to open it.
5.2.6.3. Allow the mercury column to come to rest at 0.
5.2.6.4. Contact an authorised supplier if the mercury column comes to rest below this 0.

5.3. Flow Chart
5.3.1. Operation

Start

Open lid of device and raise it until it snaps in the proper upright position

Flip blocking lever to the left to allow mercury to rise from reservoir to zero mark on scale

Connect tube of cuff to tube of manometer via the two connectors

Bare patient’s left/right upper arm

Place cuff 2-3 cm above bend of elbow on bare left/right upper arm

Check that ø symbol is above artery

Using velcro-type cuff

No

Use hook-type cuff and insert metal hook into appropriate metal bar

Yes

Close cuff by means of velcro fastener

Check that 2 fingers can still be inserted between arm and cuff

Instruct patient to lay his or her arm on table with palm turned upwards and to keep still during measurement

Place stethoscope chest piece below cuff so that membrane of chest piece is resting against inside of bicep where artery is located (refer to SOP/PD/203_02)
Hold bulb with its tubing facing upwards

Rotate air-release valve clockwise to check that it is closed

Squeeze hand bulb until cuff pressure is 20-30 mmHg higher than maximum expected blood pressure

Read values from scale by comparing column of mercury with graduated scale

Gently rotate air-release valve anticlockwise to slowly start to release air from cuff at a rate of 2-3 mmHg/second

Check that mercury display is moving along scale at rate of 1-1.5 graduations/second

Record level of mercury column when first rhythmical thumping sound is heard. 
*This corresponds to SBP*

Record level of mercury column when thumping sound stops. 
*This corresponds to DBP*

Open air-release valve completely to deflate cuff

Carefully tilt device to the left until no more mercury is visible

Flip blocking lever to the right

Securely close lid of device

End
Maintenance

Start

1. Wipe manometer, bladder, adjoining tubes and bulb with a moist cloth

   - Need to disinfect cuff: Yes
     - Remove bladder
   - No
     - Need to disinfect bladder and/or tubes: Yes
       - Use a moist cloth containing ethanol
     - No
       - Place cuff in cold water together with an added disinfectant

   - Service device periodically by an authorised supplier

   - Need to check precision of device: Yes
     - Remove tube from manometer
     - Open mercury lock
     - Allow mercury column to come to rest at 0
     - Mercury column came to rest at 0: Yes
       - Contact authorised supplier
     - No
   - No
     - Lift sliding piece at lower end of glass tube
     - Remove glass tube
     - Clean glass tube using supplied wire cleaner
     - Place glass tube in lower and upper holders accordingly

End
6. Precautions

6.1. Medical Device

6.1.1. Avoid damaging the rubber parts with sharp, cutting objects.
6.1.2. Do not expose the sphygmomanometer to extremes of temperature.
6.1.3. Does not scrub, machine wash, iron or dry clean the cuff.
6.1.4. Ensure that cleaning of the glass tube is done at regular intervals since this will allow the mercury to move up and down in the glass tubing freely and thus react quickly to changes in cuff pressure.
6.1.5. In the case of a mercury spillage:

6.1.5.1. Ventilate the room to prevent inhalation of the mercury vapours.
6.1.5.2. Wear appropriate latex gloves to handle the broken material.
6.1.5.3. Gather all the spilled mercury droplets, transfer them to a glass container, close tightly and dispose off as hazardous waste.

6.2. Accurate Measurement

6.2.1. Ensure that the correct cuff size is being used to obtain precise blood pressure readings.
6.2.2. Ensure that the patient is relaxed, still and is not speaking when measurement is being taken.
6.2.3. Wait for 5 minutes until the pulse rate returns to normal, if the patient had been active, before taking readings.
6.2.4. Ensure that the patient is sitting down and that the cuff is positioned at heart level when taking readings.
6.2.5. Ensure that the measurements are performed on a bare arm, as circulation could be restricted.
6.2.6. Ensure that the cuff is not too tight or too loose fitting as inaccurate readings may result.
6.2.7. Wait 3-4 minutes between successive readings.
6.2.8. Ensure that the membrane of the chest piece is placed on the artery.
7. References

Rudolf Riester GmbH. Riester the familiar way instructions: Mercurial sphygmomanometers and cuffs. Jungingen (Germany): Riester.

8. Appendices

N/A

9. Revision History

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