Fundamental of Nursing I
Lec:4 part 2
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3. Respiration Rate (R.R):

Is the act of breathing; normal respiration is slightly observable, quiet, effortless, regular, and automatic.

Respiration is defined by physiological functioning as:

- **External respiration**: the exchange of O^2 and CO^2 between the alveoli of the lungs and the pulmonary blood system.
- **Internal respiration**: the interchange of O^2 and CO^2 between the circulating blood and cells throughout the body.
- **Inspiration (inhalation):** the intake of air into the lungs**.**
- **Expiration (exhalation):** refer to breathing out or the movement of gases from the lungs to the atmosphere.
- **Ventilation:** refers to the movement of air in and out of the lungs.
- **Respiratory rhythm:** the regularity of the expiration and inspiration it can be described as regular or irregular. Respiration normally spaced.
- **Eupnea:** breathing that's normal in rate and depth.

✓ **Type of breathing:**

a. Costal (thoracic) breathing: involves intercostal muscle and other accessory muscle, such as the sternocleidomastoid muscle. It can be observe by the movement of the chest upward and outward.

b. Diaphragmatic (abdominal) breathing: involve the contraction and relaxation of the diaphragm. It can be observe by movement of abdomen.

✓ **Regulation of breathing:**

Respiration is controlled by:

A. Respiratory centers in the medulla oblongata and the pons of the brain.

B. Chemoreceptors located centrally in the medulla and peripherally in the carotid and aortic bodies.

These centers and receptors respond to changes in the concentrations of O^2 and CO^2, and hydrogen in arterial blood.

✓ **Assessing respiration:** Respiration should be assessed by observing chest wall expansion and bilateral symmetrical movement of the thorax. Another way to assess breathing is to place the hand back next to the client's nose and mouth and feel the expired air. Each respiration includes one complete

inhalation and exhalation by the client. The rate, depth, rhythm of breath is determined. Normal adult's RR (12 - 20 breath /minute). Respiratory depth can be established by watching the movement of the chest; it's generally described as normal, deep, or shallow.

- ❖ **Deep respiration:** in which a large volume of air is inhaled and exhaled, inflating most of the lung.
- ❖ **Shallow respiration:** involve the exchange of small volume of air and often the minimal use of lung tissue.

✓ Factors affecting respiration:

A. Factors increase the respiratory rate: (Exercise, stress and anxiety, acute pain, fever, increased environmental temperature, lowered oxygen concentration and anemia, respiratory and heart disease, some medications, smoking, alteration in acid-base balance, small age population).

B. Factors decrease the respiratory rate: {Decreased environmental temperature, certain medication (e.g., narcotics, sedative), increased intracranial pressure, old age population}.

✓ Altered breathing patterns and sounds:

1. Altered breathing rate:

A. Bradypnea: abnormally slow respiration, RR (10) or less breath per minute in adults.

B. Tachypnea: abnormally fast respiration, RR greater than (20) breathes per minute in adults.

C. Apnea: cessation or absence of breathing.

2. Altered breathing volume:

A. Hypoventilation: under expansion of the lungs, characterized by very shallow respiration.

B. Hyperventilation: over expansion of the lungs, characterized by very deep, rapid respiration.

3. Altered breathing effort:

A. Dyspnea: difficulty breathing as observed by forced respiration by using accessory muscle in the chest and neck.

B. Orthopnea: ability to breathe only in upright sitting or standing positions.

4. Secretion and coughing:

A. Hemoptysis: presence of blood in sputum.

B. Productive cough: cough with expectorated secretions.

C. Nonproductive cough: a dry, harsh cough without secretion.

5. Breath Sounds:

A. Stridor: harsh sound heard during inspiration with laryngeal obstruction.

B. Wheeze: continuous, high-pitched musical squeak or whistling sound occurring on expiration and sometimes on inspiration when air moves through a narrowed or partially obstructed airway.

✓ **NOTE:**

- ❖ Respirations are under both involuntary and voluntary control.
- ❖ Count regular respiratory rhythms for 30 seconds and multiply result by 2; and count irregular respiratory rhythms for a full minute.
- ❖ An adult sleeping client's respirations can fall to fewer than 10 shallow breaths per minute. Use other vital signs to validate the client's condition.

4. Blood Pressure (BP):

BP refers to the force of the moving blood against arterial walls. It's measured in millimeters of mercury (mm Hg). Atypical BP for a healthy adult should be not more than 120/80 mmHg.

Arterial blood pressure: a measure of pressure exerted by the blood as it flows through the arteries, there are two BP measures:

A. Systolic pressure: the phase in which the ventricles contract to eject blood, which present the height of the blood wave.

B. Diastolic pressure: the phase in which ventricles are at rest (ventricles are relaxed). Diastolic pressure, then, is the lower pressure, present at all times within the arteries.

Pulse pressure: the difference between diastolic and systolic pressure. Normally is about 40 mmHg. A consistently elevated pulse pressure occurs in arteriosclerosis. A low pulse pressure (e.g., less than 25 mmHg) occurs in conditions such as severe heart failure.

Hemodynamic regulators for BP control:

1. **Peripheral vascular resistance:** is the capillaries diameter or the capacity of the arterioles, peripheral resistance can increase BP especially diastolic.
2. **Pumping action of the heart**: lower cardiac output decrease BP and higher cardiac output increase BP.
3. **Blood volume**: BP decrease when fluids in arteries decreased e.g., in hemorrhage or dehydration, conversely when volume increase BP increased e.g., rapid intravenous infusion.
4. **Blood viscosity:** when proportion of RBCs to blood plasma is high, BP increase when the blood is highly viscous.

Factors affecting blood pressure:

1. **Age:** Pressure rises with age, reaching the peak on puberty and then tend to decline somewhat. In older adults BP is increased as a result of decreased elasticity of the arteries.

2. **Exercise & physical activity:** increases cardiac output and thus increasing B/P. For reliable assessment of BP, wait 20-30 minutes following exercise.

3. **Stress:** increasing BP reading (stress stimulate sympathetic nervous system, thus increase cardiac output and arterioles constriction).

4. **Medical conditions and medication:** Any condition affecting the cardiac output, blood volume, blood viscosity, and/or compliance of the arteries has a direct effect on the BP.

5. **Race.**

6. **Sex:** after puberty females have lowers BP than males at the same age, this difference is due to hormonal variations. After menopause women higher BP than before.

7. **Obesity:** predisposed to hypertension.

8. **Diurnal variation:** BP usually lowest at the early morning then raise throughout the day and peaks in the late afternoon or early evening.

9. **Temperature:** Because of increased metabolic rate, fever can increased BP; external heat causes vasodilatation and decrease BP, external cold causes vasoconstriction and increase BP.

10. **Body position:** BP higher when person standing rather than sitting or lying.

Methods for assessing BP:

A. Direct (invasive) measurement involves the insertion of a catheter into the brachial, radial, or femoral artery. Arterial pressure is displayed on a monitor. With correct placement, this pressure reading is highly accurate. **B.** Indirect (noninvasive) methods: auscultatory and palpatory methods. **Blood pressure assessment sites through indirect methods:**

1. Most common site on the client's upper arm (brachial artery).
2. Radial – taken on the lower arm; possible site for infants or clients who have very large upper arms.
3. Client's thigh (popliteal artery) is indicated in these situations:
   a. BP cannot be measured on either arm (e.g., burns or trauma).
   b. BP in one thigh is to be compared with BP in the other thigh.

BP is not measured on a particular client's limb in the following:

a. Injury or disease in the limbs.
b. Cast or bulky bandage is on any part of limbs.
c. Surgical removal of breast or axillary, inguinal lymph nodes.
d. Intravenous or blood transfusion on that limb.
e. Arteriovenous fistula in that limb.

Classification of blood Pressure:

Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
Normal	< 120 mm Hg	< 80 mm Hg
Elevated	120-129 mm Hg	< 80 mm Hg
Hypertension stage I	130-139 mm Hg	80-89 mm Hg
Hypertension stage Π	≥ 140 mm Hg	≥ 90 mm Hg

Adopted from; ACC/AHA, Guideline for the prevention, detection, evaluation, and management of high blood pressure in adults (2018).

Alteration in Blood Pressure:

a. Hypertension: BP above normal, when either systolic BP higher than 140 mmHg or diastolic BP is 90 mmHg or higher. A single elevated BP reading indicates the need for reassessment. Usually hypertension cannot be diagnosed unless an elevated BP is found twice at different time.

b. Hypotension: BP below normal. That is **systolic** reading consistently between 85 and 110 mmHg in an adult whose normal pressure is higher than this. **Orthostatic hypotension:** BP that falls when the clients sit or stands.

References

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