LESSON ASSIGNMENT

LESSON 5
Active and Passive Range of Motion Exercises.

TEXT ASSIGNMENT
Paragraphs 5-1 through 5-9.

LESSON OBJECTIVES
After completing this lesson, you should be able to:

5-1. Identify the effects of immobility.

5-2. Identify the purposes of exercise for the immobile patient.

5-3. Define the five types of exercises.

5-4. Define the nine types of body movement.

5-5. Identify guidelines for range-of-motion exercises.

SUGGESTION
After studying the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.
LESSON 5
ACTIVE AND PASSIVE RANGE OF MOTION EXERCISES

5-1. INTRODUCTION

The body was designed for motion. Regular exercise contributes to a healthy body; therefore immobility has a negative effect. A joint that has not been moved sufficiently can begin to stiffen within 24 hours and will eventually become inflexible. With longer periods of joint immobility, the tendons and muscles can be affected as well. Most people move and exercise their joints through the normal activities of daily living. When any joint cannot be moved in this way, the patient or nurse must move it at regular intervals to maintain muscle tone and joint mobility. Range of motion (ROM) exercises are ones in which a nurse or patient move each joint through as full a range as is possible without causing pain. The effect of both regular exercise and immobility on major body systems are discussed in this lesson.

5-2. THE EFFECTS OF IMMObILITY

a. Cardiovascular System.

(1) Venous stasis caused by prolonged inactivity that restricts or slows venous circulation. Muscular activity, especially in the legs, helps move blood toward the central circulatory system.

(2) Increased cardiac workload due to increased viscosity from dehydration and decreased venous return. The heart works more when the body is resting, probably because there is less resistance offered by the blood vessels and because there is a change in the distribution of blood in the immobile person. The result is that the heart rate, cardiac output, and stroke volume increase.

(3) Thrombus and embolus formation caused by slow flowing blood, which may begin clotting within hours, and an increased rate in the coagulation of blood. During periods of immobility, calcium leaves bones and enters the blood, where it has an influence on blood coagulation.

(4) Orthostatic hypotension probably due to a decrease in the neurovascular reflexes, which normally causes vasoconstriction, and to a loss of muscle tone. The result is that blood pools and does not squeeze from veins in the lower part of the body to the central circulatory system. The immobile person is more susceptible to developing orthostatic hypotension. The person tends to feel weak and faint when the condition occurs.
b. **Respiratory System.**

(1) **Hypostatic pneumonia.** The depth and rate of respirations and the movement of secretions in the respiratory tract is decreased when a person is immobile. The pooling secretions and congestion predispose to respiratory tract infections. Signs and symptoms include:

   (a) Increased temperature.
   (b) Thick copious secretions.
   (c) Cough.
   (d) Increased pulse.
   (e) Confusion, irritability, or disorientation.
   (f) Sharp chest pain.
   (g) Dyspnea.

(2) **Atelectasis.** When areas of lung tissue are not used over a period of time, incomplete expansion or collapse of lung tissue may occur.

(3) **Impaired coughing.** Impairment of coughing mechanism may be due to the patient's position in bed decreasing chest cage expansion.

c. **Musculoskeletal System.**

(1) **Muscle atrophy.** Disuse leads to decreased muscle size, tone, and strength.

(2) **Contracture.** Decreased joint movement leads to permanent shortening of muscle tissue, resistant to stretching. The strong flexor muscles pull tight, causing a contraction of the extremity or a permanent position of flexion.

(3) **Ankylosis.** Consolidation and immobility of a joint in a particular position due to contracture.

(4) **Osteoporosis.** Lack of stress on the bone causes an increase in calcium absorption, weakening the bone.
d. **Nervous System.**

   (1) Altered sensation caused by prolonged pressure and continual stimulation of nerves. Usually pain is felt at first and then sensation is altered, and the patient no longer senses the pain.

   (2) Peripheral nerve palsy.

e. **Gastrointestinal System.**

   (1) Disturbance in appetite caused by the slowing of gastrointestinal tract, secondary immobility, and decreased activity resulting in anorexia.

   (2) Altered digestion and utilization of nutrients resulting in constipation.

   (3) Altered protein metabolism.

f. **Integumentary System.** Risk of skin breakdown, which leads to necrosis and ulceration of tissues, especially on bony areas.

g. **Urinary System.**

   (1) Renal calculi (kidney stones) caused by stagnation of urine in the renal pelvis and the high levels of urinary calcium.

   (2) Urinary tract infections caused by urinary stasis that favors the growth of bacteria.

   (3) Decreased bladder muscle tone resulting in urinary retention.

h. **Metabolism.**

   (1) Increased risk of electrolyte imbalance. An absence of weight on the skeleton and immobility causes protein to be broken down faster than it is made, resulting in a negative nitrogen balance.

   (2) Decreased metabolic rate.

   (3) Altered exchange of nutrients and gases.

i. **Psychosocial Functioning.**

   (1) Decrease in self-concept and increase in sense of powerlessness due to inability to move purposefully and dependence on someone for assistance with simple self-care activities.
(2) Body image distortions (depends on diagnosis).

(3) Decrease in sensory stimulation due to lack of activity, and altered sleep-wake pattern.

(4) Increased risk of depression, which may cause the patient to become apathetic, possibly because of decreased sensory stimulation; or the patient may exhibit altered thought processes.

(5) Decreased social interaction.

5-3. THE PURPOSES OF EXERCISE FOR THE IMMOBILE PATIENT

a. To maintain joint mobility is done by putting each of the patient’s joints through all possible movements to increase and/or maintain movement in each joint.

b. To prevent contracture, atony (insufficient muscular tone), and atrophy of muscles.

c. To stimulate circulation, preventing thrombus and embolus formation.

d. To improve coordination.

e. To increase tolerance for more activity.

f. To maintain and build muscle strength.

5-4. TYPES OF EXERCISES

a. Passive. These exercises are carried out by the nurse, without assistance from the patient. Passive exercises will not preserve muscle mass or bone mineralization because there is no voluntary contraction, lengthening of muscle, or tension on bones.

b. Active Assistive. These exercises are performed by the patient with assistance from the nurse. Active assistive exercises encourage normal muscle function while the nurse supports the distal joint.

c. Active. Active exercises are performed by the patient, without assistance, to increase muscle strength.

d. Resistive. These are active exercises performed by the patient by pulling or pushing against an opposing force.
e. Isometric. These exercises are performed by the patient by contracting and relaxing muscles while keeping the part in a fixed position. Isometric exercises are done to maintain muscle strength when a joint is immobilized. Full patient cooperation is required.

5-5. TYPES OF BODY MOVEMENT

NOTE: For types of body movement, see figure 5-1.

a. Flexion. The state of being bent. The cervical spine is flexed when the chin is moved toward the chest.

b. Extension. The state of being in a straight line. The cervical spine is extended when the head is held straight.

c. Hyperextension. The state of exaggerated extension. The cervical spine is hyperextended when the person looks overhead, toward the ceiling.

d. Abduction. Lateral movement of a body part away from the midline of the body. The arm is abducted when it is held away from the body.

e. Adduction. Lateral movement of a body part toward the midline of the body. The arm is adducted when it is moved from an outstretched position toward the body.

f. Rotation. Turning of a body part around an axis. The head is rotated when moved from side to side to indicate "no."

g. Circumduction. Rotating an extremity in a complete circle. Circumduction is a combination of abduction, adduction, extension, and flexion.

h. Supination. The palm or sole is rotated in an upward position

i. Pronation. The palm or sole is rotated in a downward position.

5-6. GUIDELINES FOR RANGE OF MOTION EXERCISES

a. Plan when range of motion exercises should be done (see figures 5-2 and 5-3). Plan whether exercises will be passive, active-assistive, or active. Involve the patient in planning the program of exercises and other activities because he/she will be more apt to do the exercises voluntarily.

b. Expect the patient's heart rate and respiratory rate to increase during exercise.
c. Range-of-motion exercises should be done at least twice a day. During the bath is one appropriate time. The warm bath water relaxes the muscles and decreases spasticity of the joints. Also, during the bath, areas are exposed so that the joints can be both moved and observed. Another appropriate time might be before bedtime. The joints of helpless or immobile patients should be exercised once every eight hours to prevent contracture from occurring.

d. Joints are exercised sequentially, starting with the neck and moving down. Put each joint needing exercise through the range of motion procedure a minimum of three times, and preferably five times. Avoid overexerting the patient; do not continue the exercises to the point that the patient develops fatigue. Some exercises may need to be delayed until the patient's condition improves.
e. Start gradually and move slowly using smooth and rhythmic movements appropriate for the patient’s condition.

f. Support the extremity when giving passive exercise to the joints of the arm or leg.

g. Stretch the muscles and keep the joint flexible.

h. Move each joint until there is resistance, but never force a joint to the point of pain.

i. Keep friction at a minimum to avoid injuring the skin.

j. Return the joint to its neutral position.

k. Use passive exercises as required, however, encourage active exercises when the patient is able to do so.
5-7. DOCUMENTATION

a. Evaluation. Evaluate the patient in terms of fatigue, joint discomfort, and joint mobility.

b. Record Keeping. Range of motion is often placed on a flow sheet (see figure 5-3). If a flow sheet is not used, an entry should be made in the Nursing Progress Notes using a narrative format. If there is any adverse response to the exercises, a narrative note must be made. Nursing notes should address the extent to which joints can be moved in degrees (see figure 5-4).
5-8. CONTRAINDICATIONS TO RANGE OF MOTION EXERCISES

a. Heart and Respiratory Diseases. Range of motion exercises require energy and tend to increase circulation. Increasing the level of energy expended or increasing the demand for circulation is potentially hazardous to patients with heart and respiratory diseases.

b. Connective Tissue Disorders. Range of motion exercises put stress on the soft tissues of the joint and on the bony structures. These exercises should not be performed if the joints are swollen or inflamed or if there has been injury to the musculoskeletal system in the vicinity of the joint.

5-9. CLOSING

Encourage the immobile patient to participate as fully as possible so that he feels involved in the process. Always explain to the patient what you are about to do and enlist his cooperation. To avoid strain, remember to maintain your own proper body mechanics as you carry out the exercises for the patient. The overall nursing goal is to promote the maximum degree of mobility for the patient who cannot engage in the normal activities of daily living and prevent or reduce the effects of immobility. Performing range of motion exercises can often save the patient a lengthy rehabilitation.
EXERCISES, LESSON 5

INSTRUCTIONS. The following exercises are to be answered by completing the incomplete statement or by writing the answer in the space provided at the end of the question.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers.

1. Regular exercise contributes to a healthy body. Immobility has a ________ effect.

2. When a joint cannot be moved and exercised through normal activities of daily living, the patient or nurse must move it at regular intervals to maintain ____________ and ________________.

3. Range of motion exercises are ones in which a nurse or patient moves each joint. ________________________________.

4. The effects of immobility on the cardiac system include:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
   d. ________________________________.

5. The effects of immobility on the respiratory system include:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
6. The effects of immobility on the musculoskeletal system include:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
   d. ________________________________.

7. The effects of immobility on the nervous system include:
   a. ________________________________.
   b. ________________________________.

8. The effects of immobility on the gastrointestinal system include:
   a. ________________________________.
   b. ________________________________.

9. One effect of immobility on the integumentary system is _________________.

10. An absence of weight bearing on the skeleton and immobility causes protein to be broken down faster than it is made, resulting in a _________________.

11. The inability to move purposefully and dependence on someone for assistance with simple self-care activities results in a decrease in and an increase in a _________________________________.

12. Four purposes of exercise for the immobile patient are:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
   d. ________________________________.

13. The five types of exercises are:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
   d. ________________________________.
   e. ________________________________.

14. The nine types of body movement are:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.
   d. ________________________________.
   e. ________________________________.
   f. ________________________________.
   g. ________________________________.
   h. ________________________________.
   i. ________________________________.
15. Range of motion exercises should be done at least ___________________. The joints of helpless or immobile patients should be exercised once every ___________________ to prevent contracture.

16. Joints should be exercised sequentially, starting with the__________ and moving __________.

17. Each joint needing exercise should be put through the range of motion procedure a minimum of ____________________.

18. One guideline for range of motion exercises is to move each joint until there is ______________ but never force a joint to the point of ____________.

19. When documenting that range of motion exercises have been done, the nurse should evaluate the patient in terms of:
   a. ________________________________.
   b. ________________________________.
   c. ________________________________.

20. If there is any adverse response to the exercises, a________________ must be made.

21. Two contraindications to range of motion exercises are:
   a. ________________________________.
   b. ________________________________.

*Check Your Answers on Next Page*
SOLUTIONS TO EXERCISES, LESSON 5

1. Negative. (para 5-1)

2. Muscles tone, joint mobility. (para 5-1)

3. Through as full a range as possible without causing pain. (para 5-1)

4. Venous stasis.  
   Increased cardiac workload.  
   Thrombus and embolus formation.  
   Orthostatic hypotension. (paras 5-2a(1)--(4))

5. Hypostatic pneumonia.  
   Atelectasis.  
   Impaired coughing mechanism. (paras 5-2b(1)--(3))

   Contracture.  
   Ankylosis.  
   Osteoporosis. (paras 5-2c(1)--(4))

7. Altered sensation.  
   Peripheral nerve palsy. (paras 5-2d(1), (2))

8. Disturbance in appetite.  
   Altered digestion and utilization of nutrients.  
   Altered protein metabolism. (paras 5-2e(1)--(3))

9. Risk of skin breakdown. (para 5-2f)

10. Negative nitrogen balance. (para 5-2h(1))

11. Self concept, sense of powerlessness. (para 5-2i(1))

12. (Any four of the following):  
   To maintain joint mobility.  
   To prevent contracture, atony, and atrophy of muscles.  
   To prevent thrombus and embolus formation.  
   To improve coordination.  
   To increase tolerance for more activity.  
   To maintain and build muscle strength. (para 5-3--f)
   Active assistive.
   Active.
   Resistive.
   Isometric. (paras 5-4a--e)

14. Flexion.
   Extension.
   Hyperextension.
   Abduction.
   Adduction.
   Rotation.
   Circumduction.
   Supination.
   Pronation. (paras 5-5a--i)

15. Twice a day, eight hours. (para 5-6c)

16. Neck, down. (5-6d)

17. Three times. (Para 5-6d)

18. Resistance, pain. (para 5-6h)

19. Fatigue.
   Joint discomfort.
   Joint mobility. (para 5-7a)

20. Narrative note. (para 5-7b, figure 5-4)

   Connective tissue disorders. (paras 5-8a, b)

Return to Table of Contents