



American Medical Certification Association

**Working Together to Develop Quality Allied
Healthcare Professionals!**

Physical Therapy Technician/Aide Certification Study Guide (PTTC)

Welcome to **AMCA's** Physical Therapy Technician/Aide Certification Study Guide.



DISCLAIMER: This exam prep study guide is intended to be used as reinforcement for what you have already learned. It is provided as a courtesy by the AMCA to be used as an optional resource. All study material is developed independently from the Certification Board, and it is not required, endorsed, recommended, or approved by the Certification Board.

Special Accommodations

AMCA pledges to comply with the provisions of the Americans with Disabilities Act, as amended (42 USC Section 12101, et. seq.), and with Title VII of the Civil Rights Act, as amended (42 U.S.C. 2000e, et seq.), to the best of their ability. If you need special accommodations because of a disabling condition, you may ask for special testing services. This request can be submitted in one of three ways.

1. A letter from a qualified objective physician outlining the disability or medical condition and need for accommodation.
2. A letter from a qualified objective professional requesting the need for accommodation and reasoning.
3. An Individual Educational Plan (IEP) that is less than two years old.

All letters must include the following:

- An outline of the specific disability/diagnosis.
- An explanation how this condition affects the candidate's ability to take the exam under regular conditions.
- Date and duration of diagnosis.
- Specifically state the requested accommodation. If physical testing conditions are requested, state precisely what those entail. If extra time is needed, state how much time and is needed and why.

All documentation should be emailed to compliance@amcaexams.com. Requests are handled on an individual basis, must be received prior to the scheduled test date, and are reviewed by the Compliance Department. The individual requesting accommodations will be notified via email or hard copy of the accommodations being allowed. The candidate can then provide the hard copy of granted requests to the test site.

Physical Therapy Technician/Aide Certification Study Guide (PTTC)

Introduction

A Certified Physical Therapy Technician/Aide (PTTC) participates in both the planning and implementing of individual patient treatment plans. A PTTC is an active part of a team, typically taking instruction/lead from a Physical Therapy Technician or Assistant. A Physical Therapy Technician/Aide may perform some or all the following duties. However, they are not limited to just these responsibilities:

- Carrying out non-technical duties of physical therapy
- Preparing treatment areas
- Ordering devices and supplies
- Transporting patients
- Instruct on the use of crutches
- Apply heating modalities to patients

A Physical Therapy Technician/Aide is an important part of a team working together for one goal – to get the patient back to his/her daily activities. Other team members include – a doctor, physical therapist (4-year degree), physical therapy assistant (2-year degree), athletic trainer, recreational therapist, occupational therapist et. al.

Practice Settings

As a member of the allied health care field, Physical Therapy Technician/Aides are required to have at least a high school diploma or its equivalent. PTTC's also have received some advanced training in the field in which they plan on working. This could include both didactic and theoretical training in addition to training on the equipment in which they will be using. The following are settings in which they work:

- Schools
- Clinics
- General private practices
- Acute care Hospitals
- Nursing homes
- Sub-acute Care Facilities
- Rehabilitation centers

Outpatient settings – clinical decisions focus on the patient’s ability to perform daily activities

Acute care settings – moving patients to basic levels of function in order to move on to the next level of care

Qualities of a Physical Therapy Technician/Aide

In a typical workday, a PTTC will interact with a wide variety of people. In addition to the variety of personalities that may be encountered, each patient’s problems will vary from simple to complex. Although each patient presents a challenge, the PTTC must be able to communicate with them as well as the attending doctor or the physical therapist in charge. Knowledge of medical terminology and technical terms relative to the industry are imperative.

Providing instruction in using crutches for the first time or communicating with someone with a language barrier requires a great deal of patience and empathy – two important aspects of a good PTTC. Taking direction well, communicating changes observed in a patient, and pride in appearance all can be helpful in being a successful PTTC.

Communication

Communication Methods

How you communicate is just as important as what you communicate. Written communication must always be professional. Charting, a form of communication, should be as accurate as possible. Medical charts are legal documents.

- Listening
- Good listeners apply the following skills:
 - Face the person
 - Have good eye contact
 - Lean toward the person
 - Respond to the person
 - Paraphrasing – restate the person's message in your own words. An excellent way to show you are listening.
 - Clarifying – lets you make sure that you understand the message.
 - Silence – sometimes nothing needs to be said. Silence is a powerful message.

Nonverbal Communication

- 1.) Kinesics – the study of nonverbal communication
 - a.) Kinesics slip – where verbal and nonverbal messages do not match
- 2.) Zones of comfort
 - a.) intimate space (18 inches or closer)
 - b.) personal space (18 in. to 4 ft)
 - c.) social space (4 ft to 12 ft)
 - d.) public space (12 ft or more)

Phone Etiquette

When speaking on the phone always identify yourself to the caller. Convey to the person your undivided attention and willingness to help. Listen without interrupting, provide reasonable alternatives for the caller and take a clear concise message in order for the call to be returned. The following steps will ensure proper telephone etiquette:

Answer the telephone promptly and kindly.

- Never allow an angry or aggressive caller to upset you; remain calm and composed.
- Speak clearly and concisely
- Be sure to ask the caller's permission before placing them on hold

Understanding a patient's feeling is important. They may be anxious, nervous or even frightened. Empathy, having an understanding and compassion for what they may be experiencing, is a good characteristic to have in order to relate to your patients.

E-mail is a quick and easy way to communicate. Keep these handy tips in mind when using email to communicate:

- Use a personal name if your system allows it.
- Fill in the subject line to identify your message.
- Do not write a message with upper case as this may be perceived as expressing anger.
- **ALWAYS CHECK WHO THE RECEIVER OF THE EMAIL IS BEFORE YOU CLICK SEND.** This can be quite embarrassing if the email goes to the wrong recipient.
- Use "please" and "thank you".
- Remember, email could be used as a legal document. Never threaten or intimidate someone; even in jest.

Forms of Charting

- Narrative – written description of patient's visits in chronological order SOAP Note Charting – method that tracks subjective, objective, assessment and plan for a patient's visit.
- Subjective – patient's statements (chief complaint)

- Objective – observations made by the medical assistant, examination findings and vital signs
- Assessment – doctor’s diagnosis
- Plan – health care providers prescribed plan of action
- POMR Note Charting - **Problem-Oriented Medical Record Charting** – tracks a patient’s problems throughout medical care. Each problem is assigned a number and the number is referenced when the patient comes in for care.
- Flow Charts – visual tools that help track certain information in patient’s medical records like an infant’s/child’s growth.
- Progress Notes – daily chart notes made during patient’s visits to document patient progress with certain conditions.

Medical Records

Medical Records are a written account of a person’s condition and response to treatment and care. There are many parts to a medical record including:

- Admission sheet
- Nursing history
- Graphic sheet
- Progress notes
- Flow sheets
- Reporting is the oral account of care and recording is the written account of care and observations
- Assessment involves collecting information about the person and observation is using the sense of sight, hearing, touch and smell to collect information.
- Objective Data: is information that is heard, felt or smelled.
- Subjective data are things a person tells you about that you cannot observe through your senses.

When charting, always follow the institutions policy regarding how to write/document notes for patients.

Medical Law and Ethics

Ethics and Patient Rights

Ethics has been a part of medicine since ancient times. These ethics serve as principals in which to guide your career in the medical field. Ethics are based on integrity, responsibility to service and community, respect, self-discipline and intent to further your career.

Patient Rights

Patients actively participate in their own health care. The Patient Care Partnership serves as a guide for both patients and their physicians involved in their care.

Understand and use these rights. If for any reason you do not understand or you need help, the hospital will attempt to provide assistance, including an interpreter. A patient's medical history is generally taken before admission to the hospital; it may be taken at the doctor's office or in the admitting office of the hospital.

Law and Ethics

Ethics is the knowledge of what is right conduct versus what is wrong conduct. There are also choices involved in ethics which may have more to do with morals. Ethical behavior is never prejudiced or biased. For example, you may have to make a choice regarding a co-worker or even a patient. A co-worker of yours is consistently late. She often asks you to cover for her when she is late. She asks you not to tell and she will return the favor if you are ever going to be late. What would you do?

You suspect a patient is being abused. He/She has bruises all over their body. The explanation given regarding those bruises is weak. What should you do? It is your ethical duty to provide emotional support. If you suspect any type of abuse, share/report your concerns to the Physical Therapist or whoever is in charge immediately.

Laws are rules of conduct made by a government body. Criminal laws are concerned with offenses against the public and civil laws are concerned with relationships between people.

- Tort is a wrong committed against a person or the person's property. Torts may be intentional or unintentional.
- Liable is being held accountable under law
- Negligence is an unintentional wrong and must be proven
- Malpractice is negligence by a professional person (unintentional)
- Intentional torts are acts that are meant to be harmful.
- Defamation is injuring a person's name and reputation by making false statements to a third person
- Libel is making false statements in print, writing or through pictures
- Slander is making false statements orally
- Invasion of privacy is violating a person's right not to have his or her private affairs exposed
- Fraud is saying or doing something to trick, fool or deceive a person.
- Assault is intentionally attempting to touch or threaten a person's body without their consent
- Battery is touching a person's body without their consent. Battery
- A misdemeanor is a crime punishable by one year or less
- A felony is a crime punishable by more than one year
- Informed Consent is when the person clearly understands what is going to be done.

HIPAA

The Health Insurance and Accountability Act (HIPAA) of 1996 accounts for the privacy of patients' health information. The basic premise of HIPAA is to protect people's private health information, ensure health insurance coverage for workers and their families if the change or lose their jobs, uncover fraud and abuse and create standards for electronic transmission of healthcare transactions.

HIPAA contains five provisions called "titles" that focused on various aspects of healthcare. The titles include:

- Title I: Healthcare Access, Portability and Renewability
- Title II: Preventing Health Care Fraud and Abuse
- Title III: Tax – Related Health Provisions
- Title IV: Application and Enforcement of Group Health Plan Requirements
- Title V: Revenue Offsets

HIPAA Security Rules

HIPAA requires the usage of password protection on all electronic devices used to access patient information. If you work in a reception area that is visible to patients, it is important that your computer is positioned in a manner that does not reveal information to patients that may be standing close to your desk. Additionally, each employee is required to log off their computers when leaving their desks, in order to prevent information from falling into the wrong hands.

Encryption is also required when computers exchange data over the Internet. Encryption is the process of encoding information in such a way that only the person (or computer) with the key can decode it. PMP's encrypt data traveling between the office and the Internet, especially Social Security numbers.

Medical Terminology

A.) Word Elements

- 1.) Prefix – comes before the root word
- 2.) Root word - relating to specific body parts
- 3.) Suffix – comes after the root word
- 4.) Combining vowel- makes the word easier to say

B.) Body Direction Terms

- 1.) Ventral – front part of body
- 2.) Dorsal – back part of body
- 3.) Anterior – in front of
- 4.) Posterior – toward the back part of body
- 5.) Medial – towards the midline of the body
- 6.) Lateral – towards the side of the body
- 7.) Proximal – closest to the point of origin
- 8.) Distal – away from the point of origin divides the body into front and back portions
- 9.) Frontal plane – divides the body into ventral and dorsal sections
- 10.) Transverse plane - divides the body into upper and lower portions

C.) Body Positions

- 1.) Normal anatomic position – standing with arms lank and palms forward
- 2.) Supine position – lying on the back
- 3.) Prone position – lying on stomach
- 4.) Lateral recumbent position – lying on the side

Word Analysis

Healthcare terminology is broken down into word roots, prefixes, suffixes and combining vowels and forms. Word roots, or base words, are the foundation of the healthcare term. A suffix is a word ending, a prefix is a word beginning, and a combining vowel, (usually o), links the root to the suffix or to another root. The combining form is word root plus the appropriate combining vowel.

For example: oste /o/ arthr/itis

Combining Forms and Their Meanings

• Arthr/o	joint
• Bi/o	life
• Cardi/o	heart
• Carcin/o	cancerous, cancer
• Cephal/o	head
• Cerebr/o	cerebrum (largest part of the brain)
• Cyt/o	cell
• Dent/l	teeth
• Derm/o	skin
• Electr/o	electrical activity
• Enter/o	intestines
• Fet/o	fetus
• Gastr/o	stomach
• Rhin/o	nose
• Sarc/o	flesh
• Thromb/o	clotting
• Ur/o	urinary tract

Some suffixes and their meanings:

• -al	pertaining to
• -algia	pain
• -asthenia	weakness
• -dynia	pain
• -ectomy	excision, removal
• -emia	blood condition
• -genic	produced by, pertaining to producing
• -globin	protein
• -gravida	pregnancy
• -itis	inflammation
• -oma	tumor, mass swelling
• -osis	condition, usually abnormal
• -pathy	disease condition
• -sis	state of; condition

Some Prefixes and their meanings:

• Ante-	before, in front of
• Anti -	against
• Brady-	slow
• Dia -	through, complete
• End, endo	within
• Epi -	above, upon
• Hyper-	excessive, above more than normal
• Hypo -	deficient, below, under less than normal
• Peri -	surrounding, around
• Pre-	before
• Sub-	under, below

Suffixes used to describe therapeutic interventions

• -ectomy	excision
• -graphy	process of recording
• -metry	process of measurement
• -scopy	a visual examination
• -stomy	a new opening
• -tomy	incision
• -tripsy	process of crushing

AMCA, Physical Therapy Technician/Aide Certification Study Guide (PTTC)

This document is the property of the AMCA. The document and any of its contents cannot be reproduced, shared or disseminated for any reason without written consent of the AMCA. ©

No ROM – most synarthroses are immovable joints held together by fibrous tissue.

Limited ROM- amphiarthroses are joints joined together by cartilage that is slightly moveable, such as the vertebrae of the spine or the pubic bone.

Full ROM – diarthroses are joints that have free movement. Ball-and-socket joints (hip) and hinge joints (knees) are common diarthroses joints. (Synovial joints)

Synovial joints, free moving joints, are surrounded by joint capsules. Many of the synovial joints have **bursae**, which are sacs of fluid that are located between the bones of the joint and the tendons that hold the muscles in place.

Action	Description
Extension	to increase the angle of a joint
Flexion	to decrease the angle of a joint
Abduction	movement away from the midline
Adduction	movement towards the midline
Supination	turning the palm or foot upward
Pronation	turning the palm or foot downward
Dorsiflexion	raising the foot, pulling the toes toward the shin
Plantar flexion	lowering the foot, pointing the toes away from the shin
Eversion	turning outward
Inversion	turning inward
Protraction	moving a part of the body forward
Retraction	moving a part of the body backward
Rotation	revolving a bone around its axis

Fractures

A fracture is a broken bone. Most fractures occur as a result of trauma, however some diseases like cancer or osteoporosis can also cause spontaneous fractures. Fractures can be classified as simple or compound. Simple fractures do not rupture the skin, as compound fractures split open the skin allowing for an infection to occur.

Types of Fractures

- **Comminuted** – the bone is crushed and or shattered.
- **Compression** – the fractured area of bone collapses on itself.
- **Colles** – the break of the distal end of the radius at the epiphysis often occurs when the patient has attempted to break his or her fall.
- **Complicated** – the bone is broken and pierces an internal organ
- **Impacted** – the bone is broken, and the ends are driven into each other.
- **Hairline** – A minor fracture appears as a thin line on x-ray and may not extend completely through the bone.
- **Greenstick** – the bone is partially bent and partially broken; this is a common fracture in children because their bones are still soft.
- **Pathologic** – any fracture occurring spontaneously as a result of disease.
- **Salter-Harris** – a fracture of the epiphyseal plate in children.

Sprains, strains and dislocation/subluxation is a traumatic injury to a joint involving the soft tissue. The soft tissue includes the muscles, ligaments, and tendons. A strain is a lesser injury; usually this is a result of overuse or overstretching. Dislocation is when a bone is completely out of place and subluxation is partially out of place joint.

Human physiology is the science of the mechanical, physical, bioelectrical, and biochemical functions of humans in good health, their organs, and the cells of which they are composed. Physiology focuses principally at the level of organs and systems.

The **musculoskeletal system** consists of the human skeleton (which includes bones, ligaments, tendons, and cartilage) and attached muscles. It gives the body basic structure and the ability for movement. In addition to their structural role, the larger bones in the body contain bone marrow, the site of production of blood cells. Also, all bones are major storage sites for calcium and phosphate. There are three muscle types found in this system: *skeletal* – voluntary muscles that are connected to bone and make it possible for voluntary movement such as walking or picking up something. *Smooth muscles* or involuntary muscles which cannot be controlled by our own

will but rather by the autonomic nervous system. *Smooth muscles* are found in the digestive or respiratory system. The *cardiac muscle* makes up the heart wall.

There are 4 distinct groups of vertebrae:

- Cervical – 7 vertebrae found in the neck
- Thoracic – 12 vertebrae found in the upper trunk. These attach to the ribs.
- Lumbar – 5 vertebrae found in the lower back
- Sacral and Coccygeal – Additional bones connected the lumbar vertebrae that form the tailbone

Bones of the Upper Extremity

The shoulder joint has three bones: The scapula or shoulder blade, the clavicle and the humerus. The humerus is found in the upper arm, the lower arm has two bones: the ulna and the radius. The radius is on the thumb side of the forearm and the ulna is on the little finger side of the forearm. The wrist has eight individual bones that are grouped together and are called carpal bones. The hand has two groups of bones- the metacarpal bones located between the fingers and the wrist and the 14 finger bones called the phalanges.

Bones of the Lower Extremity

The hip joint is formed by the pelvis and the femur. The kneecap is called the patella. The lower leg has two bones: the tibia and the fibula. The fibula is the outside bone and the tibia is inside. These two bones shape the ankle. The bony projections that form the ankle are called malleoli. The inside malleolus is the medial malleolus and the outside projection is the lateral malleolus.

Muscles of the Back

There are six major muscles of the back: trapezius, deltoid, triceps, latissimus dorsi, external oblique and gluteus maximus. The trapezius attaches at the base of the skull. The muscles rotate the scapula so the arm can be lifted overhead. The triceps extend the forearm at the elbow. The latissimus dorsi draws the shoulder downward and backward. The gluteus maximus extends and helps to externally rotate the hip.

Muscles of the Upper Body

The muscles of the upper body are the deltoid, the pectoralis, the serratus anterior, the abdominals and the external oblique. The pectoralis attaches to the ribs, the scapula and the humerus. The serratus anterior attaches to the ribs and the scapula, stabilizes the scapula. The abdominals forward flex the trunk.

Muscles of the Arm

The muscles of the arm are the deltoid, the pectoralis, the triceps, the biceps, the rotator cuff and the wrist and finger extensors and flexors.

Muscles of the Upper and Lower Leg

The muscles of the upper leg are the gluteus maximus, the quadriceps, the hamstrings and the gastrocnemius. The quadriceps muscle is four separate muscles - they attach from the pelvis across the kneecap to the lower leg.

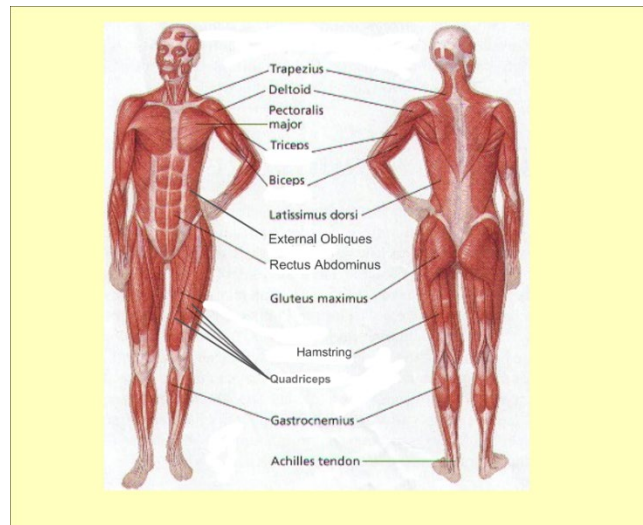
The muscles of the lower leg include the gastrocnemius, the foot evertors, and the ankle dorsiflexors and plantar flexors.

The foot evertors help turn the foot out laterally. The ankle dorsiflexors help dorsiflex the foot. The plantar flexors, on the back of the foot, help plantar flex the foot.

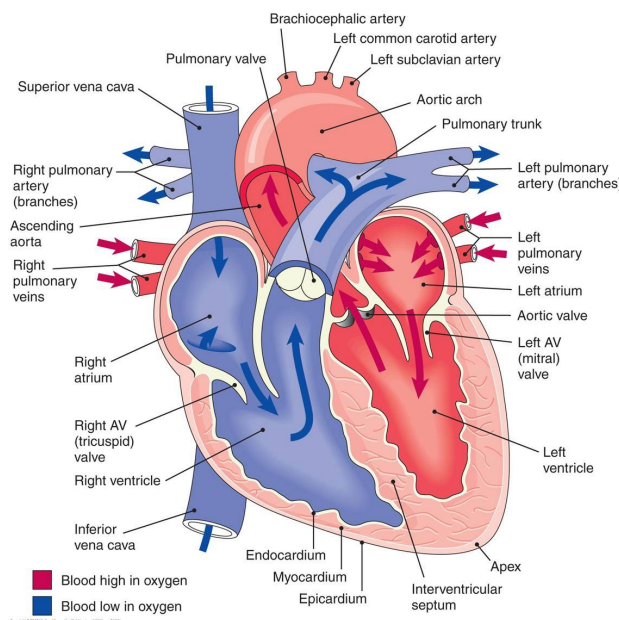
Terminology

The point at which two bones come together is a joint. There are many different types of joints as well as many functions.

- Hinge joints – help us bend our fingers, elbows or knees
- Immovable joint – this is a junction of the bones like in the adult skull – provides protection for the brain.
- Tendons – part of the musculoskeletal system and they attach muscles to bones
- Ligaments – hold the bones together at the joint
- Dislocation – a bone injury in which a bone is moved away from its normal position
- Arthritis – disease involving an inflammation of the bones at the joints usually accompanied by pain or swelling



The **circulatory system** consists of the heart and blood vessels (arteries, veins, capillaries). The heart propels the circulation of the blood, which serves as a "transportation system" to transfer oxygen, fuel, nutrients, waste products, immune cells, and signaling molecules (i.e., hormones) from one part of the body to another. The blood consists of fluid that carries cells in the circulation, including some that move from tissue to blood vessels and back, as well as the spleen and bone marrow.



The amount of blood within the body of the average human adult is equivalent to a measurement of five or six liters. Plasma, the liquid portion of the blood in its anticoagulated (or un-clotted) state, accounts for 55 to 65 percent of the blood volume. Serum is the liquid portion of the blood that remains after the blood has coagulated. Red blood cells also referred to as RBCs or erythrocytes, are produced in the bone marrow and live approximately 120 days. RBCs contain hemoglobin, the pigment responsible for the reddish color of the blood.

White blood cells, also known as leukocytes, are categorized into five different types.

- Neutrophils, the most common WBCs, defend the body against infectious diseases.
- Lymphocytes, the second most common WBCs, provide a boost to immune defense of the body; they also help respond to viruses, when necessary.
- Monocytes, the largest cells in normal blood, are phagocytic cells that provide support in cell-mediated immunity.
- Eosinophils function in allergic or inflammatory responses.
- Basophils, the least numerous WBCs, contain histamine and provide aid in allergic states.

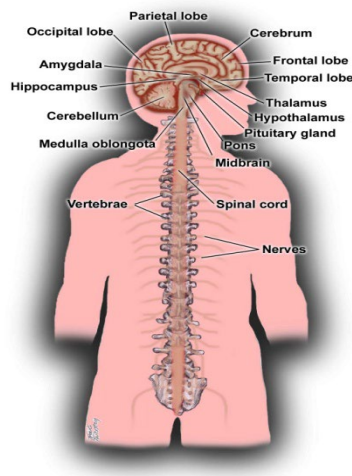
Platelets, also known as thrombocytes, are the smallest cells found in the blood. They aid in the process of coagulation, the formation of blood clots that occurs when a blood vessel is damaged. Coagulation is the last step of hemostasis, the process by which the flow of blood ends.

Many patients coming into the office will have diseases or disorders of the circulatory system including:

- Anemia
- Arteriosclerosis
- Congestive heart failure
- Coronary occlusion
- Myocardial infarction
- Hemorrhage
- Hodgkin's disease
- Hypertension
- Heart murmur
- Phlebitis
- Varicose veins

The **respiratory system** consists of the nose, nasopharynx, trachea, sinuses, diaphragm and lungs. It brings oxygen from the air and excretes carbon dioxide and water back into the air.

The **nervous system** consists of three parts – the central nervous system (brain and spinal cord), the peripheral nervous system (nerves) and the autonomic nervous system which controls all of our involuntary functions such as the digestive and respiratory



Disorders of the nervous system include stroke, epilepsy, and paralysis. This will all present a challenge during a physical therapy visit.

Anatomy and Physiology

The human skeleton, made up of 206 bones, has five basic functions. The skeleton provides support to the body, protection for the body, producing blood cells, storing fats and minerals and providing sites for muscles to attach to for movement to happen.

Bones and Bone Terminology

Cancellous Bone Tissue – has many open spaces and has a spongy appearance. It is in the open spaces that blood vessels infiltrate and provide food and oxygen and remove waste products of metabolism. Red marrow is also found in cancellous bone tissue

Compact Bone Tissue – is much thicker and if observed under a microscope it appears to have many circles. The circles are bony plates, which make up canals called Haversian Canals. These run long ways through the bone. Horizontally, there are channels called Volkmann's Canals. It is through both canals that we can transport food, oxygen, metabolic waste as well as nerve supply.

- Osteocytes – cells that make up bone tissue
- Osteoblasts – a type of osteocyte which form collagen fibers
- Osteoclasts – a type of osteocyte that destroys bone tissue
- Diaphysis – long, main portion of the bone
- Epiphyses – the end part of a long bone, initially growing separately from the shaft
- Periosteum – protective covering on the outer surface of the bone
- Medullary cavity – hollow shaft of a long bone
- Endosteum – the medullary cavity contains yellow bone marrow, which is lined with endosteum which is composed of osteoblasts and a few osteoclasts.
- Articular cartilage – provides protection for the bone ends and helps with smooth movement of the joints
- Long Bones – include bones in the upper and lower arm, the upper and lower leg, and the fingers and toes.
- Short bones – include bones of the wrist and ankle and are responsible for providing strength
- Flat bones – include the ribs, the scapulae, and some bones of the skull
- Irregular bones – function mainly is for articulation and to form joints. Irregular bones are found in the vertebrae, inner ear and some of the facial bones.

- Sesamoid bones – found next to joints and primarily function to eliminate friction in joints and increase efficiency of motion – the kneecap is a good example of a sesamoid bone.

Bones of the Skull – include the following;

- Cranium
- Facial bones – nose, cheeks and jaw
 - Facial Bones – consists of the nasal bones (nasal conchae or turbinate), the maxillae (upper jaw), cheekbones (zygomatic/malar bones), and the lacrimal bones.

Bone Diseases and Disorders

- Rheumatoid arthritis – affects the bones and joints as well as other body systems.
- Osteoarthritis – is a degenerative joint disease – seems to occur in obese patients or patients who may have suffered some type of joint trauma
- Gout – typically affects only one joint and is characterized by crystal deposits in and around the affected point.
- Osteoporosis – seen in elderly women, osteoporosis is common in those patients who have been confined to bed for long period of time.
- Rickets – disease that affects children who do not have enough Vitamin D and eventually causes the bones not to harden and results in deformities and bending of the bones
- Bursitis – inflammatory condition of the bursa
- Scoliosis- side to side curvature of the spine

Muscular Disorders

Muscular Dystrophy – a degeneration of the muscle cells that eventually causes the muscles to waste away and atrophy. **Contracture** – permanently shortened muscle causing the formation of fibrous tissue that replaces the muscle cells.

Spinal Column and Vertebrae

The spinal column is designed to protect the nerves and structures that make up the spinal column. In adults there are 26 vertebrae, and in children there are 30-33. The difference is that in adults some of the vertebrae fuse together. The vertebrae are numbered. The first 7 are called cervical vertebrae and are numbered C1 through C7. The next twelve are called the thoracic

AMCA, Physical Therapy Technician/Aide Certification Study Guide (PTTC)

vertebrae and are numbered T1 through T12. The next five are called the lumbar vertebrae and are numbered L1 through L5. The last vertebrae are called the coccygeal vertebrae which in adults eventually fuse together to form the coccyx.

Ribs – there are 12 pairs of ribs whose primary function is to protect the heart and lungs. The first seven pairs attach directly to the sternum and the last five pairs attach dorsally and are held in place by cartilage.

Appendicular Skeleton – includes all the bones of the upper and lower extremities. The bones in the shoulder inclusive of some of the bones in the arm and hand, bones in the pelvis, bones in the leg and some of the bones in the feet.

Physical Therapy and Common Medical Disorders

What type of physical therapy modality would best help a patient is a complicated decision. There is a process that needs to be followed in order to best meet the needs of the patient.

Assessing pain is often subjective (statements made by the patient) and need to be considered to make an accurate evaluation. The doctor in charge will make an assessment based on certain factors to identify the pain and discomfort of the patient.

The certain pains occur after sitting, on weight bearing, after an injury, after an interval of rest, movement of certain joints, radiating pain in a particular area, or pain while a person is working, are all factors that need to be considered in a patient's treatment plan.

Total Hip Replacement

With Total Hip Replacement (THR) an artificial joint is inserted in the place of the natural hip. The artificial joint is called prosthesis. These types of patients present specific problems in the area of physical therapy and the exercise plan should be followed to prevent dislocation during the healing process. Bending, crossing legs and pivoting all can be challenging to the THR patient. Take precautions in all exercise and activities.

Amputee Patients

Working with a patient that has suffered an amputation could be challenging. There are those who do not have prosthesis and will have to learn how to manage full-time in a wheelchair or how to go about daily living activities with the healthy limb. Circulation is often compromised in

amputees due to the lack of activity and any changes in the remaining limbs should be noted.

Working with Stroke Patients

A stroke occurs when the normal circulatory pattern of the brain is disrupted. Oxygen is denied to essential parts of the brain and this lack of oxygen often results in brain damage, paralysis, loss of motor skills or sensory changes. Some precautions to take when working with a stroke patient are:

- Do not place the patient in a face down position
- Immediately alert the therapist in charge if there is a change in breathing or breathing appears labored
- All activities should be done slowly
- The patients balance may be impaired – always take extra precaution during a transfer or sitting/standing

Safety

The term therapeutic environment in relation to a patient and health care means the factors that influence the external environment and those that affect the internal composition of the body. A physical therapy aide's focus should be on providing a safe environment, practicing all safety precautions, and using good body mechanics to assist the patient to achieve a greater degree of health.

External factors include the regulation of temperature, humidity control, the use of color, noise control, neatness and organization and light regulation. Prevention of odors, providing privacy and ventilation control are also external factors that could affect the wellbeing of a patient.

Prevention

Preventing falls, preventing burns and simply preventing accidents are all a part of a physical therapy aide's daily responsibility. Taking all the necessary precautions to ensure a patient transport is event free is extremely important part of rehabilitation.

Proper Body Mechanics

Using good body mechanics contributes to providing a safe environment. Avoiding injury to yourself while helping patients shows commitment to the patient and to providing an injury

AMCA, Physical Therapy Technician/Aide Certification Study Guide (PTTC)

This document is the property of the AMCA. The document and any of its contents cannot be reproduced, shared or disseminated for any reason without written consent of the AMCA. ©

free environment.

The efficient and safe use of the body during activity.

- Test the load. Before you lift, check the weight and make sure you can lift it safely. If not, get help or use an assistive device.
- Keep your back in its natural curve. Bend at the hips and/ or knees. With the low back erect, the forces are distributed safely.
- Hold objects as close to you as possible. This reduces stress on the back.
- Do not twist when carrying. Move or change directions with the feet. This decreases the stress and load on the back.
- Tighten stomach muscles when lifting. This helps the abdominal area to help in the lift and reduce strain on the low back.
- Lift with the legs or the large muscles. Using the large muscle groups helps diminish the forces on the low back.
- Maintain good communication if two or more people are involved. Good timing on a lift reduces the likelihood of jerky or sudden unexpected movements.
- Move obstacles out of the way. Making sure the path is clear (clearing away toys, tools, loose rugs, etc.) decreases the risk of slipping or falling.
- Push rather than pull. It is easier to utilize your weight advantage when pushing.

Fire

In the event of a fire, you may be responsible to assist in the evacuation of the patients who are endangered by the fire. If the fire is elsewhere, the aide is expected to assist the nursing personnel in closing the doors to the patient rooms. Fire doors must be closed also. It is important to remember the RACE system which is implemented by many hospitals:

- R Rescue individuals in danger**
- A Sound the alarm**
- C Confine the fire by closing all doors and windows**
- E Extinguish the fire with the nearest suitable fire extinguisher**

Electrical Safety

- Using Electrical Equipment
 - avoid using damaged power chords
 - avoid using any extension cords
 - avoid any electrical equipment while collecting blood
 - when available, try and use three pronged plugs

Radiation Safety

- Amount of radiation is determined by:
 - time: exposed to source
 - shielding: if anything is between you and the source of radiation
 - distance: how far person or object is away from source

First Aid

- External Hemorrhage
 - apply direct pressure to wound until bleeding stops or EMS arrives
 - if bleeding continues, keep applying cloth or gauze over the ones already on the wound

Shock

- Common symptoms:
 - clammy, pale, cold skin
 - rapid weak pulse
 - shallow or increased breathing rate
 - staring eyes and expressionless face
- First aid for shock:
 - maintain open airway
 - call for assistance
 - keep patient lying down with head lower than the rest of body
 - attempt to control bleeding or other cause of shock if known
 - keep patient warm until help arrives

AHA Chain of Survival

- Early access to care
- Early CPR
- Early defibrillation
- Advanced care

Hazardous Substances

A hazardous substance is any chemical in the workplace that can cause harm. The Occupational Safety and Health Administration (OSHA) require that health care employees

- Understand the risks when dealing with such substances and know how to handle them safely.
- Labeling is extremely important when handling any substance in the hazardous material area. Bags, barrels, cans, cylinders, drums and storage tanks all need labels identifying handling instructions. Every hazardous substance has a material safety data sheet. It provides detailed information about the substance. The following are symbols that will be familiar in a health care facility.



Biohazard Symbol



Poison Symbol



Toxic Symbol

Preventing Infection

Infection is a major threat and health hazard in all our health care facilities. Everyone is at risk and prevention of that risk is an important part of everyone's job description.

- **AIDS** - AIDS stands for acquired immunodeficiency syndrome and is caused by a virus called human immunodeficiency virus. AIDS is transmitted by blood, vaginal fluids, and semen and is not spread through casual contact. AIDS also may be transmitted through the blood of an infected person that enters another person's bloodstream through a

cut, an open sore, or blood that is splashed into the mouth or the eye. Thus, appropriate personal protective equipment must be worn when one is coming into contact with body fluids from all patients.

- **Hepatitis B** - This disease is caused by an inflammation of the liver that is caused by the hepatitis b virus, also known as HBV. Since health care providers are at risk for exposure, it is essential for standard blood and body fluid precautions to be practiced. The Occupational and Safety Health Administration states that employers must provide the hepatitis B vaccine for all employees who have an occupational employer risk.
- **Tuberculosis** - This disease is caused by *Mycobacterium tuberculosis*, an airborne pathogen. Health care workers that encounter patients who have tuberculosis must wear personal protective equipment, such as special fitted masks.
- **Nosocomial infections** - Any infection that first occurs during a patient's stay at a health-care facility, regardless of whether it is detected during the stay or after, is known as a nosocomial infection. These infections are usually transmitted to the patient by a health care worker. Proper hand washing techniques are the best method of preventing the spread of nosocomial infection.

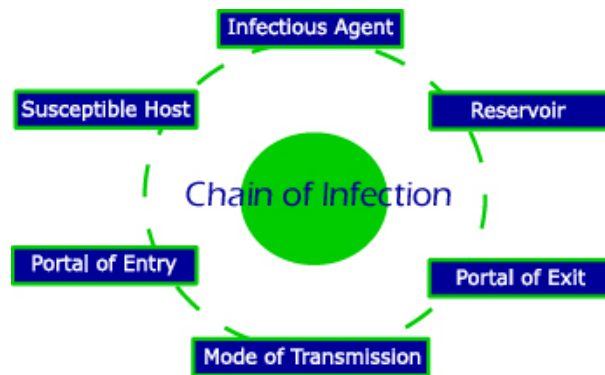
Hand washing is the most important means of preventing the spread of infection. A routine hand wash procedure uses plain soap to remove soil and transient bacteria. Hand antisepsis requires the use of antimicrobial soap to remove, kill or inhibit transient microorganisms. It is important that all healthcare personnel learn proper hand washing procedures. Washing hands for 1 to 2 minutes is the proper amount of time.

Protective clothing provides a barrier against infection. Used properly, it will provide protection to the person wearing it; disposed of properly it will assist in the spread of infection. Learning how to put on and remove protective clothing is vital to ensure the health and wellness of the person wearing the PPE. PPE or personal protective equipment include:

- Masks
- Goggles
- Face Shields
- Respirator

Infection Control/Chain of Infection

This consists of links, each of which is necessary for the infectious disease to spread. Infection control is because the transmission of infectious diseases will be prevented or stopped when any level in the chain is broken or interrupted.



- Agents– are infectious microorganisms that can be classified into groups namely: viruses, bacteria, fungi, and parasites. It is these agents that cause disease.
- Portal of exit –the method by which an infectious agent leaves its reservoir. The nose, hands, or sneezing could be considered portals of exit.
- Mode of transmission – method of transfer. There are five main types of mode of transmission:
 - Contact: direct and indirect
 - Droplet - such as a sneeze
 - Airborne
 - Common vehicle
 - Vector borne- a living organism that carries a disease from one infected person to another – such as a mosquito
- Portal of entry – An opening allowing the microorganism to enter the host. Portals include body orifices, mucus membranes, or breaks in the skin. Portals also result from tubes placed in body cavities, such as urinary catheters, or from punctures produced by invasive procedures such as intravenous fluid replacement

- Susceptible host – A person who cannot resist a microorganism invading the body, multiplying, and resulting in infection. The host is susceptible to the disease, lacking immunity or physical resistance to overcome the invasion by the pathogenic microorganism.

Isolation Precautions

The CDC recommended universal precautions, which is a method of infection control that assumed that all human blood and body fluids were potentially infectious. The CDC issued a revised guideline consisting of two tiers or levels of precautions: Standard Precautions and Transmission-Based Precautions. These are outlined below.

Standard Precautions

Standard precautions are a set of infection control practices used to prevent transmission of diseases that can be acquired by contact with blood, body fluids, non-intact skin (including rashes), and mucous membranes. These measures are to be used when providing care to all individuals, whether or not they appear infectious or symptomatic.

The standard precautions are:

- Consider every person (patient or staff) as potentially infectious and susceptible to infection.
- Wash hands—the most important procedure for preventing cross-contamination (person to person or contaminated object to person).
- Wear gloves (both hands) before touching anything wet—broken skin, mucous membranes, blood or other body fluids, or soiled instruments and contaminated waste materials—or before performing invasive procedures.

Transmission- Based Precautions- the second tier of precautions and are to be used when the patient is known or suspected of being infected with contagious disease. They are to be used in addition to standard precautions. In all situations, whether used alone or in combination, using the utmost care regarding patient and employee is crucial.

Contact precautions:

Infectious agent (bacteria, virus or parasite) transmitted directly or indirectly from one infected

or colonized person to a susceptible host (patient), often on the contaminated hands of a health worker. The following precautions should be taken:

Wear clean, non-sterile examination gloves when entering room. Change gloves after contact with infective material (e.g., fecal materials or wound drainage). Remove gloves before leaving patient room. Wash hands with antibacterial agent or use alcohol-based hand-rub after removing gloves. Do not touch potentially contaminated surfaces or items before leaving the room.

Airborne precautions:

These precautions are designed to reduce the nosocomial transmission of particles 0.001mm or less in size that can remain in the air for several hours and be widely dispersed. Special air handling and ventilation are required to prevent airborne transmission.

Droplet precautions:

These precautions reduce the risks for nosocomial transmission of pathogens spread wholly or partly by droplets larger than 0.001 mm in size. Droplet precautions are simpler than airborne precautions because the particles only remain in the air for a short time and travel only a few feet; therefore, contact with the source must be close for a susceptible host to become infected. It is recommended to wear a mask when interacting with patients to reduce the incidence of infection.

Sanitization, Disinfection and Sterilization

Sanitization is the scrubbing of instruments with special brushes and detergent to remove blood, mucous, etc. Disinfection is the process that destroys pathogenic micro-organisms. Sterilization is the process of destroying all microbial forms of life – typically an autoclave is used for this along with distilled water.

Asepsis is being free of disease-producing microbes. Microbes are everywhere. Medical asepsis is the practice to remove or destroy pathogens and to prevent pathogens from spreading from one person or place to another.

Surgical Asepsis is the practice that keeps items free of all microbes. Sterilization is the process of destroying all microbes. Contamination is the process of becoming unclean. Disinfection is the process of destroying pathogens. Germicides are disinfectants applied to the skin, tissues and non-living objects.

Patient Transportation/Preparation

Verbal commands are important in helping the patient focus on what needs to be done. Speaking to the patient in clear, simple language helps avoid confusion.

Patient preparation is important as well as communication. Some patients in a hospital setting may be wearing hospital gowns which aides in nursing care. Draping to provide comfort for the patient while transporting is essential. Possibly wearing a robe or two hospital gowns, one opening in the front is a good way to provide modesty for the patient.

Transporting the patient from one area to another is often necessary. The use of a cart, gurney, or wheelchair may be required so the use of safety techniques is essential for both the patient and the physical therapy aide. The use of side rails, safety belts, and using the brakes on the cart or wheelchair all contribute to a safe arrival from one place to the other.

Patient Positioning

Fowler's Position

In this position the patient is lying, on his/back, on the bed. This position is considered, by many to be the most comfortable. It is ideal for many treatments and is also comfortable for watching TV, feeding, and is comfortable for patients who have difficulty breathing. Modern beds allow the head of the bed to be elevated at different comfort levels. It is ideal to have two to three pillows under the back and shoulders.

The patient's hips should be at the place where the bend bends when the bed head is rolled up. Place the head of the bed at 30° for semi-Fowler's, 45° to 60° for Fowler's, and 90° for high Fowler's. Flex elbows and place a pillow under each arm to prevent pull on the shoulders.

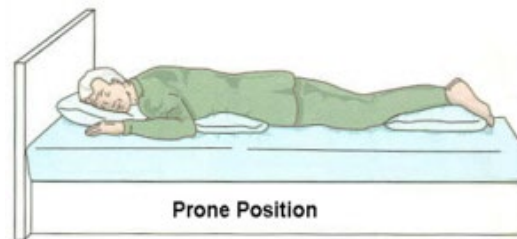


In a side lying position, the patient remains resting on his/her side for some time. It is easiest to get to the side lying position from the supine or prone position.



Prone position

Patients who are positioned in the prone position lie with their shoulders parallel to their hips and the spine straight. The head may be turned to either the right or the left side, or may be maintained midline with a small pillow or towel placed under the forehead for comfort.



Patient Transfer and Mobility

Gravity and momentum are very important in in-patient transfer as well as safety for both the aide and the patient. Understanding body mechanics helps in correctly positioning your own body, for you to help the patient move safely and efficiently and avoiding injury.

Transfers

There are two basic types of transfers – standing and sitting. A standing transfer is where the patient stands and places his/her weight on one or both legs and sits down in a new place. A sitting transfer is where the patient does not rise but moves from one sitting position to another normally by moving his/her hips. These are very common for amputees or patients suffering from paralysis. In this type of transfer, a sliding board is very helpful as it makes the surfaces the same height.

Every patient will have a “strong side” and this should be kept in consideration as you prep the patient for transfer. Generally, the patient will prefer to move toward his/her strong side. Footwear is also important to remember in patient prep – if the patient requires the use of any appliance, brace, prosthesis; this should be in place before the transfer.

Some general rules for transfers:

- Transfer toward the patient’s strong side. If the patient is heavy, get help or

- use a sliding board
- Keep your back straight
- Bend your knees with feet apart
- Hold the patient close to you
- Never let the patient hold you around your neck during the transfer
- Count to three out loud so the patient will be prepared for the transfer
- Make sure when transferring to or from the bed, the bed is at the same height as the wheelchair or the stretcher

Assisting with Patient Mobility and Gait Training

Many patients come to physical therapy requiring help with walking. Some may have assistive devices like crutches, canes etc. If any adjustments are necessary to the gait devices this should be done by the therapist in charge. No matter what type of ambulatory device is prescribed, the aide needs to be aware that the amount of energy required using that device is generally high. The patient can tire very easily and when attending therapy sessions, this should be a factor.

Type of devices for Ambulation and Gait Training

Gait patterns can be taught by using parallel bars. These bars provide stability and help the patient become accustomed to being upright. Whatever device is prescribed, demonstrating the proper use is important in helping the patient establish a comfort level using the device. Demonstrating, verbal instructions and watching other patients using the same devices can also be a great way to learn the proper use of the prescribed device. It is the responsibility of the physical therapist aide to guard the patient while walking. Use a gait belt and stand on the patient's weak side. Keep your step-in line with the patient for balance.

Gait Patterns – include non-weight bearing with crutches and walker, toe-touch bearing with crutches and walker, partial weight bearing with crutches and walker, four-point, three-point, two-point, swing to and swing through. Practicing on different types of surfaces should include curbs, carpets, hard-wood floors, and rough-uneven surfaces.

Common Ambulatory Devices

- Parallel Bars/Hemi Bars – provide stability and are typically used as the first step in teaching a patient to walk.
- Walkers – these may be standard, rolling platform or reciprocal
- Crutches – come as axillary, forearm and platform
- Canes – come in different forms to offer a variation in stability

Therapeutic Exercises/Range of Motion

A therapeutic exercise program is a difficult part of any physical therapy plan. The patient will have to be shown how to do certain exercises, perform them, and often need correcting once done. The ultimate goal of any exercise program is to return the patient back to normal activity by increasing strength, mobility, flexibility, relaxation and coordination.

Patients require range of motion exercises to:

- Maintain or improve mobility in the joints
- Relax spasticity to allow free movement of legs and arms
- Improve circulation to the joint
- Prevent joint contractures

There are three types of range of motion: passive range of motion, active assistive range of motion, and active range of motion.

The goals of passive range of motion are to:

- Prevent joint and muscle contractures
- Increase sensation to the joints
- Maintain the normal length of the muscle
- Stimulate normal reflexes
- Prepare the patient for active exercises

The goals of active assistive range of motion are to:

- Improve range of motion of the joint
- Prevent atrophy of the weak muscles
- Increase strength in weak muscles
- Improve coordination of movement
- Prevent joint or muscle contractures

The goals of active range of motion are to:

- Increase range for functional activities
- Prevent wasting in weak muscles
- Prevent muscle or joint contractures
- Increase strength and circulation

Although the physical therapist is responsible for development of the exercise plan, it is the physical therapist aide who assists the patient with carrying out the exercise program.

The program will be designed with the following factors in mind:

- Should an improvement in range of motion be the goal?
- How much stress is being placed on the patient – both physically and emotionally?
- How gradual should the intensity and duration be?

There are certain modalities that will be used in conjunction with the exercise program. Heat, ice, infrared heating, paraffin baths, electric stimulation and ultrasound are all modalities that could be suggested in addition to the exercise program.

Stretching can also be added as an additional part of the exercise plan. Stretching can either be done actively or passively. The goal of stretching exercises is to lengthen a muscle or a tendon when it is too short. An increase in the length of a muscle or a tendon will help increase range of motion.

There are several types of exercise plans to choose from – active resistive exercise, endurance training and aerobic exercise are a few types of exercise that promote mobility and stability.

Additional terminology:

- Hydrotherapy – complete immersion of the body part into heated water – helps increase blood flow.
- Hydrocollator pack – used as moist heat and placed on the area to be heated
- Infrared heating – radiant heat – advantageous due to no pressure being on the body
- Paraffin bath – used to treat arthritis or joint pain – the hand or foot is dipped into the wax material
- Ultrasound – ultra sonic waves that penetrate the superficial tissue and are reflected on the deep tissue
- Whirlpool Therapy- whirling motion of water has a massaging effect on the skin and tends to dilate the blood vessels
- Therapeutic Pool – used for patients with lower extremity issues.
- Cold Therapy – used to reduce swelling and inflammation
- Massage – used to increase the supply of blood to an affected part
- Cervical traction helps in the relief of muscle spasms and can also help reduce swelling
- Two types of traction include skin traction and skeletal traction
 - Skin traction uses tapes or traction strips attached to the skin
 - Skeletal traction uses a wire or pin inserted in the bone with pull applied to the pin or wire



wishes you good luck on your certification exam.
For additional questions, visit our website
www.AMCAexams.com.