

Chapter 2. Anatomical Terminology: planes, directions, and positions

1. Learning Objectives

By the end of this chapter you will be able to ...

1. **Define** the three cardinal anatomical planes and the axes that pass through them.
2. **Describe** the standard directional terms used to locate body structures in text, palpation, and medical imaging.
3. **Identify** and correctly use common patient positions employed in physiotherapy assessment, exercise, and electro-physical modalities.
4. **Apply** these terms to real-life clinical scenarios and chart notes, ensuring clear interdisciplinary communication.

2. The Cardinal (Orthogonal) Planes & Axes

Plane	Axis Perpendicular to Plane	Description	Physiotherapy Examples
Sagittal (Median when mid-sagittal)	Mediolateral (frontal-horizontal)	Divides body into right & left parts	Hip flexion-extension during gait analysis; forward reach test
Coronal / Frontal	Anteroposterior (sagittal-horizontal)	Divides body into anterior (ventral) & posterior (dorsal) parts	Shoulder ab-/adduction in joint play; scapular wall slides
Transverse / Horizontal / Axial	Longitudinal / Vertical	Divides body into superior & inferior parts	Cervical rotation range; trunk rotation in PNF patterns

Clinical Pearl — Plane ≠ Movement

- A motion **occurs parallel to a plane** and **around** its perpendicular axis.
- A resistance exercise cue such as “move in the frontal plane” guides both therapist and patient to maintain correct movement trajectory, reducing compensations.

3. Directional Terms (with PT-Specific Context)

Pair	Meaning	Practical PT Application
Anterior / Posterior	Toward the front / back of body	Recording thoracic kyphosis as “posterior convexity”
Superior / Inferior	Above / below a reference point	Cueing “superior glide of patella” in mobilisations
Medial / Lateral	Toward / away from the midline	Describing meniscus tears on MRI report
Proximal / Distal	Nearer / farther from limb root	Splint reaches “distal third of forearm”
Superficial / Deep	Closer to surface / further inside	Ultrasound head used for deep transverse friction
Cranial (Rostral) / Caudal	Toward head / tail end; often embryology, spine	Documenting “caudal traction” in lumbar traction note
Ipsilateral / Contralateral	Same side / opposite side of body	Cross-extension reflex training in stroke rehab
Palmar / Dorsal (hand)	Anterior hand / posterior hand	Electrode over palmar motor point of abductor pollicis brevis
Plantar / Dorsal (foot)	Inferior foot / superior foot	Stretch applied to plantar fascia

Documentation Tip: Combine terms for accuracy—e.g., “distal-lateral fibula tenderness” pinpoints the anatomy better than “outer ankle pain.”

4. Fundamental Body Positions in Physiotherapy

Position	Anatomical Features	Typical Uses in PT
Anatomical Position	Standing, eyes forward, arms at sides, supinated palms	Universal reference for directions & planes
Supine	Lying face up	Bridging, SLR strength testing, E-stim for paraspinals
Prone	Lying face down	Prone press-ups for McKenzie, scapular re-training
Sidelying (Left / Right)	Lying on one side	Hip abductor MMT, modified thoracic rotation mobilisations
Hook-lying	Supine, hips & knees flexed, feet flat	Core stabilisation, transversus abdominis activation
Crook-lying	Synonym of hook-lying (UK usage)	—
Long-sitting	Sitting with knees extended	Hamstring stretch, neurodynamic testing
High-sitting	Sitting with hips flexed $\approx 90^\circ$, knees dangling	Lower-limb MMT, dynamic balance
Fowler's (Semi-recumbent)	Supine with head elevated 45-60 °	Pulmonary drainage, semi-upright IMT
Trendelenburg	Supine, head lower than feet 15-30 °	Postural drainage (contraindicated in \uparrow ICP)
Quadruped (All-fours)	Hands & knees on table	Bird-dog exercise, rocking for lumbar mobility
Kneeling / Half-kneel	Weight on both knees / single knee	Proprioceptive/balance drills, gait pre-training
Standing	Weight-bearing on feet	Gait, posture assessment, CKC strengthening

Safety Note: Always document any **contra-indications** to positions (e.g., hypotension in upright, pregnancy in prone) before treatment.

5. Putting It All Together - Charting Example

Subjective: Patient c/o right shoulder pain.

Objective:

- AROM: Glenohumeral **abduction in coronal plane** limited to 90°.
- Accessory motion: **Posterior glide** (anteroposterior axis) hypomobile.
- Palpation: Tender at **anterosuperior acromion**.

Assessment: Sub-acromial impingement.

Plan: Mobilise in **sidelying**, apply **inferior glide** (longitudinal axis) grade III, then prescribe closed-chain wall slides maintaining **scapular plane** alignment.

Correct use of planes, axes, and directions minimizes ambiguity for any clinician reading this note.

6. Quick Visualisation Hacks

1. **Laser Pointer Method:** Imagine a laser fixed perpendicular to each plane—where the beam points is the axis.
2. **Door & Hinge Analogy:** Door moves in a plane; hinge pin is the axis.
3. **“Salami Slice” MRI Thinking:** Each axial MRI slice is a transverse plane; mentally stack slices to reconstruct 3-D relationships.

7. Self-Assessment Quiz

1. Which axis corresponds to flexion-extension at the elbow?
2. In a right-handed baseball swing, trunk rotation occurs in which plane?



3. Name two patient positions unsuitable immediately after total hip replacement (posterior approach) and explain why using directional terminology.
4. Define “contralateral” and provide an example from neuro-rehabilitation.
5. True/False: The median nerve lies lateral to the brachial artery in the cubital fossa in anatomical position.

Answers of Self-Assessment Quiz

1. Mediolateral axis (perpendicular to sagittal plane).
2. Transverse (horizontal) plane.
3. (i) Low-sitting (hip > 90 ° flexion – risk of posterior dislocation) and (ii) Cross-leg sitting (combined hip flexion, adduction, internal rotation).
4. Pertaining to the opposite side; e.g., **contralateral hemispheric stroke** causing weakness in the left limb if the right cerebral hemisphere is affected.
5. False – it lies **medial** to the brachial artery.

8. Suggested Lab Activities

1. **Plane Tape Drill:** Tape sagittal, coronal, and transverse lines on the floor. Have students perform movement patterns staying within each lane.
2. **Directional Bingo:** Instructor calls a term (“distal-posterior femur”); first student to palpate correctly scores.
3. **Position Swap Stations:** Rotate through treatment plinths set in prone, sidelying, quadruped—document three potential interventions per station.

9. Key Take-Home Points

- Planes and axes form the **coordinate system** for describing movement.
- Directional terms eliminate vagueness; pair them when necessary.
- Mastery of patient positions underpins safe, effective treatment and accurate documentation.
- Consistency in terminology facilitates teamwork across disciplines and improves patient understanding.