Nervous system examination for PACES

This document describes key aspects of the examination, focusing on areas where general physicians most frequently seek guidance. It may also offer useful guidance for candidates preparing for PACES, but is not an exhaustive guide on the full examination required in PACES.

General principles

Skill A (physical examination)

Rather than requiring strict observance of traditional technique and order of examination, candidates should be marked for demonstrating that they understand the purpose of the elements they choose to examine (e.g. examining for a sensory level in a suspected myelopathy).

As a full neurological examination is not possible in the time available, examiners should agree at calibration which elements need to be demonstrated for a satisfactory mark.

An abbreviated screening technique (e.g. distal sensation) is acceptable when no abnormalities are expected from the history (e.g. migraine), but a more detailed method is needed if the history or screening exam suggest abnormalities may be found.

Skill B (identifying physical signs)

Candidates should localise the abnormality anatomically (central/peripheral, then cortex, basal ganglia, cerebellum, brainstem, cord, roots, nerves, neuromusuclar junction or muscle) and identify patterns of signs that fit a clinical syndrome (e.g. bradykinesia, shuffling gait, asymmetrical resting tremor and rigidity in Parkinson's disease).

Skills D and E (differential diagnosis and clinical judgement)

The differential (skill D) and plan of investigation and management (skill E) should be appropriate for the anatomical location and clinical context (e.g. CT head is inappropriate for a peripheral neuropathy).

Higher function

Ask handedness to determine laterality of cognitive functions such as language. Candidates should know how to examine higher function but are not expected to memorise cognitive tests such as the MMSE.

Cranial nerves

Pupils. Test light reflexes, relative afferent pupillary defect and accommodation.

Fields. Test each eye independently, comparing against the examiner's field by presenting a stimulus from each quadrant, equidistant from both observers who are around an arm's length apart. The target size and colour should be appropriate for the patient's acuity – a hatpin or round neurotip are most discriminating, though a finger may suffice if acuity is poor. Traditionally a white pin on a dark background is used for peripheral vision, which is monochrome, and a red pin for central vision (blind spot and scotomas), as central colour vision is sensitive for red. However, as most rooms have white walls, red pins may be more accurate for peripheral vision because in the periphery they are seen as black, providing better contrast.

Fundoscopy. Only if appropriate.

Eye movements. To test smooth pursuit, move a target, such as a finger, in an H shape at a distance of around 40cm. If there is diplopia the candidate should determine which is the paretic eye. Candidates may examine saccades (hypo- or hypermetric saccades may suggest a cerebellar lesion).

Trigeminal (V). Test light touch in each of the 3 divisions, comparing sides, and if abnormal, use a pin to delineate accurately. Offer to test the corneal reflex, but do not proceed without permission.

Vestibulocochlear (VIII). Perform the whisper test, and if abnormal they may offer Rinne's and Weber's tests. However, these are unreliable and candidates should not be penalised for omitting.

Glossopharyngeal (IX). Offer to perform the gag reflex, but only proceed with permission.

Vagus (X). Assess speech, cough and swallow, then inspect palatal movement, depressing the tongue with a wooden stick.

Upper limbs

Inspection. Candidates may elicit a postural tremor by holding arms outstretched with wrists cocked back, then pointing index fingers towards each other in front of the nose with elbows out.

Power. Select muscle groups to demonstrate C5-T1 myotomes and the main nerves. For screening, the candidate may test the following movements at the midpoint of range, conventionally moving proximal to distal. Grades 2-3/5 require appropriate limb positioning to "eliminate" the effects of gravity; such repositioning may not be practical (especially for the lower limbs) so identifying weakness as <3 may suffice.

- Shoulder abduction (C5)
- Elbow flexion (C5-7; musculocutaneous nerve)
- Elbow extension (C7-8; radial nerve)
- Wrist extension (C7; radial nerve)
- Grip (finger flexion, C8-T1; median & ulnar nerves).
- Finger extension (C7; radial nerve)
- Finger abduction (T1; ulnar nerve).
- Thumb abduction (T1; median nerve)

Coordination. Finger-nose testing and dysdiadochokinesis.

Reflexes. Biceps (C5-6), supinator (brachioradialis, C5-6) and triceps (C7). Technique varies, but most involve a relaxed joint at the midpoint of its range and the tendon should be struck with a brisk single stroke. For small upper limb tendons, conventionally one strikes a finger placed over it to ensure force is directed onto the tendon. Regardless, technique need only be sufficient to elicit the reflex and not cause pain. If absent, reinforce by jaw clench.

Sensation. Demonstrate each modality on the central chest. For light touch use cotton wool or a fingertip, for vibration a 128 Hz tuning fork over a bony prominence, and for pinprick a neurotip, asking if it feels sharp or blunt. For joint position sense (proprioception) isolate joints, but it is not necessary to hold from each side. Formal temperature testing is usually not possible in PACES, but a metal object may be used for cold. For screening, test each modality at the fingertip. If an abnormality is suspected, delineate the abnormal area, test dermatomes and the main nerves with pinprick, as below, comparing sides as you go, traditionally moving distal to proximal. It is not necessary for the patient to close their eyes. Dermatomal maps should be viewed as approximate as there is considerable overlap and variation. Candidates should differentiate patterns of sensory loss (e.g. cord, root, individual nerve or generalised neuropathy).

- C4 over the acromioclavicular joint
- C5 at the lateral (radial) elbow
- C6 and radial nerve at the first dorsal web
- Median nerve at the palmar index finger
- C7 at the middle finger
- C8 and the ulnar nerve at the palmar little finger
- T1 at the medial (ulnar) elbow

Lower limbs

Inspection and gait. Stand without using hands to assess proximal power, then observe gait. Candidates may ask for steps on toes, then heels, to test distal power, then tandem gait (one foot in front of the other) for cerebellar function. Romberg's test, standing with feet together and eyes closed, may be used to assess for proprioceptive loss.

Tone. For ankle clonus, >3-5 beats are considered abnormal.

Power. Lie flat and select muscle groups to demonstrate L2-S1 myotomes and the main nerves. For screening, candidates may test the following (as for upper limbs).

- Hip flexion (L1-3; femoral nerve).
- Hip extension (L5-S2).
- Knee extension (L3-4; femoral nerve)
- Knee flexion (L5-S1; sciatic nerve)
- Ankle dorsiflexion (L4-5; common peroneal nerve (CPN), a branch of the sciatic)
- Ankle plantarflexion (S1-2; tibial nerve, a branch of the sciatic)
- Ankle eversion (L5-S1; CPN; peroneus longus & brevis). Tested in foot drop along with inversion to distinguish a CPN (foot drop & weak eversion) from L5 root lesion (foot drop, weak eversion & inversion).
- Ankle inversion (L4-5; tibial nerve; tibialis posterior)
- Big toe extension (L4-5; CPN; extensor hallucis longus)

Reflexes. Knee (L3-4; femoral) and ankle (L5-S1; sciatic) reflexes, with technique as for upper limbs. Plantar responses are evoked by stroking the lateral border of the sole, then across the foot pad. As technique varies, candidates should not be marked down for choice of implement (e.g. end of a tendon hammer, orange stick, or thumb), but they must correctly elicit the response without causing pain or harm.

Sensation. For screening, test each modality at the tip of the big toe. If an abnormality is suspected, delineate the abnormal area, test dermatomes and the main nerves as above. If a cord lesion is suspected, determine the sensory level by continuing up into the abdomen and chest.

- L2 & femoral nerve at the upper anteromedial thigh over the inguinal ligament.
- Lateral femoral cutaneous nerve (L2-3) at the lateral thigh.
- L3 at the anterolateral thigh
- L4 at the medial side of the ankle
- L5 & common peroneal nerve at dorsum of foot

- S1 & tibial nerve at the lateral aspect of the heel
- S2 at the back of the knee

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