AFMC National Clinical Skills Working Group Evidence-Based Clinical Skills Document

# Table 10: Neurological Exam

| Physical Sign / Manoeuvre | Rationale | Technique(s) | Interpretation | Evidence | Pre-Clerkship | Clerkship |
|---|---|---|---|---|---|---|
| | Gross contextual screening | Orientation to person, place and time | Gross assessment of connection to context (confusion) | Impaired consciousness K value of 0.65-0.88<br><br>McGee, 2001. | 2 | |
| Folstein Mini Mental (see also mental status section) | Test for cognitive impairment | Standard administration | Dementia | +LR of 14.5 for scores< 21<br><br>McGee, 2001, p56.<br><br>K:0.28-0.80<br><br>McGee, 2001, p56. | 2 | 3 |
| clock-drawing test (see also mental status section) | Test for cognitive impairment | Standard administration | Dementia | +LR of 14 to rule in dementia<br><br>Juby, 2002.<br><br>K:0.73 | 2 | |
| Glasgow coma scale | Assessment of brain injury | Standard clinical record | Grading and evolution of brain injury | Consistency of scoring highest for best motor response.<br><br>Gabbe, 2003. | 2 | 4 |
| Fundoscopy | Assessment of retina and optic nerve abnormalities | Examination of eye with ophthalmoscope or retinography | Increased intracranial pressure, retinal complications of hypertension, diabetes mellitus | No value in the management of HBP<br><br>van den Born, 2005.<br><br>Useful in DM if combined with retino-graphy<br><br>O'Hare, 1996. Harding, 1995.<br><br>Papilledema: high sensitivity, low specificity<br><br>Johnson, 1991.<br><br>Overall K: 0.65 | 2 | 3 |
| CN1 | Gross assessment of olfactory dysfunction | Test smell with readily available scents | Anosmia | None available | 1 | 1 |
| CN2 | Understanding of dysfunction and topography of lesions in the visual pathways | Visual field testing by confrontation, if abnormal needs further testing. | Retinal disease<br><br>Optic nerve damage | V.F. has a +LR between 4.2-18.3.<br><br>Hemianopia is | 3 | 4 |

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| | | Visual acuity. Papillary reaction to light and accommodation | Occipital lobe stoke<br><br>Screening<br><br>Coma, optic nerve, drug effects stroke syndromes | 98% specific in unilateral cerebral disease McGee, 2001.<br><br>V.A. no evidence found when it is used as gross screening.<br><br>PRLA :High sensitivity for optic nerve disease, ipsilateral brain herniation, and post communicating art aneurism. Very high sensit/specif for Horner's syndrome<br><br>McGee, 2001. | | |
| CN3 | Understanding of dysfunction and topography of lesions in the visual pathways | Observation of pupils, upper eye lid and examination of eye movements. | Diseases of the external eye muscles. Injury to CN 3 or disease of mid/brain stem nucleae. Increased ICP | Isolated palsy is most commonly caused by posterior communicating artery aneurysm or ischemic infarct. Pupil reaction +/- spared. Evidence not qualified. | 3 | 4 |
| CN4 | Understanding diplopia and its neurologic causes | Examination of eye movements. | Diseases of the external eye muscles. Head, cavernous sinus or orbital injuries. Disease of mid brain nucleae | Isolated palsy most commonly seen in head trauma (34%) and ischemic infarcts (22%). Evidence not quantified. | 3 | 4 |
| CN6 | Understanding diplopia and its neurologic causes | Examination of eye movements. | Diseases of the external eye muscles. Head, cavernous sinus or orbital injuries. Disease of brain stem nucleae | Isolated palsy most frequently seen in increased ICP, ischemia and lesions in the base of the skull. Evidence not quantified. | 3 | 4 |
| CN5 | Understand facial sensation, mastication | Test V1, V2, V3, sensation and corneal reflex. Test jaw clenching | Tic dolorous, stroke, cerebellopontine lesions. Herpes zoster | High sensitivity in thalamic or hemispheric injury but low specificity<br><br>McGee, 2001. | 3 | |
| CN7 | Understanding facial expression dysfunction | Observation<br><br>Motor | Peripheral versus central nerve palsies<br><br>Stroke syndromes | No appraisal of evidence found.<br><br>Facial palsy, present or absent has a K | 3 | |

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| | | | Bell's palsy | value of 0.48-0.68<br><br>McGee, 2001. | | |
| CN8 | Understanding hearing and vertigo | Whispered voice, Rinne and Weber not useful for general screening of hearing problems.<br><br>Dix-Hallpike test BPPV. | Hearing<br><br>Vestibular dysfunction | Whispered voice test has high sensitivity, good specificity and +LF of 6 for hearing loss.<br><br>Dix-Hallpike test, widely used but accuracy not appraised<br><br>Olaleye, 2001. | 3 | 4 |
| CN 9, 10 | Understanding swallowing | Test together<br><br>Swallow test, gag reflex, observe for dysphonia | Stroke<br><br>Aspiration risk<br><br>Brain stem lesions | Water swallow test, reasonable sensitivity, specificity and +LR of 5.6 K value: 1<br><br>McGee, 2001. | 3 | 4 |
| CN 11 | Understanding of sternocleidomastoid muscle function | Turning of the head and shoulder elevation | Neck trauma<br><br>Cerebral hemispheric lesions<br><br>Medullary and high spinal lesions | No appraisal of evidence found | 3 | 4 |
| CN12 | Understanding of tongue motor function | Motor | Brain stem lesions<br><br>Lesions associated with lower cranial nerves. Lesions in upper neck and base of skull | No appraisal of evidence found | 3 | 4 |
| 10 g monofilament | Screening for future complications of PDN | Use instrument<br><br>Test 10 times on dorsum and plantar aspect | Peripheral neuropathy, risk for diabetic foot ulcer | Moderate to high predictor of foot ulcers, osteomyelitis and amputations. +LR of 2.9-7.2<br><br>McGee, 2001.<br>Lee, 2003.<br><br>K: 0.72-0.83. | 2 | 4 |
| Light touch, pain sense | Mapping of sensory defects | Use non-reusable sharp object such as broken tongue depressorLight touch - spindle | Peripheral nerve, spinal cord lesions, stroke syndromes | Quite accurate in mapping peripheral nerve injuries, radiculopathy, spinal cord syndromes, lateral medullary, thalamic and hemispheric syndromes | 3 | 4 |

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| | | | | K: 0.41–0.63<br><br>McGee, 2001. | | |
| Vibration sense | Adjunct in the investigation of certain neuropathies | Use 128 Hz tuning fork | Peripheral neuropathy and spinal cord disease | Diminished in peripheral neuropathies and spinal cord disease<br><br>K: 0.45–0.54<br><br>McGee, 2001. | 3 | 4 |
| Proprioception (Joint position sense) | Adjunct in the investigation of certain neuropathies.<br><br>Associated with vibration sense. | Slightly hold sides of digit and move up and down | Peripheral nerve, spinal cord disease, posterior column lesions and severe hemispheric disease | Diminished in peripheral neuropathies, spinal cord disease and cortico–hemispheric disease.<br><br>No appraisal found | 3 | 4 |
| Two point discrimination, stereognosis, graphesthesia | Complex sensation that requires intellectual elaboration | Two pressure points applied simultaneously to the skin.<br><br>Recognition of a object in the hand.<br><br>Recognition of numbers traced on the palm of the hand | Lesions in the posterior parietal cortex | Altered in lesions of the posterior parietal (sensory) cortex.<br><br>No appraisal found | 3 | 4 |
| Dermatomes | Mapping of spinal cord lesions and radiculopathy | Light touch and pain sensory examination | Peripheral nerves, spinal cord and nerve root lesions | Fairly accurate examination defining the level of spinal cord injury. High specificity with high +LR in C6, C7, C8 radiculopathy in sensory loss of thumb, middle and little finger<br><br>McGee, 2001. | 3 | 4 |
| Muscle bulk | Associated with muscle disease or denervation | Inspection of muscle groups for wasting, hypertrophy and fasciculations | Muscle disease, upper and lower MN disease or injury, nerve and neuromuscular end plate disease | Comparative calf wasting accurate, indicates low radicular compression due to disc herniation, +LR 5.2.<br>K:0.32–0.81<br><br>McGee, 2001. | 3 | 4 |
| Muscle tone | Associated with neurophysiologic control of muscle function | Test for flaccidity, spasticity, cogwheel | Stroke<br><br>Spinal cord lesions | Rigidity alone in the diagnosis of Parkinson's disease has low | 2 | 4 |

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| | | rigidity | Neuromuscular junction<br><br>Extrapyramidal disease (Parkinson's disease) | sensitivity, low specificity and low +LR. Accuracy increases with the presence of bradykinesia and typical pill-rolling tremor. Spasticity/rigidity have a K value 0.21-01.64<br><br>McGee, 2001. | | |
| Muscle Power | Assessment of corticospinal and neuromuscular function | British Medical Research Council (MRC) Scale for grading muscle strength<br><br>Medical Research Council, 1976. | Assessment and progression of upper and lower MN disease and myopathy | Moderate to good sensitivity. Good to very good specificity. Good +LR.<br><br>K:0.69-0.93<br><br>McGee, 2001. | 3 | 4 |
| Pronator drift | Hemispheric lesion | Hold arms up in pronated position, eyes closed | Unilateral cerebral hemispheric disease | High sensitivity: 79%<br><br>Very high specificity, 98% and +LR, 33<br><br>McGee, 2001. | 3 | 4 |
| Reflexes (DTRs) | Assessment of motor neuron and peripheral nerve disease | Triceps, biceps, bracheoradialis, patellar, ankleGrade, reflex, amplitude0-4 | Abnormal DTRs have diagnostic value ONLY when they are asymmetric or accompanied by other signs of motor neuron disease (McGee, 2001) | Diminished DTRs have a general moderate sensitivity but high specificity 90%+, and high +LR in the diagnosis of radiculopathy.<br><br>K: 0.34-0.94<br><br>McGee, 2001. | 3 | 4 |
| Plantar Reflex (Babinski) | Adjunct in assessment of hemispheric and pyramidal tracts disease | Scratching the lateral aspect of the sole of the foot with a hard, pointed object | Spino-cortical (pyramidal)tract lesion<br><br>Severe metabolic disturbance | Highly specific, 98% with high +LR, 19, for pyramidal tract lesions.<br><br>K values: 0.17-0.61<br><br>McGee, 2001. | 3 | 4 |
| Primitive reflex (palmomental, glabellar and grasp) | Adjunct in the assessment of dementia, frontal lobe and Parkinson's disease and advanced AIDS | Scratching of hand palm and twitching of chin.<br><br>Tapping on glabella triggers sustained blinking.<br><br>Sliding a finger | These are frontal release reflexes. The palmomental and glabellar reflexes can be found in normal people. | Grasp reflex has a high specificity, 99%, and high +LR, 20.1 in the diagnosis of frontal, cortical, subcortical and thalamic nuclei lesions, with a K value of 0.46-1.0 | 2 | 4 |

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| | | on the patient's hand – the hand grasps the clinician's finger | | McGee, 2001. | | |
| Gait | Assessment of ambulation | Observation of ambulation | Stroke, Parkinson's disease, myelopathy, peripheral neuropathy and cerebellar disease | 8.8 +LR as predictor of falls<br><br>Diagnosis of abnormal gait has a K value of 0.11-0.52<br><br>McGee, 2001. | 3 | 4 |
| Coordination/cerebellar | Assessment of cerebellar function | Ataxia (gate, finger-nose test and rapid alternating movements), nystagmus, hypotonia, dysarthria | Cerebellar disease | Positive cerebellar signs present with variable frequency in unilateral cerebellar disease, 10-93%, being the most frequent gate ataxia, 85% in unilateral disease, to 100% in alcoholic cerebellar syndromes<br><br>Finger-nose test has a K value of 0.55-0.79<br><br>McGee, 2001. | 3 | 4 |
| Rhomberg | Not much rationale for teacing/performing this test. Has historic value. | Ability to stand for 60 seconds with feet together and eyes closed | Doubtful as it is very unspecific and has very low inter-observer agreement (not quantified) | Very unspecific and has very low inter-observer (K) agreement (not quantified) | 3 | 4 |
| **Irritative/provocative tests** | | | | | | |
| Meningismus (Kernig/Brudzinski) | Acute, critical and treatable CNS pathology | Passive neck stiffness<br><br>Kernig's (patient resists extension of the knee from the hip/knee flexed position)<br><br>Brudzinski's (passive flexion of the neck elicits flexion of hips/knees | Meningeal irritation | Meningimus K value: 0.76<br><br>Neck stiffness frequency in bacterial meningitis 57-92%<br><br>Neck stiffness in SAH: sensitivity 59%, specificity 94%, +LR 10<br><br>McGee, 2001. | 3 | 4 |
| Tinel's and Phalen's | Carpal tunnel syndrome | Tinel's (percuss median nerve over the carpal tunnel)<br><br>Phalen's (forcible palmar flexion of the wrist produces | Median nerve compression<br><br>Median nerve compression | Sens: 23-60%<br><br>Spec: 64-87%<br><br>+LR 1.4<br>McGee, 2001.<br><br>Sens. 10-91% | 3 | 4 |

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| | | symptoms) | | Spec. 33-86%<br><br>+LR 1.3<br>McGee, 2001. | | |
| Straight leg raising test<br><br>Crossed straight leg raising test | Lumbar nerve root compression | Patient supine and posterior pain when raising the straight affected leg.<br><br>Crossed test:pain in the affected leg when raising the straight opposite leg | Lumbar disc herniation | Sens: 73-98%<br><br>Spec: 11-61%<br><br>+LR 1.3<br>McGee, 2001.<br><br>Sens: 23-43%<br><br>Spec: 88-98%<br><br>+LR 4.3<br><br>Overall K value:0.33-0.68<br>McGee, 2001. | 3 | 4 |
| | | | | Reliability or physical findings or inter-observer agreement is expressed by Kappa (K), 0 being a level of agreement as expected by chance and 1 being perfect - 100% -- agreement. According to convention, 0-0.2 indicates slight agreement; 0.2-0.4 fair agreement; 0.4-0.6 moderate agreement; 0.6-0.8 substantial agreement; and 0.8-1 almost perfect agreement. | | |

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