

1. EMQ: Match the **most likely** cause of headache with the clinical symptoms +/- signs
  - i. Migraine
  - ii. Subarachnoid hemorrhage
  - iii. Meningitis
  - iv. Cerebral Venous Thrombosis
  - v. Temporal arteritis
  - vi. Acute angle closure glaucoma
  - vii. Sinusitis
  - viii. Idiopathic intracranial Hypertension (Pseudotumour Cerebri)
  - ix. Internal Carotid Artery Dissection
  - x. Tension Headache
  - xi. Cluster Headache
  - xii. Vertebral Artery Dissection  
  - a. 40 yo Pain is sharp, and occipital in region, associated with vertigo and ataxia.
  - b. 45 yo Pain is sudden onset and global, had a loss of consciousness at the time, vomiting in ED, no neurological deficit.
  - c. 75 yo Pain throbbing and over frontotemporal region, history of polymyalgia rheumatica.
  - d. 25 yo Pain is bilateral, constant, no nausea, no neurological deficits. Relieved by NSAIDs.
  - e. 20 yo Pain worsened over 4 hour period, is unilateral, pulsatile, associated with vomiting and photophobia, afebrile. Did see flashing lights prior to headache.
  - f. 50 yo Pain is severe but only lasted 30 minutes, self-resolved, unilateral supraorbital in region, associated with conjunctival injection.
  - g. 60 yo Pain is diffuse, rapid onset, associated with neck stiffness, photophobia. Afebrile in ED but did describe shivering at home.
  - h. 30 yo Pain has been ongoing for weeks, constant and worsened by coughing, associated nausea and blurred vision, only history of obesity.
  - i. 65 yo Pain dull over forehead, worsened when leaning forward, recent URTI symptoms, fever at 38 degrees.
  - j. 35 yo Pain is diffuse, gradual onset, associated with vomits and started few days after birth of 1<sup>st</sup> baby.
  - k. 70 yo Pain unilateral left supraorbital, associated with nausea and vomiting, sees a halo out of the left eye.
  - l. 55 yo Pain is gradual onset, unilateral, over frontotemporal and facial regions, has new onset partial Horner's syndrome (has miosis and ptosis but anhidrosis absent)
  
2. Which is true of subarachnoid haemorrhages
  - a) Majority of cerebral aneurysms occur around the posterior circle of Willis
  - b) Perimesencephalic Subarachnoid bleeds generally have a poorer prognosis
  - c) Smoking gives a higher risk than hypertension
  - d) Alcohol consumption is not a risk factor

3. Regarding investigations in suspected SAH which sensitivity rating is **not** true
  - a) CT non-contrast brain done within 6 hours of symptom onset is >97% sensitive
  - b) CT non-contrast brain done at 24 hours of symptom onset is 93% sensitive
  - c) CT non-contrast brain done at 1 week after symptom onset is 50% sensitive
  - d) LP done at 12 hours after symptom onset with CSF xanthochromia is 98% sensitive
  
4. Regarding SAH grading systems which is correct
  - a) Fisher scale is radiological only and does not predict clinical complications
  - b) Fisher scale is based on blood thickness and location of blood in ventricles or intracerebral
  - c) Hunt and Hess scale is based on GCS and presence neurological deficits
  - d) World Federation of Neurosurgical Societies scale is based on severity of headache, conscious state and neurological deficit
  
5. Regarding Haemorrhagic stroke which is true
  - a) Platelet transfusion for patients on antiplatelet therapy is not routinely recommended
  - b) SBP aim of <140 confers a greater benefit in morbidity and mortality outcomes compared to SBP aim of <180
  - c) In Hypertensive intracerebral haemorrhage the cerebellum is the most frequently affected area
  - d) Conservative management is the mainstay of treatment for all intracerebral bleeds
  
6. EMQ: Match the area of brain **most likely** to be affected by a stroke with the clinical picture
  - i. Anterior Cerebral Artery
  - ii. Middle Cerebral Artery
  - iii. Posterior circulation – Distal (Posterior cerebral Artery)
  - iv. Posterior circulation – Middle (Basilar Artery paramedian branches)
  - v. Posterior circulation – Proximal (Vertebrobasilar Artery)
  - vi. Isolated Cerebellar
  - vii. Lacunar  
  - a. Symptoms: vertigo, headache, vomits, dysphagia, *right* sided limb numbness to pain.  
Signs: nystagmus, *left* sided ataxia, *left* facial numbness to pain and Horner's syndrome
  - b. Symptoms: *right* sided hemiparesis, *right* sensory loss and facial droop.  
Signs: aphasia, *right* sided homonymous hemianopia, gaze preference to the *left* side.
  - c. Symptoms: *right* sided weakness of arm and leg, *right* facial droop.  
Signs: dysarthria, dysphagia, no sensory deficit

- d. Symptoms: complete paralysis, aphasia.  
Signs: paralysis of limbs, minimal facial movements, preserved upward gaze and blinking
  - e. Symptoms: confusion, *Left* sided hemiparesis and sensory loss.  
Signs: *Left* sided motor hemineglect, urinary incontinence, no deficits of the hand and face
  - f. Symptoms: dizziness, headache, blurry vision  
Signs: *Right* sided homonymous hemianopia, inability to read but able to write (alexia without agraphia)
  - g. Symptoms: vertigo, vomiting, headache  
Signs: *Left* sided limb ataxia, dysarthria, nystagmus
7. Regarding Stroke screening tools which is correct
- a) ROSIER scale includes negative points for syncope and seizure
  - b) NIH stroke scale score <10 indicates a minor stroke
  - c) Posterior circulation strokes may have a higher NIH stroke scale score compared to other territory strokes
  - d) Melbourne Ambulance Stroke Screen has a sensitivity of only 66%
8. Which is **not** a part of the ABCD2 score for TIA risk stratification
- a) Age  $\geq$  60
  - b) Blood pressure  $\geq$  140/90
  - c) Duration  $\geq$  4 hours
  - d) Presence of diabetes
9. Which of the following suggests a delirium more so than psychosis
- a) Auditory hallucinations
  - b) Delusions
  - c) Normal attention
  - d) Fluctuating conscious state
10. Regarding Glasgow Coma Scale which applications is its use the most reliable
- a) Conscious level after head injury
  - b) Need for intubation
  - c) Conscious level after drug or alcohol ingestion
  - d) Helps distinguish psychogenic coma vs true coma

11. Which is **not** currently recommended in a patient with raised ICP
- Mannitol 0.5 to 1 g/kg IV
  - Hyperventilate to pCO<sub>2</sub> 30 mmHg
  - Dexamethasone if presence of brain tumour
  - Head elevated 30 degrees
12. Which brain lesion would cause an ipsilateral ataxia
- Lateral Cerebellar stroke
  - Midline Cerebellar tumour
  - Internal Capsule Lacuna infarcts
  - Frontal lobe tumour
13. In Parkinson's disease which is the typical gait disorder
- Apraxic gait
  - Waddling gait
  - Festinating gait
  - Senile gait
14. EMQ: Match the **most likely** cause of vertigo with associated symptoms and signs
- BPPV
  - Stroke
  - Vestibular Neuronitis
  - Acoustic Neuroma
  - Menieres
  - Labyrinthitis
  - Vestibular migraine
- Sudden onset with vertical nystagmus that does not fatigue, no hearing loss
  - Gradual onset with persistent imbalance, no nystagmus, associated unilateral hearing loss but no vertigo
  - Episodic of >30 minutes and lasts up to 24 hours, no recent infections, horizontal nystagmus, unilateral hearing loss, associated tinnitus
  - Gradual onset lasting days, not associated with head movements, horizontal nystagmus at rest, no associated hearing loss

- e. Episodic lasting up to 1 minute, associated with head movements, rotational nystagmus when head turned, no hearing loss
  - f. Recurrent spontaneous symptoms, associated with headache, no nystagmus, no hearing loss or tinnitus
  - g. Gradual onset with persistent imbalance lasting days, horizontal nystagmus at rest, associated hearing loss and tinnitus with recent otitis media
15. Regarding the HINTS (Horizontal head impulse test, nystagmus and test of skew) test which is correct
- a) A normal head impulse test with symptoms of vertigo is highly suspicious for a stroke
  - b) HINTS testing has a much poorer sensitivity and specificity compared to MRI
  - c) HINTS testing of direction-changing horizontal nystagmus on lateral gaze and test of skew deviation are equally sensitive as the head impulse test
  - d) Dix Hallpike Maneuvre is part of the HINTS testing
16. Regarding 1<sup>st</sup> Seizure diagnosed in the ED which is **not** correct
- a) All 1<sup>st</sup> seizures in adults should have a CT brain scan
  - b) Prolactin levels may be elevated up to 1 hour post seizure
  - c) 25% of patients with normal non contrast CT brains will have visualized pathology on follow-up MRI
  - d) Focal seizures have a less chance of having an abnormal CT or MRI finding compared to generalized tonic-clonic seizures
17. Which is true about status epilepticus
- a) Status is defined as a single seizure lasting  $\geq 10$  minutes
  - b) Correctable metabolic causes of seizure include hyponatraemia, hypoglycaemia and hypocalcaemia
  - c)  $\geq 2$  seizures within one ED presentation is considered status epilepticus regardless of post ictal recovery in between
  - d) Ketamine is contraindicated in seizures due to risk of raised intracranial pressure
18. Regarding PRES (Posterior Reversible Encephalopathy Syndrome) which is correct
- a) Seizures can occur in 20% of cases
  - b) Visual disturbances occur in 90% of cases
  - c) Hypertension is a prominent associated feature
  - d) Prognosis is poor especially if it is associated with seizures

19. Regarding Guillain Barre which is **incorrect**
- a) Campylobacter infections is the chief precipitant in up to 25% of cases
  - b) Miller-Fischer variant has predominantly cranial nerve involvement
  - c) CSF may only show raised protein levels
  - d) Aside from supportive other treatment recommendations include glucocorticoids with either IV Ig or plasmapheresis
20. Regarding Botulism which is correct
- a) Infantile Botulism usually occur after 6 months of age
  - b) Enterotoxin irreversibly binds to the post synaptic membrane of peripheral and cranial nerves preventing acetylcholine to bind
  - c) Clinical findings are that of descending symmetrical paralysis with no sensory deficits
  - d) Pinpoint pupils are a common ocular finding
21. Which is **not** a common complications of Diphtheria
- a) Hepatitis
  - b) Myocarditis
  - c) Cranial nerve palsy
  - d) Motor paralysis
22. Diabetes is **not** a potential cause of which of the following focal neuropathies
- a) Carpal tunnel syndrome
  - b) Deep peroneal nerve entrapment
  - c) Meralgia Paresthetica (lateral femoral cutaneous nerve entrapment)
  - d) Mononeuritis Multiplex
23. Regarding Bell's Palsy which is true
- a) Routine use of antiviral therapy with or without steroids can increase frequency of complete recovery
  - b) <40% will have permanent paralysis
  - c) Most common in 1<sup>st</sup> trimester compared to other trimesters of pregnancy
  - d) A examination feature may be loss of taste to posterior 1/3 of tongue
24. Regarding Myasthenia Gravis which is **incorrect**
- a) Poor peak flow, weak cough and hypercapnoea are reasons for ICU or intubation
  - b) Giving edrophonium for diagnosis can cause cholinergic crisis if the cause of weakness is not Myasthenia Gravis
  - c) Depolarizing muscle relaxants have a prolonged duration of action when used in Myasthenia Gravis but this is not the case with non depolarizing muscle relaxants

d) If a dose of pyridostigmine is missed the next dose is usually doubled

25. Which is the most common organism causing bacterial meningitis in adults and children

- a) Streptococcus pneumoniae
- b) Neisseria meningitidis
- c) Listeria monocytogenes
- d) Haemophilus influenza B

26. Regarding management of meningitis which is **not** correct

- a) Cefotaxime should be used instead of Ceftriaxone in infants under 3 months old
- b) Penicillin should be avoided since they cannot cross the blood brain barrier
- c) Dexamethasone ideally should be given before or with the 1<sup>st</sup> dose of antibiotics
- d) Chemoprophylaxis in close contacts only works with N.meningitidis and H.influenzae

27. Which of the following will **not** increase the rate of post lumbar puncture headache

- a) Use of a large needle size > 22G
- b) Use of a cutting needle
- c) Failure to replace stylet when withdrawing needle
- d) Failure to observe strict bed rest for 4 hours post procedure

28. Regarding Ventricular Shunts which is true

- a) Difficulty compressing shunt chamber indicates a proximal obstruction
- b) Staph aureus is the most common organism implicated in shunt infections
- c) A Lumbar puncture should be routinely done in shunt infections
- d) 80% of shunt infections occur in the first 6 months of placement

#### Answers

1. EMQ: (Tintinalli 7<sup>th</sup> edition, Specific topics in DUNN RJ emergencymedicinemanual.com 2016)

A = xii (headache almost always occipital, also pain in back of neck, common age 40s-50s)

B = ii (80% sudden onset, transient LOC is specific but not sensitive, ½ have no neuro deficits)

C = v (rare <50 yo, strong association with polymyalgia rheumatica, F>M, 35% have jaw claudication, visual disturbance is late sign and permanent once established)

D = x (IHS criteria: 30min – 7 days, bilateral, non-pulsatile, mild – mod intensity, no N+V)

E = i (associated with aura, 4-72 hours, 60% unilateral, 50% throbbing, higher intensity, aggravated by movement, N+V, photophobia, can have neuro deficits, F>M)

- F = xi (age 30-50, duration 15 – 180 min, M>F, Trigeminovascular reflex: intense unilateral pain with ipsilateral autonomic symptoms ie lacrimation, ptosis, red conjunctiva)
- G = iii (Headache may be severe & of rapid onset, atypical symptoms if immunocompromised)
- H = viii (Present late, young obese F, pain constant worse with cough, ¾ N/V, 2/3 visual issues)
- I = vii (Frontal sinusitis causes pain over forehead, pain varies with head position, runny nose)
- J = iv (Sagittal sinus thrombus subtle signs, seizures, risk: OCP, postpartum, ulcerative colitis)
- K = vi (Unilateral pain, vision loss + halo, risk: old age, F>M, FHx, SE Asian, hypermetropia)
- L = ix (Unilateral pain frontotemporal and face, usually gradual onset, 25-50% partial Horner's)
2. C (majority of aneurysms 85% occur in anterior circle of Willis with 30% at junction of anterior communicating and anterior cerebral artery, isolated perimesencephalic SAH have a good prognosis, smoking has a 3-10x risk whilst HT only has a mild risk increase, excessive alcohol consumption and binges is a risk factor. SAH, DUNN RJ emergencymanual.com 2016)
  3. D (LP xanthochromia sensitivity 85%. Ix of SAH DUNN RJ emergencymanual.com 2016)
  4. B (Fisher scale predicts risk of symptomatic vasospasm, H&H scale is based on headache severity and conscious state and neuro deficit, WFNS scale is based on GCS and neuro deficit. radiopaedia.org/articles/fisher-scale)
  5. A (INTERACT2 study demonstrated no morbidity or mortality difference between SBP <180 vs SBP <140, cerebellar haemorrhages >3cm in diameter should be operated on, most common areas affected by HT intracerebral bleed are in order: putamen; thalamus; pons; cerebellum. Stroke management DUNN RJ emergencymanual.com 2016)
  6. EMQ (Tintinalli 8<sup>th</sup> edition, K.W. Lindsay Neurology and Neurosurgery Illustrated 4<sup>th</sup> edition, Cerebral infarction DUNN RJ emergencymanual.com 2016, www.strokecenter.org/professionals/stroke-diagnosis/stroke-syndromes)
    - A = v (Left sided lesion: Lateral medullary syndrome + Wallenberg)
    - B = ii (Left sided MCA infarct with dominant left hemisphere)
    - C = vii (Left sided lesion: Pure motor lacunar infarct)
    - D = iv (Locked-in syndrome)
    - E = i (Right sided lesion = hemineglect, Left sided lesion = aphasia, Bilateral = akinetic mutism)
    - F = iii (Left sided lesion: Unilateral occipital, cortical vessels not proximal occlusion ie Weber's syndrome: midbrain contralateral limb weakness with ipsilateral CN3 lateral gaze palsy)
    - G = vi (Left sided lesion: Similar to Wallenberg but without brainstem signs)
  7. A (NIHSS score 0 = no stroke, 1-4 = minor stroke, >22 = severe stroke, thrombolysis indication criteria is NIHSS score between 4 and 22, NIHSS is weighted towards anterior circulation strokes and scores low even for large territory posterior circulation strokes, Prehospital stroke scales sensitivity: Cincinnati = 66%, Los Angeles = 91%, Melbourne = 91%. Tintinalli 8<sup>th</sup> edition, Stroke Assessment Tools DUNN RJ emergencymanual.com 2016)
  8. C (Age≥60, BP≥140/90, Clinical features of speech impairment +/- weakness, duration ≥ 1 hour, presence of diabetes, score 0 – 7, 7 day stroke risk 1% if 0-3, 6% if 4-5, 11% if 6-7)

9. D (delirium = visual hallucinations, fluctuating conscious state, disordered attention, poorly organize delusions, whilst psychosis has fixed delusions)
10. A (What GCS was originally designed for)
11. B (Dexamethasone not routinely recommended in head injury, aim for normocarbica)
12. A (Midline cerebellar lesions produces axial ataxia, internal capsule, thalamic and frontal lesions produces a contralateral ataxia)
13. C (Apraxic gait = loss of initiation of gait seen in frontal lobe dysfunction or normal pressure hydrocephalus, Waddling gait = failure to maintain normal position of pelvis seen in bilateral trunk weakness, Festinating gait = narrowly based miniature shuffling seen in Parkinson's, Senile gait = cautious gait)
14. (Tintinalli 7<sup>th</sup> edition, Vertigo, DUNN RJ emergencymanual.com 2016)
  - A = ii
  - B = iv
  - C = v
  - D = iii
  - E = i
  - F = vii
  - G = vi
15. A (Tintinalli 8<sup>th</sup> edition, HINTS testing consists of head impulse test [-ve if thrusting head 45 degrees to one side and pupils remain in central position], direction-changing horizontal nystagmus on lateral gaze [+ve left gaze causes left beat nystagmus and visa versa] and test of skew deviation [alternate eye cover test causing skew away from midline], head impulse test is as sensitive and specific as MRI for stroke, the latter two tests are specific but not sensitive, Hallpike is not part of the HINTS tests)
16. D (Tintinalli 8<sup>th</sup> edition, 25% of patients with normal non contrast CT scans have visualized pathology on follow-up MRI with focal seizures increasing to up to 53%)
17. B (Although Tintinalli 7<sup>th</sup> edition states that ketamine is contraindicated in raised ICP this is no longer considered an issue in Tintinalli 8<sup>th</sup> edition as is now a 3<sup>rd</sup> line agent, Status is defined as a seizure lasting  $\geq 5$  minutes or  $\geq 2$  seizures without recovery of consciousness in between)
18. C (PRES is associated with HT, immunosuppressive therapy and autoimmune diseases, up to 75% presents with seizures, headache and vision disturbances occur in 25% of cases, prognosis is usually good with full recovery. Seizures, DUNN RJ emergencymanual.com 2016)
19. D (Steroids are no longer recommended. Treatment is supportive with either IV Ig or plasmaphoresis but not both. Guillain Barre, DUNN RJ emergencymanual.com 2016)
20. C (Infantile botulism occur commonly before 6 months, pupils are fixed and dilated, toxin inhibits presynaptic membrane and inhibits release of Ach. Botulism, DUNN RJ emergencymanual.com 2016)
21. A (Most common pharyngitis with membrane also nephritis. Diphtheria, DUNN RJ emergencymanual.com 2016)
22. B (deep peroneal nerve entrapment is usually due to trauma, repetitive stress and weight loss)
23. B (Antiviral therapy may be tried for severe disease but not routine, most common in 3<sup>rd</sup> Trimester, loss of taste on anterior 2/3 of tongue, resolution worst statistic is 60% complete)

recovery in complete paralysis. Assessment of facial weakness, DUNN RJ  
emergencymedicinemanual.com 2016)

24. C (Non-depolarizing muscle relaxants will have 2-3 time longer duration in Myasthenia Gravis whilst depolarizing muscle relaxants have an unpredictable reaction)
25. A
26. B (Penicillin for Listeria, Neisseria, Group B Strep)
27. D (No evidence of increased incidence of headache for bed rest post procedure, volume of CSF removed, opening pressure)
28. D (Staph epidermidis is the most common organism, difficulty compressing chamber suggests a distal obstruction whilst slow refill suggests a proximal obstruction, LP misses shunt infections and has no meaningful role in diagnosis)