NEUROLOGY REFERENCE CARD

WHO TO CALL FOR CONSULTS:

Patient service	Consultant
7S, 7N, 8S, 8E, 11S, BI NICU, BWH NICU, BWH Nursery	Neurology ICU resident
ED	Neurology ED resident
Floor (except 8E), ICP*	Neurology consult

*For daytime floor consults: if patient is followed by Epilepsy (see clinic notes), page Epilepsy Consult Fellow

Information to prepare for consults:

1. Acuity: Stroke STAT (call 52170)? Currently seizing? Impending herniation?
2. Consult question
3. Relevant Neurologic history
4. Seizure type/frequency (describe)
5. Current neuro meds (AEDs, tone meds, rescue meds). Calculate doses in mg/kg/d, times given.
6. Pertinent findings on YOUR neurologic exam (for headache, please do a fundoscopic exam)

MANDATORY CONSULTS:

1. Status epilepticus
2. Therapeutic hypothermia (in NICUs)
3. All ECMO patients
4. Cardiac arrest (most)

If a patient does not need a consult, but would benefit from urgent follow-up (<1-2 weeks), please have your Attending page the NOW Attending (Neurologist of the week).

IF PATIENT IS DUE FOR AN AED DOSE, PLEASE ADMINISTER ON TIME REGARDLESS OF WHETHER OR NOT OUR CONSULT IS DONE UNLESS OTHERWISE SPECIFIED. Consider trough levels.

THE NEUROLOGIC EXAM

Please try to do as much as possible. The more you practice, the better you'll get!

MENTAL STATUS (describe interactions):
1. Awake, comfortable, fussy, distracted, somnolent, obtunded
2. Oriented to person, place, day, month, year.
3. Follows directions
4. Maintains attention (months of the year or days of the week backwards)
5. Fund of knowledge appropriate for age
6. Memory (3 word recall at 1, 5 minutes)
7. Language: Speaking fluently, coherent, paraphasic errors, neologisms, naming, repetition.

CRANIAL NERVES:
CN II: visual acuity, visual fields, PERRLA, fundoscopic examination (disc margins at least)
CN III, IV, VI: Fixing and following, smooth eye movements or nystagmus.
CN V: Facial sensation to light touch
CN VII: Facial movements (smile, grimace, cheek puff)
CN VIII: Do they hear finger rub bilaterally?
CN IX- XII: Swallow function, any changes in articulation or voice quality, palate elevation, tongue midline or deviated. Test strength of shoulder shrug, neck rotation.

MOTOR: Describe tone (axial and appendicular), especially in newborns. Strength testing can be tricky with kids <3, but try to push and pull extremities and see how much they reciprocate. Describe abnormal movements (speed, quality, stereotyped?, suppressible?)

REFLEXES: Check especially for clonus and any asymmetry in reflexes. DTRs should be checked at brachioradialis, biceps, triceps, patellae and achilles tendons. Toes up or down with plantar reflex?

SENSATION: Check light touch at least. If there is question of a sensory deficit, please also do temp/pinprick and vibration/proprioception.

CEREBELLAR/COORDINATION: Finger-nose-finger (or describe if little kids reach for toys smoothly). Finger tapping, rapid alternating movements. Any sway on Romberg?

GAIT: Test normal gait. Do heel, tip toe and tandem if possible.

HEADACHES

Type	Characteristics	Associated symptoms	Risk factors
Migraine	Throbbing, pulsating pain. Unilateral in 60-70%, but often bilateral in younger patients. Worse with exertion, better with hydration, rest, darkness.	Associated with N/V, photo/phonophobia. Auras: usually visual, but can involve speech, sensory or motor deficits as well.	family history, female, R-L shunt
Tension	Bilateral pressure that waxes and wanes.	Associated with stress.	female, weight, drugs
High pressure headache (e.g.: idiopathic intracranial hypertension)	Variable HA. Gradual. Some constant, some throbbing, variable location, though often retrobulbar. Worse when supine, Valsalva.	Often associated vomiting. Transient visual obscurations in over half. Some with photopsia (flashes of light). Some with diplopia. Can have CN VI palsy.	obesity, prior history
Trigeminal autonomic cephalgia (e.g.: cluster HA)	Unilateral, around the eye or temple. Rapid onset (minutes), pain is continuous, excruciating.	Associated with lacrimation (ipsilateral), injection, congestion, sweating. +sensitivity to alcohol.	
Medication overuse headache	Characteristics vary, but usually preceded by another HA disorder.	Associated with use of opioids, NSAIDs, Tylenol, Fioricet for >=2 days/week x 3 mo.	

In the ED, see **Migraine EBG** (right):

Inclusion: Age 7+, low suspicion for other etiologies, HCG testing if of child-bearing age

HEADACHE RED FLAGS:
- acute onset
- atypical headache for patient
- neck stiffness
- worse when supine or with Valsalva
- waking from sleep
- vomiting w/o nausea or diarrhea
- focal neurologic symptoms
- altered mental status
- blurry/double vision

Neurology Reference Card continued on next page →

SEIZURES

Seizures: Clinical manifestation of abnormal, excessive synchronous neuronal (cortical) discharges.

Epilepsy: At least 2 unprovoked seizures occurring >24h apart

Seizures are COMMON:

- 3-5% of children <5yo have a febrile seizure
- 1% of children <14yo have an afebrile seizure
- 0.5-0.8% of children have epilepsy

Classification (ILAE 2017):

Focal Onset (formerly "partial"): Originate in one hemisphere.

- Can be **Aware** vs. **Impaired Awareness**
- Can be **Motor** onset (automatisms, atonic, clonic, tonic, spasms, hyperkinetic, myoclonic) vs. **Non-Motor** onset (autonomic, behavior arrest, cognitive, emotional, sensory)
- Can have focal to bilateral tonic-clonic (formerly "secondary generalization")

Generalized Onset: Bilaterally distributed origin.

- **Motor** (tonic-clonic, clonic, tonic, myoclonic, atonic, spasms) vs. **Non-Motor** (absence)

Management (in general):

- Febrile seizures: no treatment, unless very recurrent, then consider benzo ppx with fever
- 1st unprovoked seizure: no treatment, obtain outpatient routine EEG
- 2nd unprovoked seizure: consider treatment, esp. if EEG abnormal

Diastat Dosing (consider script if prolonged seizure)

2-5 yr (0.5mg/kg)		6-11 yr (0.3 mg/kg)		12+ yr (0.2mg/kg)	
Weight (kg)	Dose (mg)	Weight (kg)	Dose (mg)	Weight (kg)	Dose (mg)
6 - 10	5	10 - 16	5	14 - 25	5
11 - 15	7.5	17 - 25	7.5	26 - 37	7.5
16 - 20	10	26 - 33	10	38 - 50	10
21 - 25	12.5	34 - 41	12.5	51 - 62	12.5
26 - 30	15	42 - 50	15	63 - 75	15
31 - 35	17.5	51 - 58	17.5	76 - 87	17.5
36 - 44	20	59 - 74	20	88-111	20

STATUS EPILEPTICUS

Definition: failure of mechanisms responsive for seizure termination, leading to prolonged seizures with high risk of chronic consequences (neuronal death)

Practical definition (for treatment): A seizure lasting longer than 5 minutes, or any ongoing seizures w/o return to baseline for 30 minutes.*

*for convulsive seizures. Guidelines are not well-defined for non-convulsive seizures.

Keep in mind, some of our Epilepsy patients have frequent and prolonged seizures every day that sometimes go beyond these criteria. It is often useful to ask the parents or consult clinic notes to get an idea of the severity of their Epilepsy.

Time	Agent
0-5 min	**Lorazepam** 0.1 mg/kg IV/IO/IM (max 4 mg)
5-15 min	Repeat **lorazepam** 0.1 mg/kg AND **Fosphenytoin** 20 mg/kg x1 IV/IO/IM (max 1,000 mg)
15-20 min	**Phenobarbital** 20 mg/kg x 1 IV/IO OR **Levetiracetam** 30 mg/kg x1 IV/IO *if allergic, consider **valproic acid** 20 mg/kg IV/IO over 5 minutes
20-30 min	Repeat **fosphenytoin** 10 mg/kg OR **Phenobarbital** if LEV was used third, OR **Levetiracetam** if PHB was used third

CHECKLISTS FOR CONSULTS:

Headache:

[ ] Are you concerned for intracranial hemorrhage or impending herniation?
[ ] where is the pain (i.e. front, back, right, left)?
[ ] character (e.g. pounding, squeezing, sharp, etc.)
[ ] severity (1-10)
[ ] duration
[ ] frequency, change in frequency
[ ] time from onset to peak severity
[ ] are there associated symptoms (sensitivity to lights/noises, nausea/vomiting)
[ ] associated autonomic symptoms (e.g. eye tearing, eye redness, rhinorrhea, ptosis, change in facial color or temperature)
[ ] associated deficits (e.g. numbness, tingling, weakness, difficulty speaking or understanding others)
[ ] visual changes (double, blurry, flashes)
[ ] is the pain preceded by anything (scotoma, strange smell, feelings)
[ ] exacerbating factors (position, Valsalva, day/night, activity)
[ ] alleviating factors
[ ] do the headaches wake the patient from sleep and if so at what time?
[ ] family history
[ ] what is their neurologic examination?
[ ] what medications does the patient take to prevent headaches?
[ ] what medications has the patient taken to abort the headache?
[ ] what has he/she been given so far?

Seizures:

[ ] actively seizing? Concern for herniation?
[ ] seizure history
[ ] baseline frequency, duration
[ ] semiology (not "GTC" – describe what happens)
[ ] history of status epilepticus?
[ ] clinic provider – Epilepsy or Neurology?
[ ] recent medication changes
[ ] current AEDs, dosing in mg/kg/d, dose timing
[ ] Missed/late AED doses?
[ ] **When is next dose due?** Get trough levels?
[ ] How is this seizure presentation different from their baseline/typical?
[ ] Current contributing factors (e.g. illness)?
[ ] Baseline developmental level (how much do they move/interact/see at baseline?) Are they now at their baseline?
[ ] Exam including VS (any O2 requirement), mental status (describe what they do spontaneously, and in response to a stimuli)

Stroke:

[ ] Stroke STAT (call 52170)? Acute/current neurologic deficits?
[ ] Last seen well time (if <5h, consider Stroke STAT; if >5h, call neuro consult)
[ ] acuity of onset?
[ ] deficits: speech (nonsensical, slurring, output), comprehension, vision (loss/double), vertigo, weakness, numbness, coordination, gait
[ ] Symptoms now (better, worse, same)
[ ] Risk factors: sickle cell, cardiac disease/shunt, personal or family history of stroke or clots (DVT/PE, miscarriage, stroke), hypercoagulable state