Emergency Neurology and Management

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Disclaimer:

- Anything presented to you in this lecture is meant to further educate you in providing medical care. It is not meant to replace your operating protocols within your operating areas.
Shout out to my fellow college providers!
Open Your mind!
Even if you get lost, stay in the moment..
Introduction

- Prehospital neurological examinations are very brief and often very poor/out of necessity
- Terms and vocabulary are often confounded
- The inability to properly identify certain signs and symptoms, can prove detrimental to patient outcome once the patient has been received by the ER
Overview 1/2

- Neurological Hx Acquisition
  - Appropriate questions/timing
- Neurological Examination
  - Mental Status Exams
  - Cranial Nerve Review
  - Motor System Considerations
  - Sensory System Considerations
Overview 2/2

- Headache
- Weakness
- Dizziness
- Seizures
- Altered mental status
Obtaining Neuro Hx

- Obtaining a Hx ASAP increases the precision of the providers exam
  - Allows for asking appropriate questions
  - About 75% of neurological diagnoses are made while obtaining Pt Hx
- Prehospital acquisition of Hx can be challenging
  - Get what you can
  - Family is usually reliable
  - Bystanders or friends may not be (bystanders sketchy)
Neurological Hx ???
Neurological Examination

First it is important to note the patient's mental awareness:

**IMPORTANT CONSIDERATION**

If a patient is altered we immediately know that our neurological Hx may not be reliable and thus we may have challenges during the rest of the exam.
Mental Status Examination 1/3

- Initial evaluation of a patient with potential deficits includes:
  - Alertness
    - AVPU
      - Rapid alertness scale
  - Chronic vs. acute
    - Dementia, Alzheimer's
    - Unknown etiology. ACUTE Changes in LOC Require ALS evaluation
  - Characterization of Changes
    - Up – Manic, exuberant
    - Down- Lethargic, stuporous, obtunded
    - Weird / Strange - psychedelic, psychotic break, voices
Mental Status Examination 2/3

- GCS – Glasgow Coma Scale
- Coma – eyes closed unresponsive state

### Glasgow Coma Scale

<table>
<thead>
<tr>
<th>Eyes Opening</th>
<th>Verbal response</th>
<th>Motor response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - none</td>
<td>1 - none</td>
<td>1 - none</td>
</tr>
<tr>
<td>2 - to pain</td>
<td>2 - incomprehensible sounds</td>
<td>2 - abnormal extension</td>
</tr>
<tr>
<td>3 - to voice</td>
<td>3 - inappropriate words</td>
<td>3 - abnormal flexion</td>
</tr>
<tr>
<td>4 - spontaneously</td>
<td>4 - confused</td>
<td>4 - withdraws from pain</td>
</tr>
<tr>
<td></td>
<td>5 - orientated</td>
<td>5 - localises to pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 - obeys commands</td>
</tr>
</tbody>
</table>
Mental Status Examination 3/3

- Assessment and Possible causes of altered behavior
  - Comprised of pneumonic AEIOU-TIPS
- A - Alcohol, Anoxia, Arrhythmia, Acidosis, Alzheimers
- E - Epilepsy
- I - Insulin (Hypoglycemia) or Hyperglycemia
- O - Overdose (or Overmedicated)
- U - Underdose, Uremia
- T - Trauma
- I - Infection
- P - Psychotic
- S - Stroke, Shock
You are present with a 19 y/o male patient with a Hx of known opiate use. Pt was found in D.O.C laying on a couch. Patient is unresponsive

- Vitals
  - Bp 110/70
  - Pulse 130
  - RR – Absent
  - Skin diaphoretic and cool to the touch
  - PT GCS 3
  - BG- 115
- PUPILS – fixed and constricted
  - Miosis

With high degree of suspicion you Dx the patient with...
Case Study Lead In-Cont’d

- Opiate overdose
- Are there any other exams you wish to perform?
- Yes I knew you would…
- Under specific conditions coma with certain combinations of ocular findings and breathing patterns can indicate specific neuroanatomical substrates for the coma.
- Vestibulo-ocular Reflex (VOR) – Dolls Eyes stabilizes images of the retina upon movement of head. Usually indicative of brainstem injury eye movements are opposite of rotary movements.
- ** Rarely ever seen in Overdoses
** Rare for overdose victims to exhibit dolls eyes

Paralytic agents can produce similar comatose affect however pupil involvement is rare!
Quick Break
Quick Break

Dyslexic CPR
Quick Break

I think I broke my fingernail.
Cranial Nerves

The cranial nerves (I-XII) and their areas of innervation.

Credit: Encyclopædia Britannica, Inc.
Cranial Nerve Review

- **CN I – Olfactory**
  - Purely sensory
  - Used for detection of pheromones
  - Often skipped unless the patient notes some immediate deficit

- **CN II – Optic **
  - Sensory
  - Transmits visual signals from the retina to the brain
  - Utilize PERRLA or PEARRL ← My preference – to examine
Cranial Nerve Review Cont’d

- Cranial Nerves III, IV and VI are cranial nerves that primarily control eye movement
- Dysfunction of specific nerves can be localized by noting the directions of loss
- CN III – Oculomotor
  - Responsible for eye opening
    - Ptosis- drooping eyelid
    - Horner’s Syndrome
      - Ptosis
      - Anhydrosis
      - Miosis – Which may be recognized with earlier visual exam
  - Adduction vs. Abduction
    - Adduction is toward the midline
    - Abduction- away from the midline
Cranial Nerve Review 3

- **CN IV – Trochlear**
  - Motor
  - Rotates eye medially and laterally
    - Intort – toward the nose
    - Extort – toward the ear
  - Challenges in a Pt tracking in lateral or medial positions respectively usually are cause by a lesion of CN IV

- **CN VI – Abducens**
  - Mainly Motor
  - Abduces the eye/ looks outward
  - Worsened diplopia with lateral gaze
  - Tracking of finger
  - Ipsilateral palsy or Lateral rectus weakness
Cranial Nerve Review Cont’d

- **CN V - Trigeminal**
  - Motor and sensory
    - Controls facial movement and sensation
    - To test- touch patients face with finger or cold pack

- **CN VII – Facial**
  - Motor and sensory
    - Controls primarily lower aspect of face
    - Can see new onset facial droop
    - Bells Palsy

- **CN VIII – Vestibulocochlear**
  - Mostly sensory
    - Mediates sound, rotation and gravity
    - Challenging to assess directly
    - Symptoms include:
      - Nausea, vomiting, unsteady gait, vertigo
Cranial Nerve Review Cont’d

- **CN IX – Glossopharyngeal**
  - Sensory and Motor
  - Responsible primarily for gag reflex
  - Easy to test with an oral airway

- **CN X – Vagus**
  - Sensory and motor
  - Controls muscles for voice and swallowing
  - Notable in elderly and particular skinny young women syncope while swallowing food
    - Hx is important for these

- **CN XI – Accessory**
  - Motor
  - Controls sternocleidomastoid and trapezius muscles
    - Patient won’t be able to shrug and will demonstrate neck weakness

- **CN XII – Hypoglossal**
  - Motor
  - Important for swallowing
  - BOLUS formation
  - Speech articulation
    - Diagnose with alterations of speech
The Motor System

- Refers specifically to two qualities when evaluating
  - Tone
    - Can be evaluated by examining a patient's fluidity of motion at joints
    - Develop via Extrapyramidal disturbance
      - Parkinson's
  - Power
    - Can be evaluated by grip test or the gas pedal exam
    - Assess for symmetry
Motor System Cont’d

- Coordination
  - Evaluate gait if patient is able to walk
  - Balance when sitting
  - Balances disturbances when the patient is laying
- Dystonia
  - Video
- Note any kind of tics
- Or fidgeting behavior
Sensory System

- In EMS we do a very good job of this already especially in our rapid trauma exams
- Ask lots of questions keep dialogue open for changes in sensation
  - If a patient has calluses on hands or feet consider using a cold or heat pack to check for sensation
Altered Level of Consciousness

- All patients need to be getting a blood glucose test early.
- Easy to fix
Headache

- Prehospital setting we want to assess
  - Blood pressure
    - As long as diastolic pressure is below 140mm/Hg HTN usually won't be treated Prehospitaly.
  - Headache itself is not life threatening on its own
  - When it is secondary to underlying conditions it is serious and should be considered ALS
    - Trauma
    - Head injury
    - Hypovolemic shock
- EMS aids greatly in gathering information for the hospital as to CO poisoning and suspected agents of abuse
We have 4 pairs of sinuses:
- Maxillary
- Frontal
- Ethmoid
- Sphenoid

What do sinuses do?
Weakness

- Condition where muscles cannot exert normal force
  - Best assessment for this is OPQRSTI
- History is going to be your best aid
- Prehospitaly we are unable to truly identify causes of weakness as we do not have advanced capabilities
  - Blood work
  - X-ray
  - CT
  - MRI
- However of you have weakness post trauma the call is Not ALS.
Dizziness

- History is your best bet
- Literally hundreds of causes from medications and health conditions.
  - Due to the potential severity of new onset, with no potential Dx – ALS evaluation
  - Previous medical condition or Hx known from medications Txp decision is at the discretion of the provider
Seizures

- Always ALS due to the potential for advance management of the airway and pharmacologic interventions
- Important to note that we may only be able to acknowledge a seizure
  - Note location and movement
  - Duration
  - Airway
  - Incontinence
- Its always important to note that you should be prepared to bag a patient who is actively seizing
Seizures

I. Partial seizures
   A. Simple focal seizures (consciousness not impaired)
      1. With motor signs
      2. With somatosensory or special sensory signs
      3. With autonomic signs
      4. With psychic signs
   B. Complex focal seizures (with impairment of consciousness)
      1. Simple partial onset followed by impairment of consciousness
      2. With impairment of consciousness at onset
   C. Partial seizures evolving to secondarily generalized seizures
      1. Simple partial seizure evolving to generalized seizures
      2. Complex partial seizure evolving to generalized seizures
      3. Simple partial seizure evolving to complex partial seizures evolving to generalized seizure

II. Generalized Seizures (convulsive or nonconvulsive)
   A. Absence seizures
   B. Myoclonic seizures
   C. Clonic seizures
   D. Tonic seizures
   E. Tonic-clonic seizures
   F. Atonic seizures

III. Unclassified Epileptic Seizures
QUESTIONS?

Moving on to Case Studies