Medical Causes of Impairment

-OR-

“I’m not as think as you drunk I am”

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Road map for our ‘trip’

› To stay on track, and for better recall and application, I will use functional or systemic grouping and focus on common issues.

› Primary resources are commissioned by NHTSA and online
  – Medical Conditions and Driving: A Review of the Literature (1960-2000)
  – Driver Fitness Medical Guidelines (Sept, 2009 w/AAMVA)
  – Effects of Medical Conditions on Driving Performance: A Literature Review and Synthesis (July, 2018)

› Use due diligence for Internet searching
  – “Dr. Google” does pretty well
  – Caution (/avoid) personal pages
  – Verify before reporting info
› **Neurological**
  - Seizures -- Sensory deficits (eyes, ears, balance)
  - Transient Ischemic Attacks (TIAs) / Cerebrovascular Accidents (CVAs)
  - Cancer & treatment effects
  - Degenerative neuromuscular conditions

› **Endocrine / Metabolic**
  - Diabetes
  - Thyroid -- Liver disease/failure -- Lung disease / impairment
  -- Kidney failure / dialysis

› **Immunological**
  - Fever / sepsis -- Hypothermia

› **Medication effect / side effect**
“It’s all in their head”

› When it comes to any issue in the nervous system, the three essential factors are:

LOCATION, LOCATION, LOCATION

› Trauma, stroke, or infection in one area impacts function differently than in another area.

› If you see mixed signs/symptoms, if you notice stability of the findings over time—or continued deterioration:

THINK MEDICAL CONDITION
Comments on Seizures

› ~1% have epilepsy and ~4% will develop it over lifetime
› Aprox 30 types of seizures and over 60 types of epilepsy
› Up to 2/3 get some advance warning ("aura")
› Common presentations:
   – Generalized, tonic/clonic (previously "grand mal")
   – Generalized absence (previously "petit mal")
   – Atonic—sudden loss of muscle tone w/collapse (often wear helmet)
   – Tonic—sudden stiffening of body, may lead to fall if standing
   – Myoclonic—involuntary jerking of muscle/groups, may be clustered
   – Focal—involves only a portion of the body (some generalize)

More on Seizures

› Neurologists are now signing off to allow patients to drive
  – If 15-19 times more likely to drown, what about MVCs?
  – Strong legal and lobbyist support

› Sleep Disorders
  – Narcolepsy is the sudden and unexpectedly fall asleep
  – Obstructive Sleep Apnea (OSA) and Central Sleep Apnea (CSA)
    › OSA common and often undiagnosed, both cause chronic sleep deprivation
  – Chronic inadequate sleep (teen-twenties), extended work hours, childcare, eldercare, etc., can be just impaired
Cerebrovascular Circulatory Issues

› (=TIA & CVA)
› Many consider a TIA an aborted stroke/CVA, others that it is a warning flag to impending event if not intervened on
› Location of stroke drastically changes level of function seen
› Generally stable over time→ “fixed deficits” support medical
› May impact vision w/half or ¼ of visual field loss unrecognized
› May impact hearing function, but pure hearing loss can impede ability to detect, understand and comply with commands or respond to questions
Degenerative Conditions

› Dementias
   – Very variable courses, wax/wane, often glossed over until late
   – Generally detract from executive functioning, planning (signaling, leaving adequate space, following rules of road)

› Neuromuscular conditions
   – Parkinson’s – impedes motor function and control
   – Multiple Sclerosis – deteriorates over time

› Ability to cause impairment varies upon:
   – State of disease [active or quiescent]
   – Response to medical therapy [meds, PT, etc.]
   – Stage of disease [early$\rightarrow$late$\rightarrow$”end”]
Can you see the issue?

› Cataracts  
  - Cloud central vision, one or both eyes, leading cause of blindness
  

› Glaucoma
  
  - Increased pressure within the eye injures the optic nerve, impairing vision, and can lead to blindness if untreated—some say leading cause
  
  [https://www.webmd.com/eye-health/glaucoma-eyes#1](https://www.webmd.com/eye-health/glaucoma-eyes#1)

› Macular Degeneration
  
  - Estimated 10M Americans have this
  - Age-associated (most common) degeneration of retina
  - Leads to progressive central vision loss
  - No effective treatments to date
  
  [https://www.macular.org/what-macular-degeneration](https://www.macular.org/what-macular-degeneration)
Other things “impacting” the CNS

› (Prior) Traumatic Brain Injury (TBI)
  – Can reduce inhibitions, produce more direct speech, labile moods
  – Can impair instruction processing and compliance
  – **STABLE** over time

› Cancer & its treatment
  – Depending on stage of disease, therapy undergoing, and LOCATION of lesion(-s), can have many different impacts and intensities
  – Toxicities can impair function / performance, but usually not effort
  – …meaning: give “points for trying” (mentally, not on face sheet)

› Age-related failure of position sensors in body
  – Can see ataxia (/unsteady gait), poor balance, poor coordination
  – Worsened when eyes closed, as much input data lost
› Many other conditions belonging primarily to a different organ / system impact the brain via toxin production or build-up, impaired function impacting the rest of body, etc.

› Degenerative, neuromuscular, psychological and metabolic diseases (Parkinson's; Multiple Sclerosis; Wilson’s; Lupus; Fibromyalgia / CRPS; Depression; etc.) are all intertwined with CNS function
  – Musculoskeletal limitations impede (successful) compliance with testing
  – Losses are often subtle but ongoing, so subject may not (yet) realize that “ustacould” applies to them
  – Still can cause unsafe / impaired driving
Endocrine / Metabolic

› **DIABETES**
  – Oral and injection therapies can cause low blood sugar, particularly if did not eat expected quantity in usual time frame
  – A drowsy but awake subject especially, **ASK** if diabetic
  – HIPAA only matters if you blab to uninvolved, non-medical people
  – Low sugar is greater risk to subject than high

› **Thyroid**
  – [Usually undiagnosed] hyperthyroid or “thyroid storm” can present like stimulant, need medical intervention
  – Hypothyroid can resemble sedative/hypnotic...listless...cold...slow speech and action
Liver disease, when severe, hyper-acute, or end-stage:
- Liver cannot process (metabolize) waste effectively, so builds up
- Ammonia impairs consciousness, judgement, can see “flap,” and may see jaundice (yellowing of skin and SCLERA).
- Hepatic Encephalopathy (HE) receiving much attention, as under-recognized but alters personality, impairs concentration and judgement, and decreases function

Environmental / metabolic
- High core temperature can cause delirium and/or seizures and death
- Low core temperature impairs judgement, coordination, mobility
Nutritional
- B12 deficiency, along with some others can alter executive function
- STABLE over encounter

Adrenal gland disease
- Too much or too little endogenous steroids can alter mental status, impair mobility, and disrupt homeostasis

Respiratory / Pulmonary
- Inadequate respiratory effort or poor air exchange can lead to carbon dioxide build up, which impairs concentration, judgement, alertness
- Inhalation of toxic or oxygen-displacing gasses can cause systemic dysfunction and death [carbon monoxide; huffing; etc.]
› **Kidney / Renal**
  – Under or over hydration can cause electrolyte shifts and lead to confusion, decreased mental status, seizures, death. [Na\(^+\), Ca\(^{++}\)]
  – Renal disease can be insidious in its onset, and as body is unable to remove wastes, buildup causes impaired mentation, weakness

› **Infection**
  – Sepsis is the invaders having the upper hand—fevers, aches, low energy, poor concentration, risk of deterioration and death
  – Can smolder for a while prior to adequately symptomatic to get person to see Doctor
  – Others can kill within a few hours
  – Direct brain involvement (meningitis/encephalitis) impair function
Cardiovascular

- Inefficient function decreases oxygen and nutrient delivery and waste removal
- Heart failure causes fluid build up in tissues and lungs, further impairing gas exchange
- Inadequate blood pressure prevents brain from functioning optimally
- Prolonged elevated blood pressure (hypertension) can cause strokes, brain swelling, and diminished executive functioning
Medications

› “…but my Doctor prescribed…”
› “I take it just like it says on the bottle…”
› “I only occasionally forget or double dose or take extra…”
› “It’s the white pill...you know the one…”
› “Oh, I’m on a shoebox full of them…”
› Therapeutic pharmaceutical ingestion CAN cause impairment

› In Geriatrics, renal function is impaired, muscle-to-fat ratio changes, activity and diet change, and polypharmacy is the rule...and all of these should prompt medication review and dose adjustments...somewhere in the 7-13 minutes spent with the “Provider” during an office visit...before something goes wrong.
One quick “exhonorating condition”

› ABSURDLY RARE condition, need:
  – Genetic predisposition (mainly Asian descent) to not have EtOH-dehydrogenase enzyme in gut
  – Have yeast overgrowth of gut
  – Being on a PPI (proton pump inhibitor) helps, other cause for low acid OK
  – Eat a high carb diet

› ~20 cases in ALL medical literature

› Defense (occasionally) insinuates it is at prevalent as..., well...**DRINKERS**!
Thank you for your attention, any questions?

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