

INITIAL COMPREHENSIVE EVALUATION

Patient Name: Doe, Jane
Date of Birth: 01/01/81
MR#: 1234567JD
Date of Injury: 02/02/20
Date of Service: 04/30/20

MECHANISM OF INJURY: Motor vehicle collision

HISTORY OF PRESENT ILLNESS: On February 2nd, 2020, Mrs. Doe was resting, unrestrained, in the passenger seat of a vehicle driven by her husband with her 10 year-old son in the back seat. Peace was broken by an exclamation from her husband, followed by a sudden, immensely forceful impact from an 18 wheeler smashing into them head-on. The driver of the 18 wheeler was asleep at the wheel. Memories of this horrific collision are spotty and wrought with grief. Mrs. Doe is unable to remember much between the impact and her subsequent ejection from the vehicle. She recalls her door being strangely popped open at the moment of impact before being thrown out of it, with her next recalled memory one of running about, confused and terrified, searching for her son and husband. She does not have any memory of personal symptomatic responses or afflictions as she was intent only upon finding her loved ones. She would come to find her son and husband lying upon the road, both having also been ejected upon impact. Emergency services arrived and Mrs. Doe and her family were transported via ambulance to the hospital. Imaging and examination revealed fractured L2, L3, and S1 vertebrae. Her son and husband were pronounced dead on arrival.

- **Incident details:** Head-on motor-vehicle collision; daytime highway conditions, no restraints utilized.
- **Vehicle info of both parties, if applicable:** Toyota Corolla (four-door compact sedan) and 18 wheeler loaded with cargo.
- **Speed info of both parties, if applicable:** Highway speeds; 60-70 m.p.h.
- **LOC:** Positive, 0-2 minutes per ED report and patient account.
- **Hit head:** Positive; numerous impacts from impact and ejection.
- **Confusion/disorientation:** Positive
- **Dizziness/Balance:** Positive
- **Nausea/Vomiting:** Positive nausea, negative emesis
- **ER visit info:** Trauma system activated and Mrs. Doe was treated as an inpatient for 6 days following the incident. Diagnoses included: vertebral fractures (multiple), facial lacerations of 6 and 8.5 cm each, neck pain, left leg laceration of 9 cm, headache, LOC <2 minutes, and shoulder dislocation.

Initial Comprehensive Evaluation for Doe, Jane | 1 of 35

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Mrs. Doe was seen today for her initial comprehensive evaluation. The following was reported by Mrs. Doe:

1. **Post-traumatic headaches:** On a scale of 1 to 10, Mrs. Doe reports headaches of 8/10 in intensity. Headaches are recurring 5-6 days per week with a duration of 3-4 hours. Pain is described as throbbing and intense with a burning or tingling sensation in her temple and occipital region.
2. **Sensitivity to light:** Sensitivity to light is expressed both concurrent and independent of headaches. Mrs. Doe relays an inability to garden or relax outdoors due to the pain imparted by the sun.
3. **Sensitivity to sound:** No sensitivity to sound is expressed.
4. **Vision:** Blurriness and double vision recur at random intervals with a noted exacerbation when feeling fatigued.
5. **Ringing in the ear(s):** Ringing is endorsed bilaterally and likened to that of a hummingbird at a higher-pitch.
6. **Dizziness:** Episodes of dizziness are described as 'spinning' and a feeling of wooziness, more pronounced upon positional alterations.
7. **Balance:** Imbalance prevents normal functioning and inhibits her ability to perform physical therapy exercises for her back recovery. Stumbling, tripping, and fear of falling are expressed with particular focus on stairs. No falls have occurred, to date.
8. **Speech:** Word-finding difficulties and enunciation difficulties are present. Mrs. Doe relates that she is unable to form words that are familiar at times, while at others she cannot pull a known word from her memory.
9. **Neurocognitive deficits:** Since the incident, Mrs. Doe has complained of neurocognitive dysfunction.
 - a. **Memory:** The time around the incident is largely absent. Names, labels, titles are a struggle to recall. She forgot her own birthday during intake today.
 - b. **Processing Speed/ confusion:** She cannot watch television because she cannot understand what is happening. Similarly, reading books is impossible as she cannot make sense of the words as a story.
 - c. **Attention problems:** Focus is gone and she states she 'flitters' about, unable to finish anything.
 - d. **IADL deficiencies:** Mrs. Doe reports struggling with most aspects of independent living and has had to move in with her sister for safety and well-being. Significant struggles are endorsed in regards to finances and bill paying, medication compliance, and safety issues/impulsivity.
10. **Sleep:** Mrs. Doe states she 'doesn't sleep' anymore. Nightmares, sleep paralysis, and pain prevent sleep.
11. **Fatigue/Sluggishness:** Fatigue is constant and exacerbated by her inability to sleep.

Initial Comprehensive Evaluation for Doe, Jane | 2 of 35

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- 12. Nausea and/or weight change:** Nausea and/or emeis is presently denied, as are changes in weight.
- 13. Tremors:** Tremor is present in her right hand. Inability to hold a pencil or use or phone with said hand is acknowledged.
- 14. Bodily pain(s):** Pain is immense in her back and neck, with radiation to her right arm and right leg.
- 15. ADL deficiencies:** Mrs. Doe is unable to perform all of her activities of daily living at a level sufficient for independence. Walking, standing, bending, and the like preclude her ability to grocery shop, cook, launder her clothes, etc.
- 16. Numbness/ Tingling:** Numbness is present in her right arm and right leg.
- 17. Crying Spells:** Crying is extensive as the grief is overwhelming for Mrs. Doe. Crying recurs daily and sometimes encompasses the majority of her waking hours.
- 18. Depression/Anxiety:** Feelings of sadness, grief, despair, and confusion at survivorship are all expressed. Mrs. Doe relates 'joy has left the world'. Anxiety levels are high with peaks and panic-like attacks upon entering a vehicle. She is unable to ride in the front seat of a vehicle and prefers to take larger vehicles, such as a city bus, when able. To further evaluate for the presence of depression, the PHQ-9 was administered to Mrs. Doe; results are as below.

Depression Screening Questionnaire

QUESTION	SCORE
Little interest or pleasure in doing things?	3
Feeling down or hopeless?	3
Trouble falling or staying asleep, or sleeping too much?	3
Feeling tired or having little energy?	3
Poor appetite or overeating?	2
Feeling bad about yourself — or that you are a failure or have let yourself or your family down?	3

Initial Comprehensive Evaluation for Doe, Jane | 3 of 35

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Trouble concentrating on things, such as reading the newspaper or watching television?	3
Moving or speaking so slowly that other people could have noticed. Or the opposite, being so fidgety or restless than usual?	3
Thoughts that you would be better off dead, or thoughts of hurting yourself in some way?	3
TOTAL SCORE = 26	Severe

PATIENT REPORTED PAST MEDICAL HISTORY:

1. No previously recorded or reported medical history.

PATIENT REPORTED PAST SURGICAL HISTORY:

1. None unrelated to the collision.
2. ALIF L1-L2, L2-L3, L5-S-1

PATIENT REPORTED ALLERGIES/SENSITIVITIES:

1. NKDA

MEDICATIONS:

1. Tylenol (acetaminophen) 1,000 mg PRN

PATIENT REPORTED SOCIAL HISTORY: Mrs. Doe lives with her sister. She denies smoking, drinking, and/or drug use. Preceding the incident, she lived in her own home with her husband and son, but is unable to care for herself, at present.

PATIENT REPORTED OCCUPATION PRIOR TO INJURY: Pediatric nurse at Memorial Hospital.

HANDEDNESS: Mrs. Doe reports right-hand dominance.

PATIENT REPORTED EDUCATIONAL HISTORY: Bachelor's in Science - Nursing.

PATIENT REPORTED FAMILY HISTORY:

1. Diabetes; Type 2 - mother (deceased)

REVIEW OF SYSTEMS:

GENERAL/CONSTITUTIONAL: As recorded in the History of Present Illness section above.

HEAD, EYES, EARS, NOSE, AND THROAT:

Eyes: The patient reports double and blurred vision with light sensitivity. She denies pain, redness, loss of vision, flashing lights or spots, dryness, the feeling that something is in the eye and denies wearing glasses.

Ears, nose, mouth, and throat: The patient reports ringing in both ears. She denies loss of hearing, nosebleeds, loss of sense of smell, dry sinuses, sinusitis, post nasal drip, sore tongue, bleeding gums, sores in the mouth, loss of sense of taste and dry mouth.

CARDIOVASCULAR: The patient denies chest pain, irregular heartbeats, sudden changes in heartbeat or palpitations, shortness of breath, difficulty breathing at night, swollen legs or feet, heart murmurs, high blood pressure, cramps in her legs with walking, pain in her feet or toes at night or varicose veins.

RESPIRATORY: The patient denies chronic dry cough, coughing up blood, coughing up mucus, waking at night coughing or choking, repeated pneumonias, wheezing or night sweats.

GASTROINTESTINAL: The patient denies decreased appetite, nausea, vomiting, vomiting blood or coffee ground material, heartburn, regurgitation, frequent belching, stomach pain relieved by food, yellow jaundice, diarrhea, constipation, gas, blood in the stool, black tarry stools or hemorrhoids.

MUSCULOSKELETAL: As recorded in the History of Present Illness section above.

NEUROLOGIC: As recorded in the History of Present Illness section above.

PSYCHIATRIC: As recorded in the History of Present Illness section above.

ENDOCRINE: The patient denies intolerance to hot or cold temperature, flushing, fingernail changes, increased thirst, increased salt intake or decreased sexual desire.

HEMATOLOGIC/LYMPHATIC: The patient denies anemia, bleeding tendency or clotting tendency.

ALLERGIC/IMMUNOLOGIC: As recorded in the History of Present Illness - Allergies section above.

VITAL SIGNS: Vitals on the day of clinic visit are as follows:

Height: 69 in.
Weight: 151 lbs
Blood pressure: 119/69
Pulse: 72 bpm
Respirations: 16
Temperature: 99.0 °F

PHYSICAL EXAM: In general, the patient is sitting in a chair and demonstrates discomfort.

NECK: Supple without thyromegaly. No jugular venous distension.

CARDIOVASCULAR: S1 and S2 regular rate and rhythm

LUNGS: Clear to auscultation bilaterally.

EXTREMITIES: No edema.

SPINE: With scars from apparent ALIF, well healing. No scoliosis; pelvis/hips are normal to exam. Straight leg raising test is not performed due to healing nature of ALIF.

CENTRAL NERVOUS SYSTEM: Patient is able to ambulate with a walker device and exhibits obvious discomfort.

MENTAL STATUS: The patient is oriented to person, place, problem, and time.

MOOD: She was anxious and emotional during the interview with frequent tearing and crying.

SPEECH: Word-finding difficulties were noted at times during the history and exam. At one point, Mrs. Doe attempted to address the discomfort in her back and could not appropriately form the word 'back'.

CRANIAL NERVE EXAMINATION:

Cranial nerve II has normal pupil size 4mm with pupils reactive to light and dark bilaterally. Visual acuity as tested today is:

Snellen Chart

Left Eye: 20/25
Right Eye: 20/25
Both Eyes: 20/30

Cranial nerve III, IV, and VI reveal no nystagmus. Extraocular muscles are weak and convergence insufficiency is present. Normal oculomotor motility pursuits

Confrontation Visual Fields Full to counting fingers in both eyes.

Cranial nerve V shows normal sensation.

Cranial nerve VII reveals normal facial expression bilaterally. Frowning is symmetrical.

Cranial nerve VIII has normal hearing to finger rub bilaterally.

Cranial nerve IX and X show normal palatal movement and normal swallowing.

Cranial nerve XI reveals normal sternocleidomastoid and normal trapezii.

Cranial nerve XII reveals no tremors of the tongue or fasciculation of the tongue. Tongue protrudes midline.

MOTOR: There is no pronator drift of outstretched arms. Muscle bulk and tone are normal. Strength is reduced to RUE..

	Deltoid	Biceps	Triceps	Wrist extension	Finger abduction	Hip flexion	Hip extension	Knee flexion	Knee extension	Ankle flexion	Ankle extension
L	4	4	4	3	3	5	5	5	5	5	5
R	5	5	5	5	5	5	5	5	5	5	5

No focal paresis or fasciculations are noted in any muscle groups.

DEEP TENDON REFLEXES: Reflexes are 2+ and symmetric at the biceps, triceps, knees, and ankles. Plantar responses are flexor.

SENSORY: See the chart below:

	C3	C4	C5	C6	C7	C8
Left Light Touch	Normal	Normal	Normal	Normal	Normal	Normal
Left Pin Prick	Normal	Normal	Normal	Normal	Normal	Normal
Right Light Touch	Normal	Normal	Normal	Normal	Normal	Normal
Right Pin Prick	Normal	Normal	Normal	Normal	Normal	Normal
	L1	L2	L3	L4	L5	S1

Initial Comprehensive Evaluation for Doe, Jane | 7 of 35

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Left Light Touch	Normal	Normal	Normal	Normal	Normal	Normal
Left Pin Prick	Normal	Normal	Normal	Normal	Normal	Normal
Right Light Touch	Abnormal	Normal	Normal	Normal	Normal	Normal
Right Pin Prick	Normal	Normal	Normal	Normal	Normal	Normal

COORDINATION: Rapid alternating movements and fine finger movements are intact. There is no dysmetria on finger-to-nose and heel-knee-shin. There are no abnormal or extraneous movements.

ADVENTITIOUS MOVEMENTS: No myoclonus, tremor, tics, dystonia or fasciculations are noted during this exam.

GAIT: Gait was evaluated via several modes of ambulation and observations. Posture and arm swing were monitored during test performance, as were step height, turning, and base. Romberg was evaluated at the conclusion of this portion. Gait was evaluated in short distance burst due to Mrs. Doe back pain and previous surgery.

- I. **Tandem walking** - A key test for balance and used to rule out cerebellar disease, this test is performed first with eyes opened. Mrs. Doe was instructed to walk placing one foot directly in front of the other in a heel-to-toe fashion. She reported feelings of imbalance, dizziness, and a fear of falling with continuation. Evaluating proprioception, Mrs. Doe was asked to repeat the tandem walk, this time closing her eyes. She reported a sense of dizziness and imbalance and was visibly leaning to the side, requiring a steady hand.
- II. **Toe walking or 'tip-toeing'** - After being shown how to do so, Mrs. Doe was asked to walk on her toes, first with her eyes closed. Utilized to assess for signs of early plantar flexion weakness in addition to vestibular dysfunction, demonstration was provided before beginning. She exhibited wobbliness and instability with disequilibrium reported. Upon opening her eyes, abnormality continued to be apparent.
- III. **Heel walking** - Placing the weight of the body into the heels and raising the toes, Mrs. Doe then attempted to walk on her heels with her eyes closed. This test, useful in uncovering dorsiflexion weakness as well as vestibular concerns, was performed with swaying, leaning, and instances of near stumbling observed. When asked to repeat the steps with her eyes opened, improvement was expressed, though abnormality remained.

- IV. **Romberg test** - Gauging the body's sense of positioning or proprioception, Romberg's assists in elucidating the cause(s) of ataxia. Romberg's was not tested due to pain and aforementioned concerns for Mrs. Doe.
- V. **Posture, turning, base, swing, and steps** - Throughout the gait examination, Mrs. Doe was observed for signs of abnormality in step height and width, arm swing, range of motion, stability, foot positioning, abduction/extension and joint flexion, as well as base. Posture was antalgic, with Mrs. Doe visibly leaning to and/or favoring the right side.

AMNART TEST OF PREMORBID FUNCTIONING RESULTS: The Test of Premorbid Functioning estimates an individual's premorbid cognitive and memory functioning. Essentially, this gives insight as to a baseline level for better understanding deviances from such. While in our office today, this test was administered to Mrs. Doe

AMNART Errors	AMNART est. IQ
11	105.12 (avg.)

After calculating for errors and Mrs. Doe's educational attainment, a score of 105.12 was elucidated, indicating she was considered to have an average Intelligence Quotient (IQ) preceding injury.

INTERPRETATION OF THE APRAXIA BATTERY:

While in the office today, Mrs. Doe participated in an assessment to measure the presence and severity of apraxia. Apraxia is an acquired oral motor speech disorder which affects volitional and sometimes automatic speech. This presents in up to sixty percent (limb apraxia) of those with traumatic brain injury after damage to the parts of the brain that control muscle movement occur. Testing done via the Apraxia Battery (ABA-2) is useful in identification of motor and pronatory impairments for further evaluation and subsequent treatment.

APRAXIA BATTERY						
Subtest	Diadochokinetic Rate	Increasing Word Length A	Increasing Word Length B	Limb Apraxia	Oral Apraxia	Utterance Time for Polysyllabic Words
Impairment Level	Mild	None	None	Moderate	Moderate	Mild

Mrs. Doe has moderate apraxia for limb apraxia and oral apraxia with mild apraxia of speech for diadochokinetic rate and utterance time for polysyllabic words. This shows impairment of speech motor performance, articulatory and phonatory processes involved in speaking. Her speech is less fluent compared to normal subjects.

INTERPRETATION OF THE ImPACT COMPUTERIZED NEUROPSYCHOLOGICAL ASSESSMENT:

Verbal Memory Composite	Evaluates attentional processes, learning, and memory within the verbal domain
Visual Memory Composite	Evaluates visual attention and scanning, learning, and memory.
Visual Motor Speed Composite	Evaluates visual processing, learning and memory, and visual-motor response speed.
Reaction Time Composite	Evaluates average response speed

ImPACT testing is a computer-delivered assessment to quantify the neurocognitive capacity and facility of those who've suffered a brain injury. Following a simple point-and-click style exam, and taking into account previous injury, medical history, age, and related pertinent information, scores are given across multiple domains. Subtest scores and summaries are provided, as are the composite scores as seen below. These scores not only identify cognitive strengths and weaknesses, but are a useful indicator of domains requiring further evaluation and prognostication.

In our office today, Mrs. Doe participated in the ImPACT computerized assessment of cognitive functioning. The patient scored 3rd percentile for verbal memory, 2nd percentile for visual memory, 6th percentile for processing speed of the brain, and 11th percentile for the time taken by the brain to respond to stimuli.

The patient performed poorly; her score shows impairment. The patient assures us that she put in her best effort while taking this computerized assessment. The current administration shows impairment of immediate and delayed memory for words, immediate and delayed memory for designs, sustained attention, concentration, working memory, reaction time, visual processing speed, learning memory and focused attention. This is a screening test and full assessment is required for more accurate quantification of her deficits.

Initial Comprehensive Evaluation for Doe, Jane | 10 of 35

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IMAGING RESULTS:

- CT of the brain/head was negative for acute or abnormal findings on 02/02/19
- MRI of the spine indicated abnormalities on 02/02/19.

DIAGNOSIS AND PLAN:

○ POST-TRAUMATIC HEADACHES

A post-traumatic headache is defined as one that develops or onsets within the seven days following injury or after regaining consciousness (2; Defrin, 2014). Since the incident on 02/02/19, Mrs. Doe has suffered from headaches of 8/10 intensity 5-6 times each week. There is a temporal relationship between the incident and the onset of headaches. Headaches are the most frequent complaint following a traumatic brain injury, with a prevalence rate up to 95%. Even at twelve months post-incident, the cumulative incidence rate remains above 70%. The majority of those suffering experience daily or weekly onset, with the temple, forehead, neck, back of head, eyes, and vertex the most cited locations of pain (1; International Headache Society).

Migraine has been identified as the 7th most disabling disease and most disabling of all neurological illnesses. These headaches will exert a damaging effect on Mrs. Doe's life.

Occipital Neuralgia presents as recurring pain most frequently described as 'shooting', 'burning', or 'stabbing'. Occipital Neuralgia commonly results from head trauma, such as that experienced with a collision, fall, or other blow to the head that is associated with a concussion or whiplash-type injury (3; Zaremmski et al., 2015). Mrs. Doe's symptoms are indicative of Occipital Neuralgia.

I recommend the following treatment strategies for Mrs. Doe:

- **Prophylaxis:** I am starting the patient on prophylaxis of post-traumatic migraines with topiramate 100 mg PO BID and galcanezumab-glnm (Emgality) 120 mg/mL subq. Q30 days. A loading dose of Emgality was administered in the clinic today without side effects. Education regarding self-administration of future doses was provided, as was information regarding the Lilly cares prescription obtinment program. Preventative therapy such as this is used when the frequency of onset is high; it helps to reduce the severity and duration of headaches, as well as improve the efficacy of abortive treatments (below). Cost for these medications, absent insurance use, ranges from: \$1,200.00 - \$12,000.00 per year for topiramate, and \$6,000.00 - \$7,200.00 per year for Emgality, depending on dosage and formulation. With this prophylaxis regimen, Mrs. Doe will see a reduction in the aforementioned characteristics of her headaches.

Initial Comprehensive Evaluation for Doe, Jane | 11 of 35

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- **Occipital Neuralgia Management:** Clinical signs and/or symptoms of Occipital Neuralgia are present and warrant treatment. I am initiating therapy with gabapentin 100 mg TID. Cost for this medication, absent insurance use, ranges from \$800.00 - \$5,500.00 per year, depending on dosage and formulation. Should relief fail to be actualized with pharmacotherapy alone, nerve blocks, as detailed below, will be considered.
- **PRN Therapy:** Mrs. Doe is prescribed butalbital-acetaminophen-caffeine (Fioricet) 50-325-40 mg PO q 4 hours PRN as an acute rescue therapy for use when and if she suffers from headaches. I explained Fioricet's potential to become habit-forming and instructed her in the safe utilization of this medication. When using acetaminophen containing products such as Fioricet or Tylenol, care to avoid exceeding 4 gms per day must be used to avoid potential complications. The requirement of PRN migraine medications will significantly decrease with prophylactic therapy. Cost for this medication, absent insurance and at a moderate use, ranges from \$500.00 - \$2,500.00 per year, depending upon dosage and formulation. Mrs. Doe is advised to implement a barrier method of contraception for the duration of topiramate use.
- **Acute Abortive Medication:** To provide expeditious relief from headache pain, I am initiating a prescription for rizatriptan benzoate 5 mg q 2 PRN for Mrs. Doe. She has been instructed to use Fioricet as a first line of treatment and that, should it be required, a second dose may be taken if complete relief isn't felt with the first. The requirement of acuter abortive medications will significantly decrease with prophylactic therapy. Cost for this medication, absent insurance and at a moderate use, ranges from \$400.00 - \$3,900.00 per year, depending upon dosage and formulation.
- **Interventional Headache/Migraine Management:** If the medical management does not provide relief as anticipated, or fails to provide relief of an adequate nature, escalation will be warranted. I will schedule Mrs. Doe to receive Onabotulinum toxin A injections to reduce the frequency and intensity of her post-traumatic migraines. Additionally, I will also schedule Mrs. Doe for bilateral Greater and Lesser Occipital Nerve Block under Ultrasound-guidance, as well as bilateral Third Occipital Nerve Block under fluoroscopy.
 - **33 Point Botox Injections:** Botox inhibits local neurogenic inflammation and inhibits central sensitization, thus relieving and therefore improving sharp and/or shooting pains in up to 88.9% of sufferers (4; Choi, 2016). Costs for this series of injections, absent insurance use, ranges from \$2,000.00 - \$9,000.00 per treatment.
 - **Greater/Lesser Occipital Nerve Block(s):** Nerve blocks, both Greater and Lesser, are well-accepted, long utilized treatments for headaches of various types. When adhering to a standard protocol, studies have shown

Initial Comprehensive Evaluation for Doe, Jane | 12 of 35

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that relief is significant; the number of headaches reduced by 10.48 - 11.21 days, severity reduced by 3.1 on a ten point scale, and duration more than halved (5; Inan et al., 2015). Costs for these procedures, absent insurance use, range from \$5,000.00 - \$10,000.00 per treatment.

- **IV Infusion Therapy:** If the medical treatment plan outline above provides minimal or no relief, then I will move forward in the treatment of her refractory post-traumatic migraines with IV infusion with DHE/ valproic acid/ 25 mg of Baclofen/ 2 gms MgSO₄. This combination infusion combines commonly acknowledged migraine relief medications into a single intravenous session. Costs for this treatment session, absent insurance, range from \$4,200.00 - \$9,900.00.

○ **MODERATE TRAUMATIC BRAIN INJURY WITH NEUROCOGNITIVE DEFICITS**

Since the incident, Mrs. Doe is suffering from neurocognitive deficits. The following areas are presumably affected based in history and the screening ImPACT test:

Memory
Learning
Intelligence
Visual and Spatial analysis
Judgement
Executive functions

I am initiating neurorehabilitative exercises, listed below, to improve her neurocognitive deficits. Mrs. Doe is advised to do these neurorehabilitative exercises on a daily basis for a minimum of thirty minutes. She is also advised to keep a log of progress and the number of hours spent engaged in these exercises and bring it with her to each subsequent encounter.

Her inability to stay focused and pay attention is interfering negatively with her job; treatment is warranted. I am starting her on amphetamine-dextroamphetamine 10 mg PO daily to improve her concentration, sustained attention, attention to detail and focus. Cost for this medication, absent insurance, ranges from \$1,200.00 - \$7,200.00 per year, depending upon dosage and formulation.

Additionally, I am ordering an MRI of her brain and brainstem to evaluate gross or structural abnormalities and to serve as a baseline for future imaging. This imperative imaging has a range of costs, dependent upon facility, from \$1,800.00 - \$7,500.00 for those not utilizing insurance.

Initial Comprehensive Evaluation for Doe, Jane | 13 of 35

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○ **ENVIRONMENTAL ENRICHMENT**

Brain stimulation via physical and social surroundings is known to increase psychological and physiological well-being. When provided with a richer, more stimulating environment, higher rates of synaptogenesis and more complex dendrite arbors are actualized as brain plasticity increases. Essentially, the brain's network grows and strengthens, creating new and/or rebuilding damaged pathways. Environmental enrichment therapies inclusive of physical, cognitive, and social stimulation, have been proven to improve both functional and histological outcomes in those who have suffered from a traumatic brain injury. Mrs. Doe has suffered a traumatic brain injury; she would benefit from an enriched environment to aid in the recovery process and overall well-being. Costs to implement these therapeutic changes vary, but an average of \$1,500.00 - \$5,000.00 annually is appropriate. The following should be implemented in Mrs. Doe's home environment to bolster her recovery and work towards regaining her cognitive capacity:

- Mirrors, pictures, photographs, books, and interesting things to look at.
- Varied lighting from lava lamps or colored bulbs or neon signs. Christmas lights or those meant for outdoor use will work.
- Items of comfort for relaxing such as rugs, large pillow, bean bags, and/or blankets.
- Chairs and seating of varied types such as rocking chairs, hammocks, etc.
- Calming music or sounds such as those similar to the ocean or rain sounds. Classical or instrumental music will work well.
- Pleasant scents; lavender, clary sage, and peppermint have calming or attentional properties.
- Textures of all varieties. Include varied materials from wood to fuzzy pillows.
- Opportunities to exercise, as able. Treadmills, stationary bikes, rowing machines, yoga mats, etc.
- Aesthetically interesting with height variations and surface changes throughout. Ensure that the environment is pleasing and provides opportunity for inquiry and contemplation.
- Opportunities for socializing in a limited or controlled capacity such as volunteering, coffee 'dates', library outings, and mall-walking.
- Creative outlets and the supplies needed for painting, coloring, journaling and the like.
- Cognitively challenging tasks or materials; word-finds or crosswords, newspapers, documentaries, or even local classes will serve well.

- **NEUROREHABILITATIVE EXERCISES**

The following websites and apps may partially restore and/or improve diminished brain functions:

BrainHQ: www.brainhq.com

Happy Neuron: <http://www.happy-neuron.com/>

Lumosity: <https://www.lumosity.com/>

Tactus Therapy: <https://tactustherapy.com/therapy/>

Web Sudoku: <https://www.websudoku.com>

Lumosity: a free app version of the full site with mobile compatibility. Tailored goal format allows for working on specific areas of concern, including memory, attention, problem solving, processing speed, and cognitive flexibility.

Eidetic: Utilizes spaced repetition to improve memory recall and recognition. Different from many training apps as it utilizes contextual knowledge, thus bolstering the same.

Elevate: After an initial quiz to assess baseline, daily tasks are set for personal goals to improve in areas of weakness. Brief but thorough games exhibit progress via visual maps.

Fit Brains Trainer: Increasingly complex and challenging tasks build upon each other to expand brain prowess.

Personal Zen: Focuses on anxiety reduction and emotional stability.

Brain Trainer Special: Varied levels for several concepts such as sequencing, calculations and numerical capacity, and memory.

Brain Fitness: Series of memory training exercises to increase focus, problem-solving skills, attention, memory, and overall cognitive capacity. Please note, there is both a free and a paid version.

○ **STRESS MANAGEMENT**

General stress management techniques including meditation, yoga, and massage therapy may be helpful.

Compensatory strategies that may be useful for Mrs. Doe to implement in her daily living are as follows:

- Allowing more time to complete tasks to avoid time pressures.
- Utilizing a day planner/calendar to record appointments and important future tasks.
- Writing down and organize information to be remembered by carrying a small notebook and pen.
- Breaking up longer tasks into multiple, shorter tasks and avoid multitasking.
- Completing tasks in a quiet room, turning off televisions or other distracting sources.
- If becoming fatigued or losing focus, stop and take a break before returning to the task.

○ **DIFFUSION TENSOR IMAGING**

I am ordering Diffusion Tensor Imaging of her brain. This test is warranted to evaluate the extent of damage to the white matter tracts following head injury. DTI will allow more precise discovery into the areas damaged, at a level unable to be viewed with traditional MRI or CT; these techniques are not sensitive to detecting diffuse/traumatic axonal injuries (DAI/TAI) - the major brain injuries observed in mTBI (6; Shenton et al, 2012). Symptoms in this patient group are the result of alterations undetectable by traditional CT and/or MRI machinery, thus giving the appearance of a 'normal' brain. While structural knowledge is important for Mrs. Doe's care, information garnered from DTI reveals microscopic damage and is very helpful for the targeted neurocognitive rehabilitation and prognostication. Costs for this sophisticated imaging, absent insurance, range from \$12,500.00 - \$35,000.00, depending on facility and interpreter expertise.

○ **NEUROPSYCHOLOGICAL ASSESSMENT BATTERY**

A Neuropsychological Assessment Battery is a comprehensive test or assessment of the patient's brain functions: attention, processing speed, learning, memory, intelligence, language, sensory acuity, calculation, visuospatial ability, problem solving, judgement, abstract thinking, mood, and temperament. After brain injury, many or all of these cognitive domains may be impaired or affected. Simple screenings, while appropriate for a high-level overview or diagnostically challenging cases, cannot ascertain the depth or breadth of a comprehensive series, specifically in a complex presentation wherein

Initial Comprehensive Evaluation for Doe, Jane | 16 of 35

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multiple domains appear impacted (7; Kosaka, 2006). This test is warranted and of benefit for Mrs. Doe as the information obtained from this testing will be helpful in clinical decision making as well as ongoing and future neurocognitive rehabilitation. Costs for this intensive battery vary by provider expertise and level of credential, with a range of \$8,500.00 - \$22,000.00 typical for those without insurance.

This should be performed six months or greater after injury, therefore, I will schedule Mrs. Doe for a comprehensive Neuropsychological Assessment Battery at her earliest convenience.

○ **NEUROCOGNITIVE RECOVERY SUPPLEMENTS**

In addition to a diet filled with antioxidant foods, such as berries, carrots, tea, nuts, and a variety of vegetables, and as part of a low saturated fat and reduced refined sugar diet, the following have been shown to be of benefit to those recovering from traumatic brain injury:

- **Vitamin D 3000 IU daily with food** - supports the growth of new brain cells.
- **Fish Oil / Omega 3 Supplements 2-3 grams with food daily** - may improve brain function.
- **Probiotics** - improves gut health and, via the vagus nerve and production of neurotransmitters, brain health, too.
- **Magnesium L Threonate 1-2 grams daily** - boosts brain levels of magnesium and associated benefits for sleep, anxiety, and cognition.
- **Vitamin B12 1000 micrograms daily** - may prevent brain atrophy.
- **CoEnzyme Q10 100 mg daily** - protects brain cells from oxidative damage.
- **N-Acetyl Cysteine 150 mg daily** - regulates glutathione and glutamate levels to improve brain health.
- **Zinc 20 mg daily** - aids in brain signal transmission and cell growth.
- **Alpha Lipoic Acid (ALA) 100 mg daily** - fights free radicals, reduces inflammation, and offers protective benefits.
- **Phosphatidylserine (PS) 100 mg daily** - protects the brain and aids in messaging between cells.
- **Glucoraphanin 15 mg daily** - prevents damage, even delayed, and aids in cognitive restoration.
- **Curcumin (Turmeric) 2 gm daily** - reduces oxidative stress and protects the brain; reduces the overall effects of concussive injury on cognition.

Monthly costs for these supplements varies by quality and retailer. Allotting \$100.00 - \$300.00 monthly, or \$1,200.00 - \$3,600.00 annually, should provide for their acquisition.

Initial Comprehensive Evaluation for Doe, Jane | 17 of 35

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- **SPEECH ABNORMALITIES**

Brain damage, such as that imparted by trauma, is a major cause of adult-onset communication disorders, specifically aphasia, apraxia, and dysarthria. Diffuse brain injury is known to cause difficulties in comprehension and expression. Damage to the left hemisphere often manifests as aphasiac conditions and dysarthria, while right hemisphere damage accounts for confrontational naming, word fluency, reading, writing and related impairments (8; Bobba et al, 2019). Mrs. Doe has been suffering from dysnomia, pronatory difficulties, and word-finding difficulties. Additionally, during testing today, she was found to have moderate apraxia for limb apraxia and oral apraxia with mild apraxia of speech for diadochokinetic rate and utterance time for polysyllabic words..

To address this newly onset communication concern, she was instructed to practice deep breathing exercises, talk slowly to prevent distortions of speech, and slow down her pace of life in general. An educational handout on speech dysfunctions after Traumatic Brain Injury, and a handout of speech exercises to help improve her speech at home were provided. Professional intervention for those suffering with communication impairments following brain injury has been proven effective for the majority of patients. With tailored treatment plans, studies show that between 67% - 82.5% of patients showed improvement in language-based capabilities (9; Coelho et al, 1996).

To ensure that Mrs. Doe receives optimal rehabilitative care, I will order an evaluation by a Speech-Language Pathologist and formal speech therapy if the symptoms do not improve with the provided home speech exercises. Individualized treatment plans vary in intensity and duration dependent upon patient need. Costs for each treatment session range from \$95.00 - \$500.00, absent insurance. For a 24 session plan, this equates to \$2,280.00 - \$12,00.00.

- **DEPRESSIVE DISORDER/GENERALIZED ANXIETY DISORDER**

Since the incident, Mrs. Doe has been experiencing mood swings, immense sadness, fatigability, anxiety, and signs/symptoms of depression. Further, she endorses anhedonia and disinterest in previously-enjoyed activities. When the Depression Screening Questionnaire was administered during this encounter, Mrs. Doe scored a 26 , indicating she is suffering from severe depression.

Depression is common after traumatic brain injury; affecting half of sufferers in the first year, and two-thirds within seven years of injury. Of those suffering depression, half will present with newly onset concomitant anxiety (11; MSKTC, 2020). Proactive treatment of these psychiatric symptoms following a brain injury has been shown to improve mental

health outcomes, cognition, somatic symptoms, and daily functioning (10; Silverberg & Paneka, 2019). Thus, I am starting her on the following treatment:

- To address her depressive symptoms, I am initiating treatment with quetiapine 100 mg PO qhs. Costs for this medication average \$2,000.00 - \$3,600.00 annually, absent insurance, dependent upon formulation selection.
- To address her anxiety, I am initiating treatment with sertraline 25 mg PO daily. Costs for this medication average \$240.00 - \$6,000.00 annually, absent insurance, dependent upon formulation selection.

Helpful apps for Mrs. Doe:

Happify: Emotional intelligence and training for behavior adaptation; beneficial for adjusting to life after traumatic brain injury.

Positive Activity Jackpot: For those with Post-traumatic Stress Disorder or depression; coping skills and behavioral therapy via apps and a reward system.

ReliefLink: an app created by Dr. Kaslow for those suffering with depression to track and monitor symptoms, response, etc. and find assistance near-by.

CBT Thought Diary: Utilizing the principles behind cognitive behavioral therapy, this app encourages the user to record and monitor feelings, symptoms, and actions. In doing so, reflection can be made to exhibit patterns and aid in behavioral adjustment.

○ **SLEEP DISORDER/FATIGUE**

Mrs. Doe has difficulty falling asleep and staying asleep, as well as suffers from fatigue unabated by rest. Nightmares and pain further preclude her rest. Sleep disturbances such as this are common and affect up to 70% of traumatic brain injury sufferers, while up to 53% endorse enduring fatigue (12; Viola-Saltzman & Watson, 2012).

The following treatments are being initiated to alleviate sleep disturbance(s) and combat fatigue:

- An educational handout on sleep hygiene was provided to Mrs. Doe which explains the importance of proper sleep hygiene and routine, of which I encourage adherence to.
- Pharmacological treatment with zolpidem 5 mg qhs. This medication aids in falling and staying asleep. Annual costs range from \$600.00 - \$8,400.00, dependent upon formulation selection.

Initial Comprehensive Evaluation for Doe, Jane | 19 of 35

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- Daily exercise of 30-60 minutes, at least 2 hours before anticipated bedtime.

- **POST-TRAUMATIC VERTIGO AND BALANCE DISORDER**

Vestibular dysfunction has been shown to adversely affect processes of attention, and increased demands of attention can worsen the postural sway associated with vestibular disorders. Dysfunction may occur centrally, due to damage to the vestibular nuclei in the brainstem after a head injury, or peripherally, due to damage in the inner ear, such as with Benign Paroxysmal Positional Vertigo (BPPV). After brain injury, vestibular dysfunction ranges from 15%-30% in mild or blast-related TBI, to 100% in those who sustain temporal bone impact or fracture. Presentation includes dizziness, balance deficits, vertigo, visual impairments, and auditory changes (14; AAM PR, 2013).

Mrs. Doe endorsed and/or displayed signs/symptoms of vestibular dysfunction during examination. Treatment initiated today includes the following:

- Meditation, omega 3 supplementation, and substituting TV or cell phone watching with stable visual activities, such as reading.
- Utilization of meclizine 25 mg PO TID PRN for symptomatic relief. Costs for this medication range from \$420.00 - \$700.00 yearly absent insurance, dependent upon frequency of use.
- Vestibular exercises at home to improve upon dizziness and imbalance.
- Videonystagmography (VNG). These tests are warranted for the diagnosis and rehabilitation of her imbalance and dizziness as reported and/or exhibited during examination. Cost for this testing ranges from \$350.00 - \$1,500.00, absent insurance.
- Computerized Dynamic Posturography (CDP). These tests are warranted for the diagnosis and rehabilitation of her imbalance and dizziness as reported and/or exhibited during examination. Cost for this testing ranges from \$750.00 - \$2,500.00, absent insurance.
- Vestibular therapy, to include canalith repositioning or BPPV treatment. Each session has a range of costs from \$100.00 - \$500.00. For 12 sessions, this equates to \$1,200.00 - \$6,000.00.

Additional information for balance improvement:

Increasing strength and flexibility, specifically in the ankle and hip muscles. Activities such as mini-squats, toe-raises, and/or standing leg lifts, when physical functioning allows, are beneficial.

Many practitioners are utilizing Wii and other physically interactive gaming systems to aid in vestibular rehabilitation. This can be a fun, simple way to build and restore damaged systems.

Single-leg balancing while maintaining proper posture, initially for thirty seconds can be done first with the eyes open, and then with the eyes closed with improvement. This can be done anywhere where safety is not a concern and when fall risk is minimal. Waiting in line, while cooking, etc.

Practicing standing or walking in different conditions, when capable, will build physical ability and confidence, while giving the visual system a workout, as well.

Online resources available to aid/educate in recovery:

aVOR - A free app tool, useful for those with vestibular ocular reflex system disorders. Benign Positional Paroxysmal Vertigo education is provided.

BalanceandMobility.com - Education regarding causation and treatments available.

Vestibular Rehabilitation Therapy for Patients - Created by Physiotherapist Dr. Jordan Tucker, this video discourses vestibular rehabilitation. https://www.youtube.com/watch?v=pkA75_RWHYA. (Googling his name also works).

VertiGo Exercise - A comprehensive app that provides video instruction of exercises to improve balance. Progress and time spent are built-in for ease of use.

Vertigo Exercises - Visual renderings of causation, along with video demonstrations of relieving exercises, are free in this app.

- **CERVICAL RADICULOPATHY**

Mrs. Doe also complains of having neck pain. Treatments to relieve this pain, inclusive of physical therapy, have failed to provide adequate or long-term relief. I recommend continuation of care with her current provider as they work towards amelioration of this pain. Should relief fail to be actualized, I will refer her to a spine surgeon. Costs for evaluation range from \$400.00 - \$700.00 per visit, dependent upon credential, speciality, location, and level of expertise. Should it be recommended, physical therapy costs range from \$70.00 - \$160.00 per session, with 24 sessions a typical duration of care. Epidural steroid injections may be required for relief at a cost of \$3000.00 - \$5,000.00 each, frequently performed in a series of 3. All costs presume no insurance utilized.

- **LUMBAR RADICULOPATHY**

Mrs. Doe is having tremendous pain in the back. Treatments to relieve this pain, inclusive of ALIF and physical therapy, have failed to provide adequate or long-term relief. I recommend continuation of care with her current provider as they work towards amelioration of this pain. Should relief fail to be actualized, I will refer her to a spine surgeon. Costs for evaluation range from \$400.00 - \$700.00 per visit, dependent upon credential, speciality, location, and level of expertise. Should it be recommended, physical therapy costs range from \$70.00 - \$160.00 per session, with 24 sessions a typical duration of care. Epidural steroid injections may be required for relief at a cost of \$3000.00 - \$5,000.00 each, frequently performed in a series of 3. All costs presume no insurance utilized.

- **VISUAL DISTURBANCES**

Vision is the most important source of sensory information. Consisting of a sophisticated complex of subsystems, the visual process involves the flow and processing of information to the brain. The visual system is really a relationship of sensory-motor functions, which are controlled and organized in the brain. After TBI, there is frequently a shifting of the visual midline, vitreous hemorrhaging, and macular or retinal abnormalities. Common visual changes following injury include blurred vision, double vision, and decreased peripheral vision. Others suffer photophobia, accommodation, eye movement, convergence, pupillary function, and/or visual fields impairments or changes. Studies indicate that up to 60% of TBI patients suffer from some visual dysfunction in at least one eye (15; Armstrong, 2018).

Mrs. Doe reports blurred vision, diplopia, and photophobia. Treatment for these concerns will consist of the following:

- Initiation of diclofenac sodium 0.1% ophthalmic solution 1 drop into the affected eye drop QID x 14 days to address any inflammation present. Costs for a single course of treatment with this medication, absent insurance, range from \$50.00 - \$750.00, dependent upon formulation selection.
- Neurophthalmic evaluation by a specialized professional. Costs for a single examination range from \$300.00 - \$1,000.00 each, absent insurance.
- Optometric evaluation for corrective lenses or visual acuity concerns. Costs for a single examination range from \$75.00 - \$350.00 each, absent insurance.

Additionally, I have counseled her to wear polarized, rose-tinted glasses at all times for the next three months to aid in the alleviation of photophobia. Costs for these, as non-prescriptive lenses, range from \$150.00 - \$1,000.00 each.

Recommended retailers of rose-tinted glasses:

- **Felix Gray** - Proprietary blue light filters embedded in polarized and anti-glare lenses. Costs span most budgets and styles are plentiful. Available in prescription and non.
- **Theraspecs** - Designed to aid in migraine and post-concussion relief, these glasses come in multiple styles and price points.

○ **POST-TRAUMATIC TINNITUS**

Up to 53% of those who have suffered a traumatic brain injury develop tinnitus. Causes include: mechanical trauma, pressure-related injury, noise associated traumata, and neck injury or emotional trauma (16; Kreuzer et al, 2014). Mrs. Doe reports ringing in her ears likened to a high-pitched hummingbird.

- I recommend tinnitus maskers (noisers) and soft background music to distract her from concentrating on the noise. Tinnitus maskers can be purchased at a cost between \$50.00 - \$500.00, depending upon complexity of device, at most retailers and online outlets. Simple white noise machines to provide background noise can be obtained for under \$100.00.
- I will also start her on amitriptyline 25 mg PO qhs. Costs for this medication average \$120.00 - \$290.00 annually, absent insurance, dependent upon formulation selection.
- To address any inflammation that may be present, I am prescribing hydrocortisone w/ acetic acid 1-2% otic solution 3 drops into affected ear(s) TID x 10 days. Costs for this medication, absent insurance, range from \$75.00 - \$225.00 per course of treatment.

Initial Comprehensive Evaluation for Doe, Jane | 23 of 35

Houston: 6065 Hillcroft St, Ste 202, Houston, TX 77081

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○ **CONVERGENCE INSUFFICIENCY**

Convergence insufficiency is the inability to integrate visual information and results in blurry vision, dizziness, and other complaints. Affecting near-vision, it presents in up to 42% of TBI patients (18; Cohen et al, 1989) .

Mrs. Doe has convergence insufficiency as exhibited today. I am starting her on pencil push-up therapy to strengthen her eye muscles. This is an eye exercise in which a pencil is held directly in front, at arm's length, before being drawn slowly towards the nose. Mrs. Doe is advised to follow the pencil with her eyes, trying to keep it in clear focus. When the pencil starts to appear as a double image, the pencil should be drawn away from the nose again. The exercise is repeated several times per session, for several sessions per day. This exercise will correct her near point convergence insufficiency. I have also given her a handout with this routine explained for ease of use. She is advised to do this exercise for 15 minutes a day, five or more days a week. I will re-evaluate her during the follow up visit.

○ **TREMOR**

More than 10% of patients will manifest a tremor or related movement disorder after sustaining a traumatic brain injury. While the majority of these are transient, some may become permanent (19; Krausm et al, 1997). Lateral tremor is reported in Mrs. Doe's right upper extremity/ hand. This tremor is interfering with her daily functioning, thus I am initiating treatment with the following:

- Pharmacological therapy with propranolol 10 mg PO BID. Costs for this medication, absent insurance, range from \$260.00 - \$500.00 annually.
- Should this medication fail to provide sufficient relief, I will order an EEG/VEEG to further evaluate this concern. Costs for 24-hour monitoring and interpretation range from \$10,000.00 - \$26,000.00, absent insurance.
- Topiramate, prescribed for headache prophylaxis, may also impart benefits in controlling her tremors.

○ **POST-TRAUMATIC STRESS DISORDER**

Traumatic brain injury increases the risk of developing psychiatric disorders by nearly three-fold. Mild traumatic brain injury increases the risk of subsequent or comorbid PTSD (20; Bryant, 2011).

Mrs. Doe is suffering signs/symptoms of PTSD to include: unwanted and repeated memories of the incident/incident, flashbacks with a loss of reality in which the incident/incident is re-lived, intentional avoidance of reminders (places, items, sounds,

Initial Comprehensive Evaluation for Doe, Jane | 24 of 35

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etc.), detachment from loved ones and/or depersonalisation, shame surrounding the incident/incident, survivor guilt, hypervigilance, irritability absent discernible cause, intense and/or unwarranted arousability, and/or paranoia.

I am referring Mrs. Doe for Cognitive Behavioral Therapy, as well as psychotherapy, for the evaluation and treatment of this complex condition. Cognitive Behavioral/Processing Therapy, along with Eye Movement Desensitization and learned reprocessing, are widely regarded as beneficial modes of treatment. Costs for these therapies vary greatly depending upon provider credential and expertise. Absent insurance, a range of \$150.00 - \$600.00 per session, or \$3,600.00 - \$7,200.00 for 24 sessions is typical.

Information and resources for P.T.S.D:

<https://www.ptsd.va.gov/> - Understanding signs/symptoms, different treatment options, and additional resources for those suffering from Post-Traumatic Stress Disorder.

National Suicide Prevention Lifeline: 1-800-273-8255 - 24 hour hotline offering guidance and assistance with trained responders providing emotional support during times of PTSD crisis.

Crisis Text Line: Text **CONNECT** to 741741 - For those in the midst of a crisis who are unable to tolerate or prefer to avoid voice communication. Trained counselors respond in kind with help and assistance of all kinds.

Substance Abuse and Mental Health Services Administration (SAMHSA) National Helpline: 1-800-662-HELP (4357) - Free help in locating mental health facilities, local support groups, community-based organizations, and available resources in the local area.

○ **PSEUDOBULBAR AFFECT**

Pseudobulbar Affect, or PBA, presents or is clinically suggested in 5.3% - 48.2% of those suffering from a traumatic brain injury¹³. Mrs. Doe has been experiencing signs/symptoms of PBA, to include involuntary and uncontrollable episodes of laughter, crying, and/or anger with disproportionate or incongruent intensity. PBA is associated with significantly reduced quality of life, quality of relationships, health status, and social and occupational functioning.

Initial Comprehensive Evaluation for Doe, Jane | 25 of 35

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Nuedexta (dextromethorphan and quinidine) has been proven effective at reducing episodic rates by nearly 50%, with a 76% reduction from baseline episodes in those using this medication for PBA (13; Engleman et al, 2014). Thus, I am initiating treatment with Nuedexta 20mg/10mg BID for Mrs. Doe and will refer her for psychological intervention to better manage this complex condition. Costs for this medication, absent insurance, range from \$16,800.00 - \$19,200.00.

- **ONGOING/ LONG-TERM CARE NEEDS**

A Life Care Plan (LCP) is a document that outlines a comprehensive future plan for medical requirements for patients with long-term treatment needs. Mrs. Doe is suffering from back pain, headaches, neuralgia, visual changes, and significant cognitive decline; she is unable to meet her ADL or IADL requirements which will require ongoing and perhaps lifelong care, and thus will benefit from a Life Care Plan.

It is our medical opinion, based upon our combined experience and education, that Mrs. Doe has likely suffered a traumatic brain injury secondary to the collision.

Mrs. Doe was given a handout on at-home vestibular exercises, neurorehabilitative exercises, speech therapies, stress management, rehabilitation supplements, medication education, and sleep hygiene. A pamphlet detailing the Lilly Cares prescription obtainment program was provided in regards to the Emgality (Galcanezumab-glnm) injection.

I will follow up with her in 3 months. She will need to complete the Neuropsychological Assessment Battery as soon as it is convenient.

Throughout this assessment and examination, supportive techniques inclusive of active listening, validation, and supportive counseling, were utilized to extend understanding, address distress, and encourage healthy coping mechanisms in regards to requisite post-incident adjustments. Communications were entered with the intent of empathetic listening, reflective comments, and to proffer encouragement. Mindfulness and self-awareness were supported, as were healthy choices. Mrs. Doe responded well to these interventions and left our office in a seemingly less distressed state.

Thank you for allowing me to participate in Mrs. Doe's care after her traumatic brain injury. If I can be of further assistance, please don't hesitate to contact me.

Huma Haider

Huma Haider, MD
Medical Director, National Brain Injury Institute
Board Certified in Neurocritical Care through United Council for
Neurologic Subspecialties
Certified Life Care Planner (CLCP)
Board Certified in Anesthesiology through American Board of
Anesthesiology

Initial Comprehensive Evaluation for Doe, Jane | 27 of 35

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ORDER FORM FOR ADDITIONAL DIAGNOSTIC STUDIES AND SERVICES

Patient Name: Doe, Jane	MR#: 1234567DJ
Date of Birth: 01/01/81	Date of Injury: 02/02/19
Phone Number: (832) 825-4564	Date of Service: 04/30/20

Please fax the results of all the imaging studies, testing and consultation reports to NBII at 1-281-942-4504 as soon as they are available.

Diagnosis	ICD-10 Codes	CPT Codes	Recommendation
Imaging			
Traumatic Brain Injury	S06.2	70551	<input checked="" type="checkbox"/> MRI of the Brain and Brain Stem w/out contrast
		70552	<input checked="" type="checkbox"/> MRI of the Brain and Brain Stem with contrast
		70553	<input type="checkbox"/> MRI of the Brain and Brain Stem with + w/out contrast
		70540	<input type="checkbox"/> MRI of the Temporal Bone and Internal Auditory Canal w/out Contrast
		73221	<input type="checkbox"/> MRI of the Left/Right Shoulder w/out contrast
		73223	<input type="checkbox"/> MRI of the Left/Right Shoulder with and w/out contrast
		72141	<input type="checkbox"/> MRI of the Cervical Spine w/out contrast
		72156	<input type="checkbox"/> MRI of the Cervical Spine with and w/out contrast
		72146	<input type="checkbox"/> MRI of the Thoracic Spine w/out contrast
		72157	<input type="checkbox"/> MRI of the Thoracic Spine with and w/out contrast
		72148	<input type="checkbox"/> MRI of the Lumbar Spine w/out contrast
		72158	<input type="checkbox"/> MRI of the Lumbar Spine with and w/out contrast
		76498	<input checked="" type="checkbox"/> Diffusion Tensor Imaging (DTI) of the Brain with measurement of Fractional Anisotropy (FA), Mean Diffusivity (MD), Radial Diffusivity (RD) and Axial Diffusivity (AD) <input checked="" type="checkbox"/> Areas of interest for tractography are: Head Injury, Cognitive Dysfunction, and Psychiatric
			<input checked="" type="checkbox"/> DTI of the Brain Imaging review by Specialist Neuroradiologist
	78607	<input type="checkbox"/> SPECT Scan of the Brain	
Tremors/ seizure disorders	G40.909	95951	<input type="checkbox"/> Electroencephalogram - Routine (72 Hour VEEG)
Neuralgia/ neuritis	M79.2	95855, 95856	<input type="checkbox"/> Electromyogram Routine
Syncopal Episodes	R55	93880	<input type="checkbox"/> Bilateral carotid doppler

Initial Comprehensive Evaluation for Doe, Jane | 28 of 35

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Dysphagia	R13.10	99205	<input type="checkbox"/> Gastroenterology evaluation
Snoring, Insomnia	R06. 83, G47.00	95811	<input type="checkbox"/> Polysomnography
Diabetes Insipidus	E23.2	80418	<input type="checkbox"/> Evocative/Suppression testing; Anterior Pituitary Gland Evaluation; complete hormone panel (GH, Prolactin, LH, FSH,TSH, and ACTH)
			<input type="checkbox"/> Other:
IV Infusion Therapy for Headache Management			
Post-traumatic Headaches (Intractable)	G44.301	96374 & J1110	<input type="checkbox"/> IV Infusion Therapy with Dihydroergotamine (DHE)
		96374 & J3490	<input type="checkbox"/> IV Infusion Therapy with Valproic Acid
		96374 & J3490	<input type="checkbox"/> IV Infusion Therapy with Ketamine
Posttraumatic Headache Procedures			
Post-traumatic Headaches (Intractable), Occipital Neuralgia	G44.301, M54.81	64615	<input type="checkbox"/> 33 Points Botox Injection
		64450 & 77002	<input type="checkbox"/> Third Occipital Nerve Block under Fluoroscopic guidance
		64405 & 76942	<input type="checkbox"/> Greater Occipital Nerve Block under Ultrasound guidance
		64450 & 76942	<input type="checkbox"/> Lesser Occipital Nerve Block under Ultrasound guidance
Other			
Dysphasia/Aphasia	R47.0	92507	<input checked="" type="checkbox"/> Speech Therapy
Benign Paroxysmal Positional Vertigo/ Disequilibrium	H81.93, H81.10	97112	<input checked="" type="checkbox"/> Vestibular Therapy [Balance and Gait Rehab and Canalith Repositioning for BPPV]
		92547	<input checked="" type="checkbox"/> Videonystagmography (VNG)
		92548	<input checked="" type="checkbox"/> Computerized Dynamic Posturography (CDP)
Depression, Anxiety, PTSD	F32.9, F41.9, F43.1	90837	<input checked="" type="checkbox"/> Psychotherapy
		90791	<input checked="" type="checkbox"/> CBT <input checked="" type="checkbox"/> Psychiatric evaluation
Traumatic Brain Injury w/ Neurocognitive Deficits	G31.84	97127 96136, 96137	<input type="checkbox"/> Neurocognitive Rehabilitation (Outpatient) <input checked="" type="checkbox"/> Neuropsychological Evaluation
Bruxism	G47.63, F45.8	D9940	<input type="checkbox"/> Evaluation for Occlusal Guard by a Dental Professional
Hearing Loss	H91.90	92551, 92552	<input type="checkbox"/> Audiology
Blurred/Impaired Vision	H53.8, H54.7	92102	<input checked="" type="checkbox"/> Optometry/Neuro-Ophthalmology
Neck Pain, Lower Back Pain	M54.2, M54.5	97162, 97166	<input type="checkbox"/> Physical Therapy/ Occupational Therapy
Shoulder Muscle Tear	M75.102	99205	<input type="checkbox"/> Consultation with an Orthopedic Surgeon
Cervical Spine Disc Herniation, Thoracic Spine Disc Herniation	M50.10, M51.24	99205	<input type="checkbox"/> Consultation with Spine Surgeon
Pain, acute or chronic, due to trauma	G89.11, G89.21	99205	<input type="checkbox"/> Evaluation by Pain Management Specialist

Initial Comprehensive Evaluation for Doe, Jane | 29 of 35

Houston: 6065 Hillcroft St, Ste 202, Houston, TX 77081

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Huma Haider, MD
Medical Director, National Brain Injury Institute
Board Certified in Neurocritical Care through United Council for
Neurologic Subspecialties
Certified Life Care Planner (CLCP)
Board Certified in Anesthesiology through American Board of
Anesthesiology

Initial Comprehensive Evaluation for Doe, Jane | 30 of 35

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Preferred Ancillary Service Providers - Houston, TX

Provider	PoC with whom to coordinate referral and arrange payment
<p>National Brain Injury Institute <u>Services Offered</u></p> <ul style="list-style-type: none"> ● Diffusion Tensor Imaging Scan of the Brain (DTI) ● Neuropsychological Assessment Battery (NAB) ● Certified Physician Life Care Plans (CPLCP) ● Videonystagmography (VNG) ● Neuro-optometry 	<p>Juan Hernandez jhernandez@nationalbii.com P:281-769-3906</p>
<p>Memorial MRI 7 locations in Houston <u>Services Offered</u></p> <ul style="list-style-type: none"> ● MRI of Temporal Bone ● EMG - Electromyogram ● Greater and Lesser Occipital Nerve Block (With Dr. Lee) ● Third Occipital Nerve Block (With Dr.Lee) 	<p>Imaging Referral Form 713-554-3200 OR Pain Procedure Referral Form Nita Arroyo Narroyo@texasregionalclinic.com 281-529-6629</p>
<p>CereScan 9701 Richmond Ave., #122, Houston, TX 77042 <u>Services Offered</u></p> <ul style="list-style-type: none"> ● SPECT Scan 	<p>Referral Form Deb Scheer dscheer@cerescan.com 720-259-3671 866-433-3965 (fax)</p>
<p>Balance and Neurological Physical Therapy 4141 SW Freeway Service Rd Suite 100, Houston, TX 77027 <u>Services Offered</u></p> <ul style="list-style-type: none"> ● Vestibular Therapy 	<p>Referral Form Kristin Puhl kristin@balancediagnostic.com P:713-223-1800</p>
<p>NeuroRestorative <u>Services Offered</u></p> <ul style="list-style-type: none"> ● Speech Therapy ● Psychotherapy ● Vestibular Therapy ● Neurocognitive Rehabilitation 	<p>David Wall dwall@mentisneuro.com C:281-254-0515 O:713-331-0259 F:832-202-0899</p>
<p>Eye Wellness Center Better Eye Care, 1701 Sunset Blvd Houston, TX 77005 <u>Services Offered</u></p> <ul style="list-style-type: none"> ● Neuro-Optometric Exam 	<p>Julie Prusmack jprusmack@neuroeye.com 713-842-0803</p>
<p>Alliance Neurodiagnostics (LoP only for auto accidents) <u>Services Offered</u></p>	<p>John Puzyk john@afcompanies.com</p>

Initial Comprehensive Evaluation for Doe, Jane | 31 of 35

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<ul style="list-style-type: none"> • Continuous Video EEG monitoring for 72 hours • Continuous EKG monitoring for 72 hours 	<p>P:281-744-9735 F:888-982-8442</p>
<p>Dr. Remi Nader Texas Center for Neurosciences <u>Services Offered:</u></p> <ul style="list-style-type: none"> • Neurosurgical Evaluation 	<p>Carmen Flores MedAssist@texasneuroscience.net P:832-932-9300</p>
<p>Out-patient Harris County Mental Health Care facilities</p>	<p>1: 7200 Northloop east Houston Tx 77028, 713-970-8700. 2: 1504 Ben Taub loop, Houston, 77030, 713-970-4640</p>
<p>Apnix Sleep Diagnostics 4003-B Bellaire Blvd Houston, Texas 77025</p>	<p>info@apnix.com P:713-349-9767</p>
<p>The Center for Audiology 4544 Post Oak Place Dr., Suite 380 Houston, TX 77027</p>	<p>P:713-255-0035</p>

Please forward any reports for services obtained to info@nationalbii.com so that we may incorporate them into our care of the patient. Thank you.

- The NBII Team

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Initial Comprehensive Evaluation for Doe, Jane | 35 of 35

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