# Neuropsychological Assessment

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| Name: | {NAME} (preferred name "{PREFERRED\_NAME}”) |
| Date of Birth: | {DOB} |
| Date of testing: | {TEST\_DATE} |
| Medical Record #: | {MEDICAL\_RECORD\_NUMBER} |
| Age at Testing: | {AGE\_AT\_TESTING} |
| Address: | {ADDRESS} |
| Medication: | {MEDICATION} |

## Referral Request and Records Review

Name

was referred for a neuropsychological assessment by her inpatient rehabilitation physiatrist at the point of her discharge from inpatient rehabilitation on 21 Apr 2015 following a traumatic brain injury sustained 12 Apr 2015.

### Records Review

The following excerpts from information in the clinical record are particularly relevant to the current assessment:

25 Jul 2014 - cardiology - "Name Name is an 18 year old female from Tooele who presents today for consultation from her PCP Heather George. Name has been having symptoms of lightheadedness, dizziness, palpitations and feelings of 'irregular' heart beats a couple times a month for several months now. At one time, she says she nearly had full loss of consciousness. She denies having any chest pain. These episodes are brief, lasting only a few seconds."

13 Apr 2015 - emergency dept - "This is a 19-year-old female who was involved in a single car rollover earlier this morning. She was unconscious at the scene and EMS was not called immediately because it was not a witnessed accident. . . Status post MVA, trauma 2 activation. The patient found to have a small right frontotemporal hemorrhagic contusion with positive loss of consciousness. The patient had a small right facial laceration, abrasion, and periorbital contusion."

13 Apr 2015 - CT Brain scan - "There is a 10 mm circumscribed hemorrhage posterior lateral aspect right frontal lobe without significant mass effect."

14 Apr 2015 - Consult - "Ms. Name is an 19-year-old woman with no significant history of medical problems, not taking any medications, not previously hospitalized, who was admitted after a motor vehicle accident in which she was the driver with no passengers and other cars involved. It is unclear what caused the accident. She does not have recollection of the details, but she was able to walk out of the vehicle after it rolled over after some period of time. She did not lose consciousness. . . . She does have a history of palpitations, orthostatic, lightheadedness and presyncope, several syncopal episodes, . . . she was encouraged to increase her electrolytes intake and she began to drink Gatorade and Powerade and her palpitations improved according to her. She has not been taking electrolyte replacement drinks lately, but has still been feeling good up until the time of her accident without any palpitations, chest pain, shortness of breath, or lightheadedness. She is a limited historian due to pain that irritates her and has post-concussive mental status changes, so that she is only minimally cooperative."

15 Apr 2015 - speech language pathology - "Ms. Name is alert and oriented to person, place, year and that she got in an accident. Attention to task is good. Divided attention is fair/poor. Long term memory is good. Short term memory is fair/poor, she was able to recall one word out of 3 without cues, the other two with semantic cues. Concrete problem solving fair. Abstract problem solving poor. The patient is able to spell the word 'world' backwards 3 attempts. Verbal sequencing is fair at the 3 unit level. She is unable to perform serial 7's with max cues. Patient able to track bilaterally although likes to keep her eyes closed. Organization of thought is poor. Poor insight into mentation deficits. Affect is emotionally labile, she cries easily as well as is quite harsh with her interactions with her mother."

21 Apr 2015 - discharged from inpatient rehabilitation - " The patient had a short rehabilitation stay and made excellent progress. For basic ADLs and mobility skills, she became completely independent. For high level IADLs and complex test, she continues to need a little bit of assistance and cues. She has an impaired attention span and is easily distracted."

15 May 2015 - speech language pathology - "Name states that she has become "more introverted" since her accident. She also reports increased sensitivity to noise and light. Her mother reports that she is "more reactive" or sensitive, that she is easily upset. Name concurs that she has had more difficulty controlling her emotions. She also reports poor sleep, waking easily to environmental sounds and discomfort because she is wearing a heart monitor. Per chart review this was ordered on 5/4/2015 due to complaints of heart palpitations and diagnosis of A-fib, had worn a monitor in July of 2014 due to similar complaints."

19 Jun 2015 - physiatry - "reviewed report of 5/6/15 MRI which showed expected evolution of 1cm right frontal ICH as well as bifrontal scattered foci of signal consistent with DAI. Overall as expected + some DAI as suspected."

## Background History

The following summary is based on an interview with ***NAME*** and her mother Mary.

### Presenting Problem

The patient reports that she was functioning well academically and socially at the point of a rollover motor vehicle accident on 13 Apr 2015 - she was driving, the only occupant of the vehicle and causation for the crash is unknown. She was in good health at the time of her injury and was a full time student at Southern Utah University. The accident was unwitnessed and initial injury details are difficult to determine with accuracy. It is clear that the patient sustained a moderate to severe traumatic brain injury due to extended posttraumatic amnesia for her intensive care unit stay and brain scan findings of a 10mm diameter parenchymal hemorrhage in the right frontal lobe (posterior lateral), and evidence of diffuse axonal injury.

The patient was hospitalized - no neurosurgical intervention was required. She was discharged from inpatient rehabilitation 21 Apr 2015 and has been living in her parents' home since that time. She has been participating in outpatient occupational therapy (now discharged) and speech language pathology.

She has few lingering complaints - she states that her mother has commented to her that she has a reduced "ability to filter" - referring to her tendency to be less inhibited in telling people what she thinks when she is annoyed. An example was provided where she told some people who were being noisy in her church foyer to "shut up." She also notices that her memory for events in weeks both preceding and after the accident is poor due to the fact that people remind her of things that she did during those weeks and she cannot recall them. She does not note any other significant difficulties in her functioning when contrasted to her pre-injury functioning. Her mother notes that over the summer Name's activities and demands on her time have been minimal and in that context she appears to be functioning well overall.

On the Neurobehavioral Symptom Inventory (a screen for neurologically related symptoms present in the previous two weeks), she reports:

* Severe difficulties in no areas
* Moderate difficulties with concentration, memory
* Mild difficulties with light sensitivity, appetite changes, fatigue, insomnia, low mood, and frustration tolerance.

It is noted that her pattern of responses to embedded validity items is consistent with a valid response style.

The patient is independent for all basic activities of daily living (including personal hygiene and grooming, dressing, feeding, mobility, toileting) and all instrumental activities of daily living (including housework, meal preparation, taking medication, financial management, shopping, telephone and other technology use, community mobility). She recently passed an occupational therapy driving evaluation. Daily activities are primarily spending time on the computer, sleeping, reading, spending time with her siblings. She hopes to return to college but currently has no concrete plans to do so.

### Developmental History

Prenatal difficulties included preeclampsia late in the pregnancy. She was born 1 week pre-term via C-section, weighing 5 pounds. Her size tended to be around the fifth percentile during her early years. Otherwise, there are no reported atypical features associated with prenatal development, birth, or achievement of early developmental milestones. Social and behavioral history as an infant and during early childhood was within the typical range.

### Medical History

In addition to the medical history reported in presenting problem and psychological screening section, the patient has a history of near-syncopal episodes associated with orthostatic intolerance as noted in the records review. She reports that she continues to have "head rushes" characterized by blurry vision and brief head pain about once a week which she estimates is similar to her pre-injury baseline. She does not report any lasting fatigue, nausea, or cognitive difficulties associated with these episodes once acute symptoms resolve in a matter of seconds. There was no additional family or personal medical history reported relevant to the present assessment.

### Academic and Employment History

Name reports a typical progression throughout her academic history. She graduated from high school with a 3.0 GPA and has completed one semester a Southern Utah University where her grades ranged from A's to C's. She reports a lifelong tendency to find math courses more challenging but there is no history of remedial education or repeated grades. She has not been employed as yet - her injury occurred during her second semester at college.

### Social History

Name was raised by her biological parents along with 7 half siblings - she is the youngest. She reports that her sister who she shared a room with was very hostile at times - physically and emotionally. No other forms of childhood trauma or abuse are reported. She is single, not currently dating, and has no children. She was living on campus at the time of the injury but since discharge has lived with her parents and brother - she reports positive and supportive family relationships.

In terms of community participation, she is an active member of the LDS church. She states that throughout her life she has been a loner - she may socialize with friends outside her family only once or twice a month. She reports no forensic difficulties past or present.

## Presentation and Observations

*Appearance, Movement, and Behavior* – Name was appropriately groomed and dressed. She was personable and cooperative with the assessment and there were no noted abnormal motor movements or mannerisms other than intermittent motor tick in the right eye and mild psychomotor agitation (fiddling, fidgeting). Eye contact, facial expression, and posture were appropriate.

*Orientation and Autobiographical Memory* – She was alert throughout the assessment which included a clinical interview and testing, lasting a total of 4 hours split by a 10 minute break. She was oriented to time, place, situation, and person. Her autobiographical memory for both recent and remote events appeared unimpaired.

*Speech* - Verbal communication was appropriate in volume, content, and flow, and was intelligible 100% of the time. Responses were appropriate in length and level of detail.

*Thought Content and Process* – There was no apparent disturbance in thought content – no indication of hallucinations, delusions, obsessions, dissociation, or intent to harm self or others. There was no apparent disturbance in thought processes - responses appeared to be relevant to the assessment process and display appropriate levels of logical connection.

*Insight / Judgment* – Insight and judgment regarding current situation appears to be intact for the most part - there are historical notes suggesting lack of awareness of cognitive difficulties initially but this appears to have attenuated over time.

*Affect / Mood* – Mood was reported to be "indifferent" most of the time. Affect was expansive - somewhat more extreme expression of excitement, distaste etc than is typical. There were some rare instances of incongruent nervous laughter when discussing distressing aspects of her experience - overall in the upper end of the normal range.

*Validity* – She was able to attend to the material presented. Her responses during assessment appeared to be well considered. Performance on formal validity measures (CVLT-FC, RDS), as well as her overall cognitive profile, presentation, and consistency in the medical record, suggest that the current assessment is an accurate reflection of the patient’s current neurobehavioral status.

## Cognitive Functioning

Data from measures of cognitive functioning is reported in the appendix for those trained in interpretation of psychological and neuropsychological testing. Reported performance on cognitive tests is based on comparison with age based norms – adjusted for education where indicated. Some of the tasks used in this assessment are vulnerable to ceiling effects so high average to superior performance may not be captured (reported as average). The following descriptors are used throughout this report:

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| Descriptor | Percentile |  | Descriptor | Percentile |
| Extremely Low | <2.3 |  | High Average | 75.1-91.1 |
| Borderline | 2.3-8.9 |  | Superior | 91.2-97.8 |
| Low Average | 9.0-25.0 |  | Very Superior | 97.9-100 |
| Average | 25.1-75.0 |  |  |  |

### Perception and Motor Skills

See motor and sensory examinations on file in physiatry notes. She reports no difficulties with vision, hearing, smell, taste, touch or balance other than mild light sensitivity. Initial noise sensitivity has resolved. During testing, there were no apparent sensory or motor difficulties that interfered with her ability to perceive or manipulate test material.

### Attention and Concentration Ability

Performance on tasks that required her to hold and manipulate information in her mind was in the average to high average range. She did not display any difficulties with simple repetition, mental manipulation of information, difficulties sustaining attention over time, or divided attention tasks.

### Speed of Processing

The speed with which she was able to generate responses was in the average to high average range.

### Memory

Performance in immediate recall, recall after a 20 to 30 minute delay, and delayed recognition tasks - for verbal information was in the superior range for stories and in the average range for lists of words. Although her initial and delayed recall of a complex visual figure made of interconnected geometric shapes was poor (extremely low range), this most likely reflects her difficulty conceptually organizing her copy of the figure - especially when her recognition of features of the figure after a delay was solidly in the average range (see visuospatial reasoning section).

### Verbal Reasoning

Performance on verbal reasoning tasks was in the average to high average range.

### Visuospatial and Visuomotor Processing Abilities

Visuospatial processing relates to a person’s ability to understand and use visual material that cannot easily be put into words (puzzles, construction tasks, pictures, etc). Performance on tasks in this area was in the low average to average range for up to moderately complex information and in the borderline range for complex information.

### Executive Functioning

Executive functioning relates to a person’s ability to integrate the skills described above to effectively negotiate the demands of the environment. It includes tasks such as deciding what is relevant to focus attention on (and what to filter out), adaptability to unexpected changes in the environment, emotional regulation, frustration management, inhibiting socially inappropriate responses, planning, and organization.

Qualitative descriptions of occupational and social functioning suggest some isolated incidents of behavioral disinhibition. The patient tends to respond rapidly to situations and had evidence of difficulty appreciating the overall context of a situation due to being hyper-focused on details. She did display the ability to slow her responding to maintain accuracy when motivated to do so during testing - this suggests that she has a skill base that could be utilized to compensate for mild tendency toward behavioral disinhibition. Performance on objective testing for measures that load on executive functioning capacity was in the average to high average range overall – including tasks that involve mental flexibility, abstract reasoning, developing problem solving strategies, response inhibition, monitoring, and verbal fluency. In complex visual situations she had some difficulties with planning and organizing her response as previously noted. She is unlikely to encounter situations where this will impact her functioning in day to day tasks and so the functional relevance of this finding is likely minimal.

## Psychological Screening

*Note: This evaluation focuses on evaluating cognitive functioning and collating information relevant to behavioral rehabilitation for neurologic conditions the patient presents with. The brief psychological screening presented here is rehabilitation focused, and should not be considered a comprehensive psychological evaluation.*

Name reports that her mood in recent weeks has been "indifferent." She states that her level of contentment with life has definitely reduced but not in an extreme way - she is frustrated that she was in an accident that led to her life activities being put on hold.

She has no previous treatment for psychological disorders. She reports a period of four years of untreated depression from age 10years. She does not note any clear precipitants for this and did not reveal her emotional struggles to adults or physicians at the time. She is not sure why things resolved other than increases in her level of social involvement during her high school years.

She tends to go to bed about 0300 and takes 30-50 min to fall asleep which is typical for her. She tends to get out of bed around 1300 to 1500. She does not report middle latency difficulties.

There is no reported history of any plan or intent to harm herself or others. There is no history of alcohol or drug related difficulties.

She completed the Symptom Checklist-90-R (a screening measure for a wide variety of psychological symptoms). Clinically relevant elevations (>95th percentile) were **not** noted on any of the clinical scales - including those associated with anxiety, depression, cognitive concerns, interpersonal sensitivity, hostility, or psychosis. Individual item analysis did note moderate low interest in activities and moderate loneliness.

## Synthesis, Diagnosis, and Recommendations

### Summary:

Name Name is a 19 year old single student who presents of a neuropsychological evaluation following a moderate to severe traumatic brain injury sustained in a motor vehicle roll-over accident 13 Apr 2015. Brain scans identify a 10mm right lateral frontal lobe contusion, and diffuse axonal injury. She has a history of orthostatic intolerance prior to her injury which per medical records was relatively well managed by increased electrolyte fluid intake. She states that her difficulties in this area appear to be at baseline levels. She was otherwise in good health at the time of her injury. She is currently 17 weeks post injury and reports no noticeable residual difficulties other than her mother's report of mild behavioral disinhibition. This is in the context of very few daily demands associated with her current lifestyle.

She withdrew from her courses after her injury and returned to the family home. She is now considering options for re-engaging in academic pursuits. She currently participates in therapy with speech language pathology.

In terms of psychological functioning, the patient reports a mild reduction in mood and a phase shift in her sleep pattern (typical of her summer trend). Behaviorally, she appears to have some increased sympathetic nervous system activity - restless and tense. In general, she appears to be coping well with the impact of her injury and many of her psychological symptoms (which are currently subclinical) will likely resolve as she re-integrates into some of her previous activities.

Her performance in current cognitive testing and her educational and occupational history suggests that premorbid cognitive functioning globally was likely in the upper average to high average range overall (50th to 90th percentile rank compared to people a similar age). ***She continues to display functioning in the anticipated range in most areas of cognitive functioning*** - including attention, processing speed, memory, verbal reasoning and executive functioning. She had scores in the following areas that were not consistent with her overall pattern:

- ***Visual reasoning deficits***- scores for up to moderately complex visual reasoning tasks fluctuated around the 30th percentile rank and for high complexity visual tasks, scores were around the 5th percentile rank. While this may represent an innate tendency, it more likely represents the residual impact of her traumatic brain injury - the right frontal lobe is involved in complex visual reasoning and processing.

- ***Mild behavioral disinhibition*** - the patient has only mild difficulties in this area and her current patterns likely reflect a slight increase in some pre-injury tendencies. The right hemisphere tends to prioritize taking a global view of a situation (rather than focusing on details) and also has a role in inhibiting behavior. The patient likely has a mild difficulty in slowing down her responses to consider all the implications of her behavior before verbalizing what is on her mind. In low demand situation she does not report any difficulties in planning or organizing herself but her tested difficulty in planning and organization in complex visual tasks will possibly manifest in poor study planning and decision making if demands increase. This should be monitored for early intervention if needed.

**Causation:**

Causation is discussed above. The lingering impact of her traumatic brain injury is considered to be the dominant causal factor for cognitive anomalies in this case. There are no other plausible explanations apparent.

### Prognosis:

Her prognosis is positive in that she appears to have made a solid cognitive recovery in almost all areas of functioning. Her scores on testing today were dramatically improved when compared to her reported functioning in the weeks subsequent to her accident. Further improvements in coming months are anticipated. She is currently 17 weeks post injury and ongoing improvement tends to begin to plateau after the first six months post-injury and stabilizes in the majority of patients after a year.

One factor that will impact her ultimate outcome (that is as yet untested) relates to cognitive fatigue. Currently, her daily demands are minimal - she has no academic or occupational demands. She does not display prominent fatigue in this setting. However, fatigue is a common experience after traumatic brain injury and escalating fatigue that is not well managed can lead to cognitive and emotional decompensation in patients. Thus, her return to academic pursuits should be gradual - it would be appropriate for her to take one or two courses in coming months and then increase load the following semester depending on tolerance. This process should be supervised by her speech language pathologist or rehabilitation professional - she will likely need some support to shift her sleep phase and her ability to plan and organize assignments and study plan should be monitored initially to confirm independent mastery. Cognitive testing suggests that has the capacity to do well in future academic pursuits but untested tolerance for extended periods of demanding activity remains an untested ability that requires monitoring.

Speech language pathology can also set up a system to monitor for the frequency and functional relevance of mild behavioral disinhibition and discuss compensatory strategies that will allow her to slow her response speed to consider all the ramifications of a situation prior to verbalization.

### ICD-9 Diagnoses:

907.0 Late effects of intracranial injury without mention of skull fracture

310.1 Personality and/cognitive change due to conditions classified elsewhere

### Recommendations:

1. A feedback session has been scheduled to discuss the results of the present evaluation with the patient and any significant others she wishes to attend.
2. The results of the present evaluation are supportive of a graduated return to occupational or academic activity - ongoing intervention with speech language pathology until her status stabilizes is indicated for a smooth transition - specifics that may be added to current rehabilitation goals in the electronic record are noted above.
3. When the patient does resume academic activities, she is encouraged to make contact with the accessibility / disability office at her institution. Her graduated return may go smoothly without any need for accommodations. However, if fatigue becomes an issue, she may benefit from written summaries of lectures, extra support with academic planning and organization of study schedules, a note taker, or testing in a less distracting environment.
4. It is worth noting that many traumatic brain injury patients are more susceptible to sympathetic hyperactivation under stressful conditions. This can be associated with emotional sensitivity and reactivity to stress, and reduced cognitive efficiency in stressful circumstances. The patient has pre-existing autonomic nervous system dysregulation and it would be worthwhile monitoring the frequency of orthostatic difficulties (which is regulated by the autonomic nervous system) and implementing available interventions to reduce the frequency of cerebral hypoperfusion episodes / "head rushes." She may also benefit from mindfulness and resonant frequency breathing exercises in the rehabilitation setting for stabilization of the autonomic nervous system.

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Feel free to contact me if there are any queries regarding this report.



Dr. Docx, M.D.

## Data Sheet

Note: Interpretation of these test scores requires specialist training to avoid false and unhelpful conclusions.