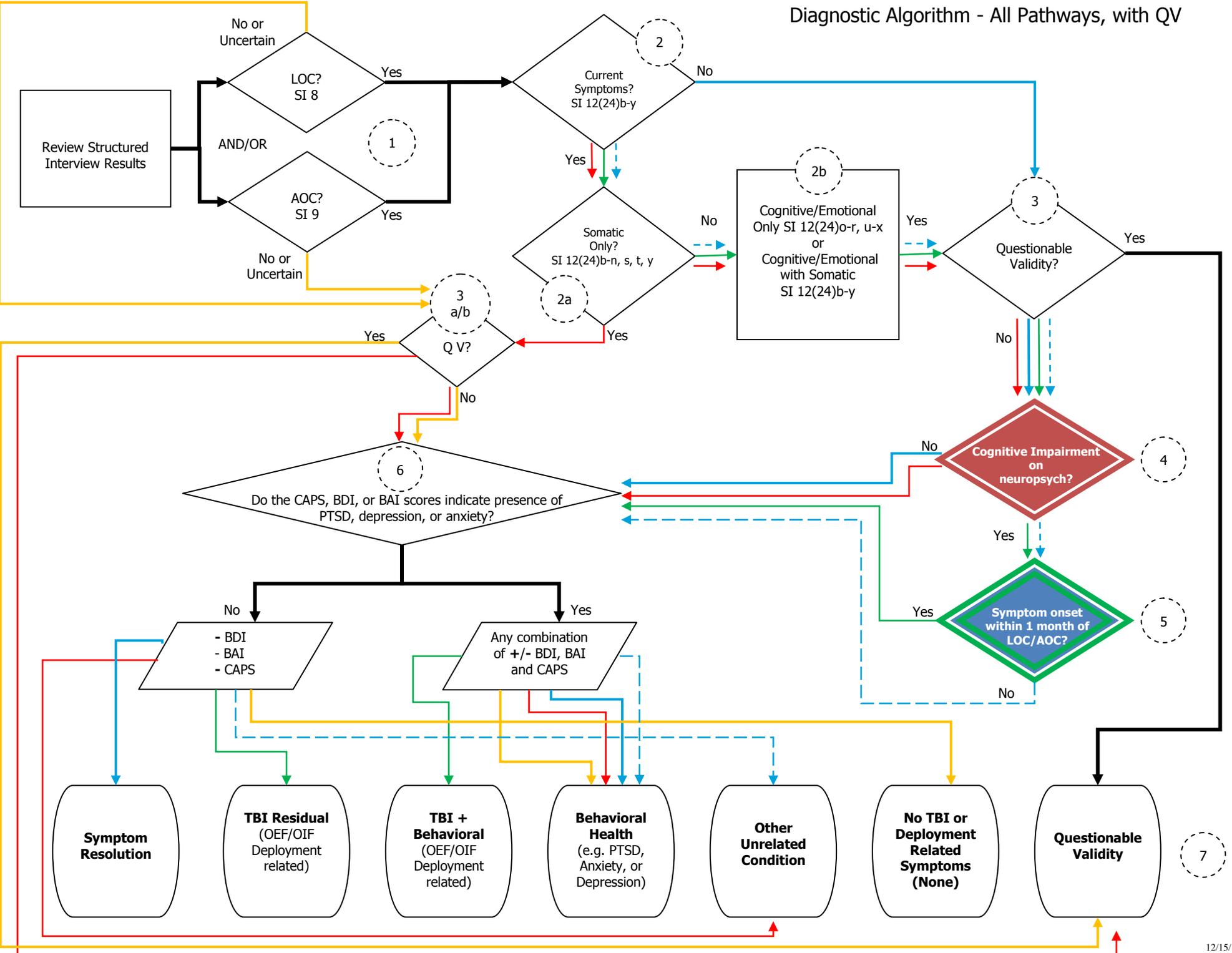


# Diagnostic Algorithm - All Pathways, with QV



## Explanation of Diagnostic Algorithm for Determining Whether a Veteran has Cognitive Impairments Resultant from Mild TBI or from some other Behavioral/Psychological Problem

*For the purposes of this study, the decision of whether a subject is experiencing cognitive impairment and whether that cognitive impairment is the result of mild traumatic brain injury (TBI), behavioral/psychological issues, or a combination of problems, will be made by a blinded neuropsychologist. The blinded neuropsychologist will make the determination according to the algorithm shown in Appendix J and following the diagnostic guidelines for determining the presence of mild TBI proposed by the American Congress of Rehabilitation Medicine (ACRM; 1993).*

1

The process begins with the neuropsychologist reviewing the Structured Interview Item 8 (loss of consciousness (LOC)) and Item 9 (alteration of consciousness (AOC)). When evaluating this aspect of the algorithm, consider the participant's awareness, memory, and general state of sensorium post-injury. As a guideline, refer to the ACRM (1993) criteria for diagnosing mild TBI presented below:

*Brain functioning is physiologically disrupted following traumatic injury as evidenced by at least one of the following criteria: (a) loss of consciousness, (b) poor memory for events immediately pre-and post-injury, (c) altered mental state immediately following injury, or (d) focal neurologic deficits that may be either persistent or transient in nature. Injury severity should not exceed: (a) loss of consciousness greater than 30 minutes, (b) Glasgow Coma Scale score of 13-15, and (c) post-traumatic amnesia greater than 24 hours (ACRM, 1993).*

If the **subject does not report experiences consistent with AOC/LOC**, proceed to item 3a/b to examine validity measures.

- If there is evidence of questionable validity, the participant is classified as *'Questionable Validity'*.
- If there is **no evidence of questionable validity**, the participant is evaluated for behavioral health issues (item 6).
- If *the CAPS, BDI, and BAI are all negative*, the participant is categorized as *'No TBI or deployment related symptoms'*.
- If **any** of the results for CAPS, BDI, or BAI are **positive**, the participant is categorized as *'Behavioral Health'*.

*If the subject **does** report experiences **consistent with LOC or AOC** from a blast, motor vehicle crash (MVC), fall, assault, or other mechanism of injury on the structured interview, the neuropsychologist will then consider Structured Interview Symptom List, items 12b-y associated with the identified LOC/AOC event.*

2

On the Structured Interview, subjects may report somatic symptoms only, cognitive symptoms only, both cognitive and somatic symptoms, or none. It should be noted that the Structured Interview also lists symptoms that could be categorized as emotional/affective symptoms. For purposes of this study, those symptoms will be categorized together with cognitive symptoms. Additionally, it should be stressed that **ONLY** those post-concussive symptoms enumerated in Item 12b-y on the Structured Interview should be counted. These post-concussive symptoms should be associated with the same LOC/AOC event identified in step 1.

- If the subject reports **no current symptoms** on the Structured Interview and does not have questionable validity, the participant falls in the 'Symptom Resolution' category. For example, the participant may have experienced symptoms following the injury; however, if he/she is not **currently** experiencing any symptoms, this item is scored as *'Symptom Resolution'*.

2a

- If the subject reports **somatic symptoms only** (Structured Interview 12b-m, s ,t, y), they are **evaluated for behavioral/psychological problems** using the **CAPS**, **BDI**, and **BAI** (unless there is questionable validity). Proceed to item 6.
- *If the CAPS, BDI, and BAI are **all negative**, the participant is categorized as 'Other Unrelated Condition'.*
- *If **any** of the results for CAPS, BDI, or BAI are **positive**, the participant is categorized as 'Behavioral Health'.*

2b

- If the subject reports **cognitive symptoms or cognitive and somatic symptoms** on the Structured Interview, results of the **neuropsychological evaluation** should be reviewed. Proceed to item 3.

Review of the neuropsychological evaluation begins with ***examination of the validity measures***: Letter Memory Test (**LMT**) and the validity scales of the Minnesota Multiphasic Personality Test - Restructured Form (**MMPI-2-RF**). For the purposes of this study, questionable validity is defined as:

**LMT:** Total score  $\leq$  92%

**MMPI-2-RF:**

**F:** T score  $\geq$  107

**F(p):** T score  $\geq$  85

**TRIN:** T score  $\geq$  80

**VRIN:** T score  $\geq$  80

Recommended cut scores for the MMPI-2-RF are based on scores suggested by Arbisi et al. (2006) following a study examining the detection of malingering PTSD in a sample of compensation seeking veterans.

If there is **evidence of questionable validity on either the LMT or the MMPI 2 RF**, the participant is classified as *'Questionable Validity'*. (Clinically, the subject may still be having mental health issues and should receive mental health assessment and services. However, **the participant cannot be categorized as disordered** if the subject is not being forthright concerning symptoms).

For subjects who do not have questionable validity, the neuropsychologist will examine the **neuropsychological profile** to determine if there is **evidence of cognitive impairment**.

For the purposes of the study, neuropsychological impairment will be broadly defined as scores in any domain\* being more than one-to-one-and-a-half standard deviations below the level **expected** given the subject's age and education level. (\*Scores on measures of motor ability are **not** to be counted in this decision.) In determining whether the participant is experiencing neuropsychological impairment in any domain, the clinical judgment of the neuropsychologist must take precedence.

For example, 2<sup>nd</sup> percentile performance on a measure of sentence repetition from a participant who performed well within normal limits on all other tests is unlikely to represent cognitive impairment. However, 2<sup>nd</sup> percentile performance on a measure of executive functioning (e.g. Stroop Task) from a participant who performed well within normal limits on all other tests is more likely to be clinically significant.

The key question here is: **In your own clinical judgment, does the pattern of scores constitute impairment?**

- If the subject shows **no cognitive impairments**, the subject is then **evaluated for behavioral/psychological problems**. Proceed to item 6.
- *If the CAPS, BDI, and BAI are **all negative**, the participant is classified as 'No TBI or Deployment Related Symptoms'*
- *If **any** of the results for CAPS, BDI, or BAI are **positive**, the participant is classified as 'Behavioral Health (e.g. PTSD, Anxiety, or Depression)'*.

5

If the neuropsychological profile indicates **cognitive impairment**, the neuropsychologist will then check the structured interview results to determine if the onset of symptoms (cognitive complaints) was within one month of AOC/LOC (due to blast, MVC, fall, assault, etc.).

- If the **onset of symptoms occurred more than one month after AOC/LOC**, the symptoms *cannot be attributed to mild TBI* (for purposes of the study) and the subject is evaluated for behavioral/psychological problems. Proceed to item 6.
- If the *CAPS, BDI, and BAI are all negative*, the participant is categorized as 'Other Unrelated Condition'.
- If **any** of the results for *CAPS, BDI, or BAI are positive*, the participant is categorized as 'Behavioral Health (e.g. PTSD, Anxiety, or Depression)'.
- If the onset of cognitive symptoms was **noticed within a month of AOC/LOC** (symptoms should have onset with injury) and the neuropsychological profile shows evidence of **cognitive impairment**, the subject is evaluated for behavioral/psychological problems. Proceed to item 6.

*Symptoms presenting within one month of exposure should generally be congruent with symptoms currently reported. However, given that the symptom picture may change somewhat over time, symptoms may be evaluated in terms of the **category** to which they belong as opposed to requiring an identical symptom count.*

*Example: If a participant reported experiencing some constellation of cognitive (e.g., poor concentration, forgetfulness) and somatic (e.g., headaches, feeling dizzy) symptoms within one month of exposure, the participant should currently report some constellation of cognitive (e.g., slowed thinking, difficulty making decisions) and somatic symptoms (e.g., vision problems, sensitivity to noise) -- even if they are not identical symptoms.*

6

Next, **examine behavioral health measures** (for all participants except than those with questionable validity). If CAPS criteria are met, the participant is classified as having PTSD. For the purposes of this study, the following cut-off scores will be used to classify a participant as depressed or anxious:

**BDI:** Total score  $\geq 17$

**BAI:** Total score  $\geq 8$

- If the subject has a *history of mild TBI, cognitive impairment* consistent with mTBI **and** *behavioral/psychological* problems, the participant is categorized as 'TBI + Behavioral Health (OEF/OIF Deployment related)'.
- If the **CAPS, BDI, and BAI** are all negative, the participant is categorized as 'TBI Residual (OEF/OIF Deployment related)'.

7

The final step is to classify each participant into one of the following 7 categories, based on their history of AOC/LOC, current symptom report, validity profile, neuropsychological test performance and symptom onset, and behavioral health symptoms.

