Clinical Decision Support (CDS) Content and Health Level 7 (HL7)-Compliant Knowledge Artifacts (KNARTs)

Neurology: Traumatic Brain Injury (TBI) Clinical Content White Paper

Department of Veterans Affairs (VA)

Knowledge Based Systems (KBS)
Office of Informatics and Information Governance (OIIG)
Clinical Decision Support (CDS)
Clinical Decision Support (CDS) Content and Health Level 7 (HL7)-Compliant Knowledge Artifacts (KNARTs): Neurology: Traumatic Brain Injury (TBI) Clinical Content White Paper

by Department of Veterans Affairs (VA), , , and

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**Table 1. Relevant KNART Information: Neurology: Traumatic Brain Injury (TBI)**

<table>
<thead>
<tr>
<th>Neurology KNART</th>
<th>Associated CLIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traumatic Brain Injury (TBI) Screening - Event Condition Action (ECA) Rule</td>
<td>CLIN0003AA</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Screening - Documentation Template</td>
<td>CLIN0005AB</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Screening - Documentation Template/Consult Request</td>
<td>CLIN0005AB</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Polytrauma Interdisciplinary Rehabilitation Clinic - Order Set</td>
<td>CLIN0004AA</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Polytrauma Concussion - Order Set</td>
<td>CLIN0004AA</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Rehabilitation Medicine Spasticity Clinic - Order Set</td>
<td>CLIN0004AA</td>
</tr>
<tr>
<td>Traumatic Brain Injury (TBI) Screening - Composite/Consult Request</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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### A Subject Matter Expert (SME) Panel

#### Table 2. VA Subject Matter Expert (SME) Panel

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Project Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joel Scholten, MD</td>
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<td>SME</td>
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<td>SME, Secondary</td>
</tr>
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<td>SME</td>
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<td>Sarah Maulden, MD</td>
<td>Assistant Professor of Neurology 550 Foothill Dr, Ste 400 SLC, UT 84113</td>
<td>SME</td>
</tr>
<tr>
<td>Lisa Perla</td>
<td>Rehabilitation Planning Specialist, 31 Hopkins Plaza, Room 1250 Baltimore, MD 21201</td>
<td>SME</td>
</tr>
</tbody>
</table>
Introduction

The VA is committed to improving the ability of clinicians to provide care for patients while increasing quality, safety, and efficiency. Recognizing the importance of standardizing clinical knowledge in support of this goal, VA is implementing the Health Level 7 (HL7) Knowledge Artifact Specification for a wide range of VA clinical use cases. Knowledge Artifacts, referred to as (KNARTs), enable the structuring and encoding of clinical knowledge so the knowledge can be integrated with electronic health records to enable clinical decision support.

The purpose of this Clinical Content White Paper (CCWP) is to capture the clinical context and intent of KNART use cases in sufficient detail to provide the KNART authoring team with the clinical source material to construct the corresponding knowledge artifacts using the HL7 Knowledge Artifact Specification. This paper has been developed using material from a variety of sources: VA artifacts, clinical practice guidelines, evidence in the body of medical literature, and clinical expertise. After reviewing these sources, the material has been synthesized and harmonized under the guidance of VA subject matter experts to reflect clinical intent for this use case.

 Unless otherwise noted, items within this white paper (e.g., documentation template fields, orderable items, etc.) are chosen to reflect the clinical intent at the time of creation. To provide an exhaustive list of all possible items and their variations is beyond the scope of this work.
Conventions Used

Conventions used within the knowledge artifact descriptions include:

<obtain>: Indicates a prompt to obtain the information listed

• If possible, the requested information should be obtained from the underlying system(s). Otherwise, prompting the user for information may be required

• The technical and clinical comments associated with a section should be consulted for specific constraints on the information (e.g., time-frame, patient interview, etc.)

• Default Values: Unless otherwise noted, <obtain> indicates to obtain the most recent observation. It is recognized that this default time-frame value may be altered by future implementations

[...]: Square brackets enclose explanatory text that indicates some action on the part of the clinical user, or general guidance to the clinical or technical teams. Examples include, but are not limited to:

   [Begin ...],[End ...]: Indicates the start and end of specific areas to clearly delineate them for technical purposes.

   [Activate ...]: Initiates another knowledge artifact or knowledge artifact section.

   [Section Prompt: ...]: If this section is applicable, then the following prompt should be displayed to the user.

   [Section Selection Behavior: ...]: Indicates technical constraints or considerations for the selection of items within the section.

   [Attach: ...]: Indicates that the specified item should be attached to the documentation template if available.

   [Link: ...]: Indicates that rather than attaching an item, a link should be included in the documentation template.

   [Clinical Comment: ...]: Indicates clinical rationale or guidance.

   [Technical Note: ...]: Indicates technical considerations or notes.

   [If ...]: Indicates the beginning of a conditional section.

   [Else, ...]: Indicates the beginning of the alternative branch of a conditional section.

   [End if ...]: Indicates the end of a conditional section.

☐: Indicates items that should be selected based upon the section selection behavior.
Chapter 1. Neurology: Traumatic Brain Injury (TBI) Screening

Clinical Context

[Begin Clinical Context.]

Mild traumatic brain injury with symptomatology is a highly prevalent condition, whose incidence is especially high within the VA population, and among those returning from deployment in particular. As such, it is a significant cause of morbidity and disability. It is therefore essential that best practices for post deployment screening and treatment be standardized across the VA in accordance with evidence-based guidelines.

Clinical Context Domains

<table>
<thead>
<tr>
<th>Target User</th>
<th>Provider to include Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>Adult patients</td>
</tr>
<tr>
<td>Priority</td>
<td>Routine unless otherwise identified</td>
</tr>
<tr>
<td>Specialty</td>
<td>Primary Care</td>
</tr>
<tr>
<td>Location</td>
<td>Outpatient</td>
</tr>
</tbody>
</table>

[End Clinical Context.]

Knowledge Artifacts

[Begin Knowledge Artifacts.]

This section describes the CDS knowledge artifacts that are part of the Neurology Traumatic Brain Injury (TBI) group, and that are intended for clinical providers caring for adult patients who may require TBI screening. Target clinical users include Primary Care clinical providers. Patient cohort includes adult outpatients.

The intent of these artifacts is to ensure screening for and proper treatment of patients with persistent symptoms who sustained head trauma resulting in alteration or loss of consciousness during deployment.

Seven knowledge artifacts define this clinical use case. These are described in detail in the following sections.

- Event Condition Action (ECA) Rule - Neurology: Traumatic Brain Injury Screening KNART
  - Rule logic for activation of the screening documentation template
  - Action includes activating the TBI screening documentation template
- Documentation Template - Neurology: Traumatic Brain Injury Screening KNART
  - Documents information provided by the clinician screening the patient for TBI
  - Includes logic for appropriate display of documentation sections
- Composite/Consult Request - Neurology: Traumatic Brain Injury Screening KNART
  - High-level, encompassing artifact which uses the Documentation Template, the Documentation Template/Consult Request and the 3 Order Set KNARTs in the Neurology Traumatic Brain Injury (TBI) group.
- Documentation Template/Consult Request - Neurology: Traumatic Brain Injury Screening KNART
Neurology: Traumatic Brain Injury (TBI) Screening

- Documents the information provided by the referring provider, in conjunction with information provided in the standalone documentation template
- Includes logic for appropriate display of documentation sections
- Order Sets - Neurology: Traumatic Brain Injury - Polytrauma Interdisciplinary Rehabilitation Clinic, Concussion, and Rehabilitation Medicine Spasticity KNARTs
  - Orderable items associated with related consult requests
  - Include logic for appropriate display of the order sets

[End Knowledge Artifacts.]
Chapter 2. Composite: Traumatic Brain Injury Screening

Knowledge Narrative

[See Clinical Context in Chapter 1.]

Consult Request

[Technical Note: The following list provides the basic components of the consult request. This is the high-level, encompassing artifact, and must be combined with the documentation templates and order sets to form a fully functional knowledge artifact. The information for the consult request can be obtained as part of the composite or within the corresponding order set component in the consult section. If obtained within the composite, this information should pre-populate the respective order set component.]

[Section Prompt: In order to initiate a Traumatic Brain Injury consult, please provide the following information.]

[Section Prompt: Reason for Consult]
  
  <obtain> Consult reason details

[Section Prompt: Goal of Consult: Please provide your recommendations and:

  □ Return to Primary Care Provider (PCP) for therapy
  □ Start treatment and return to PCP for follow up and maintenance
  □ Start treatment, monitor for effect and when on stable therapy return to PCP
  □ Treat as long as necessary (or indefinitely)

[Section Prompt: Consult Specialty]

  <obtain> Consult Specialty
  Priority: Routine

[Section Prompt: Referring Physician Information]

  <obtain> Referring Physician Name
  <obtain> Referring Physician Contact Information

[End Consult Request.]
Chapter 3. Event Condition Action (ECA) Rule: Traumatic Brain Injury (TBI) Screening

[Begin Event Condition Action (ECA) Rule: Traumatic Brain Injury (TBI) Screening.]

Knowledge Narrative

[Begin Knowledge Narrative.]

[See Clinical Context in Chapter 1.]

[End Knowledge Narrative.]

Events

1. Any access of the patient record

Conditions

Patient meets the following criteria:

1. Adult
2. Outpatient
3. Injured with head trauma resulting in alteration or loss of consciousness during deployment.

Patients should be excluded if any of the following criteria are met:

1. A referral is in process for evaluation of mild traumatic brain injury with current symptomatology
2. A traumatic brain injury screening has been completed since the most recent deployment.

Mild Traumatic Brain Injury/Concussion

[Begin Mild Traumatic Brain Injury/Concussion.]

Conditions

Patient has history of traumatic brain injury that met any of the following criteria:

1. Injured with head trauma resulting in alteration or loss of consciousness during deployment.
2. Persistent symptoms which may include headache, dizziness/balance disorder, nausea, sleep disturbance, vision changes/ light sensitivity, tinnitus, numbness and/or tingling, memory/cognitive problems, behavioral changes

Patients should be excluded if any of the following criteria are met:

1. Meets condition criteria for Emergency Evaluation and Treatment
2. Meets condition criteria for Severe Traumatic Brain Injury
3. Meets condition criteria for Moderate Traumatic Brain Injury
Actions

1. Identify the patient as a candidate for “mild traumatic brain injury with current symptomatology” screening
2. Open Documentation Template: Traumatic Brain Injury (TBI) Screening KNART
3. Make sure guideline recommendations are available to care team.

[End Mild Traumatic Brain Injury/Concussion.]

[End Event Condition Action (ECA) Rule: Traumatic Brain Injury (TBI) Screening.]
Chapter 4. Documentation Template: Traumatic Brain Injury (TBI) Screening

[Begin Documentation Template: Traumatic Brain Injury (TBI) Screening.]

[Technical Note: Please provide for the user a link to this Glasgow Coma Scale calculator: https://www.mdcalc.com/glasgow-coma-scale-score-gcs]

[Section Prompt: This documentation template is not applicable for use with patients who: require emergency evaluation and treatment, suffer from severe traumatic brain injury, or suffer from moderate traumatic brain injury.

Requires emergency evaluation and treatment:

1. Progressively declining neurological exam
2. Pupillary asymmetry
3. Seizures
4. Repeated vomiting
5. Neurological deficit (motor or sensory)
6. Double vision
7. Worsening headache
8. Cannot recognize people or disoriented to place
9. Slurred speech
10. Unusual behavior.

Moderate traumatic brain injury:

1. Post-traumatic loss of consciousness > 30 minutes but < 24 hours
2. Alteration of consciousness/mental state related to head trauma > 24 hours
3. Posttraumatic amnesia > 1 day but < 7 days
4. Best available score in first 24 hours post traumatic brain injury for Glasgow Coma Scale 9-12
5. Abnormal structural brain imaging

Severe traumatic brain injury:

1. Post-traumatic loss of consciousness > 24 hours
2. Posttraumatic amnesia > 7 days
3. Best available score in first 24 hours post traumatic brain injury for Glasgow Coma Scale < 9

Knowledge Narrative

[Begin Knowledge Narrative.]
[See Clinical Context in Chapter 1.]

[Technical Note: This documentation template should be activated when indicated by the Traumatic Brain Injury (TBI) ECA rule (section 3.1.1).]

[End Knowledge Narrative.]

**Reason for Presentation**

[Begin Reason for Presentation.]

<obtain> Chief Complaint

[End Reason for Presentation.]

**History of Present Illness**

[Begin History of Present Illness.]

[Begin Instances of Mild Traumatic Brain Injury]

[Section Prompt: Describe each instance of mild traumatic brain injury with symptomatology in chronological order.]

<obtain> Description of Instance of Mild Traumatic Brain Injury with Symptomatology

<obtain> Date

<obtain> Loss of Consciousness?

☐ Yes

☐ No

☐ Unknown

<obtain> Alterations in Consciousness or Mental State?

☐ Yes

☐ No

☐ Unknown

<obtain> Amnesia?

☐ Yes

☐ No

☐ Unknown

<obtain number> Best Glasgow Coma Score in First 24 Hours

<obtain> Treatment (Including Any Surgery and/or Rehabilitation Therapy)
Documentation Template: Traumatic Brain Injury (TBI) Screening

<obtain> Additional Details
[Section Prompt: Additional Mild Traumatic Brain Injury Event/s?]
☐ Yes
☐ No
[Technical Note: If “yes” is selected, present another instance of the “Instances of Mild Traumatic Brain Injury” section. If “no” is selected, display next section.]
[End Instances of Mild Traumatic Brain Injury]

[Section Prompt: Persistent Symptoms.]
☐ Headache
☐ Dizziness/Balance Disorder
☐ Nausea
☐ Sleep Disturbance
☐ Vision Changes/ Light Sensitivity
☐ Tinnitus
☐ Numbness and/or Tingling
☐ Memory/Cognitive Problems
☐ Behavioral Changes
<obtain> Other Persistent Symptoms/Additional Details
[Section Prompt: Do Symptoms Impact Function?]
☐ Yes
<obtain> Details
☐ No
☐ No symptoms
[End History of Present Illness.]

Neuropsychological Testing
[Begin Neuropsychological Testing.]
[Section Prompt: Neuropsychological Testing?]
☐ Yes
<obtain> Date
<obtain> Details
☐ No
☐ Unknown
[Section Prompt: Additional Neuropsychological Testing?]

☐ Yes
☐ No

[Section Prompt: Add a new set of “Neuropsychological Testing” questions if “Yes” is selected.]

[End Neuropsychological Testing.]

Imaging and Electroencephalogram

[Begin Imaging and Electroencephalogram.]

[Technical Note: Auto Populate this section and allow updates. Include date of most recent update]

[Section Prompt: Head Computed Tomography (CT)?]

☐ Yes
  <obtain> Date
  <obtain> Head CT Interpretation

[Technical Note: Link to Full Report and Images: Head CT]

☐ No
☐ Unknown

[Section Prompt: Additional Computed Tomography (CT)?]

[Technical Note: allow multiple instances of this section]

☐ Head
☐ Neck
☐ Other
  <obtain> Date
  <obtain> Additional CT Interpretation

[Technical Note: Link to Full Report and Images: Additional CT]

[Section Prompt: Head Magnetic Resonance Imaging (MRI)?]

☐ Yes
  <obtain> Date
  <obtain> Head MRI Interpretation

[Technical Note: Link to Full Report and Images: Head MRI]

☐ No
☐ Unknown

[Section Prompt: Additional MRI?]

[Technical Note: allow multiple instances of this section]
☐ Head
☐ Neck
☐ Other

<obtain> Date
<obtain> Additional MRI Interpretation

[Technical Note: Link to Full Report and Images: Additional MRI]

[Section Prompt: Electroencephalogram?]

☐ Yes
  
  <obtain> Date
  <obtain> Electroencephalogram Interpretation

[Technical Note: Link to Full Report: Electroencephalogram]

  ☐ No
  ☐ Unknown

[Section Prompt: Additional Electroencephalogram?] 

  ☐ Yes
  ☐ No

[Section Prompt: Add a new set of “Electroencephalogram” questions if “Yes” is selected.]

[End Imaging and Electroencephalogram.]

Comorbid Conditions

[Begin Comorbid Conditions.]

  ☐ Depression
  ☐ Anxiety
  ☐ Pain
  ☐ Posttraumatic Stress Disorder (PTSD)
  ☐ Sleep Disorder
  ☐ Substance Use Disorder
  ☐ Suicidality

  <obtain> Additional Details

[End Comorbid Conditions.]

Deployment History

[Begin Deployment History.]
[Section Prompt: Did the veteran serve in Operation Iraqi Freedom (OIF) or in Operation Enduring Freedom (OEF), either on the ground, in nearby coastal waters, or in the air above, after September 11, 2001? (Consider most recent OIF/OEF deployment only.)]

☐ Yes
  ☐ Operation Iraqi Freedom
  ☐ Operation Enduring Freedom

☐ No
  <obtain> Details of deployment history

[End Deployment History.]

Psychosocial History

[Begin Psychosocial History.]

[Section Prompt: Spouse/Caregiver in the home?]

☐ Yes
  <obtain> Details

☐ No

[Section Prompt: Children in the home?]

☐ Yes
  <obtain> Details

☐ No

[Section Prompt: Homeless?]

☐ Yes
  <obtain> Details

☐ No

[Section Prompt: Other Social, Living Situation, or Support Instability?]

☐ Yes
  <obtain> Details

☐ No

[Section Prompt: Currently Employed?]

☐ Yes
  <obtain> Details

☐ No

[Section Prompt: Currently Attending School?]

☐ Yes
<obtain> Details

☐ No

[Section Prompt: Highest Level of Education Completed/Degree Attained?]

☐ High School Graduate
☐ General Equivalency Development (GED) or Equivalent
☐ Some College, No Degree
☐ Associate Degree: Occupational, Technical, or Vocational Program
☐ Associate Degree: Academic Program
☐ Bachelor's Degree (e.g., BA, AB, BS)
☐ Master's Degree (e.g., MA, MS, MEng, MEd, MSW, MBA)
☐ Professional School Degree (e.g., MD, DDS, DVM, JD)
☐ Doctoral Degree (e.g., PhD, EdD)
<obtain> Details

[Section Prompt: Caffeine Use]
<obtain> details

[Section Prompt: Alcohol Use]
<obtain> details

[Section Prompt: Tobacco Use]
<obtain> details

[Section Prompt: Other Substance Use]
<obtain> Details

[End Psychosocial History.]

**Additional Medical History**

[Begin Additional Medical History.]

[Section Prompt: Additional medical history not captured above that the screening provider feels is important:]

<obtain> Additional medical history

[End Medical History.]

**Surgical History**

[Begin Surgical History.]

[Section Prompt: Additional surgical history not captured above that the screening provider feels is important:]

<obtain> Additional surgical history


**Treatment History**

[Begin Treatment History.]

[Section Prompt: Additional treatment history not captured above that the screening provider feels is important:]

<obtain> Additional treatment history

[End Treatment History.]

**Exam**

[Begin Exam.]

[Section Prompt: Cognitive Examination (e.g., Montreal Cognitive Assessment)]

<obtain> Details

[Section Prompt: Neurological Findings?]

- □ Aphasia
- □ Pupillary Asymmetry
- □ Vision Loss
- □ Hearing Loss
- □ Extraocular Muscle Movement Abnormality
- □ Muscle Weakness
- □ Pronator Drift
- □ Spasticity
- □ Clasp-Knife Response
- □ Gross Sensory Loss
- □ Hyperreflexia
- □ Babinski Sign
- □ Impaired Balance
- □ Impaired Coordination

<obtain> Additional Neurological Findings

<obtain> Other Findings

[End Exam.]

**Plan**

[Begin Plan.]
☐ Patient Education
☐ Family Education
☐ Symptom Management
☐ Polytrauma Rehabilitation Clinic Referral
☐ Physical Therapy Referral
☐ Occupational Therapy Referral
☐ Speech-Language Pathology Referral
☐ Neurology Referral
☐ Mental Health Referral
☐ Social Work Referral
☐ Integrative Health Consult
☐ Rehabilitation Medicine Spasticity Clinic
☐ Other

<obtain> Details

[End Plan.]

[End Documentation Template: Traumatic Brain Injury (TBI) Screening.]
Chapter 5. Documentation Template/Consult Request: Traumatic Brain Injury (TBI) Screening

[Begin Documentation Template/Consult Request: Traumatic Brain Injury (TBI) Screening.]

Knowledge Narrative

[Begin Knowledge Narrative.]

[See Clinical Context in Chapter 1.]

[Technical Note: This Documentation Template/Consult Request should be completed automatically based on selections made in the TBI Screening Documentation KNART (section 4.13), and only when any of the following components of the plan are selected: Polytrauma Rehabilitation Clinic Referral, Physical Therapy Referral, Occupational Therapy Referral, Speech-Language Pathology Referral, Neurology Referral, Mental Health Referral, Social Work Referral, Integrative Health Consult.]

[Technical Note: Include Documentation Template: Traumatic Brain Injury (TBI) Screening with this Documentation Template/Consult Request.]

[End Knowledge Narrative.]

Consults and Referrals

[Begin Consults and Referrals.]

[Section Prompt: Referral Request: Polytrauma Rehabilitation Clinic.]

☐ Reason for Referral: Evaluate and Manage Rehabilitation needs for Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Referral Request: Physical Therapy.]

☐ Reason for Referral: Evaluate and Manage Mobility Issues Related to Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Referral Request: Occupational Therapy.]

☐ Reason for Referral: Evaluate and Manage Activities of Daily Living Issues Related to Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Referral Request: Speech-Language Pathology.]


☐ Priority: Routine

[Section Prompt: Referral Request: Neurology.]
Consult Request: Traumatic Brain Injury (TBI) Screening

☐ Reason for Referral: Evaluate for Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Referral Request: Mental Health.]

☐ Reason for Referral: Evaluate and Manage Mental Health Issues Related to Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Consult Request: Social Services.]

☐ Reason for Referral: Evaluate Need for Social Services Related to Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

[Section Prompt: Consult Request: Integrative Health.]

☐ Reason for Referral: Evaluate Wellness Needs Related to Mild Traumatic Brain Injury with Current Symptomatology

☐ Priority: Routine

<obtain> Referring Physician

<obtain> Referring Physician Contact Information

[End Consults and Referrals.]

[End Documentation Template/Consult Request: Traumatic Brain Injury (TBI) Screening.]
Chapter 6. Order Sets: Polytrauma Interdisciplinary Rehabilitation Clinic, Concussion, Rehabilitation Medicine Spasticity Clinic

[Begin Order Sets: Polytrauma Interdisciplinary Rehabilitation Clinic, Concussion, Rehabilitation Medicine Spasticity Clinic]

Knowledge Narrative

[Begin Knowledge Narrative.]

[See Clinical Context in Chapter 1.]

[End Knowledge Narrative.]

Consults and Referrals

[Begin Consults and Referrals.]

[Technical Note: Include Consults and Referrals for Concussion, Polytrauma Interdisciplinary Rehabilitation Clinic, and Rehabilitation Medicine Spasticity Clinic.]

[Technical Note: This section should be available for all patients.]

[Section Prompt: Consults and Referrals:]

☐ Referral to Neurology: Evaluate for mild traumatic brain injury with current symptomatology (routine)

☐ Referral Polytrauma/Physical Medicine and Rehabilitation: Evaluate and manage rehabilitation needs for mild traumatic brain injury with current symptomatology (routine)

☐ Referral Physical Therapy: Evaluate and manage mobility issues related to mild traumatic brain injury (routine)

☐ Referral Occupational Therapy: Evaluate and manage activities of daily living issues related to mild traumatic brain injury (routine)

☐ Referral Speech–Language Pathology: Evaluate and manage speech, language, and cognitive issues related to mild traumatic brain injury (routine)

☐ Referral Mental Health: Evaluate and manage mental health issues related to mild traumatic brain injury (routine)

☐ Consult Social Work/Case Management: Evaluate need for social services related to mild traumatic brain injury (routine)

☐ Consult Integrative Health: Evaluate wellness needs related to mild traumatic brain injury (routine)

☐ Referral Rehabilitation Medicine Spasticity Clinic: Evaluate for mild traumatic brain injury with current symptomatology that includes spasticity (routine)
☐ Referral Polytrauma Interdisciplinary Rehabilitation Clinic: Evaluate for mild traumatic brain injury with current symptomatology (routine)

[Section Prompt: Psychiatry referral is suggested for patient being referred to the Polytrauma Interdisciplinary Rehabilitation Clinic]

☐ Consult Psychiatry: Evaluate for psychiatric comorbidity for patients with mild traumatic brain injury with current symptomatology (routine)

[End Consults and Referrals.]

**Patient and Caregiver Education**

[Begin Patient and Caregiver Education.]

☐ Mild traumatic brain injury with symptomatology education (routine)

[Technical Note: Provide a link to relevant educational materials that may be specific to the implementing institution.]

[End Patient and Caregiver Education.]

[End Order Sets: Polytrauma Interdisciplinary Rehabilitation Clinic, Concussion, Rehabilitation Medicine Spasticity Clinic]


Appendix A. Existing VA Artifacts

The following reference is from the Portland VAMC.

Figure A.1. Rehabilitation Medicine Spasticity Clinic

**PROVIDERS NOTE:**
This injection clinic assesses the appropriateness of Botulinum Neurotoxin for LIME SPASTICITY (e.g. spastic hemiparesis) to reduce uninhibited tone in the arms and legs. Injections are given every 3 months in the Portland Rehabilitation Medicine EMG laboratory.

**CONTRAINDICATIONS:**
A) Neuromuscular disease and intolerance to neuromuscular blocking agents (consideration for scleroderma in ALS with preserved innervation)
B) May not have vaccines (including flu shot) 2 weeks before or after injections of this biologically active product
C) May not have injections if current febrile illness present

<< Order Consult >>

**NOTE:**
For other neurotoxin injections such as blepharospasm and cervical dystonia please refer to Neurology Movement Disorders.

<< Movement Disorders Clinic >>

The following reference is from the Portland VAMC.
Figure A.2. Polytrauma Concussion Traumatic Brain Injury (TBI) Eval/Education

The following reference is from the Greater Los Angeles VAMC.
Figure A.3. Reason for Request: Physical Medicine and Rehabilitation (PM&R) Traumatic Brain Injury/Polytrauma (Image 1 of 2)

The following reference is from the Greater Los Angeles VAMC.

Figure A.4. Reason for Request: Physical Medicine and Rehabilitation (PM&R) Traumatic Brain Injury/Polytrauma (Image 2 of 2)
Appendix B. Basic Laboratory Panel Definition

• Blood Urea Nitrogen
• Calcium
• Chloride
• CO2 (Carbon Dioxide, Bicarbonate)
• Creatinine
• Glucose
• Potassium
• Sodium
Appendix C. Logic Diagrams

Figure C.1. ECA Rule: Traumatic Brain Injury Screening

Access Patient Health Record

ECA Rule - TBI Screening - Conditions

Lookup Patient History & In Process Referrals

Mild TBI Evaluation: In process or TBI Screening Completed

Yes

ECA Rule - Mild Traumatic Brain Injury/Concussion - Conditions

- Injured with head trauma resulting in alteration or loss of consciousness during deployment
- Persistent symptoms which may include:
  - Headache
  - Dizziness/Balance Disorder
  - Seizures
  - Sleep Disturbance
  - Vision Changes/light Sensitivity
  - Tinnitus
  - Numbness and/or Tingling
  - Memory/Emotional Problems
  - Behavioral Changes

No

Meets criteria for either:
- Emergency Evaluation and Treatment
- Severe Traumatic Brain Injury
- Moderate Traumatic Brain Injury

Yes

No

Identify patient as a candidate for "mild traumatic brain injury with current symptomatology" screening

Open Documentation Template: Traumatic Brain Injury (TBI) Screening KNART

Make sure guideline recommendations are available to care team.
# Appendix D. Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AMEDDC&amp;S</td>
<td>Army Medical Department Center and School</td>
</tr>
<tr>
<td>CCWP</td>
<td>Clinical Content White Paper</td>
</tr>
<tr>
<td>CDS</td>
<td>Clinical Decision Support</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CT</td>
<td>Computed Tomography</td>
</tr>
<tr>
<td>ECA</td>
<td>Event Condition Action</td>
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<tr>
<td>GED</td>
<td>General Education Development</td>
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<td>HL7</td>
<td>Health Level 7</td>
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<tr>
<td>HRCoE</td>
<td>U.S. Army Health Readiness Center of Excellence</td>
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<tr>
<td>KBS</td>
<td>Knowledge Based Systems</td>
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<tr>
<td>KNART</td>
<td>Knowledge Artifact</td>
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<tr>
<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
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<tr>
<td>mTBI</td>
<td>Mild Traumatic Brain Injury</td>
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<tr>
<td>OEF</td>
<td>Operation Enduring Freedom</td>
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<tr>
<td>OIIG</td>
<td>Office of Informatics and Information Governance</td>
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<tr>
<td>OIF</td>
<td>Operation Iraqi Freedom</td>
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<tr>
<td>PCP</td>
<td>Primary Care Provider</td>
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<tr>
<td>PM&amp;R</td>
<td>Physical Medicine and Rehabilitation</td>
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<tr>
<td>PTSD</td>
<td>Posttraumatic Stress Disorder</td>
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<tr>
<td>SME</td>
<td>Subject Matter Expert</td>
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