Management of PTSD and TBI
Saturday, February 25, 2017

Dr. Joy A. Awoniyi
Clinical Pharmacist, Mental Health
Miami VA Healthcare System
Joy.awoniyi@va.gov

Disclosure Statement

I, do not have a vested interest in or affiliation with any corporate organization offering financial support or grant money for this continuing education program, or any affiliation with an organization whose philosophy could potentially bias my presentation.

Objectives for Pharmacists

Upon the completion of this CE activity, the pharmacist should be able to...
1. Outline the risk factors, symptoms, and diagnostic criteria of Post-Traumatic Stress Disorder
2. Summarize the evidence based pharmacological and non-pharmacological treatments for veterans with PTSD
3. Describe the clinical presentation and management strategies for Traumatic Brain Injury (TBI)

Objectives for Technicians

Upon the completion of this CE activity, the technician should be able to...
1. List risk factors and symptoms of PTSD and TBI
2. Identify drugs used in the treatment of PTSD and TBI
What is PTSD? (Video)

POST-TRAUMATIC STRESS DISORDER

Post-traumatic Stress Disorder

Description
- Mental health disorder developing as a result of trauma or physical harm
  - Trauma may be emotional or psychological
  - Examples of physical harm
- Stress-related reactions are common after a traumatic event
- PTSD is characterized by reactions that do not go away over time and disrupt daily life

Symptoms
- Four core clusters
  - Intrusion
  - Avoidance
  - Hyperarousal
  - Negative changes in cognition and emotions (New with DSM-5)
- Other common presenting symptoms
  - Chronic pain
  - Migraines
  - Vague Somatic complaints

Pathophysiology
- Development is thought to be due to dysregulation of the hypothalamus-pituitary-adrenal (HPA) Axis
  - Regulates stress response
  - Below normal concentrations of cortisol cause an elevated stress response
  - Less cortisol (to reduce stress) causes elevation of the negative feedback response
- Neurobiologic Model
  - Serotonin – decreased 5HT receptor concentrations
  - Norepinephrine – increase in NE concentrations
    - Downregulation of alpha-2 receptors
    - Over-activity of noradrenergic system
  - Gamma aminobutyric acid (GABA)
  - Dopamine

Neurobiologic Model of PTSD
- “Adrenaline rush” or intense arousal that saves lives in combat becomes persistent and maladaptive
- Impaired norepinephrine (NE), dopamine (DA), serotonin (5HT) neurotransmission in CNS

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Theory of dysregulation of the HPA Axis

Traumatic Event – “The Gatekeeper”
- **Actual or threatened** death, serious injury, or sexual violation
- Exposure may occur in one or more of the following ways
  - Direct Experience
  - Witnessing the event in others
  - Learning the event happened to a close family member or friend
    - If actual or threatened death: must have been violent or unintentional
  - Experiencing repeated or extreme exposure to aversive details of traumatic events
    - Does not apply to exposure through television, movies unless work related
    - Example: First responders collecting human remains

Billy Bob
Billy Bob has been bullied and pushed on the ground everyday since 4th grade because he wears clothes that don’t fit him. Sometimes he has cuts and bruises from falling on the ground. He tells his parents he doesn’t want to go to school or socialize anymore.

Pablo
Pablo was emotionally abused by the director of pharmacy during his post-graduate year 1 pharmacy practice residency training. He cried every night. Upon completion he quit the pharmacy profession all together to work at a fast food restaurant.
Betty Sue was in the army for many years. Her unit was never in combat, but over the course of 2 years, she saw several other women in her unit sexually assaulted or threatened during deployments to Afghanistan.

**Betty Sue**

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**DSM-5 CRITERIA FOR DIAGNOSIS OF PTSD**

**Exposure to a traumatic event**

<table>
<thead>
<tr>
<th>Occurrence of intrusive symptoms</th>
<th>At least one avoidance symptom</th>
<th>At least two changes in cognitions and emotions</th>
<th>At least two hyperarousal symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent dream, memory, thought, or feeling</td>
<td>Avoiding activities, thoughts, memories</td>
<td>Trouble with recall</td>
<td>Easily startled</td>
</tr>
<tr>
<td>Dissociative reactions (re-experiencing)</td>
<td>Avoiding people, places, situations</td>
<td>Negative feeling about self or others</td>
<td>Irritable or angry</td>
</tr>
</tbody>
</table>

**Symptoms must…**

- Last for at least one month
- Impair social functioning
- Not be caused by another medical condition or the use of a substance

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**PTSD Timeline**

1. **Traumatic Event**
2. **Acute Stress Reaction**
   - Symptoms persist 0-2 days after the event
3. **Acute Stress Disorder**
   - Symptoms persist 2-30 days after the event
4. **Acute PTSD**
   - Symptoms persist 1-3 months after the event
5. **Chronic PTSD**

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**PTSD Subtypes**

**Dissociative**

- Depersonalization
  - Feeling as though living a dream were a dream
  - Experience of being an outside observer

**Delayed-Onset**

- Full criteria not met until 6 months or more after the event
- Usually involve sub-syndromal symptoms that later progress
- More often seen in military samples
Epidemiology

• Lifetime risk of PTSD at age 75 is 8.7%
  o 2005 US 12 month prevalence among adults 3.5%
  o Lower estimates in Europe, most Asian, African, and Latin American countries 0.5-1.0%

• More common in veterans and others whose jobs increase risk of traumatic exposure

• Highest rates among survivors of rape, military combat and captivity, or ethnically or politically motivated internment or genocide

Our Veteran Population and PTSD

• PTSD is a growing diagnosis. From 2004 to 2008, the number of individual veterans seeking help for PTSD increased from 274,000 to 442,000.

• Comorbid psychiatric disorders are prevalent in this patient population, including substance abuse, depression and anxiety.

• Patients with PTSD are six times more likely to attempt suicide than the general population.

Risk Factors

Pre-Trauma
• Prior trauma
• Female gender
• History of adverse childhood experiences
• Prior psychiatric problems
• Low level of education
• Low socioeconomic status
• Minority Race

Peri-Trauma
• Greater severity
• Greater perceived threat
• Feelings of helplessness, unpredictability, or uncontrollability
• Greater Proximity
• Interpersonal trauma (assault)

Post-Trauma
• Low levels of social support
• Ongoing exposure
• Exposure to new trauma

Complications

• Functional Consequences
  o High levels of social, occupational and physical disability
  o Impairment of social and interpersonal functioning
  o Absenteeism from work, lower income and lower educational and occupational success

• Poor physical health
  o High levels of medical utilization
  o Substantial increase in healthcare costs

• Psychiatric comorbidities
  o 80% more likely to meet criteria for at least one other mental disorder
  o Substance Abuse
PTSD Assessments

Tools for recognizing, diagnosing, monitoring PTSD

Primary Care PTSD Screen (PC-PTSD)

- In your life, have you ever had any experience that was so frightening, horrible, or upsetting that, in the past month, you:
  - Have had nightmares about it or thought about it when you did not want to?
  - Tried hard not to think about it or went out of your way to avoid situations that reminded you of it?
  - Were constantly on guard, watchful, or easily startled?
  - Felt numb or detached from others, activities, or your surroundings?
- Each Symptom is assigned 1 point
- If patient endorses any of the above symptoms, this should be considered a positive screen

PTSD Checklist (PCL-5)

- 20 item self-reported measure of symptoms
- Can be administered by any health clinician or given to a patient in a waiting room (5-10 minutes)

  Purpose
  - Screening for PTSD
  - Monitors symptom change during and after treatment
  - Provisional PTSD Diagnosis

- Updated with DSM-5 and not compatible with previous PCL versions

PTSD Checklist (PCL-5)

- Provisional Diagnosis
  - Made if patient endorses symptoms based on scores in symptom clusters
  - Also made with a summative score of 33 or higher
    - May use a lower score if screening
    - May use a higher score if diagnosing

- Measuring change to monitor your patient’s progress with PTSD treatment
  - Evidence suggests that 5-10 point change represents statistically significant change
  - A 10-20 point change represents a clinically significant change
  - Use 5 points as a minimum threshold for determining whether an individual has responded to treatment
  - Use 10 points as a minimum threshold for improvement is clinically meaningful
PCL-5 Assessment Case

JD is a 33 yo AA female who was referred to the Clinical Pharmacist for depression management. She was started on escitalopram and referred to the pharmacist for follow-up evaluation, medication titration and management. During her initial assessments, JD reported that during around her deployment to Iraq in February 2004 she had a series of traumatic events that included exposure to mortars and IED.

The pharmacist administered the PCL assessment.

Report how often you’ve been bothered by the problems mentioned. Base your answers on the problems that started or got worse after the event.

0 = not at all
1 = a little bit
2 = moderately
3 = quite a bit
4 = Extremely

<table>
<thead>
<tr>
<th>Cluster B: Intrusion Criteria B: At least 1 symptom for diagnosis</th>
<th>Score Max: 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Repeated, disturbing, and unwanted memories of the experience?</td>
<td>4</td>
</tr>
<tr>
<td>2. Repeated, disturbing dreams of the experience?</td>
<td>3</td>
</tr>
<tr>
<td>3. Suddenly feeling or acting as if the experience were actually happening again (as if you were actually back there reliving it)?</td>
<td>1</td>
</tr>
<tr>
<td>4. Feeling very upset when something reminded you of the experience?</td>
<td>3</td>
</tr>
<tr>
<td>5. Having strong physical reactions when something reminded you of the experience (for example, heart pounding, trouble breathing, sweating)?</td>
<td>0</td>
</tr>
<tr>
<td>Cluster B Total:</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cluster C: Avoidance Criteria C: At least 1 symptom for diagnosis</th>
<th>Score Max: 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Avoiding memories, thoughts, or feelings related to the experience?</td>
<td>0</td>
</tr>
<tr>
<td>7. Avoiding external reminders of the experience (for example, people, places, conversations, activities, objects, or situations)?</td>
<td>0</td>
</tr>
<tr>
<td>Cluster C Total:</td>
<td>0</td>
</tr>
</tbody>
</table>

In the past month how often have you been bothered by...

Cluster D: Changes in cognition or emotions

Criteria D: At least 2 score of 3 for diagnosis

<table>
<thead>
<tr>
<th>Question</th>
<th>Score Max:</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Trouble remembering important parts of the experience (for some reason besides a head injury or alcohol or drug use)?</td>
<td>2</td>
</tr>
<tr>
<td>9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?</td>
<td>0</td>
</tr>
<tr>
<td>10. Blaming yourself or someone else (who didn’t directly cause the event or actually harm you) for the experience or what happened after it?</td>
<td>0</td>
</tr>
<tr>
<td>11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?</td>
<td>0</td>
</tr>
<tr>
<td>12. Loss of interest in activities that you used to enjoy?</td>
<td>1</td>
</tr>
<tr>
<td>13. Feeling distant or cut off from other people?</td>
<td>3</td>
</tr>
<tr>
<td>14. Having trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?</td>
<td>3</td>
</tr>
<tr>
<td>Cluster D Total:</td>
<td>7</td>
</tr>
</tbody>
</table>

Based on JD’s Assessment, which statement is NOT correct?

A. A provisional diagnosis of PTSD can be made
B. More information will need to be obtained to diagnose JD with PTSD
C. The pharmacist should not have performed the PCL
D. JD should be counseled about her sleep
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**PCL Assessment Case Continued**

JD refused referral to a specialist for PTSD evaluation and treatment.

What additional question(s) must we ask if JD meets DSM-V Criteria for PTSD?

A. Have you used any drugs or alcohol within the past month?
B. Do your symptoms make it difficult for you to get along with others or take care of things at home?
C. Do you have any other medical problems?
D. All of the above.

When should the pharmacist follow-up to see if there has been a change in symptoms?

A. 7 days
B. 14 days
C. 30 days
D. 90 days

What PCL score would indicate the patient is responding to the treatment?

34-5 = 29 or less

What PCL score would indicate that the improvement in symptoms is clinically meaningful?

34-10 = 24 or less

**Clinician Administered PTSD Scale (CAPS-5)**

- Gold Standard for diagnosis
- Clinician-administered 30 item questionnaire often used in studies (35-45 minutes)
- Considers frequency and intensity of DSM-5 specified symptoms
- Includes a Life event checklist (LEC) to assess if patient meets Criteria A
- Assesses dissociative symptoms
- Available in 3 versions
  - Past week – Monitors change in symptoms over time
  - Past month – For diagnosing current PTSD
  - Past month/Worst Month – any month in patient’s lifetime

**Maintaining Validity of Standardized Assessments**

- Potential issues
  - Under-reporting
  - Over-reporting
  - Current mental status (intoxication, dementia)
- Assess and minimize threats to validity
  - Consider Veterans own view of their mental health and the assessment
  - Ask for clarification; examples if necessary
  - Read through other chart notes and diagnosis
  - Consider benefits and risks for low and high scores
  - Building rapport

**Medical Assessment**

- Obtain full medical history, including injuries or past psychological history
- Medication list
  - OTC medications
  - Herbals
- Assess substance use or co-occurring disorders
- Physical Exam, laboratory tests
- Mental Status Examination
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Functional Assessments

- Housing
- Legal
- Community involvement
- Financial
- Recreation
- School
- Work
- Marital/Family relationship

Determine Optimal Setting for Management

- Educate patient and family
  - Nature of symptoms
  - Coping mechanisms
  - Build motivation to participate or persist in treatment
- Integrated treatment to coordinate continued care for chronic co-occurring disorders
  - Primary Care Provider
  - Patient and Family
  - Behavioral Healthcare

Evidence-based Treatments for PTSD

VA/DoD 2010 PTSD Clinical Practice Guidelines

VA/DoD 2010 Guidelines Management Overview

- First-line treatment options
  - Pharmacotherapy
  - Psychotherapy
- Adjunctive treatments
- Somatic and Alternative interventions
  - Complimentary Alternative Medicine (CAM) consistent with patient belief systems
  - Acupuncture
- Symptom-specific management interventions
  - Insomnia
  - Chronic Pain
  - Substance Use/Dependence
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**“Stepped Care Treatment of PTSD”**

1. **Initial Reassessment at 1-4 weeks**
   - Psychotherapy or medication: SSRI, SNRI

2. **Step 1: 4-6 week Assessment**
   - Assess and address non-adherence
   - Switch to another SSRI, SNRI and/or psychotherapy

3. **Step 2: 8-12 week Assessment**
   - Add psychotherapy and/or switch to mirtazapine

4. **Step 3: Reassessment at >12 weeks**
   - Switch to alternative step II or phenelzine, TCA
   - Add psychotherapy

**At any time**
- Add prazosin for sleep/nightmares
- Consider referral to specialty care

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**Pharmacotherapy**

*Pharmacotherapy should be considered as one aspect of a broader management plan for PTSD. SSRIs and the SNRI venlafaxine should be used as first line psychotropics*

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**1st Line Antidepressants**

- The SSRIs paroxetine, sertraline, and fluoxetine have the largest collection of evidence showing their efficacy in this population.1

- Evidence supports SNRI venlafaxine. Remission rates at 24 weeks were reported to be 51% versus 38% for placebo (p=0.01, NNT = 8).2

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**Other Antidepressants**

- Clinical trials have shown promising results for mirtazapine, amitriptyline, imipramine, phenelzine, duloxetine, and nefazodone
  - Limited by small sample sizes and open label design or medication safety/side effect profiles
  - These antidepressants should be reserved for patients who have failed SSRI or SNRI monotherapy
- Monitoring for side effects and drug interactions is important
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**ANTIDEPRESSANT BLACK BOX WARNING**

May increase the risk of suicidality in young adults 18-24 years old in the first 1-2 months of treatment

Short-term studies did not show an increase in risk of suicidality with antidepressants beyond age 24

There was a reduction in risk with antidepressants compared to placebo in adults age 65 and older

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**Comparisons of Antidepressants used PTSD**

**Prazosin**

Prazosin is a reasonable option for treatment of trauma nightmares in Veterans with PTSD.

- Approximately 70% of patients with PTSD suffer from disrupted sleep patterns including nightmares and frequent awakenings.
- A generic lipid-soluble 1-alpha adrenergic antagonist introduced in 1973 as "Minipress" for treatment of hypertension
- Prazosin doses average 9-13 mg nightly in most studies
  - Titration to 20 mg or more in some vets for bedtime dosing
  - BID dosing currently being studied for daytime hyperarousal symptoms
Off-label use of Prazosin

- PTSD Indications
  - PTSD-related nightmares and sleep disruption. B Level Recommendation (Fair Evidence)
  - For global symptoms. C Level Recommendation (Fair evidence but no general recommendation)
- Other Indications
  - Hypertension (FDA Approved)
  - Raynaud Phenomenon

- Dosing:
  - Start at 1mg PO qHS
  - Maintenance 2-15 mg per day – any dose increases should be given at bedtime
  - If therapy interrupted for 3 days, restart titration
- Pregnancy Category C
- Side Effects
  - Dizziness
  - Orthostatic Hypotension, syncope

PTSD Indications

- Recurrent Distressing Dreams ("Nightmares")

- Two Prazosin RCTs in Vietnam Veterans with PTSD: CAPS Recurrent Distressing Dreams ("Nightmares")

Chart Review: Prazosin vs Quetiapine


- 237 veterans (mean age 54) prescribed prazosin (n=62) or quetiapine (n=175) for PTSD nighttime symptoms
- Short-term effectiveness: Did % improved within 6 months differ between drugs?
- Long-term effectiveness: Did % treatment continued until October 2008 endpoint differ between drugs? (3 to 6 years of medication continuity)

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Prazosin</td>
<td>1.4 mg</td>
<td>3.2 mg</td>
<td>6.3 mg</td>
</tr>
<tr>
<td>Quetiapine</td>
<td>41 mg</td>
<td>101 mg</td>
<td>135 mg</td>
</tr>
</tbody>
</table>

Chart Review: Prazosin vs Quetiapine

Effectiveness Reason for discontinuation ADR leading to discontinuation

- Similar short-term (6mo) effectiveness
  - Vets were significantly more likely to continue prazosin therapy long-term

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Benzodiazepines

The routine use of benzodiazepines is not recommended in patients with PTSD and discontinuation should be considered.

- Risks outweigh benefits for chronic use in PTSD
- There is no evidence that benzodiazepines reduce the core symptoms of PTSD or work for PTSD-related sleep dysfunction
- Withdrawal of benzodiazepines is difficult in this population and can result in increased anxiety, sleep disturbances, rage, hyper-alertness, increased nightmares and intrusive thoughts
  - Withdrawal has been documented after as little as 5 weeks of therapy

Antipsychotics

There is limited evidence for the use of atypical antipsychotics in PTSD and they cannot be recommended at this time.

Risperidone vs. Placebo in Veterans with Chronic Post-Traumatic Stress Disorder

No difference was found at 6 months between adjunctive risperidone (n=133) and placebo (n= 134)

Other Medications

<table>
<thead>
<tr>
<th>Agent/Class</th>
<th>Recommendation Details</th>
<th>Strength Rating</th>
</tr>
</thead>
</table>
| Benzodiazepines | • There is evidence to suggest against the use of benzodiazepines  
• Strongly recommend against the use for prevention of acute stress disorder or the treatment of PTSD | D |
| Antipsychotics | • The evidence does not support the use of atypical antipsychotics as monotherapy for PTSD  
• Recommend against the use of Risperidone as an adjunctive medication  
• There is insufficient evidence to recommend for or against typical antipsychotics for adjunct or monotherapy for PTSD | I, D for risperidone |
| Anticonvulsants | • The evidence does not support the use of anticonvulsants as monotherapy for PTSD | D, I |
| Bupropion, Trazodone | There is insufficient evidence to recommend the use of these medications as monotherapy in PTSD  
Trazodone may be useful as adjunctive therapy in PTSD | I |

D = Ineffective or Harmful; I = Insufficient Evidence/Unknown benefit

Non-Pharmacologic Therapies

Veterans diagnosed with PTSD should be offered trauma-focused psychotherapeutic interventions

Evidence-based Psychotherapies

• Should be considered 1st line for treatment of PTSD  
  o Best for patients who are willing to address his or her PTSD symptoms and participate in therapy  
• Are effective for complex patients  
  o Co-morbid personality disorders, SUD, TBI, etc.  
• Effects are long lasting  
  o Significant decrease in PTSD symptoms lasting up to 5 years after treatment

Psychotherapy Interventions for the Treatment of PTSD

<table>
<thead>
<tr>
<th>Classification</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive-based</td>
<td>Emphasize cognitive restructuring; relaxation techniques; discussion/narration of the traumatic event</td>
</tr>
<tr>
<td>Exposure-based</td>
<td>Psychoeducation; imaginal or narrative exposure; in-vivo exposure; processing of thoughts and emotion</td>
</tr>
<tr>
<td>Stress Inoculation</td>
<td>Coping/anxiety management skills (deep muscle relaxation, breathing control, assertiveness, thought stopping, positive thinking, self-talk); in-vivo exposure</td>
</tr>
<tr>
<td>Eye Movement Desensitization and Reprocessing (EMDR)</td>
<td>Access disturbing image with associated body sensation; relaxation/self-monitoring techniques, alternating eye movements</td>
</tr>
</tbody>
</table>
Cognitive Processing Therapy (CPT)

- Goal: Improve mood and behaviors by modifying irrational or dysfunctional thoughts, beliefs and expectations
- Treatment course
  - 12 sessions, 1-2 sessions/week
  - 50-120 minutes/session
  - Homework between sessions
  - Can be performed in individual or group formats
- Most effective for Veterans who are willing to address their PTSD symptoms and participate in therapy


A Comparison of OEF/OIF and Vietnam Veterans Receiving Cognitive Processing Therapy

Only 41% of the OEF/OIF and 60% of the Vietnam veterans met post-treatment diagnostic criteria for PTSD. OEF = operation enduring freedom, OIF = operation Iraqi freedom

Cognitive Processing Therapy (Video)

Prolonged Exposure (PE)

- Goal: Reduce distress, fear and arousal through repeated exposure to trauma-related thoughts, feelings and situations
- Treatment course
  - 8-15 sessions, 1-2 sessions/week
  - 90 minutes/session
  - Homework between sessions
- Patients may temporarily experience an increase in their level of distress, however, there is no data indicating an increase in hospitalizations secondary to trauma-focused psychotherapy
**General Education**

- Information provided should
  - Normalize common reactions to trauma
  - Enhance self-care
  - Improve coping
  - Facilitate recognition of significant problems
  - Inform regarding access to service

- Methods of Education delivery
  - Public Media
  - Community education activities
  - Written materials

**Antidepressant patient counseling**

**SIDE EFFECTS**
- Side effects usually occur before symptoms improve but usually go away
- Serotonin syndrome is rare but serious. Know the signs and report to the ER immediately

**BEHAVIOR CHANGES**
- Report any worsening of mood, suicidal ideation, or unusual changes in behavior

**BLEEDING RISK**
- Avoid aspirin or NSAIDs unless prescribed due to increased risk of bleeding
- Report signs of new or unusual bleeding

**ADHERENCE**

- Improvement of symptoms may not occur for 2-6 weeks of taking medication consistently
- Do not stop taking medications abruptly. May cause discontinuation syndrome

**Patient Counseling**

Important education for patients treated for PTSD
Serotonin Syndrome

**Signs and Symptoms**

- Marked by three groups of symptoms
  - Mental status changes
    - Agitation, anxiety, confusion, restlessness, excitement
  - Neuromuscular hyperactivity
    - Tremors, muscle twitches or spasms
  - Autonomic hyperactivity
    - High blood pressure, sweating, flushing, vomiting, diarrhea
- Usually occurs with drug combinations

**Other medications that increase serotonin**

- Antibiotic
  - Linezolid (Zyvox®)
- Other Rx antidepressants
- Pain Medications
  - Tramadol (Ultram®)
  - Sumatriptan (Imitrex®)
- OTC medications
  - Dextromethorphan (in Tylenol® DM® and Mucinex DM®)
  - Ginseng
  - St. John’s Wort

Epidemiology

- Every year...
  - 1.7 million people sustain TBI in the United States
  - 2.2 million ER visits
  - 50,000 deaths due to TBI
- Since 2000 over 294,000 service members have sustained a TBI
- Co-occurrence of PTSD and mild TBI is 48%

Traumatic Brain Injury Background

Definitions, Symptoms, and Diagnosis

For More Information...
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**Traumatic Brain Injury**
- A traumatically induced structural injury and/or physiological disruption of brain function as a result of an external force
- Indicated by at least one clinical sign immediately following the event
  - Post-traumatic Amnesia
  - Alteration of mental state at the time of injury
  - Neurological deficits
  - Intracranial lesion
- Classified as mild, moderate or severe - over 80% of diagnosed TBIs are mild

**External Forces**
- The head being struck by an object
- The head striking an object
- Acceleration/deceleration of brain movement without direct trauma to the head
- Penetration of the brain by a foreign body
- Forces generated from blasts, explosions, etc.

**Diagnosis**
- Clinical and relies predominately on patient history
- Evidence does not support the use of any lab, imaging or physiological tests to establish a definitive diagnosis
- Evaluate individuals who present with symptoms or complaints potentially related to the injury
- Preferred communication of the diagnosis is “history of TBI” or “concussion”

**Screening**

**Traumatic Brain Injury-4 (TBI-4)**
- Have you ever been hospitalized or treated in an emergency room following a head or neck injury?
- Have you ever been knocked out or unconscious following an accident or injury?
- Have you ever injured your head or neck in a car accident or from some other moving vehicle accident?
- Have you ever injured your head or neck in a fight or fall?

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Post-mTBI related Symptoms

<table>
<thead>
<tr>
<th>Physical</th>
<th>Cognitive</th>
<th>Behavioral/Emotional</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Headache</td>
<td>☐ Inability to concentrate</td>
<td>☐ Depression</td>
</tr>
<tr>
<td>☐ Fatigue</td>
<td>☐ Memory problems</td>
<td>☐ Anxiety</td>
</tr>
<tr>
<td>☐ Balance disorders</td>
<td>☐ Slowing of Processing</td>
<td>☐ Agitation/Irritability</td>
</tr>
<tr>
<td>☐ Seizures</td>
<td>☐ Judgement impairment</td>
<td>☐ Aggression</td>
</tr>
<tr>
<td>☐ Numbness/tingling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any of the above symptoms may develop within 30 days of injury

Classification of TBI Severity

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Imaging</td>
<td>Normal</td>
<td>Normal or Abnormal</td>
<td></td>
</tr>
<tr>
<td>Loss of Consciousness</td>
<td>0-30 min</td>
<td>&gt;30 min and &lt;24 hrs</td>
<td>24 hrs or more</td>
</tr>
<tr>
<td>Alteration of consciousness/mental state</td>
<td>Up to 24 hours</td>
<td>&gt;24 hours; severity based on other criteria</td>
<td></td>
</tr>
<tr>
<td>Post-traumatic Amnesia</td>
<td>0-1 day</td>
<td>&gt;1 and &lt;7 days</td>
<td>7 days or more</td>
</tr>
<tr>
<td>Glasgow Coma Scale</td>
<td>13-15</td>
<td>9-12</td>
<td>&lt;9</td>
</tr>
</tbody>
</table>

Co-occurring Conditions

- Individuals should be assessed in the primary care setting and screening instruments should be used
- Identify patients who may require further assessment or referral

Clinical Symptom Management mTBI

“There are no specific FDA approved pharmaceutical agents for the treatment of any post-concussive neurological or psychiatric symptoms emerging after mTBI. Experts in the field recommend using published CPGs for other neuropsychiatric conditions as a reference, as well as the general guidance from the fields of neuropsychiatry and behavioral neurology.”
General Considerations for Medications

- Medications to avoid
  - Seizure threshold lowering
  - Medications that cause confusion
- Rule out other factors before prescribing
- Titrate to maximal tolerated dose before discontinuing
- Assess regularly for side effects and drug-drug interactions
- Limit quantities with high risk for suicide
- Educate patients to avoid alcohol
- Minimize use of caffeine and "energy" over-the-counter and herbal products

Post-Traumatic Headaches

- Secondary headache disorders that start within 7 days of a head trauma
  - Acute – Resolves within 3 months
  - Chronic – Persisting longer than 3 months
- Occur acutely in 90% of individuals who sustain a concussion
- Most common patterns of posttraumatic headache
  - Tension type
  - Migraine
  - Mixed migraine and tension type

Tension-like or Migraine-like

<table>
<thead>
<tr>
<th>Feature</th>
<th>Tension</th>
<th>Migraine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Intensity</td>
<td>Mild to moderate</td>
<td>Severe or debilitating</td>
</tr>
<tr>
<td>Pain Character</td>
<td>Dull, aching, band-like</td>
<td>Throbbing or sharp/stabbing</td>
</tr>
<tr>
<td>Duration</td>
<td>Usually less than 4 hours</td>
<td>Can last longer than 4 hours</td>
</tr>
<tr>
<td>Photophobia</td>
<td>Less common; usually one or the other</td>
<td>One or both usually present</td>
</tr>
<tr>
<td>Functionality</td>
<td>Usually able to carry out routine activities</td>
<td>Loss of functionality is common, worsened with physical exertion</td>
</tr>
<tr>
<td>Nausea/Malaise</td>
<td>Not present</td>
<td>Usually Present</td>
</tr>
</tbody>
</table>
Pharmacologic Treatment of Post-traumatic Headaches

<table>
<thead>
<tr>
<th>Tension</th>
<th>Migraines</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prescription strength NSAIDs</td>
<td></td>
</tr>
<tr>
<td>• Combination medications (APAP, ASA, caffeine, and sedatives)</td>
<td></td>
</tr>
<tr>
<td>• Prophylactic Medications</td>
<td></td>
</tr>
<tr>
<td>o NSAIDs</td>
<td></td>
</tr>
<tr>
<td>o 5HT Receptor antagonists</td>
<td></td>
</tr>
<tr>
<td>o Combination medications</td>
<td></td>
</tr>
<tr>
<td>o Antiemetic</td>
<td></td>
</tr>
<tr>
<td>• Abortive Medications</td>
<td></td>
</tr>
<tr>
<td>o NSAIDs</td>
<td></td>
</tr>
<tr>
<td>o 5HT Receptor antagonists</td>
<td></td>
</tr>
<tr>
<td>o Combination medications</td>
<td></td>
</tr>
<tr>
<td>o Antiemetic</td>
<td></td>
</tr>
<tr>
<td>• Prophylactic Medications</td>
<td></td>
</tr>
<tr>
<td>o Anticonvulsants</td>
<td></td>
</tr>
<tr>
<td>o Beta-blockers</td>
<td></td>
</tr>
<tr>
<td>o Alpha-blockers</td>
<td></td>
</tr>
<tr>
<td>o TCAs</td>
<td></td>
</tr>
<tr>
<td>o Supplements (Magnesium, riboflavin)</td>
<td></td>
</tr>
<tr>
<td>• Abortive Medications</td>
<td></td>
</tr>
<tr>
<td>o NSAIDs</td>
<td></td>
</tr>
<tr>
<td>o 5HT Receptor antagonists</td>
<td></td>
</tr>
<tr>
<td>o Combination medications</td>
<td></td>
</tr>
<tr>
<td>o Antiemetic</td>
<td></td>
</tr>
</tbody>
</table>

Abortive Migraine Medications

<table>
<thead>
<tr>
<th>Agents</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSAIDS</td>
<td>• Ibuprofen</td>
</tr>
<tr>
<td></td>
<td>• Ketorolac IM inj</td>
</tr>
<tr>
<td></td>
<td>• Naproxen</td>
</tr>
<tr>
<td></td>
<td>• Limit use to prevent rebound headaches</td>
</tr>
<tr>
<td></td>
<td>• Bleeding-related risks</td>
</tr>
<tr>
<td>5HT Receptor Agonists</td>
<td>• Rizatriptan</td>
</tr>
<tr>
<td></td>
<td>• Sumatriptan (PO, IN, SC, TD)</td>
</tr>
<tr>
<td></td>
<td>• Zolmitriptan</td>
</tr>
<tr>
<td></td>
<td>• Caution if hx of cardiac events</td>
</tr>
<tr>
<td></td>
<td>• Risk for serotonin syndrome</td>
</tr>
<tr>
<td></td>
<td>• Limit use to prevent rebound headaches</td>
</tr>
<tr>
<td>Rx Combos</td>
<td>• Butalbital/APAP/Caffeine</td>
</tr>
<tr>
<td></td>
<td>• Butalbital/ASA/Caffeine</td>
</tr>
<tr>
<td></td>
<td>• APAP/Isometheptene/Dichloralphenazone</td>
</tr>
<tr>
<td></td>
<td>• Use if 5HT agonists are contraindicated</td>
</tr>
<tr>
<td></td>
<td>• Monitor APAP consumption</td>
</tr>
<tr>
<td></td>
<td>• Assess bleeding risk with ASA</td>
</tr>
<tr>
<td>OTC</td>
<td>• APAP</td>
</tr>
<tr>
<td></td>
<td>• ASA</td>
</tr>
<tr>
<td></td>
<td>• APAP/ASA/Caffeine</td>
</tr>
<tr>
<td></td>
<td>• Risk of tinnitus with ASA containing meds</td>
</tr>
<tr>
<td></td>
<td>• Limit use to prevent rebound headaches</td>
</tr>
<tr>
<td>Antiemetic Agents</td>
<td>Prochlorperazine</td>
</tr>
<tr>
<td></td>
<td>Promethazine</td>
</tr>
<tr>
<td></td>
<td>• EPS with long term use</td>
</tr>
<tr>
<td></td>
<td>• May cause drowsiness and constipation</td>
</tr>
</tbody>
</table>

Prophylactic Migraine Medications

• Migraine headaches occur more than once a week
• Headache attacks are disabling despite aggressive acute interventions
• Headaches compromise work attendance, societal integration, or daily life

<table>
<thead>
<tr>
<th>Agents</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticonvulsants</td>
<td>• Gabapentin with dual benefits</td>
</tr>
<tr>
<td></td>
<td>• Monitor for drug interactions, renal and hepatic function</td>
</tr>
<tr>
<td></td>
<td>• Topiramate may cause weight loss</td>
</tr>
<tr>
<td></td>
<td>• Gabapentin</td>
</tr>
<tr>
<td></td>
<td>• Topiramate</td>
</tr>
<tr>
<td></td>
<td>• Divalproex NA</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>• Propranolol</td>
</tr>
<tr>
<td></td>
<td>• May cause fatigue, exercise intolerance, depression</td>
</tr>
<tr>
<td></td>
<td>• May cause abnormal dreams</td>
</tr>
<tr>
<td>Alpha-blocker</td>
<td>• Prazosin</td>
</tr>
<tr>
<td></td>
<td>• Titrated slowly to avoid</td>
</tr>
<tr>
<td></td>
<td>• Benefit for co-occurring PTSD</td>
</tr>
<tr>
<td>Tricyclic Antidepressants</td>
<td>• Amitriptyline</td>
</tr>
<tr>
<td></td>
<td>• Desipramine</td>
</tr>
<tr>
<td></td>
<td>• Nortriptyline</td>
</tr>
<tr>
<td></td>
<td>• Monitor for suicidality</td>
</tr>
<tr>
<td></td>
<td>• Drug interactions and side effects</td>
</tr>
<tr>
<td></td>
<td>• Avoid abrupt discontinuation</td>
</tr>
<tr>
<td>Vitamin/Supplements</td>
<td>• Magnesium Oxide</td>
</tr>
<tr>
<td></td>
<td>• Vitamin B2</td>
</tr>
<tr>
<td></td>
<td>• MgSO4 should be separated from other meds</td>
</tr>
<tr>
<td></td>
<td>• B2 may discolor urine.</td>
</tr>
</tbody>
</table>

Sleep Disturbances

Presented by Dr. Joy A. Awoniyi
Sleep Disturbances

- Occurs in ~30% of patients following mTBI
- Types of sleep disturbance
  - Difficulty falling asleep or staying asleep
  - Delayed sleep phase syndrome
  - Irregular sleep/wake patterns
- No evidence that sleep disturbance after mTBI should be treated any differently than sleep dysfunction from other causes
- Consider risks for falls and confusion when prescribing medications

Sleep Agents

<table>
<thead>
<tr>
<th>Agents</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-blocker • Prazosin</td>
<td>• See previous mentions</td>
</tr>
<tr>
<td>Hypnotics</td>
<td>• Eszopiclone • Zaleplon • Zolpidem</td>
</tr>
<tr>
<td></td>
<td>• Not indicated for long term use</td>
</tr>
<tr>
<td></td>
<td>• Sleep walking and short-term amnesia reported</td>
</tr>
<tr>
<td></td>
<td>• Zaleplon preferred if issue is sleep onset and latency</td>
</tr>
<tr>
<td></td>
<td>• May cause abnormal dreams</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>• Trazodone • Amitryptiline • Doxepin • Mirtazapine</td>
</tr>
<tr>
<td></td>
<td>• Useful for common comorbid conditions</td>
</tr>
<tr>
<td></td>
<td>• Headache is a common side effect</td>
</tr>
<tr>
<td>Melatonin receptor Agonist</td>
<td>• Ramelteon</td>
</tr>
<tr>
<td></td>
<td>• Not to be used in combination with fluvoxamine</td>
</tr>
<tr>
<td></td>
<td>• Drug interaction with CYP1A2 inhibitors (smoking)</td>
</tr>
<tr>
<td>Orexin-Receptor Antagonist</td>
<td>• Suvorexant</td>
</tr>
<tr>
<td></td>
<td>• May cause headache</td>
</tr>
<tr>
<td></td>
<td>• Significant drug interactions</td>
</tr>
</tbody>
</table>

Non-Pharmacological Therapies

- Persistent Pain
  - Rehabilitation
  - Acupuncture
  - Exercise
  - Education
- Fatigue and Sleep
  - CBTi – Mobile App available
  - Exercise
  - Education – Sleep Hygiene
- Tinnitus
  - White noise generators
  - Relaxation therapies
  - Hypnosis

Potential Interventions
LIFEARMOR APP

- 17 topics for veterans after deployment
- Offers self-help techniques and tools
- Features
  - Education about subject matters
  - Self Assessments
  - Tools for coping and managing symptoms
  - Video Links

Electronic Resources

- Scan for free VA mobile apps to help with insomnia, PTSD and mindfulness!
  - PTSD Coach (iPhone & Android)
  - Mindfulness Coach (iPhone only)
  - CPT Coach (Phone only)
  - CBII Coach (iPhone & Android)
- https://mobile.va.gov/appstore/veterans

Vet Centers

- Provide a broad range of counseling, outreach, and referral services to combat Veterans and their families
- All services are free of cost and are strictly confidential
  - Individual and group counseling for Post-Traumatic Stress Disorder (PTSD)
  - Alcohol and drug assessment
  - Suicide prevention referrals
- Vet Center Call Center 1-877-WAR-VETS (1.877.927.8387)
  - The staff is comprised of combat Veterans from several eras and their family members
  - Veterans can talk about their military experiences or readjustment issues

Vet Center National Directory

- Website: https://www.va.gov/directory/guide/vetcenter.asp
- Search for
  - Centers within radius
  - Centers within a state or territory
- Includes address, phone number, link for directions, hours of operation, and key staff members
- Locations in surrounding territories US Territories
  - US Virgin Islands
  - Puerto Rico
  - Guam
  - American Samoa
True or False

- Sleep disturbances that occur as a result of a TBI are unique and should be treated differently than other sleep disturbances
  
- The most common type of traumatic brain injury is mild
  
- Traumatic brain injuries are diagnosed based on structural imaging

Questions?