Managing Combat-Related Mild TBI in the VA Polytrauma System of Care

David X. Cifu, MD
National Director, PM&R Services
Department of Veterans Affairs

Chairman and Herman HJ. Flax, M.D. Professor
Department of Physical Medicine and Rehabilitation
Virginia Commonwealth University

Glossary

- OEF – Operation Enduring Freedom (Afghanistan)
- OIF – Operation Iraqi Freedom
- OND – Operation New Dawn (OEF/OIF post 9/1/2010)
- GWOT – Global War on Terrorism
- DoD – Department of Defense
- PRC - Polytrauma Rehabilitation Center
- PNS – Polytrauma Network Site
- PSCT – Polytrauma Support Clinic Team

Introduction: Dave Cifu

- Professor and Chairman: VCU Department of PM&R
  - 60 faculty www.pmr.vcu.edu
- Executive Director – VCU Center for Rehabilitation Sciences and Engineering
  - 65 faculty www.cerse.vcu.edu
  - $16 million/year of research funding
- National Director of PM&R for Dept of Veterans Affairs
  - 16 support staff in Washington and the field www.polytrauma.va.gov
  - Oversee 522 physicians and 3,000 therapists across U.S.
  - Lead liaison to Dept of Defense for TBI, Amputation, Polytrauma care
- Neuroscience Researcher
  - 8 active grants ($25 million/yr), 170 publications, 430 presentations

Goals

- Overview system of diagnosis and management for mild TBI in the VA Polytrauma System of Care
- Discuss the VA screening and comprehensive evaluation program for mTBI
- Highlight the clinical care and use of the clinical practice guideline for mTBI in the VA-PSC

Casualties of OEF/OIF/OND – 12/19/2011

	Total Deaths	KIA	Non-Combat Deaths	WIA not RTD
OIF	**4,421**	**3,489**	**932**	**31,921**
OEF	**1,846**	**1,473**	**373**	**15,090**
OND	**66**	**38**	**28**	**305**
Total	**6,333**	**5,000**	**1,333**	**47,316**

- Over 2,100,000 total Servicemembers deployments

OEF/OIF/OND Injuries

- More than 2 million Americans have been deployed.

- Amputations >1,300
- Burns >600
- TBI >200,000
  - ~ 36,752 mod/2,288severe
  - ~200,000 mild (20% of deployed troops)
- SCI >150
- PTSD >250,000
- MSK Pain >250,000

Polytrauma – New Diagnosis?

- "Polytrauma" is a medical diagnosis that is used by VA/DoD to describe the unique, complex patterns of injuries seen with blast and combat exposure:
  - Complex, multiple injuries occurring as a result of same event
  - Injuries include brain injury, amputation, hearing and vision impairments, spinal cord injuries, psychological trauma, and musculoskeletal wounds
  - Post-deployment Syndrome – (Walker, Clark, etal 2010)

- Individuals with polytrauma require a high level of integration and coordination of medical, rehabilitation, and support services
  - Overlapping symptoms that may prolong or impair expected recovery
  - Controversy and challenge of simultaneous treatment of multiple injuries
  - Challenge of coordinating multiple clinicians, sequencing treatments, and integrating care while trying to encourage a return to productivity

Polytrauma – Contributing Factors

- Pre-Exposure
  - Pre-morbid personality and psychological factors
  - Baseline physical stressors of combat zone (sleep, diet, exercise, relaxation)
  - Baseline psychological stressors (fear, anxiety, exposure to injury/death of colleagues)
  - Reduced resiliency to injury or insult
- Post-Exposure
  - Ongoing physical stressors of combat zone (sleep, diet, exercise, relaxation)
  - Ongoing psychological stressors (fear, anxiety, exposure to injury/death of colleagues)

Polytrauma – Contributing Factors

- Post-Exposure
  - Failure to or delay in diagnosis of significant exposure (mTBI)
  - Diagnosed but undertreated (e.g., limited or no period of therapeutic rest, limited or no education, limited or no management of somatic/psychologic symptoms)
  - New or exacerbated somatic or psychologic difficulties (insomnia, headache, hypervigilance) further worsen resiliency
- Elevated Risk of Repeated Exposure to Injury
  - Unclear role of repeated TBI on recovery, presentation or outcome

Post-Deployment Syndrome

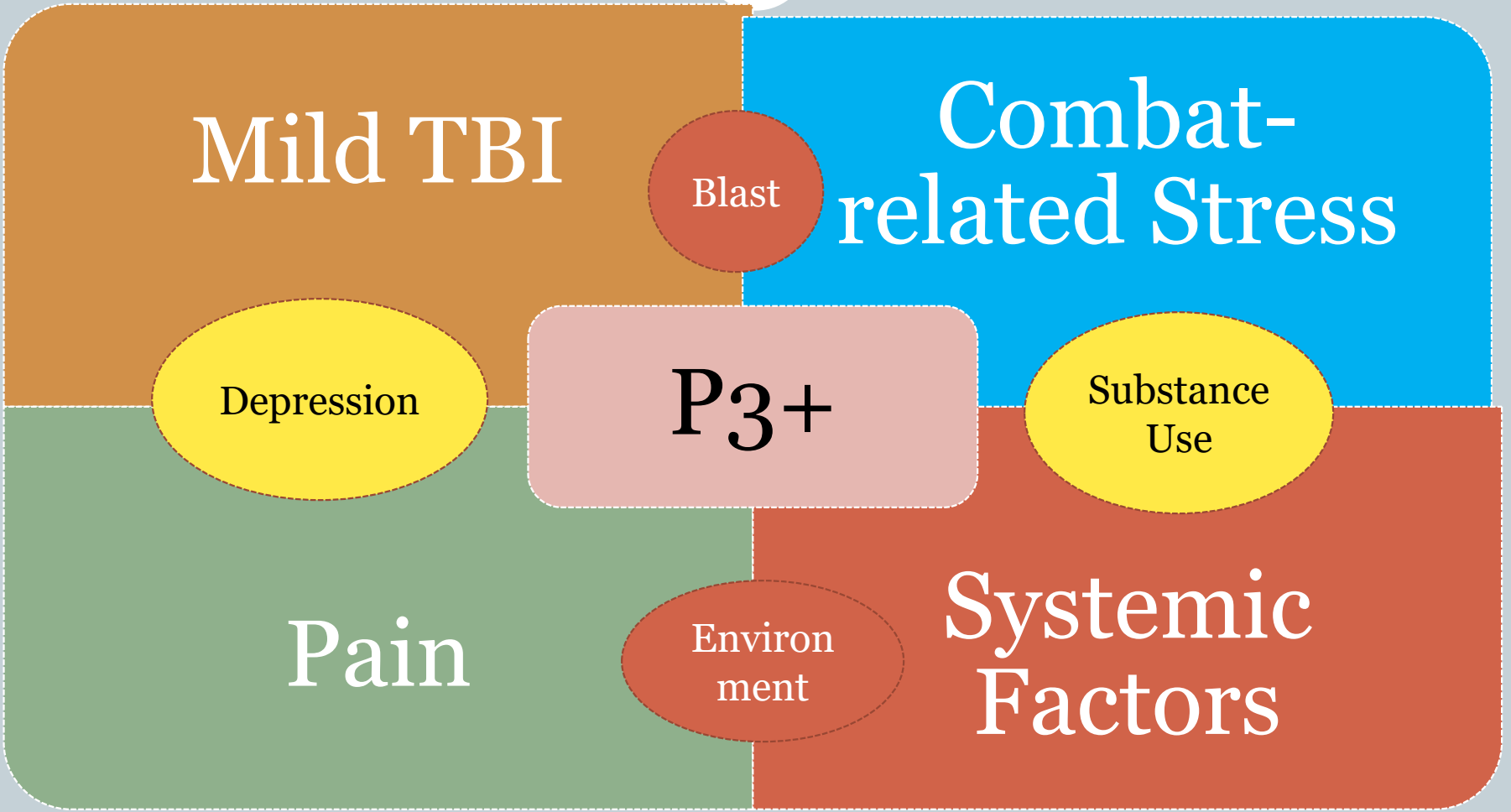
- 5-20% OEF-OIF Servicemembers are returning with persistent physical and psychological symptoms after combat exposure.

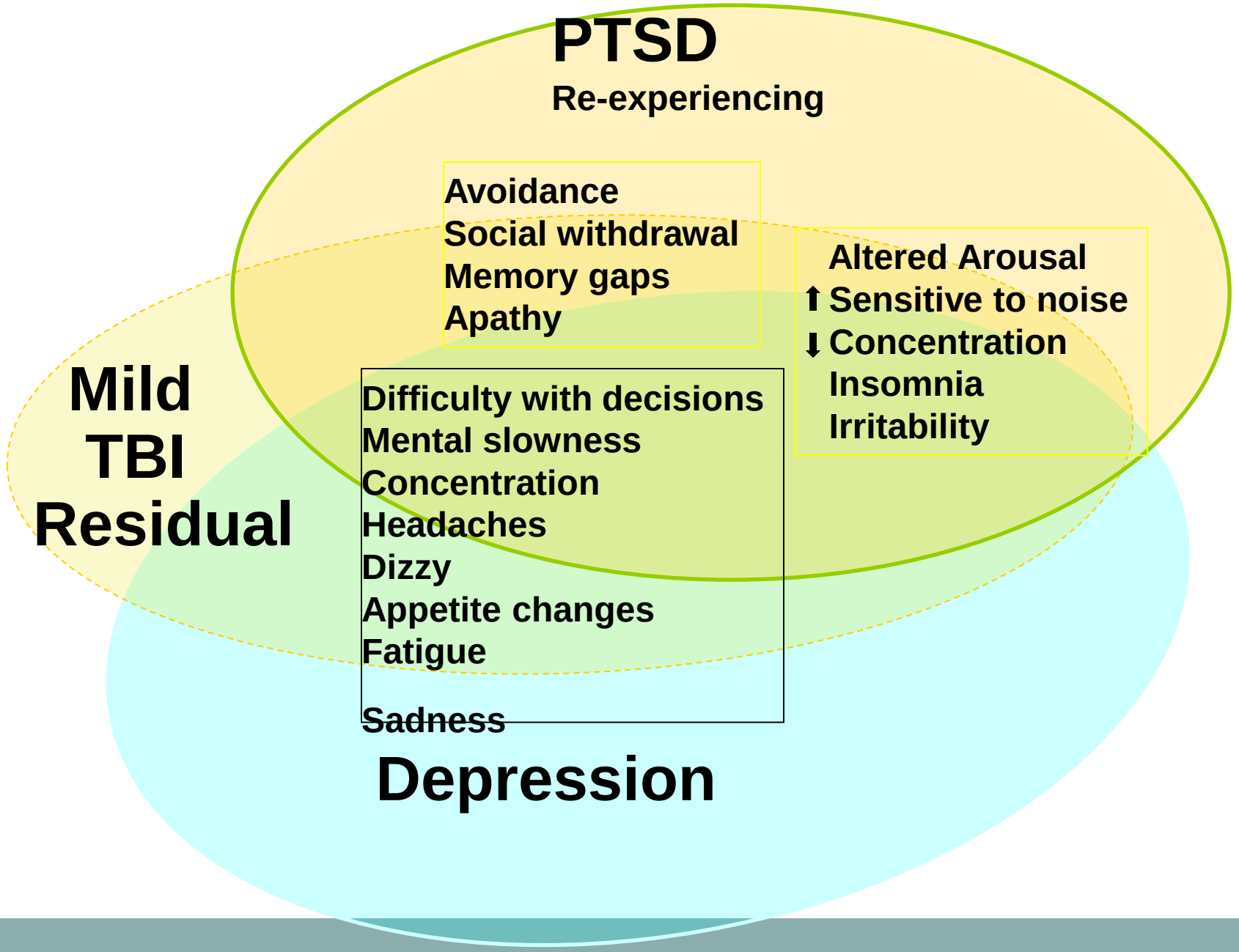
- Controversies concerning etiology of symptoms
  - Blast exposure
  - Post-concussive syndrome
  - Post-traumatic stress disorder
  - Depression
  - P3+ (PTSD, Polytrauma, PTSD, Polysubstance Use, Pain)
  - Environmental factors
  - Impact of multiple exposures (blast, trauma)

Post-Deployment Syndrome

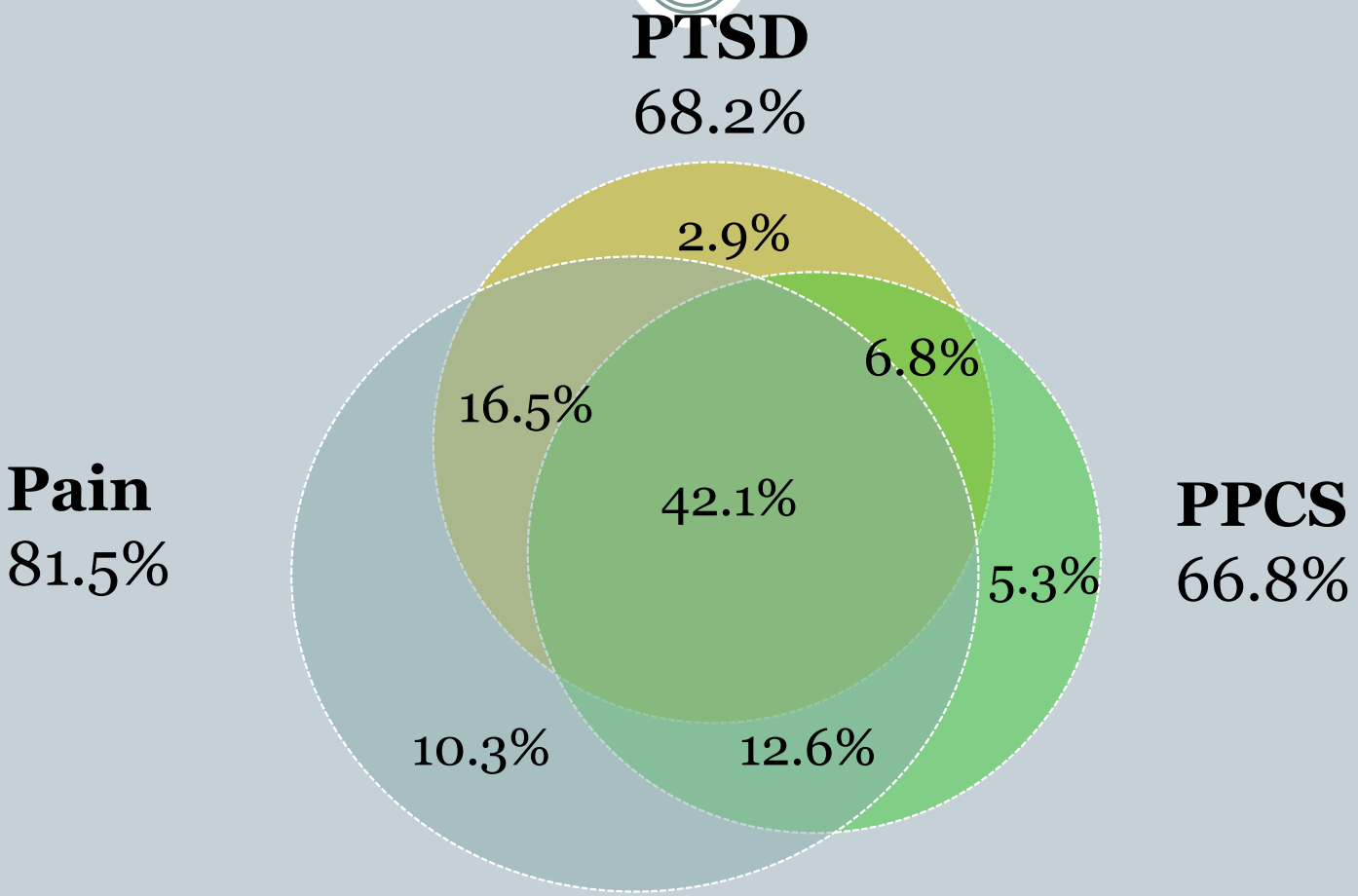
- Combat stress has been documented in all recorded wars
  - Ancient Greek Wars (Troy, Sparta)
  - Ancient Romans
  - Israelites
  - Crusades
  - U.S. Civil War
  - WWI
  - WWII
  - Gulf War
- Concussive injury has been reported for 150+ years

A Complex Condition



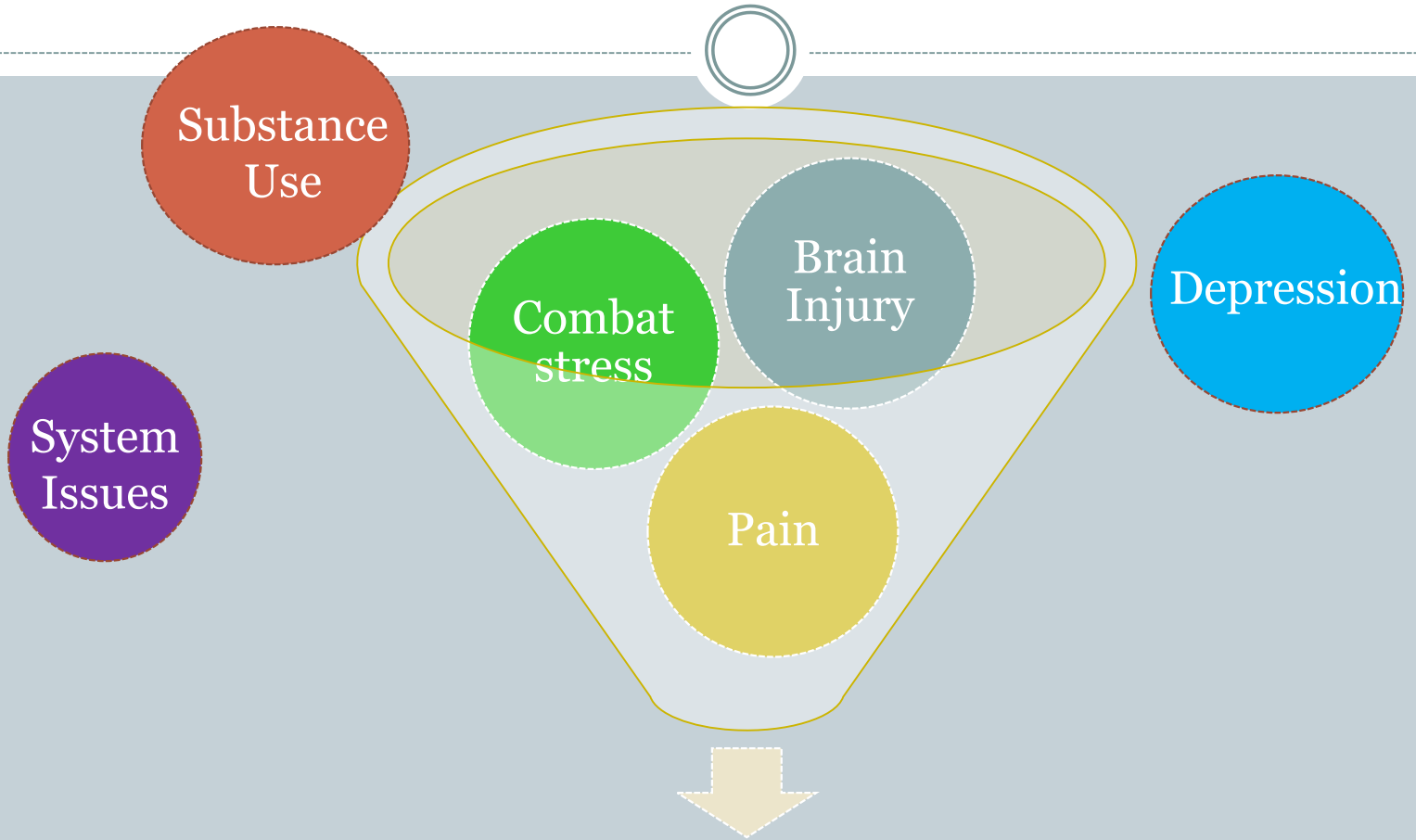

PTSD
Re-experiencing
Avoidance
Social withdrawal
Memory gaps
Apathy
Altered Arousal
⬆ Sensitive to noise
⬇ Concentration
Insomnia
Irritability
Mild TBI Residual
Difficulty with decisions
Mental slowness
Concentration
Headaches
Dizzy
Appetite changes
Fatigue
Sadness
Depression

Epidemiology: Overlap of P3



Lew: *J Rehabil Res Dev* 2009;46(6)

Post-Deployment "Gunk"



Overcoming Post-Deployment Syndrome: A Six-step Mission to Health

David Cifu and Cory Blake

- *Overcoming Post Deployment Syndrome* is a comprehensive guide for service members, Veterans and their families dealing with the repercussions of combat duty, including traumatic brain injury, post-traumatic stress disorder, anxiety, depression, chronic pain and musculoskeletal injury, and substance abuse.

- http://www.demoshealth.com/prod.aspx?prod_id=9781936303045

Can Blast Wave cause mTBI?

- Violent effect of a wave of increased atmospheric pressure
  - Dynamite or a bomb
  - Improvised Explosive Device (IED)
  - Land Mines/ Grenade
  - Rocket-Propelled Grenade (RPG)

One Explosion/Blast has Multiple Mechanisms of Injury

Wall of Air (Primary)

Blast Wind (Primary)

Flying Debris (Secondary)

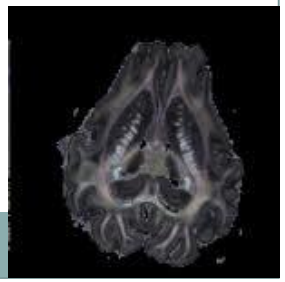
Displacement (Tertiary)

Collapse Building (Quaternary)

Impact of Primary Blast Wave

- At moderate intensity blast, theoretical modeling demonstrates
  - Skull distortion
  - Propagation of wave across skull and into underlying tissues
  - Entry of wave via small apertures (eyes, nose, ears)

- At moderate intensity blast, animal modeling demonstrates
  - Skull distortion and brain injury in immobilized rodents
  - Propagation of wave across skull and into underlying brain in immobilized swine



Impact of Primary Blast Wave

- Active DoD animal research examining biomarker, neuroimaging and neurologic impact of mild intensity blast in animals.
  - Swine
  - Primates
  - Ferrets

- Active DoD/VA research examining neuroimaging and clinical impact of mild intensity blast in humans
  - 750 consecutive OEF/OIF blast-exposed Servicemembers
    - Assessed initially and annual for 3 years (current n=120)
  - 40 Marine "breachers" assessed during training
    - No abnormalities after 4 week training program (multiple blasts)
    - Neuropsychological and imaging deficits seen in experienced trainers only
  - 40 New Zealand "breachers" followed for 3 years
    - No specific abnormalities detected

VA-mTBI Screening Program

- DoD, VA, Congress and Public concerns regarding difficulties reported by SM's and Veterans from OEF/OIF.

- VA collaboratively developed TBI Screening Tool with input from DoD experts, academia and best medical evidence.
  - All AD SMs complete PDHQ/PDHQ-R upon return from combat
  - All OEF/OIF Veterans must have TBI Screen performed before entering VA system – April 2007
  - Screening performed by PCPs must complete VHI TBI
  - VA TBI Screening results are captured in electronic medical record
  - Screening program is monitored as national VHA performance measure

- Screen focuses on persistent symptoms after TBI exposure.

Mild TBI Screening and Evaluation Program

- TBI screen identifies those who self-report alteration in consciousness with acute symptoms that have persisted.
- Positive screen triggers counseling about results and referral a second level evaluation by TBI specialist and TBI team
- Veterans and Servicemembers are referred for treatment based on this follow-up comprehensive TBI evaluation.

DoD-mTBI Referrals

- For those with + mTBI exposure, but no current symptoms
  - All are given an educational handout
  - Describes symptoms and access to care
- For those with +mTBI and current symptoms, all see the "TBI Team Providers"
  - Provided educational handout
  - Treat for pain, sleep disorders, irritability
  - F/u evaluation within 7-14 days
  - If moderate severity refer to Specialist sooner

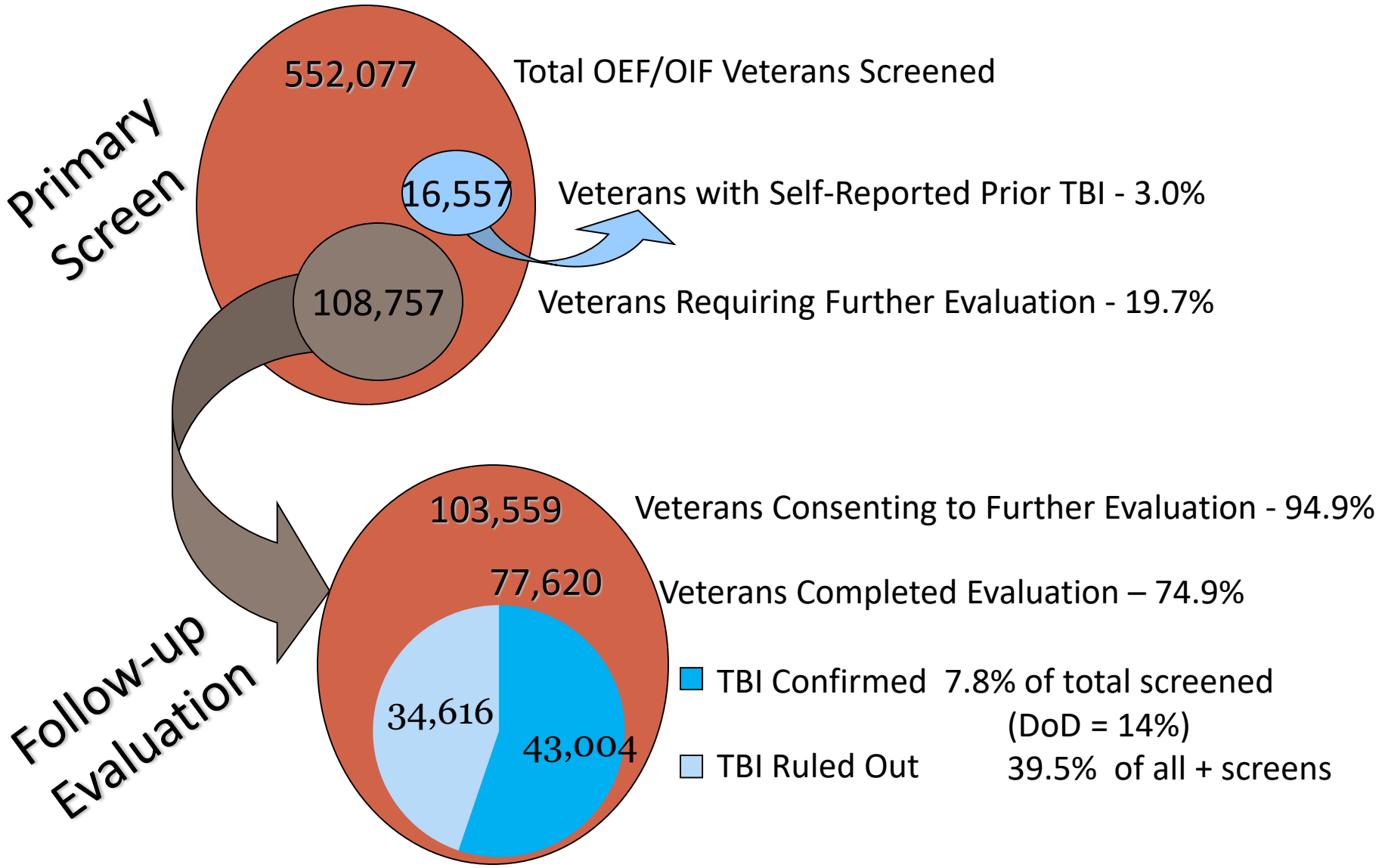
VA-mTBI Screen

- Question 1
  - **Were you exposed to a trauma or blast while in OEF/OIF?**
- Question 2
  - **As a result of the trauma or blast did you have a loss or alteration in consciousness (see stars, have bell rung, feel disoriented or confused)?**
- Question 3
  - **Did you develop problems with headache, insomnia, dizziness, thinking or behavior immediately to soon after the trauma or blast?**
- Question 4
  - **Do you still have the problems with headache, insomnia, dizziness, thinking difficulties or behavior that you developed immediately to soon after the trauma or blast?**

VA-mTBI Screen

- All data from mTBI Screen is entered into the Congressionally mandated Veterans Health Registry for TBI, maintained at Craig Hospital TBI National Data Center.
- Veterans who answer affirmatively to any of 4 questions are counseled on the significance of TBI and initiation/persistent symptoms.
- Veterans who answer affirmatively to all 4 questions are referred for Comprehensive TBI Evaluation at one of 100+ VA-PSC centers for definitive evaluation and management program.
- TBI Specialty Clinic referral is offered within 7 days of screen and actual appointment is scheduled within 30 days.

Mandatory TBI Screening Results
14 April 2007 – 1 August 2011



VA-mTBI Comprehensive Evaluation

- Veterans who affirmed all 4 screening questions were referred (within 30 days) to one of 100+ Comprehensive TBI Evaluation centers.
- TBI Evaluation centers must have PM&R, Neurology or Psychiatry physician with TBI expertise, plus key members of interdisciplinary evaluation and management team
  - Psychology
  - Speech and Language Pathologist
  - Physical Therapist
  - Occupational Therapist
  - Case Manager (RN/SW)
  - Recreation Therapist
- Telehealth evaluations to remote sites or sites without qualified expertise.
- Mini-residency training programs in TBI evaluation and management under development.

VA-mTBI Comprehensive Evaluation

- Evaluation process utilizes the Congressionally mandated Individualized Rehabilitation and Reintegration Plan of Care - EMR template.
- While interdisciplinary evaluation is encouraged to fully assess symptoms and deficits, the definitive assessment of TBI exposure is made by physician.
- Neurobehavioral Symptom Inventory (NSI) is embedded to record subjective presence and severity of 22 most common complaints after TBI exposure.
- Veterans are counseled and referred for appropriate further evaluation and care regardless of underlying cause.
- While apportioning symptoms or findings to specific etiologies is attempted and documented, the focus is on functionally based care.

VA-mTBI Rehabilitation Programs

- Additional evaluations may include
  - Neuroimaging
  - Neuropsychological testing
  - Computerized Posturography
  - Specialty physician consultation/care
  - Special Sensory testing (Vision, Hearing)

- Rehabilitation Services settings include
  - Inpatient
  - Residential
  - Day
  - Outpatient
    - Physician
    - Therapy
    - Community Integration
    - Vocational Services

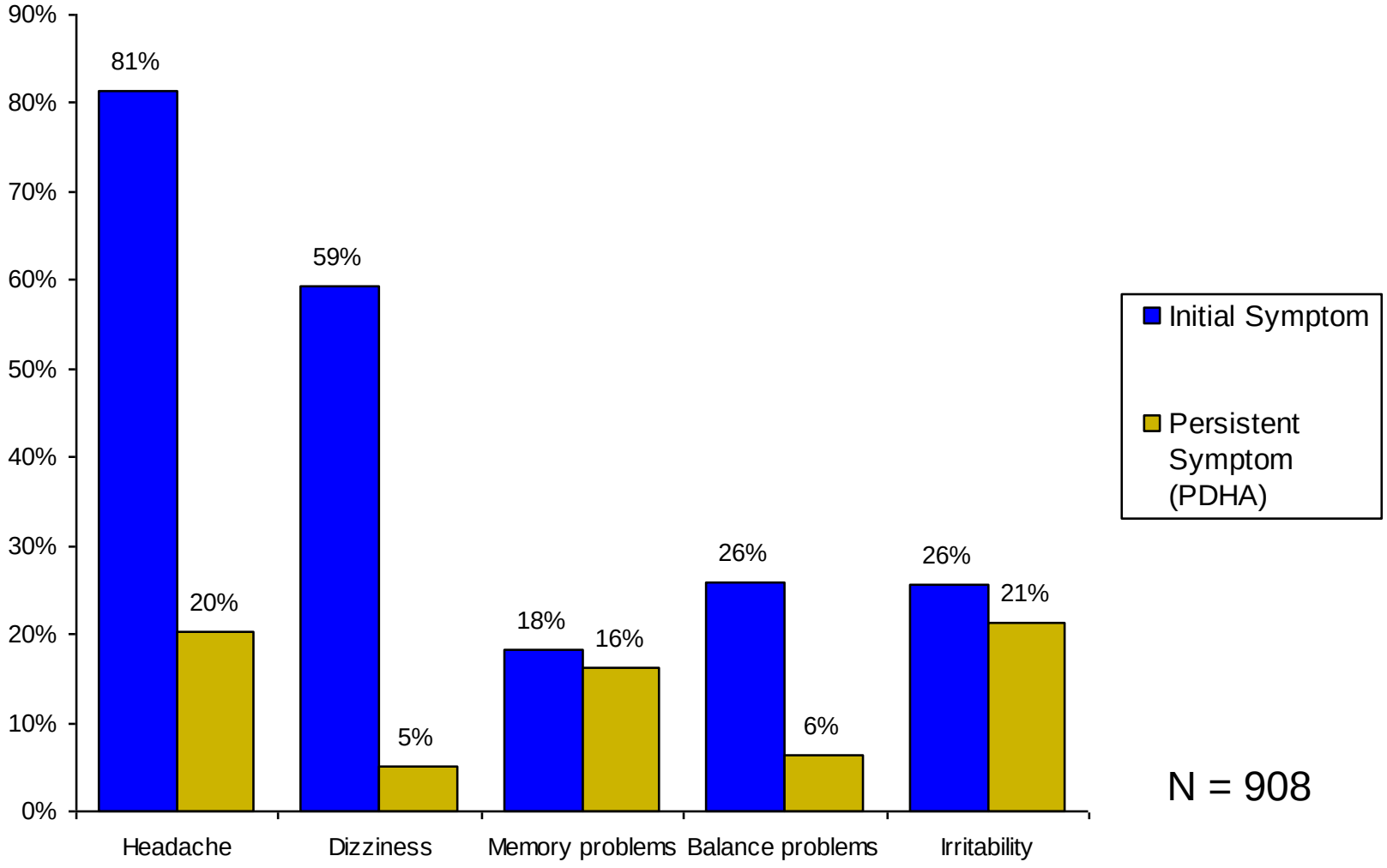
Neurobehavioral Symptom Inventory

1. Feeling dizzy
2. Loss of balance
3. Poor coordination, clumsy
4. Headaches
5. Nausea
6. Vision problems, blurring, trouble seeing
7. Sensitivity to light
8. Hearing difficulty
9. Sensitivity to noise
10. Numbness or tingling on parts of my body
11. Change in taste and/or smell
12. Loss or increase of appetite
13. Poor concentration, can't pay attention, easily distracted
14. Forgetfulness, can't remember things
15. Difficulty making decisions
16. Slowed thinking, difficulty getting organized, can't finish things
17. Fatigue, loss of energy, getting tired easily
18. Difficulty falling or staying asleep
19. Feeling anxious or tense
20. Feeling depressed or sad
21. Irritability, easily annoyed
22. Poor frustration tolerance, feeling easily overwhelmed by things

Neurobehavioral Symptom Inventory (NSI)

- The NSI has four different subtypes of symptoms:
  - Somatic/Physical (9 symptoms, items 1-6, 12, 17-18)
  - Neurosensory (5 symptoms, items 7-11)
  - Cognitive (4 symptoms, items 13-16)
  - Affective/Psychological (4 symptoms, items 19-22)
- VA and DoD mTBI clinical practice guidelines are linked to NSI symptoms

Post-Concussive Symptoms by Time Post-Exposure



How do we treat PTSD and TBI?

- Comprehensive evaluation is crucial
  - Neuropsychological tests may not be as useful for multiple concussion patients
- Interdisciplinary team approach
- Patients often will consolidate trauma memory instead of challenging events – rehearsal of concepts is needed
- TBI treatment can integrate CBT techniques to bolster PTSD treatment

What we need to know about PTSD

- National study of American civilians conducted in 1995 estimated that
  - the lifetime prevalence of PTSD was 5% in men and 10% in women
  - 7.8 percent of Americans will experience PTSD at some point in their lives
- Most people who are exposed to a traumatic event experience some of the symptoms in the days and weeks following exposure
  - Available data suggest that about 8% of men and 20% of women go on to develop PTSD, and roughly 30% of these individuals develop a chronic form that persists throughout their lifetimes.
- About 30 percent of the men/women who have spent time in war zones experience PTSD

PTSD Course of Treatment

- Coping skills building can take anywhere from 5 sessions to 3 months depending on a variety of factors
- Active treatment for PTSD typically last 12-20 sessions
- This may need to be increased for TBI/PTSD patients
- No treatment outcome studies have been done on PTSD/TBI patients

Treatment Efficacy

- Cognitive therapies have been assessed at up to 5 year follow up.
- Results indicate that therapy gains are typically maintained for at least 70% of the clients.
- Drop out rates of therapy average between 13 and 24%

DoD-VA CPGs

- The VA/DoD Evidence-Based Practice Guideline Work Group (EBPWG) was established to advise the VA/DoD Health Executive Council (HEC) on the use of clinical and epidemiological evidence to improve the health of the population across the Veterans Health Administration (VHA) and Military Health System.

- The EBPWG selects topics for implementation of evidence-based indicators based on high cost, high volume, high risk, and problem prone conditions.

DoD-VA CPGs

- These topics are prioritized based on cost, feasibility, and knowledge of the etiology of the gap.
- The work group also coordinates evidence reviews to support recommendations for care as well as maintaining and updating VA/DoD evidence-based clinical practice guidelines.
- The evidence-based process and outcome indicators are used to assess the efficacy of the implementation process. The EBPWG also promotes the use of medical informatics to support clinical decision-making.

DoD-VA mTBI CPG

- mTBI CPG released May 2009

http://www.healthquality.va.gov/management_of_concussion_mtbi.asp

- Three management Algorithms
  - A = Initial presentation after concussion
  - B= Management of Initial Symptoms
  - C=Follow-up and Management of Persistent Symptoms

- Guideline does not address urgent management of TBI or established return to sports guidelines.

- Limited Class A Evidence available for Concussion care.

VA-CPG: Initial Care

- Early assessment and management is essential to full recovery. [SR=A]
  - Reassure about excellent prognosis for full recovery
  - Counsel on prevention of repeat TBI
  - Written contact information for f/u if condition worsens or symptoms persist
  - Screen for comorbid conditions (SUD, PTSD, MDD)
  - Identify ways to assist in stress management [SR=B]
- Assessment in initial 72 hours should include neuroimaging if persistent symptoms (>15 minutes)
- No role for laboratory or biomarker testing (except to assess symptom issues)

VA-CPG: Initial Care

- Management includes symptom specific treatment (physical activity, rehabilitation therapies, counseling, limited medication usage), education and supportive care.
- Most patients can stay at work/duty or rapidly return to full duties.
- Close monitoring of symptom improvement and life/job performance in first 30 days after injury is crucial.

VA-CPG : Multiple Concussions

- The management of a patient who has sustained multiple concussions should be similar to the management for a single concussion/mTBI. (SR=I)

- The patient with multiple concussions and his/her family should be educated to create a positive expectation of recovery. (SR=I)

VA-CPG : Persistent Symptoms

- The management of an individual who has sustained a documented concussion/mTBI and has *persistent physical, cognitive and behavioral symptoms after one month should not differ based on* the specific underlying etiology of their symptoms (i.e., concussion vs. pain, concussion vs. stress disorder).

- In communication with patients and the public, this guideline recommends using the term *concussion or history of mild-TBI* and to refrain from using the term *brain damage*.

Next Steps for PSC: Polytrauma and Pain

OEF/OIF Veterans seen VA-wide for pain issues

Year	Uniques	% Seen by PM&R	% Seen in Pain clinic	Encounters	% Seen by PM&R	% Seen in Pain clinic
2006	71,000	18.8	1.6	224,000	20.3	1.3
2007	96,000	20.7	2.1	322,000	19.9	1.6
2008	132,000	26.3	2.4	465,000	22.5	1.8
2009	171,000	27.7	3.0	629,000	23.9	2.1
2010	207,000	26.8	3.2	755,000	23.2	2.3

43% ↑ 94% ↑ 14% ↑ 80% ↑

VA-PSC : Summary

- Diverse system of care established since 2003 to complement acute DoD polytrauma system and to integrate into existing VA services (PMR, mental health, primary care, prosthetics).
- While TBI-related issues were initial focus, scope of services has expanded to full post-deployment syndrome.
- Management of combat-related mTBI exposure related symptoms remains largely consensus-based approach.

Rebuilding Injured Lives






Veterans Health Affairs Polytrauma System of Care

THANK YOU

DAVID.CIFU@VA.GOV