WRIISC
War Related Illness & Injury Study Center

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The Veteran Experience of Chronic Pain from Musculoskeletal Injuries: *Lessons from the War Related Illness and Injury Study Center*

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Learning Objectives

- Describe the prevalence and range of musculoskeletal injuries in active duty military populations
- List common risk factors for musculoskeletal injuries
- Relate the lifelong impact of musculoskeletal injuries experienced by servicemembers to VHA

Poll Question #1

- What is your primary role in VA (select 1)?
  - student, trainee, or fellow
  - clinician
  - researcher
  - manager or policy-maker
  - Other

Outline

- Musculoskeletal injuries and their sequelae
- Musculoskeletal injuries in military populations
- Musculoskeletal concerns in a pilot combat conditioning program in active duty Marines
- Management of long-term impact of musculoskeletal injuries- The WRIISC perspective

Musculoskeletal Injuries

- Damage to the muscles, bones, or connective tissues.
- Characteristics of Injury
  - Mechanism
    - Overuse
    - Traumatic
  - Locations
    - Core/Axial
    - Upper extremity
    - Lower extremity
  - Damage/Impact
    - Alteration of structure
    - Loss of function

Impact of Musculoskeletal Injuries

- Alteration in body structure (deformity)
- Loss of function
- Limitation in activities and participation
  - Loss of fun activities
  - Loss of income/employment
- Increased exposure to healthcare
  - Iatrogenic complications
  - Time away from other activities
  - $

Recovery from Musculoskeletal Injuries

- Likelihood of recovery varies
- Critical Elements:
  - Injury characteristics
  - Timely recognition and assessment
  - Appropriate treatment
  - Time to heal/Return to activities
- Facilitators
- Barriers

Cycle of Negative Outcome

- Common patterns which can perpetuate negative outcomes
  - Failure to take rest and recover
    - Reinjury/failure to heal
    - Pain
    - Accumulation of new injuries
  - Failure to substitute activities
    - Weight gain
    - Isolation/Disruption of participation
    - Depression
  - Over-reliance on healthcare providers for ‘cure’
    - Medications alone are unlikely to suffice
    - Iatrogenesis

Musculoskeletal Injuries and Physical Fitness

- Physical fitness requires activity
  - More activity, greater risk for musculoskeletal injuries
  - Activities can be performed more or less safely
  - Some activities are more risky than others
- Musculoskeletal injuries impact fitness
  - Limit function and activity
  - Contribute to deconditioning and weight gain
  - Negatively impact mood and motivation
  - Contribute to other injuries

Barriers to Physical Fitness

- Baseline fitness
- Competing demands for time for physical training
- Imperfect knowledge about best practices for physical training
- Negative behaviors (smoking, sleep deprivation, binge alcohol use)
- Under-recognition of injuries
- Access to evaluation and treatment
- Access to adequate time for recovery

Poll Question #2

- Have you served in the military (select 1)?
  - Yes, in the past
  - Yes, currently
  - No

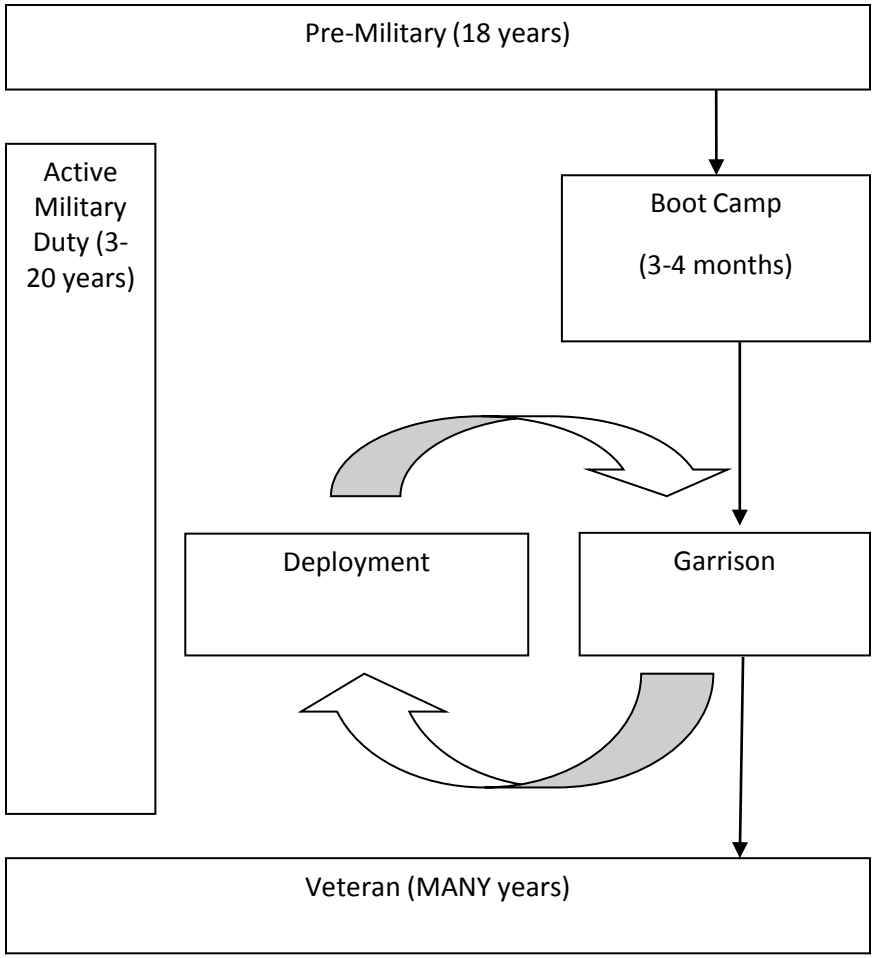
Physical Training in the Military

- 'Healthy Warrior' model
  - Physically and mentally fit
  - Resilient
- Core part of military training and service
  (USMC Order 6100.13W/CH 1)
  - Promote healthy lifestyles and combat readiness
  - Five 30-minute sessions per week
  - Under direction of the unit commander

Uses of Exercise in the Military

- Fitness
- Discipline
- Punishment
- Fill time
- Social
- Demonstrate excellence

Military Lifecycle



Framework for Musculoskeletal Injuries in the Military

	Setting/Context						
	Basic Training		Deployment			Garrison	
Injury Mechanism	***Training***	***Leisure***	***Training***	***Combat***	***Leisure***	***Training***	***Leisure***
Trauma							
Overuse							
Injury Location							
Axial							
Upper Extremity							
Lower Extremity							

Rates of Injury in Active Duty Samples

Training

- Basic training- 6-12 injuries per 100 male recruits/month
- Basic training (Army)- 25% men and 55% women report to sick call with injury
- Navy Special Forces training- 30 injuries per 100 trainees/month

Garrison

- US Army Infantry, special forces and Ranger units- 10-12 injuries/100 soldier-months; 80-90% of limited-duty days are related to physical training.
- Infantry soldiers - 51% injured in 6 months (142 injuries per 100 soldiers/year).
- Operational infantry soldiers- 95 injuries per 100 soldiers/year. 50% occurred during physical training; 15% were related to running.

Deployment

- Soldiers deployed to OEF- 45% injured in 12 months (low back 17.4%, knee 12.7%, shoulder 10.0%). 8.0% occurred during physical training.

Combat Conditioning Assessment Program (CCAP)

- Research Question
  - “Does a more systematic approach to physical training reduce musculoskeletal injuries?”
- Study Design
  - Pilot Study randomized 29 Marines to a moderate or high-moderate 11 week training program.
- Population/Sample
  - Volunteers from Active Duty USMC Clerical Unit

Combat Conditioning Program

- 11 Week Intervention
- 3 one-hour sessions/week (M, W, F)
- Exercises adapted from Combat Conditioning Manual of the Marine Corps Martial Arts Center for Excellence
- Intensity and volume of activity progressively cycled throughout the 11 weeks.

Injury Outcomes of Interest

- Any musculoskeletal issue recorded on daily log
  - Completed by participant
  - Confirmed by coordinator
- Any missed sessions due to musculoskeletal injury
  - Self-reported reason for missing
- Rate per 100 person days of physical training
  - Calculated from actual sessions completed
- Description of the context and location of injuries
  - From daily log and coordinator field notes

Characteristics of Interest

- Demographic
  - Age, sex
- Health behaviors
  - Cigarette use, alcohol use, activity level, nutritional supplement use, medication use
- Prior health issue
  - Baseline musculoskeletal issue, baseline report of any health issue, PTSD, depression
- Body habitus
  - Height, weight, % body fat
- Baseline fitness/performance on fitness tests
  - Vertical jump
  - Pull ups (hang time), Crunches, 3 mile run, ½ mile run, ammo can lifts, time under fire
- Adherence to regimen
  - Attendance
  - Drop out

Participants at Baseline (n=29)

Variable	mean	SD
Age (years)	23.1	4.4
Time in USMC (years)	3.47	3.52
PHQ 15 score (range 0-45)	2.79	3.18
CD-RISC score (range 0-100)	78.6	12.3
VR-36 PCS (range 0-100)	55.3	4.84
VR-36 MCS (range 0-100)	51.8	8.1
	Yes	**No**
Sex (male)	25 male	4 female
Deployed to combat theater	4	25
Current cigarette use	13	16
PTSD screen (positive)	4	25
Baseline musculoskeletal issue	4	25
Fitness supplement use	15	14
Prescription medication use	3	26
Problem alcohol use	3	26

Baseline Fitness & Performance

Variable	Mean	SD
Height (cm)	176.2	7.3
Weight (kg)	79.4	13.5
Body Mass Index (kg/m^2)	26.6	3.2
% Body Fat	15.2	5.2
Total METS per week	4557.5	3740.4
Vertical jump (cm)	39.1	9.7
Fitness Test Performance		
Pull ups- men	14.6	6.5
Hang time- women (minutes)	0.84	.41
Crunches	95.8	26.9
3 mile run (minutes)	22.9	3.4
½ mile run (minutes)	3.1	.33
Ammo can lifts	100.7	19.3

Results- Adherence

- Total enrolled= 29
- Total dropped out= 6 (21%)
  - 2 were transferred to different units
  - 2 were not adherent (missed 7 sessions)
  - 1 deployed to Afghanistan
  - 1 broke his wrist during leisure time on weekend
- Attendance-
  - Whole sample (n=29 completed 744 sessions)
    - mean 25.7 sessions
    - 90.4% of sessions
  - Completers (n=23 completed 677 sessions)
    - Mean 29.4 sessions
    - 92.0% of sessions
- Reasons for missing sessions (total=79 missed sessions)
  - Conflicting duties (80%)
  - Leave/Other (15%)
  - Injury (2.5%)
  - Too tired/sick (1.3%)

Musculoskeletal Concerns

- 8 Participants (8/29= 27.6%) recorded musculoskeletal concerns in 13 daily log entries (13/744=1.7%)
  - Knee- 4
  - Hamstring- 1
  - Shin splints- 1
  - Low back- 1
  - Ankle- 2
  - Calf- 1
  - Toe/foot- 1
  - Missing- 2
- 11 notations did not impede successful completion of the session for which injury was noted and 12 injury notations did not prompt medical attention.
- Two sessions were missed due to injuries
  - Shin splints (did not seek medical care)
  - "Pulled groin" (skipped 1 session on medical advice. She sought medical care after running outside the CCP; she routinely ran 8-12 miles a week outside of the CCP)
- One participant dropped out due to an extracurricular traumatic injury to his wrist.
- 0.06 injuries per participant/100 sessions (14.9 injuries/100 person months)
- 0.04 injured participants/100 training sessions (9.2 injured/100 person months)

Bi-variate associations between baseline factors & any musculoskeletal injuries

	Any injury (n=8)		No injury (n=21)		
	mean	SD	mean	SD	P-value
Body fat %	19.1	5.6	13.6	4.2	0.009
Pull ups	10	5.6	16.4	5.9	0.021
Crunches	81.8	14.5	101.2	28.8	0.081
3 mile run	22.6	4.5	23.1	2.9	0.059
Vertical jump (cm)	33.9	6.2	41.1	10.2	0.074
	yes	**no**	**yes**	**no**	
Supplement use	2	6	13	8	0.075
Medication use	3	5	0	21	0.003

Two Illustrative Injury Examples

- The participant who dropped out after breaking his wrist on the weekend illustrates several issues. He did not document the wrist injury on his daily logs and requested a modified work out to continue training. He was reluctant to seek care because of the context of his injury, but did so at the urging of the coordinator. At initial evaluation, the diagnosis and management was a sprain and wrist brace. The fracture was not identified or cast until a week later.

- The participant who missed a session for the groin pull illustrates the balance between excelling and excessive training. Her extra-curricular running was motivated by a desire to impress her superior, who was “teaching her to run” despite knowing she was engaged in the CCP. She wanted to improve her run time and was concerned about “getting fat”. She sought medical attention over the weekend after running outside of the CCP. In addition to missing one session for the groin pull, she reported knee and ankle injuries on 3 additional daily log sessions.

CCAP Summary

- Musculoskeletal concerns
  - Incidence of injuries similar to published rates
  - Most were lower extremity injuries
  - Most were very minor- did not require medical attention or missed sessions
  - The most significant (broken wrist, groin pull) were related to non-intervention activities (leisure, extra training)
- Risk factors for injuries were mostly expected
  - Baseline fitness (vertical jump, % body fat)
  - Performance (Pull ups, crunches, 3 mile run)
  - Use of supplements (Protective? Highly correlated with baseline fitness?)
- Very small sample
  - Limited generalizability
  - Limited power to test hypotheses
- Demonstrated challenges in fitness research with USMC
  - High rate of missed sessions for competing duties
  - Pressure to exercise outside of CCP

CCAP Lessons for VHA

- Window on military musculoskeletal injuries
- Think of your Veteran patients
  - Lifetime of pain and negative impact on health and function
  - Multiple, accumulated injuries
  - Contextual significance of injury and its management

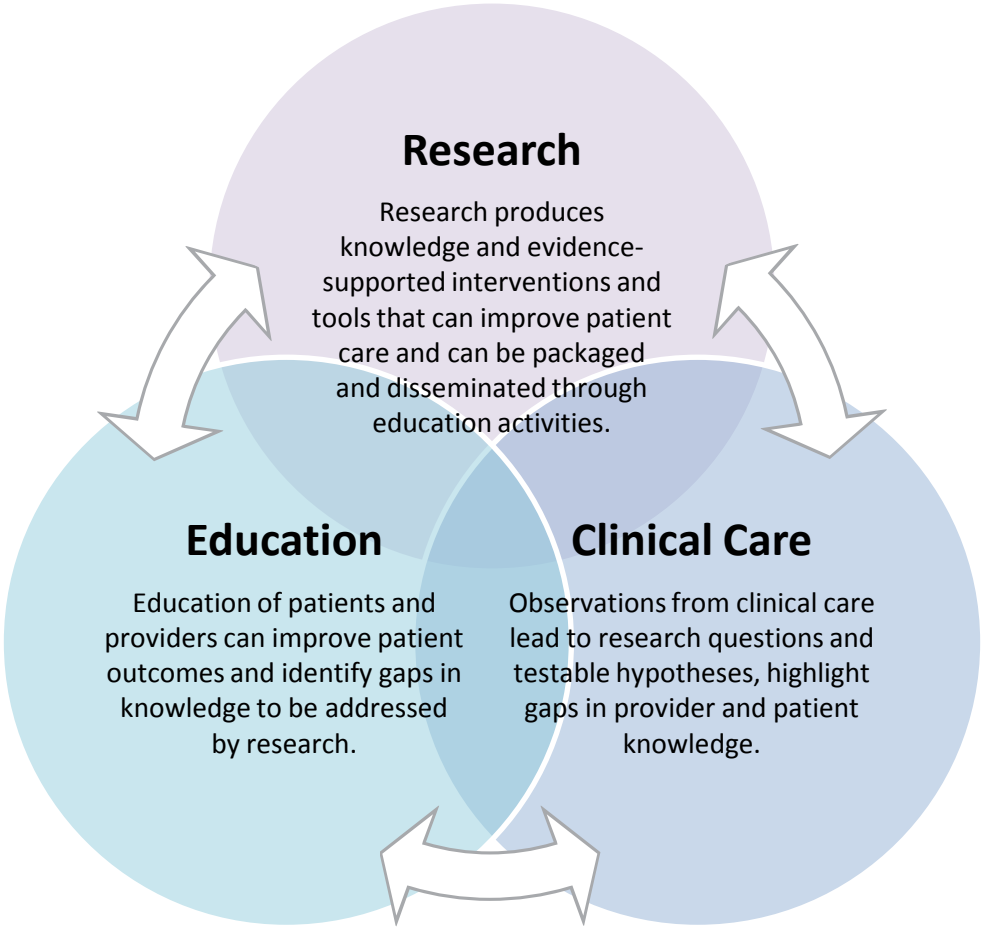
Poll Question #3

- Before this presentation, had you heard of the War Related Illness and Injury Study Center (WRIISC) (select 1)?
  - Yes, I've referred one or more patients to the WRIISC
  - Yes, I've interacted directly with the WRIISC (not for patient care)
  - Not sure
  - No

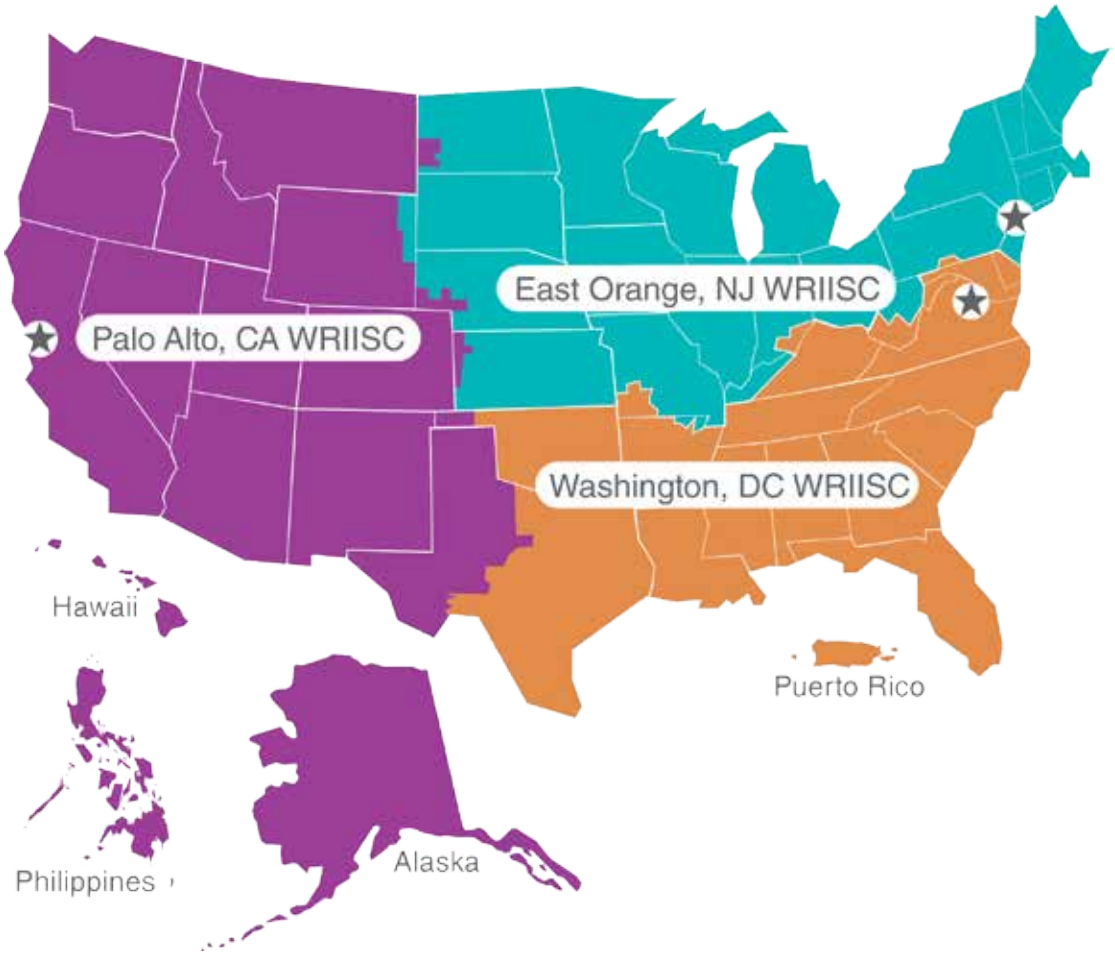
About the WRIISC

- Deployed Veterans have unique healthcare issues and concerns.
- The WRIISC serves Veterans from any conflict with war related illnesses and injuries through clinical assessments, education, and research.

WRIISC Synergies



WRIISC Service Areas



Stepped Care

Patients at the WRIISC

- Complex, symptomatic health problems
- Work up prior to referral includes appropriate tests and treatment trials
- Deployment-related environmental or occupational exposure concerns
- Local expertise exhausted

Comprehensive Evaluation Components

- History and Physical
- Psychological Evaluation
- Neuropsychological Evaluation
- Environmental & Occupational Exposure Assessment
- Social Work Interview
- Education Session
- Complementary and Alternative Medicine (CAM)
- Diagnostic Testing

WRIISC Experience with Chronic Pain

- Characteristics
  - Prevalence >60%
  - Most often musculoskeletal in nature
  - Often in multiple locations (e.g., shoulder + back + knee)
- Cause/inciting episode
  - Sometimes attributable to a specific injury
  - Often presumed to be due to overuse
  - Context of injury matters
- Barriers to chronic pain management
  - Inability to modify activities despite pain and incomplete healing
  - Difficulty accessing other desired and appropriate services
  - Ineffective interactions with healthcare providers
    - Over-reliance on medications
    - looking for an easy fix
  - Complicated by comorbidities- depression, PTSD, substance abuse, sleep disruption, other musculoskeletal injuries/dysfunction

WRIISC Model of Pain Assessment and Care Planning

- Holistic/biopsychosocial approach
  - Acknowledge and address 'other' aspects of chronic pain
- Multidisciplinary team
- Focus on optimizing health and function
- Emphasize self-management
  - Include Complementary and Alternative techniques
  - Goal and outcome oriented

The Road Map

- WRIISC and patient craft goals & next steps (Road Map)
- Provide Road Map to patient and referring provider
- Encourage appropriate & timely reassessment by PACT
  - Educate patient about working with PACT
  - Emphasize the importance of communication
  - Patient self-assesses progress (e.g., symptom log) and shares with PACT
- WRIISC follows up with patient
  - 1, 6, and 12 months
  - Problem solve barriers encountered

Outcomes Related to Pain at WRIISC

- Upgrading our follow up assessments in conjunction with stronger partnerships with the referring PACT.
- Examine:
  - Patient's personal goal achievement
  - Societal Participation (global measure of function)
  - Process measures of progress (e.g., scheduling and attending appropriate appointments)

Summary

- Musculoskeletal injuries are common in military service
  - Setting, context and injury characteristics vary
  - Barriers to recovery are common and some are relatively unique to military
- Injuries from military service may result in lifelong morbidity
  - Chronic pain
  - Dysfunction
  - Limitations of activities and participation
- A holistic, multidisciplinary approach focused on optimizing health and function is achievable
  - Goal oriented
  - Self management
  - Timely access to appropriate healthcare team member
  - Outcome assessment

WRIISC Contact Information

NJ WRIISC:

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