THE COST-EFFECTIVENESS OF COMPLEMENTARY AND ALTERNATIVE TREATMENTS TO REDUCE PAIN

WORK IN PROGRESS

PI: Stephanie L. Taylor, PhD, GLA VA
Co-PI: Patricia Herman, ND, PhD, RAND
Co-PI: Karl Lorenz, MD, Palo Alto VA , Stanford

Acknowledgements

- **Additional Team Members:**
  - Qing Zeng, PhD, George Washington U. (formerly Palo Alto VA) (Natural Language Processing Team Lead)
  - Craig Morioka, PhD, Greater Los Angeles VA
  - Wei Yu, PhD, Palo Alto VA (Cost And Utilization Data Lead)
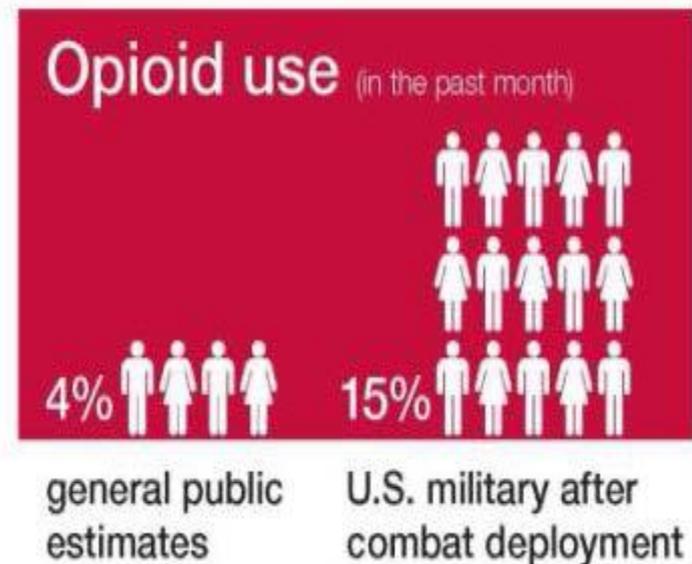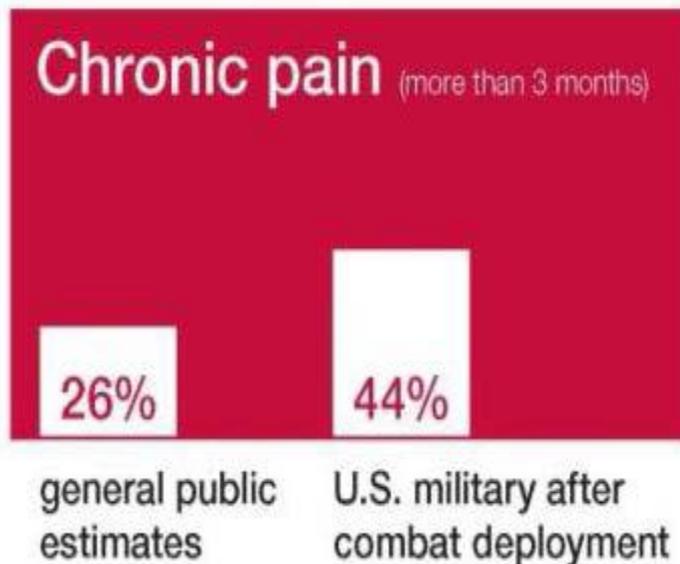 - Nell Marshall, PhD, Palo Alto VA

- **Musculoskeletal Disorder Study Cohort:**
  - Bob Kerns, MD; Cynthia Brandt, MD; Joe Goulet, PhD Yale and VA Connecticut

Study Background/Rationale

- Chronic pain and opioid use are prevalent among Veterans.

Toblin et al, 2011

Study Background/Rationale

- In the OEF/OIF/OND* Veteran population,
  - 62% have musculoskeletal disorders, most of which are accompanied by pain.
  - 58% have mental health conditions. Comorbid conditions include:
    - Anxiety
    - Depression
    - PTSD
    - Sleep Disturbance
    - Substance Abuse
    - Traumatic Brain Injury (TBI)
- There is a need to identify cost-effective non-pharmacological approaches to addressing pain and comorbid mental health conditions.

*Operation Enduring Freedom/Operation Iraqi Freedom/Operation New Dawn

Study Background/Rationale

- Some complementary and integrative health (CIH/CAM) approaches have some evidence for treating pain or comorbid mental health conditions and are being offered widely at the VA.
  - CIH/CAM = acupuncture, yoga, meditation, etc.
  - 2015 VA HAIG reports CIH offered broadly (facility level data).
  - Very little information on system-wide use by individuals.
  - CIH also not well-documented in medical records.

Study Background/Rationale

This study leverages the VA's existing databases to measure:

- the extent of CIH use in the population of OEF/OIF/OND* Veterans with musculoskeletal pain
- its impact on pain and opioid use
- its total cost
- its cost-effectiveness

Research Questions/Specific Aims

1. Determine resource use involved & "cost" of CIH services to VA

   - Big challenge is identifying CIH use

2. Determine cost-effectiveness of CIH for pain

   - Main analysis

3. Determine cost-effectiveness of CIH for co-morbid pain mental health conditions

   - Analysis of subset with both pain & 1+ MH

4. Interpret results and integrate findings into recommendations with Advisory Board help

Design and Methodology

- Cohort: Mostly OIF/OEF/OND veterans with chronic musculoskeletal disorder pain
  - Using the VA healthcare system during 2010-2013
- Chronic musculoskeletal disorder pain = either:
  - 2 or more MSD ICD9 codes "likely to represent chronic pain"* separated by 30-365 days
  - 2 or more MSD ICD9 codes within 90 days and with 2 or more pain scores ≥ 4 at 2+ visits within 90 days

*From Tian et al, J Am Med Inform Assoc. 2013; 20:e275-e280.

Design and Methodology- Defining Pain

- ICD9 code groupings
  - Back pain
  - Neck pain
  - Joint pain
  - Osteoarthritis
  - Temporomandibular disorder
  - Fibromyalgia
- Plus pain score

OR

Diagnoses "Likely to represent chronic pain" from

- Tian et al, J Am Med Inform Assoc. 2013; 20:e275-e280

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Design and Methodology- Defining Pain

- Tian examples
  - Psychogenic pain
  - Central pain syndrome
  - Joint pain
  - Anklosing spondylitis
  - Arthritis of the spine
  - Myelopathy
  - Schmorl's nodes
  - Disc degeneration
  - Postlaminectomy syndrome
  - Calcification of cartilage/disc
  - Spinal stenosis
  - Cervicalgia
  - Lumbago
  - Fibrositis
  - Fibromyalgia
  - Myelopathy
  - Coccydynia
  - Neuralgia
  - Faciitis
  - Pain in Limb
  - Backache

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MSD Pain Types – person level

Pain Types	Frequency	Percent*
Back pain	279,306	52%
Neck pain	89,522	17%
Joint pain	209,350	39%
Osteoarthritis	40,850	8%
Temporomandibular disorder	401	0%
Fibromyalgia	38,790	7%
Total Cohort	540,042	100%
Multiple MSD diagnoses	103,934	19%

*Percentages do not add to 100% because 19% of the cohort have multiple MSD diagnoses.

Design and Methodology

- Aim 1: Identifying 8 types CIH use via CPT and CHAR codes and natural language processing (NLP)
- Aims 2 and 3: Cost-effectiveness analysis using double robust methods to create comparable groups
- Aim 4: VA-based Advisory Board to help with inputs, and interpretation and integration of results

How CIH Is Being Identified

CIH Type	NLP	CPT Codes	CHAR Code
Acupuncture	X	X	X
Biofeedback	X	X	X
Guided imagery	X		X
Massage		X	X
Meditation	X		x
Tai Chi	X		X
Yoga	X		X
Hypnosis		X	X
Chiropractic*		X	

Natural Language Processing (NLP)

- A text mining technology that can search billions of pieces of electronic natural language text –e.g., notes in clinical records

- Uses a search technology that "teaches" machines to find particular words/terms in text and interpret them correctly

Keyword Identification · Text Sampling · Annotation · Training /Testing · Apply to Cohort
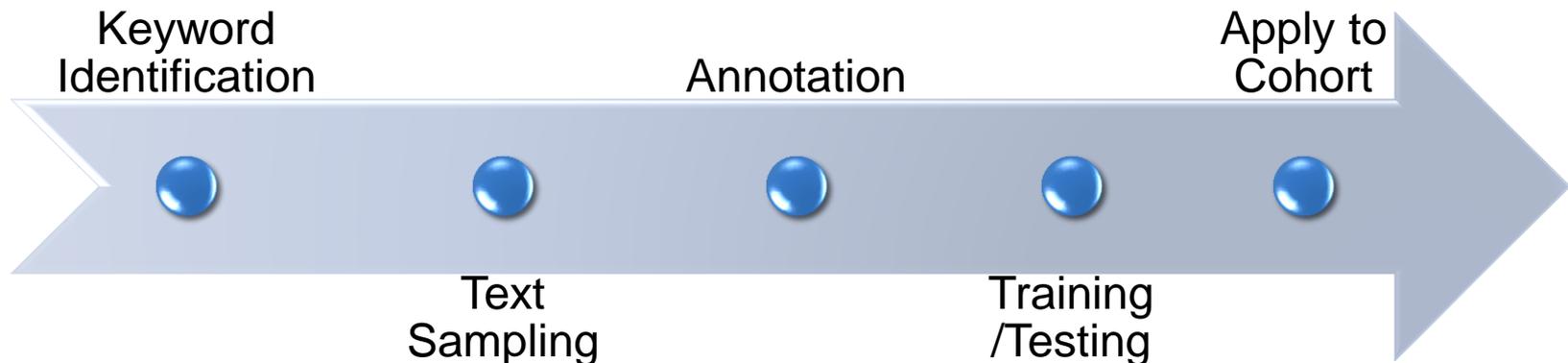
Cost-Effectiveness Analysis (CEA)

- Basic CEA is: (Δ Costs) / (Δ Effects)
- Comparison is between vets with chronic MSD pain using CIH and those who do not use CIH
  - Using double robust methods for comparisons
  - Combination of propensity scores and regression
- Effects measured using pain numerical rating scale (NRS) across the year
  - Also, will be measuring opioid use over year
- Costs are VHA healthcare utilization costs
  - VHA perspective
- Sensitivity analyses to test assumptions

Results To Date

- Cohort of mostly OEF/OIF/OND Veterans identified
  - Across both inclusion criteria 540,042 veterans w/chronic musculoskeletal chronic pain
    - 99% of these were identified by ICD9s "likely" for chronic pain
    - 91% of these were identified by ICD9s and $\geq$4 pain scores
    - So either inclusion criterion alone could have generated most of our cohort
- CIH use from NLP just obtained
- Merging with demographic, use and cost data

Frequency of CIH Use in Cohort

CIH Type	% of Cohort
Acupuncture	6%
Biofeedback	3%
Guided imagery	4%
Massage	2%
Meditation	16%
Tai Chi	2%
Yoga	7%
Hypnosis	0.1%
Chiropractic*	4%
Any of the above	27%

Challenges So Far

- Using NLP to identify CIH users and non-users
  - somewhat subjective interpretation of notes
  - Unclear if CIH documented in notes is internal or external to VA
- CIH use codes have challenges
  - Almost no one using CHAR codes yet
  - CPT4 codes – very few exist for CIH

Payoff to the VA for this Research

- Estimates of:
    - Overall CIH use - multimethod measure
    - Cost of CIH use (VA investment in CIH)
    - Impact of CIH use on healthcare utilization
    - Impact of CIH use on opioid use and pain
- Results could affect the offer and level of funding for CIH use for chronic musculoskeletal pain and:
    - Improve Veterans' health
    - Reduce their use of opioids
    - Allow for more efficient use of VA healthcare resources

Stay Tuned: Next Steps

- Examining cohort demographic characteristics –
  - Presented in next HERC cyberseminar on Feb 15, 11-12 PST (2-3pm EST)
- Explaining details of cost effectiveness (Feb 15)
- This summer – preliminary cost effectiveness results
- Dec. 2017 – final results
- Collaboration - We would be excited to collaborate with others (e.g., apply these cost effective methods to other studies of CIH)