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

WORK IN PROGRESS

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Acknowledgements

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- **Musculoskeletal Disorder Study Cohort:**
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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.
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

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
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

*
# MSD Pain Types – person level

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

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

- **Aim 1**: Identifying 8 types of 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

<table>
<thead>
<tr>
<th>CIH Type</th>
<th>NLP</th>
<th>CPT Codes</th>
<th>CHAR Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Biofeedback</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Guided imagery</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Massage</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Meditation</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Yoga</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hypnosis</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chiropractic*</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
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
Cost-Effectiveness Analysis (CEA)

- Basic CEA is: \( \frac{\Delta \text{Costs}}{\Delta \text{Effects}} \)
- 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 with chronic musculoskeletal chronic pain
  - 99% of these were identified by ICD9s “likely” for chronic pain
  - 91% of these were identified by ICD9s and ≥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
<table>
<thead>
<tr>
<th>CIH Type</th>
<th>% of Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acupuncture</td>
<td>6%</td>
</tr>
<tr>
<td>Biofeedback</td>
<td>3%</td>
</tr>
<tr>
<td>Guided imagery</td>
<td>4%</td>
</tr>
<tr>
<td>Massage</td>
<td>2%</td>
</tr>
<tr>
<td>Meditation</td>
<td>16%</td>
</tr>
<tr>
<td>Tai Chi</td>
<td>2%</td>
</tr>
<tr>
<td>Yoga</td>
<td>7%</td>
</tr>
<tr>
<td>Hypnosis</td>
<td>0.1%</td>
</tr>
<tr>
<td>Chiropractic*</td>
<td>4%</td>
</tr>
<tr>
<td>Any of the above</td>
<td>27%</td>
</tr>
</tbody>
</table>
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)