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TITLE: Impact of Evidence-Based Nonsurgical Management Guidelines on Outcomes for Disabling Knee Injuries: Long-Term Health Deficits, Disability, and Economic Analysis

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CONTRACTING ORGANIZATION: The Geneva Foundation, Tacoma, WA

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13. SUPPLEMENTARY NOTES

14. ABSTRACT

Background: Service members are at an increased risk for development of arthritic conditions, such as osteoarthritis (OA) of the knee, and therefore continued research into optimal intervention strategies is needed.
Design: Comparative effectiveness parallel-group randomized controlled clinical trial
Methods: Subjects with a diagnosis of knee OA will be recruited through the primary care clinics across 3 military hospitals (MAMC, WHASC, and BAMC). Patients that consent and enroll will be randomized to receive usual care defined as the core management strategies defined by the DoD/VA Guidelines for the Management of Knee Osteoarthritis or this same usual care in addition to physical therapy. Patients will follow up at 6 weeks, 6 months, 1 year and 2 years after enrollment.
Summary: The results of this study will help inform and develop best practices for those with a diagnosis of Knee OA.

15. SUBJECT TERMS
Pain Management

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1. INTRODUCTION:

Our overall objective is to improve the non-surgical management of TRICARE beneficiaries who have been recently diagnosed with knee OA. We hypothesize that more effective early management following diagnosis affords the greatest opportunity to improve clinical outcomes and reduce costs by delaying or avoiding the need for costly, invasive procedures. Specifically, we hypothesize that consistent delivery of evidence-based PT early in the care process for individuals recently diagnosed with knee OA will be more effective than providing only the core set of management strategies currently advocated in the VA/DoD Guidelines, and while providing PT will increase initial health care costs, the reduction in subsequent procedures will make the addition of PT a cost-effective early management strategy.

2. KEYWORDS:

Knee osteoarthritis, guidelines, usual care, service members, military health system, physical therapy

3. ACCOMPLISHMENTS:

What were the major goals of the project?

Our overall objective is to improve the non-surgical management of military beneficiaries who have been recently diagnosed with knee OA.

1. Compare the effectiveness of two early management strategies (Core Set vs. Core Set + PT) for Tricare beneficiaries recently diagnosed with knee OA by a primary care provider in the MHS for the primary outcome of knee function collected over the 2-year follow-up period.
2. Compare the effectiveness of the two early management strategies for secondary outcomes including knee pain, sleep disturbance, psychological distress (anxiety and depression), activity profile status, knee-related health care costs and utilization of invasive OA-related health care procedures (injections, arthroscopy, TKA) collected over the 2-year follow-up period.
3. Explore primary and secondary outcomes of the two early management strategies for sub-groups of patients recently diagnosed with knee OA based on OA etiology (post-traumatic vs. degenerative) and age at diagnosis (< 50 vs. > 50).
4. Compare the cost-effectiveness of two early management strategies collected over the 2-year follow-up

What was accomplished under these goals?

ACCOMPLISHMENTS

1. Project was approved by the primary site IRB at Brooke Army Medical Center 11 October 2018
2. Site Specific Addendum of Protocol submitted to each sub-site IRB and approved at all sites.
    a. Madigan Army Medical Center (IRB, May 2019; HRPO, June 2019)
    b. CLOSED // Carl R. Darnall Army Medical Center (IRB, February 2019; HRPO, March 2019)
    c. Wilford Hall Ambulatory Surgical Center (IRB, November 2018; HRPO, Dec. 2018)
3. Enrollment across all sites: 210 subjects (as of 29 September 2023)

FUTURE PLANS

We are enrolling at all 3 sites and beginning our process of recruiting from outlying clinics associated with each of the military treatment facilities which would hopefully expand our recruiting efforts and enrollment numbers.

Statement of Work Completed Tasks

	Timeline Months	**Site 1** (MAJ Pickens/ Dr. Rhon)	**Site 2** (Dr. Schroeder)	***Site 3** (Lt Col Taylor)	**STATUS**
Initial Task IRB submission, personnel hiring, and study-related training					
Subtask IT1. Hiring of research assistant(s) (months 1-3) and physical therapists (months 3-5)	0-3	Dr. R			COMPLETE
Subtask IT2: Submission of protocol at primary **IRB (BAMC – months 0-2) and then sub-site IRBs (after approval at primary site)	0-6	Dr. R	Dr. H	MAJ S	COMPLETE
Subtask IT3: Submit IRB approval and necessary documents for ***HRPO review.	6-9	Dr. R			COMPLETE
Subtask IT4: Establish administrative support for enrolling subjects. - A. Research Assistants/Project Manager will create all subject packets - B. Provide the appropriate documentation to all relevant clinicians - C. Establish databases for data collection and follow-up tracking (setup and test REDCap) - D. Manual of Procedures (MOPs) and training guidelines will be created.	6-9	Dr. R			COMPLETE

Statement of Work Future Tasks

	Timeline Months	**Site 1** (MAJ Pickens/ Dr. Rhon)	**Site 2** (Dr. Schroeder)	***Site 3** (Lt Col Taylor)	**STATUS**
Milestone 1: IRB approval and HRPO Approval	6-9				COMPLETE
<u>Specific Aim 1:</u> Compare effectiveness of two early management strategies (core set vs. core set + PT) over the 2-year	**9-82**				

follow-up period					
Task 1a: Enrollment of 300 subjects between 2 sites					
Subtask 1: Subjects are consented and study measures, that include self-report and physical performance tests, are taken	13-66	Dr. R (N = 100)	TBD *(N = 100)	TBD *(N=100)	
Milestone 2: Target enrollment met	66				
Task 1b: Follow-up occurs for a 2-year period, with follow-ups at 3 months, 6 months, and 1 year.	16-78	Dr. R	TBD	TBD	
Subtask 1: REDCap surveys sent at each time point Subtask 2: Track compliance with follow-ups	16-78	Dr. R			
Milestone 3: 1-year follow-up period complete	*78*				
Task 1c: Prepare data for analysis	78-79	Dr. R			
Subtask 1: Extract data from REDcap Subtask 2: Organize database for analysis	80	Dr. R			
Task 1d: Analyze data for AIM 1	80-82	Dr. R			
Specific Aim 2: Compare the two early management strategies for secondary outcomes collected over the 2-year follow-up period.	78-84	Dr. R			
Task 2a: Analyze data for AIM 2. (This is a data-analysis task and requires no additional subject testing beyond Aim 1.)	80-84	Dr. R			
Task 2b: Perform sensitivity analysis, and account for specific populations (PTOA, age variations, etc)	80-84	Dr. R			
Specific Aim 3: Evaluate outcomes for sub-groups of patients recently diagnosed with knee OA based on OA etiology (post-traumatic vs. degenerative) and age at diagnosis ($\leq$ 35 vs. > 35)	80-84	Dr. R			
Task 3a: Analyze data for AIM 3. (This is a data-analysis task and requires no additional subject	80-84	Dr. R			

testing beyond Aim 1.)					
Task 3b: Perform sensitivity analysis, and account for specific populations (PTOA, age variations, etc)	80-84	Dr. R			
Specific Aim 4: Compare the cost-effectiveness of two early management strategies collected over the 1-year follow-up period.	76-84	Dr. R			
Task 4a: DSA with DHA	74-81	Dr. R			
Subtask 1: Submit DSA Application to DHA for permission to collect healthcare utilization data from MDR database	74	Dr. R			
Subtask 2: Approved DSA submitted to PASBA for extraction of healthcare utilization data	76-81	Dr. R			
Task 4b: Consolidate and organize healthcare utilization data. (This is a data-analysis task and requires no additional subject testing beyond Aim 1.)	81-82	Dr. R			
Subtask 1: Match MDR data with appropriate subject ID numbers	81-82	Dr. R			
Subtask 2: Consolidate data from both sources (REDCap and MDR), and organize by individual subject ID to obtain master spreadsheet for analysis	81-82	Dr. R			
Task 4c: Compare healthcare utilization costs between groups. (This is a data-analysis task and requires no additional subject testing beyond Aim 1.)	82-84	Dr. R			
Specific Aim 5: Evaluate the mediating effects of co-morbidities and activity self-efficacy on the primary outcome.	81-84	Dr. R			
Task 5a: Conduct mediation analysis (This is a data-analysis task and requires no additional subject testing beyond Aim 1.)					

What opportunities for training and professional development has the project provided?

Nothing to Report

How were the results disseminated to communities of interest?

Nothing to Report

What do you plan to do during the next reporting period to accomplish the goals?

We have seen a steady increase in appointments in the clinic associated with musculoskeletal injuries and pain which provides a greater pool of patients to recruit from. We are actively recruiting from an outlying clinic and in the process of starting recruitment at an outlying medical home in hopes to increase study enrollment. At our current pace we should reach our goal of 300 by the end of this next year.

4. **IMPACT:**

What was the impact on the development of the principal discipline(s) of the project?

Nothing to Report

What was the impact on other disciplines?

Nothing to Report

What was the impact on technology transfer?

Nothing to Report

What was the impact on society beyond science and technology?

Nothing to Report

5.

CURRENT PROBLEMS/ISSUES:

As of 9/29/2023, we have enrolled 210 participants. We have hired another physical therapist who will be full time by December (it took 7 months to get them through the DHA contractor in-processing system), and be able to help with recruitment efforts. We also have had an opportunity to begin actively recruiting from a second clinic at one study site and are in the process of establishing ourselves to do the same at another study site. We continue to average more than one patient a week and hope this continues to improve with our expanded reach.

PREVIOUSLY REPORTED PROBLEMS:

Over the last 3 months our research staff at 2 of our 3 sites have lost 2 physical therapists. We have hired one replacement and they are getting trained up to help with enrollments and study procedures for this project. We are in the process of hiring a second physical therapist and hope to have them onboarded and working on study procedures within the next couple of months. With increased recruitment efforts we are seeing more referrals to research which is creating a more established route of care for patients coming through the primary care clinics with knee osteoarthritis. We hope with the increased referrals, we will see enrollment increase as well. A larger proportion of retirees have this condition, and many clinics are prioritizing active-duty only for appointments, deferring others to the network.

We are continuing to average 1-2 enrollments each week and seeing more consistency in enrollment across each of the 3 sites. We are working on ways in which to expand our efforts to recruit from an additional clinic at the BAMC site to increase our access to additional patients and enrollment numbers. We are problem solving ways in which to improve referrals from providers as a number of patients who appear eligible are routed through other avenues of care. We are anticipating losing two of our physical therapists in the coming months and are looking to hire two new PTs to replace them. We are hoping for enough of an overlap to maintain recruitment and enrollment efforts while we train the new staff.

Primary care clinics are continuing to normalize and there are increasing numbers of patients coming through with musculoskeletal injuries. We are averaging one to two enrollments a week across the entire study, and this is steadily improving with more patients attending our classes each week. We have been able to retain, train, and credential all of our physical therapists over the past few months which has allowed us to focus on recruitment and enrollment efforts for this study. This has positively impacted our team across all sites as much of the prior year we have had to manage understaffing and focus on training rather than recruitment efforts.

We continue to be limited for a variety of reasons. Not only did the COVID-19 pandemic reduce the level of priority for patients with osteoarthritis to be seen in the clinics, but the new wave of the EMR (GENESIS) has resulted in clinics reducing their work load to 50% availability why staff members go through the new EMR training. These bulk of this period just finished up at BAMC the end of February 2022. Many clinics (including the ones we are recruiting from) have been hesitant to re-open up access to non-active duty, the category which many of the patients that meet criteria for our study fall into. A majority of these patients have been getting referred out to the network. With the pandemic easing and the large bulk of GENESIS training mostly out of the way, we are told that things will begin to normalize again over the rest of this year in terms of opening up access again to these patients. To further complicate things, we have had a large exodus of research staff over the last 6 months and are very much understaffed right now, which affects our ability to recruit for these studies. The job market is very tumultuous right now, with salary requests for new prospects far exceeding what our current staff had and what we had budgeted. We are trying to hire replacements, but it has been taking longer than expected. Just today we had another Research PT accept an offer and join our team, and are looking to still hire 2 more in the San Antonio area. The positive part of this is that we've been able to deflect personnel costs in many ways to align with the slower progress of this trial. I fully expect to be able to complete the trial, but it will be delayed. As we get back to normal staffing numbers and begin to bring in patients, I expect this next year to be our strongest recruitment year to date. We will just need at least 1 and most likely 2 No Cost Extensions, even with a change in follow-up from 2 years down to 1 year.

Changes that had a significant impact on expenditures

A large proportion of our budget goes to personnel to help support recruitment and enrollment. While we have been less productive with the research due to the limitations listed above, we have been able to preserve somewhat funding on this project by deferring some personnel time to other projects, into the current initial NCE right now (and may potentially need 1 more) for this project.

Significant changes in use or care of human subjects

N/A

Significant changes in use or care of vertebrate animals

N/A

Significant changes in use of biohazards and/or select agents

N/A

6. PRODUCTS:

- **Publications, conference papers, and presentations**

Journal publications.

Nothing to Report

Books or other non-periodical, one-time publications.

Nothing to Report

Other publications, conference papers and presentations.

Nothing to Report

- **Website(s) or other Internet site(s)**

Nothing to Report

- **Technologies or techniques**

Nothing to Report

- **Inventions, patent applications, and/or licenses**

N/A

- **Other Products**

N/A

7. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

What individuals have worked on the project?

Name:	Dr. Daniel Rhon
Project Role:	Primary Investigator
Researcher Identifier (e.g. ORCID ID):	0000-0002-4320-990X
Nearest person month worked:	0.81
Contribution to Project:	Grant PI – coordinate studies across all sites
Funding Support:	Partially from this grant

Name:	Dr. Julie Fritz
Project Role:	Co-Investigator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	N/A
Contribution to Project:	Manages subaward to U. of Utah, helps coordinate study, and provides input into study design

Name:	Rachel Mayhew
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	2.2
Contribution to Project:	Coordinates execution of project at MAMC – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Nathan Dunn
Project Role:	Research Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.03
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Alexis Southwell
Project Role:	Research Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.58
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Athena Farias
Project Role:	Research Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.44
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Jeremy Steiner
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	1.43
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Anne Lee
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	3.47
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Brian Johnston
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.18
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Mariah Callas
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	2.03
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Tina Greenlee
Project Role:	Project Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.33
Contribution to Project:	Coordinates execution of project – multi-site coordination and process improvement, training staff, recruitment, follow-ups
Funding Support:	Partially from this grant

Name:	Jeremy Schroeder
Project Role:	Site PI
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	N/A
Contribution to Project:	Site PI - Coordinates execution of project at MAMC
Funding Support:	Partially from this grant

Name:	Cristal Hernandez
Project Role:	Research Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.49
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Timothy Murga
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	1.4
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Kaitlyn Foster
Project Role:	Research Physical Therapist
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	1.81
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Ashley Montalvo
Project Role:	Research Coordinator
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.20
Contribution to Project:	Coordinates execution of project – recruitment, enrollment, follow-ups.
Funding Support:	Partially from this grant

Name:	Amanda Morales
Project Role:	MORE Clinician
Researcher Identifier (e.g. ORCID ID):	N/A
Nearest person month worked:	0.22
Contribution to Project:	Treating patients for one of our treatment arms of the study.
Funding Support:	Partially from this grant

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

Nothing to Report

What other organizations were involved as partners?

We continue to work in collaboration with the University of Utah, who has received a subaward for this project

8. SPECIAL REPORTING REQUIREMENTS

COLLABORATIVE AWARDS:
QUAD CHARTS:

9. APPENDICES: N/A