A. Cover Page

1. Title: ***Leveraging Telemedicine to Facilitate the Diagnosis, Treatment, and Management of Rheumatoid Arthritis in the Community***

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Submitted by:
Accredited Provider: **Dartmouth-Hitchcock Medical Center**
Education Partner: **Medscape, LLC**

2. Abstract

Dartmouth-Hitchcock Medical Center (D-H) has identified gaps in the diagnosis and care for patients with rheumatoid arthritis (RA), especially those who live in rural areas and/or experience barriers to optimal care. We propose to address these gaps by combining targeted education for primary care providers (PCPs) who will have access to expert rheumatologic consultation through a variety of electronic interfaces, including telerheumatology. Through in-person visits and using a D-H designed algorithm, selected clinicians in the D-H catchment will be guided through on-demand education modules coupled with consult from D-H, which will provide community-based practitioners the opportunity to network and learn from D-H experts in RA. CME activities directed to PCPs will provide information and guidance to improve knowledge and competence needed to diagnose, treat, and manage patients with rheumatoid arthritis. This approach will increase access to education and specialist RA care among the rural-based hospitals and practices in the D-H catchment area and is expected to result in: 1) increased access to a rheumatologist for the care of patients in remote areas; 2) increased early diagnosis of patients with RA; and, 3) a larger number of patients appropriately treated and managed in a timely manner to meet treat-to-target goals. Data will be collected to measure significant changes in knowledge, competency, performance, and patient outcomes. This model for improving access to care will be reproducible in other systems as an effective method for incorporating telemedicine in the management of patients with RA.

Leveraging Telemedicine to Facilitate the Diagnosis, Treatment, and Management of Rheumatoid Arthritis in the Community

B. Table of Contents

C. Main Section of the Proposal

1. ***Overall Goal and Objectives***

Overall goal: The overall goals of this project are to: 1) Train physicians to accurately and confidently diagnose, treat and manage rheumatoid arthritis (RA) among patients by using online education modules and resources specific to the diagnosis, treatment, and management of RA; 2) Use D-H telemedicine/telerheumatology services to reduce the gap in time from onset of symptoms indicating RA and the initiation of appropriate disease-modifying anti-rheumatic drug (DMARD) therapy in patients in rural areas.

Objectives: Our objective is to increase access to education and specialist care for PCPs at rural-based hospitals and practices throughout Vermont and New Hampshire using telemedicine which will result in the following:

- Improved ability of PCPs to diagnose and initiate treatment in patients with RA;
- Increased access to rheumatologists for patients in remote areas;
- Increased number of patients with RA who are diagnosed early; and
- Increased number of patients with RA managed in a timely manner to meet treat-to-target goals.

2. ***Current Assessment of Need in Target Area***

Dartmouth-Hitchcock Medical Center (D-H) is a rural academic tertiary-care center in Lebanon, NH comprising the 400-bed Mary Hitchcock Memorial Hospital (MHMH), the Children's Hospital at Dartmouth-Hitchcock (CHaD), and the Dartmouth-Hitchcock Community Medical Practice, a network of more than 900 primary and specialty care physicians located throughout New Hampshire and Vermont, serving a population of 1.6 million, including the region's highest acuity patients with the most financial need. D-H also serves patients Maine, Massachusetts, and New York.

Many D-H patients live in the region's rural, mountainous areas where access to specialized care is a major barrier to receiving optimal treatment and achieving good outcomes. The Rural Data for Action: Comparative Analysis of Health Data for New England Region report notes that "the proportion of elderly residents increases sharply with increased rurality"; and, "Over 40% of all households in the most remote areas have one or more elderly residents present, which is the population most affected by inflammatory arthritis." Nearly 33% of elderly people in in the United States rely on social security alone to support them. Mean family incomes in rural communities in the D-H catchment area are $5000+ (23%) less than in non-rural communities, and $24,000+ (36%) less in the very isolated rural areas of the region. Patients are less able to afford the time away from work and transportation costs to seek specialty rheumatology care at D-H. Additionally, the distance between the patient's home and D-H, which can exceed 100 miles, and the average time from primary care provider referral to rheumatology visit, which can exceed 60 days, prevent patients from receiving optimal care.

Many primary care physicians are not confident in the management of rheumatic diseases. In general, there is minimal exposure to the disease area during medical school and residency training,

leaving a knowledge gap in the identification and management of rheumatoid arthritis. The American Academy of Family Physicians is aware of this gap and gearing continuing medical education toward this subject matter to address the issue.

2a. D-H Patients with RA

Ten D-H rheumatology providers see approximately 135 new patients each month with approximately 90 of these referrals from providers outside of the D-H health system. Many patients travel to D-H from rural communities, where their local primary care provider (PCP) may not be affiliated with a local critical-access hospital.

At D-H, we currently provide telerheumatology services to Weeks Medical Center (WMC), a rural critical-access hospital in northern New Hampshire. Over the last three years, D-H providers have seen 176 individual patients over the course of 244 visits in 2 WMC clinical locations in Vermont and New Hampshire. By providing this service, we found that we saved each patient an average of 200 miles of travel and reduced access barriers, enabling earlier diagnosis and treatment of inflammatory conditions such as RA, where early treatment is not only the standard of care but yields the best long-term prognosis.

2b. ***Training Needs for Physicians Diagnosing Rheumatoid Arthritis***

An estimated 52.5 million adults in the United States reported that a physician told them they have some type of arthritis, and approximately 3 to 5 million have RA. By 2030, it is estimated that 67 million Americans will suffer from arthritis. A recent *Arthritis Care and Research* study highlighted that the average time from diagnosis of RA to DMARD introduction is 8.5 years for patients in the lower socioecomic bracket, translating to statistically significant increases in disease activity and lower functional status scores (DAS 28, HAQ and Sharp). To induce successful long-term management of RA, it is critical to access patients within the first 3-6 months of disease presentation.

Studies have also shown that PCPs are uncomfortable managing rheumatoid arthritis. A 2012 study surveyed family practitioners, many of whom had been in practice over 10 years, to evaluate their perspective about diagnosing and managing rheumatoid arthritis. The majority of practitioners described themselves as “somewhat comfortable with the diagnosis and management of RA”. Thirty-five percent (35%) of the physicians reported DMARD’s need only be prescribed after failure of non-steroidal anti-inflammatory drugs (NSAID), while 61% reported they were uncomfortable initiating DMARD therapy and 80% reported they would refer only for advanced disease or patient preference. They also noted that it was difficult to get patients into see a rheumatologist (44%). In 2016, the American Academy of Family Physicians found that 42% of their constituents did not have appropriate skills to manage and diagnose rheumatoid arthritis and have initiated formal CME courses for their cohorts. Telerheumatology offers a unique way to connect with rural physicians to provide additional education and support services.

At D-H, we have worked to not only improve the delivery of care through the use of telerheumatology, but to also examine its utility and effectiveness. In the pilot study at Weeks Medical Center, we identified several rheumatology-specific care gaps. We found that rural

providers: 1) demonstrated poor recognition of the signs and symptoms of early inflammatory arthritis, potentially delaying the diagnosis and appropriate treatment; 2) were not always able to adequately convey the patient's physical exam findings to the telerheumatologist; and, 3) were either not aware of or able to access available telerheumatology services.

We also analyzed patient data from those patients referred to the D-H rheumatology clinic by rural physicians and found that providers demonstrate: 1) a lack of appropriate pairing of a patient to the telemedicine visit; 2) delayed initiation of time-sensitive therapy (eg, DMARD) by the PCPs; and 3) lack of competency for delivering appropriate care using telemedicine. These gaps were identified through analysis of the needs in our service area including audits of baseline electronic medical records and interviews with members of the RA healthcare team. Given these findings, it is imperative that we address these service gaps in our region by increasing access to D-H rheumatologists and better educating rural providers. D-H providers have significant capacity to care for the additional patients acquired through the regional visits. We are committed to accommodating any additional patients and have increased capacity with the recent hiring of a nurse practitioner and physician. We are seeking grant support to expand the use of telerheumatology services that are accessible, accurate, timely, and affordable for rural providers, which will decrease the time to diagnosis and treatment of RA.

3. ***Target Audience***

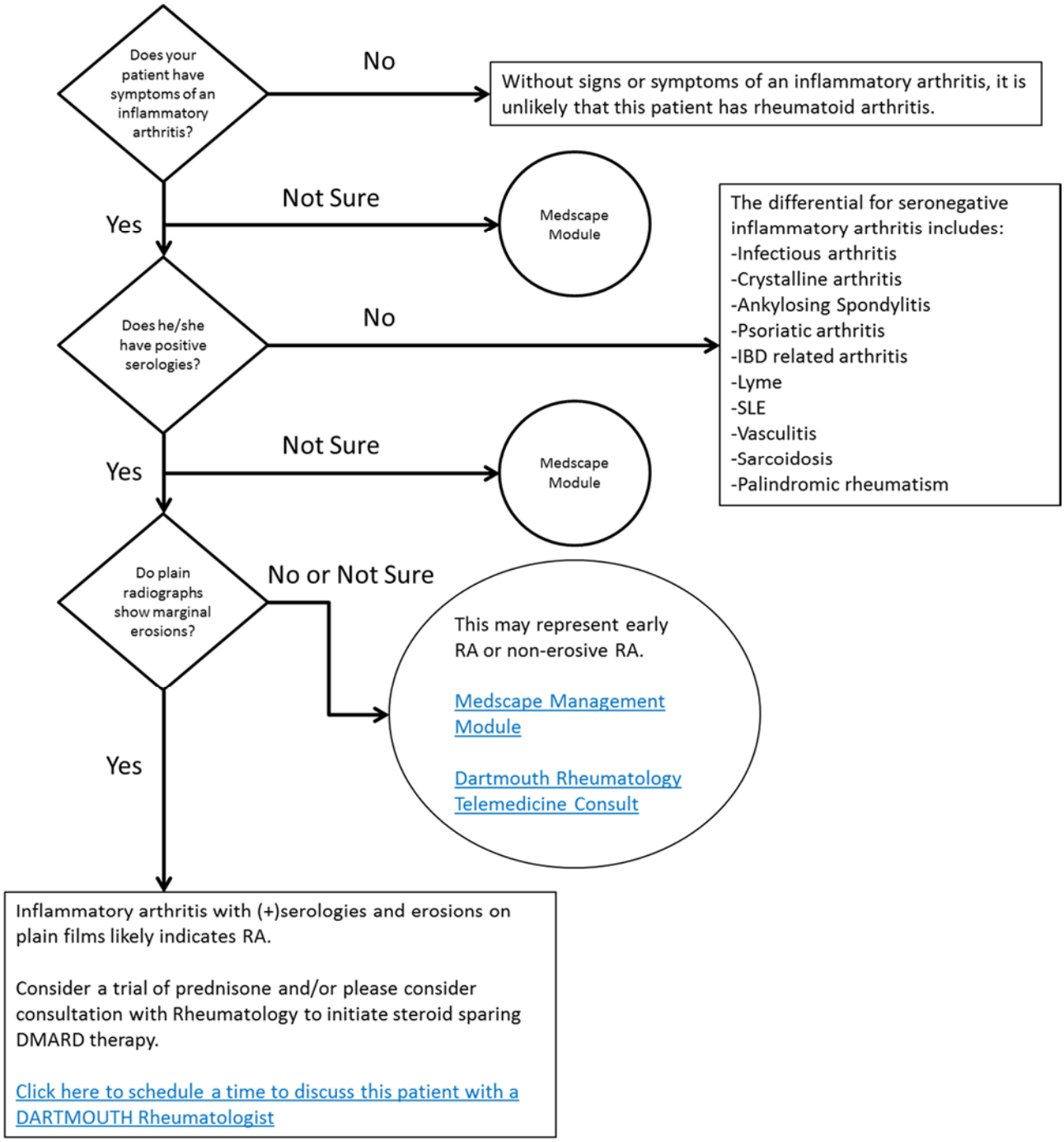
We will approach 10 institutions, of which we aim recruit 5 who demonstrate a commitment to interact with the rheumatology section to provide accelerated care of patients with presumed rheumatoid arthritis to facilitate effective management of their inflammatory disease.
Our target audience includes nearly 800 local physicians across northern New England. The scope of practice would include general practitioners primarily practicing in rural private practices, or in community-based hospital settings. Our level of commitment is to fulfill all of the demand that is generated from this outreach. Both patients and providers will benefit directly from this initiative, which includes training through online educational modules to D-H's network of physicians, reaching more than 22 rheumatologists and more than 1,000 PCPs.

Medscape, as our partner and the number one provider of online education, is uniquely qualified and positioned to expand the D-H model of telerheumatology nationwide by delivering this education to its multi-specialty and multi-professional clinician members. Medscape has the largest online membership of active US healthcare providers, including 3,590 active rheumatologist members, collectively accounting for more than 18,080 visits to Medscape per month. Medscape membership also includes nearly 1,400 registered rheumatology nurse practitioners (NPs), physician assistants (PAs), and nurses. Medscape's membership includes 185,080 primary care/internal medicine physicians, 75,180 primary care NPs and PAs, and nearly 177,000 primary care nurses. Expanding the online education to clinicians nationwide enables other systems and practices to model the approach of incorporating telemedicine/telerheumatology in the management of patients with RA.

While the educational modules, medical in-person presentations, and PCP-to-rheumatology consultations are aimed at providers (MDs, DOs, PAs, and NPs), the beneficiaries of this project are

clearly the patients. The earlier that patients receive an appropriate diagnosis of RA and can initiate therapy, the better their long-term outcomes will be, including decreased disability, decreased burden of illness, and improved quality of life. Letters of commitment from several rural, community-based healthcare facilities are included in the Appendix.

4. ***Project Design and Methods***
   A. We will partner with Medscape to address access to care and education gaps in the rural areas of Vermont and New Hampshire. Together, we will design a blended-learning initiative, which we will invite 10 small (25-bed/low patient volume) regional hospitals in the D-H catchment area to pilot with the aim of recruiting 5 sites to participate in the program. The interface will include an interactive algorithm designed to assess current provider diagnostic skill levels and to supply providers with education based on their needs at the time they are accessing the algorithm. The algorithm will allow providers to proceed progressively through the educational modules that will include topics about telerheumatology, and best practices for diagnosing and managing RA. The interface will also provide users with the ability to contact a DH Rheumatologist for additional help and patient-specific recommendations. The figure below shows a visual representation of this algorithm:



B. This targeted approach will educate providers on their self-identified knowledge deficiencies and will provide them with the opportunity to continue along the algorithm, or contact a DH Rheumatologist for assistance. In addition, D-H-affiliated rheumatology providers, who regularly care for patients with RA, will provide consultations to rural care providers accessing the algorithm, to assist with the diagnosis and treatment of patients with. These D-H providers have capacity to care for the additional patients acquired through the telerheumatology visits. Increasing the presence of D-H telehealth and telerheumatology across the five rural sites will help us define the protocols for engaging with additional rural

practices in the D-H catchment area and fostering the use of telemedicine nationwide. Telerheumatology will promote evidence-based protocol-driven patient care with integrated outcome measures through expert consultation and will support D-H at the forefront of coordinated high-value healthcare.

C. To track participation and engagement by each site, access to the D-H telemedicine program will require registration, a brief assessment of the interaction via a RedCap survey, and the viewing of the online modules. These modules may be accessed during the in-person visit or separately, at a time convenient to the clinician/practice.

D. Although telerheumatology has been explored in a small number of institutions, no organized approach to the identified and care of early RA patients has been attempted.

E. This program builds on D-H's prior experiences providing care to patients via telerheumatology in several rural clinics. Telemedicine at D-H has been pioneered by rheumatology through a stand-alone program at Weeks Memorial Hospital and a hybrid model at Southwest Vermont Medical Center, which served as an interim operation to bridge an established clinic with a retiring provider and a newly recruited physician. Both programs were unqualified successes, based on patient and provider satisfaction data. Building upon those successes and recognizing the need for access to high-quality online education, D-H and Medscape will partner to deliver a direct, telemedicine awareness campaign with online education to providers in remote clinics. One of the educational modules will be the function and utility of telerheumatology in reducing barriers to access.

F. The algorithm and educational modules are novel tools that will developed as part of the grant and will be available.

The initiative will be implemented as follows:

1. **REGIONAL SITE IDENTIFICATION AND VISITS**: Led by Daniel Albert, MD, 10 regional sites within the D-H catchment area will be selected for an initial, in-person medical grand rounds presentation about the diagnosis and treatment of RA. An orientation to this algorithm and instructions for how providers can connect with a D-H rheumatologist via telemedicine for consultation, specifically for patients with inflammatory arthritis, will be included in the grand rounds. Initial in-person contact is critical to establish relationships with providers at the rural hospitals. Proposed grand round sites include the following D-H primary care locations and rural critical-access hospitals:
    i. Alice Peck Day Gifford Medical Center, Randolph, VT
    ii. North Country Hospital, Newport, VT
    iii. Concord Primary Care, Concord, NH
    iv. Weeks Medical Center, Lancaster, NH
    v. Nashua Primary Care, Nashua, NH
    vi. Northern Vermont Regional Hospital, St. Johnsbury, VT
    vii. Cottage Hospital, Woodsville, NH
    viii. Valley Regional Hospital, Claremont, NH

ix. Speare Memorial Hospital, Plymouth, NH
x. Brattleboro Memorial Hospital, Brattleboro, VT

Our goal is to pilot this initiative at 10 sites via grand rounds including an educational algorithm that will connect rural-based practitioners with a DH Rheumatologist, as needed. Each site will sign a letter of commitment agreeing to host the medical grand rounds presentation, providing their practitioners with the opportunity to engage with online education and telemedicine platform.

We will also demonstrate how telemedicine can be used as a mechanism for building a network of specialty care by providing one computer tablet to each site and explaining how the technology can be integrated during point of care. Using the tablet, clinicians and their multidisciplinary team will be shown how to access the algorithm and the online education modules that provide training for foundational concepts about telemedicine, telerheumatology, and clinical information about the diagnosis, treatment, and management of RA. Providers will also be shown how to connect with a D-H rheumatologist via telephone. Options for patient follow-up will be offered to ensure continuity of care beyond the initial consultation.

This initiative will provide community-based practitioners with the unique opportunity to telenetwork and learn from D-H experts in the field of RA. This new program builds upon the D-H Center for Telehealth and its telemedicine consult centers. The D-H Center for Telehealth partners with health care providers throughout northern New England to provide the best and most timely care to the region's nearly two million residents, no matter where they live. The D-H Center for Telehealth offers telemedicine services for many clinical areas including: Dermatology, Liver/Transplant, Nephrology, Neurovascular, Orthorpaedics, Pediatrics, Psychiatry, Radiology, Respiratory Therapy, Rheumatology, and Trauma. Telehealth is a central part to achieving the "triple aim": better population health, improving the experience of care while reducing costs. Telerheumatology is a model of care that is particularly useful in rural regions, which affords D-H rheumatologists the opportunity to provide specialty care to patients in their local communities and to provide options for follow-up and continued care either by the PCP, by an in-person specialist visit at D-H, or via future telemedicine consults with the local PCP. Secure and medically-approved equipment and software – infrastructure already in place at D-H - allow for interactive communication with physicians in any location. Telemedicine services connect patients and providers to specialists within the D-H system.

2. **ONLINE EDUCATION**: Regional sites will have access to online education modules and resources regarding telemedicine, telerheumatology, and the D-H Center for Telehealth, as well as rheumatology-specific multimedia education modules, to be designed and developed in collaboration with Medscape. The online education modules will be certified for continuing medical education (CME) credit by the D-H Office of CME. Planned modules include the following topics:

Activity 1: ***The Promise of Telerheumatology: How It Works***
CME Expert Exchange; 0.25 *AMA PRA Category 1 Credit™*
Learning Objectives

- Identify the key components of telemedicine consultation
- Recognize the benefits of telemedicine in diagnosing and managing patients with RA

Instructional Design and Rationale
The Expert Exchange features an originally developed 10- to 15-minute video discussion between 2 rheumatologists from D-H. It also may include 1 or 2 interactive, multiple-choice, intra-activity questions that deepen learner engagement and provide immediate peer feedback. This format includes a downloadable deck of approximately 10 slides and has proven extremely popular with viewers as a lively platform for providing information in a succinct manner. A transcript with embedded slides is available for future reference and for sharing with colleagues. This format has been chosen for its aptness for exchanging and exploring viewpoints; offering access to key opinions and perspectives; and highlighting recommendations and techniques for optimal patient care. A skill-building video vignette integrated into the activity will demonstrate telerheumatology in action.

Content Focus
The discussion may include background about telemedicine toward establishing a foundation and model for telerheumatology at D-H sites.

Activity 2: *Diagnosing Rheumatoid Arthritis Early: A Guide for Primary Care*
Video Lecture; 0.5 *AMA PRA Category 1 Credit*™
Learning Objectives
- Identify the established criteria for early diagnosis of rheumatoid arthritis
- Recognize when to refer patients to a rheumatologist for evaluation using telemedicine

Instructional Design and Rationale
This 30-minute video-based lecture activity with synchronized slides is presented by an expert in the diagnosis and treatment of RA. The lecture is filmed using green-screen technology, which allows learners to view the speaker as they would during a live presentation and provides an engaging learning experience. The 25 to 30 slides that accompany the lecture may occupy the entire window of the media player or appear onscreen with the speaker. Slides with simple animation, figures, graphics, and/or diagnostic still images (e.g., x-rays, MRIs, angiograms, ultrasounds) may be included. The lecture includes interactive, multiple-choice, intra-activity questions that provide another element of engagement and feedback in addition to establishing knowledge baseline. A transcript with embedded slides and a downloadable deck are available for future reference and serve as supplemental learning tools for offline use. This format is highly effective for summarizing information on diagnosis, treatment, practice guidelines, and special population needs; reinforcing evidence-based recommendations for patient care; and advancing baseline knowledge and comprehension.

Content Focus
This clinically based primer is designed for PCPs and will detail the signs and symptoms of RA and strategies for early diagnosis and referral (telereferral) to a specialist.

Activity 3: ***Managing RA: Telepartnership Between PCP and Rheumatologist***
CME Expert Exchange; 0.25 *AMA PRA Category 1 Credit™*
Learning Objectives

- Identify assessment tools to monitor for achievement of goals of therapy in patients with RA
- Develop a plan to co-manage RA patients using telerheumatology techniques

Instructional Design and Rationale
See Activity 1.

Content Focus
The discussion between a rheumatologist from D-H and a regionally based PCP will include how telemedicine/telerheumatology can facilitate the co-management of the patient with RA, with a focus on monitoring to determine whether target goals of therapy are achieved and the need for treatment modification for treating to established target goals.

We anticipate that these online CME activities will meet the following Accreditation Council for Graduate Medical Education (ACGME) core competencies and skills:

- Patient care—Informed decision-making; develop and carry out patient management plans; use information technology; work in a team
- Practice-based learning and improvement—Analyze own practice for needed improvements; use information technology
- Interpersonal and communication skills—Work effectively as part of a healthcare team
- Systems-based practice—Understand interaction of one's practice with larger system; partner with healthcare managers and healthcare providers to assess, coordinate, and improve healthcare

This initiative will be distributed by D-H in the following manner:

- Promoting the activity on the D-H website;
- Providing links to the CME activities via D-H website;
- Hosting a 1–hour presentation at each participating rural hospital (whether or not they are a D-H affiliate) that will be led by Dr. Daniel Albert, Dr. John Mecchella, or Dr. Stephanie Mathew, who will discuss the diagnosis, treatment, and management of RA, and outline the available educational resources and ability to connect with a D-H rheumatologist; and
- Interfacing with D-H and the educational modules to be developed in this initiative via tablet-based services

The online activities will be posted by Medscape Education through the following efforts:

- Platform Integration: Includes site integration and placement into Medscape desktop and mobile platform and inclusion of the integration of CME Tracker (Medscape members' personalized trackers of their completed activities)
- Audience Generation: Audience recruitment to the activity by deploying onsite and offline announcements

- A fully integrated recruitment plan that is executed throughout the entire Medscape desktop and mobile platform using onsite placement in relevant specialty home pages and directories, CME learning centers, e-newsletters, as well as optimization within Medscape's internal search engine and external search engines (eg, Google)

5. ***Evaluation Design***

Because of the innovative nature of this project and the lack of prior studies pertaining to telemedicine and telerheumatology, the current baseline of patients with RA in rural NH and VT who are not receiving care is not yet defined. This overall initiative will be evaluated in the following manner and will establish baseline measures:

- D-H telemedicine/telerheumatology clinical/performance outcomes:
    - Count the increases of evaluations of patients who may have RA
    - Count the increased number of RA diagnoses
    - Measure the time to treatment and time to appropriate therapy initiation via retrospective analysis of patients with RA at the rural sites in the past 2.5 years, followed by a prospective analysis of time from symptom onset to treatment
    - Measure the improved management of RA (eg, pain score)
    - Measure the increase in monitoring of RA patients on therapy using established activity measures and tests (eg, RAPID3, CRP, imaging)
    - Measure the time to low disease activity or remission of RA
    - Survey the providers who received telerheumatology consultation to determine the number of RA patients on which they initiated therapy that would have been delayed without telemedicine consultation
- D-H system outcomes:
    - Count the number of sites educated about telemedicine for RA diagnosis, treatment and management
    - Measure the utilization of telemedicine in the diagnosis, treatment, and management of RA. We will obtain baseline data (see above objective measures) prior to the intervention and compare with post-intervention data
- Knowledge/competence/performance outcomes from online education modules:
    - Measure the knowledge about the diagnosis, treatment, and management of RA via pre and post-test assessments following the implementation of the modules
    - Measure how telerheumatology can help overcome barriers of early diagnosis and timely treatment of RA

Drs. Mecchella and Albert have advanced statistical training. The hypothesis that the intervention affects the various outcomes listed above will include categorical, continuous and time to event tests of statistical significance.

In-Person/Telemedicine

Following the in-person visits to healthcare facilities and telerheumatology "consultations," providers will be asked to complete a survey to assess improvements in their knowledge based on the online educational modules and on their perceived value of the telerheumatology consultation.

The consulting rheumatologists will also be asked to complete a survey to assess their experience with the electronic interaction and to identify areas for ongoing process improvement. The overall initiative will be evaluated in the following manner:

- Knowledge/competence outcomes from online education modules/rheumatology telemedicine interaction:
    - Measure the improved knowledge about the diagnosis, treatment, and management of RA
    - Measure improvements in how telerheumatology can help overcome barriers to early diagnosis and timely treatment of RA
- Clinical performance outcomes:
    - Measure the number of likely new diagnoses of RA based on the telerheumatology consultation
    - Measure the number of medication escalations attributed to the telerheumatology consultation (NSAIDs to DMARDs, or DMARDs to biologics)
    - Measure the number of in-person visits generated via the telerheumatology consultation
    - Measure the estimated time to diagnosis/treatment initiation decreased by the telerheumatology consultation
- System outcomes:
    - Count the number of sites and number of providers educated about the diagnosis and treatment of RA
    - Count the number of patient consultations for RA via telemedicine
    - Count the number of telemedicine visits used for the diagnosis, treatment, and management of RA
    - Count the number of patients managed via telerheumatology
    - Measure patient satisfaction with telerheumatology based on surveys
    - Note the number of times the electronic material was accessed

Online CME Activities

An outcomes assessment plan will determine whether each activity effectively met the needs of the target audience. In alignment with Accreditation Council for Continuing Medical Education (ACCME) accreditation standards, measures of educational effectiveness, in addition to participation metrics, will be collected for each activity, based on Moore's 2009 expanded outcomes framework: participation, satisfaction, knowledge, and competence.[Moore 2009] The following data are available for reporting:

- Activity participation (user metrics):
    - Number of CME test takers in aggregate
    - Number of learners in aggregate
- Satisfaction—participants' evaluation of the activity's ability to:
    - Achieve the identified learning objectives
    - Relate content to daily practice
    - Demonstrate faculty effectiveness
    - Affect physician practice

    - Demonstrate absence of supporter bias
- Knowledge and competence (posttest results)

In addition, participants are asked for recommendations for improvement and suggestions for future activities.

Advanced Outcomes Measurement and Reporting of Online Activities

In addition to the above assessments, data will be collected and statistically analyzed for each online activity to measure significant changes in knowledge and competency on an overall learner (aggregated) and per-learner (linked learner) basis through a **Linked Learning Assessment (LLA)** associated with each activity. Target audiences for analysis and reporting include rheumatologists and PCPs who indicate that they actively manage the care of patients with RA.

The LLA will compare individual learner responses to pre-assessment questions answered before receiving the educational content and their responses to the same post-assessment questions following completion of the associated activity. Each question will be mapped to an identified learning goal, and participant responses will be tracked and measured for change. This capture of baseline and post-participation responses—with learners serving as their own controls—will provide for a determination of overall effect and an assessment of knowledge and competency on a per-learner and overall-participant basis. The LLA will analyze data captured from learners who complete all the pre-assessment and post-assessment questions. A statistical analysis will determine the significance of the findings, with the effect size of the intervention calculated by comparing the pre- and post-assessment means. These analyses will allow categorization of learners as follows:

- Improved Learners: Any incorrect response on a pre-assessment question with a correct response on the matched post-assessment question
- Reinforced Learners: Correct responses on any pre- and post-assessment matched question
- Unaffected Learners: Any incorrect responses on a post-assessment question, whether the response to the matched pre-assessment question was correct or not

The Linked Learning Impact Report slide set, delivered approximately 3 to 4 months after activity launch, contains a summary of the methods, main findings, and conclusions; the study design; results including data analysis; qualitative participant feedback; and recommendations for future education.

Dissemination of Results

We will disseminate results and key success factors for incorporating telemedicine into other health systems and practices across the United States by submitting to professional and scientific meetings such as the Telehealth Summit, the Telemedicine National Conference, the American College of Rheumatology Annual Conference, the Alliance for Continuing Education in the Health Professions (ACEHP) Annual Conference. We will also submit manuscripts to peer-reviewed journals as appropriate.

6. ***Detailed Work Plan and Deliverables Schedule***

During the period from July 2016 to August 2018, the project will be implemented in the following manner:

- **Content Development:** Educational content for the activities and video vignette development will be overseen by Dr. John Mecchella, Dr. Stephanie Mathew and Dr. Daniel Albert of D-H, and Emilie McCardell, Scientific Director at Medscape. Activities will be certified for CME credit by the D-H Office of CME.
- **Content Delivery:** Activities will be made available to clinics through the provision and use of tablet technology at each site; activities will be hosted on Medscape and will be available by means of the D-H web portal. All activities will be available publicly at no cost to the user.
- **Outcomes Assessment:** Activities will be measured for **participation** (monthly participation statistics), **satisfaction** (CME evaluations forms), and **medical knowledge/competence** (CME post-tests). Clinician participant responses will be tracked and measured to asses post-completion changes in knowledge and competence. We will also survey the clinical sites to assess changes in clinical performance and system outcomes.
- **Outcomes Dissemination:** Outcomes and results will be submitted for presentation at professional meetings, such as the Telehealth Summit, the Telemedicine National Conference, the American College of Rheumatology Annual Conference, ACEHP Annual Conference. We will also submit manuscripts to peer-reviewed journals, as appropriate.

Milestones for project development are as follows:

Task	Month
Educational planning and site identification commences	July 2016
Development and recording of online activities, outcomes assessment tool, CME review	August 2016-October 2016
Conduct in-person site visits to 10 pilot practices	November 2016-August 2017
Initiation of outcomes analyses	September 2017-January 2018
Evaluation and reporting of outcomes findings	February 2018- April 2018
Preliminary publication and dissemination of outcomes findings	May 2018-August 2018

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