

VA



U.S. Department of Veterans Affairs

Veterans Health Administration
Multiple Sclerosis Centers of Excellence

Multiple Sclerosis Centers of Excellence **ANNUAL REPORT FISCAL YEAR 2021**



VA Maryland Health Care System
Baltimore, MD



DC VA Medical Center
Washington, DC



VA Puget Sound Health Care System
Seattle, WA



VA Portland Health Care System
Portland, OR

Mission

To further the understanding of multiple sclerosis (MS) and its impact on Veterans and ensure access to effective treatments to help manage MS and its associated symptoms.

Table of Contents

Mission	ii
Table of Contents	1
Executive Summary	2
Introduction	5
Administrative Update	6
Clinical Care Core	8
Research Core	14
Education & Training Core	25
Informatics & Telemedicine Core	36
Appendix A: MSCoE Personnel & Organizational Chart	41
Appendix B: MS Map & Network	44
Appendix C: Telehealth Utilization	47
Appendix D: MS & COVID-19 Cases in the VA HCS	48
Appendix E: Research & Clinical Fellows	49
Appendix F: Research Grants by Funding	51
Appendix G: Peer-Reviewed Publications	56
Appendix H: Health Care Professional Presentations	63
Appendix I: Patient & Care Partner Programs	65
Appendix J: MSCoE Internal & External Collaborations	66
Appendix K: University Affiliates	74
Appendix L: Acronyms	75

Executive Summary

The MS Centers of Excellence (MSCoE) provide national expertise and support comprehensive care for Veterans with MS through a network of VA MS Regional and Support programs and partnerships with MS organizations, advocates, and Veterans Services Organizations (VSOs). There are two MSCoEs, one in the East, collocated in Baltimore at the VA Maryland Health Care System (HCS) and Washington DC VA Medical Center (VAMC), and the other in the West, collocated in Seattle at the VA Puget Sound HCS and in Portland at the VA Portland HCS.

The MSCoE has four functional cores: clinical care, research and development, education and training, and informatics and telehealth.

Clinical Care Core

With two Centers of Excellence, 35 Regional Programs, and 57 Support Programs, the MSCoE Clinical Care team delivered high quality clinical care to > 13,500 Veterans with MS by identifying where Veterans get their care, understanding their needs, and facilitating appropriate interventions. The MSCoE serve as examples to other VA facilities serving Veterans with MS using Advanced Clinical Care Teams. Highlights of clinical accomplishments in FY21 include:

1. The Clinical Care team responded to the rapidly evolving COVID-19 pandemic by supporting Veteran education regarding COVID-19 safety, disease modifying therapy (DMT) use, vaccine safety and timing, and encouraged vaccination of all Veterans with MS.
2. MSCoE continued collaboration with VA Pharmacy Benefits Management Services (PBM) to ensure safe access to all FDA approved DMT including FY21 FDA-approved ofatumumab and ponesimod for use in relapsing forms of MS. Additionally, the Clinical Care team promoted access to generic biosimilars as good stewards of healthcare resources with educational materials for both Veterans and providers.
3. The Clinical Care team is ensuring the high standards of clinical care exemplified by the MSCoE by designing the MS clinical note templates and related electronic clinical tools that will be available through Cerner Electronic Medical Record System to all MS providers nationally.

Research Core

MSCoE continues to support MS research by providing a structure and environment that facilitates successful studies. MSCoE research efforts include the following areas: (1) clinical science, (2) health services, (3) rehabilitation, and (4) biomedical laboratory. MSCoE investigators have **32** active funded grants, **exceeding \$23 million** in active funding, with **three** of these grants being multi-site.

Funding comes from a range of sources, including the National Institutes of Health (NIH), VA Research and Development (VA R&D), National MS Society (NMSS), and other foundations and industry. MSCoE research led to **47** publications in peer-reviewed journals, many of which were high-impact journals and platform presentations in FY21. MSCoE advances the VA's mission by providing a structured environment that enables research that improves the lives of Veterans with MS.

Education & Training Core

The Education team had a productive year with notable expansion in the number of e-letters, podcasts, and webinars. There were increased education collaborations with the National MS Society (NMSS) and the Paralyzed Veterans of America (PVA) for people affected by MS, with expanded advertising through GovDelivery and the MSCoE website to increase attendance. MSCoE had **13** physician and psychologist advanced fellows beginning, continuing, or completing the advanced fellowship program in FY21.

Informatics & Telemedicine Core

The goal of the Informatics team is to improve health care, and biomedical research related to MS by making data accessible to clinicians and researchers. MSCoE has successfully collected data on utilization of health services in VA, with a special focus on telehealth utilization. The Informatics team continues to work collaboratively with the VA Office of Community Care (OCC) to track Veteran encounters in the private sector. MSCoE has worked collaboratively with VACO IT staff to develop the neurology data cube for standardized data and efficient reports and continue to track Veterans with MS and COVID-19 to monitor morbidity and mortality.

Administrative

Customer Service

MSCoE provides health care services to Veterans with MS and works collaboratively with the VA's Care partner Support Program to provide resources, education, and support, in the VA and community, to care partners of Veterans with MS.

Collaborators/Partners/Advocates/Stakeholders

In FY21, MSCoE expanded the network of MS Regional and Support Programs, held MSCoE East/West meetings that included Regional and Support Program directors and staff, coordinated quarterly research calls, distributed monthly e-letters for health care professionals, and provided data to Regional Programs as requested. MSCoE expanded collaborations with external organizations to optimize MS education and outreach for and to VA and non-VA healthcare professionals, Veterans,

and others affected by MS. MSCoE collaborations with partners, advocates, and stakeholders also improved Veterans' access to community resources and services that complement those provided by the VA.

Financial/Budget/Personnel Overview

MSCoE authorized full-time employment equivalent (FTEE) is 17.25, which includes clinical and administrative staff. The approved budget was approximately \$2.4 Million. MSCoE welcomed two new staff members for FY21. They include Dr. Lindsey Wooliscroft, MD (previous VA Advanced Fellow, 2018-2021), who will serve as the Co-Associate Director, Research and Development for MSCoE-West and Mr. Kenith Walker, who will serve as the Program Support Assistant for MSCoE-East.

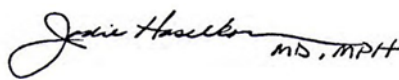
Strengths & Challenges

The work accomplished this year is a testament to staff dedication and innovation to bring the best care to Veterans with MS across the nation. MSCoE is comprised of a small, capable, collaborative, highly integrated team that continues to move the mission forward, to advance the understanding of MS and its impact on Veterans and to ensure access to effective treatments to help manage MS and its associated symptoms. The Veteran base is solid, clinical care is more effective and complex, MSCoE research has been productive, MSCoE education at all levels is in demand, and informatics is pushing forward to meet the needs of the Neurology Program in Clinical Services. We are grateful for unwavering support from our partners, advocates, and Stakeholders throughout.

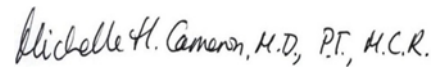
A key exciting opportunity and challenge that MSCoE faces is the move of the Neurology Program to Specialty Care in VHA Clinical Services. The changes associated with a move from national policy to the national delivery of clinical care stretch staff further as we develop the processes and implement the Specialty Care and Neurology Strategic Plans. Also, MSCoE has two separate review processes. We look forward to our third Neurology Advisory Subcommittee meeting in the first quarter of FY21 and our first GAO comprehensive 5-year review and site visit in the second quarter of FY22. These changes and new processes coincide with the possibility of increased congressional funding to support the goal of a high functioning integrated MSCoE national network.



Mitchell Wallin, MD, MPH
Director, MSCoE East



Jodie K Haselkorn, MD, MPH
Director, MSCoE West



Michelle H. Cameron, MD, PT, MCR
Co-Director, MSCoE West

Introduction

Multiple sclerosis (MS) is the most common progressive neurological condition of young adults. MS is a unique disease in the VA health care system (HCS) due to its onset in young adulthood, female predilection, and common connection with military service. The variable presentations—along with its dynamic and unpredictable course, progressive nature, and variable symptoms—make its diagnosis difficult. A multidisciplinary care team knowledgeable about MS is essential to optimizing the health and quality of life of Veterans with MS and selecting, managing, and monitoring the use of the available, but costly and potentially high risk, disease modifying treatments over their lifetime.

To address the unique needs of Veterans with MS, in 2001, Congress urged VHA to establish two MS Centers of Excellence (MSCoE) for clinical care, education, and research [Conference report (H. Rept. 106-988), Senate Appropriations Committee Report (S. Rept. 106-410), and House Appropriations Committee report (H. Rept. 106-674)] that accompanied the Department of Veterans Affairs' (VA) Fiscal Year 2001 Appropriation]. In response, the VA convened a committee of MS experts who defined the requirements for the two centers. The committee also mandated the establishment of national standards for the care of Veterans with MS and, because only two centers were to be funded, the development of a network of affiliated regional programs supporting local facilities and providers. In 2002, based on competitive applications, two coordinating centers were selected to lead MSCoE. MSCoE-East, jointly located in Baltimore, MD and Washington, DC, in VISN 5, serving VISNs 1–10 and MSCoE-West, jointly located in Seattle, WA and Portland, OR, in VISN 20, serving VISNs 12–23. MSCoE was made permanent by the Veterans Benefits, Health Care, and Information Technology Act of 2006 (S.3421).

MSCoE is organized into four cores: Clinical Care, Research, Education and Training, and Informatics and Telemedicine, that require administrative coordination. Program activities are supervised by the National Executive Director, Neurology Services. Since FY18, the Centers of Excellence are required to meet Government Accounting Office (GAO) annual performance measures for oversight and review. These measures include completing an annual self-evaluation, building a strategic plan, coordinating Neurology Center Advisory Subcommittee (NCAS) meetings, and complying with an independent review once every five years.

MSCoE promotes outreach and educational resources for Veterans, families, care partners, and healthcare professionals through a network of VA MS Regional and Support Programs. MSCoE also works collaboratively with university affiliates and community partners to manage care and optimize the Veteran experience in whole health, wellness, and self-efficacy. For more information about MSCoE, visit the MSCoE website at www.va.gov/MS.

Administrative Update

OBJECTIVES

- Provide quality customer service to the MSCoE MS network and those dedicated to serving Veterans with MS and their families.
- Improve and increase collaborations and partnerships.
- Manage executive communications, administration, and business operations.
- Monitor and report MS national and regional activities and functions.

Administrative Goal & Accomplishments (FY21)

GOAL #1

SPECIFIC: Make recommendations to VHA Leadership to minimize bureaucratic barriers and delays regarding hiring of critical staff and providing programs or equipment where MSCoE funding is currently in place.

ASSOCIATED VA PRIORITY: Business systems transformations

PROGRESS TOWARDS GOAL IN FY21: Prepared and submitted administrative concerns and proposed solutions to the Deputy Under Secretary for Health, Clinical Services, and the Acting Chief Officer, Specialty Care Services (SCS), which resulted in two meetings with the Acting Chief Officer, SCS to discuss and address administrative concerns. This is a work in progress.

Other Activities (FY21)

Operations

- Successfully recruited and backfilled three vacancies, two in MSCoE-East and one in MSCoE-West.
- Managed, maintained, and updated the MSCoE organization charts.
- Managed the MSCoE budget and administrative operations.
- Monitored implementation and compliance to VHA Directive 1011.06.
- Prepared and distributed the MSCoE annual report.

Communication

- Promoted MS clinical care initiatives and standards.
- Promoted MS education initiatives and opportunities.
- Disseminated disease modifying therapy (DMT) criteria for use (CFU) information.
- Disseminated relevant policies, initiatives, and updates to the MS network.
- Served as a liaison to SCS for executive communications and reporting.
- Maintained email distribution lists and directories of MS health care professionals and of MS Regional and Support Program directors and coordinators.

National Initiatives & Responsibilities

- Obtained, monitored, and distributed national data on Veterans with MS and services:
 - Community care,
 - MS telehealth visits, and
 - MISSION ACT implementation and its impact on MS services.
- Established and coordinated a Neurology Centers Advisory Subcommittee (NCAS) and coordinated required training and meetings in accordance with VHA Directive 1215.
- Coordinated the MSCoE Directors and Coordinators Regional Meeting.
- Prepared and submitted the annual Center of Excellence – Neurology Self-Assessment as required by Government Accounting Office (GAO) standards.
- Expanded the MS network.
- Developed and maintained internal VA/VHA collaborations and partnerships (*Appendix J*).
- Maintained external collaborations and partnerships. (*Appendix J*).

Clinical Care Core

OBJECTIVES

- Ensure high-quality clinical care across the United States by identifying Veterans with MS and understanding their use of services within and without the VA system of care.
- Optimize clinical care of Veterans with MS via a national network of VA MS Regional and Support Programs that maximizes the potential of electronic medical records and telehealth.
- Partner with Advanced Clinical Care team members to promote a wellness-first approach to care for Veterans with MS.
- Serve as advisory for appropriate, safe, and monitored use of MS therapies through collaborations with the national VA Pharmacy Benefits Management Service.
- Collaborate with MS advocacy organizations for purposes of education, support services, outreach, and advocacy.
- Mentor next generation of MS clinical care providers.

Clinical Care Goals & Accomplishments (FY21)

GOAL #1

SPECIFIC: Continued collaboration with the Cerner electronic health record development team to include and confirm MS order sets, templates, and tracking (MS Assessment Tool/MS Surveillance Registry) systems within the VA Computerized Patient Record System (CPRS) transition to Cerner.

ASSOCIATED VA PRIORITY: Electronic health record system

PROGRESS TOWARDS GOAL IN FY21: Ongoing collaboration with Cerner Technologies through weekly meetings from 7/2020 to present. MS order sets, templates, and tools established and currently in preproduction testing.

GOAL #2

SPECIFIC: Estimate the utilization of MS specialty care by Veterans with MS nationally.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: Specialty care utilization is presented in *Table 3*. Modality of visits (in-person, telehealth) and community care visits are presented in the Informatics section.

GOAL #3

SPECIFIC: Develop a strategic and implementable plan, and estimate utilization and cost savings, for medically appropriate conversion of Veterans from brand name disease modifying therapies (DMTs) when generics/biosimilars become available.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: Collaboration with VA Pharmacy Benefits Management Services (PBM) and language developed and disseminated to educate Veterans with MS and health care providers on generic/biosimilar DMTs. Information disseminated broadly in the MSCoE website, Veteran e-letter (two articles), health care professional e-letter (one article, distribution of patient and provider letters prepared by PBM), and one-on-one consultations for facilities with specific questions.

Highlights of MS Regional Program Clinical Activities (FY21)

Response to COVID-19 Pandemic

Alignment with Clinical Core Objectives: Collaborate with MS advocacy organizations for purposes of education, support services, outreach, and advocacy.

Associated VA priority: Customer service

Timeline: Real-time response to rapidly evolving clinical questions due to the pandemic.

Accomplishments in FY21: Conversion of face-to-face encounters to telehealth (video and telephone), review of expert MS guidelines regarding COVID-19 to ensure pertinence to Veterans with MS, publication of such guidance on the MSCoE website and via provider and patient e-letters, advocacy for early vaccination of Veterans with MS due to elevated risk associated with disability, and clinical data collection of Veterans with MS and COVID-19 infection.

Future considerations: Ongoing response to clinical needs and analyses of clinical data collection.

Remote Clinical Consultations

Alignment with Clinical Core Objectives: Optimize clinical care of Veterans by maximizing the potential of electronic medical records and telehealth.

Associated VA priority: Electronic health record system, customer service

Timeline: Ongoing

Accomplishments in FY21: The process for the consultation is published on the MSCoE website. Consults are responded to by MSCoE-East (Dr. Heidi Maloni) or -West (Dr. Rebecca Spain) based on the origin of the request. During Q1-3 FY21: MSCoE-West provided 19 consultations: three via

Veteran Video Connect (average 106 minutes), eight via a formal e-consult in CPRS (average 61 minutes), and eight through encrypted email (average 48 minutes).

Future considerations: Improved tracking of consultations including reasons, modalities, and satisfaction. Potential to expand services via the hub and spoke model of the MSCoE national system of MS care, as well as in support of the Neurology Telemedicine program.

Collaboration with VA Pharmacy Benefits Management to Provide Access & Education for Newly Available DMTs

Alignment with Clinical Core Objectives: Serve as advisory for appropriate, safe, and monitored use of MS therapies through collaborations with PBM.

Associated VA priority: Customer service

Timeline: ongoing

Accomplishments in FY21: Review of the Criteria for Use (CFU) documents for ponesimod and ofatumumab, health care provider and Veteran education via e-letter articles, and information on the MSCoE website.

Future considerations: NA

MS Network Expansion & Development

Alignment with Clinical Core Objectives: Optimize clinical care of Veterans with MS via a national network of VA MS Regional and Support Programs.

Associated VA priority: Business systems transformation

Timeline: Ongoing

Accomplishments in FY21: Virtual site visits conducted with VA medical facilities in Detroit, MI, Richmond, VA, Chicago, IL, Albuquerque, NM, Houston, TX, Milwaukee, WI, and Kansas City, MO.

Future considerations: Formalization and publication of guidelines to establish hub and spoke programs in the MSCoE National Network of Care using examples set by MSCoE of utilizing Advanced Clinical Care Teams (multidisciplinary) for optimal care of Veterans with MS.

Veteran Demographics, Outpatient & Specialty Care Utilization, & Disease Modifying Therapy Use

MSCoE obtains and synthesizes demographic, co-morbid conditions, utilization, safety, and expenditures data for a confirmed cohort of Veterans with MS. The data is confirmed using the VA CPRS, MS Surveillance Registry (MSSR), MS Repository, PBM, and other data streams, either taking an MS-specific therapy or at least one encounter per year with a primary diagnosis of MS. For the

following tables, a Veteran is counted as having MS if they have had three MS encounters (Inpatient/Outpatient/Rx) within any year (Culpepper WJ, et al Neurology 2019 DOI: <https://doi.org/10.1212/WNL.00000000000007043>).

Clinical Care Table 1: FY21 demographics of Veterans with an MS diagnosis in the VA system.

Demographic Variable	Entire VA	Percent of Total
N (number of patients)	19,806	
Male	14,940	73.4%
Female	4,866	24.6%
Average Age (Male)	66	
Average Age (Female)	57	
Caucasian	14,376	77.2%
Black	3,752	20.1%
Asian	64	0.3%
American Indian or Alaskan Native	121	0.6%
Pacific Islanders and Native Hawaiians	135	0.7%
Multiple Ethnicities	180	1.0%
Rural	6,465	32.6%
Operation Enduring Freedom/ Operation Iraqi Freedom (OEF/OIF)	1,429	7.2%

Data source: CDW tables describing patient by station and related tables.

Veteran Healthcare Utilization

MS Outpatient Care Visits

Clinical Care Table 2: Totals of unique Veterans and unique outpatient visits in the VA nationally MSCoE-East (VISNs 1–10) and -West (VISNs 12–23).

Fiscal Year	Events	Uniques
2021	770,448	19,806
2020	813,702	22,456
2019	854,626	22,695

Data source: CDW tables describing patient by station and related tables.

MS Specialty Care Visits

Clinical Care Table 3: National specialty care (SC) visits with MS as primary or secondary diagnosis.

Fiscal Year		Veterans with MS	Percent of all MS Veterans	Veterans Encounters	As % of all Encounters
FY21	Neurology	7,824	39.5%	17,739	2.3%
	Rehab Physicians	1,152	5.8%	2,600	0.3%
	SCI	3,596	18.2%	46,198	6.0%
FY20	Neurology	8,807	39.2%	18,720	2.3%
	Rehab Physicians	1,303	5.8%	3,216	0.4%

	SCI	3,654	16.3%	49,559	6.1%
FY19	Neurology	10,335	45.5%	26,274	3.1%
	Rehab Physicians	1,534	6.8%	4,038	0.5%
	SCI	3,922	17.3%	56,596	6.6%

Data source: CDW tables describing patient by station and related tables.

New Disease Modifying Therapies in FY21

Ofatumumab (Kesimpta®) was approved in 2020 to treat adults with relapsing forms of MS including clinically isolated syndrome and active secondary progressive MS. Ofatumumab is a subcutaneously injectable monthly treatment that can be administered at home following an induction of four weekly injections. Ofatumumab is an anti-CD-20 antibody that results in B-cell depletion.

Ponesimod (Ponvory™) was approved in 2021 to treat adults with relapsing forms of MS including clinically isolated syndrome and active secondary progressive MS. It is a daily oral therapy that selectively binds to the S1P receptor that results in lymphocyte sequestration in lymph nodes.

Clinical Care Table 4 summarizes use of specific outpatient DMTs. Approximately 50% of Veterans with MS were prescribed a DMT.

Clinical Care Table 4: Unique prescriptions for Veterans with MS taking oral and injectable specific DMT, by year. Infusion DMTs are not included.

Medication Name	FY19	FY20	FY21 Q1 3
Cladribine (Mavenclad®)	0	8	12
Dimethyl Fumarate (Tecfidera®)	2,082	1,969	1,851
Fingolimod (Gilenya®)	479	452	408
Glatiramer Acetate 20QD (Copaxone®, Glatopa®, GA)	444	305	262
Glatiramer Acetate 40TIW (Copaxone®, Glatopa®, GA)	1,538	1,418	1,258
Interferon Beta-1a (Avonex®, Rebif®)	1,121	974	178
Interferon Beta-1b (Betaseron®, Extavia®)	270	226	189
Ofatumumab (Kesimpta®)	-	-	23
Ozanimod (Zeposia®)	-	2	8
Peginterferon Beta-1a (Plegridy®)	38	36	34
Ponesimod (Ponvory™)	-	-	-
Siponimod (Mayzent®)	2	22	28
Teriflunomide (Aubagio®)	559	557	580
Unique Veterans on oral and injectable DMT	6,263	5,947	4,831

Data source: PBM

Clinical Improvement Projects

Video Telehealth Feasibility Project

Purpose: Improve utilization and satisfaction with video telehealth services for MS treatment.

Alignment with Clinical Core Objectives: Optimize clinical care of Veterans with MS using telehealth.

Associated VA priority: Business transformation services

Timeline: FY19 concept and initiation, FY20-21 data collection, and FY22 data analysis and dissemination.

FY 21 accomplishments: Survey query of Veterans with MS through the McBurney network (n=XX), followed by qualitative interviews with 50 patients, 20 providers, and 10 insurance companies.

Disease Modifying Therapy Infusion Guidelines & Provider Disease Modifying Therapies Pocket Binder

Purpose: Harmonize best practices for DMT choice and management across the VA nationally.

Alignment with Clinical Core Objectives: Serve as advisory for appropriate, safe, and monitored use of MS therapies.

Associated VA priority: Customer service

Timeline: FY concept and initiation, FY data collection, and FY21-22 data analysis and dissemination.

FY 21 accomplishments: Published binders were distributed to MSCoE network sites for review, with plans for further dissemination via educational materials, website, and national meetings.

Research Core

OBJECTIVES

- Conduct clinical science, health services, rehabilitation, and biomedical laboratory research relevant to the care of Veterans with MS.
- Disseminate research findings through publications, presentations, abstracts, and clinical practice guidelines.
- Enhance collaboration among VA medical facilities and increase the participation of Veterans in research activities.
- Provide research mentorship for the next generation of VA MS scientists.

Research Goals and Accomplishments (FY21)

Over FY21, MSCoE continued to perform outstanding research based upon cutting edge technologies and methodologies, focused on the above defined areas of research. In addition, at the beginning of FY21, MSCoE recognized four priorities. A major effort towards those priorities, identified hereafter as goals, has been allocated. Those four major goals included:

GOAL #1

SPECIFIC: Reporting our success with telehealth implementation in the MSCoE network.

ASSOCIATED VA PRIORITY: Mission Act

PROGRESS TOWARDS GOAL IN FY21: Achieved. We presented this work in a virtual international meeting, e.g., the Americas Committee for Treatment and Research in MS (ACTRIMS), reaching our target of two presentations (the first one was delivered at the end of FY20). Two manuscripts summarizing this data have been submitted to peer-reviewed journals. The first manuscript is focused on the utilization and perception of telehealth among MS VA healthcare providers. The second manuscript describes patient, provider, payer, and policy expert perspective on telemedicine and MS during the COVID-19 pandemic. A third publication is in the early stages of preparation.

GOAL #2

SPECIFIC: Implement the new standardized Consortium of MS Centers (CMSC) guidelines for imaging Veterans with MS across all MS Regional Programs in the US.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: This project is in progress but on time with planned milestones. Recognizing the importance of this effort, MSCoE in collaboration with a team of subject matter expert neuroradiologists promptly committed to this effort for VHA. It was felt that current MRI protocols in several VA medical facilities were very similar to the newly proposed guidelines, and that implementing changes to meet the 2021 criteria would not be a major challenge. However, the workgroup did recognize the heterogeneity in vendors and scanner field strength as a fundamental obstacle towards this harmonization process.

At this time, the proposed MRI protocol is posted in the National Radiology Share Point and will be announced on the October National Radiology call. Drs. Mitchell Wallin and Francesca Bagnato presented the proposed MRI protocol on the National Radiology call on November 10, 2021. Dissemination to Regional Programs will follow immediately thereafter.

The guideline will be presented as "*best practice guidance*". An editorial to disseminate this process is being proposed for publication to the *Federal Practitioner* by Drs. Bagnato and Wallin. Immediately thereafter, dissemination of the proposed guidelines will follow.

GOAL #3

SPECIFIC: Publish 20 peer-reviewed articles by MSCoE (East and West) researchers and assess their impact.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: 47 peer-review articles were published with a mean impact factor of 5.5 (range = 1.2-19.1).

GOAL #4

SPECIFIC: MSCoE researchers, including fellows, will submit a total of at least two research grants in two different areas in FY21.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: Achieved. We have submitted a total of **17 grant applications** in the following research categories: clinical science (n=10), health services (n=1), biomedical laboratory (n=1), and rehabilitation (n=5). Of these applications, three were submitted for VA funds.

Important Research Findings in FY21

During FY21, many research activities continued to be impacted by the COVID-19 pandemic. Both basic laboratories and human-subjects research studies faced delays in recruitment, issues with supply chains, and new safety regulations for study staff and participant safety. However, despite these

challenges, in FY21 MSCoE investigators had grants that **exceeded \$23 million in funding** (for the duration of the grants), had **32 active grants, published 47 articles**, and delivered **20 national or international platform presentations**.

Summary tables of research efforts are in *Appendices F-H* and major accomplishments summarized by research area are listed below.

Clinical Science

Clinical science is focused on moving ideas along the translational pathway from scientific discovery to clinical application to advance the healthcare of our Veterans. Examples include interventional and effectiveness studies, clinical, epidemiological, and technological studies. MSCoE clinical sciences research portfolio includes work by the following investigators:

- *Dr. Bagnato* is the PI of two large R01-equivalent research grants and one industry-sponsored investigator-initiated study. In these studies, Dr. Bagnato uses sophisticated MRI methods to quantify myelin and axonal integrity as well as MRI changes related to subtle leakage of the blood brain barrier and microglia activation. She explores how these MRI detectable injuries effect people with MS at the time of the disease diagnosis. Recruitment for these studies is ongoing.
- *Dr. Daniel Harrison's* neuroimaging in MS research program continued productivity in FY21. This includes four publications and two presentations at national meetings. A new research grant, "Pooled analysis of MS findings on multi-site 7 Tesla MRI", was funded by the National Institute of Neurological Disorders and Stroke (NINDS). This project will pool together 7T MRI data from five centers in North America and will work to validate 7T MRI findings in MS on a large scale and to develop tools for future automated 7T analyses.
- *Dr. Christopher Hollen* developed and submitted a Career Development Award (CDA)-2 exploring the ability of positron emission tomography (PET) imaging to measure neuroinflammation in Veterans with progressive MS.
- *Drs. Jessica Rice, Rebecca Spain, Elizabeth Silbermann, Lindsey Wooliscroft, Vijayshree Yadav, and Michelle Cameron* published a cross-sectional study of cannabis use by people with MS in Oregon and Southwest Washington in MS and Related Disorders.
- *Dr. Silbermann* is PI on a VA-funded CDA-2, "Retinal Microvasculature as a Predictor of Neurodegeneration in MS" to explore if retinal microvasculature imaging can predict future MS disability in Veterans.
- *Dr. Spain* is PI on a multisite placebo-controlled trial of lipoic acid for progressive MS, funded by a VA Rehabilitation R&D (RR&D) Service Merit award and the National MS Society (NMSS) and MS Society of Canada. She is collaborating with several VA site PIs, Drs. Jodie Haselkorn (Seattle,

WA), Wallin (Washington, DC), and Mateo Paz Soldan (Salt Lake City, UT), as well as four non-VA sites. Dr. Spain is also conducting a longitudinal analysis of brain metabolic function in people with progressive forms of MS using advanced neuroimaging techniques.

- *Drs. Maria Xiang and Hollen*, MSCoE-West fellows, and *Drs. Spain and Wooliscroft* conducted a survey of COVID-19 vaccination willingness among people with MS and the factors associated with COVID-19 acceptance. A manuscript of their findings was published in *Multiple Sclerosis Journal – Experimental, Translational, and Clinical*.
- *Dr. Yadav* is site PI for a National Institute of Health (NIH)-funded multisite study titled “*BEAT-MS Study Evaluating the Role of Stem Cell Transplant in MS*”, evaluating hematopoietic stem cell transplant as an MS therapy. She is PI on the VA Merit review grant titled “*Vascular Disease Risk Factors and MS Progression*”, evaluating the relationship of vascular disease and MS using novel imaging techniques. Dr. Yadav is PI on a VA-merit funded study titled “*A Pilot Trial to Study the Effects of Oral MitoQ on Fatigue in MS*”; and is the site PI on a Patient-Centered Outcomes Research Institute (PCORI) grant evaluating the impact of stopping disease modifying therapy (DMT) in late MS.

Health Services

Health services research encompasses all aspects of VA healthcare, focusing on patient care, cost, and quality. The main mission of health services research is to identify, evaluate, and rapidly implement evidence-based strategies that improve the quality and safety of care delivered to Veterans. The MSCoE health services research portfolio includes work by the following investigators:

- *Drs. Aaron Turner and Haselkorn* are PI and Co-I of a recently completed NMSS-funded pilot study examining risk factors for chronic opioid use and associated negative health consequences. They additionally collaborate with affiliate investigator Dr. Elizabeth Gromisch on a VA Center-supported project examining adherence behaviors in Veterans with MS. Both projects are currently in data analysis and have resulted in two publications to date.
- *Dr. Wallin* is investigating the utilization of telehealth in Veterans with MS. He has summarized his data in two submitted manuscripts during FY21.

Rehabilitation

Rehabilitation research integrates clinical, preclinical, and applied rehabilitation research to enable translation into clinical practice to improve the health and wellbeing of Veterans and the nation. The MSCoE rehabilitation research portfolio includes work by the following investigators:

- *Dr. Cameron* was the PI for a VA-Merit funded study titled “*Comprehensive Fall Prevention and Detection in People with MS*”. The findings of this study have been published in the *Journal of Biomedical and Health Informatics*.

- *Dr. Cameron and Ms. Lucinda Hugos* are conducting a NMSS-funded study titled “A Randomized Controlled Trial of a Multicomponent Walking Aid Program for People with MS.”
- *Ms. Hugos* is PI on a VA-merit funded study titled “Evaluation of a Spasticity Management Program for People with MS”. Dr. Cameron is a Co-I on this study. Ms. Hugos and Dr. Cameron published a protocol for this study in *BMC Neurology*.
- *Drs. Spain and Yadav* completed the NMSS-funded grant developing patient-centered and evidence-based wellness programs for people with MS. This grant included Dr. Yadav’s study of dietary intervention for MS fatigue, a pilot oral MitoQ for fatigue improvement, and a survey of complementary and alternative therapies used by people with MS. The survey was sent to more than 8,000 people living with MS in the Pacific Northwest. It has resulted in two publications thus far.
- *Dr. Wooliscroft* is PI on a private foundation, VA, and NIH K23-funded study titled “Aerobic Exercise to Improve Mobility in MS: Optimizing Design and Execution for a Full-Scale Multimodal Remyelination Clinical Trial.” A manuscript summarizing the protocol for this study is in the early stages of preparation.
- *Dr. Turner* collaborates with affiliate partner Dr. Gromisch (PI) on a newly funded NMSS study developing and testing a mHealth intervention for MS fatigue.

Biomedical Laboratory

Biomedical laboratory research includes preclinical research to understand life processes from the molecular, genomic, and physiological levels for the purpose of advancing science and the understanding of how diseases affect Veterans. The MSCoE biomedical laboratory research portfolio includes work by the following investigators:

- *Dr. Tyrell Simkins*, a MSCoE-West fellow who graduated in July 2021, submitted a NIH K08 award investigating the mechanisms of myelination and remyelination in the brain, with particular interest in the protein Fbxw7. He worked in the basic science lab of Dr. Kelly Monk, Co-Director and Senior Scientist at the Vollum Institute at Oregon Health & Science University (OHSU) and faculty member at UC Davis.
- *Dr. Spain* collaborated with Dr. Sonemany Salinthon, a basic sciences researcher at the VA Portland Healthcare System (VAPORHCS), to explore the mechanisms by which lipoic acid may reduce inflammation in MS in monocytes and monocyte-derived macrophages. A manuscript of their work was published in *Immunology and Cell Biology*.
- *Dr. Arthur Vandenbark* is PI on a VA Biomedical Laboratory Research and Development (BLRD) grant for development of DRhQ for treatment of progressive MS, with a focus on progressive MS

in men. This research grant evolved from the road-map meeting held in FY19 and, with its focus on progressive MS and men, has high potential to improve the lives of Veterans with MS.

- *Dr. Bagnato* is PI on an NIH R21, the scope of which is validating the role of multi-b-shell diffusion MRI and selective inversion recovery quantitative magnetization transfer imaging in depicting and measuring axonal and myelin injury in two animal models of MS.

Mentoring

Dr. Harrison is the MSCoE-East Fellowship Director and Mentor. He works collaboratively with the Fellowship Directors within the VA and externally within the American Academy of Neurology (AAN) to maintain a consistent training and education program and to recruit talented candidates for the VA Advanced Fellowship Program. Drs. Turner, Haselkorn, and Dawn Ehde are PI, Co-I, and Co-PI, respectively, on an NMSS Mentor-Based Postdoctoral Fellowship in Rehabilitation Research grant (2018-2023); the current fellow (Dr. Lindsey Knowles) is now in her third year of fellowship. Drs. Yadav and Cameron have a NMSS Institutional MS Clinician Training Award (2019–2024) to support postdoctoral physician fellows. MSCoE continues to attract clinical postdoctoral physician fellows for training in MS clinical care and research, with funding from the VA Office of Academic Affiliations (OAA). MSCoE has formalized training didactics for the post-doctoral physician fellowship, where fellows are mentored on developing a research project, submitting abstracts, presenting, and publishing in peer reviewed journals.

Several prior fellows who continue to collaborate with MSCoE in research activities include Elizabeth Silbermann, MD; Michael Lane, MD; Abbey Hughes, PhD; Narineh Hartoonian, PhD; Anne Arewasikporn, PhD; Andrew Solomon, MD; Jesus Lovera, MD, PhD; and Meena Kannan, MD, MPH. Drs. Wooliscroft, Cameron, Spain, and Yadav completed MSCoE-West fellowships in prior years and now serve in MSCoE-West key leadership positions. See *Appendix E* for information on current and past fellows.

MS Physician Fellows

Vicky Chen, MD, is starting her first year of fellowship at the VAPORHCS and OHSU after completing her residency in neurology at the same institutions. Her research interests include oxidative stress as a driver for MS pathology and the role of the gut microbiome and diet in MS.

Tamar Harel, MD, is starting her first year of fellowship at the VA Maryland Health Care System, and University of Maryland Medical Center, Baltimore, MD.

Yohance Allette, MD, is starting his first year of fellowship at the VA Maryland Health Care System, and University of Maryland Medical Center, Baltimore, MD.

Mark Leekoff, MD, completed the VA Advanced MS Fellowship Program at the VA Maryland Health Care System and University of Maryland Medical Center, Baltimore, MD, July 2021. He completed his work on traumatic brain injury as a risk factor for progressing MS and presented the findings at the Americas Committee for Treatment and Research in MS (ACTRIMS) conference in 2021. He also has a full manuscript is under review. Dr. Leekoff is now in private practice as a MS Specialist at RWJBarnabas Health in West Orange, NJ.

Derek McFaul, DO, is starting a one-year clinical fellowship at the VAPORHCS and OHSU, supported by the NMSS Institutional Clinician Training award. During his fellowship he plans to develop his clinical skills caring for people with MS and other neuroimmunologic diseases. His research interests include the use of technology to improve quality of life for people with neurologic conditions.

Kayla Martin, MD, is starting her first year of fellowship at the VAPORHCS and OHSU. She completed her residency in neurology at the University of Michigan in Ann Arbor, MI where she gained experience treating Veterans with MS and looks forward to continuing to work with Veterans. Her research interests include neuroimaging and studying rare neuroimmunologic diseases, such as myelin oligodendrocyte glycoprotein (MOG)-associated disease and autoimmune encephalitis.

Christopher Hollen, MD, is starting his third year of fellowship at VAPORHCS and OHSU. In FY21, Dr. Hollen published a first-author case report about the use of rituximab for refractory MS during pregnancy and assisted with a survey exploring COVID-19 vaccine willingness and factors associated with vaccine acceptance. Dr. Hollen also presented at multiple local meetings, including the OHSU Annual Neurology Research Day, and assisted in the development of the neuroimmunology curriculum for neurology residents at OHSU and the VAPORHCS. He is currently preparing a VA RR&D CDA-2 submission exploring the ability of PET imaging to measure neuroinflammation in Veterans with progressive MS. This work has the potential to lead to promising biomarkers in future MS clinical trials. His CDA-2 submission is anticipated by the end of 2021. Below are his FY21 accomplishments.

- **Hollen C**, Rice J, Park M, Yadav V. Rituximab for treatment of refractory MS relapses during pregnancy. *Mult Scler*. 2021 Sep;27(10):1620-1623.
- Xiang XM, **Hollen C**, Yang Q, Brumbach BH, Spain RI, Wooliscroft L. COVID-19 vaccination willingness among people with MS. *Mult Scler J Exp Transl Clin*. 2021 May 31;7(2):20552173211017159.
- Xiang XM, **Hollen C**, Yang Q, Brumbach BH, Spain RI, and Wooliscroft L. COVID-19 Vaccination Willingness Among People with MS. Poster presented at OHSU Annual Neurology Research Day 2021: Poster Presentation.
- **Hollen C**. Introduction to MS Symptom Management. OHSU/VAPORHCS MS Journal Club. October 29, 2021.
- **Hollen C**. Neuromyelitis Optica. OHSU/VAPORHCS MS Journal Club. November 5, 2021.

- **Hollen C.** MS Medication Prescription Drug Pricing. OHSU/VAPORHCS MS Journal Club. January 21, 2021.
- **Hollen C.** Neurosarcoidosis. Neurology Noon Conference, Oregon Health & Science University: virtual, Mar 2021.

Xinran (Maria) Xiang, MD, completed a one-year clinical fellowship at OHSU and the VAPORHCS in July 2021, supported by the NMSS Institutional Clinician Training award. Dr. Xiang brought a unique perspective to the fellowship program as the first fellow with a pediatric neurology training background. During her fellowship, she obtained training in managing complex autoimmune diseases, including adult and pediatric populations. She also presented at multiple conferences, completed a review article about telehealth in people with MS, and led a survey exploring COVID-19 willingness and factors associated with vaccine acceptance. She is now a faculty member at Tulane University in New Orleans, LA. Below are her FY21 accomplishments.

- **Xiang XM**, Hollen C, Yang Q, Brumbach BH, Spain RI, Wooliscroft L. COVID-19 vaccination willingness among people with MS. *Mult Scler J Exp Transl Clin*. 2021 May 31;7(2):20552173211017159.
- **Xiang XM**, Bernard J. Telehealth in MS Clinical Care and Research. *Curr Neurol Neurosci Rep*. 2021 Feb 28;21(4):14.
- Rice J, **Xiang XM**. Comparing the Effectiveness of Therapies in People with Secondary Progressive MS. *Neurology*. 2021;97:1-3.
- **Xiang XM**. Enteroviral Encephalitis. Virtual Portland Pediatric Neurology Case Conference. Dec 1, 2020.
- **Xiang XM**. Autoimmune Encephalitis. OHSU Pediatric Neurology Grand Rounds. Dec 1, 2020.
- **Xiang XM**. A noninflammatory mRNA vaccine for treatment of experimental autoimmune encephalomyelitis. OHSU/VAPORHCS MS Journal Club. Feb 4, 2021.
- **Xiang XM**. Autoimmune Encephalitis. OHSU Neurology Resident Lecture Series. June 3, 2021.
- **Xiang XM**, Hollen C, Yang Q, Brumbach BH, Spain RI, and Wooliscroft L. COVID-19 Vaccination Willingness Among People with MS. OHSU Annual Neurology Research Day 2021: Poster Presentation.
- **Xiang XM**. Elevated ICP and White Matter Disease. Pediatric MS Difficult Cases Webinar. Dec 7, 2020.
- **Xiang XM**. Elevated ICP and White Matter Disease. NMSS Difficult Cases Webinar. March 9, 2021.

Tyrell Simkins, DO, PhD, completed his two-year MS and Neuroimmunology fellowship at OHSU and VAPORHCS in July 2021. In FY21, Dr. Simkins published two manuscripts exploring remyelination in MS animal models, presented his research at multiple local and national meetings, and submitted a first-author manuscript of an algorithm to predict altered mental status admission. He also submitted an NIH K08 award investigating the mechanisms of myelination and remyelination in the brain, with particular interest in the protein Fbxw7. He is now a faculty member at UC Davis.

- **Simkins TJ**, Bissig D, Moreno G, Kahlon NPK, Gorin F, Duffy A. Predicting admission of altered mental status patients: Case-control algorithm development with retrospective validation. *JACEP Open (Submitted, In Revision)*.
- **Simkins TJ**, Duncan GJ, Bourdette D. Chronic Demyelination and Axonal Degeneration in MS: Pathogenesis and Therapeutic Implications. *Curr Neurol Neurosci Rep*. 2021 Apr 9;21(6):26.
- Duncan GJ, **Simkins TJ**, Emery B. Neuron-Oligodendrocyte Interactions in the Structure and Integrity of Axons. *Front Cell Dev Biol*. 2021 Mar 8;9:653101.
- **Simkins TJ**, Collins H, Emery B, Monk K. Fbxw7, An E3 Ligase Component, Functions in Oligodendrocytes to Control Development and Limit Myelin Production. Oral presentation at the OHSU Neurology Research Day. May 2021.
- **Simkins TJ**, Collins H, Li H, Emery B, Monk K. Investigating the Role Of Fbxw7, An E3 Ubiquitin Ligase Recognition Protein, In Mammalian Oligodendrocyte Function. Poster presentation at the ACTRIMS Forum. February 2021.
- **Simkins TJ**, Yager-Stone, P, Spain, R. New Drugs, Generics, and Medications in the Pipeline for MS. *MSCoE: MS Veteran Newsletter*. Fall 2020.
- **Simkins TJ**. MS Mimics: A case-based differential. OHSU Neurology Noon Conference. January 28, 2021.
- **Simkins TJ**. Journal Club, Berghoff, et al. (2021). *Nature Neuroscience*. OHSU/VAPORHCS MS Journal Club. May 6, 2021.
- **Simkins TJ**. MS Symptom Management. OHSU/VAPORHCS MS Journal Club. October 29, 2020.
- **Simkins TJ**. MS Symptom Management. OHSU Neurology Resident Lectures. April 29, 2021.
- **Simkins TJ**. The Role of Fbxw7 in CNS Myelination. Jungers Center Works In Progress. March 9, 2021.
- **Simkins TJ**. The Role of Fbxw7 in CNS Myelination. Vollum Institute Works In Progress. February 5, 2021.

Jessica Rice, MD, completed her three-year MS and Neuroimmunology fellowship at OHSU and VAPORHCS in July 2021. Dr. Rice completed a first author manuscript of a cross-sectional survey of

cannabis use in the Pacific Northwest, an analysis of health care professionals' knowledge of cannabis for medical purposes and assisted in the case report of the use of rituximab for refractory MS during pregnancy. She also presented at local and national meetings about relevant topics in MS and her research. She is now practicing as an MS Specialist at Providence Medical Group in Portland, OR. Below are her FY21 accomplishments.

- **Rice J**, Hildebrand A, Spain R, Senders A, Silbermann E, Wooliscroft L, Yadav V, Bourdette D, Cameron M. A Cross-sectional Survey of Cannabis Use by People with MS in Oregon and Washington. *Mult Scler Relat Disord*. 2021 Oct;55:103172.
- **Rice J**, Xiang XM. Comparing the Effectiveness of Therapies in People with Secondary Progressive MS. *Neurology*. 2021;97:1-3.
- Hollen C, **Rice J**, Park M, Yadav V. Rituximab for treatment of refractory MS relapses during pregnancy. *Mult Scler*. 2021 Sep;27(10):1620-1623.
- **Rice J**, Hildebrand A, Waslo CS, Cameron MH, Jones KD. Cannabis for medical purposes: A cross-sectional analysis of health care professionals' knowledge. *J Am Assoc Nurse Pract*. 2021 Mar 19.
- **Rice J**. Alemtuzumab. OHSU/VAPORHCS MS Journal Club. October 1 2020.
- **Rice J**, Hildebrand A, Waslo C, Cameron M, Jones KD. Neurological risks and benefits of cannabis use: A cross-sectional analysis of health care professionals' knowledge. ePoster at American Academy of Neurology annual meeting, Virtual Conference. April 2021

MS Psychology Fellow

Lindsey Knowles, PhD, is continuing into her third year of the VA/University of Washington collaborative NMSS Mentor-based fellowship in Rehabilitation Research. Over the course of the fellowship, Dr. Knowles has submitted a VA RR&D CDA examining psychosocial components of fatigue intervention, published six manuscripts, and presented nine conference posters or papers. Below are her FY21 accomplishments.

- Herring TE, Alschuler KN, **Knowles LM**, Phillips KM, Morean WM, Turner AP, Ehde DM. Differences in correlates of fatigue between relapsing and progressive forms of MS. *Mult Scler Relat Disord*. 2021 Sep;54:103109.
- **Knowles LM**, Phillips KM, Herring TE, Alschuler KN, Jensen MP, Turner AP, Ehde DM. Pain Intensity and Pain Interference in People With Progressive MS Compared With People With Relapsing-Remitting MS. *Arch Phys Med Rehabil*. 2021 Oct;102(10):1959-1964.
- **Knowles LM**, Arewasikporn A, Kratz AL, Turner AP, Alschuler KN, Ehde DM. Early treatment improvements in depression are associated with overall improvements in fatigue impact and pain interference in adults with MS. *Ann Behav Med*. 2021 Aug 23;55(9):833-843.

- **Knowles LM**, Esselman EC, Turner AP, Phillips KM, Herring TE, Alschuler KN, Ehde DM. Depressive symptoms and suicidal ideation in progressive MS compared with relapsing-remitting MS: Results from a cross-sectional survey. *Arch Phys Med Rehabil.* 2021 Apr;102(4):694-701.
- **Knowles LM**, Hugos CL, Cameron MH, Haselkorn JK, Bourdette DN, Turner AT. (2021). Moderators of improvements in fatigue impact following a self-management intervention in MS: A secondary analysis of a randomized controlled trial. *Am J Phys Med Rehabil.*
- **Knowles LM**, Phillips KM, Herring TE, Alschuler KN, Jensen MP, Turner AP, Ehde DM. (2021, February). Pain Intensity and Pain Interference in Persons with Progressive MS Compared to Persons with Relapsing-Remitting MS. Poster presentation at the Annual Rehabilitation Psychology Conference, Virtual Meeting.
- **Knowles LM**, Jovel KS, Mayer C, Bottrill KC, Kaszniak AW, Sbarra DA, O'Connor MF. Relaxation and mindfulness interventions improve grief outcomes in widows and widowers: A three-arm comparative trial. *Treatment of distress in (traumatically) bereaved children and adults*, International Society for Traumatic Stress Studies: virtual, Nov 2020.
- **Knowles L**, Turner A. Veterans' Engagement Using Motivational Interviewing and Behavioral Activation. *MSCoE Regional Meeting, MSCoE West*: virtual, Jun 2021.
- **Knowles L**. Mood Changes and MS. *Ask an MS Expert Patient Series*, National MS Society: virtual, Apr 2021.

Education & Training Core

OBJECTIVES

- Provide a national program of MS education for healthcare professionals, Veterans, and care partners to improve knowledge, enhance access to resources, and promote Veteran self-efficacy and treatment adherence.
- Collaborate with Veterans Service Organizations, MS organizations, and community healthcare institutes to increase educational opportunities, share knowledge, and expand participation.
- Utilize the MSCoE website to provide enduring educational programs, opportunities, and outreach.
- Coordinate physician and psychology fellowships to develop expertise in MS healthcare.

Education & Training Goals (FY21)

GOAL #1

SPECIFIC: Track career paths of MS fellows and other trainees (nurse practitioner, PA, nurses) and link to VA job opportunities, promote retention of MS fellows trained in the VA.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: MSCoE continues collaborations and communication with many of our graduating fellows, in addition to our tracking of their career paths. When MSCoE learns of open MS positions within VHA, the positions are advertised widely and graduating fellows are encouraged to apply. Former fellows who are staff with MSCoE include Drs. Michelle Cameron (Co-Director, MSCoE-West), Rebecca Spain (Associate Director Clinical Care, MSCoE-West), Vijayshree Yadav (Assistant Director Clinical Care, MSCoE-West), Lindsey Wooliscroft (Associate Director Research, MSCoE-West), and Francesca Bagnato (Associate Director Research, MSCoE-East. Dr. Wooliscroft was hired in summer 2021. In addition to hiring on the clinical side of VHA, four MSCoE West fellows received VA Career Development Awards following their fellowship graduation.

MSCoE has encountered barriers to finding employment for former fellows and back-filling vacant MSCoE positions. MSCoE and Neurology leadership met with VACO Specialty Care Services (SCS) leadership in June 2021 to improve communications and hiring practices. Communication continues to determine ways to retain advanced fellows that have completed the program and reduce barriers for recruitment and hiring.

GOAL #2

SPECIFIC: Expand enduring educational products for Veterans available through virtual modalities.

ASSOCIATED VA PRIORITY: Customer service, Mission act

PROGRESS TOWARDS GOAL IN FY21: MSCoE has been producing a bi-annual printed newsletter for Veterans with MS since 2008. The printed version was moved to an on-line edition that is distributed quarterly. The audience doubled and led to new pages on the MSCoE website as articles were provided as links within the e-letter. MSCoE developed a new series of podcasts on MS and VA services. Six podcasts were recorded with the first one being posted to 12 on-line platforms in June 2021.

MSCoE continued collaborations with Can Do MS on 12 monthly webinars addressing living with MS. MSCoE collaborated with the National MS Society (NMSS) and Paralyzed Veterans of America (PVA) on our first virtual conference for Veterans with MS. The program was a huge success with over 375 live attendees. MSCoE-East's MS social worker, Ms. Maggie Kazmierski, reached out to NMSS to bring their Virtual Resilience Program into the VA, with the first Veteran centered webinar taking place on August 11, 2021.

GOAL #3

SPECIFIC: Expand internal and external advertising of VA educational programming.

ASSOCIATED VA PRIORITY: Customer service, Mission act

PROGRESS TOWARDS GOAL IN FY21: MSCoE increased advertising on internal and external VHA social media platforms as well as with external collaborators. All advertising and results of programs were stored in a shared file. MSCoE expanded advertising of Veterans stories from issues of the Veteran e-letter, coordinating article postings on the VA Blog and sharing links with the Veteran's facility Public Affairs Officer for local promotion. MSCoE shared our MS Awareness toolkit with the PVA for organizational promotion. We increased advertising of MS Awareness month through VHA social media platforms, with five tweets on Twitter and three statements on Facebook. MSCoE increased advertising of non-VA educational programs on GovDelivery for organizations whom VA and MSCoE collaborate. Dr. Vijayshree Yadav, fellowship director for Portland, OR, collaborated with national MS and neuroimmunology fellowship directors to develop a consensus curriculum for MS fellows which was published in the journal *Neurology: Clinical Practice*.

Other Activities (FY21)

MSCoE, and our Regional and Support Programs, collaborate and partner with many internal program offices and external organizations, including, but not limited to, VA Employee Education System (EES),

VA Pharmacy Benefits Management Services (PBM), VA Office of Academic Affiliations (OAA), VA Extension for Community Health Outcomes (ECHO), VA Wheelchair Games, PVA, NMSS, Consortium of MS Centers (CMSC), Can Do MS, VA-affiliated universities, and other national MS and Veteran organizations and advocates.

MSCoE serves and partners with Veterans, and their family members and care partners, to bring awareness, navigate the complexities of accessing healthcare, and increase knowledge about new and evolving disease treatment options, symptom management, and rehabilitation strategies for MS.

In alignment with the VA’s “Mission Act Implementation” and “Customer Service” priorities, MSCoE ensured educational content discussed the prominent needs of Veterans with MS as well as the many VA programs, services, and choices available to Veterans with MS. MSCoE education and training programs for healthcare professionals (HCPs) focused on delivering content-rich curricula on the use and safety of new disease modifying therapies (DMTs), symptom management, and multidisciplinary care practices. Veteran education and training focused on whole health, wellness, and accessing VA services and community resources.

Education Table 1: Educational programs in FY21.

Title	HCPs	Vets	Collaboration
E-letters	12	3	Network, PBM, NMSS, Can Do MS, PVA
Fellows (MD, PhD)	13		OAA, NMSS, Universities
MS Awareness Month	1	1	Network, VA Social Media, PVA
MSCoE Website	1	1	Network, PBM, NMSS, PVA
Overview of MS Booklet	1	1	
Podcasts		6	Network, PBM, EES
VA MSCoE Network Meeting	1		Network, EES, NMSS, PBM
Webinars/Virtual Conferences	14	16	Network, PBM, ECHO, NMSS, EES, Can Do MS, PVA

Several conference collaborations were planned this year, with presentations developed, but were canceled at the last minute due to the rise of COVID-19. The most impactful cancellations were the PVA Summit which was scheduled August 29 – September 1, 2021, in Dallas, TX. Drs. Jodie Haselkorn, Heidi Maloni, and Terry Lee-Wilk served on the PVA Summit Program Committee. MSCoE staff, fellows, and associated staff planned to present or moderate 15 sessions at the PVA Summit. MSCoE-East had a half day Regional Directors and Coordinators meeting planned during the PVA Summit for August 29, 2021 which was impacted by the meeting cancellation.

Conferences & Webinars

All conferences that were planned as face-to-face were canceled or made virtual in FY21 due to the COVID-19 pandemic. Details regarding presentations of MSCoE staff, fellows, and associated staff are in *Appendices H and I*. Estimated attendance for all programs is provided, but since there can be more

than one attendee on a single computer, especially for patient and care partner programs, attendance is likely higher than what is reported.

MSCoE-West Regional Directors Meeting (HCPs)

MSCoE-West held their annual CME/CE meeting with the MS Regional and Support Program directors for a half-day on June 25, 2021. There were **37** attendees at the virtual meeting, including MSCoE staff. An overview of FY21 and FY22 directions was provided as well as information on motivational interviewing, DMTs, and mentoring for research.

VA Extension for Community Health Outcomes CME/CE Webinars (HCPs)

MSCoE developed and collaborated with the VA-ECHO team in VISN 20 to present seven accredited, multidisciplinary MS webinars. These 70-minute programs use the ECHO framework of didactics, case presentations, and question-and-answer periods. Although produced locally, there are attendees from across the US, including Puerto Rico.

Education Table 2: VA-ECHO webinar participation and selected evaluation results.

Topic	Participants	Attendance Rate	Evaluation Score
Updates on COVID-19 and Vaccines	48	82%	82%
Cognition	85	91%	91%
MS Interdisciplinary Clinic	71	92%	86%

Current Topics in MS (HCPs)

MSCoE collaborated with the NMSS to produce five accredited, multidisciplinary MS webinars, with two taking place during MS Awareness month. The 60-minute webinars were recorded and stored as enduring educational material on the MSCoE and NMSS websites.

Education Table 3: Current Topics webinar participation and selected evaluation results.

Topic	Total Registrants (% VA)	Live Attendees	Recording Downloads	Agree or Strongly Agree Responses	
				Content improved my knowledge	Content improved my skills
Immunizations and Immune Health	127 (28%)	63	31	94%	69%
Providing Comprehensive Care	101(53%)	58	6	88%	82%
Cognition in MS	135 (40%)	78	1	76%	68%
Sex and Intimacy	81 (36%)	46	18	100%	86%
Complementary/Alternative Medicine	91 (48%)	43	21	96%	96%

Living with Progressive MS: A Webinar for Veterans with MS (patient/care partner)

MSCoE collaborated with the NMSS and PVA on our first virtual conference for Veterans with MS on March 11, 2021. This half-day webinar had over 375 live attendees and close to 100 viewings of the recording. Presentations were provided by VA providers on medical and non-medical interventions for MS. Representatives from each collaborating organization provided a brief presentation on services and programs relevant to Veterans with MS. 83% of survey respondents made new connections to information, resources, and sources of support while 80% of survey respondents reported planning to take action on something they learned.

Can Do MS Webinars (patient/care partner)

This is the fifth year of a successful collaboration with Can Do MS on their monthly tele-learning webinars for people affected by MS. The webinars are advertised in the quarterly Veteran newsletter and MSCoE website. Each webinar is recorded for enduring material.

Education Table 4: Can Do MS webinar participation and selected evaluation results.

Topic	Total Attendees	Veteran Attendees	Because of participating in the program I...	
			feel more confident in addressing the challenges of MS	learned new skills and strategies to improve my well being
Empowering People	988	39	84%	94%
Exercise and Diet	601	23	70%	71%
Integrative Nutrition	933	37	79%	90%
Intimacy	589	23	82%	88%
Social Activity and Connections	566	24	72%	77%
			learned new information	I became aware of new resources
Comprehensive Care	700	35	77%	75%
Fatigue and Invisible MS Symptoms	977	46	78%	72%
Making Decisions Together	459	25	67%	62%
Mood and Cognition	669	31	84%	89%
Planning for the Future	646	50	75%	79%
Resiliency to MS Transitions	615	18	82%	83%
Traveling and Recreating	527	38	84%	84%

NMSS Virtual Resilience Program for Veterans (patient/care partner)

MSCoE collaborated with the NMSS on a virtual resilience webinar August 11, 2021. Ms. Margaret Kazmierski, Spinal Cord Injury/Disorders Coordinator, VA MHCS, presented on developing strategies to promote individual resilience that can help people improve their quality of life. This was MSCoE's first time collaborating with NMSS on this webinar series. There were 12 attendees for the program.

Oregon Health & Science University Webinars/Conferences (HCPs/patient/care partner)

MSCoE collaborates closely with the Oregon Health & Science University (OHSU) Brain Institute on educational programs for HCP and people affected by MS. All virtual programs are advertised nationally to VA HCPs and Veterans with MS.

HCPs

The annual *MS and CNS Neuroimmunology: Advances and Updates* symposium provides HCP the information needed to identify, refer, treat, and implement changes to improve the care of people with neuroimmunological disorders. Dr. Yadav organized and moderated the virtual symposium while Dr. Elizabeth Silbermann, a recently graduated OAA MS fellow, spoke on DMTs. The program was a full day on September 18, 2021 and had 120 registrants, with over 50% being VA HCP.

Dr. Rebecca Spain organized and moderated the annual *MS Wellness Research Symposium* on October 23, 2020. This half-day virtual symposium explored the role of mind and body therapies in MS and generated research questions for future cross-disciplinary studies. Dr. Silbermann presented an overview on mind and body therapies while other invited speakers presented on neurobiological mechanisms and economic impact of mind and body therapies. There were 108 attendees at the symposium.

Patient & Care Partner

The virtual *At the Frontier and Beyond: MS 2021* half-day symposium on June 12, 2021 provided practical information about managing, treating, and living with MS. Dr. Yadav organized, moderated, and presented on research updates while Dr. Spain presented on DMTs. Outside speakers were invited to discuss COVID-19 and cognition and aging. There were 667 registered attendees, with 200 live views and over 800 views of the recorded program. Of those who registered, 337 were Veterans.

The *COVID-19 Vaccines and MS* webinar on February 19, 2021 was organized in response to the many questions HCPs were receiving regarding vaccines. Dr. Yadav organized the webinar and presented on MS and COVID-19 while an invited speaker provided a general overview of the COVID-19 vaccines. There were 273 registered attendees, with 160 live views and over 400 views of the recorded program. Of those who registered, 19 were Veterans.

Digital & Social Media Platforms

MS Education & Awareness Month (HCPs/patient/care partner)

MS Education and Awareness is celebrated annually in the month of March. MSCoE developed a toolkit for promotion of MS which includes images, internal and external statements, flyers, programs and products, and news releases. This toolkit was shared with the MSCoE network, VA social and

public media offices, and PVA. A Veteran story that touched on collaborations with the NMSS was produced for the VA Blog. A webpage was created on the MSCoE website to highlight MS awareness as well as the activities for the month.

Several VA facilities utilized the toolkit for promotion at their facilities. VA Social Media posted five tweets on Twitter and three statements on Facebook. MSCoE collaborated with the NMSS on two CME/CE webinars for HCPs. The PVA, NMSS, and MSCoE collaborated on our first Veteran webinar. Ms. Linda Hillman presented an MS 101 program for nurses in Puget Sound, WA.

MS & Vets Podcasts (patient/care partner)

MSCoE’s monthly podcast series, developed in collaboration with EES, discusses important issues related to the health and quality of life for Veterans with MS. Each podcast has a moderator and VA subject matter expert, with episodes ranging in length from 15-20 minutes. Podcasts are posted the 2nd Tuesday of the month on 12 different app platforms. Listeners can leave comments with MSCoE staff providing responses, increasing interactions with our Veteran population.



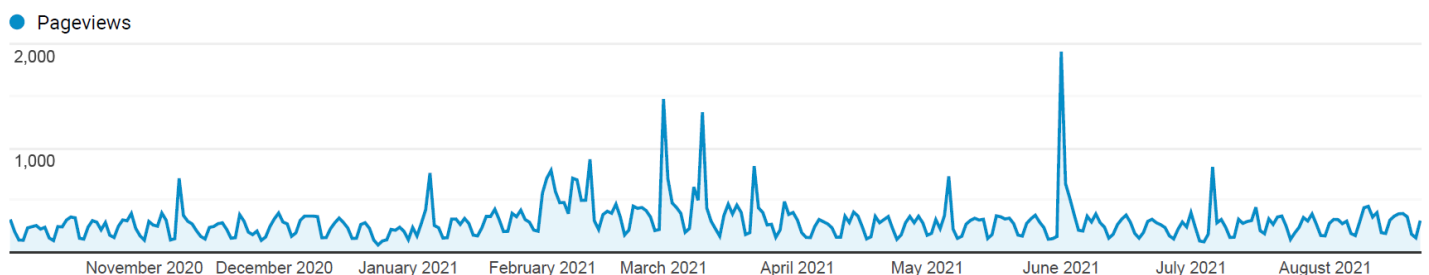
Education Table 5: MS podcast topics, speakers, and views from posting to September 30, 2021.

Topic/Available	Speaker	Views
Vaccines (6/2021)	Kathy Tortorice, PharmD - Neurology, PBM	121
Telehealth (7/2021)	Elizabeth Silbermann, MD - Portland, OR VA HCS	176
Whole Health (8/2021)	David Greaves, PhD - Portland, OR VA HCS	173
MS Research (9/2021)	Aaron Turner, PhD - Seattle, WA VA HCS	111
VA Benefits and Resources (10/2021)	Maggie Kazmierski, MSW - Baltimore, MD VAMC	NA
VA Multi-Disciplinary Care (11/2021)	Rebecca Spain, MD - Portland, OR VA HCS	NA

MSCoE Website (HCPs/patient/care partner)

The MSCoE website is a great source of information for people affected by MS, as well as HCPs treating Veterans with MS. There were over 106,000 visitors to the website in FY21, with 44% visiting Veteran pages and 25% visiting provider pages. Significant webpage additions in FY21 were generic and biosimilar DMTs as well as an evolving webpage on COVID-19.

Education Table 6: MSCoE website page views from October 1, 2020 to August 23, 2021.



Newsletters, Booklets, & Pamphlets

Our newsletters are distributed through the VA's GovDelivery system which allows VA employees and the public to sign-up for topics of interest.

MSCoE Spotlight Electronic Newsletter (HCPs)

Our monthly e-newsletter is distributed to more than 10,000 HCPs nationwide. The e-newsletter provides information on educational opportunities (VA, MSCoE, Associates), MS news, VA publications, and clinical care recommendations. MSCoE strives to highlight the expertise and accomplishments of VA HCPs within our network through the VA Publication Highlight and Clinical Corner sections.

Education Table 7: Newsletter "Clinical Corner" topics.

Topic	Author(s)
Behavioral Strategies for MS-related Fatigue	Lindsey Knowles, PhD (fellow) - Seattle, WA VA HCS
Chronic Pain	Carrie Roper, PsyD (fellow) - Baltimore, MD VAMC Terry Lee-Wilk, PhD - Baltimore, MD VAMC
Creating a Confident Care partner	Ernest Acheampong, RN, MSN, CNL - Bronx, NY VAMC April Jones, RN, BSN, CRRN - Bronx, NY VAMC Marinella Galea, MD - Bronx, NY VAMC
Evaluating DMTs in the Same Class	Natasha Antonovich, PharmD - VISN 8 PBM
Increasing Acceptance of Acupuncture in NA	Kenneth Lee, MD - Minneapolis, MN VAMC
Mindfulness and MS	Jessie Siegel, PsyD (fellow) - Baltimore, MD VAMC Terry Lee-Wilk, PhD - Baltimore, MD VAMC
MS Navigator and VA Collaborations	Alicia Sloan, MPH, MSW, LICSW - Seattle, WA VA HCS Maggie Kazmierski, MSW, LICSW - Baltimore, MD VAMC
Sole Source Contract for Dimethyl Fumarate	Kathy Tortorice, PharmD - Neurology, PBM
Supporting Healthy Homes During the COVID-19 Pandemic	Megan Dadez, OTD, OTR/L - Tampa, FL VAMC Barbara Taylor, OTR/L, CHT - Tampa, FL VAMC
TheraDoc: A Clinical Decision Support Tool	Lisa Mitchell, RN, MSN - Baltimore, MD VAMC
Video Telehealth	Office of Rural Health
Visual Outcomes in Clinical Trials	Elizabeth Silbermann, MD - Portland, OR VA HCS

MS Veteran Newsletter (patient/care partner)



Our bi-annual newsletter was reformatted to a quarterly, electronic version in Q2. Postcards were mailed to Veterans previously receiving the printed newsletter to alert them to this change and encourage them to sign-up

for the electronic version. A webpage was also created on our website, posted to the home page, directing visitors to sign up for information on MS. Each e-newsletter includes two topics and a Veteran story about living with MS. The e-letter reaches over 42,000 people affected by MS, double the number previously reached. In addition to our increased distribution, web pages are created for all

articles to increase visibility on the website. The newsletters are a collaborative effort among MSCoE staff, network members, NMSS, and PVA.

Education Table 8: Q1, Q2, and Q3 Veteran newsletter topics and authors.

Topic	Author(s)
Diet and MS	Gregory Wu, MD, PhD - St. Louis, MO HCS
Generic and Biosimilar DMTs	Rebecca Spain, MD, MSPH - Portland, OR VA HCS Mitchell Wallin, MD, MPH - Washington, DC VAMC Heidi Maloni, PhD, APRN, BC-ANP - Washington, DC VAMC Kathy Tortorice, PharmD - Neurology, PBM
Making the Most of Your Telehealth Visit	Elizabeth Silbermann, MD - Portland, OR VA HCS
Staying Active While Living with MS	Emily Reilly, Certified Personal Trainer - NMSS
VA Benefits and Services for Veterans	Alicia Sloan, MPH, MSW, LICSW - Seattle, WA VA HCS Maggie Kazmierski, MSW, LICSW - Baltimore, MD VAMC
Vaccines and MS: A Practical Guide	Kathy Tortorice, PharmD - Neurology, PBM

Overview of MS for Veterans Booklet (HCP/patient/care partner)

MSCoE’s booklet is a great resource for Veterans newly diagnosed with MS or new to VA care. Information about MS, multi-disciplinary care, VA services and benefits, self-management, and MS resources are provided as well as vignettes from Veterans living with MS. The booklet was updated this year, improving online viewing readability and adding information on VA Community Care and care partner programs.

MS Fellowships & Mentoring

Detailed information on fellow’s accomplishments can be found in the Research section while a list of MS fellows can be found in *Appendix E*.

Physician Fellows Mentoring (HCPs)

The OAA Advanced Fellowship Program in MS provides two years (with a possible third-year extension) of post-residency research, education, and clinical learning opportunities to eligible physicians. Dr. Yadav collaborated with other MS fellowship directors on the development of consensus curriculum for fellowship training in MS and neuroimmunology. The information was published in August 2021 in *Neurology: Clinical Practice*.

VA Maryland HCS Fellowship

The MSCoE-East fellowship, in partnership with the University of Maryland, has an established track record of training fellows who go on to build successful practices in MS care. MSCoE-East had two fellows to complete the VA advanced fellowship program and two new fellows starting in July 2021. Goals for the program are accomplished through activities in three core components:

1. **Research:** The fellow chooses a research mentor and works collaboratively in a substantial research project pertaining to MS, with a goal of developing independent research relevant to MS, and then presenting and publishing findings.
2. **Clinical Care:** Fellows receive clinical training in the care of people with MS through supervised weekly MS clinics at the VA Maryland HCS and MS Center at the University of Maryland. Fellows also participate in intermittent inpatient consultations and after-visit clinical care decision making.
3. **Education:** Fellows receive direct education on the care of people with MS and clinical research methods relevant to MS through multiple, relevant educational opportunities, including, but not limited to, supervised readings, seminars, symposia, and academic conferences.

VA Portland Health Care System Fellowship

MSCoE-West Portland has a strong mentorship plan for physician fellows, in collaboration with OHSU and the NMSS. Fellows are assigned a one-on-one mentor for research and clinical care, along with monthly meetings with the MS Fellowship Director. Clinical training opportunities are provided through clinic at OHSU and the VA Portland HCS, as well as attending, consults, and optional ½ day clinics in areas such as neuro-ophthalmology, neuro-rehab, urology, or rheumatology.

Fellows completing a two-year fellowship are enrolled in the OHSU Humans Investigator Program which provides clinical trial design training, as well as didactics in epidemiology and ethics of human research. Fellows are expected to participate in active research studies and in their second year, they will develop, and ideally complete, their own research study. A two-hour didactic session occurs every Thursday, with the first three months of didactics being a “boot camp” covering the basics of MS care. Fellows are provided opportunities to author publications and present at patient and provider events. In FY21, we had three fellows graduate, one continued into a third year, and three new fellows started in July 2021.

Psychology Fellows Mentoring (HCPs)

VA Maryland HCS Postdoctoral Fellowship in Clinical Neuropsychology

The VA Maryland HCS neuropsychology fellowship is a two-year postdoctoral experience that is consistent with the Houston Conference and Division 40 guidelines for training in clinical neuropsychology. It is funded by OAA and is accredited by the Commission on Accreditation of the American Psychological Association. The fellowship has dual goals of refining skills in neuropsychological assessment, treatment, consultation, and research relating to the specific needs of Veterans, as well as facilitating the development of fellows from trainees to independent psychologists. Fellows are provided with general training in a VA medical center setting, including a six-month rotation in conjunction with MSCoE-East Baltimore. Fellows attend MS clinics and provide

neuropsychological evaluations and therapeutic interventions to Veterans with MS. Two fellows are recruited annually, with a total of four fellows in the program at any given time.

VA Seattle Health Care System Collaborative Post-Doctoral Fellowship in MS Rehabilitation Research

The Seattle Collaborative Fellowship, funded by the NMSS, is a mentor-based postdoctoral fellowship program in MS rehabilitation research based on a partnership between MScOE-West and the University of Washington (UW) Department of Rehabilitation Medicine. The primary aim of the fellowship is to recruit new investigators and provide them with knowledge and skills to serve as successful independent researchers in the field of MS rehabilitation research. The fellowship is highly flexible, and trainee based. Fellows may provide MS clinical care within the UW and VA Puget Sound MS Centers, depending on their training goals. Fellows are enrolled for a period of one to three years, depending on experience and interests.

Informatics & Telemedicine Core

OBJECTIVES

- Monitor outpatient utilization of VA health care by Veterans with MS including the unique MSCoE stop code visits (344) by VISN.
- Collect data on Community Care for Veterans with MS.
- Developed a MS-COVID-19 Registry for the VA healthcare system using active surveillance.
- Expand the use of MSCoE telehealth encounters and track utilization for Veterans with MS.
- Provide MS population management and individual care and maintain a national VA MS Data Repository of Veterans with MS utilized in clinics and MS research.

Informatics & Telemedicine Goals (FY21)

GOAL #1

SPECIFIC: Increase the number of patients with MS at the MSCoE enrolled in the MS Surveillance Registry (MSSR) by 10%.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: Goal met with 16% increase (FY20 to FY21).

GOAL #2

SPECIFIC: Estimate the COVID-19 incidence and explore its severity in Veterans with MS compared with the overall experience in VHA based on hospital admissions and mortality.

ASSOCIATED VA PRIORITY: Customer service

PROGRESS TOWARDS GOAL IN FY21: Goal met with data presentation in final report for FY21. Input of MS-COVID19 cases into MS Surveillance Registry is ongoing.

GOAL #3

SPECIFIC: Monitor community care encounters and exchange of patient data/records between non-VA providers and VA. Reach out to Community Care liaisons and review type of care (neurology, rehabilitation, imaging, etc.) by geographic location.

ASSOCIATED VA PRIORITY: Mission act

PROGRESS TOWARDS GOAL IN FY21: Goal met with data presented in *Table 3*. Also, new contract

set up in FY21 to make data cube for Community Care consults.

Other Activities (FY21)

The following activities took place during FY21 which align with VA national priorities:

1. Data identified and pulled in the Corporate Data Warehouse (CDW) to support VA Career Development grant application for Dr. Alexis Lizarraga at Buffalo, NY VA Medical Center and Merit Review for Dr. Mitchell Wallin and Ms. Susan Conroy at the VA Maryland HCS.
2. Data pulled and analyzed from MSSR for VA colleagues for use in manuscript write-ups.
3. Continued tracking of MS cases in VA by MS algorithm for FY21. Up to five controls identified for each case.
4. Provided data to justify new Community Care encounter cube for more efficient evaluation of health care services paid for by Community Care outside VA.
5. MSSR sustainment and enhancements made with VA OI&T programming support contract. These changes were vetted by Drs. Wallin and Joel Culpepper (Business Owners) for optimal input and viewing of MS-related data through the VA Computerized Patient Record System (CPRS) or via web-based portal. MSSR tools allow for efficient searches and downloads of data for MScOE clinics.

Accomplishments

- Launched the neurology data cube web program with a training overview for providers in the neurology centers of excellence: MScOE, ECoE, and PADRECC.
- Initiated tracking of COVID-19 vaccinations in 2021 and continued tracking MS and comorbid COVID-19 cases across the national VA healthcare system.
- Created enhancements for data downloads, data displays, and new disease modifying therapies (DMTs) in the MSSR.
- Tracked telehealth encounters in the national MS cohort and controls without MS from 2008-2020.
- Created coding (ICD, SNOMED, and CPT) to track quality indicators in the current (CPRS) and future (Cerner) electronic health record systems for: MS diagnosis, MS subtype, and DMT discussion.

- Used national MS cohort and controls to produce morbidity and utilization data for several collaborators: Drs. Minden (Complementary and Alternative Medicine and MS), Melamed/Stuve (Alcohol Utilization and MS), and Lizarraga (Peripheral and Autonomic neuropathy and MS).

MSCoE Data Structures & Tools

Three primary data structures are available to MS clinicians and researchers for population-based morbidity and mortality data: the MS Repository, the MSSR, and the neurology data cube. The MS Repository contains data on algorithm-defined MS cases and controls from 1998-present. The MSSR is a provider-initiated registry that stores core demographic and clinical data related to MS and links these data to specific CDW fields (e.g., inpatient encounters, imaging). The neurology cube provides real-time and historical data about Veterans receiving neurology care for epilepsy, MS, and Parkinson’s disease/movement disorders in the national VA system. Together, these data structures provide information regarding MS subtype, disability, utilization of DMTs, clinical utilization, administrative information, and data for research.

Table 1 shows MS case encounters by ICD Code, MSCoE stop code, and MSSR by VISN for FY21. These data were assembled from the neurology data cube. Overall, there were 19,806 Veterans with MS that utilized the VA healthcare system in FY21. The proportion of Veterans with MS taking DMTs is displayed in *Table 2*. A total of 91% of MSSR enrollees have ever taken a DMT. *Table 3* shows the percentage of Veterans receiving community care services (CCS) for any medical need over the past two fiscal years. There was a 60% increase in utilization of community care in FY21 vs FY20 with the highest mean rate of community care services being accessed in VISN 8 (Florida and Caribbean). The overall mean number of CCS encounters per Veteran with MS utilizing CCS was 50 in FY21.

Informatics Table 1: Veteran MS case encounters by ICD Code, MSCoE stop code, and MSSR. (Data from 10/1/20-9/30/21)

Geographic Region	Unique MS Patients per VSSC Neurology Cube	Unique MS Patients as defined by MS Algorithm	Patients with MS Encounters by MSCoE Facility (344 stop code; primary or secondary position)	MS Surveillance Registry Patients
Data Source	VSSC Neurology Cube	VSSC Neurology Cube	VSSC Encounter Cube	MSSR
VISN 1	917	905	108	14
VISN 2	990	977	265	369
VISN 4	986	942	66	139
VISN 5	795	784	586	520
VISN 6	1,441	1,413	116	81
VISN 7	1,363	1,340	89	207
VISN 8	1,762	1,744	27	44

VISN 9	827	815	180	7
VISN 10	1,727	1,698	68	22
VISN 12	982	973	569	2
VISN 15	778	770	21	10
VISN 16	1,126	1,112	82	16
VISN 17	1,233	1,218	0	167
VISN 19	1,386	1,371	190	183
VISN 20	1,389	1,378	613	729
VISN 21	992	984	0	8
VISN 22	1,505	1,493	541	12
VISN 23	1,079	1,069	65	3
Total	19,806	19,579	3,586	2,543

Informatics Table 2: Percentage of Veterans in MSSR Taking DMTs. (FY21 Data from MSSR)

Age Group (yrs.)	Total MSSR Patients	% Each age group over total	MSSR Patients ever taking a DMT	% Each Age group ever taken a DMT	MSSR Patients currently taking a DMT	% Each age group currently taking a DMT
21-30	27	1.07%	27	100%	24	88.89%
31-40	226	8.92%	223	98.67%	174	76.99%
41-50	401	15.83%	390	97.26%	305	76.06%
51-60	605	23.88%	576	95.21%	436	72.07%
61-70	618	24.40%	554	89.64%	344	55.66%
71-80	541	21.36%	467	86.32%	225	41.59%
81+	115	4.54%	89	77.39%	33	28.70%
Total	2533	100.0%	2326	91.83%	1541	60.84%

Informatics Table 3: Office of Community Care (OCC) utilization by Veterans with MS FY20-FY21. Data from OCC, VACO. Abbreviations: Pt: patients; Enc.: Encounters; *Numbers covered OCC services after payment was made for the encounter. (Last date of service 9-22-2021, last date of process 9-30-2021).

Location	FY20: # Algorithm Identified MS Pts Receiving OCC	FY20: # OCC Enc. from Algorithm Identified MS Pts Receiving OCC	FY20: Mean # OCC Enc. from Algorithm Identified MS Pts Receiving OCC	FY21: # Algorithm Identified MS Pts Receiving OCC	FY21: # OCC Enc. from Algorithm Identified MS Pts Receiving OCC	FY21: Mean # OCC Enc. from Algorithm Identified MS Pts Receiving OCC
VISN 1	185	4,675	25.3	117	4,682	40.0
VISN 2	184	4,785	26.0	90	5,169	57.4
VISN 4	169	4,363	25.8	78	3,183	40.8
VISN 5	180	4,438	24.7	63	3,165	50.2
VISN 6	436	10,394	23.8	160	5,710	35.7
VISN 7	393	12,778	32.5	216	14,056	65.1
VISN 8	505	21,242	42.1	282	21,315	75.6

VISN 9	299	6,198	20.7	121	5,258	43.5
VISN 10	454	11,582	25.5	155	7,404	47.8
VISN 12	306	10,821	35.4	141	7,914	56.1
VISN 15	319	8,271	26.0	151	6,713	44.5
VISN 16	382	10,159	26.6	177	8,042	45.4
VISN 17	400	13,490	33.7	222	9,149	41.2
VISN 19	458	14,242	31.1	229	10,120	44.2
VISN 20	537	13,927	25.9	236	13,099	55.5
VISN 21	309	8,590	27.8	185	7,517	40.6
VISN 22	503	14,365	28.6	243	10,154	41.8
VISN 23	394	8,087	20.5	170	7,287	42.9
Total	6,362	182,415	28.7	2,993	149,946	50.1

MSCoE Telehealth

Overall, telemedicine utilization increased for both MS cases and controls over the study period (2008-2020), but patients with MS (PwMS) had consistently higher annual telehealth encounter rates compared to non-MS controls (*Appendix C*). Conditional logistic regression analyses revealed increased adjusted odds ratio for telemedicine utilization for 2010 (aOR=1.26 95% CI: 1.18-1.33), 2016 (aOR=1.65 95% CI: 1.51-1.80), and 2020 (aOR=2.06 95% CI: 1.78-2.40) after adjusting for county and census tract-level social determinants of health. Specific geographic regions for higher telemedicine use included eastern and west coast metropolitan regions. Poverty, crowded housing, race/ethnicity, living in a rural environment, and being enrolled for medical care in 2020 during the COVID-19 pandemic were independently associated with higher odds of telemedicine utilization.

MSCoE & COVID-19

While the rate of COVID-19 infections decreased in the spring months of 2021, the rates of COVID-19 vaccinations rose across VA. As of July 27, 2021, a total of 506 PwMS and COVID-19 infection have been identified nationally. This is a 9.2% positive rate out of the 5,505 PwMS that have been tested. Overall, 10,038 PwMS have received at least one dose of the COVID-19 vaccine within the VA healthcare system and 9,047 have received two doses (*Appendix D*).

Appendix A: MScCoE Personnel & Organizational Chart

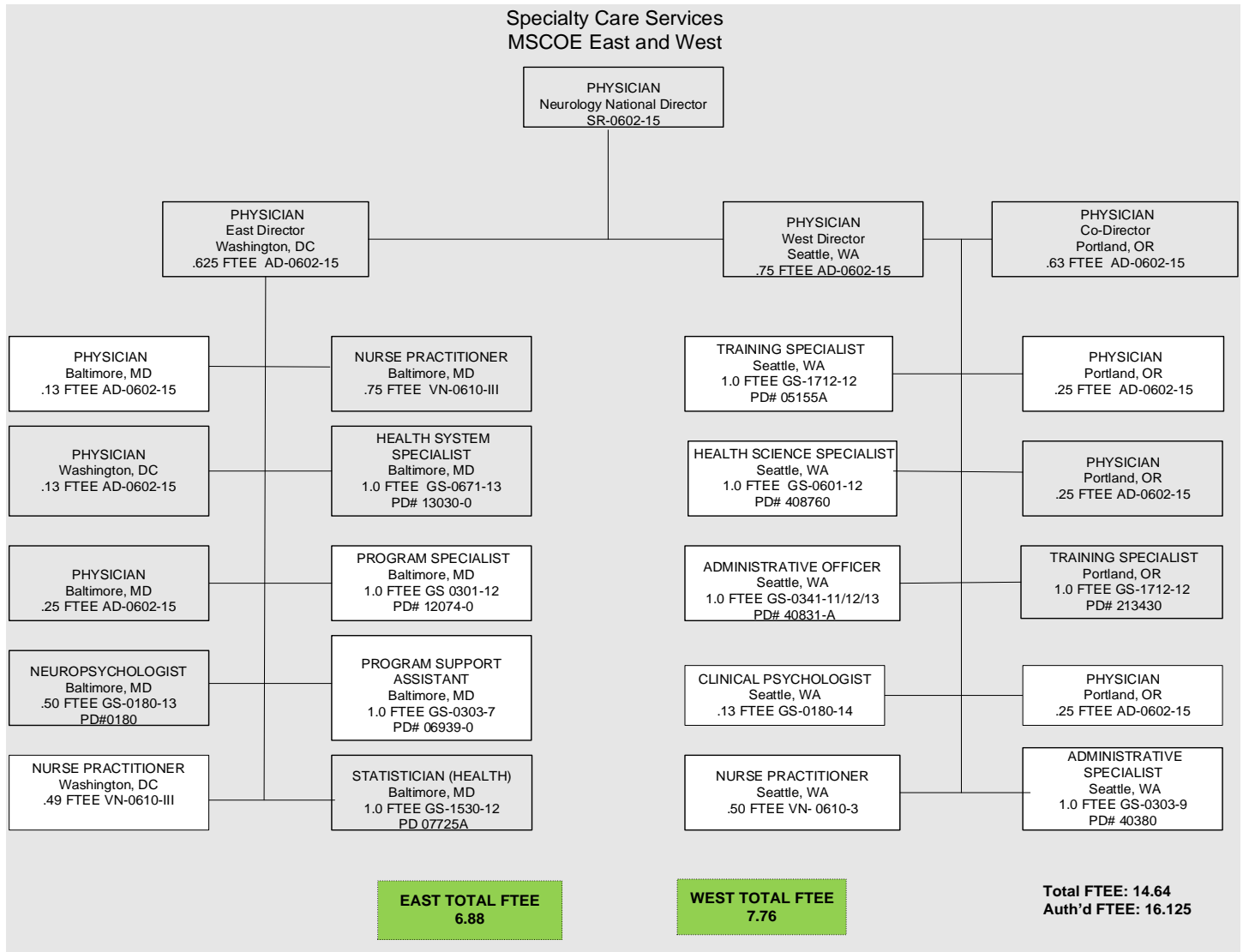
MScCoE East

Name	MScCoE Position	Email	Phone	MScCoE FTE
Mitchell Wallin, MD, MPH	Director	mitchell.wallin@va.gov	(202) 745-8146	0.625
Dan Harrison, MD	Fellowship Director	daniel.harrison2@va.gov	(410) 605-7480	0.25
Angela Young, MBA	Administrative Officer	angela.young4@va.gov	(410) 605-7133	1.0
Kenith Walker	Program Support Assistant	kenith.walker@va.gov	(410)-605-7480	1.0
Shan Jin	Statistical Programmer	shan.jin@va.gov	(410) 605-3594	1.0
Terry Lee-Wilk, PhD	Director Neuropsychology	terry.lee-wilk@va.gov	(410) 637-1393	0.5
Heidi Maloni, NP, PhD	Assoc. Director Clinical Care	heidi.maloni@va.gov	(202) 745-7873	0.49
Francesca Bagnato, MD	Assoc. Director Research	francesca.bagnato@va.gov	(615) 873-7510	0.25
Arlene Zawadzki	Nurse Registrar	arlene.zawadzki@va.gov	(716) 886-7485	0.25 (MoA)
Lisa Mitchell, RN, MSN	National MScCoE Nurse Coordinator	lisa.mitchell2@va.gov	(410) 605-7000 x 54372	0.38 (MoA)
Karen Noblitt, APT	Registrar	karen.noblitt@va.gov	(813) 972-2000 x 2351	0.25 (MoA)
Margaret Kazmierski, LCSW	Social Worker	margaret.kazmierski@va.gov	(410) 605-7000 x 57550	0
Mark Leekoff, MD	MScCoE Fellow	mark.leekoff@va.gov	(410) 605-7000 x54341	0
Tamar Harel, MD	MScCoE Fellow	tamar.harel@va.gov	(410) 605-7000 x 54341	0
Yohance Allette, MD, PhD	MScCoE Fellow	yohance.allette@va.gov	(410) 605-7000 x 54341	0
Horea Rus, MD	Physician	horea.rus@va.gov	(410) 605-7480	0
Vacant	Director Education and Training			1.0
Vacant	Clinical Technician			1.0
Vacant	Assoc. Director Informatics			0.125
Vacant	Physician/Neurologist			0.75
Vacant	Physician/Neurologist			0.375

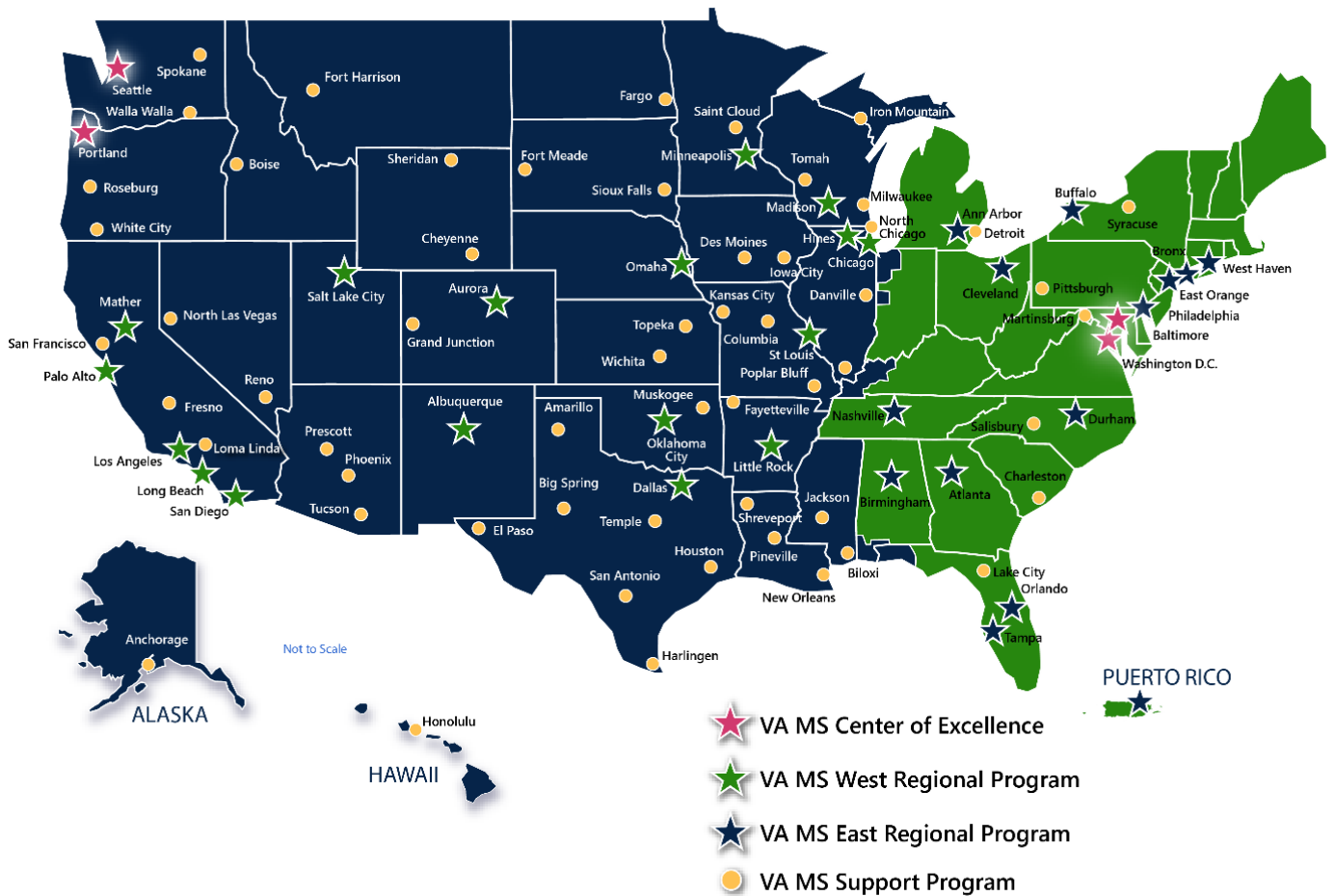
MSCoE West

Name	MSCoE Position	Email	Phone	MSCoE FTE
Jodie Haselkorn, MD, MPH	Director	jodie.haselkorn@va.gov	(206) 277-3452	0.75
Michelle Cameron, MD, PT, MCR	Co-Director	cameromi@ohsu.edu	(503) 220-8262, x 57018	0.625
Rebecca Spain, MD, MSPH	Assoc. Director Clinical Care	rebecca.spain@va.gov	(503) 494-5759	0.25
Lindsey Wooliscroft, MD	Assoc. Director Research	Lindsey.Wooliscroft@va.gov	(503) 220-8262	0.25
Steven Leipertz, PhD	Assoc. Director Informatics	steve.leipertz@va.gov	(206) 277-6425	1.0
Aaron Turner, PhD, ABPP (RP)	Assoc. Co-Director R&D	aaron.turner@va.gov	(206) 277-6134	0.125
Vijayshree Yadav, MD, MCR	Assist. Director Clinical Care/ Fellowship Director	vijayshree.yadav@va.gov	(503) 494-3813	0.25
Lynda Hillman, DNP, ARNP	National Clinical Nursing Director	lynda.hillman@va.gov	(206) 277-4688	0.5
Jaimie Henry, MPA	Program Specialist	jaimie.henry@va.gov	(503) 273-5191	1.0
Lani Pitofsky	Administrative Specialist	lani.pitofsky@va.gov	(206) 277-6079	1.0
Lindsey Knowles, PhD	MSCoE Fellow	lindsey.knowles@va.gov		0
Christopher Hollen, MD	MSCoE Fellow	christopher.hollen@va.gov		0
Vicky Chen, MD	MSCoE Fellow	chenvic@ohsu.edu		0
Kayla Martin, MD	MSCoE Fellow	makayla@ohsu.edu		0
Derek, McFaul, DO	MSCoE Fellow	mcfaul@ohsu.edu		0
Tyrell Simkins, Do, PhD	MSCoE Fellow	tyrell.simkins@va.gov		0
Jessica Rice, MD	MSCoE Fellow	jessica.rice4@va.gov		0
Cinda Hugos, PT	Health Science Specialist	lucinda.hugos@va.gov		0
Elizabeth Silbermann, MD	Neurologist	elizabeth.silbermann@va.gov		0
Jan Spencer, LCSW	MS Social Worker	janet.spencer@va.gov		0
Arthur Vandenbark, PhD	Health Science Specialist	arthur.vandenbark@va.gov		0
Vacant	Assoc. Director Education			1
Vacant	Administrative Officer			1

Organizational Chart



Appendix B: MS Map & Network



MSCoE East

VISN	Regional Programs	Support Programs
1	Boston, MA West Haven, CT	
2	East Orange, NJ Bronx, NY Buffalo, NY	Syracuse, NY
4	Philadelphia, PA	Pittsburg, PA
5	Washington, DC	Baltimore, MD Martinsburg, WV
6	Durham, NC Richmond, VA	Salisbury, NC
7	Birmingham, AL Atlanta, GA	Charleston, SC

8	Orlando, FL Tampa, FL San Juan, PR	Lake City, FL
9	Nashville, TN	
10	Cleveland, OH Ann Arbor, MI	Detroit, MI

MSCoE West

VISN	Regional Programs	Support Programs
12	Chicago, IL Hines, IL Madison, WI Milwaukee, WI	Danville, IL North Chicago, IL Iron Mountain, MI Tomah, WI
15	Saint Louis, MO	Columbia, MO Marion, IL Topeka, KS Wichita, KS Kansas City, MO Poplar Bluff, MO
16	Little Rock, AR	Fayetteville, AR New Orleans, LA Pineville, LA Shreveport, LA Biloxi, MS Jackson, MS Houston, TX
17	Dallas, TX	Amarillo, TX Big Spring, TX El Paso, TX Harlingen, TX San Antonio, TX Temple, TX
19	Denver, CO Oklahoma City, OK Salt Lake City, UT	Grand Junction, CO Fort Harrison, MT Muskogee, OK Cheyenne, WY Sheridan, WY
20	Portland, OR Seattle, WA	Anchorage, AK Boise, ID Roseburg, OR White City, OR Spokane, WA Walla Walla, WA
21	Mather, CA	Fresno, CA

	Palo Alto, CA	San Francisco, CA Honolulu, HI N. Las Vegas, NV Reno, NV
22	Long Beach, CA Los Angeles, CA San Diego, CA Albuquerque, NM	Tucson, AZ Loma Linda, CA Phoenix, AZ Prescott, AZ
23	Minneapolis, MN Omaha, NE	Des Moines, IA Iowa City, IA St. Cloud, MN Fargo, ND Sioux Falls, SD Fort Meade, SD

Appendix C: Telehealth Utilization

Telehealth Utilization by MS cases by VISN for FY19 - FY21 (Oct. 1, 2019 - Sept. 30, 2021). MS patient cases defined by MS algorithm. **TH:** telehealth; **ENC:** encounters

Telehealth Variable	# MS Pts FY19	# ENC. FY19	Mean ENC. FY19	# MS Pts FY20	# ENC. FY20	Mean ENC. FY20	# MS Pts FY21	# ENC. FY21	Mean ENC. FY21
All outpatient encounters	21,606	651,114	30.14	21,537	581,990	27.02	22,746	1,258,713	55.34
All telehealth encounters	17,841	159,280	8.93	20,066	260,508	12.98	21,116	387,312	18.34
Telehealth encounters defined by video	2,666	13,038	4.89	8,409	42,410	5.04	11,100	76,634	6.90
Telehealth encounters defined by telephone	16,472	113,351	6.88	19,554	187,364	9.58	20,699	282,852	13.67
Telehealth encounters defined by supplementary remote	9,700	32,891	3.39	9,037	30,734	3.40	10,426	51,487	4.94
Telehealth encounters contributed by clinic stop codes	17,643	143,137	8.11	19,986	238,384	11.93	21,050	375,887	17.86
Telehealth encounters contributed by CPT codes or CPT modifier	16,695	123,701	7.41	19,686	217,829	11.07	19,293	176,822	9.17
Telehealth encounters contributed by telehealth CPT modifier	1,384	3,988	2.88	4,397	20,944	4.76	0	0	0
Telehealth encounters contributed by telehealth CPT codes	16,539	120,001	7.26	19,557	200,315	10.24	19,293	176,822	9.17
Telehealth encounters served for neurology treatment	1,398	2,846	2.04	4,343	7,876	1.81	4,623	8,945	1.93
Telehealth encounters served for MS Treatment	212	471	2.22	930	1,701	1.83	1,185	2,305	1.95

Appendix D: MS & COVID-19 Cases in the VA HCS

Abbreviations: COVID: COVID-19, Pts: patients, CDW: Corporate Data Warehouse

Data Source	CDW COVID MS (% All PwMS)	CDW Inpatient COVID MS	CDW Inpatient All MS	CDW COVID MS Inpatient/All MS Inpatient %	CDW COVID MS Deaths	CDW Deaths/All MS %
TOTAL	627 (3.2%)	195	1,841	10.5%	74	11.8%
VISN 1	33 (3.5%)	7	74	9.5%	4	12.1%
VISN 2	54 (5.4%)	23	172	13.4%	11	20.4%
VISN 4	41 (4.2%)	10	74	13.5%	3	7.3%
VISN 5	30 (3.8%)	5	63	7.9%	2	6.7%
VISN 6	51 (3.5%)	8	79	10.1%	4	7.8%
VISN 7	56 (4.2%)	11	104	10.6%	5	8.9%
VISN 8	103 (5.8%)	22	192	11.5%	4	3.9%
VISN 9	38 (4.6%)	4	93	4.3%	1	2.6%
VISN 10	69 (4.0%)	16	144	11.1%	12	17.4%
VISN 12	40 (4.1%)	5	104	4.8%	3	7.5%
VISN 15	34 (4.4%)	9	71	12.7%	3	8.8%
VISN 16	52 (4.6%)	15	90	16.7%	3	5.8%
VISN 17	28 (2.3%)	8	88	9.1%	3	10.7%
VISN 19	42 (3.0%)	8	86	9.3%	2	4.8%
VISN 20	31 (2.2%)	11	71	15.5%	1	3.2%
VISN 21	37 (3.7%)	8	80	10.0%	2	5.4%
VISN 22	86 (5.7%)	17	178	9.6%	8	9.3%
VISN 23	54 (5.0%)	8	78	10.3%	3	5.6%

Appendix E: Research & Clinical Fellows

Year	Name	Fellowship Location	Current and Past Position(s) (ongoing or completed in last 2 years)	Primary Mentor(s)
2018-2021	Jessica Rice, MD	Portland, OR	Neurologist, Providence Medical Center, Portland, OR; VA Advanced Fellow	M. Cameron
2019-2021	Carrie Reoper, PsyD	Baltimore, MD	VA Advanced Fellow, Mental Health/Neuropsychology	T. Lee-Wilk
2019-2021	Jesse Siegel, PsyD	Baltimore, MD	VA Advanced Fellow, Mental Health/Neuropsychology	T. Lee-Wilk
2019-2021	Mark Leekhoff, MD	Baltimore, MD	Neurologist, Saint Barnabas Medical Center, Livingston, NJ; VA Advanced Fellow	D. Harrison M. Wallin
2019-2021	Tyrell Simkins, DO, PhD	Portland, OR	Assistant Professor, Department of Neurology, UC Davis, Sacramento, CA; VA Advanced Fellow	K. Monk
2020-2021	Maria Xiang, MD	Portland, OR	Assistant Professor, Pediatric Neurology and Neuroimmunology, Department of Pediatrics Section of Neurology, Tulane University School of Medicine, New Orleans, LA; National MS Society Fellow	V. Yadav
2019-Current	Christopher Hollen, MD	Portland, OR	VA Advanced Fellow	V. Yadav
2019-Current	Lindsey Knowles, PhD	Seattle, WA	National MS Society Fellow	A. Turner
2021-Current	Derek McFaul, DO	Portland, OR	National MS Society Fellow	E. Silbermann
2021-Current	Kayla Martin, MD	Portland, OR	VA Advanced Fellow	V. Yadav
2021-Current	Tamar Harel, MD	Baltimore, MD	VA Advanced Fellow	D. Harrison M. Wallin
2021-Current	Vicky Chen, MD	Portland, OR	VA Advanced Fellow	M. Cameron
2021-Current	Yohance Allette, MD	Baltimore, MD	VA Advanced Fellow	D. Harrison M. Wallin

Appendix F: Research Grants by Funding Source

VA Research & Development (n=9)

Grant Title	Investigator(s)	Mechanism	Amount	Years	Research Category
Vascular Disease Risk Factors and MS Progression: A Study of Brain Metabolism	V. Yadav (PI)	Merit	\$1,220,000	1/2015-9/2021	Clinical Science
Lipoic Acid for the Treatment of Progressive MS	R. Spain (PI) J. Haselkorn (S-PI) M. Wallin (S-PI) P. Soldan (S-PI)	Merit	\$1,098,594	5/2018-4/2022	Clinical Science, multi-site
A Pilot Trial to Study the Effects of Oral MitoQ on Fatigue in MS	V. Yadav (PI)	Merit	\$300,000	4/2020-11/2023	Clinical Science
Improving the assessment of myelin and axonal integrity in early MS	F. Bagnato (PI)	Merit	\$945,462	7/2021-6/2025	Clinical Science
Retinal Microvasculature as a Predictor of Neurodegeneration in MS	E. Silbermann (PI)	CDA2	\$1,382,087	10/2020-9/2025	Clinical Science
Comprehensive Fall Prevention and Detection in MS	M. Cameron (PI) L. Hugos (Co-I)	Merit	\$1,056,602	10/2015-3/2021	Rehabilitation
Evaluation of a Spasticity Management Program for People with MS	L. Hugos (PI) M. Cameron (Co-I)	Merit	\$1,096,000	1/2018-12/2021	Rehabilitation
Immunoregulation of Myelin-Specific T Lymphocytes	A. Vandenberg (PI)	Merit	\$675,000	4/2016-12/2021	Biomedical Laboratory
Preclinical Translational Studies with DRH	A. Vandenberg (PI)	Merit	\$930,000	4/2020-3/2024	Biomedical Laboratory

National MS Society (n=7)

Grant Title	Investigator(s)	Mechanism	Amount	Years	Research Category
Lipoic Acid for the Treatment of Progressive MS: Multi-Site Randomized Controlled Trial of Lipoic Acid in Progressive MS	R. Spain (PI)	Research Grant	\$1,180,579	10/2017-9/2021	Clinical Science
7T-rings as biomarker of disease severity	F. Bagnato (PI)	Research Grant	\$835,540	10/2019-9/2023	Clinical Science
Development and feasibility of a fatigue self-management Health program for persons with MS	J. Haselkorn (Co-I) A. Turner (Co-I)	Research Grant	\$700,429	7/2021-6/2026	Clinical Science
Developing Patient-Centered and Evidence-Based Wellness Programs for People with MS	R. Spain (PI) V. Yadav (Co-I)	Collaborative MS Research Center	\$825,000	4/2015-3/2021	Rehabilitation
A Randomized Controlled Trial of a Multicomponent Walking Aid Program for People with MS	M. Cameron (PI) C. Hugos (Co-I)	Research Grant	\$569,000	10/2019-9/2022	Rehabilitation
Oregon Health & Science University Institutional Clinical Training Award	V. Yadav (PI) M. Cameron (Co-I)	Institutional Clinical Training Award	\$584,375	7/2020-6/2025	Clinical Science
Mentor-Based Fellowship in Rehabilitation Research: The Seattle Collaborative Fellowship	A. Turner (PI) J. Haselkorn (Co-I)	Mentor-Based Postdoctoral Fellowship	\$401,426	7/2018-6/2023	Rehabilitation

Patient-Centered Outcomes Research Institute (PCORI) (n=1)

Grant Title	Investigator(s)	Mechanism	Amount	Years	Research Category
Discontinuation of Disease Modifying Therapies (DMTs) in MS	V. Yadav (S-PI)	Research Award	\$253,213	8/2016-9/2021	Clinical science, multi-site

National Institutes of Health (n=8)

Grant Title	Investigator(s)	Mechanism	Amount	Years	Research Category
Mobility Life: Monitoring Mobility in Daily Lives of People with Neurological Disease	R. Spain (Co-I)	R44	\$1,247,406	9/2016-5/2021	Clinical Science
In vivo assessment of meningeal inflammation and its clinical impact in MS by 7 Tesla MRI	D. Harrison (PI)	R01	\$1,796,000	2/2018-6/2023	Clinical Science
A Multicenter Randomized Controlled Trial of Best Available Therapy versus Autologous Hematopoietic Stem Cell Transplant for Treatment-Resistant Relapsing MS	V. Yadav (site PI)	R01	\$1,622,430 per participant	12/2019-12/2025	Clinical science, multi-site
Pooled analysis of MS findings on multi-site 7 Tesla MRI	D. Harrison (PI)	R01	2,000,000	9/2020-9/2025	Clinical science, multi-site
Aerobic Exercise to Improve Mobility in MS: Optimizing Design and Execution for a Full-Scale Multimodal Remyelination Clinical Trial	L. Wooliscroft (PI)	K23	\$638,916	7/2020-6/2025	Rehabilitation
Aerobic exercise to improve mobility in MS: optimizing design and execution for a full-scale multimodal remyelination clinical trial	L. Wooliscroft (PI)	Loan Repayment Program	\$100,000 in student loan repayment	9/2021-8/2023	Rehabilitation
Development of DR α 1-MOG-35-55 for Treatment of DR2-Negative MS Subjects	A. Vandenberg (Co-PI)	R44	\$998,210	4/2020-3/2023	Biomedical Laboratory
Longitudinal measurements of neurodegeneration in two murine models of	F. Bagnato (Co-PI)	R21	\$239,332	4/2021-3/2025	Biomedical Laboratory

MS: a clinical and histopathologic validation study					
---	--	--	--	--	--

Other Funding Support (n=7)

Grant Title	Investigator(s)	Funding Source	Amount	Years	Research Category
Pilot study of meningeal inflammation on 7T MRI as a tool for measuring and predicting ocrelizumab response in MS	D. Harrison (PI)	Genentech, Inc.	\$1,104,000	6/5/18-8/2022	Clinical Science
Aerobic exercise to improve mobility in MS: optimizing design and execution for a full-scale multimodal remyelination clinical trial	L. Wooliscroft (PI)	Clinical and Translational Research Center Career Development Support Award	\$20,000	4/2020-6/2022	Rehabilitation
Novel Biomarkers of Neural Repair in MS	L. Wooliscroft (PI)	Myelin Repair Foundation	\$24,964	11/2020-6/2025	Rehabilitation
Assessing Aerobic Exercise as a Remyelination Therapy in MS	L. Wooliscroft (PI)	Medical Research Foundation	\$49,400	2/2021-1/2022	Rehabilitation
The effects of aerobic exercise on structural, functional, and blood biomarkers of remyelination and neural repair in MS	W. Rooney (PI) L. Wooliscroft (Co-I)	Myelin Repair Foundation and EMD Serono	\$49,840	8/2021-7/2025	Rehabilitation
Lipoic Acid for the Treatment of Progressive MS. Multisite Randomized Controlled Trial of Lipoic Acid in Progressive MS (non- VA sites)	R. Spain (PI)	MS Society of Canada	\$300,000	12/2018-11/2022	Biomedical Laboratory
4th Annual MS and CNS Neuroimmunology Symposium	V. Yadav (PI)	Paralyzed Veterans of America	\$15,000	6/2021-5/2022	Educational symposium

Appendix G: Peer-Reviewed Publications (IF = Journal Impact Factor via Journal Citation Reports)

Peer Reviewed Manuscripts

1. Aravamuthan B, Landsness EC, **Silbermann E**. ANA Webinars: implementation of a conference-based virtual networking event. *Ann Clin Transl Neurol*. 2021 Feb;8(2):525-528. doi: 10.1002/acn3.51278. Epub 2020 Dec 22. PMID: 33352002. PMCID: PMC7886028. IF=5.2
2. Chanpimol S, Benson K, **Maloni H**, Conroy S, **Wallin M**. Acceptability and outcomes of an individualized exergaming telePT program for veterans with MS: a pilot study. *Arch Physiother*. 2020 Oct 1;10:18. doi: 10.1186/s40945-020-00089-5. eCollection 2020. PMID: 33014426. PMCID: PMC7528243.
3. Fielder S, **Spain R**, Kim E, Salinthon S. Lipoic acid modulates inflammatory responses of monocytes and monocyte-derived macrophages from healthy and relapsing-remitting MS subjects. *Immunol Cell Biol*. 2021 Jan;99(1):107-115. doi: 10.1111/imcb.12392. Epub 2020 Sep 11. PMID: 32762092. IF=5.6
4. GBD 2017 US Neurological Disorders Collaborators, Feigin VL, Vos T, Alahdab F, Amit AML, Bärnighausen TW, Beghi E, Beheshti M, Chavan PP, Criqui MH, Desai R, Dhamminda Dharmaratne S, Dorsey ER, Wilder Eagan A, Elgendy IY, Filip I, Giampaoli S, Giussani G, Hafezi-Nejad N, Hole MK, Ikeda T, Owens Johnson C, Kalani R, Khatab K, Khubchandani J, Kim D, Koroshetz WJ, Krishnamoorthy V, Krishnamurthi RV, Liu X, Lo WD, Logroscino G, Mensah GA, Miller TR, Mohammed S, Mokdad AH, Moradi-Lakeh M, Morrison SD, Shivamurthy VKN, Naghavi M, Nichols E, Norrving B, Odell CM, Pupillo E, Radfar A, Roth GA, Shafieesabet A, Sheikh A, Sheikhbahaei S, Shin JI, Singh JA, Steiner TJ, Stovner LJ, **Wallin MT**, Weiss J, Wu C, Zunt JR, Adelson JD, Murray CJL. Burden of Neurological Disorders Across the US From 1990-2017: A Global Burden of Disease Study. *JAMA Neurol*. 2021 Feb 1;78(2):165-176. doi: 10.1001/jamaneurol.2020.4152. PMID: 33136137. PMCID: PMC7607495. IF=18.3
5. Gromisch ES, Neto LO, **Turner AP**. What Biopsychosocial Factors Explain Self-Management Behaviors in MS? The Role of Demographics, Cognition, Personality, and Psychosocial and Physical Functioning. *Arch Phys Med Rehabil*. 2021 Oct;102(10):1982-1988.e4. doi: 10.1016/j.apmr.2021.05.012. Epub 2021 Jun 24. PMID: 34175273. IF=4.0
6. Gromisch ES, **Turner AP**, **Haselkorn JK**. Lo AC, Agresta T. Mobile health (mHealth) usage, barriers, and technological considerations in persons with MS: a literature review. *JAMIA Open*. 2020 Dec 15;4(3):o0aa067. doi: 10.1093/jamiaopen/o0aa067. eCollection 2021 Jul. PMID: 34514349. PMCID: PMC8423420.

7. Herring TE, Alschuler KN, **Knowles LM**, Phillips KM, Morean WM, **Turner AP**, Ehde DM. Differences in correlates of fatigue between relapsing and progressive forms of MS. *Mult Scler Relat Disord*. 2021 Sep;54:103109. doi: 10.1016/j.msard.2021.103109. Epub 2021 Jun 23. PMID: 34237561. IF=4.3
8. **Hollen C, Rice J**, Park M, **Yadav V**. Rituximab for treatment of refractory MS relapses during pregnancy. *Mult Scler*. 2021 Sep;27(10):1620-1623. doi: 10.1177/1352458521998937. Epub 2021 Apr 30. PMID: 33929267. IF=6.3
9. **Hugos CL, Cameron MH**. MS Spasticity: Take Control (STC) for ambulatory adults: Protocol for a randomized controlled trial. *BMC Neurol*. 2020 Oct 7;20(1):368. doi: 10.1186/s12883-020-01902-1. PMID: 33028236. PMCID: PMC7541326. IF=2.5
10. Devan SP, Jiang X, **Bagnato F**, Xu J. Optimization and numerical evaluation of multi-compartment diffusion MRI using the spherical mean technique for practical MS imaging. *Magn Reson Imaging*. 2020 Dec;74:56-63. doi: 10.1016/j.mri.2020.09.002. Epub 2020 Sep 6. PMID: 32898649. PMCID: PMC7669580. IF=2.5
11. Harper K, Roof M, Wadhawan N, Terala A, Turchan M, **Bagnato F**, Upender R, Pham H, Eoff B, Charles D. Vanderbilt University Medical Center Ambulatory Teleneurology COVID-19 Experience. *Telemed J E Health*. 2021 Jun;27(6):701-705. doi: 10.1089/tmj.2020.0382. Epub 2020 Nov 18. PMID: 33216703. PMCID: PMC8215411. IF=1.3
12. Clarke MA, Lakhani DA, Wen S, Gao S, Smith SA, Dortch R, Xu J, **Bagnato F**. Perilesional neurodegenerative injury in MS: Relation to focal lesions and impact on disability. *Mult Scler Relat Disord*. 2021 Apr;49:102738. doi: 10.1016/j.msard.2021.102738. Epub 2021 Jan 5. PMID: 33609957. IF=4.3
13. Kim D, Kuruvilla-Dugdale M, de Riesthal M, Jones R, **Bagnato F**, Mefferd A. Articulatory Correlates of Stress Pattern Disturbances in Talkers With Dysarthria. *J Speech Lang Hear Res*. 2021 Jun 18;64(6S):2287-2300. doi: 10.1044/2021_JSLHR-20-00299. Epub 2021 May 13. PMID: 33984259. IF=2.3
14. Chen A, Wen S, Lakhani DA, Gao S, Yoon K, Smith SA, Dortch R, Xu J, **Bagnato F**. Assessing brain injury topographically using MR neurite orientation dispersion and density imaging in MS. *J Neuroimaging*. 2021 Sep;31(5):1003-1013. doi: 10.1111/jon.12876. Epub 2021 May 25. PMID: 34033187. IF=2.5
15. **Rice J**, Hildebrand A, **Spain R**, Senders A, **Silbermann E, Wooliscroft L, Yadav V**, Bourdette D, **Cameron M**. A cross-sectional survey of cannabis use by people with MS in Oregon and Southwest Washington. *Mult Scler Relat Disord*. 2021 Oct;55:103172. doi: 10.1016/j.msard.2021.103172. Epub 2021 Jul 25. PMID: 34332457. IF=4.3

16. Lema Dopico A, Choi S, Hua J, Li X, **Harrison DM**. Multi-layer analysis of quantitative 7 T magnetic resonance imaging in the cortex of MS patients reveals pathology associated with disability. *Mult Scler*. 2021 Feb 18;1352458521994556. doi: 10.1177/1352458521994556. Epub ahead of print. PMID: 33596719. IF=6.3
17. Choi S, Spini M, Hua J, **Harrison DM**. Blood-brain barrier breakdown in non-enhancing MS lesions detected by 7-Tesla MP2RAGE ΔT_1 mapping. *PLoS One*. 2021 Apr 26;16(4):e0249973. doi: 10.1371/journal.pone.0249973. PMID: 33901207; PMCID: PMC8075220. IF=3.2
18. **Mizell R**, Chen H, Lambe J, Saidha S, **Harrison DM**. Association of retinal atrophy with cortical lesions and leptomeningeal enhancement in MS on 7T MRI. *Mult Scler*. 2021 Jun 14;13524585211023343. doi: 10.1177/13524585211023343. Epub ahead of print. PMID: 34125629. IF=6.3
19. **Knowles LM**, Esselman EC, **Turner AP**, Phillips KM, Herring TE, Alschuler KN, Ehde DM. Depressive symptoms and suicidal ideation in progressive MS compared with relapsing-remitting MS: Results from a cross-sectional survey. *Arch Phys Med Rehabil*. 2021 Apr;102(4):694-701. doi: 10.1016/j.apmr.2020.09.385. Epub 2020 Oct 17. PMID: 33080210. IF=4.0
20. **Knowles LM**, Arewasikporn A, Kratz AL, **Turner AP**, Alschuler KN, Ehde DM. Early treatment improvements in depression are associated with overall improvements in fatigue impact and pain interference in adults with MS. *Ann Behav Med*. 2021 Aug 23;55(9):833-843. doi: 10.1093/abm/kaaa102. PMID: 33196779. IF=4.9
21. **Knowles LM**, Phillips KM, Herring TE, Alschuler KN, Jensen MP, **Turner AP**, Ehde DM. Pain Intensity and Pain Interference in People With Progressive MS Compared With People With Relapsing-Remitting MS. *Arch Phys Med Rehabil*. 2021 Oct;102(10):1959-1964. doi: 10.1016/j.apmr.2021.05.003. Epub 2021 May 25. IF=4.0
22. Manago MM, **Cameron M**, Schenkman M. Association of the Dynamic Gait Index to fall history and muscle function in people with MS. *Disabil Rehabil*. 2020 Dec;42(25):3707-3712. doi: 10.1080/09638288.2019.1607912. Epub 2019 May 3. PMID: 31050569. IF=3.0
23. Mosquera-Lopez C, Wan E, Shastry M, Folsom J, Leitschuh J, Condon J, Rajhbeharrysingh U, Hildebrand A, **Cameron M**, Jacobs PG. Automated detection of real-world falls: Modeled from people with MS. *IEEE J Biomed Health Inform*. 2021 Jun;25(6):1975-1984. doi: 10.1109/JBHI.2020.3041035. Epub 2021 Jun 3. PMID: 33245698. IF=5.8
24. **Rice J**, Hildebrand A, **Spain R**, Senders A, **Silbermann E**, **Wooliscroft L**, **Yadav V**, Bourdette D, **Cameron M**. A Cross-sectional Survey of Cannabis Use by People with MS in Oregon and Washington. *Mult Scler Relat Disord*. 2021 Oct;55:103172. doi: 10.1016/j.msard.2021.103172. Epub 2021 Jul 25. IF=4.3

25. **Rice J**, Hildebrand A, Waslo CS, **Cameron MH**, Jones KD. Cannabis for medical purposes: A cross-sectional analysis of health care professionals' knowledge. *J Am Assoc Nurse Pract*. 2021 Mar 19. doi: 10.1097/JXX.0000000000000590. Online ahead of print. PMID: 33767121. IF=1.2
26. Saslow L, Li DKB, Halper J, Banwell B, Barkhof F, Barlow L, Costello K, Damiri P, Dunn J, Giri S, Maes M, Morrow SA, Newsome SD, Oh J, Paul F, Quarterman P, Reich DS, Shewchuk JR, Shinohara RT, Van Hecke W, van de Ven K, **Wallin MT**, Wolinsky JS, Traboulsee A. An International Standardized Magnetic Resonance Imaging Protocol for Diagnosis and Follow-up of Patients with MS: Advocacy, Dissemination, and Implementation Strategies. *Int J MS Care*. Sep-Oct 2020;22(5):226-232. doi: 10.7224/1537-2073.2020-094. Epub 2020 Oct 27. PMID: 33177959. PMCID: PMC7643842.
27. Shah V, McNames J, Harker G, Curtze C, Carlson-Kuhta P, **Spain RI**, El-Gohary M, Mancini M, Horak F. Does gait bout definition influence the ability to discriminate gait quality between people with and without MS during daily life? *Gait Posture*. 2021 Feb;84:108-113. doi: 10.1016/j.gaitpost.2020.11.024. Epub 2020 Nov 25. PMID: 33302221. PMCID: PMC7946343. IF=2.8
28. Shah V, McNames J, Mancinic M, Carlson-Kuhta P, **Spain RI**, Nutt JG, El-Gohary M, Curtze C, Horak F. Laboratory versus daily life gait characteristics in patients with MS, Parkinson's disease, and matched controls. *J Neuroeng Rehabil*. 2020 Dec 1;17(1):159. doi: 10.1186/s12984-020-00781-4. PMID: 33261625. PMCID: PMC7708140. IF=4.3
29. Stienstra N, Horton J, Lane M, Kumthekar A, Sathe N, Sunny C, **Yadav V**, Deodhar A. Demyelinating Disease After Exposure to Tumor Necrosis Factor α Inhibitors: A Case Series in a Tertiary Care Center. *J Clin Rheumatol*. 2021 Sep 17. doi: 10.1097/RHU.0000000000001789. Online ahead of print. PMID: 34538848.
30. Tatomir A, Beltrand A, Nguyen V, Boodhoo D, Mekala A, Cudrici C, Badea TC, Muresanu DF, Rus V, **Rus H**. RGC-32 Regulates Generation of Reactive Astrocytes in Experimental Autoimmune Encephalomyelitis. *Front Immunol*. 2021 Jan 25;11:608294. doi: 10.3389/fimmu.2020.608294. eCollection 2020. PMID: 33569054. PMCID: PMC7868332. IF=7.6
31. Tolaymat B, Zheng W, Chen H, Choi S, Li X, **Harrison D**. Sex-specific differences in rim appearance of MS lesions on quantitative susceptibility mapping. *Mult Scler Relat Disord*. 2020 Oct;45:102317. doi: 10.1016/j.msard.2020.102317. Epub 2020 Jun 18. PMID: 32615504. PMCID: PMC7606497. IF=4.3
32. Walton C, King R, Rechtman L, Kaye W, Leray E, Marrie RA, Robertson N, La Rocca N, Uitdehaag B, Van der Mei I, **Wallin M**, Helme A, Angood Napier C, Rijke N, Baneke P. Rising prevalence of MS worldwide: Insights from the Atlas of MS, third edition. *Mult Scler*. 2020 Dec;26(14):1816-1821. doi: 10.1177/1352458520970841. Epub 2020 Nov 11. PMID: 33174475. PMCID:

PMC7720355. IF=6.3

33. Wiedrick J, Meza-Romero R, Gerstner G, Seifert H, Chaudhary P, Headrick A, Kent G, Maestas A, Offner H, **Vandenbark A**. Sex differences in EAE reveal common and distinct cellular and molecular components. *Cell Immunol*. 2021 Jan;359:104242. doi: 10.1016/j.cellimm.2020.104242. Epub 2020 Oct 22. PMID: 33190849. PMCID: PMC7770093. IF=4.9
34. **Wooliscroft L**, Boespflug E, Hildebrand A, Shangraw K, **Silbermann E**, Bourdette D, **Spain R**. Enlarged perivascular spaces are not associated with vascular co-morbidities, clinical outcomes, and brain volumes in people with secondary progressive MS. *Mult Scler J Exp Transl Clin*. 2020 Oct 13;6(4):2055217320964502. doi: 10.1177/2055217320964502. eCollection Oct-Dec 2020. PMID: 33110618. PMCID: PMC7557790.
35. **Wooliscroft L**, Brown D, Cohen J, Skolarus L, **Silbermann E**. Continuing Clinical Research During Shelter-in-Place. *Ann Neurol*. 2020 Oct;88(4):658-660. doi: 10.1002/ana.25840. Epub 2020 Jul 31. PMID: 32621372. PMCID: PMC7361568v. IF=10.4
36. Wiedrick J, Meza-Romero R, Gerstner G, Seifert H, Chaudhary P, Headrick A, Kent G, Maestas A, Offner H, **Vandenbark AA**. Sex differences in EAE reveal common and distinct cellular and molecular components. *Cell Immunol*. 2021 Jan;359:104242. doi: 10.1016/j.cellimm.2020.104242. Epub 2020 Oct 22. PMID: 33190849. PMCID: PMC7770093. IF=4.9
37. Jamal I, Shah J, Mativo P, Hooker J, **Wallin M**, Sokhi DS. MS in Kenya: Demographic and clinical characteristics of a registry cohort. *Mult Scler J Exp Transl Clin*. 2021 Jun 14;7(2):20552173211022782. doi: 10.1177/20552173211022782. PMID: 34188951. PMCID: PMC8209835.
38. Zhang Y, Salter A, Jin S, Culpepper WJ 2nd, Cutter GR, **Wallin M**, Stuve O. Disease-modifying therapy prescription patterns in people with MS by age. *Ther Adv Neurol Disord*. 2021 Mar 31;14:17562864211006499. doi: 10.1177/17562864211006499. PMID: 33868459. PMCID: PMC8020738. IF=6.6
39. Bonomi S, Jin S, Culpepper WJ, **Wallin MT**. MS and Disability Progression in Latin America, Africa, Asia and the Middle East: A Systematic Review. *Mult Scler Relat Disord*. 2021 Jun;51:102885. doi: 10.1016/j.msard.2021.102885. Epub 2021 Mar 9. PMID: 33773273. IF=4.3
40. **Xiang XM**, **Hollen C**, Yang Q, Brumbach BH, **Spain RI**, **Wooliscroft L**. COVID-19 vaccination willingness among people with MS. *Mult Scler J Exp Transl Clin*. 2021 May 31;7(2):20552173211017159. doi: 10.1177/20552173211017159. eCollection Apr-Jun 2021. PMID: 34104472. PMCID: PMC8172949.
41. Duncan GJ, **Simkins TJ**, Emery B. Neuron-Oligodendrocyte Interactions in the Structure and Integrity of Axons. *Front Cell Dev Biol*. 2021 Mar 8;9:653101. doi: 10.3389/fcell.2021.653101.

eCollection 2021. PMID: 33763430. PMCID: PMC7982542. IF=6.7

42. **Simkins TJ**, Duncan GJ, Bourdette D. Chronic Demyelination and Axonal Degeneration in MS: Pathogenesis and Therapeutic Implications. *Curr Neurol Neurosci Rep.* 2021 Apr 9;21(6):26. doi: 10.1007/s11910-021-01110-5. PMID: 33835275. IF=5.1
43. **Xiang XM**, Bernard J. Telehealth in MS Clinical Care and Research. *Curr Neurol Neurosci Rep.* 2021 Feb 28;21(4):14. doi: 10.1007/s11910-021-01103-4. PMID: 33646409. PMCID: PMC7917521. IF=5.1
44. Jelescu IO, Palombo M, **Bagnato F**, Schilling KG. Challenges for biophysical modeling of microstructure. *J Neurosci Methods.* 2020 Oct 1;344:108861. doi: 10.1016/j.jneumeth.2020.108861. Epub 2020 Jul 18. PMID: 32692999. IF=2.4
45. Petzold A, Albrecht P, Balcer L, Bekkers E, Brandt AU, Calabresi PA, Deborah OG, Graves JS, Green A, Keane PA, Nij Bijvank JA, Sander JW, Paul F, Saidha S, Villoslada P, Wagner SK, Yeh EA; IMSVISUAL, **ERN-EYE Consortium**. Artificial intelligence extension of the OSCAR-IB criteria. *Ann Clin Transl Neurol.* 2021 Jul;8(7):1528-1542. doi: 10.1002/acn3.51320. Epub 2021 May 19. PMID: 34008926. PMCID: PMC8283174. IF=4.5
46. **Bagnato F, Wallin M**. COVID-19 Vaccine in Veterans with MS: Protect the Vulnerable. *Fed Pract.* 2021 Apr;38(Suppl 1):S28-S32. doi: 10.12788/fp.0113. PMID: 34177237. PMCID: PMC8221823.
47. Ontaneda D, Raza PC, Mahajan KR, Arnold DL, Dwyer MG, Gauthier SA, Greve DN, **Harrison DM**, Henry RG, Li DKB, Mainero C, Moore W, Narayanan S, Oh J, Patel R, Pelletier D, Rauscher A, Rooney WD, Sicotte NL, Tam R, Reich DS, Azevedo CJ; North American Imaging in MS Cooperative (NAIMS). Deep grey matter injury in MS: A NAIMS consensus statement. *Brain.* 2021 Aug 17;144(7):1974-1984. doi: 10.1093/brain/awab132. PMID: 33757115. IF=13.5

Books

1. Yee AH, Ng KL, Park K, Duffy A, Chen D, **Simkins TJ**. (2020) *Pharmacotherapy for Neurologic Conditions*. New York, Springer Publishing Company: 185-202.
2. **Harrison D**. Committee member and author of 2 chapters ("Multiple Sclerosis" and "Spinal Cord Disorders"). *MKSAP 19 – Neurology*, by American College of Physicians. American College of Physicians, July 2021.
3. Lee J, Fraietta J, **Cameron M**. *Physical Agents in Oncology*. In: Goodman C, Fuller K, Lazaro R, McCullough K. *Pathology: Implications for the Physical Therapists*. 4th ed. St. Louis, MO: Elsevier. 2015. 5th ed. 2021.

Web Publications

1. **Bagnato F.** MS: what the role of AHSCT? [MEDPAGE TODAY 2021](#)
2. **Bagnato F.** The ANA Q&A: Using MRI to study MS. [ANA Innovators in discovery, education and care.](#)
3. Gromisch ES, **Turner AP, Haselkorn JK.** (2021). Part I: MS – Types and Stages of Disease Progression. In Practical Pain Management (Eds.) A Clinical Primer: Understanding Disease Progression, Pain & Function in MS. September 13, 2021
[https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-types-stages-disease-progression.](https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-types-stages-disease-progression)
4. Gromisch ES, Wallin M, **Turner AP, Haselkorn JK.** (2021). Part II: MS Assessment Protocols and Considerations of Comorbidities. In Practical Pain Management (Eds.). A Clinical Primer: Understanding Disease Progression, Pain & Function in MS. September 13, 2021
[https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-diagnosis-comorbidities.](https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-diagnosis-comorbidities)
5. Gromisch ES, Wallin M, **Turner AP, Haselkorn JK.** (2021). Part III: MS Treatment Options and Considerations. In Practical Pain Management (Eds.). A Clinical Primer: Understanding Disease Progression, Pain & Function in MS. September 30, 2021
[https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-types-stages-disease-progression.](https://www.practicalpainmanagement.com/resource-centers/ms-clinical-primer/multiple-sclerosis-types-stages-disease-progression)
6. **Lee-Will T,** DeLuca John. MS cognitive decline linked to brain network dysfunction. [MDedge Neurology 2021](#)

Appendix H: Healthcare Professional Presentations MSCoE Staff, Fellows* & Associated Staff

1. **Bagnato F.** Clinical application of diffusion MRI. International Society Magnetic Resonance in Medicine: virtual, Dec 2020.
2. **Bagnato F.** Imaging brain inflammation. 2021 Virtual Annual Meeting, Southern Clinical Neurological Society: virtual, Jan 2021.
3. Brandt D, O'Toole K, Talent B, **Wallin M** (panel member). Issue Panel: Expanding Telehealth. Public Policy Conference, National MS Society: virtual, Mar 2021.
4. **Harrison DM.** Update on Neuromyelitis Optica. Town Gown 2021, University of Maryland School of Medicine: virtual, May 2021.
5. **Haselkorn J.** MSCoE Overview of FY21 and Directions for FY22. MS Regional Meeting, MSCoE West: virtual, Jun 2021.
6. **Hillman L.** MS Practice: A Rewarding and Multidisciplinary Field. Nursing Education, VA Puget Sound HCS: virtual, Mar 2021.
7. **Hollen C***. Neurosarcoidosis. Neurology Noon Conference, Oregon Health & Science University: virtual, Mar 2021.
8. **Knowles LM***, Jovel KS, Mayer C, Bottrill KC, Kaszniak AW, Sbarra DA, O'Connor MF. Relaxation and mindfulness interventions improve grief outcomes in widows and widowers: A three-arm comparative trial. Treatment of distress in (traumatically) bereaved children and adults, International Society for Traumatic Stress Studies: virtual, Nov 2020.
9. **Knowles L***, **Turner A.** Veterans' Engagement Using Motivational Interviewing and Behavioral Activation. MS Regional Meeting, MSCoE West: virtual, Jun 2021.
10. **Lee-Wilk T**, Dux, M. Cognition in MS: What You Can Do. Current Topics in MS, MSCoE and National MS Society: virtual, Mar 2021.
11. **Maloni H.** Complementary, Alternative and Integrative Therapies. Current Topics in MS, MSCoE and National MS Society: virtual, Sep 2021.
12. **Maloni H.** Do's and don'ts for conducting telehealth visits for decentralized clinical research studies. Summer Seminar Series, Georgetown-Howard Universities Center for Clinical and Translational Sciences: virtual, Aug 2021.
13. **Maloni H.** Management of Neurologic Diseases and the Love Affair with the Monoclonal Antibody. Annual Meeting, American Association of Neuroscience Nurses: virtual, Apr 2021.

14. **Maloni H.** MS Disease Modification Update and Recommendations for Patients in a Sars-CoV-2 Environment. Webinar, American Association of Neuroscience Nurses: virtual, Apr 2021.
15. **Maloni H.** Telemedicine and MS during the COVID-19 Pandemic: Perspectives from Patients, Healthcare Providers and Payers in the United States. Clinical and Translational Science Awards Program (CTSA) Conference, National Institutes of Health: virtual, Apr 2021.
16. Manago M, **Cameron M, Silbermann E, Spain R.** Research in the VA Environment – Career Development Awards and Mentoring. MS Regional Meeting, MSCoE West: virtual, Jun 2021.
17. Marrie RA, **Wooliscroft L** (Co-chair). The Spectrum of Inflammation and Environmental Impacts on Inflammation. Forum 2021, Americas Committee for Treatment and Research in MS: virtual meeting, Feb 2021.
18. McArthur J, **Wooliscroft L** (Co-chair). Leveraging Digital technologies in Neurology. Annual Meeting, American Neurological Association: virtual, Oct 2020.
19. **Silbermann E.** An overview of mind and body therapies in MS. MS Wellness Research Symposium, Oregon Health & Science University: virtual, Oct 2020.
20. **Silbermann E.** Disease Modifying Therapy Update for MS. 4th Annual MS and CNS Neuroimmunology Symposium, Oregon Health & Science University: virtual, Sep 2021.
21. **Simkins T***. MS Symptom Management. Neurology Resident Lectures, Oregon Health & Science University: virtual, Apr 2021.
22. **Simkins T***. MS Mimics: A case-based differential. Neurology Noon Conference, Oregon Health & Science University: virtual, Jan 2021.
23. **Tortorice K.** Newer MS Agents and Treatment Selection. MS Regional Meeting, MSCoE West: virtual, Jun 2021.
24. **Wallin M,** Moran J. Introduction to the VSSC Neurology Cube Focus on MS. Subject Area Training, Veteran Support Service Center: virtual, May 2021.
25. **Xiang M***. Autoimmune Encephalitis. Pediatric Neurology Grand Rounds, Oregon Health & Science University: Virtual, Dec 2020.
26. **Xiang M***. Elevated ICP and White Matter Disease. Difficult Cases Webinar, National MS Society: virtual, Mar 2021.
27. **Xiang M***. Elevated ICP and White Matter Disease. Pediatric MS Difficult Cases Webinar, National MS Society: virtual, Dec 2020.
28. **Xiang M***. Enteroviral Encephalitis. Pediatric Neurology Case Conference, Oregon Health & Science University: Virtual, Dec 2020.

Appendix I: Patient & Care Partner Presentations MSCoE Staff, Fellows* & Associated Staff

1. **Cameron M.** Managing MS relapses. Ask an MS Expert, National MS Society: virtual, Jun 2021.
2. **Hillman L.** Caregiving in MS – We’re a Team! 2nd Annual VA Puget Sound HCS Care Partner Summit: virtual, Jun 2021.
3. **Kazmierski M.** Resilience: Addressing the Challenges of MS. Virtual Resilience Program, National MS Society: virtual, Aug 2021.
4. **Knowles L***. Mood Changes and MS. Ask an MS Expert, National MS Society: virtual, Apr 2021.
5. **Maloni H.** Mindfulness and Cannabis. Ask an MS Expert, National MS Society: virtual, Dec 2020.
6. **Maloni H.** Pain and Fatigue. Ask an MS Expert, National MS Society: virtual, Nov 2020.
7. **Silbermann E.** Telehealth for Veterans with MS: Getting the Most Out of Your Virtual Visit. MS & Vets, MSCoE: virtual, Jul 2021.
8. **Spain R.** Disease Modifying Therapies for MS. At the Frontier & Beyond, Oregon Health & Science University: MS 2021: virtual, Jun 2021.
9. **Tortorice K.** Vaccines and MS: What You Need to Know. MS & Vets, MSCoE: virtual, Jun 2021.
10. **Turner A.** Overview of MS Research in the VA. MS & Vets, MSCoE: virtual, Sep 2021.
11. **Wallin M, Kazmierski M.** MS Centers of Excellence. Elite Warrior Project: virtual, Mar 2021.
12. **Yadav V.** MS and COVID vaccination. COVID-19 Vaccines and MS, Oregon Health & Science University: virtual, Feb 2021.
13. **Yadav V.** Research Update from the Hill. At the Frontier & Beyond, Oregon Health & Science University: MS 2021: virtual, Jun 2021.
14. **Young A.** About VA MS Centers of Excellence. Living with Progressive MS: A Webinar for Veterans with MS, National MS Society, MSCoE, and Paralyzed Veterans of America: virtual, Mar 2021.

Appendix J: MScOE Internal & External Collaborations

Internal Collaborations

VA Office of Academic Affiliations

The VA conducts education and training programs to enhance the quality of care provided to Veterans within the VA healthcare system. Building on the longstanding, close relationships among the VA and the nation's academic institutions, the VA plays a leadership role in defining the education of future healthcare professionals (HCPs) that helps meet the changing needs of the nation's healthcare delivery system. Through its partnerships with affiliated academic institutions, the VA conducts the largest education and training effort for health professionals in the nation.

VHA Office of Community Care

The VHA Office of Community Care (OCC) operates two main service lines, Delivery Operations and Revenue Operations, that support medical care delivery and services for Veterans and their families. OCC is also responsible for functions that support service lines such as administration, planning, oversight, and stakeholder relations. OCC works closely with Veterans and their families, community providers, and VA staff to ensure that Veterans can get care from community providers when needed.

VHA Office of Community Engagement

The VHA Office of Community Engagement (OCE) serves as a trusted resource and a catalyst for the growth of effective partnerships at the national, state, and community level. It also serves as a facilitator/access point for public and private entities interested in partnering with VHA to benefit Veterans, their families, care partners, and survivors.

VA Employee Education System

The VA Employee Education System (EES) partners with the VA, VHA program offices, and VISNs to provide quality workforce education and training to improve outcomes in Veteran clinical care, healthcare operations, and administration. EES also offers accredited courses and programs, in association with 17 national and two state accrediting bodies.

VA Office of Information & Technology

The VA Office of Information & Technology (OI&T) provides a seamless, unified Veteran experience through the delivery of state-of-the-art technology through collaboration with business partners.

VHA Pharmacy Benefits Management Services

The VHA Pharmacy Benefits Management Services (PBM) provides leadership for pharmacy activities in the VHA and provides advice and support regarding pharmacy issues to a wide variety of stakeholders, including Veterans, the Under Secretary for Health, VA medical facility Directors, and clinical staff across the system. PBM works to enhance clinical outcomes and improve the health of Veteran patients through the appropriate use of pharmaceuticals.

VA Office of Research & Development

The VA Office of Research & Development (R&D) is focused on health issues that affect Veterans. It is part of an integrated healthcare system and has come to be viewed as a model for superior bench-to-bedside research. The R&D program has been improving the lives of Veterans and all Americans through health care discovery and innovation.

VA Advisory Committee on Prosthetics & Special Disabilities

The VA Advisory Committee on Prosthetics and Special Disabilities (ACPSD) provides advice to the Secretary of Veterans Affairs on VA prosthetics and special-disabilities programs; coordination of VA and non-VA programs to develop and test prosthetic devices; and coordination of the informational exchange regarding development and testing of prosthetic devices. ACPSD also serves as the parent Federal Advisory Committee (FAC) to the Neurology Centers Advisory Subcommittee (NCAS).

VA Spinal Cord Injury & Disorders National Program

The VA Spinal Cord Injuries and Disorders (SCI-D) program supports and maintains the health, independence, quality of life, and productivity of Veterans with spinal cord injuries and disorders throughout their lives. These objectives are accomplished through rehabilitation, sustaining medical and surgical care; patient and family education; psychological and vocational care; education; and professional training. In addition, SCI-D works collaboratively with MSCoE in the care management of Veterans with MS who also have spinal cord lesions and complications.

VA Facility Support Groups & Community Engagement

The MSCoE at Washington, DC VAMC hosts a bimonthly Veteran support group, currently through the VA Skype platform. Each group member is assigned to do a presentation each week, and guest speakers are invited throughout the year.

Ms. Margaret Kazmierski works closely with both the National MS Society (NMSS) and Can Do MS for patient support programs and groups. Ms. Kazmierski provided a virtual presentation entitled "Resilience: Addressing the Challenges of MS" in collaboration with the NMSS in August 2021. MSCoE also collaborated with the NMSS on their Veteran focused "Ask an MS Expert" series, with Dr. Lindsey Knowles, MSCoE psychology fellow, speaking on "Mood" in April 2021.

Dr. VJ Yadav, Fellowship Director MSCoE-West, collaborated with Oregon Health & Science University (OHSU) on a webinar for COVID-19 in February 2021.

The VA Puget Sound has monthly support groups for Veterans with MS. Each month includes a presentation from an MS provider regarding topics of interest. The support group occurs at the Seattle VA, with teleconference links to the American Lake VA and Mt. Vernon Community-Based Outpatient Clinic (CBOC).

External Collaborations & Partnerships

MSCoE collaborations and partnerships with non-VA organizations exist for the purpose of building strong communities, sharing knowledge, and enhancing communication within the MS network to optimize services and resources for Veterans. Services include providing educational materials and programs for healthcare professionals and Veterans, developing strategies to reach people with MS in rural areas, providing fellowship opportunities and experiences, promoting research in MS, and providing networking opportunities. The following organizations are the primary MSCoE external collaborators and partners:

National MS Society



As part of the VA's efforts to advance and improve the lives of Veterans with MS, the VA formalized a partnership with the NMSS on March 6, 2019, with a Memorandum of Agreement (MoA). The partnership has continued to build on the VA's national network of MS clinical services, education, and research. The VA and NMSS seek to enhance health services, education, and self-efficacy and promote whole health goals of Veterans and their families by sharing information

about resources and collaborating on policy, education, and research initiatives. While the MSCoE and NMSS have collaborated from the beginning of the MSCoE establishment in 2003, the MoA allowed for an expanded reach of NMSS resources through advertising. NMSS preliminary data on VA interactions are shown in *Table 1* below, followed by some notable NMSS highlights of this fiscal year.

Collaborations Table 1: Interactions between VA healthcare professionals and the NMSS.

Profession	Quarter 1 (n = 357)	Quarter 2 (n = 509)	Quarter 3 (n = 366)	Quarter 4 (n = 374)
Neurologist	157 (44%)	219 (49%)	141 (39%)	132 (35%)
Nurse	50 (14%)	87 (17%)	59 (16%)	69 (19%)
Advanced Practice	39 (11%)	51 (10%)	27 (7%)	28 (8%)
Social Worker	57 (16%)	102 (20%)	62 (17%)	61 (16%)
Rehab	11 (3%)	25 (5%)	22 (6%)	20 (5%)
Mental Health	11 (3%)	25 (5%)	12 (3%)	15 (4%)
Other	32 (9%)	0 (0%)	43 (12%)	49 (13%)

In collaboration with NMSS, a national curriculum to train NMSS Navigators about VA benefits and VA staff about the NMSS navigator program has been developed.

Collaborations Table 2: MS Navigator interactions with Veterans with MS.

Response Category	Q1 Unique Constituents (n = 137)	Q2 Unique Constituents (n = 148)	Q3 Unique Constituents (n = 134)	Q4 Unique Constituents (n = 150)
Benefits and Employment	14	4	4	8
Care Management	3	3	4	4
Connection to Chapter Program	3	5	3	2
Connection to National Program	4	3	62	5
Crisis Management	64	76	16	78
Financial Assistance	11	24	17	25
Hot Topic	21	19	111	12
Information and Referral	116	129	7	121
Literature Fulfillment	6	5	55	3
Service Management	58	67	55	60
Service Provider Referral	73	62	69	69
Topic Discussed	34	41	31	34

The NMSS continues to support post-doctoral fellows, education, research, and translational research performed by the VA through grants, scholarships, and fellow conferences.

NMSS Advocacy Progress

The NMSS has joined other organizations to urge Congressional appropriations committees to pass final FY22 funding bills to ensure that MS programs maintain critical funding. Additionally, the NMSS continues to monitor the progress of the language included in the FY22 Military Construction, Veterans Affairs, and Related Agencies appropriations bill, to support Neurology Centers of Excellence within the VHA (including epilepsy, headache, MS, and Parkinson’s disease).

The NMSS continues to track and monitor progress on the FY22 Budget Reconciliation bill and the bipartisan infrastructure package-which contain important provisions related to healthcare expansion and access, drug pricing, telehealth, and economic security provisions for people affected by MS. MSCoE continues to be actively involved with NMSS programs and events, with several VA healthcare professionals serving on NMSS planning and review committees. *Table 3* lists the VA professional volunteers for NMSS.

Collaborations Table 3: VA Professional Volunteers for NMSS

VA Staff	City, State	Service with NMSS
Jodie Haselkorn, MD, MPH	Seattle, WA	Member, Planning Committee, MS Regional Summit; National Patient Engagement Committee in Research; and

		Telehealth work team
Kathleen Burgess, MD	Seattle, WA	Member, Greater Northwest Healthcare Provider Council
Alicia Sloan, LCSW	Seattle, WA	Member, Greater Northwest Healthcare Provider Council
Mitch Wallin, MD, MPH	Washington, DC	Member, Telehealth guideline work team
Heidi Maloni, PhD, NP	Washington, DC	Member, Clinical Fellows Review Committee
Andrea Hanssen, RN	Palo Alto, CA	Member, Southern California Healthcare Provider Council
Andrea Hanssen	Palo Alto, CA	Southern California Healthcare Provider Council
Suma Shah, MD	Durham, NC	Council Chair, North Carolina/South Carolina Healthcare Provider Council; served on the student mentorship planning committee and was a didactic presenter; serves on the Workforce Development committee; participated on the ECHO East hub team
Francesca Bagnato, MD	Nashville, TN	Member, National Medical Advisory Committee and the Healthcare Provider Engagement Council of Tennessee/Kentucky and the student mentorship planning committee. Working on community/general neurology survey in Q3 & Q4. Very involved in the Southeast Council mental health project
Lisa Mitchell, BSN, MSN	Baltimore, MD	Maryland/DC/Virginia/West Virginia Healthcare Provider Council
Margaret Kazmierski, MSW, LCSW-C, CCM	Baltimore, MD	Chair, NMSS, Greater DC/Maryland Chapter Healthcare Provider Council

Consortium of MS Centers



The Consortium of MS Centers (CMSC) provides leadership in clinical research and education, develops opportunities to share information and knowledge among consortium members, and disseminates information to the healthcare community and to people affected by MS. Its accredited activities have educated thousands of healthcare professionals about the spectrum of needs in MS. The

CMSC has been a consistent partner and supporter of the MSCoE and has provided excellent education opportunities for VA healthcare professionals through scholarships to attend the CMSC Annual Meetings, with additional training opportunities for fellows and nurses. During the CMSC annual meetings, the MSCoE is complemented with two sponsored education symposia that are facilitated by VA presenters. The Consortium also provides an opportunity for MSCoE to host an annual VA Business Meeting, host an educational booth in the exhibit hall, and collaborate with the CMSC on the annual Patient Education Program. The CMSC provides complementary consortium membership to all VA employees and a position on the CMSC Board of Governors to a MSCoE representative. Dr. Jodie Haselkorn, Director of MSCoE West, is currently serving as the MSCoE representative.

Can Do MS



Can Do MS is a nonprofit that delivers health and wellness education programs for families with MS. The organization has been at the forefront of promoting the culture and belief that everyone living with MS has the power to live full lives. MSCoE partners with Can Do MS to deliver health and wellness education programs via monthly patient-education webinars and virtual programs.

Paralyzed Veterans of America



The Paralyzed Veterans of America (PVA) is a Veterans' service organization that holds 34 chapters and 69 National Service Offices in the US and Puerto Rico. The PVA offers service representatives for facility-based consultation for Veterans and healthcare providers regarding specific clinical and home-support services that are unique to the Veteran population. PVA staff are skilled at working with the unique issues involved with MS care access, disability, and service-connection as well as a variety of recreational opportunities (e.g., Wheelchair Games, winter sports camps). PVA visits many MSCoE Regional Program providers as part of its evaluation of SCI Centers at those sites, providing Veteran and organizational perspectives, highlighting MSCoE locally and in the VISN, and recommending opportunities for improvements. PVA representatives are also members of facility Internal Review Boards (IRBs), providing a voice for Veteran needs and expertise on topics including disability inclusion, ethics, and research.

PVA representatives frequently collaborate on local events, including MS Awareness Month, care partner support conferences, and other local activities relevant to the clinical care of the facility. PVA is an integral part of clinical care, education, and research at MSCoE and MS regional program sites.

Collaborations Table 4: MSCoE Staff and Regional and Support Program Volunteers for PVA

MSCoE Staff/Network Member	City, State	Service with PVA
Terry Lee-Wilke, PhD	Baltimore, MD	Member, Planning Committee, PVA Summit
Heidi Maloni, PhD, NP	Washington, DC	Member, Planning Committee, PVA Summit
Jodie Haselkorn, MD, MPH	Seattle, WA	Member, Planning Committee, PVA Summit and Member, Wheelchair Games
Paul Gutierrez, MD	Albuquerque, NM	Member, Planning Committee, PVA Summit and Member, Wheelchair Games

International Organization of MS Nurses



The International Organization of MS Nurses (IOMSN) is the only international organization focusing solely on the educational needs and goals of professional nurses worldwide who care for people with MS. The IOMSN supports nurses by offering hope through mentoring, educating, networking, and sharing.

Ms. Lisa Mitchell, MScOE-East National Nurse Coordinator and MS Nurse Case Manager at the VA Maryland HCS. She is a member of the Greater DC Maryland Chapter of the NMSS and is an MS Certified Nurse. Ms. Mitchell has served as a VA representative for the IOMSN for three years. She was interviewed by the IOMSN and featured in the IOMSN News Fall 2020 publication, written for and by IOMSN members, about VA Telemedicine Innovations and use of telemedicine during the COVID-19 pandemic.

Ms. MaryAnn Roseberg from the VA New Jersey HCS, East Orange, NJ (VISN 2 Regional Site), was selected as a winner of the **2021 Nightingale Award** presented by IOMSN and EMD Serono. Ms. Rosenberg was awarded for her proposal that will contribute to the expansion of MS nursing in a way that will have a lasting impact. Ms. Rosenberg, along with other 2021 Nightingale Award winners, were invited to attend a reception during the 2021 CMSC Annual Meeting on October 27, 2021.

Appendix K: University Affiliates

University of Maryland School of Medicine



University of Washington School of Medicine



Oregon Health and Science University



Appendix L: Acronyms

ACTRIMS, Americas Committee for Treatment and Research in MS

AAN, American Academy of Neurology

AAN, American Academy of Neurology

CCS, Community Care Services

CDA, Career Development Award

CMSC, Consortium of MS Centers

CDW, Corporate Data Warehouse

CVT, Clinical Video Telehealth

DMT, Disease modifying therapy

CFU, Criteria for use

EDMUS, European Database MS

ENCTRS, Encounters

EES, Employee Education System

ECTRMS, European Committee for Treatment and Research in MS

FAC, Federal Advisory Committee

FTEE, Full-time employment equivalent

GAO, Government Accountability Office

HCP, Healthcare Professional/Provider

HCS, Healthcare System/Health Care System

INPT, Inpatient

IOMSN, International Organization of MS Nurses

MINDS, MS Intervention and Development of Skills

MOA, Memorandum of Agreement

MS, Multiple sclerosis

MSCoE, MS Centers of Excellence

NMSS, National MS Society

NCAS, Neurology Centers Advisory Subcommittee(s)

OAA, Office of Academic Affiliations

OCC, Office of Community Care

OCE, Office of Community Engagement

ORH, Office of Rural Health

OHSU, Oregon Health & Science University

PTS, Patients

PVA, Paralyzed Veterans of America

PCORI, Patient-Centered Outcomes Research Institute

PBM, Pharmacy Benefits Management

SCI-D, Spinal Cord Injuries and Disorders

VA, Veterans Affairs

VACO, Veterans Affairs Central Office

VANTS, Veterans Affairs National Telecommunication System

VAVC, Veterans Affairs Video Connect

VHA, Veterans Health Administration

VSO, Veterans Service Organization

VISN, Veterans Integrated Service Network