VHA | STATE OF INNOVATION REPORT

OCTOBER 2020

INNOVATION IS CHANGING AND SAVING VETERAN LIVES

U.S. Department of Veterans Affairs

Choose VA

TOGETHER, WE INNOVATE

Necessity can be a powerful driver of innovation. Just ask frontline employees at the Veterans Health Administration who are evaluating the safety and functionality of a variety of 3D printed nasal swab designs for COVID-19 diagnostic tests, or the clinicians, who, between February and May of this year, facilitated the spike of VA Video Connect telehealth video visits from 10,000 to 120,000 per week. For our frontline Innovators, the pandemic has unlocked opportunities for adaptation, outside-the-box thinking, and more sophisticated and flexible applications of technology. Our frontline health care workers sprinted to the aid of their communities – adapting, developing, iterating, replicating, and scaling innovative solutions and leveraging VHA's innovation infrastructure to amplify their efforts.

VHA has long embraced innovation, from the first implantable cardiac pacemaker in 1960 to the recent exploration of clinical virtual reality (VR) applications and 3D bioprinting to fabricate patient-matched, vascularized, living bone. Innovation empowers frontline staff to take calculated risks, methodically test assumptions, learn from failure, and thrive in uncertainty. Our ability to adapt and rapidly spread innovation throughout the VHA Health Care System, shows us every day what it means to be a learning organization. This is one of our most critical resources in delivering the best care to Veterans.

For our Veterans, we want to reassure you that we will be here for you throughout this crisis and beyond. There will always be capacity in our system for you. We'll be here to meet your critical needs, from virtual visits and prescription refills to mental health services and homeless programs. We'll work continually to improve the way we deliver care, by supporting the implementation and development of innovative solutions.

Throughout this report, you will learn about innovation across VHA today, and the exciting ways gamechangers are adapting to meet current and future challenges patients and their health care providers may face. We invite you to celebrate the work our innovators have accomplished, especially their agility and commitment in combatting COVID-19. We invite you to think about what else is possible when we have the courage to learn quickly, fail quickly, and apply lessons learned to move forward quickly.

---- **Richard Stone, MD**
Executive in Charge,
Veterans Health Administration (VHA)

---- **Carolyn Clancy, MD**
Deputy Under Secretary for Discovery,
Education and Affiliate Networks (10X),
Veterans Health Administration (VHA)

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AT A GLANCE

VETERANS HEALTH ADMINISTRATION

VHA MISSION: Honor America's Veterans by providing exceptional health care that improves their health and well-being.

Veterans Health Administration (VHA) has evolved into the largest integrated health care system in the United States, delivering primary care with a lens focused on Veteran specialty care needs, including spinal cord injury, polytrauma, prosthetics and rehabilitation, traumatic brain injury, and post-traumatic stress disorder (PTSD) treatment. Frontline staff and clinicians are dedicated to quality care, and continually improve the delivery of care to Veterans through research, partnerships, training, and the application of innovative solutions. VHA continues to be a leader in training. Today, VHA is cultivating dynamic partnerships with federal agencies, nonprofits, and private industries, as well as collaborating with academic affiliates to test innovative solutions through research. These innovations range from virtual reality for the treatment of PTSD, to telehealth, which vastly improves the accessibility of clinical services to Veterans.

Focusing on Veterans and understanding the physical, psychological, and economic determinants contributing to their health uniquely positions VHA to deliver not just health care, but comprehensive Veteran care.

Veterans choose VHA for the Veteran-centric model of care and expertise in service-connected health issues. Veterans stay with VHA for the community, resources, and support it builds around them.

9M
ENROLLED VETERANS

>2/3
OF MEDICAL RESIDENTS OBTAIN A PORTION OF THEIR TRAINING AT VA HOSPITALS

1/3
VA STAFF ARE VETERANS

1255
170 VA MEDICAL CENTERS
1074 OUTPATIENT FACILITIES

3
NOBEL PRIZE WINNERS

322K
FULL-TIME HEALTH CARE PROFESSIONALS

A BRIEF TIMELINE OF INNOVATION AT VHA

1960

Dr. William Chardack of the Buffalo VA Medical Center teams with engineers Wilson Greatbatch and Dr. Andrew Gage to invent the first clinically successful implantable cardiac pacemaker.

1967

Dr. Thomas Starzyl of the Denver VA Medical Center performs the world's first successful liver transplant, a ground-breaking success that has paved the way for several medical innovations today.

1970

Alongside the Public Health Service, VA begins planning for what would become the Nation's first electronic health record system, drastically disrupting the health landscape for years to come.

1984

Two decades after the 1964 Surgeon General's Report on Smoking and Health, VA researchers develop the nicotine patch and other therapies to combat cigarette addiction.

1990

Endocrinologist John Eng, of the James J. Peters VA Medical Center, discovers a peptide in venom from the Gila Monster that would eventually serve as the basis for a widely used diabetes drug.

1995

The VHA National Surgical Quality Improvement Program measures and improves the quality of surgical care and has accounted for significant drops in surgical mortality and morbidity nationwide.

2002

VA and NIH publishes ALLHAT study which finds that thiazide-type diuretics should be the initial hypertension treatment in most patients.

2007

VA unveils the first powered ankle-foot prosthetic, which yields a faster walking-pace and ultimately introduces a new era of innovation in prosthesis.

2011

VA embarks on a mission to build the largest medical database by collecting voluntary health information from one million Veterans, to gain insights on genomic health and disease management.

2016

VA and IBM Watson announce, 'Cancer Moonshot' Partnership, focused on using artificial intelligence to recommend tailored treatments for advanced- stage cancer patients.

2016

ReachVET, which enables VA staff to identify Veterans with risk factors for mental health crisis, wins FedHealthIT Innovation Award.

2020

In early 2020, VA Palo Alto Health Care System became one of the first health care systems in the United States to adopt 5G in order to explore healthcare use cases. Known as Project CONVERGENCE, this effort was made possible through the National Center for Collaborative Healthcare Innovation in partnership with Verizon, Microsoft, and Medivis.

NOBEL PRIZE TRIFECTA

Dr. Rosalyn Yalow, the second woman ever to earn a Nobel Prize, received the Nobel Prize in Physiology or Medicine for her work in discovering the role of radioimmunoassay in insulin production, which led to major advances in diabetes research.

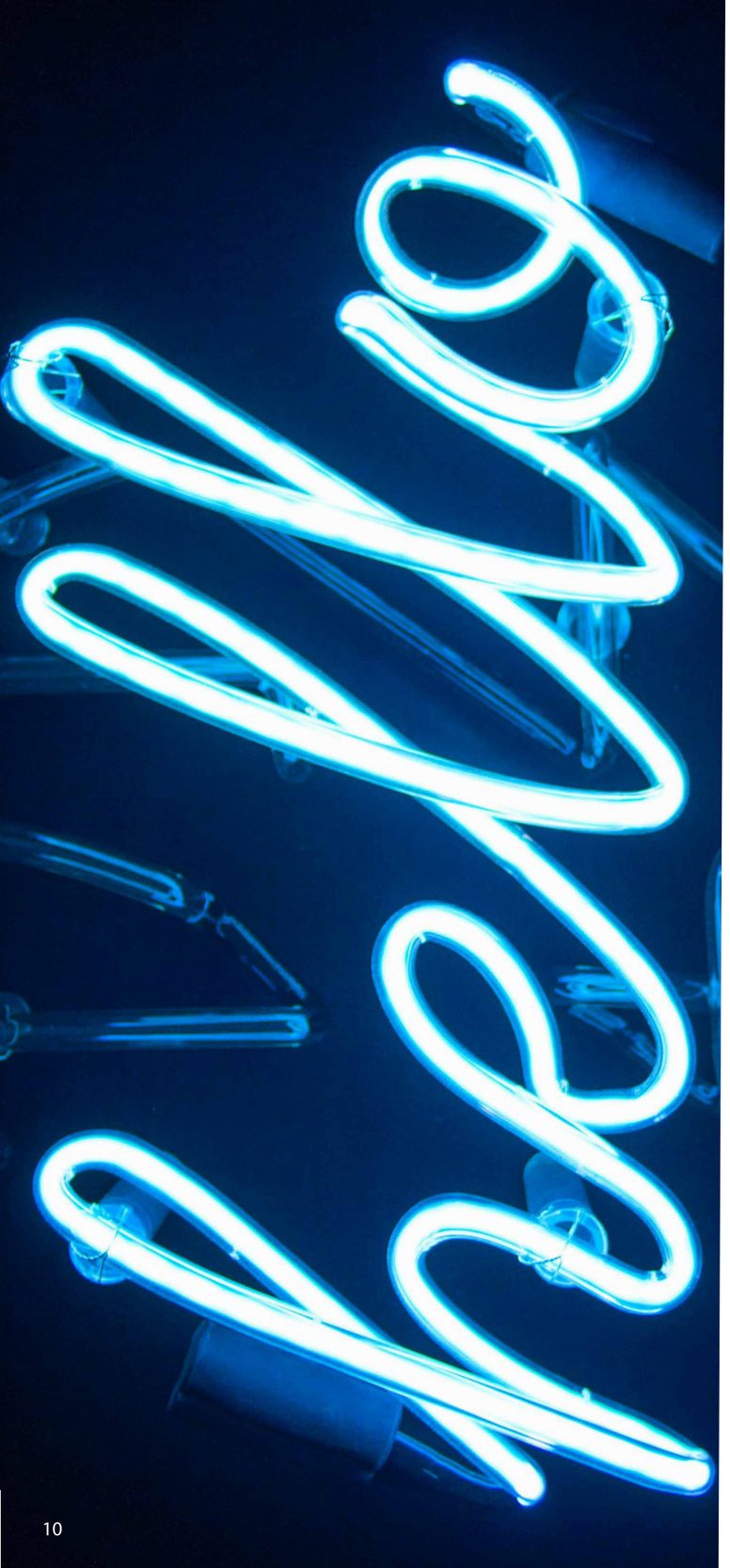
Dr. Andrew V. Schally, the head of the Endocrine, Polypeptide and Cancer Institute, Veterans Affairs Medical Center, in Miami, Florida, received the Nobel Prize in Physiology or Medicine in 1977. His research has more recently helped understand and treat endocrine-related diseases such as breast and prostate cancer.

Dr. Ferid Murad shared the 1998 the Nobel Prize in Physiology or Medicine with Robert F. Furchgott and Louis J. Ignarro, for their discovery regarding the natural production of nitric oxide - helping widen blood vessels to regulate blood pressure, prevent the formation of blood clots, and much more.

"INNOVATION DISTINGUISHES BETWEEN A LEADER AND A FOLLOWER." - STEVE JOBS

CULTURE & CAPACITY FOR CHANGE

Our people fuel our mission. A culture of innovation is paramount, as VHA fosters meaningful impact across communities. Investing in our staff, equipping them with the best resources, and encouraging collective imagination helps us deliver new solutions for Veterans every day.



Ryan Vega, MD
Executive Director, VHA Innovation Ecosystem
innovation superpower: leadership

Kristopher "Kit" Teague
Deputy Director, VHA Innovation Ecosystem
innovation superpower: persistence

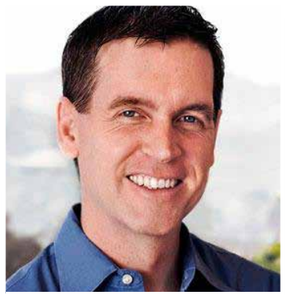
Suzanne Shirley, LCSW
Director, Fellowships & Community Engagement
innovation superpower: vision

Joshua Patterson
Director, Care & Transformational Initiatives
innovation superpower: tenacity

Hello
my name is

VHA Innovation Ecosystem Leadership

Beth Ripley, MD PhD
Enterprise Lead, VHA 3D Printing Network
Director, VA Ventures
innovation superpower: agility



Thomas Osborne, MD
Director, National Center for Collaborative Healthcare Innovation
innovation superpower: grit

Allison Amrhein, MPH
Director, VHA Innovators Network Operations
innovation superpower: perseverance

Blake Henderson
Director, Diffusion of Excellence
innovation superpower: imagination

Brynn Cole
Director, VHA Innovators Network Programming
innovation superpower: foresight

VHA INNOVATION
Ecosystem

AT A GLANCE

VHA INNOVATION ECOSYSTEM

VHA INNOVATION Ecosystem

VHA IE is the catalyst for enabling the discovery and spread of mission-driven health care innovation to advance care delivery and service that exceeds expectations, restores hope, and builds trust within the Veteran community. As part of VHA Office of Discovery, Education, and Affiliate Networks, VHA IE leverages the collective power of innovation champions from across VA, academia, and industry to operationalize innovation in the Nation's largest integrated health care system.

FOUR CRITICAL ELEMENTS FOR INNOVATION

1. WORKFORCE CAPACITY TO ACTUALIZE INNOVATION
Investing in VHA employees to give them the tools and skillsets needed to bring innovative ideas to fruition

2. RESILIENT ORGANIZATIONAL INFRASTRUCTURE
Institutionalizing innovation through integrated, systematic, repeatable pathways for change

3. AN INNOVATION-NURTURING CULTURE
Shifting the mindset to envision innovation as everyone's responsibility to improve service delivery and create a new normal

4. STRATEGIC EXTERNAL PARTNERSHIPS AND COLLABORATIONS
Innovation cannot be realized in isolation and requires novel, cross-industry partnerships that surface novel ideas and help catalyze a shift in the status-quo

OUR TEAMS

VHA Innovators Network

Diffusion of EXCELLENCE
Diffusing Best Practices Across VHA

Care & Transformational Initiatives

NCi2I
NATIONAL CENTERS FOR INNOVATION TO IMPACT

THOUGHT PIECE

ESTABLISHING A FOUNDATION FOR INNOVATION

Innovation has the limitless potential to address the rising costs and unsatisfactory outcomes in U.S. health care. Yet, the majority of health care innovations have failed to meet these goals. These failures point to a larger problem—most health systems lack a foundation for operationalizing innovation into practice and establishing a repeatable model for identifying, maturing, scaling, and sustaining innovation.

In a recent publication titled ***VHA's Innovation Ecosystem: Operationalizing Innovation in Health Care,*** included in New England Journal of Medicine (NEJM) Catalyst, Dr. Ryan Vega, VHA IE Executive Director describes the four critical elements that VHA IE provides the foundation for supporting the development and deployment of innovation throughout VHA:

1. **Workforce capacity to actualize innovation**
2. **Resilience organizational infrastructure**
3. **An innovation-nurturing culture**
4. **Strategic external partnerships and collaborations**

VHA IE provides an illustrative example for how this model can be used to successfully and sustainably support the entire lifecycle of innovation in the Nation's largest integrated health care network.

Since 2015, VHA IE has been building the workforce capacity and organizational infrastructure needed to reliably manage innovation and leverage it into meaningful advances, fostering an innovation-nurturing culture enhanced by strategic external partnerships and collaborations. Through VHA IE programs, innovations have positively impacted more than one million Veterans and caregivers and resulted in the direct cost avoidance of at least $40 million to date. Over 25,000 employees have received training in innovation competencies, especially human-centered design, and have engaged in various innovation competitions or led replication and implementation of promising practices. Several partnerships are currently testing and co-developing solutions that hold promise to transform health care at large, such as bioprinting and upstream suicide prevention.

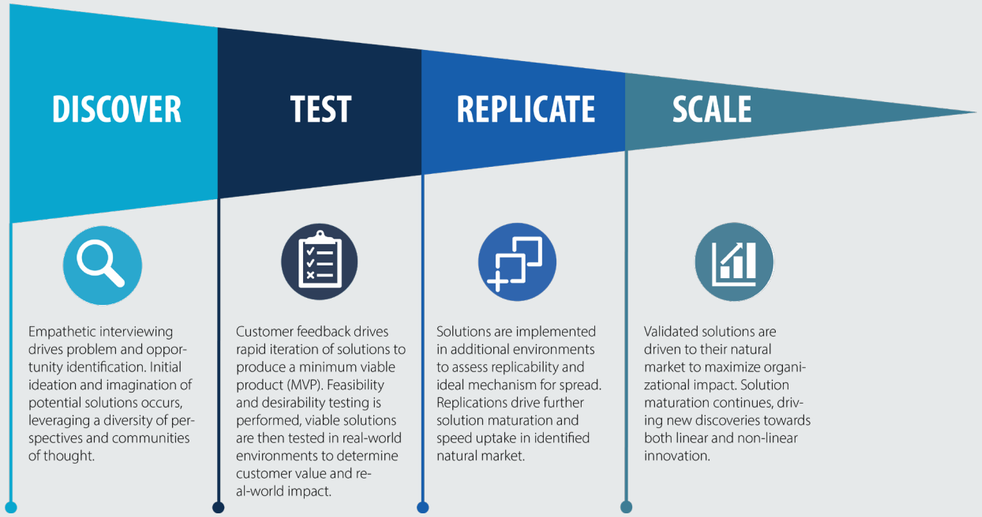
Even in a large, complicated government organization where the barriers to innovation are high, re-imagining the innovation culture has cost relatively little and is showing great promise. VHA IE successes illustrate how feasible it is to build a foundation for innovation in other health systems—if it can happen in the Department of Veterans Affairs (VA), it can happen anywhere.

The article can be access at the NEJM website.

RYAN VEGA, MD, MSHA

Ryan Vega, MD, MSHA serves as the Executive Director of VHA IE in VHA Office of Discovery, Education and Affiliate Networks. In this role, he oversees the management of both grassroot and strategic innovation initiatives across VHA. Dr. Vega is a graduate of the Louisiana State University School of Medicine. He completed his Internal Medicine residency at the Virginia Commonwealth University Health System where he served as Chief Medicine Resident in the Department of Internal Medicine, as well as VA Chief Resident for Quality and Safety. He gained additional training in clinical quality through the Advanced Training Program at Intermountain Health Care under the tutelage of Dr. Brett James. He received a Master of Science in Healthcare Administration from Virginia Commonwealth University where he was an A.D. Williams Scholar.

VHA INNOVATION ECOSYSTEM OPERATIONAL MODEL



Missed patient appointments lead to decreased access to Veteran care and contribute significantly to an increase in waiting times, reduced appointment availability, higher costs, poor efficiency, and lower patient satisfaction. For frontline employees like Shane Elliott and Deanna Callahan at the VA Loma Linda Health Care System, problems like these are opportunities to move away from the status quo and think innovatively about patient care. Their team had an idea: a text message appointment reminder system for Veterans with the potential to decrease no-shows.

With a little infrastructure, the ideas of frontline employees, like Shane and Deanna, have the potential to become transformative solutions for Veterans. The VHA IE Operational Model was developed to equip innovators with a structured, repeatable, outcomes-driven process to amplify grassroots and strategic innovation across the organization. The model has four phases: **DISCOVER, TEST, REPLICATE, AND SCALE.**

DISCOVER: The team at Loma Linda found that over 9 million appointments across health care systems nationwide go unutilized each year due to no-shows. They worked with Robert Durkin in VA Office Information and Technology (OIT) to develop VEText, an automated system that sends Veterans appointment reminders via text messages and offers the ability to confirm or cancel their appointments.

TEST: The VEText team received funding through the VHA Innovators Network Spark-Seed-Spread Investment Program in 2017 and began testing within their medical center.

REPLICATE: Successful implementation at Loma Linda led to replicating and deploying VEText first to VA medical centers (VAMCs) in Arizona, California, and New Mexico.

SCALE: With help from VA OIT Office of the Chief Technology Officer and VHA Office of Veterans Access to Care, the project team scaled VEText across all VAMCs. In line with the iterative and sometimes non-linear pathway of innovation, the team discovered they could further increase access by automatically redirecting cancellations via text message to Veterans currently waiting more than 30 days for an appointment. This feature, Open Slot Management, was tested and scaled nationwide. To date, VEText enabled the re-booking of over one million appointments.

The status quo is not enough – if we continue to do what we have always done, we will get the results we have always gotten. Pairing innovative thinking with the VHA IE Operational Model helps us deliver improved results now and in the future: increased access, faster diagnosis and treatment, more convenience, greater sensitivity to cultural differences and health disparities, and so much more.

VEText

Innovation Ecosystem

We know we cannot innovate alone.

We know we cannot determine the solutions
that will transform healthcare
over the next ten years, by ourselves.

We know innovation happens
in the spaces between.

So, we work every day with patients:
Veterans excited and invested
in giving feedback and trying new technologies
for even the slightest chance
of helping other Veterans.

And we work every day with partners:
industry, academia, start-ups,
big companies, small companies--
any company that shares our mission
and is positioned to design, develop, and scale.

And we work every day as an intentionally-
curated team to build infrastructure
that spans across the enterprise;
and we ramp into high gear as soon as we see
the opportunity to respond in times of need.

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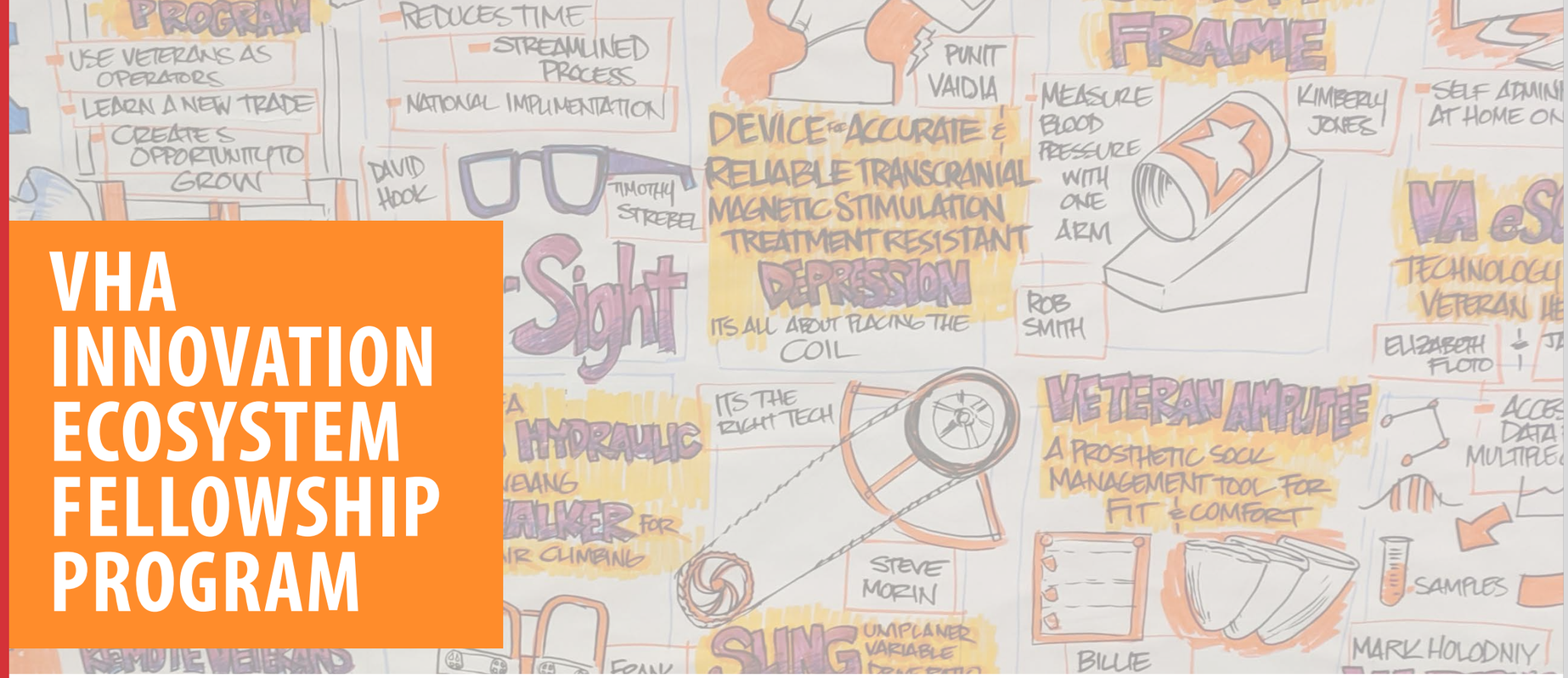
The above poem is credited to The Good Listening Project, who believes that good listening leads to good health. Jenny Hegland, the Listener Poet, wrote this poem after speaking with Suzanne Shirley on her experience working with VHA Innovation Ecosystem.



VHA INNOVATION ECOSYSTEM FELLOWSHIP PROGRAM

VHA IE established the Entrepreneur in Residence and Senior Innovation Fellowship programs to build the innovative leaders of tomorrow and to spread mission-driven advances in health care delivery across VHA. These programs offer unique experiential learning opportunities for emerging and accomplished VHA leaders with a dynamic presence, passion for innovation, and vision for the future. Fellows are empowered through strategic guidance and relationship development to become change agents and catalytic leaders capable of championing solutions that will improve health care for Veterans.

VHA IE Fellowships aim to develop individuals to:

- Serve as the innovation thought leaders of tomorrow;
- Drive innovative programmatic changes that advance care delivery and service to Veterans; and
- Create an environment of collaboration and partnership that fosters innovative approaches to solving complex health care challenges.

ENTREPRENEUR IN RESIDENCE FELLOWSHIP

The **ENTREPRENEUR IN RESIDENCE FELLOWSHIP** seeks to engage emerging leaders who are prepared to implement an innovative project that leverages internal stakeholders and leaders at their local institutions and beyond. During the fellowship year, the Entrepreneur in Residence will participate in experiential learning and develop skills in public speaking, storytelling, building professional networks, developing a business case, engaging early adopters, inspiring change, and demonstrating strong leadership.

SENIOR INNOVATION FELLOWSHIP

The **SENIOR INNOVATION FELLOWSHIP** seeks to engage accomplished leaders who are prepared to implement a national scale project that leverages internal and external stakeholders throughout the organization, government, academia and industry. A Senior Innovation Fellow will develop important skills in expanding their professional networks, navigating complex aspects of the organization, and solidifying their role in health care as a thought leader and change agent whose work has a profound impact on the organization and the lives of Veterans everywhere.

"Without this fellowship I never would have had the opportunity to implement such large-scale change across VHA. Within the first few weeks of my new role as the 2018 Entrepreneur in Residence, I was on a plane to Boston to design a collaboration with MIT. I couldn't have imagined what we'd accomplish together… the lives we'd change and the community we'd build along the way. This fellowship has been the most transformative experience of my ten year career in VHA."

---Suzanne Shirley, LCSW
2018 Entrepreneur in Residence

MIT CATALYST 2021: FELLOWSHIP COLLABORATION WITH VHA IE

VHA IE is pleased to announce the launch of a new fellowship program in collaboration with Massachusetts Institute of Technology (MIT). MIT's Catalyst program creates meaningful opportunities for VA innovators to collaboratively develop mature and sustainable solutions in the clinical setting. While MIT Catalyst has been in motion for some time in Boston, MIT and VHA are now expanding to new cities and sites across the Nation.

MIT Catalyst is a principled methodology for needs identification and opportunity development, and an organizational model that fosters a vibrant multi-stakeholder community. Fellows bring incredible diversity to the program as engineers, clinicians, scientists, researchers, MBAs, entrepreneurs and beyond. Each fellow benefits from the unique opportunity to collaborate within their diverse cohorts to solve health care challenges and to advance health care globally.

The MIT Catalyst Fellowship Program's mission is to increase the potential impact of biomedical research and improve the likelihood that newly developed solutions will address unmet health care needs in VHA. MIT Catalyst's framework sparks innovation from insight to impact, which aligns with VHA IE's priorities and will accelerate the pace of innovation in health care and empower VA employees this year in Memphis, Salt Lake City, and Boston.

The MIT Catalyst Fellowship Program enables fellows to identify need-driven opportunities and ideate impactful solutions under the academic framework of a world-renowned innovation program. Through the program, fellows will test and hone their solutions into a practical and effective proofs of concept guided by a cross-functional faculty team. During the first 6 months of the program, teams will work to identify unmet medical needs, brainstorm and evaluate plausible solutions, and plan project proposals. At the end of the program, projects with demonstrated potential for impact will establish longer-term engagements with VA and initiate further testing and development that deliver impactful solutions directly to Veterans across the Nation.

MEET THE 2020 VHA IE INNOVATION FELLOWS

INNOVATION SUPERPOWER: CONNECTING

DANIELLE KRAKORA

ENTREPRENEUR IN RESIDENCE

Danielle Krakora is a dynamic leader, Veteran advocate, and innovative Product Manager for VA OIT. She is committed to elevating the patient and employee experience by modernizing systems with technology, building strategic relationships, and encouraging a principle-based approach across the organization. She has held numerous positions during her seven-year tenure with VA and is known for her innovative projects and programs. When asked to comment on the meaning of innovation, she stated it "…means thinking differently, doing differently and constantly challenging yourself and others to change the world, one idea at a time."

MAKEATHON MODEL FOR BUILDING COMMUNITY PARTNERSHIPS:

Danielle developed a novel approach to challenge competitions in collaboration with a Veteran non-profit organization, Challenge America. Through this collaboration, the team adapted a face-to-face program into an incredible series of five virtual competitions that developed solutions to keep frontline essential workers safe during the COVID-19 pandemic. Throughout the program, over 200 organizations collaborated on nearly 50 unique and essential products, several of which are being used by VA employees across the country. From a UVC powered sanitation station to a 3D printed device to relieve the pressure of wearing a face mask and nasal canula on the ears - these solutions are changing and saving lives! Leveraging an approach focused on the end user leads to more refined products that are further along in the development process, shortening the time to market, and accelerating the delivery of impactful solutions directly to Veterans. As we look to the future of innovation at VA, Danielle believes that "through the growing partnerships, evolving programming, and strong leadership, VA innovation will not only improve the lives of our Veterans, but people around the world."

INNOVATION SUPERPOWER: RESOURCEFULNESS

G. ELI KAUFMAN

ENTREPRENEUR IN RESIDENCE

G. Eli Kaufman is a Research Prosthetist at VA Center for Limb Loss and Mobility (CLiMB) in Seattle, WA, where he collaborates with several teams on research and development of prostheses and other device-based solutions for individuals with limb loss and other mobility impairments. As Entrepreneur in Residence, his proudest accomplishment is "...When I can provide VHA's world class prosthetics care in a personalized way by visiting a Veteran at home, I know my work is making a difference for our patients who have sacrificed so much already."

MOBILE OPS:

The Mobile Orthotic & Prosthetic Services (Mobile OPS) pilot was launched in December 2018 in response to observations that some Veterans with limb loss were failing to receive prescribed prosthetic care due to obstacles with traveling to VA health care facilities. Eli also realized that mental health conditions like PTSD and anxiety were also factors preventing many Veterans from traveling for care. To improve access for these Veterans and provide the care they need at home, Mobile OPS was designed to utilize portable digital technologies and a mobile laboratory based on a platform of low-cost, lightweight, modular battery-powered tools to provide care where the Veteran is most comfortable.

Through his fellowship, Mr. Kaufman has galvanized wide support for mobile prosthetic services and has developed a business plan and roadmap for national expansion of Mobile OPS. This expansion plan covers standardization of operational processes, identification of funding sources, and promotional awareness of the program benefits within and outside VHA. In the coming year, Mr. Kaufman will investigate a variety of emerging technologies that may compliment mobile prosthetic care to both enhance outcomes and further minimize potential exposure to COVID-19. With collaboration at the forefront, Mr. Kaufman has stated its criticality, commenting "I have learned so much and attribute much of my success to collaboration with amazing individuals working in a broad variety of disciplines across VHA and in the community."

INNOVATION SUPERPOWER: PRESENCE AND PERSEVERANCE

AMANDA PURNELL

SENIOR INNOVATION FELLOW

Amanda Purnell, PhD, has been working as an Innovation Specialist at VA St Louis Health Care System within the VHA Innovators Network (iNET) part-time since October 2016 and full-time since April 2018. Dr. Purnell has a PhD in Counseling Psychology from The Ohio State University and loves to empower others, ignite curiosity, and wonder about what is possible. Prior to her work with iNET, she held leadership roles in implementing programs for prevention, integrative and complimentary care, and health behavior change at VHA.

DEMOCRATIZING DATA:

A problem in VHA is that data is not easily understood and accessed by diverse users both within and outside the health system. This is especially true for complex questions that require multiple data sources, trustworthy and accurate data, and attention to privacy or information security concerns. Internally, there are bottlenecks in data access and externally, partners must overcome multiple obstacles to access data. This discourages collaboration and creates barriers to advancing solutions for Veterans.

The objective of Democratizing Data is to develop and test solutions that improve the user experience of accessing meaningful data to advance user-identified goals. Over the past year, Dr. Purnell has worked on multiple projects that aim to leverage VA data to serve Veterans. She facilitated a collaboration across multiple program offices to host a virtual Data Summit for Suicide Prevention to confirm core data related challenges and focus attention on the most impactful potential solutions. In the spring, she launched a COVID-19 data challenge with precisionFDA using synthetic data. In tandem, she has worked with VHA researchers to test the privacy preserving properties and clinical utility of synthetic data generated from original data.

Dr. Purnell believes that innovation "…is about having an open-mind and curiosity that is laser focused on solving challenges." Through democratizing data, she has leveraged her curiosity and expertise to further drive access to data, and in turn care, to a wider range of Veterans.

WELCOME, SimLEARN!

On July 17, 2009, the Acting Under Secretary for Health authorized the establishment of a national simulation training and education program for VHA. Simulation Learning, Education and Research Network (SimLEARN) improves the quality of health care services for America's Veterans through the application of simulation-based learning strategies to clinical workforce development. Their mission is to set the standard for reliable, relevant and result driven clinical-based simulation training to ensure exceptional health care for Veterans through our Nation.

SimLEARN provides training solutions to equip local facilities with the tools and resources to deliver quality, simulation training programs independently. They developed a public-facing website for just-in-time clinical training resources available to internal and external health care providers. They also generate educational content published in newsletters for purposes of sharing best practices in VHA and outside VA. With a focus to demonstrate impact on clinical care and Veteran outcomes within VHA, SimLEARN collaborates with numerous partners to build advanced simulation courses centered around training needs to ensure our Nation's Veterans receive the best possible care.

A key component to leading simulation, is exploring cutting-edge technology that could be implemented into VHA simulation labs and medical facilities. SimLEARN is positioning itself as a testing site for innovative technologies and practices for validation through simulation to address educational challenges in the simulation health care industry. Some of the exciting technologies include 3D printing, artificial intelligence in medical simulation, clinical augmented reality and virtual reality as VHA expands services to Veterans in a virtual modality.

SimLEARN is working towards establishing itself as the VHA leader in clinical simulation by driving national simulation activities and providing expertise to train the VHA workforce. SimLEARN Virtual Academy, will introduce the best parts of the National Simulation Center to be distributed virtually across the country to reach learners where training is needed.

As of October 1, 2020, SimLEARN has been organizationally realigned to the newly formed VHA Office of Healthcare Innovation and Learning, and will be a sister organization to VHA IE under VHA Office of Discovery, Education, and Affiliate Networks. VHA IE is excited to welcome SimLEARN and looks forward to future collaborations in the exploration of cutting-edge technology that can be implemented into VHA simulation labs and medical facilities.

SimLEARN℠
Excellence in Veterans' Healthcare

SimLEARN COMPONENTS

HIGH-TECHNOLOGY, IMMERSIVE ENVIRONMENT FOR TRAIN-THE-TRAINER ACTIVITIES

OPERATIONAL HUB FOR COORDINATION FOR NATIONAL VHA CLINICAL SIMULATION

CRITICAL TRAINING SUPPORT FOR MEDICAL CENTER CLINICAL AND NON-CLINICAL EMPLOYEE FIELD TRAINING.

STANDARDIZATION OF BEST PRACTICES FOR IMPROVED QUALITY, OPPORTUNITIES FOR INNOVATION, AND NETWORKING.

CATALYZING INNOVATION

VHA works hard to connect the dots between innovative efforts. Whether it is re-imagining large-scale processes or transforming local Veteran care, innovation is present across the enterprise. Harnessing these efforts for communal success ensures VHA is constantly redefining expectations.

"A GOAL WITHOUT A PLAN IS JUST A WISH."

-ANTOINE DE SAINT-EXUPÉRY

INNOVATORS NETWORK

ACCELERATING FRONTLINE INNOVATION

As health care is quickly evolving and advancing, VHA is looking to individuals on the front lines to keep up with disruptive innovation. Frontline employees see patients every day and are best positioned to solve the challenges they face. Through funding, training, a robust field-based innovation community, and an innovation accelerator program, the VHA Innovators Network (iNET) empowers employees across VHA to design, develop, test and implement solutions to improve Veterans' lives and reduce the cost of health care. Through iNET, employees like retired U.S. Army Major and nurse, Terri Ohlinger, from the Cincinnati VAMC, can go from identifying a need to implementing game-changing solutions.

Terri Ohlinger has served Veterans as a registered nurse at the Cincinnati VAMC for over 20 years. As Nurse Case Manager of Eye Surgery at the Cincinnati VA Eye Center, she understands the difficulties her patients can face with using their post-operative prescription eyedrops once out of the clinical setting. Reduced vision and impaired manual dexterity can lead to inconsistent dosing, resulting in patient frustration, increased costs, and compromised outcomes affecting patient vision. Terri began researching and designing different concepts when she couldn't find anything already available on the market. Her solution: an easy-to-use eyedrop delivery system called Drop Ease, designed to aim and consistently dispense one eye drop at a time with little effort, regardless of pressure applied. With the help of iNET, Drop Ease has gone through two rounds of prototyping and is in the process of further design refinement based on user feedback.

WHO WE ARE

iNET provides innovators like Terri a space for disruption–where change and failure are encouraged, and ideas can become transformative solutions. iNET is a network of 33 VAMCs changing the way employees think and solve problems through training and accelerated operationalizing innovation. iNET provides the in-house capability of driving a culture of innovation through a cycle of Ignite-Accelerate-Celebrate. iNET commands the power of hundreds of frontline employee innovators who are uniquely attuned to patients' needs and ready to make a difference. Through iNET, employees can draw on and learn from each other's diverse experiences to empower change and integrate innovation into their everyday work.

INNOVATION SPECIALISTS

iNET is dedicated to building a collaborative environment for VHA frontline employees to incubate, test, and scale innovative ideas. Each site is led by an Innovation Specialist trained in supporting new approaches and spreading best practices, working with outside organizations, persevering through challenges, and leveraging innovation principles. When frontline innovators have ideas for changing and improving the delivery of Veteran care, the Innovation Specialists answer the call. They equip employees with the training, resources, and tools to accelerate innovation.

SPARK-SEED-SPREAD INNOVATION INVESTMENT (SSS) AND ACCELERATOR PROGRAMS

Each year, VHA Innovators Network Spark-Seed-Spread Innovation Investment (SSS) and Accelerator Programs enable a cohort of frontline VHA Investees to integrate innovation into their everyday work. SSS provides an immersive opportunity for employees to prototype and test their ideas through an accelerated innovation lifecycle and learn innovation-focused concepts. The SSS Innovation Investment Program offers start-up funding, while the Accelerator provides an in-depth learning-by-doing experience, centered around innovation-related frameworks such as lean startup and human-centered design to their strong community of grassroots innovators. SSS and the Accelerator challenge employees to think differently and compress years' worth of innovative learning-by-doing into just a few months. These programs enable VHA employees in the field to acquire the skills, knowledge, guidance, and community to grow or spread their health care innovations into practices that are changing and saving Veteran lives.

GO FISH!

Innovative thinking and passionate employees exist across VHA beyond iNET sites. To capture the drive and innovative ideas of VHA employees beyond iNET sites. iNET is extending its resources through an opportunity called Go Fish!

Innovators who are not employed by an iNET site have the opportunity to apply through Go Fish!, a pitch application process for non-iNET sites to find a Network "match" to sponsor their innovation through the Spark-Seed-Spread Innovation Investment Program. iNET Director of Operations, Allison Amrhein, recognizes the importance and possibilities of Go Fish!

This potential is key. Employees, like Terri are the heart of VHA, and their ingenuity drives better service to Veterans. Frontline powered innovation promotes a culture at VHA where employees are willing to fail and iterate to develop more thoughtfully designed solutions for Veterans. For innovators like Terri, it is all about the Veterans.

"We need to reach out to all VHA employees for their input and ideas on how to make Veteran care better. In my experience working with employee innovators, their passion and drive is unparalleled. If we don't harness as much of that enthusiasm as we possibly can to innovate within our healthcare system, we are truly missing out on unbelievable impact potential," says Allison Amrhein, iNET Director of Operations

FUELED BY VHA Innovators Network

"If iNET didn't exist, this idea would probably still be just a doodle on a piece of paper."

-TERRI OHLINGER

INNOVATORS NETWORK

PROJECT SPOTLIGHTS

FUELED BY VHA Innovators Network

VETERANS REPRODUCTIVE HEALTH ENGAGEMENT PROGRAM

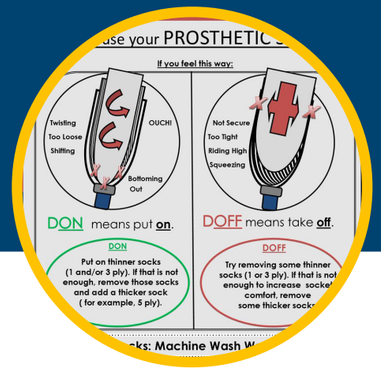
Dr. Lori Gawron, Obstetrics & Gynecology, at VA Salt Lake City Health Care System noticed the underutilization and nuanced barriers to timely reproductive health services for women Veterans. To identify missed opportunities and connect women Veterans to reproductive services sooner, she created the Veterans Reproductive Health Engagement Program (VetRHEP). VetRHEP is a centralized, virtual care coordination approach to provide screening and time-sensitive reproductive counseling and services. This program leverages the expertise of OBGYNs and women's health staff in the VAMC to support Community Based Outpatient Clinic (CBOC) providers working in clinics with varied service capacity. Coupled with Veteran engagement, the team is developing a provider mentorship and education program to address variation in experience levels with reproductive services, standardizing services, and care pathways across CBOCs.

Dr. Gawron has received positive feedback from Veterans participating in the program to date. One Veteran shared that she often ignores her reproductive health because the closest OBGYN and VA CBOC are hours away from her home and travel is a burden. The Veteran expressed her appreciation with her phone call and care coordination that VetRHEP was able to provide. She thanked Dr. Gawron and said she was "so glad VA is working to support women Veterans, no matter where they are."

DOMINATING DIABETES PROGRAM

Dr. Adam Gold, Clinical Pharmacy Specialist (PharmD), at Martinsburg VA Medical Center was inspired to innovate by meeting one Veteran named "Cookie Monster Joe" in 2015. This Veteran had generated over 200 critical glucose values during one year in Domiciliary Care (DOM) eating cookies all night due to a fear of low glucose levels and walking all morning with his rollator due to a fear of high glucose levels. Upon being labeled "brittle," the Veteran lost hope. Dr. Gold believed that his approach may have been different had the Veteran connected earlier on with a peer mentor for a positive direct learning connection. From his encounter with "Cookie Monster Joe," Dr. Gold developed the DOMinating Diabetes Program, which combines weekly Veteran-empowered peer mentoring with comprehensive diabetes disease state management within an inpatient mental health setting.

The DOMinating Diabetes Program is reaching a once "impossible" market that was not reachable prior to this program's development. Its success has been evident through iNET, with Dr. Gold commenting that "It has been uplifting to our patients to hear they are getting kudos for doing great self-care…It really turned up the power on the peer mentoring because everyone gained confidence."



PROSTHETIC SOCK MANAGEMENT TOOL

Acknowledging the importance of pre-, post- and rehabilitative care for people having an amputation, in 2017 VA and DOD together issued revised clinical practice guidelines for rehabilitation of individuals with lower limb amputations. These guidelines recommend that physical and functional interventions for prosthetic training be provided to patients. This includes residual limb management, which incorporates instruction on the correct donning and doffing of prosthetic socks. The Prosthetic Sock Management Tool (PSMT) is a two-piece instructional system that clinicians may use for this purpose. The PSMT consists of an easy-to-use three zippered kit with labeled pouches and a laminated instructional infographic.

The PSMT project began in 2018 as a iNET supported project in the Minneapolis VA Health Care System. With input from a broad variety of stakeholders (including Veterans, Physiatrists, Prosthetists, Rehabilitation Therapists, and others), human-centered design principles were put into action. Prototypes and their iterations soon followed. After a small pilot test at the Minneapolis VA, with the support of the National Program Manager of the Amputation System of Care (ASoC), the PSMT was introduced nationally to VA Amputation Rehabilitation Coordinators. Due to the COVID-19 pandemic, professional manufacturing of the PSMT has been delayed. As a pivot, the instructional infographic was deployed to over 12 VHA facilities and is currently in use. As production and supplies become available, the PSMT system will be deployed within VA ASoC and data will be collected to measure clinician and Veteran satisfaction with its use.

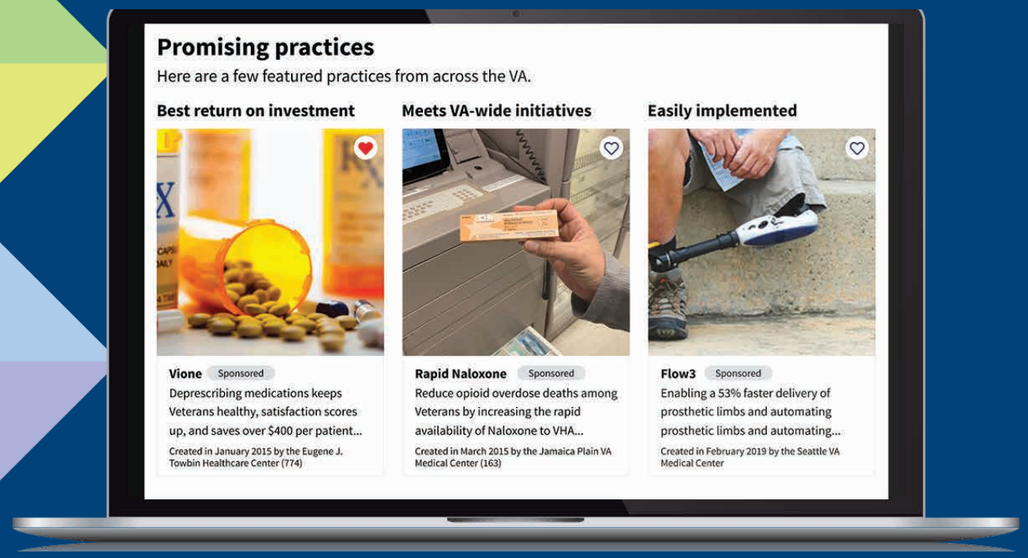
PRIDE IN ALL WHO SERVED

Clinical psychologists Dr. Tiffany Lange-Altman and Dr. Michelle Hilgeman believe that sexual orientation and gender identity are vital in helping VHA provide culturally competent care for Veterans. To help VHA employees better address the specific health care needs of their LGBTQ+ patients, they developed the PRIDE in All Who Served program (PRIDE). LGBTQ+ Veterans experience increased risks of stress, social isolation, depression, suicidal ideation, and substance abuse. PRIDE delivers better care by combating discrimination and addressing Veteran reluctance to seek medical care.

PRIDE is a 10-week health education group developed for LGBTQ+ Veterans focused on reducing health care disparities and enabling dialogues about health care needs. During these sessions, Veteran participants focus on improving their overall wellness and increasing social connection. The sessions provide a forum to discuss issues of concern ranging from identity development models and coming out to family or health care providers, to resources and information on sexual health and current VHA policies. PRIDE is available in 15 medical centers around the country, with more sites in the process of planning their first group. More than 600 VHA staff were trained in 2019, reaching more than 275 Veterans (55% women, 27% racial/ethnic minority Veterans). Dr. Lange-Altman and Dr. Hilgeman hope that the program continues to empower LGBTQ+ Veterans and shows them that VHA cares about delivering services that meet their unique health care needs.

VHA DIFFUSION OF EXCELLENCE

DIFFUSING INNOVATION ACROSS THE NATION'S LARGEST INTEGRATED HEALTH CARE SYSTEM



It was just after 10 a.m. when a World War II Veteran announced to the unit nurse manager: "I have to brush my teeth so that I don't get pneumonia." The Veteran's abrupt departure highlights the effectiveness of a VHA nurse-led intervention: brushing teeth and cleaning dentures to prevent hospital acquired pneumonia (HAP). Project HAPPEN, or Hospital Acquired Pneumonia Prevention by Engaging Nurses, equips hospitalized Veterans and their caregivers with the information and assistance they need to reduce the risk of developing HAP. Project HAPPEN, was a practice created in October 2016 at Salem VAMC, has now served 29,398 unique Veterans and scaled to 65 VHA facilities. Scaling emergent, high impact health care practices, such as Project HAPPEN, across the Nation's largest health care system is the goal of Diffusion of Excellence.

Diffusion of Excellence meets its goal through deploying a model to discover, test, replicate, and scale. Supporting its mission to change and save Veteran lives, Diffusion of Excellence develops employee training programs, aids with project management, and creates practice-specific materials for evidence-based practices. The goal of Diffusion of Excellence is to identify and disseminate clinical and administrative best practices and standardize those that promote positive outcomes for Veterans system-wide. Since its inception in 2015, Diffusion of Excellence has sponsored five VHA Shark Tank Competitions, eliciting more than 1,000 employee-designated promising practices that address access, care coordination, employee engagement, quality and safety, and Veteran experience. Each cohort of VHA Shark Tank Competition winners, known as Diffusion of Excellence Fellows, receive Promising Practice designation and attend Diffusion of Excellence Base Camp to gain skills necessary to adapt new practices for different facilities. Ultimately, Diffusion of Excellence supports VHA as it strives to be a learning system that empowers its employees to develop and spread promising practices.

DIFFUSION MARKETPLACE

This work led to a new question. What if everyone in VHA could search across all the promising practices currently being diffused in our health care system to find the one that is right for their facility and the problems they need to solve? The Diffusion Marketplace, housed on the VA Intranet, is a digital platform designed to do just that. The Marketplace is a living, searchable repository of hundreds of promising practices developed and implemented by frontline employees to improve clinical care and operations. Practice creators manage their own practice pages and provide updates as their practices evolve. Visitors to the Marketplace can search, follow, comment, and even commit to adopting a practice. They can navigate an interactive map of over 1,000 practice adoptions to see what other facilities have implemented or are in the process of adopting. **"When it comes to learning health care systems, seeing is still believing. People need something they can interact with. And while VHA may still be evolving as a learning system, its Diffusion Marketplace is bringing that system to life in high definition,"** says Dr. Carolyn Clancy, Deputy Under Secretary for Discovery, Education and Affiliate Networks.

DIFFUSION ACADEMY

VHA Diffusion Academy is a learning academy that bridges projects from Diffusion of Excellence and VHA Innovators Network portfolios to opportunities that promote project team cohesion, replication strategy advancement, national stakeholder buy-in, strategic communication, and resources for growth and sustainment. It is designed to propel innovative projects towards sustainability and scaling with continued active engagement through workshops and community mentorship. The curriculum addresses knowledge and project management gaps for projects to continue diffusing, maturing, and progressing naturally, as well as a final business case presentation to use during future stakeholder engagement meetings. In 2020, VHA IE launched a new offering, VHA Diffusion Academy, to six projects across VHA IE.

SHARK TANK

As part of Diffusion of Excellence, the VHA Shark Tank Competition serves as a mechanism to identify field-developed practices that promote positive outcomes and improved experiences for Veterans and employees. Open to all VHA employees, the competition shines a spotlight on employees passionate about solving some of the toughest challenges across VHA and provides them with a platform to bring exposure from all levels of leadership to their practices that are elevating the standard of care for Veterans. To be eligible, applicants must have successfully implemented their practice in at least one facility, collected data-based results for at least one month, and the practice must address one of the VHA Shark Tank Priorities. The 2020 VHA Shark Tank Priorities include:

- Access
- Health Care after COVID-19
- High Reliability Culture Change: Commit to Zero Harm
- Rural Women Veterans: A Diverse Community,
- Veteran and Employee Experience
- Whole Health
- Upstream Suicide Prevention

Winning practices from the competition receive Promising Practice designation and proceed with six to nine months of facilitated replication in the winning VAMC and the Veterans Integrated Service Network Director Shark's facilities. Winners also gain access to project management, communication, and technical support from Diffusion of Excellence, which helps applicants with impact studies to determine scaling feasibility, support for conference and award submissions, and national rollout. By the end of the Diffusion of Excellence program, winners can expect to accomplish packaged knowledge-based material, confirmation of desired clinical or operational impact in different settings, and engagement from national stakeholders for their input and support.

VHA INCUBATES, TESTS, AND SCALES HEALTH CARE INNOVATIONS WHILE:

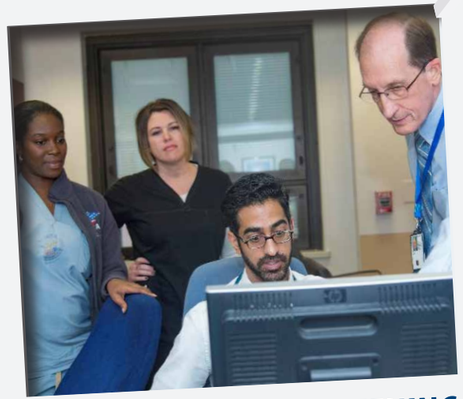
- Empowering employees to promote innovation knowledge sharing and a supportive culture of continuous improvement and high-quality care
- Minimizing negative variation and standardizing promising practices by diffusing innovative and industry-recognized solutions across the enterprise
- Institutionalizing processes and mechanisms for systematically diffusing and implementing promising practices

Diffusion of EXCELLENCE
Diffusing Best Practices Across VHA

VHA DIFFUSION OF EXCELLENCE

Diffusion of EXCELLENCE
Diffusing Best Practices Across VHA

PROJECT SPOTLIGHTS



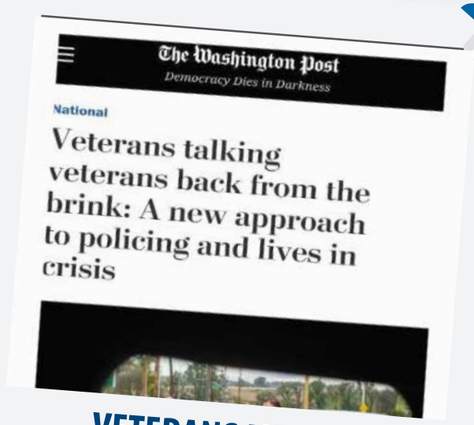
PRE-OP FRAILTY SCREENING AND PREHABILITATION

The Pre-operative Frailty Screening and Prehabilitation practice was created by Omaha VAMC in July 2011, and developed into a 2019 VHA Shark Tank Competition winner. Pre-operative Frailty Screening uses the Risk Analysis Index to screen for frailty in 30 seconds to identify highest risk patients at the point of care before proceeding with surgery or intervening with a variety of common-sense interventions that leverage existing resources. To date, this practice has been successfully implemented in 17 facilities, and utilization of this practice has resulted in 1 in 5 patients declining surgery in favor of non-operative management strategies and a 20% reduction of per-case costs.

COPD CARE

In October 2015, the COPD CARE practice was created by William S. Middleton Memorial Veterans' Hospital and later became a 2018 VHA Shark Tank Competition winner. COPD CARE, or Chronic Obstructive Pulmonary Disease Coordinated Access to Reduce Exacerbations, evaluates patients who are recently discharged from the hospital or emergency department with a COPD exacerbation. COPD CARE empowers Patient-Aligned Care Team (PACT) Clinical Pharmacy Specialists, Nurse Care Managers, and other disciplines to deliver high-quality COPD disease state management to Veterans. With the creation of an implementation checklist and training workbook and attendance at VHA Diffusion Academy 2020, COPD CARE has been adopted in 10 VHA facilities. This practice offers a means of interprofessional coordination for enhanced COPD management resulting in a statistically signification reduction in 30 day re-admission rates and doubling access to care within 30 days of discharge.

In August 2018, the Veterans Mental Evaluation Team (VMET) practice was created at Tibor Rubin VAMC. Most recently, VMET was a 2019 VHA Shark Tank Competition winner and has been adopted in five VHA facilities. The VMET program assists in responding to calls involving local law enforcement interactions with Veterans in crisis and conducts outreach efforts to contact at-risk Veterans who have stopped showing up for their psychiatric care at VA hospitals. In the first year of implementation, VMET saved 70 Veteran lives, received 823 phone calls, placed 27 psychiatric holds, responded to 52 calls with assistance from local police agency, and leveraged four housing placements.



The Washington Post
Democracy Dies in Darkness

National

Veterans talking veterans back from the brink: A new approach to policing and lives in crisis

VETERANS MENTAL EVALUATION TEAM

While advancements in prosthetic limb technology were evident in the Veteran population, the wait between being prescribed and fitted for a prosthetic limb and receiving the limb remained a challenge. In some cases, wait times spanned between six to twelve months, adding to the challenge of limb loss through frustrated patients and feelings of despair. As Dr. Jeffrey Heckman, a physician at VA Puget Sound Health Care System, treated these frustrated patients, he became motivated by one Veteran in particular to improve these processes. Collaborating with prosthetist Wayne Biggs and data system expert Jeffrey Bott, together they worked to automate and ultimately streamline the prosthetic limb acquisition process. Using three interrelated software platforms, this effort became known as FLOW3. After a successful launch at Puget Sound, the team spread their solution through the Diffusion of Excellence program, ultimately rolling this innovation across VISN 12. Through the use of FLOW3, it successes have been evident. More Veterans returned to their clinics, and feelings of despair dissipated as they were excited to receive their prosthetic limbs. Furthermore, there was greater data transparency related to Veterans with limb loss and prosthetics. The development of FLOW3 not only ignited innovation at VISN 12, but is spreading to increase the quality of life for Veterans nationwide.

FLOW3

CARE & TRANSFORMATIONAL INITIATIVES

A Veteran who was growing weary from limited success in combating his PTSD reached out to his VAMC for help. His providers at Martinsburg VAMC suggested he try something new and non-traditional, a VR-based PTSD treatment called StrongMind. Hopeful, the Veteran gave it a go, and for the first time in years, he finally began to see progress in combating his PTSD.

Through VHA IE's Care and Transformation Initiates (CTI) portfolio, VHA is tapping into the incredibly dynamic and constantly evolving landscape of external health care technologies, like VR Veteran care. CTI is building a collaborative innovation community across academia, industry, non-profit organizations, and other government collaborators to co-develop solutions that Veterans need most. CTI focuses on testing and refining cutting-edge technologies, innovative care models, and transformational initiatives that can be meaningfully scaled. CTI is focused on six key priority areas that each carry rising importance in modern health care and the potential to positively impact Veterans in revolutionary ways. Below, you will find examples of the CTI's active efforts leveraging cutting-edge technologies to solve the health care challenges our Veterans face.

IMMERSIVE TECHNOLOGY

VR THERAPY TO HELP VETERANS SUFFERING FROM PTSD

Combat situations can leave Veterans vulnerable to mental health challenges such as PTSD. On average, 20 U.S. Veterans commit suicide each day and the suicide rate among Veterans age 18-34 is more than three times the national average. VHA is enhancing therapeutic treatment for Veterans with PTSD through an innovative partnership with SoliderStrong. StrongMind is SoldierStrong's evidence-based treatment for PTSD. StrongMind amplifies typical prolonged exposure therapy to recount patient traumas via systematic confrontation. Clinicians adjust content of virtual scenarios in real-time to customize exposure matching patient experiences. StrongMind creates 14 virtual worlds mimicking event-specific battle images and sounds to de-condition PTSD via extinction learning. VHA is helping augment traditional imaginal therapy where clinicians listen to the patient narrative and try to circumvent patient avoidance. It is currently deployed in 15 sites.

SOLDIERSTRONG

INNOVATIVE XR CARE THROUGH THE EXTENDED REALITY NETWORK

CTI recognized early on that while exciting extended reality applications are rapidly spreading within VHA, there is no centralized resource available to facilitate connections between frontline staff, researchers, external partners, and individual VAMCs. This has created a number of hurdles for new and existing XR initiatives, including difficulty building projects from the ground up and navigating the uncertainty of scaling successful pilots. CTI is looking to help usher in the next frontier of XR within VHA by standing up the XR Network. This network will bring together subject matter experts to provide guidance, distill best practices, and contribute to the quality, safety, standardization, and utilization of XR technology within VHA.

Care & Transformational Initiatives

VETERAN-FACING SOLUTIONS

IMPROVING OUTCOMES WITH BARDA

Veterans at VA's Community Living Centers (CLCs) are at higher risk of contracting COVID-19 due to their age and underlying health conditions. As part of a new collaboration, VHA IE and Biomedical Advanced Research and Development Authority (BARDA), a division of U.S. Department of Health and Human Services, launched a pilot to assess the ability of a wearable biosensor to improve patient outcomes by remotely monitoring Veterans at a CLC for health deterioration, including respiratory rate, body temperature, blood oxygen levels and heart arrhythmias. Early indications of health status changes detected by the wearable will be evaluated to inform on COVID-19 infection and to allow health care professionals at the CLC to intervene earlier, improving the clinical management and health outcomes for Veterans.

PRECISION MEDICINE

EXPANDING MOLECULAR TESTING THROUGH GENOMIC LABORATORY INFORMATION MANAGEMENT SYSTEM (GLIMS) INTEGRATION

VHA IE is investing in a GLIMS coupled to Cerner's Helix software solution to revolutionize the way VA laboratories study and work with genetic mutations. By connecting VA laboratories with the Cerner Reference Laboratory Network, VAMCs are able to electronically order and report complex test results as structured data. This investment has the potential to particularly improve the quality of cancer care for Veterans by expanding access to genomic testing, capturing data that can be analyzed and measured, and eventually enabling oncologists to recommend targeted therapies designed to specifically a Veteran's tumor.

CARE MODELS

REDUCING HEART FAILURE READMISSIONS THROUGH PREDICTIVE ANALYTICS

VHA IE is committed to reducing Heart failure (HF) readmissions. HF is a major health burden for Veterans and 80% of HF costs result from hospitalizations. In a pilot study at multiple VAMCs, telemetry with a small wearable sensor accurately detected impending readmission for HF. LINK HF is the combination of remote cardiac monitoring with a predictive analytics algorithm to collect patient data and generate clinical alerts. A clinical response algorithm suggests follow up actions including medication changes and outpatient assessments for the Veteran. This technology shows tremendous potential in VA environments and offers exciting opportunities to improve HF care and additional chronic conditions.

ARTIFICIAL INTELLIGENCE

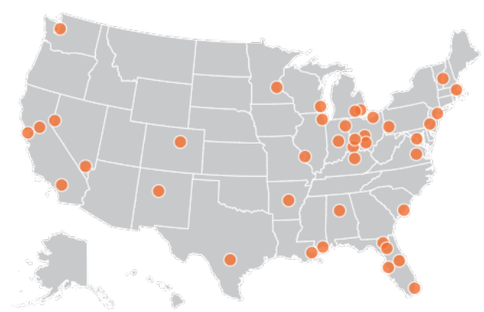
AUGMENTED REALITY MICROSCOPES FOR PATHOLOGY AND RADIOLOGY

Through a partnership with the Defense Innovation Unit (DIU), a division of US Department of Defense, CTI aims to revolutionize pathology clinical workflows by introducing augmented reality microscopes that leverage artificial intelligence, big data, and machine learning models to detect breast cancer in lymph nodes and classify prostate cancer. CTI and DIU are also exploring novel augmented reality applications to assist with medical image integration for radiologists and clinical resource allocation.

3D PRINTING

VHA 3D PRINTING NETWORK: From combat wounds to chronic health conditions, VHA IE strives to deliver individualized health care to Veterans. Today, VAMCs across the country are using 3D printing to build health care solutions customized to patients' needs. Solutions include a rehabilitation tool for a patient with plantar fasciitis, insoles for diabetic patients to prevent ulcers, pre-surgical planning models, and on-demand hand braces and lower-limb prosthetic sockets. Each of these solutions has unique benefits as well, such as easing of persistent pain within 30 minutes of initial use, prevention of foot ulceration, elimination of extensive travel time, same-day fitting and delivery of custom orthotics and prosthetics, and reduction in required face-to-face appointments. With the help of 3D printing, VHA is breaking away from a one-size-fits all model and moving towards custom solutions that address the unique health care needs of patients, when and where they need them.

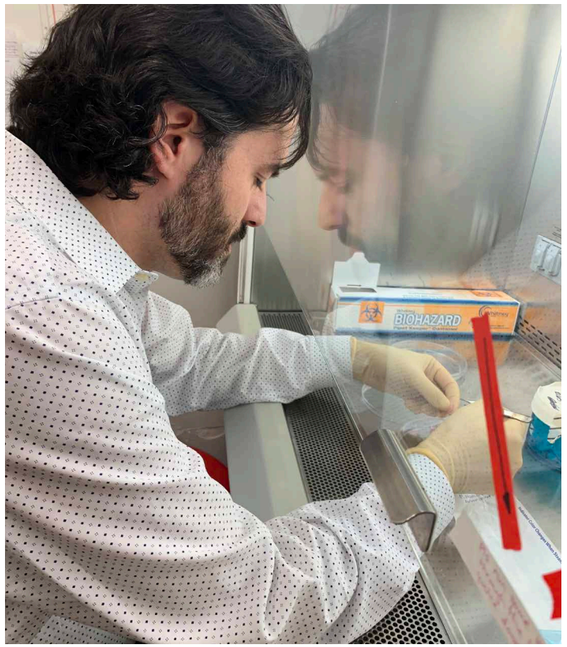
The VHA 3D Printing Network, supported by the CTI portfolio, is a conduit to share expertise, pool resources, test innovations, and scale 3D printing capabilities across the enterprise, growing from three sites in 2017, to 40 sites (and growing) in 2020.



MAP OF VHA 3D PRINTING NETWORK SITES

One of the most important things we're doing is building the infrastructure, the vision, the future, so that Veterans across the country—all 9 million that we serve, and beyond—can have customized, individualized, meaningful personal care. That's what it's all about, enabling Veterans, making them feel whole again, and really changing their lives for the better.

"What we've been able to accomplish over the past three years—growing from 3 hospitals within VA that have 3D printing capabilities to 40 hospitals—[is] monumental. But I think the real accomplishment is how we really come together as a family and a network. We are sharing resources, sharing ideas, seamlessly handing off work so that patients that walk into one hospital see the experts in whatever disease or treatment that they need regardless of where they are in the network, link all of the people, resources, and talents together into this seamless enterprise that can deliver at the door of the Veteran, instead than asking them to travel." -Dr. Beth Ripley, Enterprise Lead, VHA 3D Printing Network



PRIORITY AREAS

IMMERSIVE TECHNOLOGY

VETERAN-FACING SOLUTIONS

PRECISION MEDICINE

CARE MODELS

ARTIFICIAL INTELLIGENCE

3D PRINTING

NATIONAL CENTERS FOR INNOVATION TO IMPACT

Health care is faced with three profound interrelated challenges. 1) Our rapidly growing older adult population is living with multiple co-morbidities requiring complex resource-intensive care; 2) health care spending in the US is growing at an extraordinary rate, surpassing $3 trillion a year; and 3) at the same time, there is a growing deficit in the number of available providers and caregivers. Consequently, it has become apparent that the traditional approaches to care will not meet the expanding demands even if we could afford it.

The collision of these three dramatic forces will not only profoundly impact the Veteran community, but also society as a whole. As a result, we are at a critical inflection-point requiring innovative and scalable solutions to tackle these challenges. This will require the organized collaboration of experts from diverse disciplines and perspectives to deliver timely, co-developed solutions.

VHA IE National Centers for Innovation to Impact (NCI2I) aim to foster collaboration between both internal and external partners and select, local VA medical centers to address VHA's most pressing health care challenges. While each center is designed to have a unique "sweet spot" in relation to VHA's overarching challenges, the tie that binds these centers together is the collective objective to bridge VHA strategic priorities with frontline solutions that are transformational, scalable, and responsive to the needs of Veterans. This vision can only be realized through frontline-lead incubation, co-development, and testing of solutions with Veterans themselves and support from a diverse cadre of internal partners such as VA Office of Information & Technology and VHA Office of Research & Development, and external partners from academia, industry, nonprofits, and other government agencies. These partners can serve as force multipliers and will help build both the culture and capacity for innovation across VHA.

To date, VHA IE has launched the first two of six planned NCI2I centers: (1) National Center for Healthcare Innovation (NCCHI) at VA Palo Alto Health Care System (VAPAHCS) located in Palo Alto, California, and (2) VA Ventures at VA Puget Sound Health Care System (VAPSHCS) in Seattle, Washington.

FRONTLINE PERSPECTIVE + PARTNER COLLABORATION = DELIVERING MORE, TOGETHER

NCI2I
NATIONAL CENTERS FOR INNOVATION TO IMPACT

NATIONAL CENTER FOR COLLABORATIVE HEALTHCARE INNOVATION
@VA PALO ALTO

Strategically located in Silicon Valley, NCCHI builds impactful collaborations between VA Palo Alto Health Care System, VHA IE, leading technology companies, and other government agencies to improve Veteran health care.

NCCHI is chartered to bring together these cross functional elements with a focus on:

1. **DIVERSE EXPERTISE**: NCCHI aims to build innovative and scalable solutions by collaborating with experts from diverse disciplines ranging from academia, industry, within VA, and other government agencies.
2. **TARGETED SOLUTIONS**: NCCHI focused on early disease detection, prevention, treatment, clinical decision support, and operational efficiencies.
3. **PROCESSES**: The underlining strategy is to produce thoughtfully designed, developed, and implemented solutions through a deep understanding of key stakeholders needs and requirements.

In 2019, when the President of the United States stated the importance of winning the race to be the world's leading provider of 5G cellular communications networks, VHA IE seized the opportunity and immediately initiated plans to become among the first health care systems to adopt 5G.

NCCHI partnered with Verizon, Microsoft, and Medivis to provide Veterans with one of the Nation's first medical campuses. Known as Project CONVERGENCE, the initiative brings Verizon's 5G technology, Medivis' 3D holographic clinical visualization system and Microsoft's HoloLens 2 headset with Microsoft Azure together in an effort to reduce costs and improve the quality and safety of surgical care for our Nation's Veterans. Together, they're delivering a 5G-enabled, augmented reality (AR) surgical navigation system. See more about Project CONVERGENCE on the next page.

WELCOME, VA VENTURES!
@VA PUGET SOUND

Innovation and ingenuity have long been a part of VA's care for Veterans. However, the mission of providing the best care for all who served cannot be carried out alone. This is especially true in the modern health care space, where new ideas require considerable technical knowledge and rigorous testing. That's why VHA IE has launched VA Ventures, the second VHA IE National Center for Innovation to Impact, in collaboration with the VPSHS in Seattle. VA Ventures identifies health care challenges, develops solutions, and helps their creators rapidly turn them into commercialized products, changing and saving Veteran lives and ensuring innovations are delivered to Veterans first.

VA Ventures starts where all VA care starts: Veterans and frontline staff. By working directly with Veterans and staff, the center discovers the challenges facing them, enabling VA Ventures to then turn to academia, start-ups, and industry to develop solutions. This tactic means that those most impacted by these innovations are involved early and often in their creation, yielding human-centered designs that solve issues being experienced right now. Once challenges are discovered, VA Ventures solicits responses through hackathon efforts and quarterly pitch sessions.

VA Ventures focuses on innovations in five key areas:

1. Improving access to care through homecare and telehealth innovations
2. Personalizing health care solutions for each Veteran patient
3. Uncovering new mechanisms for detecting, preventing and treating disease through large-scale data analysis
4. Building and supporting new ways to manage Veteran care across disciplines
5. Delivering best-in-class care and products to Veterans at lower costs

Beth Ripley, MD PhD
Director, VA Ventures

PROJECT CONVERGENCE

WITH 5G-ENABLED HOSPITALS FOR VETERANS, A BETTER FUTURE OF HEALTH CARE IS ON THE HORIZON

Providing health care services for 9 million Veterans is complex. To meet its mission to honor America's Veterans by providing exceptional health care that improves their health and well- being, VHA, the largest health care system in the United States, strives to be at the forefront of innovation. Imagine a more precise assessment of a patient's condition, improved quality and safety of surgical interventions, and accelerated, remote-access review through detail-rich, 3D-rendered images. 5G-powered technology could help make mixed-reality-enabled surgery a reality.

VHA IE deployed advanced, 5G-enabled clinical care systems at the VAPAHCS with a goal to deliver unprecedented improvements in care to our Nation's Veterans, as well as being a leader in the Fourth Industrial Revolution in health care powered by 5G. Known as Project CONVERGENCE, the initiative brings Verizon's 5G technology, Medivis' 3D holographic clinical visualization system and Microsoft's HoloLens 2 headset with Microsoft Azure together in an effort to reduce costs and improve the quality and safety of surgical care for our Nation's Veterans. Together, they're delivering a 5G-enabled, AR surgical navigation system.

SOLUTION

Today at VAPAHCS, 5G-enabled, holographic, AR-assisted surgery seeks to leverage the speed and low latency of Verizon 5G, Medivis' Surgical AR platform and Microsoft's HoloLens head-mounted display to deliver breakthrough advances in the quality, safety, and cost of care. In the future, Azure cloud store and compute could provide global availability of high-resolution images from its cloud Picture Archive and Communication System. When combined with Verizon's mobile edge computing, VHA could accelerate the era of AR-assisted surgery.

The goal? To advance surgical visualization by transforming traditional 2D imaging data into near real-time 3D holographic visualizations, giving doctors the ability to visualize a patient's anatomy to enhance surgical practices and the precision of care they provide. With this technology, **"a surgeon could have a 3D image superimposed upon a patient so they can see into that patient before they start cutting and have electronic health data displayed on the headset at the same time,"** explains Dr. Thomas Osborne, Director of NCCHI.

MOVING FORWARD

VHA's work continues, building upon this platform to deliver ever more sophisticated clinical care solutions that will transform the entire health care delivery experience for Veterans and the Nation.

"We have both an opportunity and responsibility to lead the discovery of solutions that improve the health and wellness of our Veterans," said Dr. Osborne. **"Groundbreaking collaborative partnerships like this are an important part of our future success. As the largest integrated health care system in the United States, these advances have the potential to have far-reaching positive impact." Although our work is focused on Veterans, it is also expected to benefit other individuals and organizations, thanks to VA's authority to partner with others."**

VA | U.S. Department of Veterans Affairs verizon Microsoft MEDIVIS

PROJECT SPOTLIGHTS @ PALO ALTO

COMBINING COMPUTATIONAL INNOVATION WITH BIG DATA TO BENEFIT VETERANS

NCCHI is working with the Lawrence Livermore National Lab (LLNL) at the Department of Energy (DOE) to cross-boundaries in the name of improved medical care for Veterans. The partnership will combine the Nation's largest and most robust longitudinal dataset with the computational prowess of the DOE to focus on Amyotrophic Lateral Sclerosis (ALS), prostate cancer, and suicide risk. These issues are of critical importance for the Veteran community:

- Veterans are nearly 60% more likely to contract ALS than non-Veterans, but the reason for this disparity is unclear
- Prostate Cancer is the most common cancer diagnosis among Veterans, affecting nearly one in five Veterans in 2012
- The suicide rate for Veterans was 1.5 times that of non-Veteran adults in 2017

The goal of this innovative partnership is to better understand the Veteran patient populations impacted by these conditions, as well as the influence of various treatments or medications on the conditions. Ultimately this boundary-breaking collaboration stands to not only improve the lives of Veterans, but also inform national health care initiatives in these areas.

Lawrence Livermore National Laboratory

CREATING FALL RISK ASSESSMENT SOLUTIONS FOR CLINICIANS

Each year over $50 billion is spent on fall-related injuries, most commonly occurring in adults age 65 or older. This is an ever-growing problem within the Veteran population. NCCHI is looking to revolutionize the way VA Medical Center approaches and mitigates fall risk among Veterans within their patient population. This new innovative project, led by Dr. Osborne, is working to integrate existing fall risk data into clinical workflows in order to improve the identification and visibility of Veterans at high risk for falls and ultimately improve their access to quality, tailored preventative care.

"YOU CAN INVENT ALONE BUT YOU CAN'T INNOVATE ALONE."
- GIJS VAN WULFEN

INNOVATION THROUGH PARTNERSHIP

DELIVERING MORE TOGETHER

Innovation through partnership promotes health care ingenuity and VHA embraces Veteran care as a team sport. Collaboration ensures diverse capabilities, integrated technology, and interdisciplinary thinking continually inform each Veteran solution.

COVID-19 RESPONSE

COVID-19 has posed an unprecedented threat to lives and livelihoods across the globe. The magnitude and reach of the pandemic have exposed vulnerabilities in supply chains, economies, health care systems, and government response. It has also exposed an underlying story of ingenuity. Across the world, innovators are responding and asking, "How can we help? "

RAPID RESPONSE TO COVID-19

VHA IE has teamed up with U.S. Food and Drug Administration (FDA), the National Institutes of Health (NIH) 3D Print Exchange, and America Makes to harness the efforts of makers and engineers around the world who are creating solutions in response to the outbreak. The Rapid Response to COVID-19 Using 3D Printing initiative leverages the medical knowledge and public health and safety expertise of the VA, FDA, NIH, and America Makes to rapidly evaluate 3D printed solutions that are filling shortfalls in the supply chain. The initiative is using the virtual NIH Print Exchange platform to host a collection of open source prototypes, resources, and lessons learned that are being shared across the medical community.

Since the launch of the initiative at the end of March, over 611 designs have been published to the NIH Print Exchange website ranging from face masks and ventilator parts to hands-free door opening devices. By August, 741,534 unique visitors had viewed the site and the designs in the collection had garnered 1.36 million views from around the world. VHA IE supported design testing and, together with our collaborators, evaluated over 200 prototypes based on ASTM, testing standards. The initiative will continue testing and expand their reach through the ongoing development of testing protocols and guidance for makers.

FDA

NIH National Institutes of Health

America Makes

AGILE DESIGN AND PRODUCTION TRANSFORMATION INITIATIVE

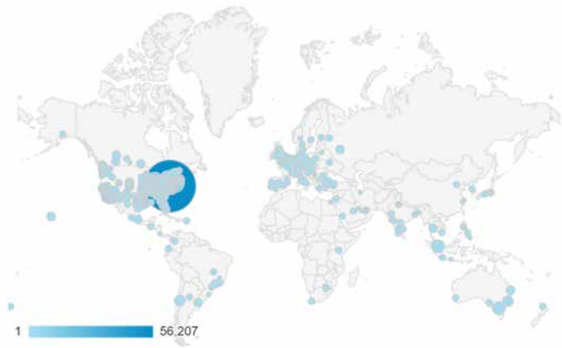
VHA's 3D printing experts and makers are responding to the critical shortage of personal protective equipment (PPE) and medical supplies with a determined, **"We can make it, and we can make it at our VAMCs."**

The Agile Design and Production Transformation Initiative (ADAPT) is enlisting the VHA 3D Printing Network to do just that. ADAPT was initiated to enable VHA to pivot in-house resources, priorities, technology, and expertise towards critical health care needs. Executing the ADAPT initiative has engaged internal collaboration with VHA IE, VHA 3D Printing Network, VHA Office of Healthcare Transformation, and VHA Procurement and Logistics Office in order to augment VHA's PPE supply chain from industry and empowers VHA to design, test, and produce validated and approved products for both emergent and non-emergent needs.

ADAPT efforts enabled VHA to rapidly expand enterprise production capabilities to address the shortage of PPE supplies throughout the pandemic and are protecting frontline VHA employees and the Veterans they serve. To date, the VHA 3D Printing Network has successfully printed a limited production of surgical masks, nasal swabs, a powered air-purifying respirator hood, and a ventilator within VHA hospitals.

"VHA has been at the forefront of using 3D printing technology to benefit our patients," notes Beth Ripley, Enterprise Lead, VHA 3D Printing Network. **"Now, with the collective actions of our partners, we are bringing our in-house medical expertise and 3D printing experience and capabilities to the frontline of the fight against COVID-19, helping health care providers stay safe."** For VHA IE and Massachusetts Institute of Technology (MIT), a pandemic requires a global community to build solutions.

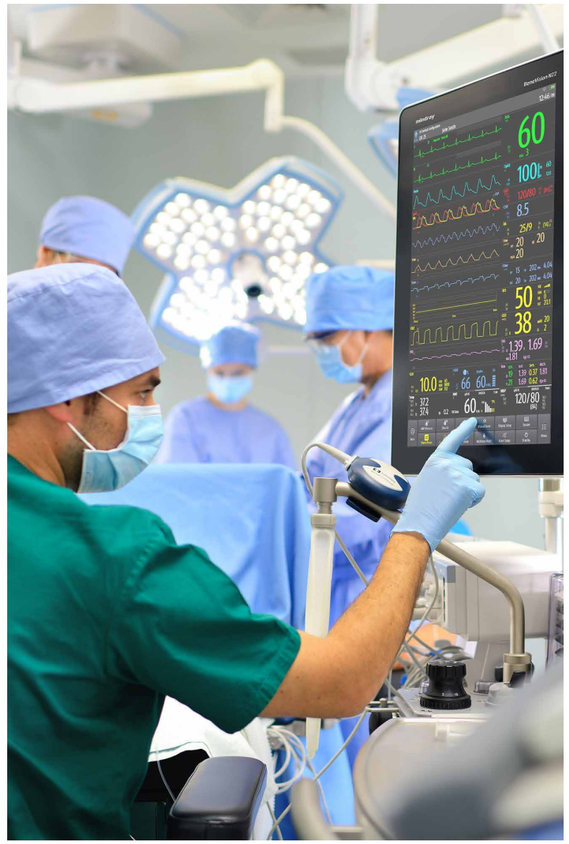
NIH 3D PRINT EXCHANGE: NUMBER OF UNIQUE USERS BY LOCATION

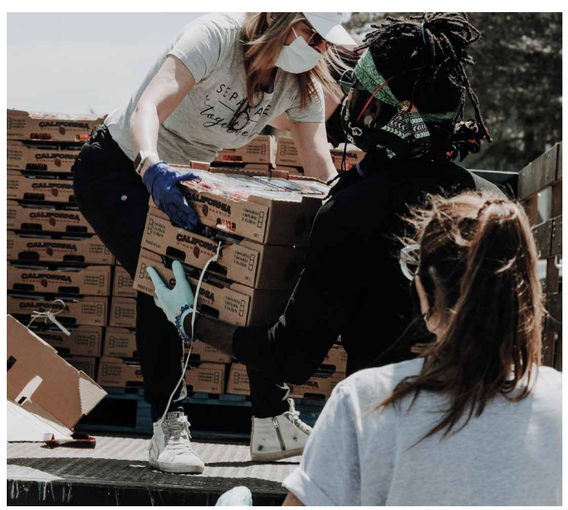


U.S. FOOD AND DRUG ADMINISTRATION (FDA) PRECISION MEDICINE

Based on risk factors including age, heart disease, and diabetes, Veterans are classified as among those most vulnerable to contracting the pandemic. From June 1–July 3, 2020, VHA and precisionFDA launched a collaborative COVID-19 response calling on the public to develop machine learning and artificial intelligence models to predict health outcomes such as COVID-19 status, length of hospitalization, and mortality, using synthetic Veteran health records. The COVID-19 Risk Factor Modeling Challenge was developed to improve the risk and protective factors for severe COVID-19 illness, specifically within the Veteran population. Using the Synthea Synthetic Patient Population Simulator, 147,451 synthetic patients were generated as a data set, with nearly two thirds of the patients being COVID-19 positive. Information on potential comorbidities including conditions, medications, and procedures were also included.

Through this collaboration, both VHA IE and precisionFDA looked to identify at-risk individuals to better target and tailor preventative efforts in mitigating COVID-19's effects on the Veteran population. Results from the challenge paved the way for next steps to test in a real Veteran dataset provided by VHA, while also strengthening the quality of synthetic data. As VHA continues to pivot to accommodate needs from COVID-19, challenges such as these allow for testing and modeling opportunities in not only the present, but the future.





VA BOSTON RIDESHARE INITIATIVE

Charles Franklin, from VA Boston Healthcare System, created Rideshare in 2018 to increase transportation accessibility through ridesharing apps like Uber and Lyft, helping Veterans get to job interviews, attend medical appointments, and find housing opportunities. Rideshare was selected as a Spark-Seed-Spread project and received early investment and innovation training support from the iNET.

When COVID-19 hit, Charles Franklin and his Rideshare team did what comes naturally to Innovators; they adapted to address and help combat the effects of COVID-19. Rideshare pivoted to deliver essential goods, including transporting food from food banks to highly vulnerable Veterans, limiting their need to leave the safety of their home and mitigating their risk to exposure. Over the past 18 months, Rideshare has assisted 116 Veterans in obtaining full-time employment and assisted seven Veterans with transportation to and from chemotherapy treatments during the May 2020 peak of COVID-19. The pivot to food delivery has resulted in 40,000 deliveries to date.

COVID-19 CLINICAL TRIALS TASK FORCE

In an effort to pivot, adapt, and collaborate during the early days of the pandemic, the VHA Office of Research and Development (ORD) and VHA IE came together to channel resources, expertise, curiosity, and existing collaborations by launching the COVID-19 Clinical Trial Task Force. This task force aimed to connect VA and Veterans with cutting edge clinical trials aimed to detect, prevent, treat and track COVID-19 infections. Academic and industry partners were engaged and presented opportunities to the task force, where protocols were assessed and in many cases, principal investigators matched and trials launched. By testing and validating innovative solutions through multi-site clinical trials across VHA, and Veterans remain leaders in informing broader transformation in healthcare. As evidenced by collaborations such as these, VHA understands its unique position as the largest integrated health care system in the country, made up agile teams driven by a mission to serve Veterans. When these teams work together to drive enterprise wide efforts to study and deliver cutting edge care, there's no limit to what can be achieved.

VA | U.S. Department of Veterans Affairs
Veterans Health Administration
Office of Research & Development

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

When COVID-19 hit, VHA and MIT pivoted their hackathon collaboration to engage some of the world's brightest minds in developing solutions to address the debilitating effects of the pandemic COVID-19. Starting in April 2020, VHA joined MIT in a series of COVID-19 virtual Challenges entitled "Beat the Pandemic". These Challenges are 48-hour virtual events focused on critical problems and impacts of the pandemic on people's lives and more broadly, their health care implications. Diverse teams of problem-solvers from industry, academia, and healthcare come together from all over the world to generate concepts, prototypes, and business cases aimed at solving problems in real time. VHA mentors and collaborators support the Challenge and select winning teams in bringing their solutions to life through further design, discovery, subject matter expertise, and Veteran feedback. These events empower the broader VHA community with Veteran-centric solutions from innovators and co-creators around the world.

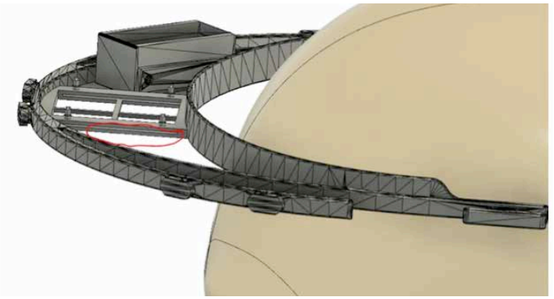
MIT COVID19 CHALLENGE

COVID-19 MAKER'S CHALLENGES

VHA IE is engaging designers, health care workers, 3D printing experts, engineers, software programmers, and other volunteers in a five-part COVID-19 Maker Challenge series. These makers engage in a week-long makeathon to quickly ideate and develop prototypes that address the needs of frontline workers like the environmental management staff at VHA. Why focus on environmental management workers, why now?

Vonda Broom, VHA Deputy Director of Environmental Programs Service, Healthcare Environmental Facilities Programs kicked off the Environmental Management Services (EMS) challenge by recognizing the impact of frontline workers, and the importance in helping them address the additional challenges brought on by COVID-19. **"From sanitation to ensuring that Veterans are received with clean beds, gowns, and other things to have a comfortable experience at their VA medical center, our workforce of over 12,000 housekeeping aides, 90 percent of whom are Veterans themselves, shape the experience for the Veterans we serve,"** says Vonda Broom.

The COVID-19 Maker's Challenges are a significant effort enabling VHA to shift and rapidly develop solutions that address the immediate needs of frontline workers brought on by the pandemic. In addition to supporting EMS workers, the makeathons are leveraging the expertise of their participants to target the needs of first responders, nursing home and assisted living facilities, caregivers, and disaster relief workers. Prototypes developed during the week-long makeathon challenges held to date, include a UV-C sanitation box that sanitizes objects in seconds, a retractable 3D printed door opening and touchpoint device capable of sanitizing itself, and a software solution that checks individuals for COVID-19 symptoms prior to beginning a shift at work. The key is our ability to leverage the innovation infrastructure we have built at VHA to further explore these solutions. **iNET recognizes the value of these prototypes and will be deploying a few for pilot testing and future implementation at VAMCs across the country.**



XPRIZE

At the VHA IE we strive to be at the forefront of health care, making sure that Veterans are receiving the most advanced, groundbreaking care to positively change and save lives. Our partnership with the XPRIZE Foundation is doing just that, putting leading innovators and health care providers at VA next to their private sector and academic counterparts from around the world to develop ways to combat COVID-19. Through VHA's participation in XPRIZE's Pandemic Alliance, and their AI for Good: Pandemic Competition, VHA is collaborating with others in the health care industry while evolving and adapting our own care through collaboration and partnership.

XPRIZE and VHA IE's collaboration began this past April when VHA IE NCCHI led VHA 's participation in the XPRIZE alliance of health care organizations and professionals from around the world who are working to rapidly confront COVID-19. Dr. Thomas Osborne, Director of NCCHI, along with a host of other VHA innovation leaders, took part in a series of collaborations in which innovators and health care leaders shared ideas, presented projects, advised collaborators, and vetted solutions to help rapidly scale the most promising technology for the global pandemic response. The Pandemic Alliance has already launched a number of competitions to incentivize advances such as: XPRIZE Rapid COVID Testing, Next-Gen Mask Challenge, COVID-19 CT Scan Collaborative. There are also a number of additional projects being co-developed by various Alliance members at the XPRIZE Exchange Marketplace.

XPRIZE PANDEMIC ALLIANCE

"In the face of adversity, we have a choice. We can be bitter, or we can be better. " - Caryn Sullivan

ENGAGING THE INNOVATION COMMUNITY

IT TAKES A COMMUNITY

At VHA, working together to solve problems is just the beginning. As America's largest integrated health care system, we are uniquely positioned to drive solutions that will transform health care in the coming years. But we can't do it alone. Through formalized collaborations with academia, industry, non-profits, and other government organizations, we work with some of the brightest minds to solve Veterans' toughest health care challenges.

The outcomes of these collaborations have been incredible. We've built exponentially expanding networks through engagements with MIT and their hacking community. We've enabled access to 80,000 hours of donated respite services for Veteran Family Caregivers through a collaboration with the Elizabeth Dole Foundation. We've seen, through quality improvement studies, the complete elimination of major amputation in clinics participating in the "Initiative to End Diabetic Limb Loss" through our partnership with health care startup, Podimetrics. Many ask about the technical aspects of these collaborations, but the backbone of these efforts comes down to relationships. Through building connections, communities, and relationships around improving health care for Veterans, VHA has become the tip of the spear in transformative innovation.

Throughout this piece, we will share just a handful of the partnerships that are helping VHA operationalize innovation throughout the enterprise. As we look to the future, it's the dedication and collective efforts of the innovation community that continues to develop in VHA and beyond, that guides the transformation of health care.

---Suzanne Shirley, LCSW
Director, Fellowships &
Community Engagement

COLLABORATIONS WITH NON-PROFIT ORGANIZATIONS

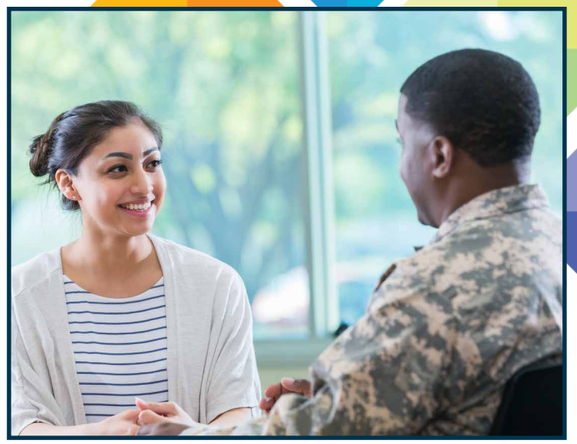
RAPID PROTOTYPING THROUGH MAKEATHONS

Army and Marine Corps Veteran, Charles, AKA "Z", approached Challenge America: Makers for Veterans (CAMVETS) with a challenge – to help him once again ride a motorcycle. Z was hit by a drunk driver on his way to his fourth deployment to Afghanistan. After four months in a coma, he woke up to a missing leg and the end of his military career, the latter of which he found most heartbreaking. CAMVETS convened a cross-sector team of experts through a makeathon to co-create and rapidly deploy a solution. The team worked on adjustments to Z's prosthetic leg that would allow him to straddle a bike and help him regain the sense of connection and freedom that he feels from riding a motorcycle.

Makeathons are rapid prototyping sprints that convene teams of leaders and frontline providers across academia, government, industry, and the broader health care community to collaborate and build early stage solutions that address some of the tough challenges Veterans face when returning home.

VA Northeast Ohio Healthcare System kicked off a collaboration with CAMVETS in 2019, to address the nuanced needs of the Veteran population. CAMVETS leverages VHA brainpower by engaging employees as subject matter experts and allowing them to co-create solutions with makers, engineers, students, and other volunteers to address specific Veteran challenges. **Through these efforts, seemingly disparate individuals come together to learn from one another, forge new relationships, and capitalize on each other's skills and expertise to build "high quality multi-layered integrated 'product(s)…' to address Veteran needs,"** noted participant Sandy Sberro, a Program Manager at Liberty IT Solutions.

Makeathon challenges like these enable VHA to build strategic collaborations that deliver innovative discoveries, uplift change makers, and better the lives of our Nation's Veterans.



RESPITE RELIEF FOR MILITARY AND VETERAN CAREGIVERS

Veterans who fall ill or are injured as a result of their service often rely on the daily care of their loved ones: parents, siblings, spouses, partners, and friends. Nearly 40 percent of the 5.5 million military caregivers in the U.S. are between the ages of 18 to 30 and now, during COVID, with large scale shifts in the accessibility of home care services, skilled nursing care, and with work and school happening from home, the burden of care has never been greater.

VHA IE, VHA Caregiver Support Program, VHA Geriatrics & Extended Care, and Veterans Experience Office (VEO) are collaborating with the Elizabeth Dole Foundation (EDF) to launch Respite Relief for Military and Veteran Caregivers. The program grants Veteran families access to no-cost, short-term aid, enabling caregivers to secure much needed support and the opportunity for self-care during the pandemic.

Respite Relief for Military and Veteran Caregivers offers 80,000 hours of respite relief nationwide, donated to the Elizabeth Dole Foundation by CareLinx and Wounded Warrior Project. Approved Caregivers receive approximately 24-hours of respite care provided by CareLinx to cover a variety of support services including companionship, meal preparation, exercising, grooming, light housekeeping, medical and medication reminders,mobility assistance, transportation and other activities. Sherwin Sheik, CareLinx CEO, stated, **"We want to give these family caregivers a break, while still ensuring that Veterans continue to get the support they need."** The program is available for Veteran Caregivers nationwide.

Challenge America

Elizabeth Dole Foundation
CARING FOR MILITARY FAMILIES

COLLABORATIONS WITH ACADEMIA

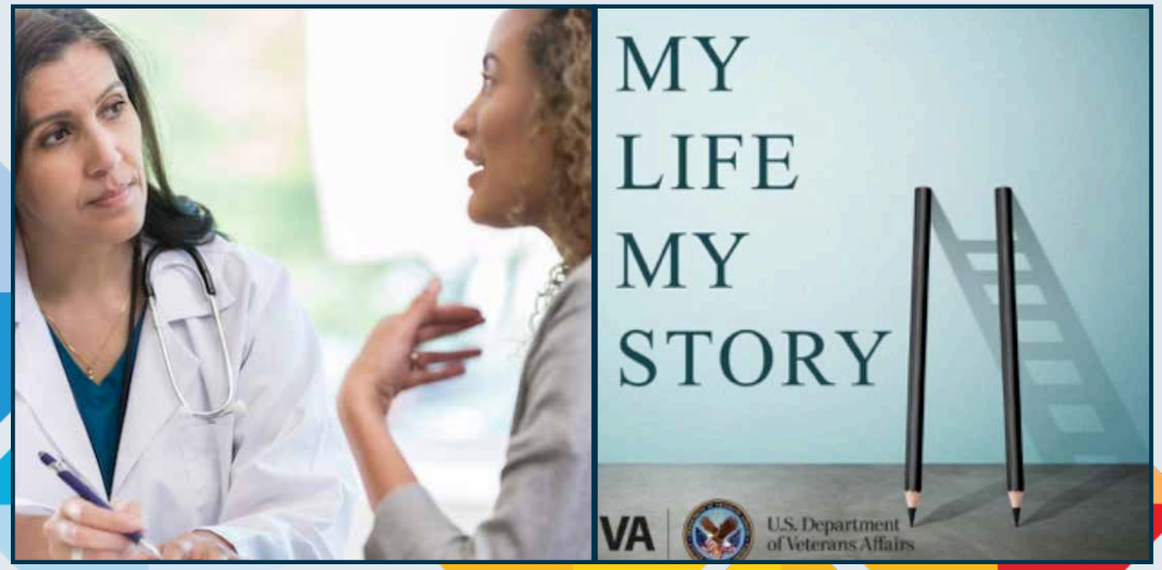
LEVERAGING ALGORITHMS TO CAPTURE VETERAN STORIES

How would you tell your life story? The My Life, My Story team asks Veterans just that. The team spends time with Veterans asking thoughtful and compassionate questions about what matters to them – who they are, and the memories they would most like to share. These interviews are transformed into beautiful and engaging stories that are incorporated into the Veteran's medical chart, creating a unique pathway infusing empathy and understanding into routine medical care. These professionally written stories help Veterans build strong relationships with VA providers they meet over the course of their lives.

Thor Ringler, a writer-editor at the William S. Middleton Memorial Veterans Hospital in Madison, Wisconsin, spearheaded VHA's My Life, My Story in collaboration with Office of Patient Centered Care & Cultural Transformation (OPCC&CT) and Veterans Experience Office. This program has empowered thousands of Veterans with ages ranging from 22 to 108 years old to tell their stories. Selected as a Gold Status Practice recipient in the VHA IE 2017 Virtual Shark Tank, the My Life, My Story initiative saw further growth when OPCC&CT adopted its practices and further diffused the project across Boston, Iowa City, and St. Louis.

In an effort to enhance the ability to share honest and genuine stories told by Veterans, **Thor and his team are now working with VHA IE in collaboration with the MIT Innovation Initiative to leverage computational methodologies to speed up the story writing process.** During this effort, stories gathered will be used to train computational and AI tools developed by MIT. These tools will synthesize information, learn the syntax and language patterns from the interviews, and offer the opportunity for the initial structure and content of future stories to be written by the algorithms. Employing AI tools helps to focus on what matters most- the Veteran. AI alleviates the time and resources needed for professional drafting and allows the My Life, My Story team to spend more time interviewing Veterans.

As of 2020, the growth of this collaboration is evident, over 12 hospitals in Boston, Providence, Philadelphia, and others have adopted this program for training medical students and allied health professionals. In September 2020, the first season of the "VA Presents: My Life, My Story" podcast was produced by the Madison-based My Life, My Story team, and Employee Education Services. **My Life, My Story is crucial in helping Veterans share their stories, nationwide, and allows us to celebrate their service and commitment to their country.**

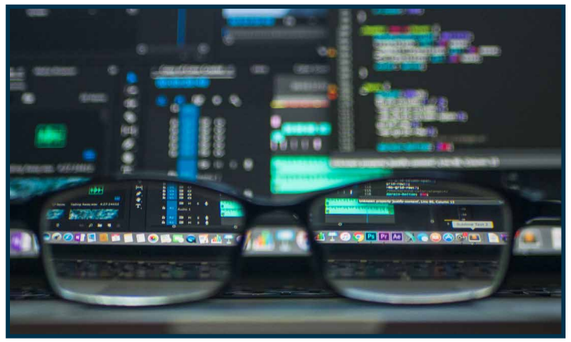


COLLABORATIONS WITHIN GOVERNMENT

DATA SUMMIT FOR SUICIDE PREVENTION

Can we use data to save Veteran lives? Answering this question is key in working to prevent Veteran suicide across VHA and beyond. The 2019 National Veteran Suicide Prevention Annual Report published by the Office of Mental Health and Suicide Prevention (OMHSP) found that the number Veteran suicides exceeds 6,000 each year. To better assess why and how Veteran lives are being lost, VHA identified a need for better data. VHA conducted over 100 exploratory interviews with Veterans, key stakeholders, champions, and leaders to gain insight on the current efforts in place to combat Veteran suicide. VHA IE leveraged these insights as a baseline for the Data Summit for Suicide Prevention in August of 2020, a collaborative effort engaging OMHSP, Office of Enterprise Integration (OEI), and Office of Research and Development (ORD).

Summit participants worked to define problem statements for future data-related challenges. Attendees and collaborators came from across VHA during this virtual two-day event to explore challenges and solutions that leveraged data in the fight against suicide. To prepare for the discussions, OMHSP, OEI, and ORD developed the Data Summit Guide mapping the current state of program office efforts, continued challenges, and potential identified solutions. From the identified challenges, the summit allowed for the development of pathways to solutions we hope will combat and prevent Veteran suicide. With interoffice collaboration at the forefront, program offices have their hand as change makers for Veteran populations, present and future. As VA Secretary Robert Wilkie stated, **"Data is an integral part of our public health approach to suicide prevention."** By working together and ideating on solutions to strengthen data, the tragic loss of Veterans can be fully eliminated.



DEVELOPING YOUTH PROGRAM INITIATIVES TO ENABLE INNOVATION

VA Voluntary Service (VAVS) prioritizes and uplifts its volunteers, viewing them as "…a priceless asset to the Nation's Veterans and Department of Veterans Affairs." NAF, formerly the National Academy Foundation, exists to ignite passion in high school students as it pertains to Science, Technology, Engineering, and Math (STEM)-specific curricula, experiences, and internships. With innovation at the forefront, VHA IE had an opportunity to harness its expertise to support an engagement centered on young minds. As learning curricula were tailored to an online format due to the COVID-19 pandemic, VAVS, VHA, and NAF had the shared goal to leverage virtual capabilities to co-design a 6-week STEM-based engagement for high school students. During this collaboration, students will learn how to leverage STEM and innovation capabilities to provide solutions to Veteran health care challenges. Mentorship will be in the form of Innovation Specialists and/or site champions who will help problem source with the high school students, utilizing expertise in innovation-related capabilities for the duration of the engagement. Using a human-centered approach, identified mentors would provide insight and teach students how to solve the identified problems.

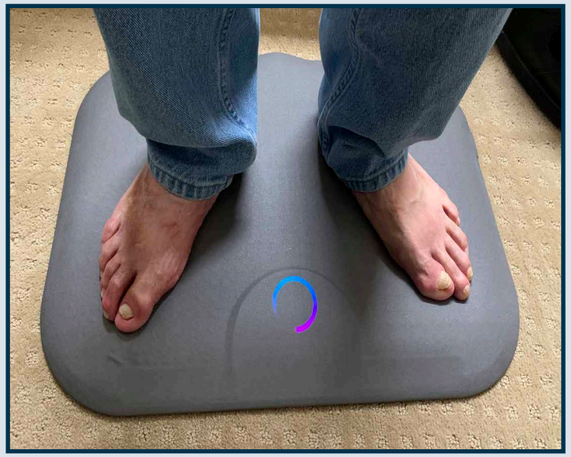
Collaborations like these create the opportunity for VHA employees to experience the value of collaborative design and development with non-government parties. **VHA has the organizational ability to co-create with industry, inviting agility and openness to new pathways of innovation.** When VHA engages in collaborations with academia, particularly as it pertains to youth, the organization greatly benefits. The synergies between innovation and youth can create solutions to positively impact the future of Veteran care. VHA believes it is invaluable to cultivate a cohort of innovative volunteers to serve Veterans, and this collaboration establishes a potential pool of future public service employees dedicated to the health and well-being of America's Veterans.

COLLABORATIONS WITH INDUSTRY

INITIATIVE TO END DIABETIC LIMB LOSS

More than 25% of Veterans suffer from Type 2 Diabetes and many are at risk for diabetic foot ulcers (DFU). DFU is a complication that can lead to amputation and carries a 43% 5-year mortality rate. While the cost to VA is $3.2 Billion per year, the cost to Veterans is highest. Suzanne Shirley, Director of Fellowships & Community Engagement recalls, **"…as a clinical social worker, I saw Veterans lose their lives to complications from these wounds and amputations and I knew (VHA) had to tackle this problem and find a solution…Now through the Initiative to End Diabetic Limb Loss in VA, VHA is leading the charge in shifting clinical care models from treatment to prevention, from in-clinic to virtual, and empowering Veterans to regain a sense of control over their health and well-being."**

VHA IE, VHA National Podiatry Office, Office of Health Equity, Podimetrics, and providers and researchers in the field, have been working together under this initiative to design and test new care models that incorporate remote temperature monitoring in Prevention of Amputation (PAVE) care throughout VA. This remote temperature monitoring system, the Podimetrics SmartMat, is now incorporated in PAVE clinics at 40 VAMCs and growing. **Quality improvement audits across populations participating in remote temperature monitoring at home have shown a near elimination of DFU and total elimination of major amputations and graft product usage.** The collaboration has allowed VHA and Podimetrics to design, implement, and test new business and care models and amplify access to this early intervention technology through VHA podiatry clinics and telehealth. In August of 2020, this initiative was awarded a G2Xchange Disruptive Tech award in celebration of challenging the status quo and delivering solutions that achieve tangible change. G2Xchange Disruptive Tech winners are celebrated for their ability to not only champion, but push forward and implement solutions with measurable results. Team members include Suzanne Shirley, Director of Community Engagement & Fellowships for VHA IE, Dr. Jeffrey Robbins, Director, Podiatry Service, Dr. Jon Bloom, CEO Podimetrics, Dr. Kyle Nordrum, PT, Cincinnati VAMC, and Dr. Lindsay Reigler, Innovation Specialist, Cincinnati VAMC.



The next iteration of this initiative includes both economic and social determinants of health, research, and a new care model pilot in Cincinnati where the team is testing a shift to remote temperature monitoring as a telehealth intervention that utilizes VA Video Connect and STF, enabling VA providers and Veterans to work together to resolve emerging DFU from the Veteran's home. The Cincinnati VAMC team is now a Shark Tank Finalist to further test and scale this approach through VHA IE Diffusion of Excellence. As Suzanne Shirley stated, **"When we engage in collaborative design and development with VA champions and industry partners to build scalable care models that deliver such incredible value to Veterans, we can really see how VHA is positioned to influence healthcare transformation throughout the organization and beyond."**

PODIMETRICS

EMERGING COLLABORATION

PINPOINTING BIOMARKERS TO SUPPORT MENTAL HEALTH

VHA IE continues to embrace challenges and solutions that address Veteran mental health and suicide prevention. VHA IE is collaborating with TruGenomix, a high-growth start-up company led by a team of retired combat medics, scientists and physicians, to advance a biomarker test that helps clinicians quickly and objectively recognize patients with the physiological dysregulation seen in PTSD, anxiety and depression. This collaboration seeks to assess the validity of the assay specifically in the veteran population.

With innovative tools woven into VHA mental health care that help providers identify risk factors and support clinical diagnoses, we hope to improve VHA's ability to respond quickly to the emergent needs of our Veterans who struggle with anxiety, depression and post-traumatic stress disorder. **"When we can validate and incorporate innovative diagnostic supports in mental health care for Veterans, we contribute to VHA's larger effort to heal wounds of combat, support Veterans in rebuilding their communities and ultimately preventing Veteran suicide,"** said Suzanne Shirley, Director Fellowships & Community Engagement, VHA IE.

TRUGENOMIX™

CELEBRATING INNOVATION: VHA INNOVATION EXPERIENCE

VHA IE hosts an annual conference, VHA Innovation Experience (iEx), to celebrate and highlight ongoing innovation activities across VHA and the employees committed to transforming the way in which VHA serves our Nation's heroes. Over the three-day event from October 23-25, 2019, more than 100 innovators told stories of how their innovations are delivering world-class care to diverse Veteran populations. The event attracted more than 450 in-person attendees and engaging 3,000+ viewers through live streaming. A few of the most exciting features of last year's event included:

VHA SHARK TANK LIVE!

VHA Shark Tank Live!, a live competition featuring 15 VA employee finalists with field-developed, evidence-based promising practices, competing for an opportunity to replicate their innovative solutions at other VA Medical Centers. The competition offers a unique opportunity to recognize frontline employees who are solving some of the toughest challenges across the health care system.

KEYNOTE ADDRESSES

Keynote addresses from industry-recognized leaders, including New York Times Best Selling Author, Dr. Vijay Govindarajan, and MIT's Hacking Medicine Institute Founder, Zen Chu, provided insight into the current state of health care and an opportunity to interact with leaders in the field.

INTERACTIVE EXPERIENCE CENTER

The experience center showcased 3D printers, virtual reality booth, hackathons, and other innovative technologies currently in use at VHA. Some highlights included the live 3D printing of a heart valve, 3D printed products created to solve real life challenges facing today's Veterans; a virtual reality booth which featured exposure therapy, a PTSD treatment strategy; and hackathon solutions created through collaborative teams across sectors and expertise.

DEMO DAY

Demo Day featured three-minute pitch presentations of over 80 innovative approaches to problems facing Veterans today. These demos identified an issue and presented a solution supported by data and evidence of improved Veteran experience.

IEX TALKS

The iEx Talks showcased TED-style talks that shared the innovative practices and ideas of frontline VHA employees. These five- to eight-minute presentations highlighted practices from across VHA.

VHA IEX POSTER SESSION

The VHA iEx Poster Session, featured 24 posters selected from over 200 entries that showcased a variety of innovations from across the VHA health care system.

VHA iEx continues to be a noteworthy event in the innovative health care industry, stimulating thought provoking and informational conversations. VHA iEx celebrates the accomplishments of frontline employee innovators and the impact their solutions are having on Veterans and employees nationwide. Every story highlights the innovator's purpose, passion, and commitment to designing, implementing, and disseminating innovative practices across the health care system. VHA iEx is a testament to the VHA community's dedication to discovery and spreading of health care innovations that exceed expectations, restores hope, and builds trust.

DR. ROBERT L. JESSE INNOVATOR OF THE YEAR AWARD

Dr. Robert L. Jesse had a clear 'why'- delivering exceptional care to Veterans. Throughout his roles at the U.S. Department of Veterans Affairs (VA) as Chief of Cardiology at the Hunter Holmes McGuire VAMC, Chief of Academic Affiliations, Principal Deputy Under Secretary for Health, and Acting Under Secretary for Health, Dr. Jesse never lost sight of this purpose and ultimately dedicated over 30 years to advancing health care for Veterans. The Dr. Robert L. Jesse Award for Excellence in Innovation honors a current VHA employee who demonstrates excellence and promotes innovation across the enterprise either at the VA medical facility, Veterans Integrated Service Network, or VHA Program Office level, and has demonstrated excellence as to garner recognition from his or her peers.

The VHA Innovation Ecosystem presented the inaugural Dr. Robert L. Jesse Award to Dr. Thomas Osborne at the 2019 VHA Innovation Experience. With Dr. Osborne's vision, the National Center for Collaborative Healthcare Innovation (NCCHI) was established in collaboration with VHA Innovation Ecosystem as a catalyst for the advancement of care delivery and mission driven innovation. This trailblazing center is working with Silicon Valley technology giants to create groundbreaking health care solutions in the areas of oncology, heart disease, and mental health. The committee selected Dr. Osborne based on his clear vision, strong collaborations, and emphasis on Veteran-centric outcomes.

2020 VHA INNOVATION ECOSYSTEM AWARDS

VHA IE strives to push forward the discovery and spread of innovative health care solutions across VHA. VHA IE continues to influence the future of the health care industry and has been recognized by numerous external organizations for their outstanding work.

In 2020, the following VHA IE programs and projects received awards:

GEARS OF GOVERNMENT

- 4Sight
- VIONE Clinical Team Project
- VHA 3D Printing Network
- VHA Innovation Ecosystem (President's Award)

FEDERAL HEALTH INNOVATION AND TECHNOLOGY (FEDHEALTHIT)

- No Wound Left Behind Initiative – TeleWound Care Program
- Veterans Health Administration 3D Printing Network
- Diffusion Marketplace
- FLOW3: Enterprise Prosthetic Limb Workflow Management System
- Machine Learning Decision Support to Audit and Impact Prescription Service Connection/Special Authority Decision

G2XCHANGE DISRUPTIVE TECHNOLOGY

- Project CONVERGENCE
- Eliminating Diabetic Limb Loss

AMERICAN COUNCIL FOR TECHNOLOGY AND INDUSTRY ADVISORY COUNCIL (ACT-IAC) IGNITING INNOVATION AWARDS

- StrongMind Virtual Reality Post-Traumatic Stress Disorder Therapy: Game Changer Dynamite Award Winner
- FLOW3: Enterprise Prosthetic Limb Workflow Management System: Top Eight Finalist
- Care and Transformational Initiatives: Top 40 Finalist
- VHA Health Hackathons: Top 40 Finalist

VHA IE WINS GEARS OF GOVERNMENT PRESIDENT'S AWARD

The Gears of Government Awards honor recipients who embody the values of mission and service, working as public servants across the government for the greater good. The awards are designed to further drive a culture of excellence and continuous improvement, ultimately providing the federal workforce with ideas to serve our Nation. In September of 2020, VHA IE was selected from over 200 teams and individuals for mission-driven results, customer service, and accountable stewardship to receive the highest level of distinction – the Gears of Government President's Award.

VHA IE was recognized for three innovations that impacted services for Veterans at Veterans Administration (VA) hospitals nationwide, including practices to: de-prescribe unnecessary medicine to Veterans, prevent hospital acquired pneumonia, and reduce opioid overdose deaths at VA campuses. As VA Secretary Robert Wilkie stated, **"VHA IE truly empowers frontline employees to help improve services for Veterans by investing in the infrastructure necessary to adopt cutting edge solutions in collaboration with academic and industry partners."** Since its reconfiguration in 2018, VHA IE has played a pivotal role in reshaping employees' ability to not only discover but spread their innovations throughout the VHA health care system. As of 2020, VHA IE initiatives have impacted over one million Veterans, lowered costs for taxpayers by over $40 million, saved countless lives from opioid overdose, and propelled care forward for the entire field of medicine.

The Gears of Government President's Award showcases those who not only impact the government, but Veteran lives. VHA IE holds a mission fueled by its people, with innovation at the forefront of its success. Honing in on a culture of not only excellence, but change, VHA IE continuously seeks opportunities to leverage existing resources while creating new ones to provide the best possible care. As VA Secretary Wilkie stated, **"The VHA IE team has transformed the way VA employees view the culture of innovation in our organization."** Congratulations to the VHA IE team!

SAMUEL J. HEYMAN SERVICE TO AMERICA MEDAL RECIPIENT, DR. BETH RIPLEY

Each year, the Partnership for Public Service highlights innovation and excellence in the federal workforce through the Samuel J. Heyman Service to America Medals (Sammies). The Sammies honor the many exceptional federal workers who are breaking down barriers, overcoming huge challenges, and achieving results that meet the needs of the American people.

Since 2001, 36 VA employees have shared 30 Service to America Medals. This year, one of those honorees is VHA's Beth Ripley, M.D., PH.D., Enterprise Lead, VHA 3D Printing Network. Dr. Ripley is being honored as the 2020 winner of the Sammies Science and the Environment Medal for her exemplary leadership in 3D Printing and work in creating and growing an interconnected, hospital-based network of 3D printing experts. The VHA 3D Printing Network is assisting health care providers with medical procedures, reducing unnecessary surgeries, developing patient specific solutions such as orthoses and pre-surgical models, and helping to improve quality of life for Veterans.

With 40 sites and growing, the VHA 3D Printing Network arguably has one of the most diverse and comprehensive hospital-based 3D printing programs in the world. It has impacted more than 1,000 Veterans, reducing surgical times by an average of more than an hour, alleviating time, travel, and medical costs for procedures deemed too risky by doctors examining patient specific 3D printed pre-surgical models, decreasing the number of hospital visits for some services, and delivering assistive technology devices.

VHA 3D Printing Network has proven invaluable in responding to the shortage of safety equipment for frontline health care workers brought on by COVID-19. In late March, the VHA 3D Printing Network leveraged its 3D technology expertise and collaboration with the Food and Drug Administration, National Institutes of Health, and America Makes to address personal protective equipment supply chain vulnerabilities. They have worked together to develop, prototype, and clinically evaluate designs for PPE, ventilator parts, nasal swabs, and other supplies.

Dr. Ripley works tirelessly to harness the power of 3D printing to drive medical innovations within VHA and provide patients with the best in-class treatments. She believes that what makes the VHA 3D Printing Network truly special and impactful are the makers and innovators that drive the work. In her words, **"The real accomplishment is how we really come together as a network to share resources, ideas, and expertise. In the world of 3D Printing, you need technology, expertise, and vision from a wide variety of people – engineers, designers, patients, experts across government, corporations, and education. Leveraging all these different people and experiences to work on the same problem is powerful. The VHA 3D Printing Network allows us to seamlessly hand off work (through 3D printed anatomical models and technology applications) so that patients that walk into a VA hospital can see the expert in whatever disease or treatment they need, regardless of where they are in the country. That's what keeps me getting up and coming in, working with people with the common goal of taking care of patients in a personalized and meaningful way."**

Adaptability is a competitive advantage, and it is one that VHA IE firmly believes is key to delivering the best patient care now and in the future. This year, COVID-19 has imposed countless challenges and an unprecedented strain on health care systems around the world. For VHA, it has provided distinct opportunities for us to innovate, design, pivot, and tailor in-house solutions. We have the infrastructure in place to quickly adapt and respond to emergent needs. Our work over the past few years to foster a culture that embraces innovation, allows our frontline employees space to fail forward and iterate, and encourages strategic external collaborations.

The ADAPT initiative is allowing us to pivot our resources, priorities, and expertise towards addressing critical health care supply chain gaps and working to make VHA self-sustaining in the design, testing, and production of validated solutions. We are providing seamless care by scaling solutions and driving partnerships at an unprecedented rate. We are evaluating our current programs and revising their delivery to meet emergent needs and decrease Veteran exposure to the virus.

We are leveraging our expertise in research, training, innovative practices, and technology applications, like 3D printing to augment supply needs, to help not only Veterans, but health care at large. My job as the Executive Director of the Veterans Health Administration Innovation Ecosystem is to promote innovation within every level of the organization, and to empower our employees and our collaborators to innovate and adapt with us. This is exactly what our VHA innovators have done in response to the pandemic.

Throughout this report, we highlighted the impact of collaborations, the importance of adaptability, and our ability to together, change and save lives. I invite you to partner with us and join our integrated ecosystem – an ecosystem that creates a foundation for operationalizing health care innovation through the four critical elements of: workforce capacity to actualize innovation, a resilient organizational infrastructure, an innovation-nurturing culture, and strategic collaborations. VHA is a leader in demonstrating how increased employee engagement correlates to better service for our Nation's Veterans. There is no problem too big, and no idea too small, when we work together.

---- **Ryan Vega, MD**
Executive Director of VHA Innovation Ecosystem

On behalf of the VHA Innovation Ecosystem, we would like to say **THANK YOU** to the following colleagues who work tirelessly behind the scenes to enable the amazing innovation that VHA delivers to Veterans everyday. Without their support day in, day out, none of this would be possible. Again,

THANK YOU!

Local VA Medical Centers Public Affairs
VA Center for Limb Loss and MoBility
VA Financial Services Center
VA Infrastructure Operations, IT Franchise Fund
VA Office of Enterprise Integration
VA Office of General Counsel
VA Office of Information and Technology
VA Office of Public and Intergovernmental Affairs
VA Regional Procurement Office East Network Contracting Office 5
VA Secretary's Center for Strategic Partnerships
VA Strategic Acquisition Center
VA Technical Acquisition Center
VA Veterans Experience Office
VA Voluntary Service
VHA Rehabilitation and Prosthetic Services
VHA Office of Academic Affiliations
VHA Office of Communications
VHA Office of Finance
VHA Office of Health Equity
VHA Office of Mental Health and Suicide Prevention
VHA Office of Nursing Services
VHA Office of Procurement & Logistics
VHA Office of Research and Development
VHA Office of Rural Health
VHA Program Contracting Activity Central
VHA Workforce Management Consulting

For more information, visit https://www.va.gov/innovationecosystem, or email vhainnovation@va.gov