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"Artificial Intelligence at VA: Exploring its Current State and Future Possibilities."

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Chair Miller-Meeks, Ranking Member Brownley, and members of the House Committee on Veterans' Affairs Subcommittee on Health, I appreciate the opportunity to come and speak this morning on the use of AI at VA and future applications of these transformative technologies. I possess advanced technical degrees with over four decades of experience operating national health plans, large-scale care-integrated delivery medical centers, and an international clinical research organization.

I also want to acknowledge the federal government, including VA, and its initiatives, which lean into the use of AI and ML to improve the health of Americans. My company had the privilege to participate in these early-stage programs, from identifying the most clinically vulnerable resulting from COVID-19 infection to **predicting beneficiaries with high clinical risk due to deferred care** and untoward events of VA ICU patients.

However, before I begin my testimony, I believe we must use a standard definition of Artificial Intelligence (AI) compared to Machine Learning (ML); while closely related, they differ in many ways.

AI is a broad field that uses technologies to build systems that mimic cognitive functions associated with human intelligence, such as seeing, hearing, understanding, and responding to spoken or written language or visual cues, analyzing data, and making recommendations or taking action. AI is a machine or system that senses, reasons, acts, or adapts like a human.

ML extracts knowledge from data and learns from it autonomously. ML leverages algorithms to analyze enormous amounts of data, learn from insights, and make informed predictions, analyses, or recommendations. Machine learning algorithms improve performance over time as they are trained—and exposed to larger, diverse data sets. Generally speaking, the more varied data used, the better the model will get.

Today, I speak before the committee with two voices as the CEO of Cogitativo, a Berkeley CA based artificial intelligence company, and with a second voice as the son of a retired Master Sergeant, a Korean War combat Veteran, who was awarded two Silver Star medals at age 17 when serving in 1st Ranger Company, 2nd Infantry Division.

Over nine years ago, I co-founded Cogitativo with a single purpose to advance the use of AI to serve as a beacon to identify our most vulnerable individuals and their families while enabling

the delivery of effective personalized care – our initial mantra was and will always be "making the unseen, seen."

An excellent example of our ethos is our work during COVID. On March 7, 2020, my co-founder and I wanted to help the Country by using AI to minimize the pain, suffering, and loss of life from COVID-19. Based on lived experiences dealing with SARS, we could foresee the scale of devastation from this virus.

We quickly determined that several universities had built strong predictive positivity models that track the movement of the virus through our communities. At the same time, the federal government was predicting mortality rates. We decided to select a unique endpoint to predict—what if we could accurately predict which individuals would have the highest risk of being admitted to the ICU post-infection of the virus? We believe that predictive endpoint would enable government agencies, healthcare organizations, and other community organizations to encourage the most vulnerable to stay sheltered in place. Fortunately, we found two large California healthcare payors who sponsored our AI COVID work to develop and deploy this model within their organizations. Their support and efforts allowed us to validate our model while enabling these payors to bring food and medications to their most vulnerable members.

These efforts led us to Operation Warp Speed, where, in November 2020, we received a contract through the Department of Health and Human Services to use this ML model to score over 200 million Americans for the probability of ICU admission resulting from infection. The outputs from this work were used to develop distribution plans for the initial vaccine shipments.

However, being raised by a Ranger where "end results" are measured, we knew we had to get jabs in arms. So, we collaborated with several religious organizations and Drew University to establish vaccination sites at local parks in South Central Los Angeles. We vaccinated over 2,500 individuals over four weekends.

Today, Cogitativo's AI/ML capabilities have been deployed in the VA, HHS, and private sector clients such as Kaiser Permanente, Blue Cross Blue Shield plans, Cigna, and Molina Health. We offer a unique fusion of nationally recognized healthcare operators, complex systems researchers, and world-class data scientists who address some of our most complex healthcare challenges. Our projects within the VA include predicting disease progression, identifying the most clinically vulnerable, and predicting clinical deterioration for ICU patients.

Why VA and Cogitativo?

As I previously mentioned, my father was a Korean veteran with combat-related injuries. However, he did not use VA for most of his medical care –like many other Veterans, my father believed that other Veterans needed these precious resources more than he did - he did not want to "take" from other Vets.

However, he dealt with PTS for over 60 years, for which he did use VA for treatment—fortunately, his mental health counsel would gently nudge my dad to get an annual physical from a VA provider. This nudge saved his life!

Unbeknownst to our family, VA had been using these visits to log his biomarkers (lab values) into VistA for over a decade, creating a detailed temporal continuity of care view of his health status.

Seven years ago, my dad was admitted to a private sector ICU with severe pneumonia, including an extensive volume of fluids in his lungs—standard treatments were not working.

The ICU physician was about to order Lasix with an angiotensin inhibitor. As we were awaiting the preparation of treatment, my dad's cell phone rang. It was a San Diego VA patient advocate calling for his annual appointment. I told her what was happening, and she took the initiative to find his Primary Care doctor immediately, who viewed his medical chart and identified a negative GFR "trend" line even though he had not been diagnosed with chronic kidney disease. The VA clinician asked to speak to the ICU physician and warned her that the administration of the proposed treatment could irreparably damage my father's kidneys.

While this is not a true example of "machine learning," it shows the value of human (or machine) learning and analyzing temporal data, incorporating previous knowledge, and then making an informed decision- this is the foundation of machine learning.

In our family's case, we were divinely lucky that VA called at the moment of need, but we should not have to rely on luck; given the current state of technology, VA can effectively and safely deploy ML/Al solutions that serve the mission of the best care anywhere.

VA AI success

I have witnessed VA's commitment to advancing healthcare through ML and AI, which is evident in its proactive approach to research initiatives and the exploration of diverse advanced analytical techniques. VA has invested in groundbreaking research endeavors, ranging from predictive analytics for personalized treatment plans to integrating AI in medical imaging, significantly improving diagnostic capabilities. This commitment to innovation extends to the nation-leading expansion of virtual and augmented reality throughout the VA network, bringing a state-of-the-art approach to a variety of use cases.

Furthermore, VA's partnership with Cogitativo on deferred care and telecritcal care advanced analytics underscores a commitment to advancing healthcare through Machine Learning. These ML algorithms can predict patient deterioration across various conditions, including prevalent Chronic and ICU clinical endpoints, enabling early intervention and more effective clinical resource use.

I applaud VA's efforts and early successes in exploring the use of AI in healthcare delivery and administrative functions. However, there is an extensive greenfield of use cases that could

immediately benefit VA and its beneficiaries. Some of these use cases include targeting ML/AI in processing disability claims with higher accuracy and speed, accelerating the diagnosis of diseases, revealing underserved Veterans, and reducing provider administrative tasks.

Now, I would like to turn to more immediate opportunities for the use of AI at VA.

VA AI opportunities

VA has an immense opportunity to make substantial advancements in using advanced analytics. Immediate opportunities include the deployment of VA-proven, validated, and human-in-the-loop supported solutions for enhancing national access, availability, and outcomes while improving effectiveness.

For example, VA can apply ML/AI to the following challenges:

1. Identifying the most clinically vulnerable from deferred care induced by changed behaviors resulting from the COVID-19 pandemic.
2. Solving the escalating challenges of capacity and prolonged wait times with the direct and community delivery systems.
3. Uncovering health risks resulting from toxic exposures
4. Understanding, preventing, and providing comprehensive support to Veterans at risk of suicide.

Deferred Care: The issue of deferred care has become increasingly prevalent throughout all healthcare delivery sectors, with disruptions caused by the pandemic leading to delayed or postponed healthcare treatments. In this context, ML emerges as a powerful ally, capable of proactively identifying beneficiary-level clinical vulnerabilities and intervening to avoid adverse outcomes resulting from deferred care. Through VA support, my company tested and refined four chronic condition-specific algorithms that scored all 8 M+ beneficiaries for clinical risk resulting from deferred care. The central office and two VISNs have validated these outputs. We are currently in dialogue with several VISNs regarding the operational deployment of this capability.

Further, an ML-driven approach to combat this surge in service demand could focus on a proactive approach, allowing the VA to identify vulnerable patients early, enabling more efficient use of available clinical resources, and a significant opportunity to reduce community care costly in-patient, ER admissions as well as lowering cognitive demands on provider practices.

Capacity and Resource Management: Addressing capacity planning and access challenges within VA requires an approach that builds on these techniques. Any solutions must use advanced ML and AI methods to identify at-risk individuals, clearly account for current state service demands, and predict future demands with specific needs across specialties and geographies. The goal is to align medical staff levels with beneficiary care needs, optimizing wait times across the direct and community care networks while decreasing costly acute healthcare costs. Furthermore,

predicting future patient demand across regions and specialties helps mitigate the potential cost overrun from referring beneficiaries from VA care to community care. With a massive workforce of over 450,000, we advocate that AI is central to addressing this complex, dynamic challenge.

Toxic Exposures: We recognize the pressing concern of adverse health effects from toxic exposure among our Veterans and active military personnel. Despite the successes of ML in predictive toxicology, there is a significant gap in understanding, predicting, and managing the health impacts of toxic exposures.

The PACT Act is a transformative enabler representing the largest benefits expansion for Veterans in a generation. While VA has necessarily focused on the health care and benefit needs of Veterans who are ill today, we submit that ML/AI can be a powerful tool in helping to identify veterans at risk of longer-term or latent manifestations of various exposures.

Genetic polymorphisms play a pivotal role in influencing health outcomes post-toxic exposures, as evidenced by conditions such as Gulf War Illness (GWI). An ML/AI-driven analysis allows us to analyze large-scale datasets from projects like the Million Veteran Program (MVP) and VA Corporate Data Warehouse (CDW), providing invaluable insights into these factors' intricate, presently unseen relationships. By leveraging machine learning techniques to unravel the complex interplays between genetic polymorphisms and chronic illnesses resulting from toxic exposures, VA can enhance its understanding of how these factors influence health outcomes and, consequently, enable timely, earlier diagnosis and treatment.

Suicidal Tendencies: Addressing the prevalent issue of suicide with the VA beneficiary population demands a comprehensive approach. As reported by VA, 6,392 Veterans died by suicide in 2021- an increase of 114 from 2020. We applaud all VA efforts in this area; however, we must continue to bring new approaches and tools to prevent suicides. We assert that we can rapidly bring a new capability to address this national crisis by employing AI. Through AI, we can capture and curate clinical, audio, and visual data to predict an individual's risk of suicide. The VA's unique position, with access to extensive datasets and robust systems, positions them at the forefront of research and design of targeted suicide prevention strategies**.**

Other areas of ML and AI demonstrate exceptional potential in various critical healthcare domains, including critical care and telecritical care, remote patient monitoring, opioid use disorder, mental health, and operational domains such as claims processing and medical coding.

In critical care scenarios, AI/ML algorithms can analyze thousands of patient data, from vital signs to lab results, to swiftly identify deteriorating conditions and prompt timely interventions. Remote patient monitoring, facilitated by AI, allows continuous tracking of patient health metrics, enabling early detection of subtle changes and reducing the need for hospital admissions. In the realm of opioid use disorder, ML algorithms can analyze gut biomes to predict the predisposition of addiction, thereby enabling the use of new, less addictive therapies.

These AI/ML-powered solutions promise to improve patient outcomes, optimize resource allocation, and improve stewardship of our precious healthcare resources.

Today, we stand on the brink of transformative possibilities with the potential to empower beneficiaries, reduce stress on providers, improve patient outcomes, and deliver genuinely precise healthcare. We must swiftly embrace innovation and harness AI's capabilities to uplift our providers, streamline processes, and ensure every Veteran receives unparalleled care.

How can Congress help?

Improving human health through innovation is not inevitable, nor is it dependent on divine intervention, as in my father's case – Improving human health comes through a continuous struggle of use-case ideation, disciplined experimentation, validation, and thoughtful scaling.

As the committee is aware, several clinical research and development studies already suggest that AI can perform as well as or better than humans, such as diagnosing disease. Today, algorithms outperform radiologists at spotting malignant tumors and guiding drug researchers in constructing cohorts for costly clinical trials.

AI has clear transformative potential, but its success goes beyond technology. Unlocking progress requires a deep understanding of the clinical domain and healthcare delivery. Trustworthy and ethical AI solutions necessitate integrating human-in-the loop clinical expertise and the dynamic nature of medical decision-making. VA should combine these novel technologies with deep domain expertise, world-class data scientists, and hands-on workflow experience that targets impactful use cases.

With the support of Congress, I believe VA can be a national cornerstone in **delivering** AI-enhanced services that improve human health while deploying AI workflow tools that enhance the efficacy of a provider's daily administrative practices and clinical interventions. Given VA's unique mission, operations, and rich data repositories, few other organizations can deliver on this objective better. I am confident that AI will provide essential capabilities for improving human health and that the VA can be central in delivering these capabilities.

I look forward to discussing with the committee the opportunities to deploy AI/ML in safe, appropriate ways that benefit the health and life of our Country's most precious heroes, our Veterans. These remarks conclude my statement, and I would be pleased to answer any questions you or the Committee members may have. Thank you