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INFORMATICS

Current areas of VA research in health care informatics include data analytics, natural language processing, genome studies, adverse event monitoring, clinical decision support systems, and care management tools.

ABOUT INFORMATICS

• Informatics improves patient health, health care, and biomedical research by making health data accessible to researchers and clinicians and using that data to benefit patients.

• One area of informatics is studying data within electronic health records (EHRs) and learning how to best extract those data. This includes creating systems that can help clinicians make better treatment decisions and developing tools to monitor postsurgical adverse events, medications, and care coordination.

• Studying EHRs and genetic data of Veterans helps researchers better understand the causes of chronic diseases like diabetes, and can lead to more effective treatments. Establishing a centralized library of genetic variations and associated health traits helps researchers to look for trends in large patient populations.

• Natural language processing (NLP) uses artificial intelligence to interpret and understand written language. It is especially useful for interpreting medical data contained within an EHR.

• Informatics includes developing and providing access to large clinical data warehouses to help researchers conduct better-informed research.

• Health data are used to create decision aids that assist clinicians and Veterans to make informed treatment choices using a shared decision-making approach based on new information and historic data.

VA RESEARCH ON INFORMATICS: OVERVIEW

• In 2019, VA established the National Artificial Intelligence Institute (NAII) to provide artificial intelligence (AI) research and development that is meaningful to Veterans and to the American people. AI uses computers to simulate human thinking, especially in applications involving large amounts of data.

• Health Services Research & Development (HSR&D) supports a comprehensive informatics research program, funding intramural research projects and maintaining two resource centers that promote access to clinical and administrative data for VA researchers.

• The mission of the VA Informatics and Computing Infrastructure (VINCI) is to reduce the time and effort required to appropriately access, properly understand, and effectively use Veteran data for research. VINCI partners with the VA Office of Information and Technology to deliver a full-service computing environment.

• VA Information Resource Center (VIReC) strives to advance VA's capacity to use data and information systems effectively and to foster communication between data users and the VA health care community through activities that support research.

SELECTED MILESTONES AND MAJOR EVENTS

2007 – Launched the HSR&D Health Care Informatics Research program with a request for applications for natural NLP research

2008 – Funded the Consortium for Health Care Informatics Research (CHIR), a multisite collaborative research program featuring NLP studies

2008 – Funded VINCI, a high-performance analytic environment with secure access to a corporate data warehouse and other VA data sources

2011 – Funded a Quality Enhancement Research Initiative (QUERI) project focused on implementation of eHealth strategies in VA

2016 - Held the VA ORD Workshop "The Central Role of Phenotyping in VA Research" to begin discussions on the role and importance of phenotyping in VA

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2018 - Agreed with the Department of Defense to merge VA data with data collected in DOD's Millennium Cohort Study and Millennium Cohort Family Study to evaluate the long-term health effects of deployments on military members and their families

2019 - Launched the National Artificial Intelligence Institute

2020 - Established the Coordinating Hub to Promote Research Optimizing Veteran-centric EHR Networks (PROVEN) and a Virtual Care Consortium of Research (CORE) to facilitate collaborations on new types of informatics research

RECENT STUDIES: SELECTED HIGHLIGHTS

• **Changing how mild cognitive impairment is assessed could improve prediction of Alzheimer's disease,** according to a study by a VA San Diego researcher and colleagues. The study showed that changing the requirement for a mild cognitive impairment diagnosis to impairment on at least two separate memory tests markedly improved the ability to predict degradation of brain tissue and Alzheimer's. The change improved accuracy of these predictions even when brain atrophy was not yet present. (*Brain Imaging and Behavior*, June 2020)

• **Patient views on sharing electronic health records differed by race,** in a study of nearly 20,000 Veterans. A majority of white patients preferred a system in which they could opt out of sharing their EHRs. But patients of other races were less likely to accept an opt-out approach, instead preferring a system where their records could be shared only if they opted in. The results show that cultural sensitivity and trust must be considered during EHR changes. (*Journal of the American Medical Informatics Association*, May 1, 2020)

• **A wearable sensor can provide accurate early detection of impending rehospitalization from heart failure,** found a study by VA researchers. Patients were monitored for three months using a sensor patch placed on the chest that recorded physiological data. Data were uploaded continuously via smartphone and analyzed using machine learning. The platform was able to predict imminent rehospitalization with more than 80% accuracy, an average of six days before hospitalization. (*Circulation*, March 2020)

• **Two machine learning platforms were successfully used to provide cancer diagnostic guidance,** in a James A. Haley Veterans' Hospital study. Researchers tested the Google AutoML and Apple Create ML artificial intelligence programs on a number of cancer topics. Both programs were useful in differentiating between normal lung tissue and cancerous lung tissue. They could also tell the difference between two different types of lung cancer. Next, the programs could determine the presence of a genetic mutation in colon cancer. Finally, the programs identified whether cancer cells were from lung or colon cancer. (*Federal Practitioner*, October 2019)

• **Two gene variants tied to kidney disease have only a modest cardiovascular effect on African American patients,** found a VA Million Veteran Program study. The study included nearly 31,000 African American Veterans. It was one of the largest genomic studies to date focused strictly on African Americans. Chronic kidney disease and cardiovascular disease appear to be linked in this population. Researchers studied how two gene variants known to increase kidney disease risk affected cardiovascular disease. The study revealed that the gene variants did not increase cardiovascular risk, beyond worsening kidney function. (*Circulation*, Sept. 17, 2019)

• **A VA Million Veteran Program study identified multiple locations in the human genome related to the risk of re-experiencing traumatic memories.** Re-experiencing is the most distinctive symptom of PTSD. The researchers compared the genomes of more than 165,000 Veterans. They found eight separate regions of the genome associated with risk of re-experiencing symptoms. The results provide valuable information on genetic factors that may put people at risk for PTSD. (*Nature Neuroscience*, September 2019)

For more information on VA studies on informatics and other key topics relating to Veterans' health, please visit www.research.va.gov/topics

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