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**Electronic Health Record Modernization (EHRM)**

**Project Registry**

## Chawla, Neetu Licensed Independent Practitioners (LIP) call center evaluation

**Neetu Chawla, PhD, MPH** – COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, West Los Angeles, CA

**Funding Sources:** VA Office of Connected Care; VA Office of Nursing Services MOU

**Project Dates:**

**ABSTRACT**

**PUBLICATIONS & PRESENTATION**

## Church, Victoria VA EHRM Essential Clinical Dataset (ECD): Value realization

**Victoria Church, RN, MS, CNS-BC** – Program Manager, Electronic Health Record Modernization | VA Office of Nursing Services, Washington, DC

**Funding Sources:** VA Office of Nursing Services

**Project Dates:**

**ABSTRACT**

**PUBLICATIONS & PRESENTATION**

## Cordasco, Kristina Impacts of Cerner Millennium on communication across specialty care referrals

**Kristina M. Cordasco, MD, MPH, MSHS** - COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, West Los Angeles, CA

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** December 2020 – September 2022

**ABSTRACT**

Providing clinically integrated care, with timely access and optimal coordination across providers and settings, is a key VA priority. Specialty care referrals require reliable and time-sensitive communication between primary care and specialists, as well as between specialists and sub-specialists. We assessed frontline staff perceptions of Cerner Millennium’s referral tools and processes. Between November 2021 and February 2022, we conducted, and qualitatively analyzed, semi-structured interviews with 15 primary care providers (PCPs) and four specialists, at the Mann-Grandstaff (Spokane) VA Medical Center and its remote primary care clinics. Interviews yielded findings about Cerner Millennium’s embedded clinical decision support tools (“Care Pathways”), referral management software (“Referral Manager”), and processes for conveying/receiving referral recommendations. We found that a few providers liked the logic embedded in Care Pathways. However, most PCPs and specialists found them to be not helpful, time intensive, not intuitive to use, and detracting from patient care. Specialists reported receiving unclear and incomplete information; some referrals do not have the necessary tests while others have unnecessary tests. Similarly, some providers liked certain features in Referral Manager, but most found using this software to be time-intensive and difficult, and lacking some information they need. Finally, referring providers are inconsistently receiving specialist recommendations in a timely fashion, particularly from Community Care providers. Within VA, referring providers are not automatically alerted that recommendations are available and therefore may miss seeing them if the specialist does not specifically send them. In sum, Cerner Millennium referral processes, as deployed at the Spokane VA Medical Center, significantly hamper care efficiencies, VA provider experience, patient safety, and providing Veteran-centered care. User-centered design, as well as increased automation, need to be further applied to Millennium’s referral processes, and future implementation sites should consider augmenting coordinator support for referral triage, tracking and management, to facilitate well-coordinated and efficient care for Veterans.

**PUBLICATIONS & PRESENTATION**

Cordasco KM. Specialty care referrals in VA’s Cerner Millennium: Provider and nurse experiences, perceptions, and recommendations for improvements. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, January 2023](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=5266&Seriesid=111).

Cordasco KM, Gable AR, Ganz DA, Brunner JW, Fix GM. Specialty care referrals in VA’s Cerner Millennium electronic health record: Early reports from frontline providers. Poster presented at: 2022 American Medical Informatics Association Clinical Informatics Conference; May, 2022; Houston, TX.

Cordasco KM, Gable AR, Ganz DA, Brunner JW, Smith AJ, Hertz B, Post EP, Fix GM. Cerner Millennium’s care pathways for specialty care referrals: Provider and nurse experiences, perceptions and recommendations for improvements*. Journal of General Internal Medicine*, in press.

Cordasco KM, Gable AR, Ganz DA, Smith A, Brunner JW, Fix GM. Cerner Millennium’s care pathways for specialty care referrals: Provider and nurse perceptions and recommendations for improvements. Poster presented at: VA Health Services Research & Development/QUERI National Conference; February, 2023; Baltimore, MD.

## Davila, Jessica Developing safety metrics for safer EHR transitions (VA Safety MEMO—Metrics for EHR MOdernization)

**Jessica Davila, PhD, MS** - Research Investigator, IQuESt | Michael E DeBakey VA Medical Center, Houston, TX

**Hardeep Singh, MD, MPH** – Physician Investigator, IQuEST | Michael E. DeBakey VA Medical Center, Houston, TX

**Funding Source**: Health Systems Research (SDR)

**Project Dates**: February 2024 – January 2026

**ABSTRACT**

Unintended consequences can emerge in any EHR transition, potentially threatening patient safety. Currently no reliable and valid approaches to measure safety performance of the EHR. The overarching goal of the VA Safety MEMO project is to use a measurement approach involving high-priority metrics that gather data on patient safety and integrate the resultant measures into routine clinical and safety operations.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Deeds, Stefanie The impact of Electronic Health Record Modernization (EHRM) on the quality and safety outcomes of primary care for patients at a Veterans Affairs IOC site

**Stefanie Deeds, MD** – Director, Primary Care Innovation Lab | VA Puget Sound Health Care System, Seattle, WA

**Scott Hagan, MD** – Attending Physician | VA Puget Sound Health Care System, Seattle, WA

**Funding Source:** VA Primary Care Analytics Team (PCAT)

**Project Dates:** July 2019 – June 2022

**ABSTRACT**

Transitioning medical records is a time of high risk for patients and healthcare facilities due to challenges in data migration, capturing of screening and health factor data, and use of new tools and registries within the EHR. Additionally, during transition there are challenges in ensuring safe health IT (integrity and availability) and safe use of health IT (usable, correct use). VA has many national and local screening reminders, reports, and registries for tracking patients, and it is unknown how EHRM will impact population health management. Health IT has the potential to improve patient safety. Safety monitoring in primary care lags behind inpatient efforts. Essential primary care markers of safety include ensuring that abnormal results and important referrals are followed up. There are few reports on the impact of transitioning from one electronic record to another electronic record on quality of care. Because the VA is a national health system, with empaneled patients and over 20 years of electronic data, EHRM is a unique opportunity to study the impact of EHR transition regarding patient safety and quality. We aim to monitor the quality of patient care during the EHR transition period, and address areas of potential safety concern.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Fix, Gemmae Enhancing PROVEN’s understanding of the Veteran experience during the Cerner transition (PROVEN VET)

**Gemmae M. Fix, PhD, MA** - COIN Investigator, CHOIR | Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA

**Jessica Davila, PhD, MS** - Research Investigator, IQuESt | Michael E DeBakey VA Medical Center, Houston, TX

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** October 2021 – September 2022

**ABSTRACT**

The Department of Veterans Affairs (VA) has embarked on the largest system-wide electronic health record (EHR) transition in history. To date, research has been predominantly directed towards providers. However, patients will be affected by changes to the patient portal and appointment scheduling, as well as changes to healthcare teams’ workflows. Our goal is to understand patients’ needs and priorities, and to identify strategies to support them prior to implementation. Our qualitative study design has two phases. In Phase 1, we conducted listening sessions (January- March 2022) with four geographically diverse Veteran Engagement Groups in the Northeast, Southwest, rural Mountain West, and West Coast. Sessions lasted 60-90 minutes and held during the groups’ regular meetings. We began with a brief overview about the transition. The facilitator then provided key prompts: What have Veterans heard/read about the change?; What do Veterans need to know?; How can the VA help Veterans during this change?. A qualitative methodologist wrote descriptive fieldnotes and an analytic summary immediately following each session. The summaries were iteratively reviewed first individually and then across groups. The full team identified key themes across the sessions. Groups ranged from 3 to 13 members (N=29). Members were diverse in age, military experiences, and careers, and had a range of technology use, including use of the VA’s existing patient portal. Across the Veteran Engagement Groups, few were aware of the EHR transition, including several who worked for or with their local VA hospital. Members raised three key areas to address prior to the EHR rollout: Guidance and training on the new patient portal; open and transparent communication about EHR transitions to maintain veterans’ trust in the VA; and advertising and marketing strategies to reach diverse patient populations. In Phase 2, we will interview Veterans at two VAs that have implemented Cerner.

**PUBLICATIONS & PRESENTATION**

Cogan AM, Haltom TM, Shimada SL, Davila JA, Fix GM (under review). A scoping review of patients’ preferences and experiences during an electronic health record transition. Patient Education and Counseling.

Fix GM, Davila JA. Understanding Patients’ Preferences and Experiences During an Electronic Health Record Transition. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, July 2023](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=6385&Seriesid=111).

Fix GM, Haltom TM, Cogan AM, Shimada SL, Davila JA. Understanding patients’ preferences and experiences during an electronic health record transition. *Journal of General Internal Medicine* (2023): 1-7.

Fix GM, Haltom T, Cogan AM, Shimada SL, Davila JA. Understanding patients’ preferences and experiences during an electronic health record transition. Poster presented at: 2023 AcademyHealth Annual Research Meeting; June, 2023; Seattle, WA.

## Gray, Kristen Impacts of the Electronic Health Record Modernization on women’s health care coordination: A qualitative investigation

**Kristen E. Gray, PhD, MS** - Research Career Development Awardee, Seattle/Denver | VA Puget Sound Health Care System, Seattle, WA

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** May 2022 – April 2023

**ABSTRACT**

In the remainder of Fiscal Year (FY) 2022 and FY 2023, VA will transition several VISN 20 sites from the legacy VistA/CPRS electronic health record (EHR) to a Cerner EHR under the Electronic Health Record Modernization (EHRM). To date, the EHRM has been beset by delays and, at its first site, resulted in significant challenges for frontline staff who rely on the EHR for patient care. Based on anticipated EHRM rollout in VISN 20, our research team undertook foundational work to characterize current women’s health care coordination processes, barriers, and facilitators within VistA/CPRS (HSR&D grants: RVR 19-484, SDR 20-197-5) at three sites: Puget Sound, Boise, and Roseburg. Our team has developed significant expertise in women’s health care coordination and built connections with VISN 20 Women Veterans Program and EHRM leadership. We propose to extend our research by conducting follow-up interviews at these sites after transitioning to Cerner. We will capitalize on our team’s knowledge, skills, and existing relationships to characterize changes in women’s health care coordination processes, barriers, and facilitators from pre- to post-EHRM. We will develop and disseminate recommendations for local Women Veterans Programs and the Office of Women’s Health (OWH) relating to strategies for supporting high-quality, timely women’s health care during and after EHRM.

**PUBLICATIONS & PRESENTATION**

Benson SK, Pleasure ZH, Gray KE. Delivering care for women veterans after transitioning from one electronic health record to another: Perspectives from staff in the Veterans Health Administration. Poster presented at: 2023 AcademyHealth Annual Research Meeting; June, 2023; Seattle, WA.

Benson SK, Pleasure ZH, Guillory A, Gill SK, Gray KE. (in press). Women’s Health Care Delivery and Coordination after Transitioning from One Electronic Health Record to Another: Perspectives from Staff in the Veterans Health Administration. *Women’s Health Issues*. xxx-xx (2024), 1-7. https://doi.org/10.1016/j.whi.2024.09.002. Epub 2024 Oct 12.

## Gray, Kristen Identifying clinical informatics solutions to coordinating mammograms performed outside of VA

**Kristen E. Gray, PhD, MS** - Research Career Development Awardee, Seattle/Denver | VA Puget Sound Health Care System, Seattle, WA

**Kristine E. Lynch, PhD, MS** - Affiliate Investigator, IDEAS 2.0 | VA Salt Lake City Health Care System, Salt Lake City, UT

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** October 2020 – September 2021

**ABSTRACT**

Breast cancer screening is a key quality metric for women’s healthcare. Most VA healthcare facilities do not offer on-site mammography and refer mammograms to community providers. Mammograms referred to the community require involvement of multiple VA service lines for initiation, approval, and scheduling and to coordinate care with community providers. The goal of our research was to understand current mammogram care coordination practices, identify barriers and facilitators to care coordination, and describe the format and completeness of key mammogram coordination data within the VistA/CPRS electronic health record. We interviewed 27 key informants involved in coordinating mammograms at 7 VA facilities that do not offer on-site mammography. Participants included Women’s Health Care Coordinators; Women Veteran’s Program leaders; primary care providers, nurses, and admin staff; Office of Community Care (OCC) supervisors and front-line staff; and one Radiology staff member. To determine the availability of key care coordination data in CPRS, we reviewed EHR records from a national sample of 500 community care mammograms completed during 2018-2019. We found that coordinating mammograms referred to the community is currently challenging, with staff expressing frustration with inefficiencies and several negative impacts on Veterans. Some challenges can be mitigated when there is rapport and regular communication among stakeholders across VA service lines and healthcare systems and when roles and responsibilities are clear. Much of mammogram care coordination involves burdensome manual tracking processes. VA has invested in tools to help facilitate tracking (e.g., the Breast Care Registry and SMART CPRS template) but sites underutilized these tools, highlighting additional training needs. Finally, we identified potential targets for future Natural Language Processing work which could enhance the completeness of mammogram coordination data extracted from the EHR.

**PUBLICATIONS & PRESENTATION**

Gray K, Cusack C, Guillory A, Lynch K. Community care mammograms: Care coordination barriers and facilitators and clinical informatics solutions. Oral presentation in the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, June 2022.](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=5178)

Monty GR, Benson SK, Deeds SA, Callegari LS, Katon JG, Cordasco KM, Gray KE. "We are working harder, not smarter": A qualitative inquiry into care coordination for Department of Veterans Affairs mammograms referred to the community. *Womens Health Issues.* 2023; 33(4):414-421. doi: 10.1016/j.whi.2022.11.004. Epub 2022 Dec 15. PMID: 36528428.

## Krein, Sarah Optimizing support for VA nurses during transition to Cerner: Assessment of non-VA nursing experiences

**Sarah L. Krein, PhD, RN** - COIN Investigator, CCMR | VA Ann Arbor Healthcare System, Ann Arbor, MI

**Julian W. Brunner, PhD, MPH** - COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, Los Angeles, CA

**Jessica Davila, PhD, MS** - Research Investigator, IQuESt | Michael E DeBakey VA Medical Center, Houston, TX

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** April 2023 – March 2024

**ABSTRACT**

Objectives: Understanding and informing nursing workflow changes required by the Cerner-Millennium electronic health record (EHR) and its impact on VA nurses is a priority for the VA Office of Nursing Services. Our goal is to identify pragmatic strategies for mitigating potential negative effects on nurses, including burnout, and nursing care in VA related to Cerner Millennium implementation.

Research Plan: The objectives of this study are to 1) Develop preliminary insights to understand the impact of the new EHR and EHR transition on nursing care in non-VA settings using qualitative methods. This will enhance our knowledge of changes in nursing workflows related to the Cerner EHR and its impact on nursing outcomes; and 2) Identify lessons learned in non-VA settings that can inform strategies to optimize support for VA nurses during Cerner implementation.

Methods: We will conduct interviews with approximately 30 non-VA nurses and key stakeholders from sites that have previously implemented the Cerner EHR. We will focus on: 1) Major changes experienced in patient care delivery, 2) Nursing input prior to and during the transition, 3) The impact of the transition on nurses both short-term and longer term (e.g., job satisfaction). 4) How the changes might differ by setting (e.g., inpatient, outpatient) and role (e.g., RN, LPN), 5) What participants would recommend to other nurses who are undergoing this transition.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Maciejewski, Matthew Qualitative interviews of non-VA Cerner adopters to understand data curation needs

**Matthew L. Maciejewski, PhD** - Senior Research Career Scientist, ADAPT | Durham VA Medical Center, Durham, NC

**Matthew H. Samore, MD** - Center Director, IDEAS 2.0 | VA Salt Lake City Health Care System, Salt Lake City, UT

**Funding Source:** VA QUERI Partnered Evaluation Initiative

**Project Dates:** August 2019 – December 2019

**ABSTRACT**

Between October 2019-February 2020, our team conducted 14 semi-structured interviews with key informants with clinical informatics expertise at two non-VA medical systems. Information and comments were analyzed, synthesized, and a series of considerations and recommendations were developed. Barriers and challenges reported by sites included issues with data storage, aggregation, and optimization; needing to create customized workflows and workarounds; disruptions in data availability during implementation; data documentation gaps; and training and learning curve challenges. Facilitators and strategies reported by sites included the flexibility of Cerner allowing for innovation and usability; support from Cerner customer service at go-live and after; and site-specific strategies of physician super-users, close mapping of legacy data, and optimization groups. Impacts on safety we heard included conflicting perceptions of medication safety/interaction information in Cerner; differing alerts, which can cause alert fatigue; and delays in ordering and an increase in safety incidents at go-live, which decreased with time.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Matheny, Michael Clinical encounter data evaluation & harmonization across the legacy to Cerner EHR transition

**Michael Matheny, MD, MS, MPH, FACMI** – Affiliate Investigator, Center for Patient Healthcare Behavior | Tennessee Valley Healthcare System, Nashville, TN

**Funding Source**:PROVEN Rapid Pilot Project

**Project Dates**: May 2022 – September 2023

**ABSTRACT**

Clinical encounters, or documentation of a contact with the healthcare system and what occurs during that encounter, is foundational to healthcare delivery. In fact, clinical encounters are of the U.S. Core Data for Interoperability version 2 issued by ONCHIT. In the Department of Veterans Affairs, the legacy ViSTa/CPRS system encodes data and represents encounters in a significantly different way than the Cerner electronic health record. This project will evaluate these differences, how data can and cannot be aligned between the two systems, and identify recommendations and limitations in the use of data. This represents an important step toward providing support to the observational science community in the VA. This has particular and critical relevance for anyone wishing to analyze data across the EHR transition boundary at any healthcare facility

**PUBLICATIONS & PRESENTATION**

None at this time.

## Miake-Lye, Isomi Identifying and measuring key organizational factors in EHR transitions

**Isomi M. Miake-Lye, PhD** - COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, West Los Angeles, CA

**Julian W. Brunner, PhD, MPH** - COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, West Los Angeles, CA

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** June 2021 – May 2022

**ABSTRACT**

Best practices for EHR transitions are rarely "one size fits all" and frequently vary according to the distinct characteristics of each facility. But which facility characteristics most inform tailoring of implementation strategies, and which can help identify facilities that are most likely to struggle? We conducted this project to identify key facility-level factors that make EHR transitions easier or harder, and that can inform the tailoring of implementation strategies. We extracted data from three systematic reviews (on national rollouts, readiness assessments, and EHR transitions) to identify a preliminary set of constructs. We then interviewed key informants with expertise in EHR implementation and organizational behavior to identify additional constructs. Finally, we conducted a two-day expert panel using a modified Delphi process to further refine and operationalize the model. This yielded a model of 28 factors across 5 domains adapted from Greenhalgh's framework for diffusion of innovations in service organizations: Facility Structure; Dedicated Resources; Receptive Context for Change; Tension for Change; and Existing Communication and Networks.

**PUBLICATIONS & PRESENTATION**

Miake-Lye I, Brunner J. Facility level factors in the VA EHR transition: Findings from an expert panel process. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, April 2022](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=5154).

## Molloy-Paolillo Understanding Cerner Analytics application to VA Electronic Health Record Modernization

**Brianne Molloy-Paolillo, PhD** – Applied Social Psychologist & Project Manager, CHOIR | Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA

**Funding Source**: PROVEN Rapid Pilot Project

**Project Dates**: March 2023 – September 2024

**ABSTRACT**

VA’s transition to Cerner Millennium will generate new opportunities for researchers to work with Cerner analytic databases and tools to evaluate how clinicians are using the new EHR. To date, there is not a clear pathway for researchers to access these analytic resources. This project will establish procedures for accessing Cerner analytic databases for EHR use data and conduct preliminary analyses of EHR use over time at new implementation sites.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Rinne, Seppo Integrating rapid cycle evaluation to improve Cerner implementation (EMPIRIC)

**Seppo T. Rinne, MD, PhD** - COIN Investigator, CHOIR | Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA

**George Sayre, PsyD** - Qualitative Research Specialist, Denver/Seattle | VA Puget Sound Health Care System, Seattle, WA

**Funding Source:** VA QUERI Partnered Evaluation Initiative

**Project Dates:** January 2021 – September 2024

**ABSTRACT**

VA’s electronic health record (EHR) modernization is expected to last ten years and cost $16 billion. While EHR modernization (EHRM) offers an opportunity to improve systems of care, these transitions are complex undertakings that disrupt multiple sociotechnical systems and challenge clinicians. Prior studies have found that EHR transitions are deeply disruptive and impact frontline clinicians’ performance and well-being. Cerner’s EHR change management efforts must be evaluated to learn from frontline clinicians, identify ways to support clinical teams undergoing EHRM, and mitigate negative consequences. This proposal seeks to optimize EHRM outcomes by identifying and promoting practices clinical teams can employ to complement Cerner’s change management approach. Our specific aims are to evaluate pre-implementation, implementation, and sustainment at initial EHRM sites to identify practices to improve EHRM outcomes and use consensus methods with an expert panel convened by PROVEN to develop recommendations for practices that VA clinical teams can use to improve EHRM. In Aim 1, we conduct a formative evaluation that uses mixed methods, including (1) workflow evaluation to compare current versus new Cerner workflows; (2) surveys to assess clinical teams’ change readiness, clinician experience, and EHR proficiency; (3) interviews, reflections, and observations with clinical team members to identify strategies used to support EHRM; and (4) EHR log data to assess EHR proficiency. We conduct current state and gap analyses and develop site specific action plans. In Aim 2, we use expert panel methods to interpret information from Aim 1 and develop consensus on EHRM optimization strategies. Information from frontline clinicians undergoing EHRM can inform best practices to improve EHRM outcomes. This proposal directly addresses a top VA priority to modernize the EHR and will provide specific recommendations to engage clinicians and improve EHRM outcomes in the form of a case series, implementation playbook, and multicomponent strategy.

**PUBLICATIONS & PRESENTATION**

Rinne S, Weiner M, Wayde E. Opportunities to Contribute to an Electronic Health Record Modernization Research Agenda. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, Dec 2020](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=3913).

Rinne S, Draime J, Wayde E. Lessons Learned from Non-VA Health Systems about EHR Modernization. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, April 2021](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=3959).

Miake-Lye I, Rinne S, Lakhani P, Weiner M. Evidence Review of EHR Transitions: Implications for VA's Implementation of Cerner Millennium. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, June 2021](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=3997).

Rinne S, Sayre G, Matthews K. Clinician Experiences with VA's Electronic Health Record Modernization: Initial Findings from the EMPIRIC QUERI Evaluation. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, October 2021](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=4046).

## Rinne, Seppo Strengthening Cerner implementation for health professions trainees to optimize learning and reinforce Veteran care (SCHOLAR)

**Seppo T. Rinne, MD, PhD** - COIN Investigator, CHOIR | Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA

**George Sayre, PsyD** - Qualitative Research Specialist, Denver/Seattle | VA Puget Sound Health Care System, Seattle, WA

**Funding Source:** VA QUERI Partnered Evaluation Initiative

**Project Dates:** October 2021 – September 2024

**ABSTRACT**

Change management efforts for VA’s organizational transformation to replace the existing electronic health record (EHR) have primarily focused on supporting VA employees, while less attention has been given to the unique needs of health professions trainees (HPTs), who play a critical role in delivering Veteran care. Many HPTs experienced challenges accessing and using the EHR, adversely impacting their education and ability to deliver Veteran care. We combine health services research and human-centered design (HCD) methods to identify improvement opportunities for HPTs’ EHR transition. Specifically, we will identify and understand HPTs’ EHR transition challenges and needs and design a prototype intervention to improve EHR transitions for HPTs. In our multi-phased evaluation, will use surveys, qualitative interviews, and EHR use data to understand HPT experiences with the EHR transition (Aim 1). We will use expert panel methods to develop consensus on parameters for an intervention to improve the EHR transition for HPTs, and we will engage HPTs in HCD methods to develop a draft prototype of the intervention (Aim 2). We will identify practices that improve HPT experience across four levels of the Kirkpatrick Model: Reaction (attitudes about the EHR transition), Learning (EHR knowledge and confidence), Behavior (EHR competence and use), and Results (clinical education and Veteran care delivery). Findings from this evaluation will lead to a pilot-tested intervention to optimize EHR transitions for HPTs. This proposal directly addresses two major VA priorities: educating HPTs and modernizing the EHR. It will help identify meaningful and actionable solutions that can ensure HPTs rapid uptake and use of the new EHR and minimize negative impacts on their clinical education and ability to contribute to Veteran care.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Shelton, Jeremy Formative evaluation of EHRM councils

**Jeremy B. Shelton, MD, MSHS** - COIN Investigator, CHSIIP | VA Greater Los Angeles Healthcare System, Los Angeles, CA

**Julian W. Brunner, PhD, MPH** - COIN Investigator, CSHIIP | VA Greater Los Angeles Healthcare System, Los Angeles, CA

**Funding Source:** PROVEN Rapid Pilot Project

**Project Dates:** July 2020 – June 2021

**ABSTRACT**

In 2018, the VHA began the monumental project of replacing its electronic health record (EHR) system. Configuring the new system to meet VA’s needs was primarily driven by over 1,000 VA employees among 18 governing “councils” alongside contracted consultants and software vendor employees. These councils shape the way care is delivered in the largest healthcare system in the country, but their inner workings have been poorly understood. We conducted a formative evaluation to examine how councils were structured, their work processes, and key outputs of their work. We conducted semi-structured interviews with 29 council leaders and members from July-December 2020. Participants included leads of EHR councils and associated workgroups, representing Ambulatory and Inpatient Care (6 councils) and Ancillary services (6 councils), and including a mix of field-based clinicians and national clinical leaders. Councils were primarily organized around distinct components of the EHR and designed to promote interdisciplinary input. Council structure was dynamic, evolving as council needs changed and as the vendor came to understand unique features of VA. Councils varied dramatically in size, program office involvement, and degree of communication with other councils. Though many council decisions had only indirect implications for patient care (e.g., units, terminology), many had implications for provider/staff roles (e.g., co-signature requirements for residents), and some had direct implications for patient care (e.g., reminders for preventive screenings). The evaluation also surfaced two key emergent themes: 1) Vendor control: in most councils, the specific content and form of the work undertaken by the council was set primarily by the software vendor; and 2) Enterprise standardization: EHR configuration decisions were highly intertwined with a simultaneous effort to reduce variation in clinical processes across facilities.

**PUBLICATIONS & PRESENTATION**

Brunner J, Shelton J, Singh S. Configuring Cerner Millennium for VA: A Formative Evaluation of the EHRM Councils. Oral presentation for the [VA HSR&D Cyberseminar Series on Research & EHR Synergy, Feb 2021](https://www.hsrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=3936).

Brunner J, Cannedy S, McCoy M, Shelton J. Governance of the VA’s new electronic health record: The underappreciated role of standardization. Oral presentation at the VA Health Services Research & Development/QUERI National Conference; February, 2023; Baltimore, MD.

Brunner J, Cannedy S, McCoy M, Miake-Lye, Shelton J. “Care and Feeding” of History’s Largest Electronic Health Record System: Key Stakeholder Perspectives about Continuous Improvement of the VA’s New EHR. Poster presentation at: 2021 AcademyHealth Annual Research Meeting; June, 2021.

Brunner J, Cannedy S, McCoy M, Hamilton AB, Shelton J. Software is policy: Electronic health record governance and the implications of clinical standardization. *Journal of General Internal Medicine* (2023).

Brunner J, Shelton J, Singh S. Configuring Cerner Millennium for VA: A formative evaluation of the EHRM councils. Oral presentation for the VA HSR&D Cyberseminar Series on Research & EHR Synergy, Feb 2021.

Cannedy S, McCoy M, Miake-Lye I, Brunner J, and Shelton J. Moving a national healthcare system to an off-the-shelf EHR software: Formative evaluation of the councils configuring VA’s new EHR. Poster presented at: 2021 AcademyHealth Annual Research Meeting; June, 2021.

McCoy M, Cannedy S, Miake-Lye I, Brunner J, and Shelton J. Out of the “silo:” The importance of multilevel communication and relationship-building during the VA electronic health record modernization. Poster presented at: 2021 AcademyHealth Annual Research Meeting; June, 2021.

## Singh, Hardeep The SAFER VA EHRM Project: A proactive self-assessment of patient safety

**Hardeep Singh, MD, MPH** – Physician Investigator, IQuEST | Michael E. DeBakey VA Medical Center, Houston, TX

**Funding Source**: PROVEN Rapid Pilot Project

**Project Dates**: October 2022 – September 2023

**ABSTRACT**

The SAFER VA EHRM Project will conduct a proactive self-assessment of patient safety using ONC SAFER Guides, which were recently adopted into new federal policy on CMS reimbursement to US hospitals. This collaborative multidisciplinary effort will bring together key stakeholders from VA offices involved with EHRM to evaluate 1) which SAFER recommended practices are already being implemented in the VA; 2) which practices need to be implemented, and 3) next steps to facilitate practice implementation. This project partnership enables EHRM-related patient safety to become an organizational priority. VA’s self-assessment of SAFER Guide practices will provide a robust foundation for ensuring that EHRM related activities and associated work systems are safe and effective. It will enable development of tools, activities, processes, policies, and strategies for achieving EHRM benefits in real-world clinical settings.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Weiner, Saul A Simulation Effectiveness Study of Clinical Decision Support Tools to Prevent Contextual Errors in Medical Decision Making

**Saul J. Weiner, MD** - Deputy Director, Center of Innovation for Complex Chronic Health Care | Jesse Brown VA Medical Center

**Funding Source:** VA Health Systems Research (IIR)

**Project Dates:** PRE-FUNDED

**ABSTRACT**

Background: A contextual error occurs when failure to consider a patient’s life situation and behavior results in a care plan that while evidence-based, is nevertheless unlikely to achieve its intended aims. For instance, increasing the dosage of insulin to address an elevated Hgb A1c when a patient’s underlying challenge is deteriorating vision limiting their ability to read their syringe would constitute a contextual error. Prescribing such a patient prefilled syringes would constitute a contextualized care plan. Over nearly 20 years, our research team has documented many such errors, demonstrating that they are common and adversely impact health care outcomes. In a recent non-VA study, we developed clinical decision support (CDS) tools for the Oracle Cerner electronic health record (EHR) system, that reduce contextual error rates. The purpose of this study is to import them into the VHA Oracle Cerner system and rigorously test them in a simulation study and collect preliminary data on facilitators and barriers to implementation.

Significance: The VHA Electronic Health Record Modernization is at a critical phase in its implementation. There is a consensus that VHA is overdue for modernization; however, the unique environment of VHA has proven challenging. Hence there is a critical need for research on Cerner in VHA. The VHA Office of Health Informatics is supporting this study because the CDS tools we propose to test are grounded in research on contextualization of care within VHA, and a recent non-VA study showing evidence of effectiveness.

Innovation & Impact: To date CDS systems have been primarily clinical, and not sensitive to variations in patient life context. We have demonstrated that incorporating contextual information into the CDS knowledge base helps clinicians prevent contextual errors. This study will employ standardized patients portraying scenarios in which contextual factors are essential to decision making, randomized to clinicians with vs without contextualized CDS tools built in a non-production domain of the Cerner EHR that is a replica of the production domain. This novel experimental design will isolate the effect of contextualized CDS on clinical decision making to determine whether it prevents contextual errors in Veterans’ care.

Specific Aims:

1. H1: Clinicians are more likely to adapt care to contextual factors with compared to without contextualized CDS support.

2. H2: Clinicians are less likely to order unnecessary or inappropriate clinical studies or treatment interventions with compared to without contextualized CDS support, with a concomitant reduction in costs.

[3. Implementation: Employ a CDS user experience survey instrument and Consolidated Framework for Implementation Research (CFIR) guided semi-structured interviews with clinicians to assess feasibility and acceptability, and to identify barrier and facilitators to the introduction of novel EHR tools that alert them to contextual factors and pre-write orders for interventions, in the new VA Cerner work environment.]

Methodology: First, the contextualized CDS tools will be built into a non-production environment of the VHA Cerner/Oracle system using Discern, the Cerner CDS programming language. Then, standardized patients portraying four scripts will visit 16 clinicians in person and 16 via telehealth. The scripts will be organized into four counterbalanced sets in which two scripts are presented with CDS active and two without CDS active, and block randomized. Participating clinician subjects who use Oracle Cerner EHR will also provide feedback on user experience to inform implementation both through semi-structured interviews and through completion of the Questionnaire for User Interaction Satisfaction (QUIS).

Next Steps/Implementation: The VHA Office of Health Informatics, a close partner in this study, will decide whether to implement the CDS technology in the live EHR environment based on the findings.

**PUBLICATIONS & PRESENTATION**

None at this time.

## Wong, Edwin Reducing employee turnover and identifying workforce needs during EHRM (RETAIN)

**Edwin S. Wong, PhD, MA** - Research Career Development Awardee, Seattle/Denver | VA Puget Sound Health Care System, Seattle, WA

**Seppo T. Rinne, MD, PhD** - COIN Investigator, CHOIR | Edith Nourse Rogers Memorial Veterans Hospital, Bedford, MA

**Funding Source:** VA Health Systems Research (SDR)

**Project Dates:** June 2023 – May 2026

**ABSTRACT**

VA’s ongoing electronic health record modernization (EHRM) represents one of the largest and most complex organizational initiatives VA has undertaken. VA’s current EHRM initiative, if poorly implemented, is a major threat to this operational need. Early work indicates that EHRM at the first site to undergo transition (i.e., go-live) was profoundly disruptive to clinicians, adversely impacting perceptions of the EHR, employee morale and the ability to deliver clinical care. VA operational leaders are in urgent need of information to alter the course of EHRM to ensure the well-being of a fully staffed and high functioning health workforce. This multi-methods study will examine the effects of EHRM across VA nationally. Data sources include employee information from the VA Corporate Data Warehouse, Personnel and Accounting Integrated Data files, HR SMART database, the VA All Employee Survey, and semi-structured interviews. In Aim 1, a quasi-experimental study design will be applied to quantitatively identify overall and subgroup effects of EHRM by leveraging pseudo-random variation in the staggered implementation of EHRM. In Aim 2, we will collect and analyze qualitative data from key informant interviews to explore EHRM-related elements associated with workforce outcomes. Data will be collected from remaining and separated clinicians at sites expected to go-live in the proceeding months. Aim 3 will apply multivariable regression techniques to examine relationships between perceptions of EHRM elements and workforce outcomes using new survey data collected in this study. The key innovation of the study is the generation of new scientific knowledge that comprehensively identifies how EHRM affects four workforce outcomes: turnover, absenteeism, burnout, and engagement. New insights gained from this study will provide timely insights to meaningfully improve the course of EHRM in VA and guide other non-VA health systems planning their own EHRM.

**PUBLICATIONS & PRESENTATION**

None at this time.