

A Tale of Two Databases: The DoD and VA Infrastructure for Clinical Intelligence (DaVINCI)

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Abstract

The Department of Defense (DoD) and Department of Veterans Affairs (VA) Infrastructure for Clinical Intelligence (DaVINCI) creates an electronic network between the two United States federal agencies that provides a consolidated view of electronic medical record data for both service members and Veterans. This inter-agency collaboration has created new opportunities for supporting transitions in clinical care, reporting to Congress, and longitudinal research.

Keywords:

Electronic Health Records, Health Information Exchange, Government Agencies

Introduction

The DoD and VA Infrastructure for Clinical Intelligence (DaVINCI) was sponsored as a Joint Incentive Funded (JIF) inter-agency project. It built on existing data and governance processes to reduce cost and most immediately provide return on investment. On the VA side, the Veterans Health Administration Health Services Research and Development VA Informatics and Computing Infrastructure (VINCI) formed the core infrastructure. On the DoD side, the Defense Health Agency Information Delivery Division Health Services Data Warehouse (HSDW) and the Military Health System Data Repository (MDR) formed the core infrastructure. DaVINCI provided the first DoD-VA full population data integration and brought together medical records, claims, and benefit information from both agencies. Combining records from multiple data sources presented several challenges, but the potential benefits for properly credentialed teams to access and seamlessly utilize relevant information from multiple source systems in both agencies provided motivation for DaVINCI.

Methods

The goal of DaVINCI is to increase DoD-VA data integration for interagency collaboration and resource sharing in support of the Joint Strategic Plan and each agency's healthcare and benefits missions [1]. DaVINCI creates a cornerstone of informatics and data sharing that support health analysis, operations, and other secondary uses of health care data. The special relationship between DoD and VA (that is, all those eligible for care in VA were first armed forces service women or men in the DoD) means that the data sharing and overlapping

populations are distinct from most other overlapping healthcare systems [2, 3]. Three distinct populations are included in DaVINCI. The DoD Only population contains persons who have electronic medical records from DoD, but not from VA. This includes active duty, guard, reserve personnel, and those who have completed service but who have not yet received care in a VA facility. The VA Only population consists of those who have electronic medical records from VA, but served before DoD used computerized record systems. The DoD and VA population contains electronic medical records from both agencies.

Instead of building interfaces with each source system, DaVINCI built on the many years of work aggregating and cleaning source systems into data warehouses (VINCI, HSDW, and MDR). Crosswalk lists are generated from the respective data warehouses and then combined and compared. This process removes employees, service member dependents, and others that are outside the DaVINCI populations. Following best practices, the data from both systems were transformed into a common data model [4] called Observational Medical Outcomes Partnership (OMOP) [5]. This allows VA and DoD data to be joined seamlessly in a longitudinal record regardless of which source agency or source system the data originates.

Once the crosswalk is complete, data files from each agency are prepared and transmitted securely. The governance process transfers stewardship of the data as well, meaning that VA medical record data becomes part of the service member's DOD medical record and vice-versa. In this way, the service member or Veteran electronic medical record follows them in subsequent care episodes.

Results

To date, DaVINCI contains more than 33 billion rows of electronic medical record data including VA data for 22,763,277 Veterans and DoD data for 6,947,102 service members. Of these, 4,039,155 (17.8% of Veterans and 58.1% of service members) have medical records in both VA and DoD.

The magnitude of current DoD and VA databases is considerable. These data are diverse and include not only healthcare utilization including inpatient, outpatient, pharmacy, immunizations, vitals, but also data on eligibility, service theater, and demographic information. The push for precision medicine and the future influx of genomics data could be included in future data transfers to make meaningful conclusions to improve outcomes.

DaVINCI has been used to plan and evaluate mental health care utilization after military service has ended, report to Congress, reply to inquiries from top VA and DoD leadership, and measure health outcomes and utilization during transition from military service.

DaVINCI deploys and evaluates solutions for governance, data integration, data security, analysis, and supercomputing to provide a solid foundation for integrated clinical and business intelligence platforms. By allowing a more complete read-only view into a service member or Veteran record, DaVINCI can facilitate improved coordination of polytrauma patients and accelerated disability evaluations. By allowing more rapid analysis of many service member and Veteran longitudinal records, this program can facilitate more accurate and efficient screening for syndromes such as traumatic brain injury and planning for joint activities such as inter-agency resource balancing of specialty-care.

Over the next decade, all VA and DoD facilities will transition to a joint-hosted instance of a commercial electronic medical record system. This move will drastically increase the interoperability of care and data sharing between VA and DoD. It is also likely that in the future, a shared data warehouse containing all data from VA and DoD would be created. In this scenario, not only is the current DaVINCI project an effective bridge providing the only combined-population analytics solution while the new infrastructure is fully implemented, but has the potential to speed the transition process. The work of standardizing and combining VA and DoD data together can mean that initial loads of a combined data warehouse can take advantage of the linking and mapping that is already done. This may reduce the need to extract from all source systems and even allow both institutions data sets to be loaded together.

The dynamic computing environment created through this collaboration not only supports the magnitude of data needed to be stored but also utilizes parallel computing to support quick responses for queries. The end result is a solution which can handle the current data requirements, can easily expand with increasing data, and supports quicker query requirements.

Conclusion

The DaVINCI project has already proven useful in determining which resources are needed on the VA side for separating service members and coordinating test results already performed on the DoD side to reduce duplication. It has been used to determine immunization status and overlap in utilization in areas where DoD and VA share medical facilities. Finally, it has supported several research projects studying conditions ranging from hearing loss to traumatic brain injury and heart disease to prostate cancer.

The opportunities that DaVINCI creates for caring for and studying the overlapping patient populations of VA and DoD will continue to benefit the health of active duty personnel and Veterans.

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