Research Using Military Health System Data
DaVinci (DoD-VA System)

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Kennell & Associates, Inc.

Sponsored by Veterans Affairs
Objectives

- Define the Military Health System (MHS)
- Describe the Beneficiaries of the MHS
- Overview of the MHS Data Repository (MDR)
- DaVINCI – new combined DoD-VA System
- Examples of Current Research & Potential Areas of Future Research
- Gaining access to MDR/DaVINCI for Research
Military Health System (MHS)
What is the Military Health System?

The MHS is a network of military hospitals and clinics (‘direct care’), supplemented by programs to enable beneficiaries to seek care in the private sector (‘purchased care’) in order to fulfill their healthcare needs according to access standards and to assure medical readiness of the force.

Our Mission
Enhance the Department of Defense and our nation’s security by providing health support for the full range of military operations and sustaining the health of all those entrusted to our care.

Our Vision
Be a world-class health care system that supports the military mission by fostering, protecting, sustaining and restoring health.
What is the Military Health System?

Eligible Beneficiaries: 9.4 million
Number of Hospitals: 50+
Number of Medical Clinics: 500+
Number of Dental Clinics: 300+
Inpatient Admissions to Military Hospitals: 240K
Inpatient Admissions in the Private Sector: 770K
Office Visits in Military Hospitals/Clinics: 41M
Office Visits in the Private Sector: 86M
Number of Prescriptions from Military Pharmacies: 34M
Number of Prescription from the Private Sector: 55M
Organizational Structure – Military Hospitals and Clinics – Current State

DoD
Office of the Secretary of Defense

Office of the Assistant Secretary (Health Affairs)

Defense Health Agency (DHA)

Army
Surgeon General

Navy
Surgeon General

Air Force
Surgeon General

Army Facilities

Navy Facilities

Air Force Facilities

National Defense Authorization Act (NDAA) 2017:
- The MTFs will be operated by the Defense Health Agency
- Services will be responsible for readiness within their Service and advising the line on medical issues
Direct Care vs. Purchased Care

MHS Direct Care System

- Refers to the acute care hospitals, clinics, and dental facilities operated by DoD.
- Most of the hospitals are small facilities. There are only 6 hospitals with more than 100 patients in their average daily census and scores of hospitals with less than 50. OB is the most popular service provided in MTFs.
- Many hospitals have Graduate Medical Education programs.
- Clinics can vary from those serving only Active Duty for primary care needs, to full service clinics with same day surgeries and such.
- The MHS has an active patient centered medical home (PCMH) program, which most MTFs participate in.
- There is no cost sharing (other than paying for food for some patients) for care at MTFs. Can be particularly useful when studying the impacts of cost-sharing on access to care.
- There is an established priority for care and in some places, eligible beneficiaries cannot get appointments at MTFs.
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<td>Vital Signs</td>
<td>Vitals</td>
<td>Vitals and Other questionnaire type data</td>
</tr>
</tbody>
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Direct Care vs. Purchased Care

TRICARE Purchased Care (MCSC)

- TRICARE Claims represent more than half of the care provided to MHS beneficiaries.
- Particularly important for those who live near small MTFs and for those who don’t have priority at MTFs, such as retirees or Medicare eligibles.
- Only administrative data is available (similar to what would be available for Medicare claims) when TRICARE has obligation for payment.
- Limits the ability to use the data for some studies and some cohorts.
- TRICARE offers numerous health plans with various cost-sharing (e.g., Prime, Select, USFHP, TRICARE Reserve Select, TRICARE for Life). The relationship a beneficiary has with the MHS determines their eligibility for specific plans and premiums/cost-shares.
Data Available in Purchased Care: TRICARE Institutional and Non-Institutional Claims

TRICARE Claims include:
- Physician Services
- Hospital Stays or Services
- Ancillary Services
- Emergency Room
- Durable Medical Equipment
- Pharmacy
- Home Health
- Hospice
- Others

- Individual claims are available
- Diagnosis and Procedure Codes, dates and location of care
- Billing and patient data
- Patient and Provider
- Other administrative data
- Clinical data are not available
  - Lab and Rad CPTs, but no results.
  - No vital signs
  - No electronic notes

- Claims are only sent to TRICARE if TRICARE has a liability.
- If 100% of the allowed amount is paid by another payor, TRICARE is blind to the fact that the care occurred.
MHS Beneficiaries
Who are the Beneficiaries of the MHS?

Eligible Beneficiaries

Active Component

- Active Duty Service Members (ADSMs) gain eligibility upon entry into the Service.
- ADSMs enroll eligible family members (ADFM) in DEERS, including spouses, children, foster children, wards, dependent parents
- ADSMs and ADFMs enjoy the best access priority and generally do not have co-pays when receiving care in the private sector.

![Active Component Beneficiaries](chart.png)

<table>
<thead>
<tr>
<th>Beneficiaries by Service</th>
<th>ACT</th>
<th>DA</th>
<th>Sum:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Force</td>
<td>318,104</td>
<td>406,083</td>
<td>724,187</td>
</tr>
<tr>
<td>Army</td>
<td>483,752</td>
<td>715,695</td>
<td>1,199,447</td>
</tr>
<tr>
<td>Marines</td>
<td>182,920</td>
<td>173,470</td>
<td>356,390</td>
</tr>
<tr>
<td>Navy</td>
<td>329,355</td>
<td>392,866</td>
<td>722,221</td>
</tr>
<tr>
<td>Other</td>
<td>48,230</td>
<td>74,816</td>
<td>122,845</td>
</tr>
<tr>
<td>Sum:</td>
<td>1,363,361</td>
<td>1,762,729</td>
<td>3,126,090</td>
</tr>
</tbody>
</table>
Who are the Beneficiaries of the MHS?

Eligible Beneficiaries

National Guard/ Reserve Component

- National Guard and Reserve gain eligibility when activated for a period of 30 days or more. There is a 30 day pre-activation eligibility period as well as 6 months of transitional assistance at no cost to the NG/R member associated with the activation.

- NG/R can also purchase MHS eligibility in the TRICARE fee programs (e.g., TRICARE Reserve Select) when not on active duty.

- NG/R family members are enrolled into DEERS, just as active duty family members.

- While on active duty, NG/R and their families have the same legal benefit as ADSMs and ADFMs.

<table>
<thead>
<tr>
<th>Types of Beneficiaries by Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Air Force</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>1. Active NG/R</td>
</tr>
<tr>
<td>2. Family of Active NG/R</td>
</tr>
<tr>
<td>3. Inactive NG/R</td>
</tr>
<tr>
<td>4. Family of Inactive NG/R</td>
</tr>
<tr>
<td>Sum.</td>
</tr>
</tbody>
</table>
Who are the Beneficiaries of the MHS?

Eligible Beneficiaries

Retirees, Retiree Family Members and Survivors
- Most active duty service members separate from the Service w/o a retirement benefit (‘Separatees’).
- Service members are eligible for retirement benefits after 20 years of Service or if medically retired.
- These beneficiaries have lower priority to receive services in MTFs and many do not live near them. These are heavier users of private sector care than the active duty.
- Many of the retiree population are eligible for other government coverage, such as the VA or Medicare. Many also purchased private health insurance.

<table>
<thead>
<tr>
<th>Types of Beneficiaries by Service</th>
<th>Air Force</th>
<th>Army</th>
<th>Marines</th>
<th>Navy</th>
<th>Other</th>
<th>Sum.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Retiree</td>
<td>883,625</td>
<td>825,848</td>
<td>128,645</td>
<td>600,441</td>
<td>49,701</td>
<td>2,191,340</td>
</tr>
<tr>
<td>2: Retiree Family</td>
<td>743,983</td>
<td>1,002,728</td>
<td>170,846</td>
<td>578,445</td>
<td>59,368</td>
<td>2,562,590</td>
</tr>
<tr>
<td>3: Survivor</td>
<td>124,110</td>
<td>232,273</td>
<td>32,723</td>
<td>135,714</td>
<td>6,620</td>
<td>604,440</td>
</tr>
<tr>
<td>Sum:</td>
<td>1,821,588</td>
<td>2,060,848</td>
<td>340,314</td>
<td>1,214,869</td>
<td>117,909</td>
<td>5,358,370</td>
</tr>
</tbody>
</table>
MHS Population FY 2000+

- Observations:
  - Increase in AD/ADFM when OIF/OEF began
  - The decrease in AD/ADFM and increase in others.
  - Others include inactive guard/reserve and their families (as well as retiree family members)
Who are the Beneficiaries of the MHS?

Dual Eligibility
• There are many patients who have more than one reason to access the MHS, which can cause an issue with identifying patients over time.
• There are also beneficiaries with eligibility for Medicare and the VA.
  • TRICARE For Life: Medicare is first payer.
  • VA: These patients can switch between systems routinely because they are dual eligible or because of resource sharing agreements between VA-DoD facilities.

Therefore there is a need for a DoD-VA combined system like DaVINCI (with plans to incorporate CMS in future).
Military Health System (MHS) Data Repository (MDR)
MHS Data Repository

- What is the MDR?
  - The most robust source of MHS data centrally available going back decades
  - Enhances data from existing operational systems (increasing data quality).
    - PDTS – Pharmacy Detail Transaction Service
    - AHLTA/CDR - Armed Forces Health Longitudinal Technology Application/ Clinical Data Mart
    - DEERS – Defense Enrollment Eligibility Reporting System
    - CHCS - Composite Healthcare System
    - MHS GENESIS – New Cerner EHR
    - TED ODS - TRICARE Claims
    - TMDS – Theater Medical Data Store
    - Etc.
Basic Data Flow

Operational DoD Sources
- CHCS / AHLTA CDR
- PDTS
- DEERS
- TRICARE claims

MDR (Data Warehouse)

ETL

M2 (Datamart)

HSDW

DAVINCI (SQL Database)

DAVINCI extracts

M2 extracts

Operational DoD Sources
- CHCS / AHLTA CDR
- PDTS
- DEERS
- TRICARE claims
MHS Data Repository

Many data warehouses simply display source data as provided.
- The MDR always stores original values that are received from sources,
- But, when possible, programs have been written to add new variables, to correct source system errors, to standardize data amongst sources or to enhance utility.
- This makes the MDR a cleaner source of data than other systems.
- Corrections are not always possible so the data are not perfect.
Routine MDR Enhancements

Person Identification Enhancement:

- MDR maintains a “Master Person Index” file that contains all known person identifiers and associations for each member.
- John has three records in DEERS; one associated with two active duty parents, and one for himself, when he goes on active duty.
- Enables the MDR to consistently assign the DEERS ID no matter how John presents for care.

<table>
<thead>
<tr>
<th>Person</th>
<th>Sponsor SSN</th>
<th>Relation</th>
<th>Pat SSN</th>
<th>DEERS ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Smith</td>
<td>111-11-1111 (Mom)</td>
<td>Child</td>
<td>333-33-3333</td>
<td>1111111111</td>
</tr>
<tr>
<td>John Smith</td>
<td>222-22-2222 (Dad)</td>
<td>Child</td>
<td>333-33-3333</td>
<td>1111111111</td>
</tr>
<tr>
<td>John Smith</td>
<td>333-33-3333 (John)</td>
<td>Sponsor</td>
<td>333-33-3333</td>
<td>1111111111</td>
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</table>
Routine MDR Enhancements

Uses DEERS files to properly assign benefit information, enrollment information and demographics.
Fixes inconsistencies related to there being 100+ separate CHCS servers.

Groups diagnosis and procedure codes into categories
Diagnosis Related Groups (TRICARE Unique)
Major Diagnostic Categories
Ambulatory Payment Classifications
AHRQ Clinical Classification Software
Risk Adjustment (TRICARE Unique)
Routine MDR Enhancements

**Application of workload weights:**
- Relative Value Units
- Relative Weighted Products (DRG weights)

**Application of risk scores**
- Financial risk
- DoD Risk Adjustment Model (Concurrent)

**Application of estimated costs**
- Full costs and variable costs for direct care data
MDR Enhancements

The idea behind the MDR enhancements is:
- Get the most accurate data available to the users
- Apply consistent tools/logic to the data
- Make the data easy to use
- Transparency, transparency, transparency

There are many other enhancements as well, some unique to each type of data.
All enhancements are fully documented (transparency).

MHS Data Repository and official reporting

- Determining the contribution from DoD to a joint DoD/Medicare fund that pays for TRICARE for Life.
- Management of purchased care claims payment.
- Developing payment rates used by TRICARE.
- Calculating “risk sharing” amounts on billion dollar managed care support contracts. Estimating costs of changes to the contracts.
- Calculating the Services budgets from DoD for operating MTFs.
- Calculating payment amounts for third party payors such as the Coast Guard and the VA.
- Reports to Congress, such as the recent MHS Review, or the Military Compensation and Retirement Commission.
- Hundreds of clinical research studies, including feeding DaVINCI
- IOM reports, CDC reporting, etc.
MHS Data and Research

The MHS has a long history of using data for research.

- There are active agencies within each Service dedicated to conducting research.
- There is not a research mandate within the MHS, however.
- Receiving and using MHS data w/o DoD sponsorship can be difficult. The most difficult part tends to be finding a way to get the data pulled.
- The DaVINCI project is intended to streamline and assist researchers and other users in gaining easier access to data to combine the DoD and VA experience for a more robust set of data to study.

*It is particularly important that users understand the MHS and the different benefits in order to properly apply the data to research.*
# Summary of Data in the MDR

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</tr>
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<tbody>
<tr>
<td>DEERS</td>
<td>VM6</td>
<td>Eligibility, enrollment, demographics, service, etc</td>
</tr>
<tr>
<td>DMDC</td>
<td>Contingency Tracking System (CTS)</td>
<td>Deployment related information</td>
</tr>
<tr>
<td>DMDC</td>
<td>Separatee</td>
<td>Separation from Service information</td>
</tr>
<tr>
<td>DMHRS</td>
<td>DMHRS</td>
<td>Human Resources/Staffing</td>
</tr>
<tr>
<td>MDR-Processed</td>
<td>Health Risk</td>
<td>Disease State, Financial Risk Adjustment</td>
</tr>
<tr>
<td>Death File</td>
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<td>Deaths from SSA, DMDC, Casualty Affairs, etc.</td>
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<td>MTF Accounting and Staff</td>
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<td>Pharmacy Data Transaction Service</td>
<td>PRTS</td>
<td>Pharmacy Utilization Review</td>
</tr>
<tr>
<td>TRICARE Encounter Data - Institutional</td>
<td>TEDI</td>
<td>Purchased Care Claims - Institutional</td>
</tr>
<tr>
<td>TRICARE Encounter Data - Non Inst'l</td>
<td>TEDN</td>
<td>Purchased Care Claims - Non Institutional</td>
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<tr>
<td>National Provider ID</td>
<td>NPI</td>
<td>Provider Directory</td>
</tr>
<tr>
<td>Designated Provider</td>
<td>DP</td>
<td>Purchased Care Claims - Designated HMO</td>
</tr>
<tr>
<td>Theater Medical Data Store</td>
<td>TMDS</td>
<td>Theater Healthcare Data</td>
</tr>
<tr>
<td>Direct Care Dental</td>
<td>DC Dental</td>
<td>Direct Care Dental records</td>
</tr>
<tr>
<td>Purchased Care Dental</td>
<td>PC Dental</td>
<td>Purchased Care Claims - Dental</td>
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<tr>
<td>Case Management</td>
<td>CM</td>
<td>Case Management - Direct Care</td>
</tr>
<tr>
<td>Behavioral Health Data Portal</td>
<td>BHDP</td>
<td>Behavioral Screening Exams</td>
</tr>
</tbody>
</table>
DaVINCI Cohort

DHA Population

- Other Categories
- DoD Fam Mbrs
  - Active Duty
  - Guard/Reserve
  - DoD Fam Mbrs Seen by VA

DAVINCI Population Subset

- Retirees
- Separatees

VHA Population

- Other Categories
- DoD Fam Mbrs Seen by VA
- Separatees

1 Includes ADCs & Non-ADCs
2 Vast Majority from VHA
3 Common Patients Only
4 Full Operating Capability
OMOP Common Data Model (CDM)

• The Observational Medical Outcomes Partnership (OMOP) has developed a Common Data Model (CDM) that allows for analysis of disparate observational databases.

• Data from the DoD and VA are stored in different formats both within and between the two agencies.

• Different terminologies or vocabularies are used between the two agencies (e.g. MEPRS Codes vs. Stop Codes) and within the two agencies (e.g. transitioning from ICD-9 to ICD-10 diagnosis codes).

• The OMOP CDM standardizes both the data model and the common representation of data in the model.

• Theoretically, users can use data mapped to the OMOP CDM without knowing specifics about the source data systems.

• The Extract, Transfer, Load (ETL) logic that builds the OMOP CDM must be carefully designed to accurately represent the source data.

https://github.com/OHDSI/CommonDataModel/wiki
Mapping any data source to the OMOP model

- VistA
- Cerner
- AHLTA / CHCS
- Medicare Claims
- CDW
- HealthEDW
- MDR
- CMS Data Repository
- OMOP
- Query using the same SQL code
Pros and Cons of the OMOP CDM

**Pros**

- Analyze data from multiple sources in one format using one set of standardized vocabularies.
- No need to know every nuance of each source.
- Combining many data sources provides a more comprehensive view of a patient’s medical history.
- Generally, the provenance of the data is contained in the model so records can be linked back to the source data for confirmation or more detailed analysis.

**Cons**

- Some source-specific data is not easily represented in the OMOP CDM.
  - e.g. Commonly used DoD variables like Beneficiary Category or VA variables like Service Era are not available.
  - e.g. The OMOP CDM is not designed to track changes to a person’s status (Primary Care Manager, location) over time.
- The CDM is only as good as the process that was used to transform the source data.
- There are some nuances to using the OMOP CDM which requires its own learning curve.
Nearly everything in the OMOP CDM is represented by a concept.

The most important application of this is for administrative codes like diagnosis and procedure codes.

Each code is represented by a concept and concepts are mapped to standard concepts.

The tables in the OMOP CDM contain:

- **Source value**: The code as it appears in the source data.
  - E.g. ICD-9 Diagnosis of PTSD 309.81
- **Source concept ID**: The ID for the concept that represents the source value.
  - 44836990 represents the source concept ID of that specific PTSD diagnosis code.
- **Concept ID**: The ID for standard concept that the source concept maps to.
  - Most diagnosis codes are mapped to SNOMED; 436676 represents the concept ID for the specific PTSD code in the standard concept of SNOMED.

Concepts are also used for things like race, ethnicity, place of service, provider specialty, etc.
Single Concept table:

For every code that exists there is a map to a Standard Concept:

- ICD-9-CM Diagnoses to SNOMED
- ICD-10-CM to SNOMED
- NDC to RxNorm

Some common vocabularies are used as standard concepts:

- CPT-4
- CVX
- HCPCS
- ICD-9-CM Procedures
- ICD-10-PCS
- LOINC
Person table

Person_source_value contains familiar identifiers

- DoD model: EDIPN
- VA model: ICN

Person_id is the best way to uniquely identify a person across both models

- e.g. If Bob Smith (EDIPN = 1001122334, ICN = 1998877665) appears in both models, they will have the same person_id (maybe 12345)
# Full OMOP Model, Record Counts (DoD & VA)

<table>
<thead>
<tr>
<th></th>
<th>Patient Records in DoD OMOP only</th>
<th>Patient with Records in Both, from DoD table</th>
<th>Patient with Records in Both, from VA table</th>
<th>Patient Records in VA OMOP only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Active Duty</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>1,248,553</td>
<td>309,349</td>
<td>309,349</td>
<td>0</td>
</tr>
<tr>
<td>Visits</td>
<td>99,683,887</td>
<td>26,320,796</td>
<td>3,144,993</td>
<td>0</td>
</tr>
<tr>
<td>Diagnoses</td>
<td>145,856,522</td>
<td>39,409,327</td>
<td>1,840,957</td>
<td>0</td>
</tr>
<tr>
<td>Procedures</td>
<td>238,313,832</td>
<td>60,788,838</td>
<td>2,312,451</td>
<td>0</td>
</tr>
<tr>
<td>Medications</td>
<td>100,189,589</td>
<td>26,894,652</td>
<td>1,083,981</td>
<td>0</td>
</tr>
<tr>
<td>Measurements (Labs/Vitals)</td>
<td>386,050,481</td>
<td>97,456,079</td>
<td>17,033,118</td>
<td>0</td>
</tr>
<tr>
<td><strong>Deceased</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>287,245</td>
<td>578,302</td>
<td>746,855</td>
<td>7,258,887</td>
</tr>
<tr>
<td>Visits</td>
<td>32,568,006</td>
<td>62,576,727</td>
<td>115,518,986</td>
<td>852,056,466</td>
</tr>
<tr>
<td>Diagnoses</td>
<td>83,519,832</td>
<td>166,733,440</td>
<td>92,154,692</td>
<td>660,747,860</td>
</tr>
<tr>
<td>Procedures</td>
<td>63,148,155</td>
<td>121,798,103</td>
<td>94,464,044</td>
<td>668,350,486</td>
</tr>
<tr>
<td>Medications</td>
<td>39,936,219</td>
<td>84,598,876</td>
<td>358,607,532</td>
<td>2,322,152,763</td>
</tr>
<tr>
<td>Measurements (Labs/Vitals)</td>
<td>28,037,299</td>
<td>68,648,844</td>
<td>691,115,014</td>
<td>5,342,926,233</td>
</tr>
<tr>
<td><strong>Retirees</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td>651,199</td>
<td>1,560,401</td>
<td>1,560,401</td>
<td>0</td>
</tr>
<tr>
<td>Visits</td>
<td>100,675,545</td>
<td>301,603,347</td>
<td>233,034,899</td>
<td>0</td>
</tr>
<tr>
<td>Diagnoses</td>
<td>209,146,876</td>
<td>621,327,467</td>
<td>184,222,388</td>
<td>0</td>
</tr>
<tr>
<td>Procedures</td>
<td>176,373,144</td>
<td>548,881,599</td>
<td>185,812,747</td>
<td>0</td>
</tr>
<tr>
<td>Medications</td>
<td>145,110,827</td>
<td>407,040,836</td>
<td>279,525,828</td>
<td>0</td>
</tr>
<tr>
<td>Measurements (Labs/Vitals)</td>
<td>162,955,937</td>
<td>554,144,045</td>
<td>1,038,773,588</td>
<td>0</td>
</tr>
</tbody>
</table>
Significant Overlap in Clinical Data

The longitudinal record for these patients for visits, conditions, drugs, and procedures is significantly longer and more complete than just using VA or DoD data alone.

Of the 4B+ procedure records (FY 2000+) in the full combined (DoD + VA) model, 41.7% are for patients who have been seen in both the DoD and VA healthcare systems:

<table>
<thead>
<tr>
<th>DaVINCI Cohort</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Frequency</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Both</td>
<td>1,697,885,785</td>
<td>41.67%</td>
<td>1,697,885,785</td>
<td>41.67%</td>
</tr>
<tr>
<td>DoD Only</td>
<td>665,445,050</td>
<td>16.33%</td>
<td>2,363,330,835</td>
<td>58.00%</td>
</tr>
<tr>
<td>VA Only</td>
<td>1,711,061,807</td>
<td>42.00%</td>
<td>4,074,392,642</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

For procedures, the median timespan between the first and last procedure in the combined OMOP model is 12.7 years for patients in both the DoD and VA data, vs. just 6.5 years for patients only in VA data:

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N (# patients)</th>
<th>25th Pctl</th>
<th>50th Pctl</th>
<th>Mean</th>
<th>75th Pctl</th>
<th>99th Pctl</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Both</td>
<td>5,116,558</td>
<td>7.13</td>
<td>12.72</td>
<td>11.20</td>
<td>15.33</td>
<td>19.25</td>
</tr>
<tr>
<td>DoD Only</td>
<td>3,878,946</td>
<td>1.25</td>
<td>5.02</td>
<td>6.60</td>
<td>12.43</td>
<td>16.33</td>
</tr>
<tr>
<td>VA Only</td>
<td>10,076,639</td>
<td>1.33</td>
<td>6.52</td>
<td>7.56</td>
<td>13.26</td>
<td>18.60</td>
</tr>
</tbody>
</table>
Significant Overlap in Clinical Data

Likewise for the Visit_occurrence table, using the combined model shifts the median # years of data available about 6 years:

<table>
<thead>
<tr>
<th>Cohort</th>
<th>N (# patients)</th>
<th>25th Pctl</th>
<th>50th Pctl</th>
<th>75th Pctl</th>
<th>99th Pctl</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Both</td>
<td>5,152,414</td>
<td>7.69</td>
<td>13.09</td>
<td>15.76</td>
<td>19.33</td>
</tr>
<tr>
<td>DoD Only</td>
<td>3,890,676</td>
<td>1.23</td>
<td>5.00</td>
<td>12.44</td>
<td>17.00</td>
</tr>
<tr>
<td>VA Only</td>
<td>10,823,640</td>
<td>1.52</td>
<td>7.47</td>
<td>14.19</td>
<td>19.07</td>
</tr>
</tbody>
</table>
Limitations of DaVINCII

• No cost data, no deployment data

• DaVINCII cohort does not include the majority of family members

• Limitations of source data are reflected in DaVINCII (e.g., DoD Lab Results only go back to FY 09)
Examples of Research in MHS/DaVinci
# Examples Current Research Projects

## MDR
- Clinical Examples:
  - Asthma (Vanderbilt)
  - Musculoskeletal Injuries/Surgeries
  - Mental Health/Suicide/TBI
  - Opioids
  - Wounded Warriors
  - OB/GYN
- Cost/Utilization/Policy
  - Price elasticity / Demand for healthcare
- Access to Care/GIS:
  - Drive time files
- AI/NLP
  - Google CRADA – radiology/pathology

## DaVINCI
- Clinical research using:
  - Diagnosis Codes/SNOMED
  - CPTs
  - NDCs/RxNorm
- Long longitudinal studies
  - 10 years+
- The effect of transitioning between healthcare plans
MDR
- Guide to DoD Researchers on using MHS Data
  - https://health.mil/Reference-Center/Publications/2012/10/10/Guide-for-DoD-Researchers-on-Using-MHS-Data
- DoD Sponsor (Co-Investigator), Regulatory Paperwork (Protocol, IRB, Data Sharing Agreement)
- Extraction vs. Access

DaVinci
- Operates under existing MOU between DoD and VA, so only need approval from VA or DoD, depending if working with a DoD or VA Sponsor (Co-Investigator)
- The VA’s Health Services Research and Development (HSRD) website is a great resource for information and has a similar guidebook
Thank you!!

Questions?

vpav@kennellinc.com