

Estimating the Cost of Treatment Using VA and DoD Data

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HERC Cost Effectiveness Analysis Series

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Focus Question

- How to compare the cost of treatment using VA facility and DoD facility data?

Poll Question 1

- Have you ever examined VA and or DoD cost data?
 - 1. VA cost data.
 - 2. DoD cost data.
 - 3. Both VA and DoD cost data.
 - 4. Neither VA nor DoD cost data.

Outline

- VA Managerial Cost Accounting (MCA) hospital cost data.
- DoD MTF (Military Treatment Facility) hospital cost data.
- Comparing the cost of hospital treatment for a single diagnosis-COVID-19.
- Comparing the cost of hospital treatment for a condition with multiple diagnoses: Traumatic Brain Injury (TBI).

VA MCA Hospital Data¹

- The Managerial Cost Accounting System (MCA) maintains National Data Extracts (NDE) that track utilization and cost for inpatient hospital care provided by the U.S. Department of Veterans Affairs medical centers (VAMCs).
- Researchers with VA Informatics and Computing Infrastructure (VINCI) authorization can access these files stored as structured query language (SQL) datasets.
- MCA HDISCH is the inpatient hospital database that contains cost data for an entire hospitalization during a fiscal year.

VA MCA Hospital Data¹

- MCA uses activity-based cost accounting, a method designed to provide precise cost estimates.
- Each record contains the total cost of the hospitalization, along with subtotals for laboratory, pharmacy, surgery, radiology, nursing, and all other care.
- Each of these subtotals is further subdivided into fixed direct, variable direct, and indirect costs.

DoD MTF Hospital Cost Data²

- DaVINCI is a Joint Incentive Funded Project between DoD and VINCI.
- Data from DoD's Military Health System Data Repository (MDR) are sent to the VA through DaVINCI. This provides a consolidated view of healthcare for Servicemembers and Veterans receiving care from DoD or VA from military service entry until death.
- Access to these data for research purposes is provided using the VA's internal process and granted by the VA's data stewards.

DoD MTF Hospital Cost Data

- Standard Inpatient Data Record (SIDR) is the inpatient hospital database for Military Treatment Facility hospitalizations.²
- The DoD also uses activity-based costing to assign costs to a hospitalization.³
- Each hospital record contains full cost as well as variable cost for the categories of laboratory, radiology, ICU, ancillary, surgery, support, clinical salary, and other personnel salary.²

Cost of Hospitalization

- For VA, the *totcost* variable from HDISCH database indicates the total cost of the hospitalization.¹
- For DoD, total cost is estimated from SIDR database by summing the following variables²:
FCANCLAB+FCANCRAD+FCCLNSAL+FCICU+FCOTHANC+FCOTHSAL+FCSUPPRT+FCSURG

Building a VA-DoD Database

- 1. Identify variables that can be matched between VA and DoD Hospitalization databases.
- 2. Give the variables a common name to merge the data.
- 3. Create a variable indicating VA or DoD hospitalization prior to merging.

Total Cost of Hospitalizations

- Obtain the total cost (totcost) variable from the VA HDISCH database.¹
- Obtain the cost variables described previously from the DoD SIDR database to estimate the total cost.²
- Divide total cost by the length of stay to obtain the cost per day.

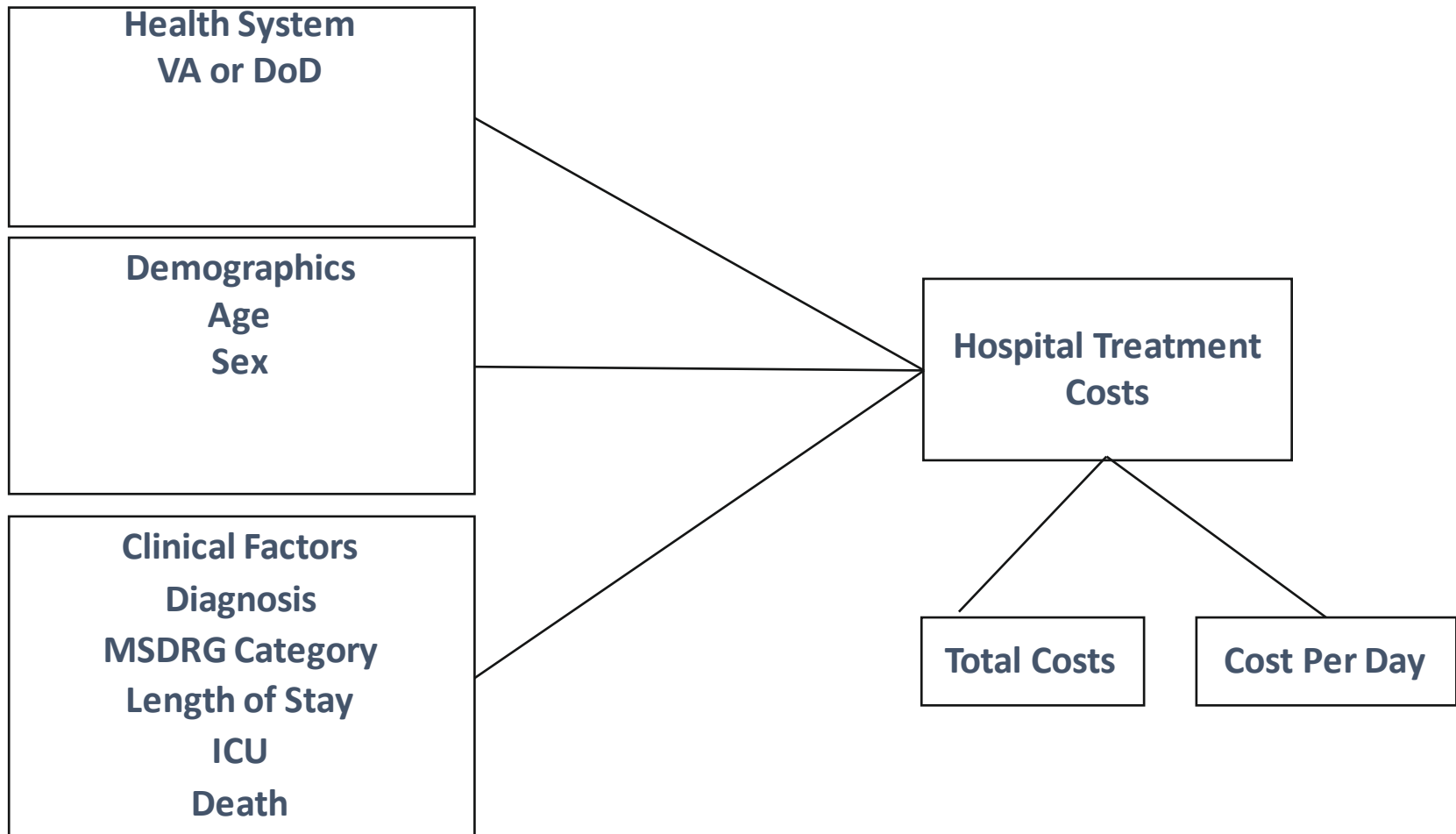
Additional variables

- Length of stay is *los* in VA HDISCH¹ and *Length_of_Stay* in DoD SIDR.²
- Primary Diagnosis is identified based on *icd10dxprime* in VA HDISCH data¹ and *Diagnosis_1* in DoD SIDR.²
- MSDRG, which are groups used by Medicare to reimburse hospitals based on patient clinical complexity⁴, is *drgms* in VA HDISCH¹ and *MSDRG* in DoD SIDR².

Additional variables

- Age is *age* in VA HDISCH¹ and *Age* in DoD SIDR.²
- Sex is *sex* in VA HDISCH¹ and *Gender* in DoD SIDR.²
- Death is identified based on disposition codes in *discdisp* in VA HDISCH¹ and *Disposition_Status_Code* in DoD SIDR.²
- ICU utilization is calculated based on *icucost* in VA HDISCH¹ and *FCICU* in DoD SIDR.²

Conceptual Model Treatment Costs⁵



Identifying Hospitalizations For COVID-19

- Using the VA HDISCH20 database, identified all primary diagnoses (icd10dxprime) for COVID-19, U071 during FY2020.⁶
- Using DoD SIDR database, identified primary diagnosis (Diagnosis_1) for COVID-19, U071 during FY2020 based on the FY variable contained in SIDR.⁶
- Identify age, sex, ICU, death, and MSDRG variables in VA and DoD as described previously.
- Create DoD and VA variables for separate databases and merge similar variables.

Methods

- Compare unadjusted total costs of COVID-19 hospitalization treatments by system, age, sex, and MSDRG.
- Compare unadjusted LOS of COVID-19 hospitalization treatments by system, age, sex, and MSDRG.
- Compare unadjusted cost per day of COVID-19 hospitalization treatments by system, age, sex, and MSDRG.
- Used K-sample median tests due to non-normal distribution of cost and LOS.⁷

COVID-19 Hospitalizations FY2020

* P<0.05	DoD n=773	VA n=7,818
Sex*		
Male	85.25%	93.31%
Female	14.75%	6.69%
Age*		
Mean (Median)	54.12 (56)	68.51 (71)
17-59	58.21%	22.55%
60-70	20.57%	27.44%
71-76	8.80%	24.03%
77+	12.42%	25.98%
LOS Mean (Median)*	6.53 (4)	12.99 (7)
ICU*	46.31%	25.85%
Death*	6.86%	13.16%

COVID-19 Hospitalizations FY2020

*P<0.05	DoD n=773	VA n=7,818
MSDRG 177* Respiratory Infections and Inflammation With MCC	69.34%	75.17%
MSDRG 178* Respiratory Infections and Inflammations with CC	8.28%	13.69%
MSDRG 179* Respiratory Infections and inflammations W/O MCC/CC	11.90%	5.44%
MSDRG 207* Respiratory System Diagnosis With Ventilator Support>96 Hours	5.82%	2.12%
MSDRG 208* Respiratory System Diagnosis With Ventilator Support<=96 Hours	3.10%	1.55%
Other MSDRGs*	1.55%	2.03%

COVID-19 Unadjusted Cost, LOS, Cost Per Day

* P<0.05	Total Cost Mean (Median)	LOS Mean (Median)	Cost Per Day Mean (Median)
Health System			
VA	\$61,628 (\$31,587)*	12.99 (7.0)*	\$5,155 (\$4,474)
DoD	\$28,396 (\$13,640)*	6.53 (4.0)*	\$4,633 (\$4,276)
Sex			
Male	\$59,105 (\$30,330)*	12.71 (7)*	\$5,113 (\$4,464)
Female	\$48,393 (\$21,784)*	8.65 (5)*	\$5,055 (\$4,513)
Age			
Age 17-59	\$40,767 (\$19,139)*	7.20 (5)*	\$5,078 (\$4,473)*
Age 60-70	\$59,773 (\$29,454)*	10.73 (7)*	\$5,211 (\$4,491)*
Age 71-76	\$69,515 (\$35,693)*	15.89 (8)*	\$5,343 (\$4,645)*
Age 77+	\$64,724 (\$40,320)*	16.46 (10)*	\$4,814 (\$4,252)*

COVID-19 Unadjusted Cost, LOS, Cost Per Day

* P<0.05	Total Cost Mean (Median)	LOS Mean (Median)	Cost Per Day Mean (Median)
MSDRG 177* Respiratory Infections and Inflammation With MCC	\$58,514 (\$30,571)*	12.74 (7)*	\$5,098 (\$4,507)*
MSDRG 178* Respiratory Infections and Inflammations with CC	\$37,873 (\$20,796)*	10.98 (6)*	\$4,226 (\$3,819)*
MSDRG 179* Respiratory Infections and inflammations W/O MCC/CC	\$24,305 (\$12,543)*	6.83 (4)*	\$4,173 (\$3,767)*
MSDRG 207* Respiratory System Diagnosis With Ventilator Support>96 Hours	\$135,221 (\$119,668)*	17.51 (15)*	\$8,304 (\$7,669)*
MSDRG 208* Respiratory System Diagnosis With Ventilator Support<=96 Hours	\$80,409 (\$60,073)*	10.68 (9)*	\$8,405 (\$6,901)*
Other MSDRGs	\$175,379 (\$104,131)*	21.71 (16)*	\$7,436 (\$5,979)*

Unadjusted COVID-19 Treatment Results

- DoD has a higher utilization of ICU in COVID-19 hospitalization treatment.
- VA has a higher utilization of LOS in COVID-19 hospitalization treatment.
- DoD has twice as many female and younger patients as VA.
- VA has twice as many deaths as DoD.
- VA patients have a higher frequency of MSDRGs with complications and major complications.
- DoD patients have a higher frequency of MSDRGs with ventilator use.

Unadjusted COVID-19 Treatment Results

- Total cost is higher in VA relative to DoD.
- However, LOS is also higher in VA relative to DoD.
- Therefore, cost per day is not significantly different between DoD and VA.
- The highest-cost MSDRGs are those associated with ventilator use.
- DoD treats COVID-19 more intensely via ICU, the use of ventilators, and more rapidly via lower LOS.

Poll Question 2

- What are the benefits of comparing VA and DoD facility data?
- 1. Understanding differences in patient characteristics between DoD and VA.
- 2. Understanding differences in clinical characteristics between DoD and VA.
- 3. Understanding cost differences associated with treatment differences between DoD and VA.
- 4. All of the above.

Identifying Hospitalization Treatment For TBI

- Identifying Hospitalization Treatment for Traumatic Brain Injury involves searching hospital databases for numerous diagnoses.
- There are DoD/VA guidelines for identifying ICD diagnoses for TBI.⁸
- Using the VA HDISCH20 database, identified all primary diagnoses (icd10dxprime) for Traumatic Brain Injury, during FY2020.⁸
- Using DoD SIDR database, identified primary diagnosis (Diagnosis_1) for TBI, during FY2020 based on the FY variable contained in SIDR.⁸

Comparison of VA and DoD TBI Treatment Costs

- Identified TBI according to VA/DoD Guidelines.
- Created a merged dataset of DoD MTF and VA Hospitalizations For TBI.
- Merged data on age, sex, TBI diagnosis, MSDRG, LOS, ICU, and death as described previously.
- Adjusted costs to 2023 dollar values.⁹
- Compared frequency of categorical variables between VA and DoD using the chi-square test.
- Compare cost, LOS, and cost per day based on the k-sample median test.⁷

TBI Hospitalizations Demographics

* P<0.05	DoD n=243	VA n=630
Sex*		
Male	89.30%	96.51%
Female	10.70%	3.49%
Age*		
Mean (Median)	49.20 (44)	73.21 (73)
18-59	59.26% (n=144)	12.06% (n=76)
60-71	11.93% (n=29)	30.16% (n=190)
72-82	15.23% (n=37)	30.16% (n=190)
83+	13.58% (n=33)	27.62% (n=174)
LOS Mean (Median)*	5.22 (3)	9.11 (4)
ICU	46.50%	45.08%
In Hospital Death	2.88%	5.71%

TBI Hospitalizations Diagnoses

TBI Diagnoses*	DoD n=243	VA n=630
* P<0.05		
S065X0A – Traumatic subdural hemorrhage w/o LOC	15.23%	47.78%
S066X0A-Traumatic subarachnoid hemorrhage w/o LOC	9.88%	11.59%
S065X9A-Traumatic subdural hemorrhage w/ LOC, unspecified duration	14.40%	8.10%
S066X9A-Traumatic subarachnoid hemorrhage w/ LOC, unspecified duration	11.52%	4.13%
S0990XA- Unspecified injury of head	1.65%	4.44%
S060X9A-Concussion w/LOC, unspecified duration	8.23%	1.11%
All Other TBI Diagnoses	39.09%	22.86%

TBI Hospitalizations MSDRGs

TBI MSDRGs*	DoD n=243	VA n=630
86-Traumatic Stupor and Coma<1 Hour W/CC	9.47%	27.46%
87-Traumatic Stupor and Coma<1 Hour W/O CC/MCC	14.81%	13.97%
85-Traumatic Stupor and Coma<1 Hour W/MCC	3.70%	15.71%
83-Traumatic Stupor and Coma>1 Hour W/CC	9.88%	6.67%
84-Traumatic Stupor and Coma>1 Hour W/O CC/MCC	12.76%	3.49%
90-Concussion W/O CC/MCC	16.05%	1.11%
Other TBI MSDRGs*	33.33%	31.59%

Unadjusted Hospital Cost By TBI Diagnosis

* P<0.05	DoD Total Cost Mean (Median)	VA Total Cost Mean (Median)
All Hospitalizations	\$32,285 (\$13,548)*	\$48,526 (\$23,084)*
S065X0A – Traumatic subdural hemorrhage w/o LOC	\$57,454 (\$26,826)	\$47,672 (\$26,331)
S066X0A-Traumatic subarachnoid hemorrhage w/o LOC	\$23,927 (\$18,575)	\$38,394 (\$19,633)
S065X9A-Traumatic subdural hemorrhage w/ LOC, unspecified duration	\$37,075 (\$15,973)	\$44,034 (\$19,779)
S066X9A-Traumatic subarachnoid hemorrhage w/ LOC, unspecified duration	\$38,102 (\$13,156)*	\$54,191 (\$28,366)*
S0990XA- Unspecified injury of head	\$12,144 (\$6,151)	\$27,470 (\$11,245)
S060X9A-Concussion w/LOC, unspecified duration	\$6,863 (\$4,952)*	\$17,139 (\$13,917)*
All Other TBI Diagnoses	\$27,314 (\$8,580)*	\$61,636 (\$22,231)*

Unadjusted LOS By TBI Diagnosis

* P<0.05	DoD LOS Mean (Median)	VA LOS Mean (Median)
All Hospitalizations	5.22 (3)*	9.10 (4)*
S065X0A – Traumatic subdural hemorrhage w/o LOC	8.05 (4)	9.03 (4)
S066X0A-Traumatic subarachnoid hemorrhage w/o LOC	4.75 (3.5)	6.76 (4)
S065X9A-Traumatic subdural hemorrhage w/ LOC, unspecified duration	5.77 (3)	7.21 (4)
S066X9A-Traumatic subarachnoid hemorrhage w/ LOC, unspecified duration	5.64 (3.5)*	11.61 (6)*
S0990XA- Unspecified injury of head	2.5 (1.5)	6.11 (2.5)
S060X9A-Concussion w/LOC, unspecified duration	1.7 (1.5)*	3.43 (3)*
All Other TBI Diagnoses	4.76 (2)*	11.52 (4)*

Unadjusted Hospital Cost Per Day By TBI Diagnosis

* P<0.05	DoD Cost Per Day Mean (Median)	VA Cost Per Day Mean (Median)
All Hospitalizations	\$6,606 (\$4,888)	\$6,415 (\$5,330)
S065X0A – Traumatic subdural hemorrhage w/o LOC	\$10,377(\$5,694)	\$7,109 (\$6,025)
S066X0A-Traumatic subarachnoid hemorrhage w/o LOC	\$6,976(\$6,472)*	\$5,804 (\$5,196)*
S065X9A-Traumatic subdural hemorrhage w/ LOC, unspecified duration	\$6,365(\$5,324)	\$6,383 (\$5,373)
S066X9A-Traumatic subarachnoid hemorrhage w/ LOC, unspecified duration	\$6,098(\$5,274)	\$5,934 (\$4,998)
S0990XA- Unspecified injury of head	\$4,521(\$4,537)	\$5,064 (\$4,343)
S060X9A-Concussion w/LOC, unspecified duration	\$4,732(\$3,139)*	\$5,212 (\$4,885)*
All Other TBI Diagnoses	\$5,765(\$4,290)	\$5,695 (\$4,917)

Unadjusted Hospital Cost by TBI MSDRG

* P<0.05	DoD Total Cost Mean (Median)	VA Total Cost Mean (Median)
All Hospitalizations	\$32,285 (\$13,548)*	\$48,526 (\$23,084)*
86-Traumatic Stupor and Coma<1 Hour W/CC	\$18,732 (\$16,177)	\$41,127 (\$20,764)
87-Traumatic Stupor and Coma<1 Hour W/O CC/MCC	\$14,385 (\$11,356)	\$27,652 (\$13,617)
85-Traumatic Stupor and Coma<1 Hour W/MCC	\$29,377 (\$24,254)	\$47,142 (\$26,331)
83-Traumatic Stupor and Coma>1 Hour W/CC	\$17,400 (\$16,181)*	\$56,588 (\$23,722)*
84-Traumatic Stupor and Coma>1 Hour W/O CC/MCC	\$11,286 (\$9,034)	\$16,381 (\$11,005)
90-Concussion W/O CC/MCC	\$6,416 (\$5,049)	\$44,406 (\$7,841)
Other TBI MSDRGs	\$69,313 (\$32,224)	\$66,875 (\$30,502)

Unadjusted Hospital LOS by TBI MSDRG

* P<0.05	DoD LOS Mean (Median)	VA LOS Mean (Median)
All Hospitalizations	5.22 (3)*	9.10 (4)*
86-Traumatic Stupor and Coma<1 Hour W/CC	5.43 (3)	9.56 (4)
87-Traumatic Stupor and Coma<1 Hour W/O CC/MCC	3.36 (1.5)	6.05 (2)
85-Traumatic Stupor and Coma<1 Hour W/MCC	4.44 (5)	9.10 (5)
83-Traumatic Stupor and Coma>1 Hour W/CC	3.91 (3)	12.40 (4)
84-Traumatic Stupor and Coma>1 Hour W/O CC/MCC	3.22 (2)	3.54 (2)
90-Concussion W/O CC/MCC	1.89 (1)	13.71 (2)
Other TBI MSDRGs	8.82 (5)	9.82 (5)

Unadjusted Hospital Cost Per Day By TBI MSDRG

* P<0.05	DoD Cost Per Day Mean (Median)	VA Cost Per Day Mean (Median)
All Hospitalizations	\$6,606 (\$4,888)	\$6,415 (\$5,330)
86-Traumatic Stupor and Coma<1 Hour W/CC	\$5,110 (\$4,515)*	\$6,170 (\$5,166)*
87-Traumatic Stupor and Coma<1 Hour W/O CC/MCC	\$6,264 (\$4,888)	\$5,783 (\$5,077)
85-Traumatic Stupor and Coma<1 Hour W/MCC	\$7,547 (\$7,796)	\$6,485 (\$5,646)
83-Traumatic Stupor and Coma>1 Hour W/CC	\$5,699 (\$4,527)	\$5,436 (\$5,082)
84-Traumatic Stupor and Coma>1 Hour W/O CC/MCC	\$5,662 (\$4,282)	\$5,754 (\$4,994)
90-Concussion W/O CC/MCC	\$4,747 (\$3,361)	\$3,876 (\$3,289)
Other TBI MSDRGs	\$8,604 (\$5,694)	\$7,242 (\$6,067)

Unadjusted TBI Treatment Results

- DoD patients are younger and more female.
- DoD patients have a higher frequency of TBI diagnoses with Loss of Consciousness (LOC), possibly due to military exposures such as blasts.¹⁰
- DoD patients have a higher frequency of MSDRGs associated with Traumatic Stupor and Coma >1 Hour.

Unadjusted TBI Treatment Results

- Total Cost is higher in VA than DoD
- LOS is higher in VA than in DoD.
- Cost Per Day is not significantly different.
- Traumatic subdural hemorrhage w/o LOC is the highest median total cost diagnosis in DoD.
- Traumatic subarachnoid hemorrhage w/ LOC, unspecified duration, is the highest median total cost diagnosis in VA.
- Traumatic Stupor and Coma<1 Hour W/MCC is the most expensive median total cost in VA and DoD.

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Future Work

- Future Work: Comparing outpatient care costs between DoD and VA facilities.
- VA uses Clinic Stop Codes.
- DoD uses Medical Expense and Performance Reporting System (MEPRS) codes.
- Clinic Stop Codes to MEPRS codes require classification via a crosswalk.

Questions?

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