

Determining the Cost of VA Care  
with the Average Cost Method for the 1993-1997 Fiscal Years

Paul G. Barnett, PhD,  
Shuo Chen, PhD,  
and Todd H. Wagner, PhD

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## 1. Overview

The U.S. Department of Veterans Affairs (VA) provides health care to veterans at some 150 medical centers. VA does not routinely bill patients for their care. As result, VA economics researchers have not had billing data to estimate the cost of health care encounters. This working paper describes a method of estimating the cost of health care encounters using centralized VA cost and utilization data bases and relative value units obtained from non-VA databases.

We used VA cost and utilization data to estimate the cost of VA patient care encounters. Our estimates are based on the cost of patient care departments reported in the VA Cost Distribution Report (CDR) and the detailed utilization data reported in the Patient Treatment File (PTF) and the Outpatient Care File (OPC). This document describes methods we used for the federal fiscal years ending in 1993 through 1997.<sup>1</sup>

We have called this the “average cost” method, as it assumes that every health care encounter has the average cost of all encounters that share its same characteristics. While this assumption limits the accuracy of the cost estimates, this method is the only available method of generating a comprehensive set of encounter-level estimates of all patient care provided by VA prior to the 1998 fiscal year. This average cost method relied on the following assumptions:

- X To find the cost of outpatient visits, we found the average cost per clinic location that was visited for each of 12 different types of outpatient care. We assumed that all visits within each category have the same cost.
- X To find the cost of long-term, rehabilitation, and psychiatric hospital stays, we found the average cost of a day of stay, and applied it to estimate the cost of care. This makes the assumption that every day of stay has the same cost, that is, that costs are proportionate to the length of stay.

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1. The federal fiscal year begins on October 1 and ends on September 30 of the following year. We follow the convention of referring to a federal fiscal year (FY) by the year it ends, thus FY97 represents the period October 1, 1996 to September 30, 1997.

X To find the cost of acute hospital care, we used relative value units (RVUs) from the non-VA sector. These RVUs are the Diagnosis Related Group (DRG) weights used by the Health Care Financing Administration to reimburse U.S. hospitals for the care they provide to Medicare patients. The RVUs reflect the effect of diagnosis on the relative quantity of resources used in a hospital stay. We used these RVUs so that our cost estimates would reflect the effect of diagnosis on resource use. The method we employed makes the following assumptions: (1) that the non-VA relative value units, the Medicare DRG weights, reflect the relative costs of VA hospital stays, (2) that all stays with the same characteristics have the same cost, (3) that costs are exactly proportional to the DRG weight when the length of stay is equal to the mean for that DRG, (4) and that when a stay is different from the mean, the difference in length of stay has a constant proportional effect on costs.

This paper begins with a description of the VA Cost Distribution Report (CDR), our source of cost information. It then provides an overview of our method of combining the CDR with the VA utilization files.

Section 4 describes how these data were used to estimate the unit costs for outpatient care. Section 5 describes VA inpatient databases, and how we tabulated them to find the costs of hospital stays. Section 6 describes our method of determining the daily cost of mental health, rehabilitation, and long-term care stays. The final section of this working paper describes our method of finding the cost of acute hospital stays.

The paper includes comments to indicate our plans for improvements in the costing method that we plan to adopt for FY98 and subsequent fiscal years.

## **2. Cost Distribution Report**

The Cost Distribution Report (CDR), also called report RCS 10-0141, is routinely prepared by all VA medical centers. The CDR represents an estimate of the costs expended by each VA patient care department.

VA expenditures are recorded in its general ledger, the Financial Management System

(FMS). The FMS system tracks expenditures by cost center, a budget entity which corresponds to a VA service. Examples of VA cost-centers are Medical and Plant Operations. Cost centers do not correspond to a specific patient care department.

The CDR is created by distributing costs reported in the FMS cost centers to the “cost distribution accounts” (CDA) of the CDR. The CDAs include patient care departments, such as Medical Intensive Care, or Medical Ambulatory Care. CDAs also include indirect cost departments.

The distribution of costs is based on estimates prepared by the service chiefs in each medical center. They estimate the amount of time staff spend on different activities. The cost of staff time, as reported in FMS, is then assigned to each CDA. At the end of each fiscal year, a cumulative CDR is prepared, and it is reconciled to the costs reported in FMS.

Table 1 lists the inpatient cost distribution accounts in the CDR, Table 2 lists the outpatient cost distribution accounts. (There are additional cost accounts, such as cost of contract providers, home care programs, and benefits, which are not included in either table).

Table 1  
Cost Distribution Accounts (CDAs) in the Cost Distribution Report  
Inpatient Services

DEPARTMENT	COST DISTRIBUTION ACCOUNT	
	DIRECT COST	INDIRECT COST
GENERAL MEDICINE	1110	1100
NEUROLOGY	1111	
REHABILITATION	1113	
EPILEPSY CENTER	1114	
BLIND REHAB	1115	
SPINAL CORD INJ	1116	
MED INT CARE UNIT	1117	
INPATIENT DIALYSIS	1118	
INPATIENT AIDS	1119	
GEM UNIT - MED BEDS	1120	
PRIMARY CARE – MED	1130	
SURGICAL WARD COST	1210	1200
SURG INTENSIVE UNITS	1211	
OPERATING ROOM SUITE	1212	
OPEN HEART SURGERY	1213	
PRIMARY CARE – SURG	1230	

Table 1 (continued)

PSYCHIATRIC WD COST	1310	1300
GEN INTERMEDIATE PSY	1311	
S/A INTERMED CARE	1312	
S/A TREAT PROG – HI	1313	
SPEC INPAT PTSD UNIT	1314	
EVAL/BRIEF TRMT PTSD	1315	
STAR I, II & III	1316	
S/A STAR I, II & III	1317	
GEM UNIT - PSYCH BED	1320	
PRIMARY CARE – PSYCH	1330	
NURSING HOME OVERHEAD	1400	1400
VA NURSING HOME CARE	1410	
GEM UNIT - NH BEDS	1420	
DOMICILIARY BED SECT	1510	1500
DOM SUBSTANCE ABUSE	1511	
PTSD RESID REHAB DOM	1512	
GEM UNIT - DOM BEDS	1520	
INTERMEDIATE CARE	1610	1600
GEM UNIT - INT BEDS	1620	
PRRTP	1711	1700
PRRP	1712	
SARRTP	1713	
HCMC CWT/TR	1714	
SA CWT/TR	1715	
GENERAL CWT/TR	1717	

Tables 1 and 2 also explain the correspondence between direct and indirect costs in the CDR. The middle column lists the direct costs CDAs. These represent costs directly attributed to patient CDAs, such as the cost of physician services, nursing staff, laboratory services, supplies, etc. The right column provides the indirect CDAs. The CDR does not distribute these indirect costs to each department; however, they are only distributed to a group of departments. Although there are more than 40 direct cost accounts, there are just 7 corresponding indirect cost accounts. There is just one indirect CDA to correspond to the 31 direct CDAs for outpatient care.

Each of these indirect CDA accounts include as many as eleven different types of indirect costs, each distinguished by numbers to the right of the decimal place. The types of indirect costs include education (.11, .12, .13, .14), research (.21 and .22), administrative support (.30),

building management (.40), engineering (.50), equipment depreciation (.70), building depreciation (.80). Thus the indirect cost account “medical research support” for medical bed section is designated as 1100.21, and includes the costs of medical research associated with the eleven CDAs numbered between 1100 and 1118. We used the CDR detail file as our source of data, as it includes indirect cost CDAs for equipment and building depreciation that are not included in the CDR jurisdictional file.

Table 2  
Cost Distribution Accounts in the Cost Distribution Report  
Outpatient Services

DEPARTMENT	DIRECT COST	INDIRECT COST
MEDICINE - SOC	2110	2800
ADMITTING/SCREENING	2111	
HIV/AIDS OP CLINICS	2119	
OP PRIMARY CARE MED	2130	
SYRGERY - CBC	2210	
AMB OPERATING ROOM	2211	
OP PRIM CARE SURG	2230	
SPEC PSYCH - SOC	2310	
GEN PSYCH - SOC	2311	
HCHV/HMI SOC	2312	
PTSD CLINICAL TEAM	2313	
PSYSOCIAL-GRP SOC	2314	
PSYSOC-IND SOC	2315	
SUBSTANCE ABUSE (OP)	2316	
SUBSTANCE USE DISORD	2317	
HUD/VASH SOC	2318	
COMMUNITY OUTREACH	2319	
OP PRIM CARE SPT SOC	2330	
OP PRIM CARE GEN SOC	2331	
DIALYSIS - SOC	2410	
CANCER TREATMENT	2420	
ADULT DAY HLTH CARE	2510	
ANCILLARY SVC - SOC	2610	
REHAB-SUPT SVCS	2611	
DIAGNOSTIC SVC - SOC	2612	
PHARMACY - SOC	2613	
PROSTHETICS/ORTHOT	2614	
SCI SUBS ABUSE OP	2616	
DENTAL PROCEDURES	2710	
DOM AFTERCARE - VA	2750	
TELEPHONE CONTACTS	2780	

**Distribution of Indirect Costs.** Our average cost estimate required information about each CDA, including its share of indirect costs. The CDR distributes indirect costs only to groups of patient care departments, but we needed to distribute them to each CDA. We assigned indirect costs to each CDA in proportion to its share of the total direct costs of its group of CDAs. For example, the indirect cost of the inpatient mental health bed sections was distributed to the component departments of psychiatry, substance abuse, and PTSD according to each CDA's share of their total direct cost. At a facility where the psychiatry CDA had 55% of the direct cost in the group of inpatient mental health CDAs, we assigned 55% of the indirect cost to psychiatry.

We considered using quantity of utilization as the basis to allocate indirect costs. This would have required us to assume that indirect costs are incurred in proportion to the quantity of service provided, such as the number of inpatient days or the number of clinic visits. We decided that this assumption was unwarranted, as services are heterogeneous. For example, since some clinic visits have much greater direct cost, it is not reasonable to assume that they use the same indirect cost. We are unaware of any available data to distribute VA indirect costs on another basis, e.g., to distribute facility maintenance costs based on square footage of space.

**CDR Units and Unit Costs.** We did not use the units of service or the unit costs reported in the CDR because of our lack of confidence in the accuracy of these data. Utilization is sometimes excluded. This occurs when a cost distribution account has no cost; any utilization in the corresponding bed section or clinic stop is not included in the CDR. Costs are sometimes excluded from the calculation of unit costs. This occurs when the CDR reports costs but has no matching utilization, since unit costs would otherwise be a "divide by zero" error, the computer program that creates the CDR calculates the unit costs for that department to be zero; in this way, the cost is effectively dropped from consideration. Instead, we used the VA discharge (the Patient Treatment File) and ambulatory care data bases (the Outpatient Care File) as our source of utilization data in order to find the per unit cost of services.



### 3. Overview of Merger of Cost and Utilization Databases

This section describes how we merged the CDR with VA utilization data bases. The VA database of hospital stays is called the Patient Treatment File (PTF); its database of outpatient visits is called the outpatient care file (OPC).

We excluded the cost of facilities that do not provide patient care. Over time, facilities have consolidated, but these consolidations were not necessarily implemented at the same time in the cost and utilization databases. We recoded data to keep a common definition of facility in the databases. Since patient care departments are sometimes defined differently in the cost data than in the utilization data, we aggregated departments to find a common denominator.

#### A. Excluded Facilities.

We excluded the 16 facilities that report costs in the CDR, but do not report utilization in either the PTF and OPC. These include records for VA Headquarters (station 101), information services centers, and other VA support facilities. A list of these facilities, and their 3 digit facility number, is provided in table 3. Nine of these facilities do not appear in the official listing of VA facilities.<sup>2</sup>

Table 3  
Excluded Facilities

Facility Number	Facility Name
101	VHA Headquarters
200	Austin Automation Center
722	Albuquerque, NM Outpatient Center
741	Denver CHAMPVA
721, 724, 742, 760, 761, 762, 763, 764, 765	
792	Prosthetics Center
794	Somerville
797	Hines (CIO?)

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<sup>2</sup>Consolidated Address and Territorial Bulletin 1-L, U.S. Department of Veterans Affairs, Washington, DC 20420, August 31, 1999

We felt that central administration may involve activities that are more characteristic of a health care payer, rather than a health care provider. For this reason, we decided not to count these facilities as overhead cost to be distributed to patient care departments.

## **B. Facility Mergers**

VA has been consolidating facilities. When one facility merges with another, they both take on a single identification number (See Table 4). This change is sometimes implemented at different times in the different data systems. We wished to maintain the distinction between facilities as long as it was possible. We also wished to work with observations that consisted of facility level data for an entire fiscal year. We consolidated all data into the new facility number in the first fiscal year that the CDR or the utilization databases no longer maintained a distinction between the facilities.

Table 4  
Facility Consolidations and the Year of their Occurrence

VHA Integrated Health Care Systems	Date of Merger	Old facility number	New facility number
VA Palo Alto Health Care System (Palo Alto/Livermore)	April 1995	599	640
VA Puget Sound Health Care System (Seattle/Tacoma)	July 1995	505	663
VA Connecticut Health Care System (West Haven/Newington)	July 1995	627	689
VA Maryland Health Care System (Baltimore/Fort Howard/Perry Point)	October 1995	641, 566	512
VA Central Texas Health Care System (Temple/Marlin/Waco)	October 1995	611, 685	674
VA South Texas Health Care System (San Antonio/Kerrville)	October 1995	591	671
VA Northern Indiana Health Care System (Marion/Fort Wayne)	October 1995	569	610
VA Western New York Health Care System (Buffalo/Batavia)	January 1996	513	528
VA New Jersey Health Care System (East Orange/Lyons)	July 1996	604	561
VA Black Hills Health Care System (Fort Meade/Hot Springs)	July 1996	579	568
VA Pittsburgh Health Care System (University Drive/Highland Drive)	October 1996	645	646
VA Chicago Health Care System (Westside/Lakeside)	January 1997	535	537
VA Central Alabama Health Care System (Montgomery/Tuskegee)	January 1997	680	619
VA North Texas Health Care System (Dallas/Bonham)	January 1997	522	549
Southern California System of Clinics (Sepulveda/Los Angeles/Santa Barbara)	July 1997	665	691
Hudson Valley VA Health Care System (Montrose/Castle Point)	July 1997	533	620
VA Central Iowa Health Care System (Des Moines/Knoxville)	October 1997	592	555
VA Greater Nebraska Health Care System (Lincoln/Grand Island)	October 1997	574	597
VA Eastern Kansas Health Care System (Topeka/Leavenworth)	January 1998	686	677
VA Montana Health Care System (Fort Harrison/Miles City)	July 1998	617	436
North Florida/South Georgia Veterans Health Care System (Gainesville/Lake City)	October 1998	594	573
VA Greater Los Angeles Health Care System (West Los Angeles/Southern California System of Clinics)	October 1998	752	691

VA Boston Health Care System (Boston/Brockton/West Roxbury)	July 1999	525,690	523
New York Harbor Health Care System (New York/Brooklyn)	October 1999	527	630
VA Health Care Network Upstate New York System (VA Western New York Health Care System/Canandaigua)	October 1999	532	528

**C. Definition of patient care unit.**

Patient care units are defined differently in the CDR and the utilization databases. In the CDR, care is characterized by the cost distribution account. The Cost Distribution Report Handbook (U.S. Department of Veterans Affairs, 1996) maps the correspondence between Cost Distribution Accounts and the utilization databases. It does not include the Cost Distribution Accounts and utilization codes created since 1996, so the handbook is now out of date.

The Patient Treatment File (PTF) characterizes inpatient care by the “bed section.”<sup>3</sup> The bed section is the type of ward where the patient received care, such as medical intensive care unit, or nursing home unit. Each inpatient Cost Distribution Account in the CDR reports the costs of operating a group of several different bed sections. To learn about the correspondence between new bedsection codes and new cost distribution accounts, we examined the variable “BEDCDR” in the PTF bedsection file. This variable has the value of the CDA that corresponds to the bedsection. Only one CDA is assigned to each bedsection. As a result, the exact correspondence between “BEDCDR” and “BEDSECN” (the variable for bed section) in the PTF represents a statement of the CDA associated with each bedsection.

The OPC characterizes care using the “clinic stop”, the location where care was delivered. Each outpatient Cost Distribution Account reports the costs of operating a group of outpatient clinic stops. The CDA associated with new clinic stops is provided in a policy that

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3. The bed section is the “treating specialty” assigned to the physician who is responsible for the patient’s care. It roughly corresponds to the location where care is delivered. We used this variable from the PTF, called BEDSECN, to characterize inpatient care. PTF includes another variable, PLBED, to denote the location where care was provided. We did not use this variable to characterize the location of care because many records have missing values for PLBED, whereas all records have a value for BEDSECN.

defines clinic stops (U.S. Department of Veterans Affairs, 1998).<sup>4</sup>

Our review of CDR data suggested that many medical centers do not consistently use the definitions given in the CDR handbook and these supplemental sources. The cost of providing care in a particular bed section or clinic stop is not always assigned to the corresponding CDA specified in the CDR handbook. Some facilities have utilization in bed sections or clinic stops without assigning any costs to the corresponding CDA. In other cases, costs are assigned to a CDA, but no utilization appears in the corresponding bed sections or clinic stops.

One cause of this problem is the addition of new CDAs to the CDR, new bed sections to the PTF, and new clinic stops to the OPC. Facilities may implement new utilization codes and CDAs at different times.

We dealt with these issues by defining aggregate “patient care categories.” These categories represent our judgment about what constitutes the smallest common denominator between cost and utilization. A patient care category represents a group of related cost distribution accounts, and their associated utilization.

We defined patient care categories for each year. We compared cost and utilization data for each year for each medical center. We aggregated CDAs into categories, and ascertained that for almost every medical center, if the category had costs, it also had utilization; and if it had utilization, it also had costs. We also examined the mean cost of care, examining outliers that suggested mismatch of cost and utilization data.

For some categories of care at some medical centers, there were still mismatches between cost and utilization data. When there was no apparent way to match data, and the mismatched data were small, we simply dropped the observation. For FY97, a total of \$3.2 million in cost,

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4. In 1998, outpatient stops were renamed DSS identifiers, and changes were made to the codes that are used. The reference between DSS identifiers and Cost Distribution Accounts is found in VHA Directive 96-057 "Ambulatory Care Data Capture FY98 Decision Support System." Identifiers (DSS ID's)," <<http://www.va.gov/publ/direc/health/direct/196057c3.htm>>, which also provides a sentence description of each DSS Identifier.

6,600 days of stay, and 29,309 visits were dropped from further analysis because there was no apparent way to match them into a single category of care.

Most mismatches were handled by assigning the costs and utilization to a similar department, creating a higher level of data aggregation. Examples of this aggregation include the grouping of inpatient substance abuse care with inpatient psychiatric care, outpatient substance abuse care with outpatient psychiatric care, intermediate care with long-term care, spinal cord injury and blind rehabilitation care with rehabilitation care, and rehabilitation care with medicine. The most prevalent problem handled this way was the lack of correspondence between cost and utilization for inpatient substance abuse care. In FY97, there were 20 medical centers with mismatched data. We combined substance abuse treatment with the inpatient psychiatry category at all but two sites; at these two sites, the mismatch involved less than 5 days of stay, and the observations were dropped.

Intermediate care was another category that had cost and utilization data that were inconsistent. In FY97, 9 sites had data mismatches; at 6 sites, we reassigned the data to the long-term care category of care; care was assigned to medicine at two sites which did not provide long-term care, and at one site, 4 days of stay were simply dropped.

#### **4. Unit Cost of Outpatient Stops**

**Outpatient Care File.** Information on outpatient visits is maintained in the outpatient care file (OPC). Clinical encounters are characterized by a “stop code,” a three-digit code that corresponds to a location where care was provided.

For FY 1996 and earlier years, the OPC was organized so that a single record represented all outpatient care received by a single patient on a given day. As many as 15 different clinic “stops” were reported in each record. VA used either one or two stop codes to characterize each scheduled clinical encounter. Approximately one-third of patient care encounters were characterized with a secondary stop code, called a “credit stop.” It was not possible to distinguish credit stops from the principal stop code in the OPC for FY96, or for earlier years. As a consequence, it was not possible to tell the exact number of outpatient encounters that

occurred on days represented in the OPC with a record with two or more stop codes. For example, two stop codes might have represented two distinct encounters, or they may have represented the primary and credit stop for a single encounter.

VA reorganized the outpatient file beginning with FY97. The new file is known as the outpatient extract of the National Patient Care Database (NPCD). Primary and credit stops were recorded as distinct fields in a new file, with one record per clinical encounter. At the same time, the use of credit (secondary) stops was limited; for a given primary stop code, only certain credit stops could be used, and only for the specific purpose of providing further identifying the location of care. This change took place October 1, 1996, affecting utilization for FY97 and subsequent years. The new outpatient data also includes up to 12 different Current Procedures Terminology (CPT) codes to characterize the services that were provided during the visit.

Comment: For FY98 and subsequent years, we plan to consider only the primary stops.

**Outpatient care categories.** Outpatients clinics were grouped into 12 categories based on the similarity of services provided and the personnel providing them (see Table 5). For example, all types of physical and occupational therapy were grouped together; medical clinics were grouped together, but kept distinct from visits to surgery clinics.

Table 5. Categories of Outpatient Care

<b>CATEGORY OF CARE</b>	<b>FY93 CDR ACCT</b>	<b>FY93 STOP CODE</b>	<b>FY94 CDR ACCT</b>	<b>FY94 STOP CODE</b>	<b>FY95 CDR ACCT</b>	<b>FY95 STOP CODE</b>
Outpatient Medicine	2110,2111, 2119,2800*	101,102,301-318	2110,2111, 2780^,2800*	101-103,301-324	2110,2111, 2130,2780^, 2800*	101-103,301-326
Outpatient Dialysis	2410,2800*	602-604,606-609	2410,2780^, 2800*	602-604,606-609, 611	2410,2780^, 2800*	602-604,606-609, 611
Outpatient Ancillary Services	2610,2800*	117,120,122,123- 125,160,165,999	2610,2780^, 2800*	117,120,122,123- 125,147,160,165, 999	2610,2780^, 2800*	117,120,122,123- 125,147,160,165- 169,999
Outpatient Rehabilitation	2611,2800*	201-214	2611,2780^, 2800*	201-214,216	2611,2780^, 2800*	201-214,216
Outpatient Diagnostic	2612,2800*	104-109,115,126- 128	2612,2780^, 2800*	104-109,115,126- 128,144-146,148	2612,2780^, 2800*	104-109,115,126- 128,144-146,148
Outpatient Pharmacy	2613,2800*	Not applicable	2613,2800*	Not applicable	2613,2800*	Not applicable
Outpatient Prosthetics	2614,2800*	417,418	2614,2780^, 2800*	417,418,423,425	2614,2780^, 2800*	417,418,423,425
Outpatient Surgery	2210,2211, 2800*	401-416,419-422	2210,2211, 2780^,2800*	401-416,419-422, 424	2210,2211, 2230,2780^, 2800*	401-416,419-422, 424,426,427
Outpatient Psychiatry	2310,2311, 2312,2313, 2800*	502,505,506,509- 512,515,516,520- 522,540,550,553, 554,557-559,562, 571,572	2310,2311, 2312,2313, 2750,2780^, 2800*	502,505,506,509, 510,512,515,516, 520-522,524-527, 540,542,550,553, 554,557-559,562, 571-575,727	2310,2311, 2313,2330, 2331,2750, 2780^,2800*	502,505,506,509, 510,512,515,516, 520-522,524-531, 540,542,550,553, 554,557-559,562, 563,573-575,727, 729
Outpatient Substance Abuse	2316,2317, 2616,2800*	507,508,513,514, 517-519,523,555, 556,560	2316,2317, 2616,2780^, 2800*	507,508,513,514, 517-519,523,543- 545,555,556,560	2316,2317, 2616,2780^, 2800*	507,508,513,514, 517-519,523,545, 555,556,560
Outpatient Dental	2710,2800*	180	2710,2780^, 2800*	180,181	2710,2780^, 2800*	180,181
Outpatient Adult Day Health	2510,2800*	190	2510,2800*	190	2510,2800*	190

NOTES: “^” indicates that the costs in the telephone care account were allocated by proportional utilization to the care categories and  
 “\*” indicates an overhead account whose costs were allocated proportionally across more than one care category.

Table 5. (continued)

<b>CATEGORY OF CARE</b>	<b>FY96 CDR ACCT</b>	<b>FY96 STOP CODE</b>	<b>FY97 CDR ACCT</b>	<b>FY97 STOP CODE</b>
Outpatient Medicine	2110,2111, 2130,2780^, 2800*	101-103,301-326, 328,330-332,428	2110,2111, 2130,2780^, 2800*	101-103,290,293, 301-326,328,330-332,428
Outpatient Dialysis	2410,2780^, 2800*	602-604,606-609, 611	2410,2780^, 2800*	602-604,606-609, 611
Outpatient Ancillary Services	2610,2780^, 2800*	117,120,122,123- 125,147,160,165-169,999	2610,2780^, 2800*	117,120,122,123- 125,147,160,165-169,999
Outpatient Rehabilitation	2611,2780^, 2800*	201-214,216	2611,2780^, 2800*	201-214,216
Outpatient Diagnostic	2612,2780^, 2800*	104-109,115,126- 128,144-146,148- 153	2612,2780^, 2800*	104-109,115,126- 128,144-146,148- 153
Outpatient Pharmacy	2613,2800*	Not applicable	2613,2800*	Not applicable
Outpatient Prosthetics	2614,2780^, 2800*	417,418,423,425	2614,2780^, 2800*	417,418,423,425
Outpatient Surgery	2210,2211, 2230,2780^, 2800*	327,329,331,401-416,419- 422,424, 426,427,429-433	2210,2211, 2230,2780^, 2800*	291,327,329,331,401-416,419-422, 424,426,427,429-433,435
Outpatient Psychiatry	2310,2311, 2313,2330, 2331,2750, 2780^,2800*	502,505,506,509,510,512,515 ,516,520-522,524-531, 540,542,550,553,554,557- 559,562, 563,573-579,727, 729	2310,2311, 2312,2313, 2314,2315, 2318,2319, 2330,2331, 2750,2780^, 2800*	292,502,505,506,509,510,512,515,51 6,520-522,524-532,535-537,540, 542,550,553,554,557-559,561-563, 573-581,590,727, 729
Outpatient Substance Abuse	2316,2317, 2616,2780^, 2800*	507,508,513,514, 517-519,523,545, 555,556,560	2316,2317, 2616,2780^, 2800*	507,508,513,514, 517-519,523,545, 547,555,556,560
Outpatient Dental	2710,2780^, 2800*	180,181	2710,2780^, 2800*	180,181
Outpatient Adult Day Health	2510,2800*	190	2510,2800*	190

NOTES: “^” indicates that the costs in the telephone care account were allocated by proportional utilization to the care categories and  
“\*” indicates an overhead account whose costs were allocated proportionally across more than one care category.



**Telephone care.** We did not rely on the CDA for telephone care, as we think that it is unlikely that the CDR can be used to gauge the cost of this service. We distributed the costs assigned to the telephone care Cost Distribution Account back to the component clinics which provided telephone care. Each clinic was assigned costs on the basis of its share of the total number of telephone "visits."

**Pharmacy costs.** The CDR identifies the cost of outpatient pharmacy as cost distribution account 2613. In FY97, \$1.091 billion was reported under this CDA.

There is no easily accessible, centralized source of data with information on VA pharmacy utilization, however. In the absence of data on how to assign pharmacy costs, our estimates of outpatient costs do not include this cost. We assume that the analyst will obtain micro-cost information to estimate the pharmacy costs incurred by individual patients. Potential sources of pharmacy data include the pharmacy files in the VA VISTA clinical data base. Since FY98, the DSS system, or the National Pharmacy Benefits Management data system, may provide this information.

**Calculation of Unit Cost of Outpatient Care.** We distributed the indirect costs of ambulatory care to the 12 categories of outpatient care based on each category's share of the total direct cost. We tallied the number of clinic stops in each category, and divided the total cost by the number of stops to find the average cost per clinic stop. For each category, the average cost per clinic stop was calculated for each medical center. We found the median cost of VA medical centers. Table 6 presents this median of facility cost stop in each of the 12 categories, excluding pharmacy cost.

Table 6. Median Facility Cost per Clinic Stop Visited  
by Outpatient Category of Care  
FY93-FY97  
(Excludes pharmacy cost)

	CATEGORY OF CARE	FY93	FY94	FY95	FY96	FY97
11	Medicine	75.18	80.51	87.14	100.34	112.10
12	Dialysis	376.01	388.91	362.32	312.66	315.80
13	Ancillary	12.86	13.31	13.43	14.76	17.33
14	Rehabilitation	43.02	46.52	47.64	51.99	57.24
15	Diagnostic	57.60	62.79	61.13	60.82	56.52
17	Prosthetics	344.72	383.46	311.80	308.15	380.58
18	Surgery	76.12	87.58	74.50	81.91	91.00
19	Psychiatry	64.16	66.51	59.56	63.02	59.91
20	Substance Abuse	62.95	67.68	64.20	66.89	62.44
21	Dental	158.86	172.96	175.67	178.61	158.62
22	Adult day health	74.94	76.62	78.41	84.81	81.10

Comment: We assumed that all visits within each category have the same cost. This is a strong assumption that is unlikely to be true. Prior to October 1, 1996, however, the only way that outpatient encounters were characterized was by the stop code. After this date, VA began to use CPT codes. Future work can use the system of relative value units associated with CPT codes, and estimate the average cost per relative value unit for each category of care. Future work must also address the stops that are not assigned to any cost distribution account in the CDR handbook.

## 5. VA Inpatient Databases

**Data sources.** The VA maintains a database of hospital stays called the Patient Treatment File (PTF). Although this database contains neither cost nor charge data, it includes data such as patient demographics, length of stay, and the Diagnosis Related Group (DRG) for the hospitalization.

**Patient Treatment File Main and Bed-Section Files.** The PTF records information on hospital stays in two different files. It is important to understand how this information is organized, because VA defines a hospital stay somewhat differently than the non-VA sector.

The PTF main file reports on all hospital stays that ended in a particular year. This file

contains one record for each hospital stay. In addition, there is another file that has multiple records per stay. This is the bed section file. It divides hospital stays into sequential segments, with one record for each portion of the stay spent in a different "bed section." A bed section is a hospital ward such as medicine, intensive care, rehabilitation, or long-term care. This view provides information on the number of days the patient spent in each bed section.

Neither the main file nor the bed section file uses a definition of a hospital stay that is strictly comparable to the non-VA sector. In the non-VA sector, an acute hospitalization followed by a long-term care stay would be recorded as two different stays. In the PTF main file, this is a single stay; in the PTF bed section, it is represented by two records, analogous to the way the non-VA sector records these as two separate stays.

In other cases, it is the PTF main that is more analogous to the non-VA sector. For example, an acute hospital stay that began in the Intensive Care Unit and ended in a medicine ward would be regarded as a single stay in the non-VA sector. This would be recorded as a single record in the PTF main file, and with two records in the PTF bed section file.

We wished to apply relative value units from acute stays in non-VA hospitals to estimate the cost of acute VA hospital stays. This required us to develop a definition of what is an acute hospital stay. We used information from both the main and bed-section files to define an acute inpatient stay, as described below in part 7, which describes our method of finding the cost of acute hospital stay.

**PTF Discharge and Census Files.** The principal files in the PTF include information on all stays that ended during a given fiscal year, regardless of when they began. The PTF Census Files includes information on patients who are in a VA hospital at the end of the fiscal year. Since cost data are reported by fiscal year, we needed data on utilization that occurred in the fiscal year. We used the census files to obtain information on hospital care provided to patients who had not been discharged by the end of the fiscal year.

**PTF Extended Care and Non-Extended Care Files.** The PTF is divided into two components, a set of files pertaining to extended care, and another set of files pertaining to other

inpatient care. Most stays that are predominantly nursing home care are recorded in the “extended care” file. Most other inpatient stays are recorded in the acute care file.<sup>5</sup> Since stays may be made up of both acute and long-term care, both of these files contain information on stays that involve acute and long-term care bed-sections. The assignment of stays to one set of files or the other did not affect our treatment of data, we merely used all data from both sets of files for our calculations.

### **Merger of Cost and Inpatient Utilization Data by Time Frame**

The CDR reports on expenditures in a federal fiscal year, which runs from October 1 until September 30. To find average cost, we wished to find the amount of care provided during that fiscal year. Since hospital stays may span fiscal years, so we developed a method to divide hospital utilization between fiscal years.<sup>6</sup>

#### **We included days spent during the current fiscal year by patients not discharged.**

We included days of stay that occurred during the fiscal year, but did not appear in the PTF discharge file because the patient had not been discharged by the end of the fiscal year. We obtained these days of stay from the PTF census files, which report on the stays of patients who remain in the hospital on the last day of the fiscal year.

**We excluded days prior to the current fiscal year.** We excluded days of stay that occurred before the beginning of the fiscal year. For stays that began before the beginning of the fiscal year, we found the length of stay during the current fiscal year by finding the number of days between the discharge date and the beginning of the fiscal year. We did not include in this

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5. Beginning in FY98, a third set of files, the observation files, were created to hold information on stays on observation bed sections.

6. A possible alternative would be to simply count the days of stay spent by patients who were discharged during the fiscal year. This would assume that the days care from stays that occurred prior to the current fiscal year were equal to the days of stay of patients who were in the hospital at the year’s end. This assumption is not warranted however; because of the decline in hospital use, adopting this assumption would overstate the amount of care provided in during the fiscal year.

tally “leave” days, that is, days that patient was absent from hospital, though not yet discharged.<sup>7</sup> The PTF records leave days, but does not indicate when they occurred. We assumed that leave days are uniformly distributed throughout the stay.

**Count of discharges.** We also determined a count of hospital discharges, to be used in models that considered the effect of department size on cost. The count was adjusted using the proportion of the stay that occurred during the current fiscal year. We adopted this method to determine the number of discharges in a way that was consistent with our method for determining days of stay.

**Inpatient care categories.** We identified 10 categories of inpatient care (see Table 7). Note that the groupings are different in different years. The definitions were changed so that the new bed section and cost distribution accounts that were added in recent years were used as soon as they appear to be reliably implemented.

Comment: For future years, we plan to create an additional category of residential rehabilitation programs.

### **Definition of Acute Hospital Stay**

We defined an acute hospital stay as all days in a single hospital stay that were spent in the medicine and surgical bed sections (bed sections in groups 1 and group 4 in Table 7). For each hospital stay, we summed the days of stay in the PTF bed section file that were in these categories of care; the total of these days represented the acute hospital stay. The remaining days were considered “non-acute” days of hospital stay.

Comment: We will improve this definition in the future. We will define an acute hospital stay as all segments of stay in an acute bed section that are contiguous. With this change, transfers that occur between acute bed sections will be considered part of the same stay, but

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7. Leave days are also called Absent Bed Occupant Days and are given the variable name LVB in the PTF.

transfers from an acute bed-section to another bed section (e.g., for rehabilitation, mental health, or long-term care) will be considered to end the acute stay. If the patient is later transferred back to an acute ward, this will be considered a new admission. Although such transfers occur infrequently, ignoring them understates the costs of a readmission to an acute hospital bed section.

Table 7. Categories of Inpatient Care

<b>CATEGORY OF CARE</b>	<b>FY93 CDR ACCT</b>	<b>FY93 BEDSECN</b>	<b>FY94 CDR ACCT</b>	<b>FY94 BEDSECN</b>	<b>FY95 CDR ACCT</b>	<b>FY95 BEDSECN</b>
Inpatient Medicine	1100*,1110, 1114,1117, 1118,1119	1-12,14-17,19, 75,83	1100*,1110, 1114,1117, 1118,1119, 1120	1-12,14-17,19, 31,34,35,75,83	1100*,1110, 1114,1117, 1118,1119, 1120,1130	1-12,14-17,19, 31,34,35,75,83
Inpatient Rehabilitation	1100*,1113	20	1100*,1113	20	1100*,1113	20
Inpatient Blind Rehabilitation	1100*,1115	21	1100*,1115	21	1100*,1115	21
Inpatient Spinal Cord	1100*,1116	22	1100*,1116	22	1100*,1116	22
Inpatient Surgery	1200-1213	50-63	1200-1213	50-63	1200-1213, 1230	50-63
Inpatient Psychiatry	1300*,1310, 1314,1315, 1316	70,71,76	1300*,1310, 1314,1315, 1316,1317, 1320	33,70,71,76,77	1300*,1310, 1311,1314, 1315,1316, 1320,1330, 1700*,1711, 1712,1714	25,26,28,33, 70,71,76,77, 79,89,91,92, 93
Inpatient Substance Abuse	1300*,1313	72-74	1300*,1313	72-74	1300*,1312, 1313,1317, 1700*,1713, 1715	27,29,72-74, 84,90
Inpatient Intermediate	1600,1610	40	1600,1610 1620	32,40	1600,1610 1620	32,40
Inpatient Domiciliary	1500,1510, 1511,1512	85,86	1500,1510, 1511,1512, 1520	85-87	1500,1510, 1511,1512, 1520	85-88
Inpatient Long Term	1400,1410	80	1400,1410 1420	80,81	1400,1410 1420	80,81

NOTE: “\*” indicates an overhead account whose costs were allocated proportionally across more than one care category.

Table 7. (continued)

<b>CATEGORY OF CARE</b>	<b>FY96 CDR ACCT</b>	<b>FY96 BEDSECN</b>	<b>FY97 CDR ACCT</b>	<b>FY97 BEDSECN</b>
Inpatient Medicine	1100*,1110, 1114,1117, 1118,1119, 1120,1130	1-12,14-17,19, 31,34,35,75,83	1100*,1110, 1114,1117, 1118,1119, 1120,1130	1-12,14-17,19, 31,34,35,75,83
Inpatient Rehabilitation	1100*,1113	20	1100*,1113	20
Inpatient Blind Rehabilitation	1100*,1115	21	1100*,1115	21
Inpatient Spinal Cord	1100*,1116	22	1100*,1116	22
Inpatient Surgery	1200-1213, 1230	50-63	1200-1213, 1230	50-63
Inpatient Psychiatry	1300*,1310, 1311,1314, 1315,1316, 1320,1330, 1700*,1711, 1712,1714	25,26,28,33, 70,71,76,77, 79,89,91,92, 93	1300*,1310, 1311,1314, 1315,1316, 1320,1330, 1700*,1711, 1712,1714, 1717	25,26,28,33, 70,71,76,77, 79,89,91,92, 93
Inpatient Substance Abuse	1300*,1312, 1313,1317, 1700*,1713, 1715	27,29,72-74, 84,90	1300*,1312, 1313,1317, 1700*,1713, 1715	27,29,72-74, 84,90
Inpatient Intermediate	1600,1610 1620	32,40	1600,1610 1620	32,40
Inpatient Domiciliary	1500,1510, 1511,1512, 1520	85-88	1500,1510, 1511,1512, 1520	85-88
Inpatient Long Term	1400,1410 1420	80,81	1400,1410 1420	80,81



## **6. Daily Cost of Mental Health, Rehabilitation and Long-Term Care Stays**

Although DRGs have been created for mental health and rehabilitation stays, the cost of stays assigned to these DRGs is highly variable. Because DRGs do not explain the variation in cost of rehabilitation and mental health stays, facilities that provide this sort of care were exempted from the Prospective Payment System of Medicare. We estimated the cost of this type of care using the average daily cost.

**Contract nursing home care.** The PTF extended care discharge file includes contract nursing home care. There is no matching cost information in the CDR. Since we had no information on the cost of this care, we examined only care that was provided by VA facilities. Community nursing home care is identified by the value of 42 for the variable STATYPE. Long-term care is indicated by a value of 80 for the variable BEDSECN. About 13% of the records in the VA extended care file have BEDSECN=80 and STATYPE=42. We excluded these from our analysis.

We found the average daily cost of mental health, rehabilitation, long-term care, and other categories of care for every facility in the VA. The median of facility daily rates are found in Table 8.

Table 8  
 Median Facility Cost per Day of Stay  
 for Mental Health, Rehabilitation, Long Term Care, and Other Inpatient Care

	CATEGORY OF CARE	FY93	FY94	FY95	FY96	FY97
1	Inpatient Medicine *	584.72	639.77	703.96	819.41	1,044.15
2	Inpatient Rehabilitation	482.92	544.45	555.14	600.33	709.12
3	Inpatient Blind Rehabilitation	558.43	620.84	691.85	699.02	761.47
4	Inpatient Spinal Cord	621.86	641.74	645.92	703.04	753.73
5	Inpatient Surgery *	1,024.46	1,161.00	1,292.04	1,553.24	2,013.58
6	Inpatient Psychiatry	329.41	362.94	387.02	434.58	567.33
7	Inpatient Substance Abuse	274.89	293.00	298.86	315.75	393.55
8	Inpatient Intermediate	284.02	308.45	317.27	333.49	364.59
9	Inpatient Domiciliary	103.95	117.88	115.28	123.80	120.42
10	Inpatient Long Term	186.27	200.98	209.93	218.25	249.63

Includes overhead costs

\* We do not recommend estimating the cost of medical and surgical care based on the cost per day reported in this table. Costs vary substantially, depending on the DRG assigned to the stay. Cost estimates will be more accurate if they reflect the relative resource profile associated with the DRG.

Comment: VA long-term care patients are evaluated using the Resource Utilization Group (RUG) assessment method. These assessments are performed at admission, transfer, and discharge. The assessment assigns Weighted Work Units to the patient. The Weighted Work Unit represents an estimate of the relative quantity of resources used to care for long-term care patients (Schneider, Fries, Foley, Desmond, & Gormley, 1988). In future years, we plan to use the relative values from the RUG assessments so that our estimates of VA long-term care costs reflect patient acuity as measured under this system.

### 6. Cost of Acute Hospital Care Stays

The cost of acute medical and surgical hospital care in VA can be more accurately estimated by applying information on the effect of diagnosis on cost (Barnett, 1997). This method overcomes limitations inherent in assuming that every day of stay is of equal cost. We describe two methods for estimating the cost of acute hospital stays. The first method was an econometric method, with parameters estimated from data on the mean characteristics of stays in VA hospitals. The second method was based on Medicare payment rates for hospital cares.

Both methods rely on the weights that Medicare assigns to estimate the relative cost of providing care to patients in different Diagnosis Related Groups (DRGs). These weights were developed by the Health Care Financing Administration (HCFA) to determine Medicare payments to hospitals.

This section describes which VA DRG we used, how we determined the DRG weight, and how we characterized length of stay. Then we present our econometric method of estimating costs, an alternative cost method, based on Medicare data; finally, we present our plans for improving our estimates of acute VA hospital cost.

**A. Selecting the DRG and the relative value associated with a DRG.**

A DRG is assigned to a hospital stay using the principal diagnosis, the condition that is responsible for the patients' admission to the hospital.<sup>8</sup> VA assigns a DRG to each bed section segment of the hospital stay, and another DRG to the PTF main file, representing the DRG for the entire stay. We used the DRG assigned to the entire stay from the PTF main file.

We assigned the relative value weight published by HCFA to each stay based on the DRG. We considered but did not use other relative value systems. We decided that the weights developed by states to pay for care provided to Medicaid and other patients are likely to reflect the patterns of practice in a specific state and that it would not be appropriate to apply them to the VA's national system of hospitals. Some relative values systems, such as the Severity of Illness Index, may provide some additional measure of relative cost (Averill et al., 1992), but they are not feasible for us to implement, as they require data that are not available in centralized VA utilization data. Patient Management Categories and Disease Staging are case-mix methods that can be applied to standard datasets, but they have been found to explain only 1-2% more

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8. Prior to October 1, 1994, VA used the primary diagnosis to define DRGs. The primary diagnosis is the most important condition treated in the stay (as opposed to the principal diagnosis, which is the diagnosis responsible for the patient's admission to the hospital). VA DRGs from stays that ended prior to this date are thus not strictly comparable to non-VA DRGs from that time period, which have always used principal diagnosis.

variation than DRGs used alone (Calore & Iezzoni, 1987).

Comment: In the future, we will characterize the DRG for the acute stay as that DRG reported in the bed section segments that make up the acute stay that has the highest Medicare DRG relative value weight. This is essentially the method that non-VA hospitals use to identify DRGs; they evaluate the stay and assign the DRG that will garner the maximum reimbursement allowed under Medicare rules.

### **B. Length of Acute Stay**

We found length of stay as the total number of days that the patient spent in acute care bed sections during the stay. We calculated the VA national average length of acute stay for each DRG. For each acute VA hospital stay, we calculated its deviation from the national average length of stay for that DRG. For each facility, we then found the mean of this value. This value was the facility level mean of deviations from DRG-specific mean length of stay.

Note that we examined only those records of patients discharged during the fiscal year under study. We included days of stay in acute bed sections, even if they occurred in previous fiscal years, and excluded data from stays that were not complete by the end of the fiscal year. This is distinct from the rest of our method, which considered only the days of stay that occurred during the fiscal year under study.

We also calculated the length of stay in Intensive Care bed sections. For each acute hospital stay, we found the number of days spent in the medical and surgical Intensive Care bed sections. As before, we found the national mean for each DRG, and each facility's mean deviation from the DRG mean. We also used a discharge view for the calculation.

### **C. Method 1: Estimate Based on Econometric Technique**

The econometric method of estimating VA acute care costs is discussed elsewhere (Barnett, 1997). We had information on the total cost incurred in operating the acute care bed sections at each VA, and information on the services provided. We used the mean value for a single VA hospital as an observation. We used the mean cost per discharge as the dependent variable. Independent variables included the mean DRG relative value weight, the mean

deviations from expected length of stay, and the mean deviation from expected number of days spent in intensive care. These “expected” values for these variables represent the national VA average length of stay for the DRG.

We estimated a model of facility levels costs, using the form:

$$\text{cost} = \text{DRGWT} + \frac{1}{N} + \text{EDUC} + \text{RES} + \text{WI} + \text{LOS} + \text{ICULOS}$$

Where COST is the mean cost per discharge, DRGWT is the mean HCFA DRG weight, N is the number of discharges at the facility, RES is the dollars of research cost per discharge, EDUC is the number of residents per discharge, LOS is the average length of stay and ICULOS is the average number of days spent in the ICU.

The model was estimated with the constraint that costs are proportionate to DRG weight. The constraint was imposed by dropping the intercept term.

#### VA Medical-Surgical Stay Regression (FY95)

	Parameter	SE	T-stat	p
DRG Weight	6,824.14	73.70	92.59	0.0001
Facility Size	2,075,275	172427.3	12.04	0.0001
Education	2.27	0.313	7.26	0.0001
Research	0.15	0.0973	1.52	0.1294
Wage Index	2,119.53	543.4	3.90	0.0001
Length of Stay	186.46	28.34	6.58	0.0001
Length of ICU Stay	1,392.95	324.4	4.29	0.0001

All variables were expressed as a deviation from the mean, so that the parameters have the natural interpretation of being the effect of the variable when all other variables are at their mean value. This allows us to apply the formula that an acute hospital stay has a cost of \$6,824 per DRGWT. Controlling for all other factors in the regression, each additional day of stay (beyond the mean for stays with this DRG) in the ICU adds \$1,393. Controlling for other factors, each additional day of acute care beyond the mean for that DRG adds \$186 cost.

Comment: This econometric method models VA costs using the mean values from medical centers. Since there are only some 150 VA medical centers, these mean values have a limited amount of variation. Outliers are not represented in the data, so it is not possible to

provide a model that represents the effect of extremes values on cost.

The HCFA DRG weights are based on hospital charges, exclusive of physician services. These weights don't reflect physician costs, so we are assuming that relative cost of physician services for a given DRG is the same as the relative cost of hospital services for that DRG.

The estimates could be substantially improved with a model based stay-level observations, as discussed below.

**D. Method 2: Estimate based on Medicare payment rules.**

We developed an alternative method of estimating VA acute care costs using the rules developed by HCFA to reimburse hospitals for acute care. This method employs national average payment rates for DRGs, applying separate weights to the hospital and physician costs of providing acute hospital care.

**Hospital component.** For 1996, we estimated that Medicare paid \$5,267 per DRG relative value weight, and that hospital stays cost an additional \$2,050 for each day of stay deviation from the mean length of stay for that DRG.

Our estimate of cost per DRG is based on Medicare payment rules and information from the Prospective Payment Commission (ProPAC).<sup>9,10</sup> We included the standard payment per DRG weight, and additional amounts for the capital reimbursement, outlier payments, indirect and direct medical education, and for assistance to disproportionate share providers.

We estimated that the standard payment was \$3,808 per DRG weight. This represents an average of the standard payment rates for large urban and other areas published in the Federal Register. We used DRG relative value units produced by hospitals in large urban areas and

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9. Federal Register / Vol. 60, No. 170 / Friday, September 1, 1995 / Rules and Regulations, "Medicare Program; Changes to the Hospital Inpatient Prospective Payment Systems and Fiscal Year 1996 Rates; Final Rule".

10. Medicare and the American Health Care System: Report to the Congress. Prospective Payment Assessment Commission, June 1997.

hospitals in other areas to weigh the standard rates. The estimate of DRG relative value units was reported by ProPAC.

We added to this standard payment rate the following costs:

- \$194.22 for outlier payments, which were expected to be 5.1% of the standard payment, according to the regulation.
- \$512.15 for capital costs. The regulation projected 1996 capital payments would be \$727.26 per discharge. We did not wish to assume that every hospital stay would have exactly the same capital cost; we decided to assign capital costs in proportion to DRG weight. As there was an average of 1.42 DRG weights per discharge in FY96, this yields \$512.15 per DRG weight.<sup>11</sup>
- \$298.43 for Indirect Medical Education payments, reflecting a 7.84% rate.
- \$291.94 for Disproportionate Share Provider payments, or 7.67%.<sup>12</sup>
- \$162.19 for Direct Medical Education payments, or 4.26%

These payment rates were calculated from the 1997 projected data published by ProPAC.

We estimated the total amount paid on the basis of standard payments by taking “operating payments” and subtracting outlier, IME, and DSH payments. Capital and direct GME were assumed not to be operating payments.

We validated this Medicare cost estimate using an independent means of estimating costs. HCFA reported \$87.5 billion in payments to acute hospitals for inpatient care in FY95, and that inpatient costs grew at an annual rate of 5.2% during the period 1990-1996. According to HCFA Medpars data, Medicare paid for 11.7 million discharges; these had an average DRG weight of 1.422, yielding a total of 16.7 million DRG weights. These data suggest an average

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11. Using the \$8 billion capital estimate in the ProPAC report gives a 13.63% capital cost, or \$519.00 per DRG weight, a very similar value.

12. Using the 5.28% outlier payments implied in the ProPAC report suggests a \$201.11 outlier payment cost. These are quite similar to the original estimate.

payment of \$5,509 per DRG weight in FY96. Since some discharges are excluded from the Medpars report (to avoid disclosing patient data), this figure represents an upper bound of the cost.

**Cost per Marginal Day.** We wished to develop a method that captures the effect of both DRG and differences in length of stay. We wanted estimates to reflect the higher cost for stays that are longer than average for their DRG, and the lower cost of days that are shorter than average. We wished to avoid the assumption that all stays in the same DRG have exactly the same cost, regardless of the length of stay.

We used an econometric technique to estimate the marginal cost of stays that are longer (or shorter) than average for their DRG. Using Medicare MEDPARS hospital discharge data of the stays of veterans in non-VA hospitals, we estimated a model with cost-adjusted charges as the dependent variable, and DRG weight and length of stay as the independent variables. We used a simple model, which assumed that the cost of a marginal day of stay was constant, that is, that the first day of additional stay has the same cost as the 2<sup>nd</sup> additional day, and all subsequent days.

Comment: An econometric technique can be used to estimate the marginal cost of stays that are longer (or shorter) than average for their DRG. The model could use cost-adjusted charges as the dependent variable, and DRG weight and length of stay as the independent variable.

**Physician component.** We estimated the cost of physician services provided to inpatients based on the DRG and the length of stay. We took advantage of a previous study which found the average reimbursement provided for inpatient physician services for Medicare patients in each DRG (Miller & Welch, 1993). We used these data to assign a cost of physician services based on the DRG. We adjusted this amount by the \$51 cost of physician daily visit to an inpatient for every day that the stay deviated from the VA mean length of stay for that DRG. This was the Medicare reimbursement for a physician visit to an inpatient.



## **E. Plan for Improved Estimates of Acute Hospital Cost**

We are developing improved relative value weights by analyzing data on non-VA hospital stays. We are estimating a cost-function based on data that uses the hospital stay as the unit of analysis. The use of the stay (rather than the average stay) as the unit of analysis provides much more variation, including observations with high DRG weights and long lengths of stay. This allows construction of a more complex model that better simulates the cost of stays with characteristics that are very different from the mean.

We are constructing this estimate with two different sources of data: the HCUP sample of U.S. hospitals in 22 states, and the data on Part A Medicare claims of a sample of veterans. We are testing models that relax the constraints of our earlier estimates, allowing the cost of marginal days of stay to vary, depending on the length of stay. In future work, we hope to estimate a separate set of relative value weights for the physician component of hospital care (e.g., the Part B reimbursement of Medicare).

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