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A Guide to Estimating Wages of VHA Employees

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Mark W. Smith, Ph.D.

Jesse P. Velez, B.A.

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Executive Summary

Economic analyses of VA care often include estimation of the cost of VA staff time. This report describes how to estimate average annual and hourly wages (including benefits) and presents these averages for fiscal years 2000-2003. Two sets of figures are presented, one based on data from the Financial Management System (FMS) and one based on data from the Decision Support System (DSS) Account-Level Budgeter Cost Center (ALBCC) datasets. The report also provides sample programs for calculating wage figures from each source.

To increase comparability with ALBCC, we limited the FMS data to cost centers pertaining to direct medical care at VA facilities. For budget object codes (job categories) in the 1100-1199 range, FMS and ALBCC data files report nearly identical total expenditures. The distribution of dollars and hours across job categories was quite similar for common job categories, such as registered nurses and full-time physicians. There was considerable variation across data sources, however, in categories pertaining to trainees, temporary employees, and administrative staff.

Because the average wages derived from the FMS and ALBCC data files are very similar, we conclude that researchers may use either source with confidence for common clinical job categories. It is difficult to provide any recommendation with respect to administrative, temporary, or trainee positions. An advantage of ALBCC over FMS is the detail available within job categories on spending across DSS intermediate products. FMS will be the only option if data from FY1999 and earlier are needed.

Introduction

There are two general approaches to determining the cost of a health care service. In the average cost method, total expenditures are divided by the total number of events, yielding the average cost per event. The other approach is micro-costing, in which the elements composing a service – such as staff time, supplies, and overhead – are assigned separate costs and then summed to yield the total cost. The methods and statistics presented in this report will support micro-costing by providing costs for a major element of health care costs.

Staff time is an important element of the total cost of health care. Estimating the hourly or annual cost of staff in a variety of job categories serves several purposes. It enables VA managers to set staffing levels in light of current budgets and to predict future expenditures under alternative staffing levels. It also allows researchers to determine the cost of interventions in a clinical trial, an essential element of cost-effectiveness analyses. These analyses in turn inform VA managers and clinicians as to the relative value of the interventions being studie d, and they enable staff and managers to learn whether VA wages are comparable to those of other employers.[1]

Wage calculations should be accurate, comparable across years and facilities, and accurately capture differences across staff types (e.g., physicians, nurse-practitioners, and registered nurses). These requirements imply that the data sources must be reliable and consistently created across place and time.

Since the start of fiscal year 2002 (FY02), two sources of VA wage data have been available: the Financial Management System (FMS) and the Decision Support System (DSS) Account-Level Budgeter Cost Center (ALBCC) datasets. Although ALBCC uses FMS data on hours and expenditures for staff time, the two sources do not provide

[1] Throughout this report, the term "wages" will be used to mean gross cash earnings plus the average cost of benefits. Benefits currently average about 30% of gross cash earnings.

exactly equivalent average wage figures. Data on staff time (workload) and wages (expenditures) are divided somewhat differently in ALBCC and FMS, and within ALBCC one finds substantial variation across VA medical centers in the allocation of staff time and wages to particular DSS departments and cost centers. For these reasons, it is necessary to estimate the average wage by job category (budget object code, or BOC) in each data system.

The report proceeds as follows. The next section describes FMS and ALBCC and provides details of the exact extracts used in the analyses. The Methods section lays out our statistical approach to comparing the two sources. A Results section follows, with major tables presented in the text and additional detail supplied in appendices. We then discuss our findings and present advice about using each data source.

Data

Financial Management System (FMS)

The Financial Management System (FMS) represents a summary of the VA general ledger. It provides a detailed breakdown of VA obligations and expenditures by category, location, and fiscal year. FMS data are organized into reports. We will use the 830 Report, which features expenditures and workload (staff time) for direct medical care.

Expenditures are characterized by four-digit codes known as cost centers. Many cost centers correspond to VA services, such as “Nursing Service” and “Psychiatry Service.” The range of cost centers must be limited when estimating the average compensation of clinical professionals. To find the average cost of a position providing direct medical care in VA facilities, include only those cost centers in the rage 8201-8286.

(A second variable, FUNDNAME, can also be used to find FMS records pertaining to medical care. It represents the appropriation fund from which money is drawn. FUNDNAME is typically six characters in length, four numbers followed by up to two

optional letters. Some examples are minor construction (0111), general operating expense (0151A1), medical research (0161A1), and Veterans Canteen Service (4014C). The medical services appropriation (called the 'medical care appropriation' prior to FY2004), consists of a half-dozen values, all of which begin with '0160'. A check of two recent years (the OBLOE files for FY2001 and FY2003; see Smith et al. (2003)) showed that once the data were limited to cost centers 8201-8286, at least 99.97% of remaining records were in the 0160 funds group. Thus, there is no practical reason to limit FUNDNAME in addition to limiting cost center. If FUNDNAME is used, be certain to check the range of values for each fiscal year. In FY2002, for example, FUNDNAME values had a one-character rather than six-character format.)

Data in FMS are also classified by *budget object code* (BOC), often called the *sub-account*. Sub-accounts identify the type of expense, such as personnel, supplies, contract services, transportation, or capital acquisition. Sub-accounts 1001-1099 (Personal Services and Benefits) can be used to calculate average wages. Each sub-account value in that range refers to a particular job category, such as 'Registered Nurses' and 'Physicians—Full Time.'

Costs characterized by single sub-account can be assigned to many cost centers. For example, the sub-account for full-time physicians (1081) will appear under cost centers 8019 (Pathology Service), 8053 (Medical Research Service), 8107 (Cooperative Studies Program), and many others. Calculating a quantity of interest will frequently require summing values from the same sub-account in multiple cost centers.

There are several sources of FMS data. For these analyses we used 830 Report data files for FY2000-FY2003. The 830 Report data are available at the Austin Automation Center (AAC) and on the VA VSSC intranet web site (the 'KLFMenu'). [2] The file name at AAC is FMSPRD.FMS.FMSTODSS.LINK.*monfy*, where '*monfy*' refers to the 3-letter month

[2] The KLFMenu is available only on the VA intranet through the VISN Support Services Center (VSSC) web site. For information on accessing KLFMenu, see Murphy et al. (2002).

and 2-number fiscal year (e.g., SEP03 for September of fiscal year 2003). This file has data at the document ID level. The data are then summarized at the level of the Cost Center and Budget Object Code and stored as RMTPRD.MED.SAS.KLFMENU. FMS.*monfy*.[3] For the analyses presented below, we chose to extract data from the KLFMenu.

We extracted all records for sub-accounts (BOCs) 1000-1099 where the cost center fell in the range 8201-8286. The extracted records included sub-account (BOC), cost center, and total expenditures (ACREXPYY) and workload (QUANTYY) for that fiscal year and sub-account. Expenditure and workload variables are year-to-date, and so by using the September records we captured total expenditures and workload for the fiscal year.

DSS ALBCC

DSS public-use data are stored in SAS files at the VA Austin Automation Center (AAC) in Austin, Texas. They may be accessed in two ways. Users with AAC time-share accounts may access the data directly through the TSO utility. This method incurs charges for the user's medical center but provides the greatest level of flexibility in extracting and manipulating data. A no-cost but less flexible alternative is to access summaries of DSS data through the VSSC web site (KLFMenu). One may use preset KLFMenu options to choose a report format showing national totals for workload (hours) and spending for each BOC. The reports are generated automatically and appear in spreadsheet format. The spreadsheets can be downloaded to a PC automatically. The KLFMenu currently features DSS ABLCC data for FY1999 through the most recent month of the current fiscal year.

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[3] Two other files containing similar information, known as OBLOE and OBOCE, are described in Chapter 3 of Smith et al. (2003). The three sources (OBLOE, OBOCE, and 830 Reports) produce very similar figures for hourly and annual wages for clinical job categories, often falling within 3% of one another. Agreement is lower for administrative positions and miscellaneous benefits categories. FY2003 data from all three sources are available from Mark Smith (mark.smith**9**@med.va.gov) upon request.

Analytic Methods

For each FMS budget object code, we summed fiscal-year-to-date expenditures (ACREXPYY) across all VA facilities and divided by the sum of fiscal-year-to-date hours (QUANTYY). This represents the average hourly rate for a given fiscal year. To find the average annual cost for a given fiscal year, we multiplied the hourly rate by 2088. Because data from multiple fiscal years appear in each year's datasets, we selected data using the fiscal year variable BFY in the KLFMenu 830 reports or BFYS in the OBOCE and OBLOE files."

The DSS wage rates were calculated in the same manner as for FMS, by summing year-to-date expenditures (ACT_DLLR) within a budget object code and dividing by year-to-date workload (ACT_HOUR). The annual wage equals the hourly wage multiplied by 2088.

DSS hourly wages were figured in two ways. The first included all DSS departments within the budget object code. DSS allocates workload and costs across DSS departments, also called “clinic codes” or “stop codes.” Because the FMS figures were limited to cost centers pertaining to direct medical care, we were concerned that the DSS data might overstate expenditures and workload in FMS. We therefore figured the hourly and annual wage rates a second time, excluding DSS departments labeled as research or administration. VA health care systems have considerable flexibility in defining individual DSS departments and the workload and costs attributed to them. As a result, the list of research and administration department codes varies by budget object code, by system, and by fiscal year.

Results

We began by comparing the total workload and wages of the FMS and DSS ALBCC data. For nearly all sub-accounts, the ALBCC data that included research and administration departments had totals much closer to the FMS totals than did the ALBCC

data without those departments. As a result, we have chosen to present only the DSS data using all departments.

Full Results

The full tables of annual wages, hourly wages, and workload (hours) are quite lengthy, and thus are placed in the Appendix. The figures are broken down by fiscal year (FY2000-FY2003), by data source (DSS ALBCC or FMS), and by sub-account (BOC), equivalent to the job category. All values are in nominal dollars, meaning that they have not been adjusted for inflation. Nominal changes across years overstate the actual change in terms of purchasing power.

What trends do we see in the nominal wage values? First, we find that DSS and FMS wages are quite similar for major clinical categories. In unreported results, we calculated the percentage difference between them. DSS and FMS hourly wages differed by less than one percent for a majority of sub-accounts in each year. Nearly all sub-accounts differed by less than five percent. The same is true for annual wages, which are simply equal to hourly wages multiplied by a constant.

Second, there was a distinct pattern to the observed differences. Sub-accounts corresponding to administrative, temporary, and trainee accounts had substantially greater variation across sources than did sub-accounts for full-time, permanent clinical positions. Trainees (sub-accounts 1051-1054, 1056) and clinical residents (1073, 1077, 1083, 1088) have very similar total spending in the two data sources but much greater workload (hours) in DSS.

Third, a number of sub-accounts reflected only benefits, were not available in both datasets, or were unlabeled. Sub-accounts 1011-1013 contain only FICA (Social Security) taxes for certain employees. Sub-accounts 1069 and 1078 reflect the cost of certain benefits afforded to employees who are otherwise unpaid, or “without compensation” (WOC). Unemployment compensation appears in sub-account 1097 in DSS. In other cases, data for a particular sub-account appears in FMS or DSS but not

both. Spending for federal summer work programs (sub-account 1091) is reported in FMS but not in DSS. Additional sub-accounts, all unlabeled, appearing in only one data source include 1000, 1060, 1070, 1091, and 1098.

Trends in Major Job Categories

Most researchers will be interested in wages for common clinical jobs such as full-time physician, registered nurse, or social worker. As displayed in Figures 1-2, we found similar trends over time in the two data sources. FMS wages were greater than DSS wages in most years, although the differences were small.

Fig. 1. Nominal Hourly Wages for Registered Nurses and Social Workers, by Year and Data Source, FY2000-FY2003

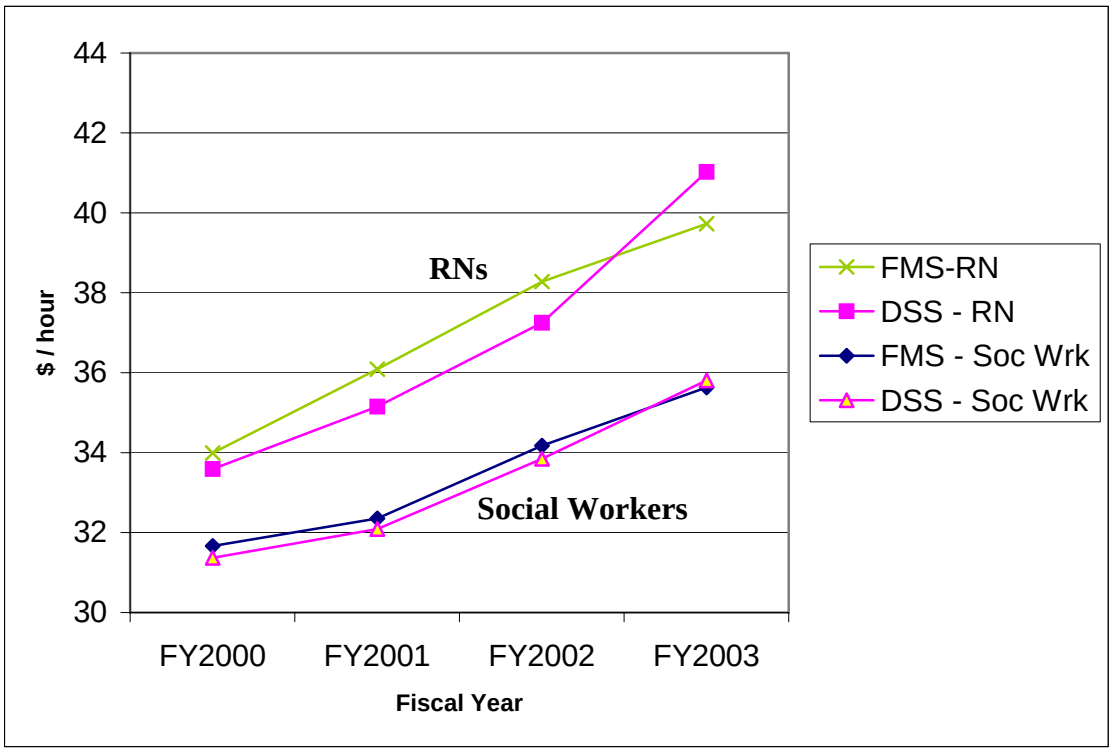
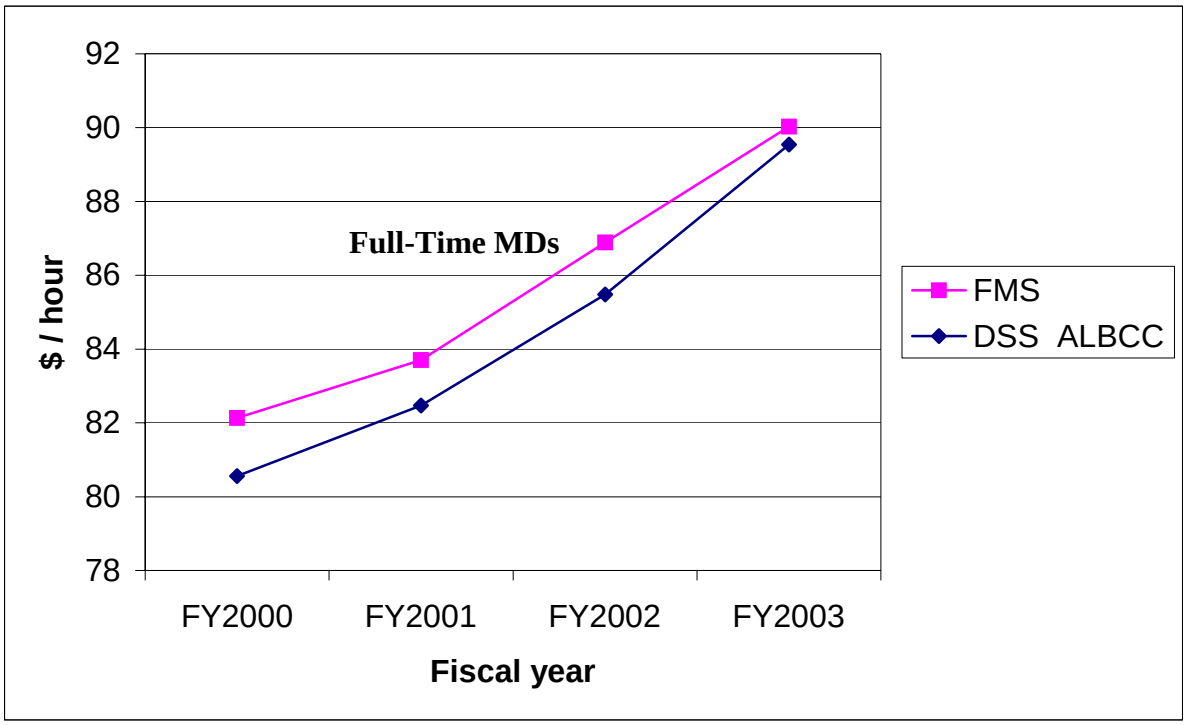


Figure 1 plots the nominal wages of registered nurses and social workers across FY2000-FY2003. For both job categories, FMS wages were higher than DSS wages in FY2000-FY2002 but lower in FY2003. The average divergence between FMS and DSS wages was about $1/hour for registered nurses but less than $0.50/hour for social workers.

Figure 2 presents similar numbers for full-time physicians. Again we find that FMS average salaries are greater than those in DSS, in this case for all four years. The gap narrowed over time, however, from nearly $2/hour in FY2000 to less than $0.50/hour in FY2003.

Fig. 2. Nominal Hourly Wages for Full-Time Physicians in Clinical Care, FY2000-FY2003, by Year and Data Source



Discussion

A major source of discrepancy between FMS and DSS ALBCC wage data will be contract labor. Contractors are used to fill a variety of clinical roles, including nursing, surgery, and carrying out renal dialysis and cardiac catheterization. FMS divides expenditures into three large categories: labor, represented by BOCs in the 1000-1999 range; supplies and contracts (2000-2999); and depreciation (3000-3999). Because contract labor falls in the 2000-2999 range, it will never be counted when determining the average wage of typical job-category BOCs in the 1000-1099 range. DSS take a different approach. Data on payment rates and total expenditures are passed to DSS staff at the local level. Based on a knowledge of contract terms, they then determine an hourly wage. If contractors do not earn the same average rate as regular VA employees, then the average rate calculated in DSS will differ from that calculated using FMS.

The process for assigning expenditures and workload for contractors is sometimes imprecise. A straightforward case would be an hourly contract. If the DSS staff receives a billing record, they will divide the payment by the hourly rate to determine the total hours worked. More difficult is when a contract specifies a payment for a variable number of hours. For instance, VA may contract with a physician group practice to perform specialty services for a capitated monthly rate. The actual time spent will vary by month and most likely will not be observable to the DSS staff. Determining a workload in this case requires the DSS staff to supply an estimated number of hours.

Although DSS and FMS handle overhead costs in different manners, this will not cause the estimated average wage rates to vary. The DSS system allocates indirect costs to direct-care departments only after the ALBCC stage. The 830 reports used to create the hourly wages in Appendix 1 still separate the overhead departments from the direct-care departments. Indeed, one can use the ALBCC data to determine the cost of particular BOCs at VACO (VA headquarters) by limiting the data to STA3N (station) 100.

The labels of many DSS clinic codes indicate that they pertain to research or administrative functions. Given that we are limiting the FMS data to “direct medical care

in VA facilities," it would be tempting to explain the variance between the two sources as arising from research and administration. In fact, however, FMS total expenditures are quite close to DSS ALBCC total expenditures when the latter includes research and administration clinic codes. Indeed, removing research and administration dollars and workload reduces the DSS expenditure total for most job categories but actually raises it for a few. (This implies that the expenditures were negative for those research and administration codes.)

Note that overtime labor does not lead to a difference between FMS and DSS. Both systems capture overtime workload and expenditures. Both also exclude these from "regular" hours and expenditures, meaning that they will not enter into the calculations of total hours or total expenditures.

Recommendations

We have several recommendations on the use of FMS or DSS ALBCC data for estimating average wages.

1. Both datasets are acceptable for estimating wages for common clinical job categories and will report very similar figures.

2. There is no clear basis for preferring FMS or DSS ALBCC for estimating wages of administrative staff. In the context of a prospective study, we instead recommend surveying employees or managers. If one of the two sources is chosen for a retrospective study, a sensitivity analysis should be performed using figures from the other source.

3. We do not recommend using either of these data sources for the wages of trainees. The trainee categories include people at many different salaries and levels of experience, rendering an average salary useless. A more accurate method would be to survey managers of trainees at a small but representative set of VA medical centers.

4. ALBCC data from FY1999 were not reliable at every VA site. Contact the DSS Bedford Technical Support Office for advice on reliability before using ALBCC data from that year.

5. Combining FMS data for certain years with DSS ALBCC data from other years could produce discontinuous jumps or falls in estimated wages. We recommend using a single source for estimating wages. In theory one could extrapolate DSS ALBCC data for FY1999 and earlier years using FMS data and an estimate of the average difference of FMS and DSS ALBCC data from FY2000 and later years. This method of extrapolation assumes that the typical gap did not change over time, however, an assumption that would be impossible to prove.

General Issues in Research on Wages

Inflation

The value of money declines over time due to inflation. Economists refer to *nominal* dollars as those that refer to prices in the current year. They are not adjusted for inflation in any way. By contrast, *real* dollars are discounted to reflect inflation since an arbitrary base year. Real dollars are intended to reflect a constant level of purchasing power as the general price level rises over time. For example, an inflation rate of 3% indicates that a general market basket of consumer goods which cost $100 last year will cost $103 this year.

Wages may be calculated in nominal dollars and converted to real dollars by multiplying by a conversation factor. The factor will equal the inverse of 1.00 plus the accumulated (i.e., compound) inflation since the base year. Continuing with the example above,

$$\$103 * [1 / (1.00 + 0.03)] = \$103 / 1.03 = \$100.$$

The U.S. federal government calculates several alternative measures of inflation. Some refer to a general market basket of consumer goods and services, while others are tailored to subsets such as health care goods and services. The federal Bureau of Labor Statistics

web site (www.bls.gov/bls/inflation.htm) offers downloadable spreadsheets with inflation rates going back many years.

DSS and FMS contain nominal expenditures, and thus wages calculated using them will be in nominal dollars. They may be converted to real dollars by choosing a base year and applying the corresponding conversion factor.

Converting from nominal to real wages will not be necessary if a research is considering expenditures in only a single year. Real wages will be preferable when one compares wages cross years or when trying to determine the value of staff time in terms of foregone consumption of other goods and services.

Sources of Wage Change over Time

Figures 1-2 and the tables in Appendix 1 make it clear that VA wages change every year. There are several reasons for this beyond inflation.

Staffing patterns may change at a medical facility. The long-term VA trend away from inpatient care and toward outpatient care may have altered the demand for nurses and physicians. If the VA is a dominant employer in a local market, or if other employers (i.e., other health care providers) are experiencing similar trends, then the market wage for clinical staff may rise or fall.

The mix of clinical staff may change. As long as pay is tied to experience, then a change in the average level of experience would affect the average rate of pay within job categories.

The relative weights across VA sites may change. The national average is affected by regional pay variations. Suppose that VA reduces staffing in the Northeast while increasing it in the Southwest. If pay rates are lower in the Southwest, then the national average wage will fall or will rise at a slower rate than it would have absent the staffing changes.

DSS allocation formulas change year to year. The DSS system allocates staff and supply expenditures to outpatient clinics and inpatient bedsections. The exact formula for these allocations can change over time as new products and departments are added, old ones are deleted, and managers determine more accurate formulas.

Regional pay differences

Extracts from FMS and DSS data may be limited to data from VA facilities in particular geographic regions. This enables researchers to compare average wages across regions. Regional variations may reflect differences in these factors:

- staffing intensity (i.e., no. of staff hours per patient)
- average federal pay grade (reflecting education and job-related experience)
- federal locality pay differentials
- for nurses, regional differences in the average nursing wage[4]
- DSS allocation methods

Quality of care

It is important to note that wage differences do not necessarily correspond to differences in quality of care. Whereas quality of care is typically tied to staffing types and levels, wage differences can be caused by many additional factors. Moreover, wage data can never reflect differences in the acuity of patients across sites. Higher acuity levels may require more intensive staffing or higher average experience among clinicians. Without accounting for patient acuity, comparisons of staffing levels and wages could be misleading.

Sensitivity analyses

Wage data could be affected by outliers and impossible values. These include include negative, zero, or very low values for expenditures, workload, or both. Using these

[4] Wages for registered nurses are set by a process that responds to local wages for non-VA nurses. As a result, there is more variation in nurse wages than for other job categories.

figures can result in average wages that are undefined or zero, that fall beneath the federal minimum wage, or that exceed $250 per hour. Before using or reporting average wage figures, impossible values and obvious outliers should be removed. After doing so, a useful sensitivity analysis is to observe how much average wages change when the lower and upper 1% of values in each budget object code are removed. If unusual values are coming from a small number of VA health care systems, it may be possible to discuss the values with FMS or DSS officials at each site.

Non-VA wages

Many researchers will be interested in comparing VA and non-VA wages. There are several sources of wage information for non-VA clinicians. These include Medicare data, the American Medical Association annual survey of physicians, Bureau of Labor Standards wage data (published in the annual Federal Register), and data collected annually by the California Office of Statewide Health Planning and Development (OSHPD). Note that most wage sources do *not* include benefits, whereas VA figures do include them. The value of VA benefits corresponding to benefits is set by regulation each year; in FY2004 it is 30% of cash earnings. Thus, an average wage of $39/hour in VA equals $30/hour in cash earnings and $9/hour in benefits.

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Appendix 1: Tables of Results