

## **Supplemental Digital Appendix 1**

### **Calculations for Economic Analyses Comparing Hospitals by Teaching Intensity**

Our unit of analysis was the hospital. We took the total unadjusted expense for routine and ancillary inpatient expenses from the corresponding line items on the Medicare Institutional Cost Reports (for routine expenses, we took the sum of Worksheet B, Part I [Cost Allocation–General Service Costs], Lines 25-35 [Inpatient Routine Service Cost Centers, including non-standard lines such as 25.xx inserted by reporting hospitals], and Column 27 [Total]; and, for ancillaries, we took the sum of Worksheet D-4 [Inpatient Ancillary Service Cost Apportionment], Line 100 [Total], and Column 3 [Inpatient Program Costs]).

We similarly identified outlier costs (Worksheet E [Calculation of Reimbursement Settlement], Part A [Inpatient Hospital Services Under Prospective Payment System (PPS)], Line 2.01 [Outlier payments for discharges on or after October 1, 1997]), Disproportionate Share payments (Worksheet E [Calculation of Reimbursement Settlement], Part A [Inpatient Hospital Services Under PPS], Line 4.04 [Disproportionate share adjustment]), and interest on capital. We estimated outlier costs as being 80% of outlier payments (personal communication with Jeffrey Stensler, PhD, Medicare Payment Advisory Commission [MedPAC] on August 11, 2009).

We used MedPAC's geographical wage indices<sup>1</sup> to identify the influence of geographic variations in wages. Following the Medicare reimbursement model,<sup>2</sup> if the wage index was  $> 1$ , we multiplied 69.7% of the unadjusted expenses (considered the labor-related portion of expenses) times the wage index minus 1. If the wage index was  $\leq 1$ , we multiplied 62% of the unadjusted expenses times the wage index minus 1.

We also identified the dollar amounts attributable to other recognized special factors, such as case mix index and disproportionate share of indigent patients. To obtain the underlying cost, we subtracted these dollar amounts from the total cost per case.

To identify the impact of case mix, we used published Medicare case mix indices (CMIs). We elected to estimate this influence through a regression model rather than simple multiplication of the generic diagnosis-related group (DRG) base payment by the specific DRG weight. The multivariate model approach is arguably at least as good as, if not better than, basic multiplication for evaluation because it controls for possible covariance--avoiding possible "double counting" of the influences--and allows for a non-zero intercept. We constructed a linear regression model with total unadjusted expenses as the dependent variable and the other factors plus CMI as the independent variables. We weighted the models by case volume and did not transform the hospital-level variables because the hospital means could be taken as normally distributed. We used the coefficients for Medicare CMI from these regressions ( $\beta = \$1,976.452145 \times$  the mean CMIs of the respective hospital groups) to identify the amounts attributable to case mix shown, taking nonteaching hospitals as the reference group to which the others were compared.

## References

1. Medicare Payment Advisory Commission. Additional technical information on constructing a compensation index from BLS data. In: MedPAC, ed. Report to the Congress: promoting greater efficiency in Medicare. Washington, D.C.; 2007.
2. Hospital Acute Inpatient Services Payment System. 2008. Available at [http://www.medpac.gov/documents/MedPAC\\_Payment\\_Basics\\_08\\_hospital.pdf](http://www.medpac.gov/documents/MedPAC_Payment_Basics_08_hospital.pdf). Accessed February 22, 2012.