

**Appendix A**  
**2003 Milwaukee Inpatient Cost Efficiency Comparison**  
**Methodology and Assumptions**

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A MILLIMAN GLOBAL FIRM

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This appendix describes the data, methods, assumptions and tools Milliman used to compare inpatient hospital cost efficiency among Milwaukee area hospitals. Measuring health care cost efficiency is a complicated and often controversial process. Therefore, the descriptions in this appendix are crucial to the effective use of this hospital comparison. Milliman's comparison of Milwaukee hospital cost efficiency should only be considered in its entirety and only with this appendix attached.

## Overview

The Greater Milwaukee Business Foundation on Health (the Foundation) commissioned Milliman to compare "cost efficiency" among Milwaukee area hospitals for a commercial health insurance population. "Cost" is defined as health insurance plan reimbursement to hospitals before reductions for participant cost sharing (e.g., deductible coinsurance, copays). Cost in this analysis does not represent a hospital's underlying expenses incurred in providing the services.

Milliman's goal for this comparison is to provide a case mix and severity adjusted comparison of hospital costs using:

- ◆ Claim data submitted to the Foundation by health plans,
- ◆ Publicly available data, and
- ◆ Unbiased and equitable methods, assumptions and tools from Milliman.

Milliman compared inpatient cost efficiency among Milwaukee hospitals for a commercial health insurance population using the following measurements:

- ◆ **Unadjusted Average Billed Charge per Admission** for commercial business reflecting each hospital's unique charge level, mix of patients, severity of illness, efficiency and cost shift burden from governmental programs. These hospital-specific average charges are not adjusted to a common mix of patients, services or cost shift burden.
- ◆ **Case Mix/Severity Adjusted Billed Charge per Admission** to estimate each hospital's billed charges for commercial business assuming every hospital served the same Milwaukee community average mix of diagnoses (case mix) and severity of illness.
- ◆ **Case Mix/Severity Adjusted Allowed Charge per Admission** to estimate the impact of health plan negotiated provider contracts on commercial business, which include negotiated discounts from billed charges.

- ◆ **Avoidable Day Efficiency** to estimate the relative impact on allowed charges resulting from an estimate of the percentage of avoidable inpatient days at each hospital.
- ◆ **Cost Shift Index** to estimate the impact on each hospital's average commercial allowed charges resulting from having a payer mix (i.e., mix of commercial, Medicaid, Medicare and uninsured business) that is different than the Milwaukee community average.

## Milwaukee Hospitals

Milliman's analysis includes all general acute care inpatient facilities in Milwaukee, Ozaukee, Waukesha, and Washington counties reported on a hospital specific and health system basis, where appropriate:

<b>Inpatient Hospital Cost Efficiency Analysis Hospitals and Hospital Systems</b>	
<b>Health System</b>	<b>Individual Hospitals Within System</b>
Aurora	Aurora Medical Center of Washington County (Hartford) Aurora Sinai Medical Center (Sinai) St. Luke's Medical Center (including South Shore Campus) West Allis Memorial Hospital
Columbia/St. Mary's	Columbia Hospital St. Mary's Hospital of Milwaukee St. Mary's Hospital Ozaukee
Covenant	Elmbrook Memorial Hospital St. Francis Hospital St. Joseph Regional Medical Center St. Michael Hospital
Froedtert/Community Memorial	Community Memorial Hospital Froedtert Hospital
ProHealth	Oconomowoc Memorial Hospital Waukesha Memorial Hospital
SynergyHealth*	St. Joseph Community Hospital of West Bend*
* Please note that St. Joseph of West Bend is included in the comparison of individual hospitals. However, SynergyHealth is not included in the comparison of hospital systems because SynergyHealth only includes one hospital (i.e., St. Joseph).	

Children's Hospital of Wisconsin is not included in the analysis or in the Milwaukee community average because of its unique demographic and market characteristics.

Sub-acute care and specialty hospitals (e.g., heart, orthopedic, behavioral health, rehabilitation and long-term acute care) are not included in the analysis.

## **Data Time Period: 2003**

The inpatient hospital cost efficiency analysis is based on data from calendar year 2003, the most recent time period for which all necessary data was readily available. Hospital billed charges, service intensity, reimbursement levels (i.e., discounts), efficiency, and case mix may change over time. The results of this comparison would likely be different if the analysis were performed on more recent data.

## **Commercial Business Only**

The inpatient hospital cost efficiency analysis is based on hospital admissions of commercially insured patients (i.e., non-Medicare, non-Medicaid) except as noted.

## **Inpatient Hospital Facility Services and Costs Only**

The hospital cost efficiency analysis is based solely on inpatient facility services and cost. It does not include any analysis of outpatient services due to lack of consistency in the hospital outpatient data submitted to the Foundation by health plans. Outpatient hospital services are an important part of any hospital analysis because outpatient hospital costs typically represent 40% to 50% of all hospital costs for a typical commercial health plan.

The analysis does not include costs from other health care providers such as physicians, home health agencies, pharmacies and other providers.

The reader of this report should consider all elements of health care costs before making any conclusions from this analysis of inpatient hospital cost efficiency.

## **Quality Comparisons**

Milliman's analysis did not include any comparisons of quality or outcomes information because such data was outside the scope of this analysis. Quality information is a critical component of provider evaluation and should be considered when evaluating hospital performance.

## **Interpreting Results: Percentage of Community Average**

Exhibit 1 compares each hospital and hospital system to the Milwaukee community average. The costs for each hospital/system are stated as a percentage of the Milwaukee community average. The Milwaukee community average is expressed as 100% in each comparison.

- ◆ Charge or fee-related costs above 100% imply higher than average costs. A hospital with a relative cost of 110% indicates that its cost is 10% over the Milwaukee community average.
- ◆ A Cost Shift Index above 100% indicates a greater than average need to shift costs to the commercial population based on a hospital's relative mix of government, commercial and self-pay business.
- ◆ Avoidable Day Efficiency above 100% implies more potentially avoidable days than the community average and lower than average utilization efficiency.

Small differences in magnitude on particular measures may not truly differentiate performance.

## **Methodology, Assumptions and Data Sources**

**Average Billed Charge per Admission** is based on inpatient data from the 2003 Wisconsin Discharge Public Use Data from the Bureau of Health Information, Division of Health Care Financing, Department of Health & Family Services, State of Wisconsin (BHI Data). Every hospital in Wisconsin submitted quarterly information for each of its inpatient admissions to BHI for inclusion in the data base. The presented data is based on each hospital's unique charge level, mix of patients, severity of illness, avoidable day efficiency and government cost shift burden. To enhance the comparability of the data, Milliman adjusted each hospital's BHI Data to reflect the following:

- ◆ Only commercial payer admissions are included (i.e., Medicare, Medicare, Private Pay and Workers Comp are excluded),
- ◆ Only inpatient admissions from residents of the four-county Milwaukee metropolitan area (i.e., Milwaukee, Ozaukee, Washington, and Waukesha counties) are included,
- ◆ Transfers to or from acute care hospitals are excluded, and
- ◆ Inpatient admissions that could not be mapped to a specific APR-DRG are excluded. For example, all neonate and well newborn admissions are excluded because the BHI data does not include enough detailed information to classify these admissions appropriately.

**Case Mix/Severity Adjustments** estimate the impact if each hospital served the same average Milwaukee mix of diagnoses (case mix) and severity of illness for a commercial

population. The basis for the severity adjustment is Milliman's Hospital Relative Value System (HRVS).

The HRVS assigns hospital relative value units (HRVUs) for inpatient acute care based on each admission's APR-DRG (a categorization and coding system available commercially from 3M that reflects four levels of severity within a diagnosis-specific admission category). The HRVUs are analogous to the Medicare Resource Based Relative Value Schedule for physicians (RBRVS) as they estimate the relative resource consumption of hospital admissions based on the severity of the case. The HRVS creates a base number of HRVUs for each APR-DRG admission, a corresponding base length of stay associated with each APR-DRG admission and incremental HRVUs for each day of an admission that exceeds the base length of stay. Milliman calculated an average billed charge per HRVU by dividing each hospital's total billed charges for each APR-DRG by the hospital's total HRVUs for each APR-DRG.

Milliman calculated an overall billed charge per HRVU for each hospital by compositing the results of the HRVS by APR-DRG using the Milwaukee community average case mix of admissions by APR-DRG. If a hospital did not have any admissions for a particular APR-DRG (hence no HRVS results for the APR-DRG), the hospital was assigned the Milwaukee community billed charge per HRVU for that APR-DRG on the assumption that a patient would need to use another hospital in the community to receive the service.

**Allowed Charge Adjustments** reflect the average reimbursement paid to the hospital (from the insurer and from patient cost sharing) after applying any discounts the hospital negotiated with insurers and health plans for commercial inpatient business. Milliman estimated the allowed charge adjustments from a combination of two sources:

- ◆ Hospital specific 2003 inpatient claims data provided to the Foundation by insurers and health plans, and
- ◆ Hospital specific allowed to billed charge ratios for commercial inpatient business calculated from information reported by the hospitals to The Wisconsin Department of Human Services and published in the 2003 Hospital Fiscal Year Survey.

Please note that negotiated discounts can vary greatly by payer contract and by type of commercial product. Milliman did not have sufficient information to standardize the commercial payer/product mix within this study. A standardized mix may provide different allowed charge adjustments.

**Avoidable Day Efficiency** estimates each hospital's potentially avoidable days relative to the potentially avoidable days calculated from the Milwaukee community average

(standardized for risk and severity). For example, an Avoidable Day Efficiency of 105% suggests that a hospital's potentially avoidable days are 5% higher than they would have been had it performed at community average efficiency (i.e., the hospital is less efficient than average). Lower levels of avoidable days would result in comparatively shorter lengths of stay and/or fewer admissions which may result in lower hospital costs.

Milliman estimated the avoidable day efficiency using Milliman's Hospital Efficiency Index™. The Hospital Efficiency Index is a statistical model that estimates inpatient hospital utilization efficiency by comparing each hospital's potentially avoidable inpatient days relative to identified "most efficient practices" throughout the United States. The Hospital Efficiency Index uses commercial inpatient admission data from the 2003 BHI Data and Medicare data from 2003 MedPar data published by the Centers for Medicare and Medicaid Services (CMS).

Milliman developed this commercially available Index by identifying the hospital or group of hospitals throughout the United States with the lowest average length of stay and lowest potentially avoidable admissions, based on a statistically credible number of admissions, for each APR-DRG (diagnosis groupings by condition and four different levels of severity). Each hospital's actual percentage of avoidable inpatient days is calculated, based on its own mix of admissions by APR-DRG, as the difference between the hospital's actual average length of stay and admission rate for each APR-DRG, and the average lengths of stay and admission rates for the nationwide best practice hospital(s). The admission data set excluded transfers to and from acute care hospitals, early deaths, outliers with lengths of stay in excess of APR-DRG specific outlier targets and low frequency APR-DRGs for which we could not establish a benchmark. All other hospital admissions are included.

The following should be considered when evaluating results from the hospital efficiency analysis:

- ◆ The evaluations do not address the relative quality of a hospital, but rather its relative efficiency level based on potentially avoidable days and admissions.
- ◆ These indices may vary due to statistical fluctuations and consideration should be given to appropriate statistical confidence levels, which are available in the Hospital Efficiency Index database.
- ◆ A hospital that has inappropriate / unnecessary admissions for a particular diagnosis / procedure combination may exhibit lower efficiency indices than would otherwise apply.

- ◆ These results measure a hospital's efficiency for the years that the data is reported using a common benchmark. To the extent that a hospital has subsequently implemented programs to improve its efficiency, its current performance level may have improved. In order to improve its relative position vis-à-vis other institutions, a hospital must improve by more than the benchmark hospitals.
- ◆ Some hospitals may be constrained by infrastructure or other resource limitations from performing at more efficient levels.

More information about the Milliman Hospital Efficiency Index can be found at [www.milliman.com/health/tools\\_and\\_models](http://www.milliman.com/health/tools_and_models)

**Cost Shift Index** estimates the theoretical impact on each hospital's commercial charge level of having a payer mix (i.e., commercial, Medicaid, Medicare, and uninsured business) that is different than the Milwaukee community average. For example, a Cost Shift Index of 105% implies that a hospital's commercial fees are 5% higher than they would have needed to be if the hospital had a community average payer mix. The Cost Shift Index is intended to illustrate how funding shortfalls from governmental and uninsured patients can affect a hospital's pricing.

Medicare and Medicaid program reimbursements and payments from uninsured patients are typically considerably lower than commercial fee levels and, for many hospitals, less than costs. Hospitals with a greater than average share of government program business or with high levels of uninsured care will have a greater relative need than other hospitals to make up for these revenue shortfalls through higher commercial fees, all other factors being equal (e.g., relative efficiency, margin expectations, etc.).

Milliman calculated a Cost Shift Index for each hospital by adjusting each hospital's percentage distribution of business by payer class (using reported billed charges to determine the percentage allocations) to the community average mix of business, and then calculating the commercial fee level required to maintain the hospital's overall net patient revenue if the hospital had a community average mix of business rather than its actual mix of business. This calculation factored in the hospital's bad debt experience and adjusted for the elimination of Medicare disproportionate share payments because a hospital with the community average payer mix would not receive such payments.

The source of data for the Cost Shift Index calculations is the Wisconsin Department of Human Services Fiscal Year 2003 Hospital Fiscal Year Survey. Milliman included the following classes of patient revenue in its calculations (as defined and reported in the Survey): Medicare, Medicaid, Workers Compensation, Private Pay, Commercial and Charity Care.



Milliman applied the Cost Shift Index to the Case Mix, Severity, Efficiency Adjusted Allowed Charge information (discussed in the prior sections of this appendix) to illustrate how hospital costs might compare if payer mix were more similar among hospitals.

Milliman did not evaluate the impact of medical education programs on hospital pricing due to insufficient data to evaluate the complete impact of such programs on hospital operating costs. Some providers believe providing a medical education program to train physicians and other health care professionals creates an additional cost burden that is inadequately reimbursed by non-commercial payors.

Milliman did not evaluate the impact of individual hospital or system profitability on hospital pricing. Since many of the individual hospitals are part of complex health systems that include non-hospital organizations, operate in geographies beyond that of this study and share collective finances, we did not believe that we could discretely measure the impact to any single hospital or most health systems. Milliman assumed that the current level of profitability for each organization or system was adequate to meet its needs.

Milliman did not evaluate whether Milwaukee's cost shift level is higher or lower than other markets.

## **Uses of Information**

Milliman encourages the business, provider, and government communities to use this information to collaborate on quality and cost improvement initiatives. We did not create this information for, and we ask that it not be used in, hospital-specific public relations efforts or for general media purposes. We also ask that this information be reviewed and used in its entirety. Hospital comparisons using only one measure or even a limited number of measures can be misleading. An informed comparison of hospital-specific performance should also incorporate other information, particularly additional quality measures, not included in this report. This information is designed for use by the business community, not individual consumers of health care services.

## **Data Reliance**

Milliman relied, without audit on public data sources and claim data submitted by the health plans. To the extent this information is not accurate; the results of Milliman's analyses may not be accurate.

## **For Further Information**

Please contact Clark Slipher, F.S.A., in the Milwaukee office of Milliman (Phone: (262) 784-2250, e-mail [clark.slipher@milliman.com](mailto:clark.slipher@milliman.com)) with questions and comments about the hospital cost efficiency analysis in this report.