

# Case Study: Age Of Assets And Quality Of Care In Three New York State Hospitals

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## ABSTRACT

*A previous study (Morey, Scherzer & Lee, 2005) of seventy-three New York hospitals examined the relationship between age of assets, fiscal viability and quality of care. The relationship of these factors was examined using 2002 data, for each of the hospitals randomly selected for inclusion in study. Several financial variables were used to construct a fiscal viability index; and a “quality index” was created from selected mortality outcomes and procedural measures used to evaluate specific aspects of institutional care. The results of the study indicated that fiscal viability positively influenced the quality of hospital care, which means that hospitals with better financial conditions tend to provide greater quality of care to their patients. However, the effect of age of assets on quality was counter-intuitive, with the research results indicating hospitals with older assets provided better quality care to their patients. This unexpected outcome might stem from a measurement error in determining the age of asset. Age of asset was determined with respect to all long-term assets, but average age of equipment may have a greater impact on hospital care quality than age of buildings. Related to this issue, various quality measures may be affected differently by the age of assets. For example, hospitals with the latest diagnostic equipment may greatly influence the outcome of certain inpatient conditions. The purpose of this case study was to examine three hospitals in the study that demonstrated this unexpected outcome; that is, hospitals with older assets that appeared to provide better quality services to their patients than hospitals with younger assets.*

## INTRODUCTION

Three New York State hospitals in 3 different regions of the State were selected for this case study and will be referred to in this case study by their locations: Northeastern, NY, Finger Lakes, NY, and Mid-Hudson, NY.

Each of these hospitals had an average asset age of 15 years or older. Also, on a score of one to three (one lowest, three highest) of quality indicators (described below), the three hospitals scored in the upper third percentile of New York state hospitals included in the sample (n=73).

## METHODOLOGY

Age of plant, fiscal ratios and quality data were used to create indices, which were used to analyze the correlations between hospital age of assets and quality of care.

As outlined by Cleverly (1997), the following methodology was used to determine age of plant:

**Table 1: Age Of Plant**

Variable	Ratio	Formula
Age of assets	Age of asset in years	Allowance for depreciation ÷ annual depreciation expense

The quality measures used in this study were selected from among 25 quality measures employed by the Alliance for Quality Health Care (Alliance, 2004) to evaluate the quality of inpatient hospital care in New York State and are presented below in Table 2. The *Inpatient Quality Indicators* were developed by Stanford University and the University of California for the Agency for Healthcare Research and Quality. (Inpatient, 2004)

Values for each measure were determined by the Alliance for Quality Care from New York State Department of Health hospital data. The data is collected by all hospitals in New York from uniform billing forms and reported to the Statewide Planning and Research Cooperative System.

**Table 2: Quality Measures Of hospital Inpatient Care**

Grouping	Measure
Mortality For Inpatient Conditions	<ul style="list-style-type: none"> <li>• Acute Myocardial Infarction</li> <li>• Congestive Heart Failure</li> <li>• Acute Stroke</li> <li>• Gastrointestinal Hemorrhage</li> <li>• Hip Fracture</li> <li>• Pneumonia</li> </ul>
Procedure Utilization	<ul style="list-style-type: none"> <li>• Cesarean Section Delivery</li> <li>• Vaginal Birth After Cesarean Utilization</li> <li>• Laparoscopic Cholecystectomy</li> <li>• Incidental Appendectomy in Elderly</li> <li>• Bilateral Cardiac Catheterization</li> </ul>

For each measure, the *risk-adjusted* rate for each hospital was compared with the *risk adjusted* State rate. If the hospital's rate was consistent with the State rate (95% CI), the hospital was considered to have a rate similar to the State's. If the hospital's rate was above or below the State's rate, it was determined to be better or worse than the State's rate.

Hospitals were given a score of two if they were consistent with the State mean, one if they were significantly (95% CI) worse than the mean, and three if significantly better. An index score was created for each hospital in the sample by averaging its scores on each measure.

## FINDINGS

The age of assets and quality indices calculated for the 3 hospitals in this case study are listed in Table 3, below:

**Table 3: Age Of Assets And Quality Scores**

Hospital	Age Of Assets	Quality Score
Northeastern Hospital	15 years	2.44
Finger Lakes Hospital	19 years	2.45
Mid-Hudson Hospital	18 years	2.14

Note: Mean quality score for all 73 hospitals included in original study = 1.98

### Northeastern Hospital

#### *Quantitative Findings*

The Northeastern hospital's aggregate asset age was 15 years. The asset age was further broken down into age of buildings, fixed equipment and moveable equipment. Moveable equipment includes diagnostic equipment that

is not attached to the building or permanent in nature. Everything from laboratory to x-ray to operating room to ICU/CCU equipment would be carried as moveable equipment. Moveable equipment has a relatively short life (1-5 years) before obsolescence, and can easily be replaced without making major building modifications.

Using Cleverly’s formula (Table 1, above) the age of moveable equipment was calculated as follows:

**Table 4: Northeastern Hospital, Assets, 2002**

<b>Northeastern Hospital</b>	<b>Assets</b>		
<b>Asset Age Analysis:</b>	<b>Moveable Equipment</b>	<b>Moveable Equipment Purchases</b>	<b>Total Asset Acquisition</b>
Asset Acquisition		\$1,015,542	\$1,302,006
Allowance for Depreciation	\$49,907,103		
Depreciation Expense	\$4,082,504		
Average Age of Moveable Equipment	12		

Asset age of moveable equipment was calculated at 12 years, three years less than the average aggregate asset age. The increase in hospital total asset value for 2002 was \$1,302,006; of that amount, \$1,015,542 (78%) was attributable to moveable equipment. Various equipment leases had an outstanding liability of \$7,453,391 at the end of 2002. The last two amounts, asset purchases and leased equipment, indicate that the hospital invested the majority of its capital in moveable equipment in 2002, perhaps indicating a commitment to “cutting edge” technology.

*Qualitative Findings*

The Northeastern hospital is a 368-bed, acute care hospital founded in 1885. According to data provided by the Joint Commission on Accreditation of Healthcare Organizations, it provides 44 areas of clinical care, including a vast array of cardiac care services (including cardiac surgery), many ambulatory diagnostic services, and mental health and nursing home services. Its heart center and intensive care unit received national recognition on prestigious “Top 100 Hospitals” list in 2001. Its medical staff includes specialists in allergy/immunology, cardiology, critical care, endocrinology, gastroenterology, hematology, infectious diseases, internal medicine, nephrology, neurosciences, neurosurgery, obstetrics/gynecology, oncology, ophthalmology, orthopedic surgery, otolaryngology, pathology, pediatrics, physical medicine, psychiatry/neurology, rheumatology, thoracic and cardiac surgery, urology, and vascular surgery.

According to information provided by the hospital, in 2002, renovation to the hospital’s emergency department was completed. Its Foundation publicly kicked off a \$16 million dollar capital campaign. Phase one of the campaign was aimed at raising money for new medical equipment, including a new CT scanner and angiography suite. Phase two will focus on building a new ICU and the creation of centers of excellence in cancer care and circulatory medicine.

**Finger Lake’s Hospital**

*Quantitative Findings*

Asset age of moveable equipment was calculated at 18 years, one year less than the total age of assets for the hospital. While the increase in hospital total asset value for 2002 was \$803,646, \$461,707 (57%) was used for moveable equipment. Various equipment leases had an outstanding liability of \$1,967,835 at 12/31/02. These last two amounts, asset purchases and leased equipment, indicate that this hospital, like the Northeastern hospital, invested the majority of its capital in moveable equipment in 2002. Little was invested in “bricks and mortar.”

Table 5: Finger Lakes Hospital, Assets, 2002

<b>Finger Lakes</b>	<b>Assets</b>		
<b>Asset Age Analysis:</b>	<b>Moveable Equipment</b>	<b>Moveable Equipment Purchases</b>	<b>Total Asset Acquisition</b>
Asset Acquisition		\$461,707	\$803,646
Allowance for Depreciation	\$22,109,207		
Depreciation Expense	\$1,215,812		
Average Age of Moveable Equipment	18		

*Qualitative Findings*

The Finger Lake's Hospital is a 250-bed, acute care facility, founded in 1908. According to data provided by the Joint Commission on Accreditation of Hospitals, the hospital provides 41 areas of clinical care, including traditional acute care services, along with many ambulatory diagnostic services, and mental health and nursing home services. Specialty services include oncology, endocrinology, gastroenterology, nephrology, otolaryngology, and vascular medicine.

No major additions or renovations have taken place in this acute care facility in the past 30 years. Its last major capital project was a six million dollar medical office building to house physician and outpatient hospital services. According to hospital provided information, in 1999 it embarked on a three million dollar capital campaign and targeted technological upgrades as one of its major goals.

The quantitative and qualitative data suggest that the focus of the hospital's investment is in technology and infrastructure to provide state of the art diagnostic services within its organization, while upgrades to its physical structure have been limited.

**Mid-Hudson Hospital***Quantitative Findings*

The Mid-Hudson Hospital's asset age of moveable equipment was calculated at 16 years, three years less than its average age of total assets. While increase in hospital total asset value for 2002 was \$824,279, only \$292,995 (35%) was used for moveable equipment. This finding does not shed light on why the Mid-Hudson Hospital's quality indicators are higher than those of "younger" hospitals, although one year's data may not be indicative of the hospital's historical expenditure patterns for moveable equipment.

Table 6: Finger Lakes Hospital, Assets, 2002

<b>Mid-Hudson Hospital</b>	<b>Assets</b>		
<b>Asset Age Analysis:</b>	<b>Moveable Equipment</b>	<b>Moveable Equipment Purchases</b>	<b>Total Asset Acquisition</b>
Asset Acquisition		\$292,995	\$824,279
Allowance for Depreciation	\$23,026,687		
Depreciation Expense	\$1,479,259		
Average Age of Moveable Equipment	16		

*Qualitative Findings*

The Mid-Hudson Hospital is a 228-bed, acute care facility, founded in 1891. According to data provided by the Joint Commission on Accreditation of Hospitals, it provides 42 areas of clinical care, including traditional acute care services, along with many ambulatory diagnostic services, and mental health and nursing home services. Its

specialty services are similar in scope to the other hospitals in this study, including: oncology, endocrinology, gastroenterology, nephrology, otolaryngology, and vascular medicine.

According to information provided by the hospital, in 1997 the hospital affiliated with another hospital in New York to create one of the largest private healthcare systems between New York City and Albany, NY. It is home to a Chronic Wound Treatment and Hyperbaric Center, the largest and most advanced program of its type in the Northeast. The hospital's other centers of excellence are the Assertive Community Treatment Center, Family Health and Wellness Center, Hyperbaric Medicine, and Intensive Case Management. Its last major hospital expansion program took place in 1976 when a new wing was constructed to offer new technology-based diagnostic and treatment services.

### **SUMMARY ANALYSIS OF THREE HOSPITALS**

The initial study that prompted the review of these three facilities indicated that as hospital asset age increased, quality also increased. Each of the 3 hospitals in this case study had an aggregate asset age of greater than 15 years, and additional analysis was undertaken to try to identify factors that explain these older hospitals' strong quality scores. According to Li and Benton (2003), hospital quality performance is associated with equipment/technology decisions. One factor that provided a plausible explanation for the higher quality scores of older New York State hospitals was investments in moveable equipment. Asset age of moveable equipment in each of the three cases examined in this study was less than aggregate age of assets – but only by 1 to 3 years. However, investments in moveable equipment as a percentage of total asset acquisition was substantial at both the Northeastern Hospital and the Finger Lakes Hospital providing some evidence that the hospitals' investment in the latest technologies might be related to their high quality measures. The qualitative data also supports this conclusion as both hospitals made significant investments in medical technology, but not in their respective physical plants, circa 2002.

Compared to the other two hospitals examined in this case study, The Mid-Hudson Hospital's investment in moveable equipment is small, suggesting that other variables influence the quality of care in older hospitals, or possibly this one year is not indicative or the facility's prior investments in moveable equipment. The three hospitals examined in this case study were established between 1885 and 1908. An important factor may be the older hospitals' long history and strong culture of serving the community and emphasizing patient care. The history may create an "esprit de corps" to motivate and focus management, providers, and staff to provide high quality patient care. The Finger Lakes Hospital explicitly refers to its history in its website:

*Hospital's history is one of change to meet the ever-growing needs of its community ... one of evolution in step with the latest developments of the health care industry ... one of steadfast commitment and support of its neighbors ... and one of excellence, clinically, technologically and professionally.*

Older hospitals might also have a larger number of long-term staff members than newer hospitals (Talbot, 1994), providing the expertise and leadership necessary to deliver high quality health care. Finally, through time, older hospitals may have honed a better understanding of the patients, families, and community they serve than newer hospitals allowing them to provide better quality health care.

### **SUGGESTIONS FOR FUTURE RESEARCH**

This study raised more questions than it answered. One major question addressed by the study concerns the relationship between investment in moveable equipment and hospital quality. This study provides some very preliminary evidence that there may be a positive relationship between older hospitals' investments in technology and the high quality of care they provide. Limitations of the study that prevent us from drawing stronger conclusions are that we only looked at 2002 data and only examined three hospitals. Future researchers will, therefore, need to study a larger sample of hospitals and collect longitudinal data. Also, we only looked at hospitals that had older than average age of assets and high quality scores. Future research will need to compare "old" hospitals to "new" hospitals to identify factors that explain differences in the quality of care provided. One hospital examined in this case study did

not invest as heavily in moveable equipment as the other two hospitals. This suggests that researchers should look at other independent variables to determine their impact on older hospital quality.

## REFERENCES

1. Cleverly, W. O., *Essentials of Health Care Finance*, Fourth Edition. Aspen Publication, 19.
2. Inpatient Quality Indicators Overview. AHRQ Quality Indicators. July 2004. Agency for Healthcare Research and Quality, Rockville, MD. [http://www.qualityindicators.ahrq.gov/iqi\\_overview.htm](http://www.qualityindicators.ahrq.gov/iqi_overview.htm).
3. IRS Form 990 for year 2002 - [www.Guidestar.org](http://www.Guidestar.org).
4. Joint Commission on Accreditation of Healthcare Organizations.
5. Li, Ling and Benton, W. C., Hospital capacity management decisions: Emphasis on cost control and quality enhancement, *European Journal of Operational Research*, Vol. 146, No. 3, p. 596, 2003.
6. Morey, Jim, Scherzer, Gary, and Lee, Hoseoup, Impact of Asset Age/Fiscal Viability On Selected Measures of Quality in Hospitals, *Journal of Business and Economics Research*, Vol. 2, Number 9, p. 89, 2004.
7. New York State Hospital Report Card (tm) Consumer Guide to Understanding the Hospital-Specific Quality Reports. *MyHealthFinder*. 2003. Niagara Health Quality Coalition, Inc. November, 2005  
<http://www.myhealthfinder.com/newyork/>.
8. St. Joseph's. November 2005 <http://www.stjosephs.org/>.
9. Talbott, Shannon P., How HR keeps current in century-old companies, *Personnel Journal*, Vol. 73, No. 10, p. 86, 1994.
10. The Mount Vernon Hospital. Sound Shore Medical Center. November 2005.  
<http://www.ssmc.org/homepagemv.cfm?id=45>.