

Department of Health and Human Services

**OFFICE OF  
INSPECTOR GENERAL**

**EFFECTS OF HOSPITAL MERGERS ON  
COSTS, REVENUES, AND PATIENT  
VOLUME**



**Richard P. Kusserow  
INSPECTOR GENERAL**

**JUNE 1992**

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This report was prepared by Thomas A. Noplock, CPA, of the OEI Health Care Branch with the assistance of W. Mark Krushat, Sc.D., and Linda M. Moscoe of the OEI Technical Support Staff.

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**OEI-12-90-02450**

# TABLE OF CONTENTS

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EXECUTIVE SUMMARY .....	i
PURPOSE .....	1
BACKGROUND .....	1
METHODOLOGY .....	1
FINDINGS .....	2
APPENDIX A .....	A-1
APPENDIX B .....	B-1
APPENDIX C .....	C-1

# EXECUTIVE SUMMARY

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## PURPOSE

To determine the effects of hospital mergers on costs, revenues, and patient volume.

## BACKGROUND

Dramatic changes have occurred in the health care industry in recent years, including growth in the number of hospital mergers. While some hospitals claim that merger is the solution to problems associated with patient volume and profitability, the U.S. Department of Justice and the Federal Trade Commission believe that some mergers can reduce healthy competition and are not necessarily the best way to increase efficiency and decrease cost.

Secretary Sullivan appointed a Task Force in November 1989 to examine the Department of Health and Human Services (DHHS) policy on hospital mergers and he asked the Inspector General to analyze several issues surrounding mergers.

## METHODOLOGY

We randomly selected eleven hospital mergers from the American Hospital Association's list of 20 mergers occurring in 1987. We also identified a control group of hospitals which were geographically similar to the eleven merged hospitals. We compared the two groups of hospitals using data from the Hospital Cost Report Information System (HCRIS) maintained by the Health Care Financing Administration (HCFA). These data items represent various measures of costs, patient revenues, and patient volume.

## FINDINGS

- ▶ *Merged hospitals reduced the cost of doing business, but otherwise were not different from hospitals which had not participated in a merger.*
- ▶ *Based on our data, it is difficult to predict what effect a merger will have on a specific hospital's operating characteristics with any degree of accuracy.*

# INTRODUCTION

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## PURPOSE

The purpose of this inspection is to determine the effects of hospital mergers on costs, revenues, and patient volume.

## BACKGROUND

Dramatic changes have occurred in the health care industry in recent years, including remarkable growth in the number of hospital mergers. Increasing market share, patient volume, and profitability are some of the reasons given for hospital mergers. A weak hospital that is losing money may find it more acceptable to merge with a financially stronger hospital than to go out of business. The stronger hospital can increase its market share by selectively marketing the most successful services of the weak hospital. While some hospitals claim that merger is the solution to their problems, the U.S. Department of Justice (DOJ) and the Federal Trade Commission (FTC) believe that some mergers can reduce healthy competition and are not necessarily the best way to increase efficiency and decrease costs.

The Secretary, Department of Health and Human Services, appointed a Task Force in November 1989 to examine the Department's policy on hospital mergers. He asked the Inspector General to analyze several issues surrounding mergers.

This inspection is a companion study to the Office of Inspector General reports entitled "The Effects of Hospital Mergers on the Availability of Services" (OEI-04-90-02400) and "The Effects of Hospital Mergers on the Availability of Services: A Case Study of Eight Hospital Mergers" (OEI-04-91-00500).

## METHODOLOGY

We randomly selected eleven hospital mergers from the American Hospital Association's list of 20 mergers occurring in 1987. We also identified a control group of hospitals which were geographically similar to the eleven merged hospitals. We compared the two groups of hospitals using data from the Hospital Cost Report Information System (HCRIS) maintained by the Health Care Financing Administration (HCFA). These data items represent various measures of costs, patient revenues, and patient volume.

Our purpose does not include a review of the criteria or formulas used by the Department of Justice (DOJ) to approve or disapprove mergers.

A full description of methodology and data analysis is included in appendix A.

# FINDINGS

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*Merged hospitals reduced the costs of doing business, but did not increase revenues or patient volume in comparison to similarly placed hospitals which had not participated in a merger.*

The results of our analysis show that, to the extent that the control group represents an appropriate comparison, hospitals that merged in 1987 differ only slightly from hospitals not participating in a merger. However, some differences do exist.

## Interpretation of the Data

To compare the two groups of merged and non-merged hospitals we calculated the percent change in costs, revenues and patient volume after the mergers took place. Two statistical tests were used to determine if the merged group of hospitals differed significantly from the controls (that is, increased or decreased their costs, revenues and patient volume more than the non-merged hospitals). The Wilcoxon Rank Sum procedure tests to see if one group tends to have values lower or higher than the other. The Medians Test determines if one group has a significantly greater number of values above the median of both groups.

Table 1 contains a listing of cost report items for merged and control hospitals. For each item tested, the p-values provide an indication of the probability that the two groups differ with respect to that variable, according to either the Wilcoxon Rank Sum procedure or the Medians Test. The lower this value, the more likely the observed differences are not due to chance alone. The asterisks in Table 1 indicate those tests with p-values below the 0.05 cutoff value, the point traditionally used to indicate statistical significance. However, because a large number of tests have been conducted, it is questionable that every difference with a p-value between 0.05 and 0.01 is significant. (When a high number of tests are performed, we increase the probability that at least some of the values will differ purely by chance.) Even so, p-values less than 0.05 can be indicative of potential trends. Also, included are the average percent changes for each group from the pre-merger period to the post-merger period.

## Results

As Table 1 indicated, most of the items that show a p-value of less than 0.05 on at least one of our tests are cost items. In addition, for most of the cost items, the merged hospitals showed either reductions in the values from pre- to post- merger, or a smaller increase than the control hospitals.

Two of the cost report items stand out: expenses associated with Medical and other Services (Summary Sheet) and Total Fixed Assets. The results indicate that the merged hospitals reduced their costs in these categories while the control hospitals

experienced increases during the same time periods. Both of these differences were highly significant for both tests.

While the merged hospitals reduced costs (or limited increases in costs) in comparison to the control group of non-merged hospitals, few differences between the groups appeared with respect to revenues or patient volume. Only two variables in these categories showed any significant differences. The number of inpatient days for Medicare dropped in the merged hospitals while slightly increasing in the controls, and hospital ancillary charges for Medicare inpatient days increased at a lower rate in the merged hospitals than in the controls.

*Based on our data, it is difficult to predict what effect a merger will have on a specific hospital's operating characteristics with any degree of accuracy.*

The Coefficient of Variation (COV) is a common statistical function that measures the variability in data. It also allows for comparisons of the variability across different data elements. The COV is the calculated standard deviation expressed as a percent of the mean. Table 1 includes the COV of the 39 data elements for the pre-merger post-merger differences. Overall, the average of these values is 626 percent. This demonstrates extreme variability in the data presented. This extreme variability, which may be due to the small number of hospitals examined or inherent variability of the data, makes it difficult for us to predict the outcomes mergers may have for specific hospitals on various aspects of costs, revenues, or patient volume.



**Table 1  
Non Parametric Test Results**

Cost Report Item	p-Values		Average Percent Change		Pre-Post Difference Coefficient of Variation
	Wilcoxon	Median	Mergers	Controls	
<u>Patient Volume:</u>					
Total Beds Available in the Hospital	0.293	0.677	-11.5%	-1.6%	172 %
Total Bed Days Available in the Hospital	0.131	0.211	-13.6%	1.5%	138 %
Medicare Inpatient Days-Hospital Total	0.076	0.037*	-5.9%	0.8%	1453 %
Medicaid Inpatient Days-Hospital Total	1.000	0.677	49.8%	44.9%	220 %
Inpatient Days, All Patients-Hospital Total	0.131	0.211	-6.2%	0.6%	279 %
Medicare Discharges-Hospital Total	0.088	0.211	-9.7%	-1.3%	152 %
Medicaid Discharges-Facility Total	0.896	0.677	13.8%	16.0%	312 %
Total Discharges, All Patients-Hospital Total	0.101	0.211	-15.5%	-5.7%	134 %
<u>Revenues:</u>					
Total Ancillary Charges-All Cost Centers	0.189	0.211	13.1%	20.3%	148 %
Total Medicare Inpatient Hospital Ancillary Charges	0.066	0.005*	7.5%	16.8%	331 %
Total Outpatient Charges	0.131	0.211	25.2%	44.8%	99 %
DRG Payments-Other Than Outliers	1.000	0.677	0.3%	0.7%	565 %
DRG Outlier Payments	0.237	0.211	132.8%	207.2%	147 %
Total Patient Revenues	0.511	0.211	9.7%	14.9%	183 %
Net Income or (Loss)	0.646	0.677	-208.8%	-64.1%	155 %
<u>Cost and Fixed Assets:</u>					
Depreciation-Buildings and Fixtures	0.805	0.839	7.0%	4.7%	338 %
Depreciation-Movable Equipment	0.307	0.291	6.5%	21.6%	2021 %
Direct Salaries-					
All General Service Cost Centers	0.358	0.211	-0.5%	1.0%	513 %
All Hospital Inpatient Cost Centers	0.149	0.037*	-8.4%	3.3%	7389 %
All Other Inpatient Cost Centers	0.049*	0.211	53.4%	80.9%	379 %
All Ancillary Service Cost Centers	0.948	0.677	7.3%	11.9%	265 %
All Outpatient Service Cost Centers	1.000	0.677	26.8%	31.6%	194 %
Total	0.149	0.211	1.4%	8.1%	358 %
Other Dir. Cost-					
All General Services Cost Centers	0.115	0.037*	-2.4%	5.3%	778 %
All Hospital Inpatient Cost Centers	0.793	0.677	78.6%	22.2%	570 %
All Other Inpatient Cost Centers	0.358	0.677	298.3%	141.9%	466 %
All Ancillary Service Cost Centers	0.022*	0.037*	-3.4%	12.0%	367 %
All Outpatient Service Cost Centers	0.101	0.211	3.1%	26.3%	541 %
Total	0.026*	0.037*	-0.3%	10.4%	910 %
Total Capital-Related Costs	0.393	0.211	-0.4%	18.0%	368 %
Total Facility Costs	0.049*	0.037*	1.3%	10.4%	340 %
Total Inpatient Ancillary Costs	0.393	0.677	-4.3%	6.7%	560 %
Total Outpatient Costs	0.101	0.211	17.9%	29.9%	113 %
Medicare Inpatient Ancillary Costs, Before Limitation	0.399	0.677	-4.4%	6.7%	847 %
Medicare Malpractice Costs	0.470	0.677	-1.6%	187.9%	188 %
Total Medicare Inpatient Operating Costs, Including Pass-Through Costs	0.076	0.037*	-4.9%	5.8%	1605 %
Reimbursable Bad Debts, Net of Recoveries	0.694	0.677	125.8%	69.2%	245 %
Medical and Other Services (Summary Sheet)	0.001*	0.000*	-10.4%	29.7%	217 %
Total Fixed Assets	0.010*	0.037*	-11.6%	2.2%	340 %
<u>Average Coefficient of Variation For Pre-Post Difference</u>					626 %

# APPENDIX A

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## METHODOLOGY

### Construction of Study Groups

The AHA (American Hospital Association) identified 20 mergers occurring in 1987 involving at least two general, short term, acute care hospitals, coexisting either in the same county, if rural, or the same MSA (Metropolitan Statistical Area), if urban, representing distinct physical plants that were unified under one management. The result of the merger could be the continuing operation of both facilities or only one. For this inspection, a merger also includes acquisitions of one hospital by another as long as the location requirements, as stated above, were met. Mergers that represented only administrative reorganizations of a single physical plant were excluded. This definition conforms to that used in the previous OIG inspections. From this original group of 20, we randomly selected 11 mergers for study. Appendix C contains a list of the hospitals included in this report.

To create a control group, we identified geographically similar hospitals in the areas identified by the 11 mergers. Two factors were considered in the construction of the control groups: size of the hospital and geographic location. The size of the hospital was determined by the number of beds as reported in the PPS-5 cost report data (see below.) For the mergers, the bed size of the institution resulting from the merger was used.

Geographic location was determined by identifying the State and County in which the merged hospitals were located. All other hospitals located within the same county and of approximately the same bed size were included in the control group. If there were too few hospitals, or no other hospitals located within the county, the adjacent counties were included until at least two other hospitals of approximate size and proximity were found. Geographic location took precedence over bed size. That is, control hospitals smaller than the merged hospital were included if counties considered too far from the index county were necessary to obtain control hospitals of approximately equal bed size.

### Analytical Methods

Comparisons of the control hospitals to the merged hospitals were undertaken using data items in the Hospital Cost Report Information System (HCRIS) maintained by the Health Care Financing Administration (HCFA). This system maintains the cost reports filed by each hospital providing services under Medicare. The data reported on the cost reports is not just Medicare data but represents data for the entire operation of the hospital. This is important because the focus of this inspection is not limited to Medicare. The data is ordered into files representing reporting cycles based

upon fiscal years and are designated as PPS-1 through PPS-6. PPS-1 includes those cost reports with fiscal years beginning after September 30, 1983 but before October 1, 1984. PPS-2 includes those cost reports with fiscal years beginning after September 30, 1984 but before October 1, 1985, and so on. No periods were chosen before PPS-1 in order to avoid mixing PPS cost reports with non-PPS cost reports. PPS-6 cost reports were the most current available. The items on data elements were selected based on recommendation from the HCRIS staff to represent the economic changes to the entire hospital that would result from a hospital merger. The list of the items used is presented in Appendix B. For each hospital in both the merger and control group, each item from the cost reports for PPS-2 and PPS-3 were averaged to obtain an combined estimate. These were considered the pre-merger values. The post-merger values were obtained from the PPS-5 data for all hospitals. The pre-merger and post-merger values were again averaged across all of the control hospitals associated with each merged hospital. We thus obtained 22 pre-merger and 22 post-merger values for each item in Appendix B; 11 from the merged hospitals and 11 from the average of the control hospitals.

To account for the effects of inflation, the amounts reported in PPS-3 and PPS-5 were adjusted to reflect constant dollars using PPS-2 as the base year. The amounts in PPS-3 and PPS-5 were multiplied by 0.9614 and 0.8652, respectively. Percent changes were then calculated using these revised amounts.

### Construction of Control Group

The number of hospitals used as controls in the index county, that is, the county where a merger occurred, and in the adjacent counties are indicated on the maps. Also included is a table detailing the control group, by bed size, for each of the merger situations. In the case of the merger that occurred in Arkansas, we were unable to identify appropriate control hospitals of similar bed size in close proximity to the index county (Table A1). The following table summarizes the distribution of merger and control hospitals by bed size.

<u>Bed Size</u>	<u>Number of Hospitals</u>	
	<u>Mergers</u>	<u>Controls</u>
<100 Beds	0	8
100-299 Beds	8	36
<u>300+ Beds</u>	<u>3</u>	<u>24</u>
Totals	11	68

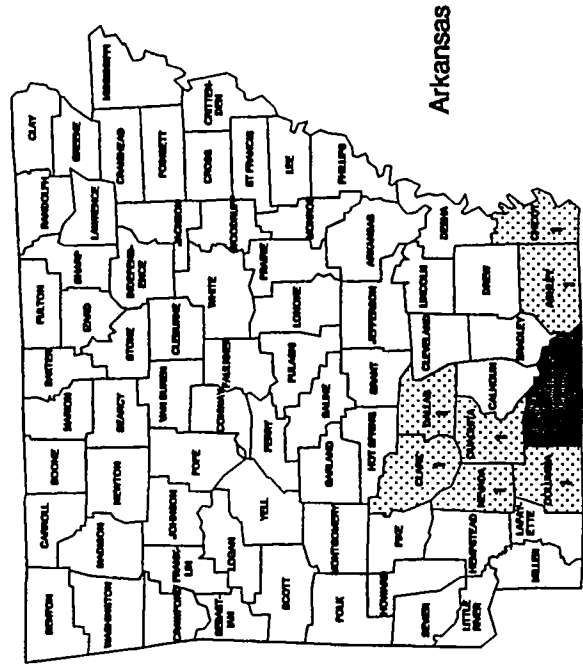
The eight control hospitals of less than 100 Beds include the six small hospitals imposed by the Arkansas case. A comparison of these two distributions indicates that this dictated difference is not statistically significant (Chi-square = 2.138, degrees of freedom = 2). The average bed size of the merged hospitals is 259 beds, with a 95 percent confidence interval of 188 beds to 330. That of the control hospitals is 287 beds, with a 95 percent confidence interval of 245 to 329 beds.

Selection of control hospitals in adjacent, or nearly adjacent, counties represent an attempt to control for demographic and economic conditions. For this analysis, it was assumed that hospitals located in close proximity, at the county level, would be subject to similar pressures affecting changes between the pre- and post- merger time periods.

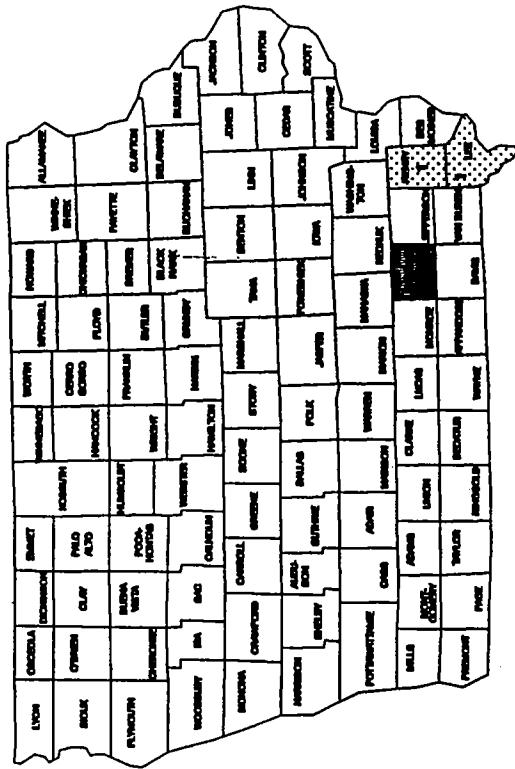
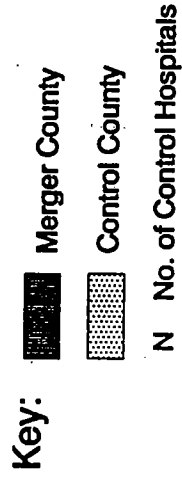
These results would indicate that, on the whole, the control group is comparable to the merged hospitals, at least with respect to the variables included here.

Table A1

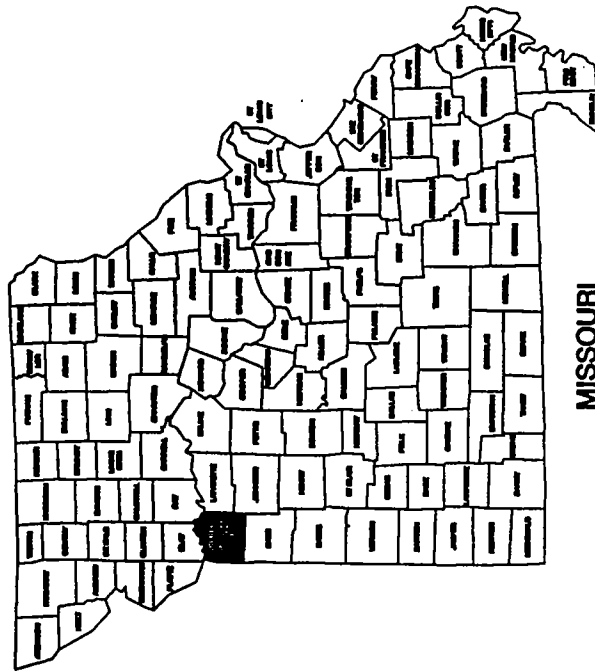
	Bed Size Strata			Average Bed Size	
	<u>1-99</u>	<u>100-299</u>	<u>300+</u>	<u>Controls</u>	<u>Mergers</u>
ARKANSAS	6	1	0	74.5	301
IOWA	0	2	0	135.5	238
KANSAS	2	3	2	219.1	123
MASSACHUSETTS	0	0	11	444.0	510
MICHIGAN	0	9	6	367.1	230
MISSOURI	0	5	0	257.6	246
NEBRASKA	0	2	0	188.0	194
NEW YORK	0	2	2	292.0	416
PENNSYLVANIA	0	5	3	332.0	296
TENNESSEE	0	5	0	197.6	108
WASHINGTON	0	2	0	176.5	187



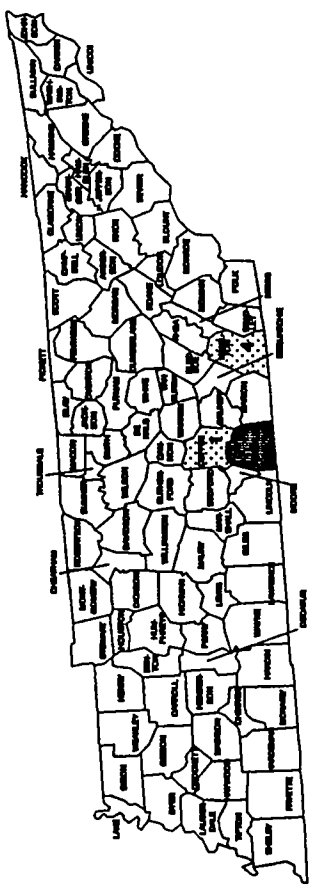
# Selected Counties by State



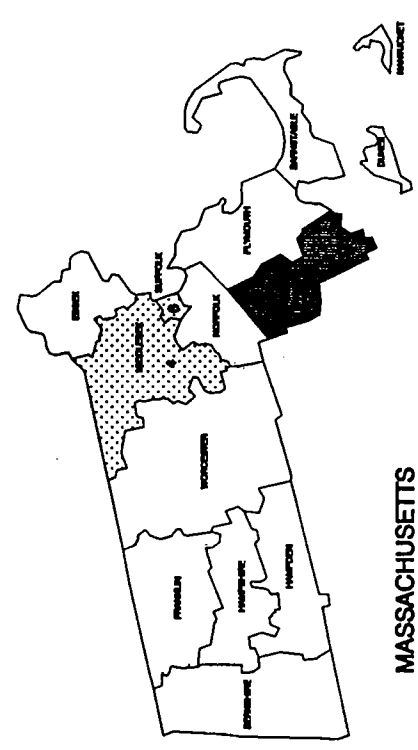
IOWA



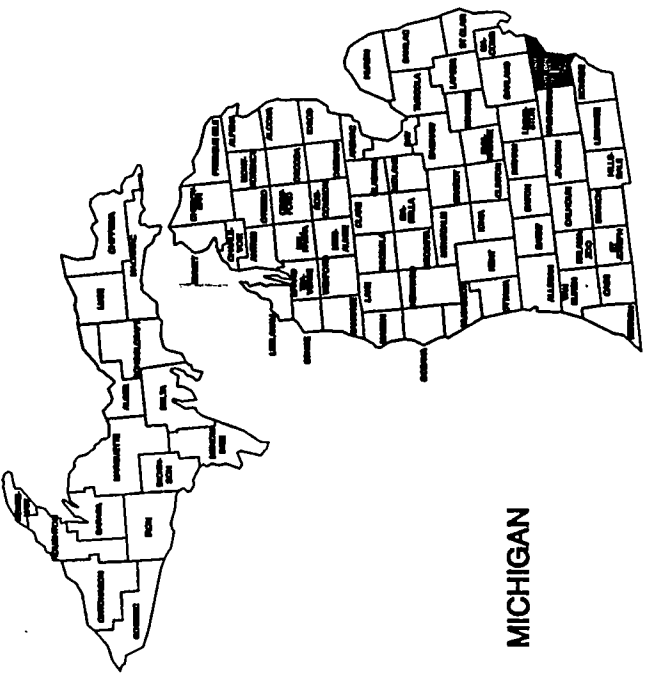
MISSOURI



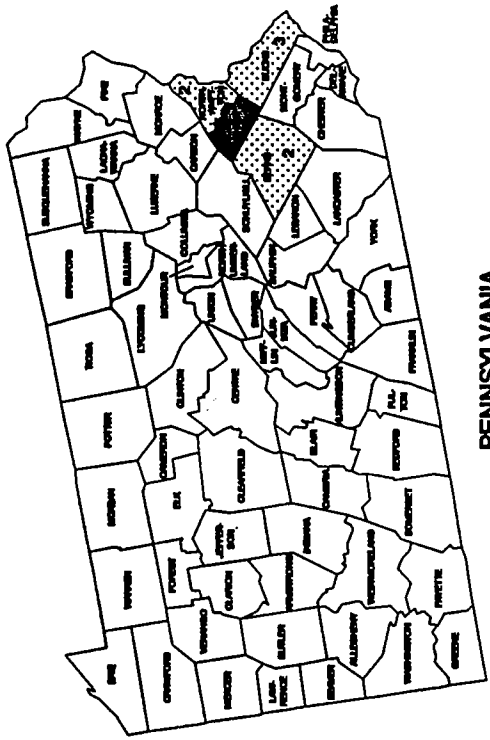
TENNESSEE



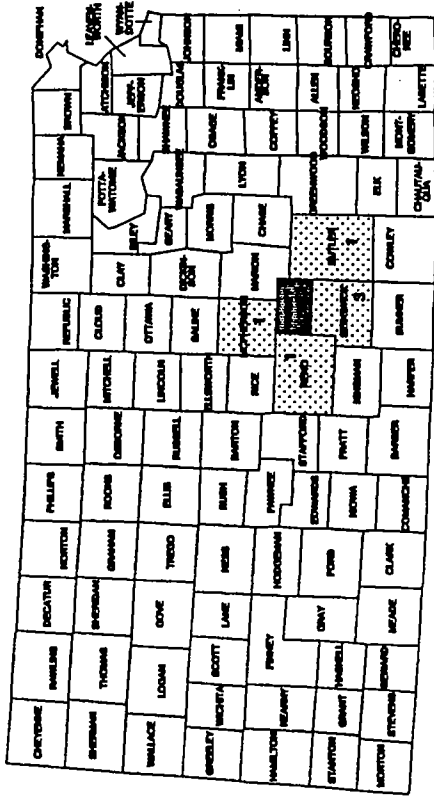
MASSACHUSETTS



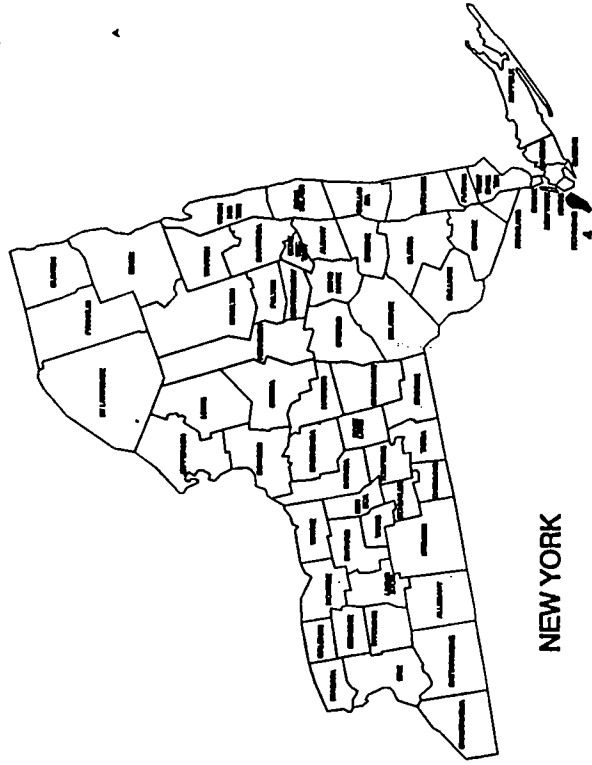
MICHIGAN



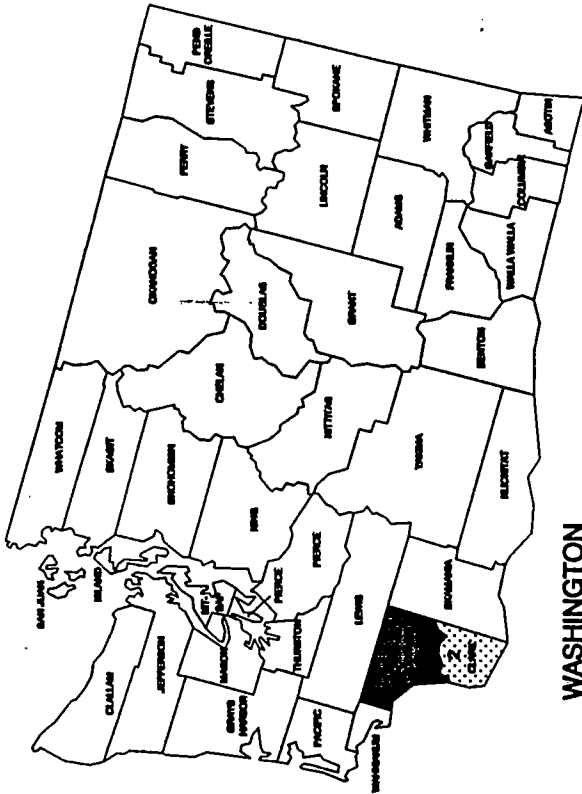
PENNSYLVANIA



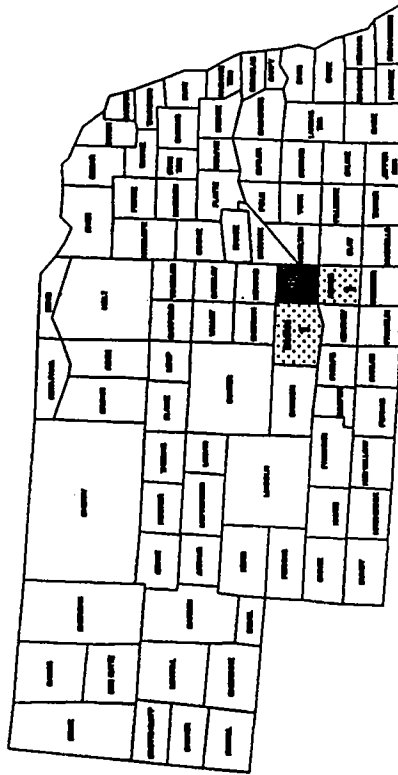
KANSAS



NEW YORK



WASHINGTON



NEBRASKA

# APPENDIX B

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## ITEMS INCLUDED IN ANALYSIS

### Report Items and HCRIS Data Element Numbers

Total Beds Available in the Hospital	F45
Total Bed Days Available in the Hospital	F52
Medicare Inpatient Days-Hospital Total	F59
Medicaid Inpatient Days-Hospital Total	F65
Inpatient Days, All Patients-Hospital Total	F72
Medicare Discharges-Hospital Total	F82
Medicaid Discharges-Facility Total	F85
Total Discharges, All Patients-Hospital Total	F88
Depreciation-Buildings and Fixtures	F90
Depreciation-Movable Equipment	F91
Direct Salaries-All General Service Cost Centers	F92
Direct Salaries-All Hospital Inpatient Cost Centers	F94
Direct Salaries-All Other Inpatient Cost Centers	F95
Direct Salaries-All Ancillary Service Cost Centers	F96
Direct Salaries-All Outpatient Service Cost Centers	F97
Direct Salaries-Total	F101
Other Dir. Cost-All General Services Cost Centers	F102
Other Dir. Cost-All Hospital Inpatient Cost Centers	F104
Other Dir. Cost-All Other Inpatient Cost Centers	F105
Other Dir. Cost-All Ancillary Service Cost Centers	F106
Other Dir. Cost-All Outpatient Service Cost Centers	F107
Other Dir. Cost-Total	F111
Total Capital-Related Costs	F221
Total Facility Costs	F263
Total Ancillary Charges-All Cost Centers	F290
Total Medicare Inpatient Hospital Ancillary Charges	F317
Total Inpatient Ancillary Costs	F344
Total Outpatient Charges	F444
Total Outpatient Costs	F448
Medicare Inpatient Ancillary Costs, Before Limitation	F456
Medicare Malpractice Costs	F457
Total Medicare Inpatient Operating Costs, Including Pass-Through Costs	F458
DRG Payments-Other Than Outliers	F470
DRG Outlier Payments	F471
Reimbursable Bad Debts, Net of Recoveries	F487
Medical and Other Services (Summary Sheet)	F492
Total Fixed Assets	F509
Total Patient Revenues	F525
Net Income or Loss	F533



# APPENDIX C

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## MERGERS INCLUDED IN THIS STUDY

<u>Merger</u>	<u>Former Hospital</u>	<u>New Hospital</u>
El Dorado, Arkansas	Union Medical Center Provider Number: 040098 Warner Brown Hospital Provider Number: 040088	South Arkansas Med. System Provider Number: 040088
Ottumwa, Iowa	Ottumwa Rgnl Health Center Provider Number: 160089 St. Joseph Health & Rehab Provider Number: 160004	Ottumwa Rgnl Health Center Provider Number: 160089
Newton, Kansas	Axtell Christian Hospital Provider Number: 170002 Bethel Deaconess Hospital Provider Number: 170103	Newton Medical Center Provider Number: 170103
New Bedford, Massachusetts	St. Luke's Hospital Provider Number: 220021 Parkwood Hospital Provider Number: 220121	St. Luke's Hospital Provider Number: 220021
Detroit, Michigan	Samaritan Health Center Provider Number: 230147 Mount Carmel Mercy Hospital Provider Number: 230039	Mercy Hospitals & Health Provider Number: 230147
Kansas City, Missouri	Trinity Lutheran Hospital Provider Number: 260031 St. Mary's Hospital Provider Number: 260118	Trinity Lutheran Hospital Provider Number: 260031
Grand Island, Nebraska	Grand Island Memorial Hosp Provider Number: 280087 St. Francis Med Center Provider Number: 280023	St. Francis Med Center Provider Number: 280023
Staten Island, New York	CHS - SI Provider Number: 330160 Richmond Hospital Provider Number: 330076	CHS - SI Division Provider Number: 330160
Allentown, Pennsylvania	Allentown Hospital Provider Number: 390133 Lehigh Valley Hospital Provider Number: 390261	The Allentown Hosp-Lehigh Provider Number: 390133

Merger

Winchester, Tennessee

Sewanee, Tennessee

Longview, Washington

Former Hospital

Methodist Hosp. of Mid TN

Provider Number: 440058

Emerald-Hodgson Hospital

Provider Number: 440005

St. John's Hospital

Provider Number: 500041

Monticello Med Cent

Provider Number: 500070

New Hospital

Methodist Hosp. of Mid TN

Provider Number: 440058

St. John's Med Cent

Provider Number: 500041