

Reducing Hospital Utilization and Related Expenses at the Community Level

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How to cite this paper: Lagoe, R. and Littau, S. (2018) Reducing Hospital Utilization and Related Expenses at the Community Level. *Case Reports in Clinical Medicine*, 7, 541-549.

<https://doi.org/10.4236/crcm.2018.711048>

Received: October 6, 2018

Accepted: October 30, 2018

Published: November 2, 2018

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Abstract

The reduction of health care expenses continues to be a major challenge for the economy and society of the United States and other nations. This study focused on a major source of health care expenses, inpatient hospitals, at the community level. It was based on the assumption that fewer inpatient hospital admissions per population contribute to lower health care costs. The study demonstrated that the hospitals of Syracuse, New York have generated fewer inpatient admissions and discharges than those of other New York State metropolitan areas per population. It suggested that the application of utilization rates for inpatient hospitalization in Syracuse to some other New York State areas could result in substantial savings. Between 2016 and 2017, the hospital discharge rates in Syracuse were 1.6 - 3.1 percentage points lower than those of Albany, 2.2 - 5.0 percentage points lower than those of Rochester, 4.1 - 4.9 lower than those of New York City, 5.4 - 8.2 percentage points lower than those of Buffalo, and 17.2 - 18.3 percentage points lower than those of Utica. The study suggested that the conservative hospitalization rates in Syracuse were developed and sustained over long periods of time through the use of ambulatory surgery, reduction of admissions through hospital emergency departments, and limitation of the inpatient bed supply. This was a lengthy process that resulted in a conservative hospital admission pattern. The study demonstrated, more recently, that specific programs such as the reduction of inpatient hospital readmissions and hospital lengths of stay have supported additional reductions of hospital and related utilization in Syracuse.

Keywords

Hospitals, Hospital Admissions, Health Care Expenses

1. Introduction

In the United States, the importance of health care expenses with respect to the

economy and society continues to increase. Health care providers and payers have become a larger part of the economy. At the same time, their expenses have become an increasing burden for government, businesses, and consumers [1] [2]. In New York State, these organizations dominate the list of the largest employers [3].

Health care expenses have become major challenges for federal and state budgets through the Medicare and Medicaid programs. They are also reducing the ability of American industries to compete in international markets [4].

Per capita health care expenses in the United States are 29 percent higher than those of the next nation. At the personal level, these expenses are limiting the ability of American families to pay costs of living [5].

It has been demonstrated that much of the increased costs of health care in the United States is related to variations in hospital use. Increases in hospital admission rates have produced excess costs at the community level [6] [7] [8] [9].

At the national and community levels, different approaches have been employed to limit health care expenses. Major employers, such as Amazon, are showing greater interest in providing health care services themselves in order to limit costs. Initiatives by major payors such as Medicare, Medicaid, and private insurance plans are also addressing reduction of health care expenses for hospital and other services [10] [11] [12].

Programs for Medicare, such as MACRA; Medicaid, such as DSRIP; and insurance companies, such as ACQA, have involved reduction of hospital admissions through substitution of other services, such as nursing home admissions, home health care visits, ambulatory care, and other community services for hospital care [13].

The impact of these developments has been reflected at the community level. Health care providers such as hospitals and physicians have become major employers. Local governments and businesses have been responsible for paying the expenses of care.

2. Population

This study focused on hospital discharges and related health care expenses in the metropolitan area of Syracuse, New York. This area includes three large acute care facilities, Crouse Hospital (18,935 inpatient discharges excluding well newborns, 2017), St. Joseph's Hospital Health Center (24,886 discharges, 2017), and Upstate University Hospital (32,411 discharges, 2017).

These hospitals provide a full range of services to an immediate service area of about 600,000. They also provide tertiary services to the eleven county Central New York Health Service area with a population of approximately 1,400,000.

Historically, the Syracuse hospitals have worked cooperatively to improve the efficiency and outcomes of health care in their service area. These efforts have included programs to limit inpatient admissions with other local providers and programs to reduce hospital lengths of stay with area nursing homes and home

health agencies. A number of these initiatives were implemented through the Hospital Executive Council [14] [15].

3. Method

This study focused on hospital admission/discharge rates as an indicator of health care expenses in the metropolitan area of Syracuse, New York. Hospital admission/discharge rates were used to evaluate these expenses because they include some of the highest health care expenses. Reduction of hospital use rates has been an objective of many efforts to limit health care expenses.

Health care expenses, rather than health care costs, related to utilization were evaluated in the study. Actual health care costs for the New York State metropolitan areas were not available.

The study focused on health care utilization and expenses, rather than outcomes. Hospital readmissions were summarized in the second component of the study. Data concerning hospital complications and readmissions were summarized in the following articles [16] [17] [18] [19].

The study also focused on utilization and expenses, rather than mortality and patient satisfaction. Updated population data concerning hospital mortality were not available for the metropolitan areas evaluated. Patient satisfaction information for specific health services was also not available for these populations.

The initial component of the study included a summary of hospital admission/discharge rates per resident population in the immediate Syracuse metropolitan area as compared with rates in other immediate New York State metropolitan areas for 2013-2017. These included Albany, Schenectady, and Rensselaer Counties (Albany), Erie County (Buffalo), Monroe County (Rochester), Oneida County (Utica), Onondaga County (Syracuse), and New York City (5 Burroughs).

Data were collected from the New York Statewide Planning and Research Cooperative System (SPARCS). This organization provides administrative data concerning hospital utilization in New York State. Data are available for indicators that do not identify individual patients.

The differences in rates between Syracuse and the other areas were used to estimate the contributions of hospital admission/discharge rates to these costs during this period. It was assumed that these differences were generated, in part, by differences in utilization of inpatient hospital services.

The second component of the study focused on efforts to reduce hospital readmissions and discharges in the Syracuse metropolitan area through use of alternative services. This analysis focused on changes in hospital adult medicine and adult surgery readmissions between 2013 and 2017. Adult medicine and adult surgery were used because they are the largest hospital services. Inpatient readmissions have been identified as a major contributor to excess health care costs.

The study data included Potentially Preventable Readmission rates for returns to the same hospital within 30 days of the initial discharge between 2013 and 2017. This information was based on all major payers. Numbers of readmissions were based on the numbers of repeat hospitalizations, rather than the numbers of patients generating them. The data were developed using the Potentially Preventable Readmissions software developed by 3M™ Health Information Systems.

The third component of the study involved hospital lengths of stay in the Syracuse hospitals. Historically, the Syracuse hospitals have worked to reduce lengths of stay as a means of improving the efficiency of care. These efforts have focused on limiting inpatient stays by discharging patients requiring extended care to nursing homes. This involved substitution of less costly long term care for acute care services.

The study data included lengths of stay for adult medicine and adult surgery patients, the largest services in the hospitals, between 2008 and 2017. Lengths of stay for the Syracuse hospitals were compared with severity adjusted national averages. Severity of illness was defined using the 3M™ Health Information Systems All Patients Refined Diagnosis Related Group Systems.

4. Results

The initial component of the study concerned hospital admission/discharge rates per population for major acute care services, including adult medicine, adult surgery, pediatrics, and obstetrics in the metropolitan area of Syracuse, New York. Related data are summarized in **Table 1**.

This information demonstrated that the Syracuse hospitals generated conservative hospital utilization rates, especially during the most recent years of the period, 2016 and 2017. During these years, the hospital discharge rates in Syracuse were 1.6 - 3.1 percentage points lower than those of Albany, 2.2 - 5.0 percentage points lower than those of Rochester, 4.1 - 4.9 lower than those of New York City, 5.4 - 8.2 percentage points lower than those of Buffalo, and 17.2 - 18.3 percentage points lower than those of Utica.

These differences were reflected in the data for subpopulations by age level in 2017. For patients aged 18 - 44 years, the admission rate for the Syracuse hospitals was 63.6 per 1000 population, compared with 65.2 - 71.8 for the other areas except Albany (60.4). For patients aged 45 - 64 years, the admission rate for the Syracuse area was 92.7 per 1000 population, compared with 98.2 - 108.1 for the other areas. For patients aged 65 years and over, the rate for Syracuse was 244.5, compared with 248.5 - 282.4 for the other areas.

Although these percent differences were limited, they translated into substantial savings. If the other communities were admitting hospital inpatients at the Syracuse rates, the annual savings at \$5000 per hospital admission during 2016 and 2017 would have been \$5,003,464 - \$9,699,000 for the Albany Area; \$24,146,618 - \$36,494,880 for Buffalo; \$8,184,715 - \$18,600,000 for Rochester;

Table 1. Resident Inpatient Hospitalization per 1000 Population, Medical/Surgical, Obstetrics, and Pediatric/Neonatal Discharges, New York State Metropolitan Areas, 2013-2017.

Resident County	2013	2014	2015	2016	2017
Capital District (Albany, Schenectady, Rensselaer)	70.7	78.3	85.5	92.7	94.0
Erie County (Buffalo)	94.5	93.4	92.3	96.5	99.1
Monroe County (Rochester)	88.9	88.0	88.2	93.3	95.9
New York City (5 Burroughs)	98.5	97.5	96.0	95.2	95.8
Oneida County (Utica)	105.9	103.0	126.5	108.3	109.2
Onondaga County (Syracuse)	90.5	89.0	91.8	91.1	90.9

2017 Data annualized based on January-September 2017 actual experience. Data do not include well newborns (APR DRGs 626,640), mental health/substance abuse treatment (APR DRGs 740-776), and rehabilitation (APR DRG 860). Sources: New York Statewide Planning and Research Cooperative System (SPARCS) (resident discharges); New York Statistical Information System (population).

\$171,259,000 - \$205,330,000 for New York City; and \$20,048,664 - \$21,305,000 for Utica.

The conservative hospital admission/discharge rates in the Syracuse hospitals were produced by a combination of factors over time. During the twentieth century, limitations on the hospital bed capacity reduced excess admissions. This included the decision not to build another hospital in the northern part of the Syracuse service area.

This utilization pattern was supported by the development of alternative services such as ambulatory surgery programs at Crouse Irving Memorial Hospital, efforts to avoid emergency department admissions at St. Joseph's Hospital Health Center, and a small health maintenance organization by the hospitals. This admitting pattern persisted in the twenty first century despite the development of unused hospital bed capacity.

Recently, the implementation of programs for reduction of hospital admissions by health care payers have provided additional support for reducing hospital admissions and substituting alternative services such as ambulatory care and primary care. These programs have included the Medicare readmissions reduction program, as well as efforts to increase the use of ambulatory and primary care such as MACRA by Medicare, DSRIP by Medicaid, and ACQA by Blue Cross Blue Shield.

The second component of the study focused on the impact of one of these initiatives, the Medicare readmissions reduction program, in the Syracuse hospitals. Relevant data are summarized in **Table 2**.

This information included readmissions within 30 days of the initial discharge in the Syracuse hospitals between 2013 and 2017. It was based on all payers, because Medicare, Medicaid, and insurance payers have implemented programs focusing on this indicator in New York State. The study data demonstrated that inpatient readmission rates for adult medical/surgical patients declined from 8.09 to 7.31 percent between 2013 and 2017. The number of readmissions declined by 2.2 percent, from 4154 to 4063. The reduction in numbers of readmissions combined with an increase in the at risk population to produce a 9.6 percent decline in the readmission rate. At an average cost of \$5000 per adult medicine readmission, the resulting savings would have been \$455,000.

The reduction in readmissions to the Syracuse hospitals was supported by the conservative hospital admission/discharge rate in the area. This utilization pattern encouraged the use of ambulatory and long term care services as alternatives to hospitalization. It helped reduce excess inpatient admissions from hospital emergency departments and other providers.

The third component of the study involved length of stay reduction in the Syracuse hospitals. Relevant data are summarized in **Table 3**.

Historically, the Syracuse hospitals have implemented programs with local nursing homes that have reduced lengths of stay by substituting long term care

Table 2. Potentially Preventable Readmissions, Adult Medicine and Adult Surgery Patients-All Payors, Syracuse Hospitals, 2013-2017.

	Number of Readmissions	At Risk Population	Readmission Rate
2013	4154	51,354	8.09
2014	4020	51,990	7.73
2015	4000	53,012	7.55
2016	4000	54,509	7.34
2017	4063	55,594	7.31

Based on 3 M Health Information Systems Potentially Preventable Readmissions algorithm applied to adult medicine and adult surgery definition by APR DRG for readmissions within 30 days. Source: Hospital Executive Council.

Table 3. Inpatient Mean Lengths of Stay, Medical/Surgical, Syracuse Hospitals, 1998, 2008, 2010, 2012, 2014, 2016.

	1998	2008	2010	2012	2014	2016
Number of Discharges	45,378	47,753	51,408	55,661	53,979	55,541
Mean Length of Stay	6.23	5.48	5.58	5.47	5.67	5.33
Severity Adjusted National Average	4.87	5.16	5.35	5.28	5.48	5.31
Length of Stay Difference	1.36	0.32	0.23	0.19	0.19	0.02
Patient Days Difference	61,714.08	15,280.96	11,823.84	10,575.59	10,256.01	1,110.82

Data exclude Diagnosis Related Groups concerning obstetrics, pediatrics, psychiatry, alcohol/substance abuse treatment, rehabilitation, and all patients aged 0 - 17 years. Source: Hospital Executive Council.

days for acute care days. These programs have reduced the costs of care by decreasing numbers of high cost hospital patient days and increasing numbers of lower cost long term care patient days. These programs include complex care for intravenous antibiotic therapy and extensive wound care.

The data in **Table 3** demonstrated that, between 2010 and 2017, the mean length of stay for adult medicine and adult surgery in the Syracuse hospitals declined from 5.58 to 5.33 days. During this period, the severity adjusted national average length of stay for this population increased from 5.35 to 5.48 days before decreasing to 5.31 days in 2016.

As a result, the difference between the mean length of stay for the Syracuse hospitals and the severity adjusted national average declined from 0.23 patient days in 2010 to 0.02 patient days in 2016. When multiplied by the numbers of discharges for this population, the number of excess days declined from 11,823 in 2010 to 1110 in 2016, a decline of 10,713 patient days.

At a late stay cost of \$600 per hospital patient day, the value of the 10,713 days saved was \$6,427,800. If all of these days resulted in the movement of patients to long term care services, the cost of the services that were substituted might have been \$250 per patient day or \$2,678,250. The savings that resulted from the substitution of services was \$3,749,550.

5. Discussion

The reduction of health care expenses continues to be a major challenge for the economy and society of the United States and other nations. These expenses are a substantial burden for government, businesses, and individuals. The health care system of the nation is a major employer. At the same time, it is also the source of large expenses at the national, state and local levels.

One approach to reducing health care expenses or limiting their growth involves the utilization of services at the community level. Inevitably, this process concerns health care providers.

This study addressed the utilization of health care for a major source of health care expenses, inpatient hospitals, at the community level. It was based on the assumption that fewer inpatient hospital admissions per population contribute to lower health care costs.

The study demonstrated that the hospitals of Syracuse, New York, over time, have generated fewer inpatient admissions and discharges than those of other New York State metropolitan areas per population. It suggested that the application of utilization rates for inpatient hospitalization in Syracuse to some other New York State areas could result in substantial savings.

The study suggested that the conservative hospitalization rates in Syracuse were developed and sustained over long periods of time through the use of ambulatory surgery, reduction of admissions through hospital emergency departments, and limitation of the inpatient bed supply. This was a lengthy process that resulted in a conservative hospital admission pattern.

The study demonstrated that, more recently, specific programs such as the reduction of inpatient hospital readmissions and hospital lengths of stay have supported additional reductions of hospital and related utilization in Syracuse. These efforts have been implemented by the area hospitals individually and collectively.

This information suggests the need for incremental efforts to address health care expenses at the community level. These efforts will require the creativity and participation of providers and the populations that they serve.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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