

Resident Hospital Discharges by Severity of Illness at the Regional Level

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Abstract

In the twentieth century, government sponsored health planning focused on the use of services by population in the United States. This case study evaluated the impact of severity of illness for resident hospital discharges for 2017, the latest time period for which this information was available. It focused on the Central New York Health Service Area, one of the original health planning populations. The study demonstrated that patients at Extreme severity of illness constituted similar percentages of adult medicine and adult surgery populations in the Central New York Region. The sizes of Moderate severity of illness populations were also similar. The study identified considerable differences in the sizes of Minor and Major severity of illness populations for adult medicine and adult surgery in the Central New York Region. These differences resulted from large numbers of healthy patients in the adult surgery population. They were admitted for orthopedic procedures and procedures to address obesity.

Keywords

Hospitalization, Hospital Discharges, Severity of Illness

1. Introduction

In the United States and elsewhere, health care is closely associated with community and regional populations. The need for these services is generated by resident populations [1] [2].

Historically, health planning has focused on the utilization of services at regional and community levels. These initiatives have included the Health Systems Agencies developed by the federal government in the twentieth century, as well as State and local efforts to evaluate and regulate providers [3] [4].

These health planning programs focused on generating voluntary compliance

from providers. Some of them were linked with payor approvals for specific projects, such as the Certificate of Need programs. They were administered by state or local planning staffs [3].

Most of these health planning programs were implemented before the use of current approaches to health care reimbursement and evaluation. They frequently employed relatively simple analytical tools, such as resource to population ratios.

Many of these programs phased out before the advent of more sophisticated approaches to hospital management. Reimbursement by discharge employing Diagnosis Related Groups was first implemented by Medicare in 1983. The evaluation of inpatient utilization by severity of illness began in the 1990s [5] [6] [7].

In the twenty first century, much of the attention concerning the use of health care has focused on provider utilization. Only recently interest in the connection between utilization and demographics has been renewed in population health [8] [9].

2. Population

This case study evaluated inpatient hospital utilization with respect to discharges and severity of illness in the Central New York Health Service Area. This region is one of the original health planning areas established by the federal health planning legislation of 1976. It includes eleven counties and a population of 1,124,173 [10].

The Central New York Health Service Area is based on three groups of counties. The largest includes Onondaga County, where the City of Syracuse, the largest metropolitan area in the region, is located. Its demographics also include the Counties contiguous to Onondaga, Cayuga, Cortland, Madison, and Oswego Counties. They are populated by the suburbs of Syracuse, as well as numerous small towns and rural areas. Tompkins County, which includes the City of Ithaca, is located in the southern part of this area. Together, these six counties include a population of approximately, 698,830, or 62.1 percent of the regional total.

The northern part of the Central New York Health Service Area comprises Jefferson, St. Lawrence, and Lewis Counties. Jefferson County includes the City of Watertown, a number of small towns and rural areas, and the Fort Drum Army base. St. Lawrence and Lewis Counties include a number of small towns and rural areas. These three counties include a population of approximately 194,540 or 17.3 percent of the regional total.

The eastern part of the Central New York Health Service Area comprises Oneida and Herkimer Counties. Oneida County includes the City of Utica, the second largest metropolitan area in the region, the City of Rose, as well as numerous small towns and rural areas. Herkimer County includes small towns and rural areas. These two counties include a population of approximately 231,617, or 20.6 percent of the regional total.

Regional planning in the region was the responsibility of the Central New York Health Systems Agency under federal health planning legislation during the 1970s. After the expiration of federal health planning legislation, the Central New York Health Systems Area was supported by New York State funding for approximately 20 years.

3. Method

This case study evaluated hospital discharges by All Patients Refined Diagnosis Related Groups and severity of illness in the Central New York Health Service Area during 2017, the most recent time period for which complete data were available. The study was based on adult medicine and adult surgery, the inpatient services with the largest inpatient volumes. It was based on discharges for all payors.

The study was based on these hospital services as defined by the All Patients Refined Diagnosis Related Groups developed by 3M™ Health Information Systems. It was also based on the All Patients Refined Severity of Illness System. This algorithm identifies severity of illness for each hospital inpatient based on the principal diagnosis, all secondary diagnoses, and demographic indicators such as age and gender [3].

Data for the study were obtained from the New York State Planning and Research Cooperative System. These data include all discharges from New York State hospitals for residents of the State. They do not include discharges from hospitals outside the State.

The study was conducted by the Hospital Executive Council, the planning organization for the Syracuse hospitals. The Council is responsible for studies and programs that improve efficiency in the service area of the hospitals [11].

The study focused on identification of numbers of discharges and discharges by Resident County for the eleven counties in the Central New York Health Service Area. It was based on discharges for these resident populations, regardless of provider in New York State, rather than on hospital specific utilization.

Within adult medicine and adult surgery, the analysis focused on comparison of resident county populations for patients with Minor, Moderate, Major, and Extreme severity of illness. These comparisons were made with respect to numbers of discharges and percent of total discharges for each resident county.

The study also included comparison of the distribution of hospital inpatients by severity of illness between adult medicine and adult surgery. As in the analysis for individual services, percentages of total discharges were used to standardize the distributions of inpatients by severity of illness.

4. Results

The initial component of the case study evaluated resident adult medicine hospital discharges in the Central New York Health Service Area by severity of illness. Relevant data are summarized in **Table 1**.

Table 1. Inpatient adult medicine discharges by severity of illness, Central New York Counties, 2017.

Resident County	Number of Discharges					Percent of Total				
	Minor	Moderate	Major	Extreme	Total	Minor	Moderate	Major	Extreme	Total
Onondaga County	3171	9306	8560	2253	23,290	13.62	39.96	36.75	9.67	100.00
Cayuga County	484	1653	1999	498	4634	10.44	35.67	43.14	10.75	100.00
Cortland County	338	956	1066	331	2691	12.56	35.53	39.61	12.30	100.00
Madison County	392	1217	1059	238	2906	13.49	41.88	36.44	8.19	100.00
Oswego County	707	2247	2351	803	6108	11.57	36.79	38.49	13.15	100.00
Tompkins County	321	1074	1181	301	2877	11.16	37.33	41.05	10.46	100.00
Oneida County	2183	6265	4745	1255	14,448	15.11	43.36	32.84	8.69	100.00
Herkimer County	615	1665	1250	271	3801	16.18	43.80	32.89	7.13	100.00
Jefferson County	730	2136	1923	443	5232	13.95	40.83	36.75	8.47	100.00
Lewis County	196	606	431	80	1313	14.93	46.15	32.83	6.09	100.00
St. Lawrence County	920	2385	2181	536	6022	15.28	39.60	36.22	8.90	100.00
Total	10,057	29,510	26,746	7009	73,322	13.72	40.25	36.48	9.56	100.00

Includes patients aged 18 years and over assigned to medical APR Diagnosis Related Groups excluding obstetrics (APR DRGs 540 - 566), mental health/substance abuse treatment (APR DRGs 740 - 776), and rehabilitation (APR DRG 860). Sources: New York Statewide Planning & Research Cooperative System (SPARCS) data.

These data were identified by Resident County, rather than hospital specific discharges, within the Region. They were based on total numbers of resident hospital discharges for all payors and resident populations. They were developed for Minor, Moderate, Major, and Extreme severity of illness.

This information identified large differences in numbers of resident inpatient discharges among the Central New York Counties in 2017. The two metropolitan areas, Onondaga and Oneida Counties, generated the largest numbers of discharges. Largely rural counties such as Cortland, Madison, and Lewis produced considerably smaller numbers.

In contrast, the data indicated that variation among percentages of adult medicine patients within each of the four severity of illness categories among counties in the Central New York Health Service Area was relatively limited. The largest proportions were generated by Major severity, ranging from 32 to 43 percent and Moderate severity, from 35 to 46 percent.

The lowest and highest levels of severity accounted for much smaller proportions of total discharges among Central New York counties. Patients at Minor severity of illness accounted for 10 - 16 percent and those at Extreme severity were responsible for 6 - 13 percent. These data suggested that for adult medicine discharges, outlier patients with low and high severity were a small minority of the total resident population.

The study also included a review of resident hospital lengths of stay by severity of illness for each of the eleven counties in the region. For ten of the eleven counties, the lengths of stay increased for each severity of illness category compared with the one before.

The second component of the case study evaluated resident adult surgery discharges in the Central New York Health Service Area by severity of illness. Relevant data are summarized in **Table 2**.

As in the case of adult medicine, these data identified substantial differences in numbers of resident discharges among Central New York Counties in 2017. The largest numbers were generated by Onondaga County, including Syracuse, and Oneida County, including Utica. The smallest numbers of discharges were produced by largely rural counties such as Cortland and Lewis.

The data indicated that variations in percentages of total discharges for individual levels of severity among Central New York counties were limited. The largest percentages among the counties were produced by Moderate severity, 35 - 42 percent of the total, and Minor severity, 31 - 41 percent. Smaller percentages were produced by Major severity, 15 - 18 percent, and Extreme severity, 5 - 10 percent.

In comparison with the severity of illness data for adult medicine, the adult surgery data included a substantial increase for Minor severity of illness patients in the Central New York Health Service Area. Patients in this category accounted for 31 - 41 percent of the adult surgery population, compared with 10 - 16 percent of the adult medicine population. The percent of total patients at Moderate severity of illness was almost the same for the two services, 35 to 46 percent for adult medicine and 35 - 42 percent for adult surgery.

A follow up analysis identified two All Patients Refined Major Diagnostic Categories (APR MDC) that contributed to the differences, Orthopedics (APR MDC 8) and Nutritional and Metabolic (APR MDC 10). In Orthopedics, the number of Minor severity resident discharges was 5462 for adult surgery and 542

Table 2. Inpatient adult surgery discharges by severity of illness, Central New York Counties, 2017.

Resident County	Number of Discharges					Percent of Total				
	Minor	Moderate	Major	Extreme	Total	Minor	Moderate	Major	Extreme	Total
Onondaga County	4151	4318	1960	916	11,345	36.59	38.06	17.28	8.07	100.00
Cayuga County	526	635	277	116	1554	33.85	40.86	17.82	7.46	100.00
Cortland County	343	432	203	120	1098	31.24	39.34	18.49	10.93	100.00
Madison County	670	649	275	104	1698	39.46	38.22	16.20	6.12	100.00
Oswego County	1111	1326	565	237	3239	34.30	40.94	17.44	7.32	100.00
Tompkins County	465	571	205	101	1342	34.65	42.55	15.28	7.53	100.00
Oneida County	2881	2568	1079	479	7007	41.12	36.65	15.40	6.84	100.00
Herkimer County	649	571	297	113	1630	39.82	35.03	18.22	6.93	100.00
Jefferson County	985	888	431	171	2475	39.80	35.88	17.41	6.91	100.00
Lewis County	247	223	92	47	609	40.56	36.62	15.11	7.72	100.00
St. Lawrence County	745	865	366	109	2085	35.73	41.49	17.55	5.23	100.00
Total	12,773	13,046	5750	2513	34,082	37.48	38.28	16.87	7.37	100.00

Includes patients aged 18 years and over assigned to surgical APR Diagnosis Related Groups excluding obstetrics (APR DRGs 540 - 566) and mental health/substance abuse treatment (APR DRGs 740 - 776). Sources: New York Statewide Planning & Research Cooperative System (SPARCS) data.

for adult medicine. This difference was produced by joint procedures such as hip and knee replacements. In APR MDC 10, the comparison was 1123 resident discharges for adult surgery and 350 for adult medicine. The difference was produced by operating room procedures for obesity.

The study also included a review of resident hospital lengths of stay by severity of illness for each of the eleven counties in the region. For all of the eleven counties, the lengths of stay increased for each severity of illness category compared with the one before.

5. Discussion

During the 1970s and 1980s, government sponsored health planning in the United States focused attention on population-based use of services. Since that time, attention has shifted to provider specific utilization including severity of illness and other clinical indicators.

This case study evaluated the impact of severity of illness for hospital patients in the Central New York Health Service Area, one of the original health planning populations. It analyzed the impact of severity within resident populations, rather than by individual providers.

The study data demonstrated that patients at Extreme severity of illness, the highest level, constituted similar proportions of adult medicine, 6 - 13 percent, and adult surgery, 5 - 10 percent, in the eleven county region. This information suggested that the sizes of these outlier populations were similar. The data also suggested that the sizes of Moderate severity populations in the two services were similar, 35 - 46 percent in adult medicine and 35 - 42 percent in adult surgery.

The study data identified considerable differences in the sizes of Minor and Major severity of illness resident populations for the two services across the eleven county region. Patients at Minor severity accounted for 10 - 16 percent of adult medicine and 31 - 41 percent of adult surgery resident populations. Patients at Major severity accounted for 32 - 43 percent of adult medicine and 15 - 18 percent of adult surgery resident populations.

These differences resulted from large numbers of healthy patients in the adult surgery resident populations. Most of these inpatients were admitted for orthopedic procedures such as joint replacements and procedures to address obesity.

This analysis addressed the distribution of resident hospital inpatients by severity of illness in a single Health Service Area. Additional research, related to population health, should evaluate these indicators in additional health planning regions.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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