

Frugal Innovations Health Care Programs at the Community Level

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Abstract

Recent experience in some countries has suggested that the use of frugal innovations can be valuable. These initiatives can reduce health care expenses by substituting less costly services for more expensive ones and by limiting the organizational costs of maintaining these programs. These approaches have been defined as doing more with less. This study described the use of frugal approaches to improve the efficiency of care by providers in the metropolitan area of Syracuse, New York. In these programs, numbers of hospital patient days were reduced by discharging patients to long term care services. Hospital emergency department utilization was also monitored and managed at the community wide level. The utilization of hospital admissions per population was also limited. The three programs described in this study were implemented with annual staff expenses of \$127,000. This amounted to only about \$42,000 annually per hospital. The development and use of these frugal innovations was made possible through cooperation among providers and use of a single organization, the Hospital Executive Council to coordinate the programs.

Keywords

Health Care Costs, Hospital Lengths of Stay, Long Term Care, Hospital Admissions

1. Introduction

During the past several years, reduction of health care expenses has been a major challenge in the United States and elsewhere. Even the most successful efforts have generated reductions in the rates of increase, rather than reductions in underlying costs, for these expenses [1] [2].

In the United States, efforts to limit health costs have frequently involved the

substitution of less expensive services in the provision of care. These efforts have generated the development of a wide range of innovative programs that focus on shifting care to less expensive services. They include Accountable Care Organizations, Bundling Services Programs, and initiatives to limit hospital readmissions. All of them involve the reduction of expenses through the development of new organizational frameworks and monitoring the utilization of services [3] [4] [5] [6] [7] [8].

In recent years, the use of frugal programs and technologies for limiting health care expenses through substitution of less expensive alternatives has also gained increased attention. Frugal innovations have been defined as affordable products that meet the needs of resource constrained consumers [9]. They have also been defined as doing more with less [10].

Frugal innovations have frequently been associated with resource constrained settings. They have been identified in third world countries. In these settings, they have used simple, less expensive technologies to limit health care costs [11] [12].

It is possible that efforts to reduce health care expenses in the United States can profit from more extensive use of frugal approaches to health care. The use of these approaches can involve the substitution of less expensive services involved in current initiatives. It could also involve reducing costs through simple and less expensive approaches to utilization monitoring and administration [13] [14].

The process of developing frugal approaches to limiting health care utilization and expenses will involve the implementation of approaches at the community level. In this environment, where health services are delivered, the potential for substituting services and reducing organizational expenses can be tested and evaluated.

2. Population

This study described the use of frugal innovations to limit health care utilization and expenses in the metropolitan area of Syracuse, New York. This area includes three large acute hospitals, Crouse Hospital (19,349 inpatient discharges excluding well newborns, 2016), St. Joseph's Hospital Health Center (24,906 discharges, 2016) and Upstate University Hospital (29,820 discharges, 2016). The area also contains 12 skilled nursing facilities and 7 certified home health agencies. The hospital medical staffs and the community include approximately 1800 physicians.

The immediate service area of the Syracuse hospitals and health care providers has a population of approximately 600,000. The area also provides health care services to the 11 county Central New York Health Service Area.

Historically, the Syracuse hospitals have worked cooperatively to improve the efficiency and outcomes of care in the service area. These efforts have included initiatives to reduce inpatient lengths of stay through cooperation with area long term care providers, coordination of emergency services, the collection and dis-

tribution of physician credentials [15].

3. Method

This study describes a series of frugal approaches to improve the efficiency of care implemented by providers in the Syracuse metropolitan area. These programs focused on substitution of less expensive care for more expensive care and on limiting administrative and data collection resources.

Consent for use of these data was provided by the hospitals in the Business Associate Agreements with the Hospital Executive Council. This mechanism is also employed to provide ethics approval from the hospitals for multihospital studies.

The first component of the study focused on improvement of efficiency with programs to support reductions in hospital lengths of stay through discharges to nursing homes. Discharges to nursing homes have been the source of the largest numbers of excess hospital patient days. Beginning in 1998, the Syracuse hospitals have identified patients that are Difficult to Place in long term care and have distributed lists of these patients, with names encrypted, to all long term care providers in the area. The lists have been distributed weekly through the Hospital Executive Council.

Each month, a Difficult to Place Summary of these patients admitted to nursing homes and the total new admissions to nursing homes has been sent by electronic mail to each hospital, nursing home, and home health agency in the area. The Difficult to Place Summaries have also included numbers of new admissions to nursing homes and the percent of these admissions that were Difficult to Place. The monthly Difficult to Place Summaries permitted each hospital to monitor the movement of these patients by long term care facility and to support nursing homes that admit the largest numbers of these patients.

The reduction of lengths of stay for discharges to nursing homes from the Syracuse hospitals also included the implementation of Subacute and Complex Care Programs to expedite the movement of patients who were most Difficult to Place. These include patients requiring multiple intravenous antibiotics, extensive wound care, and other long term acute care services.

The Subacute and Complex Care Programs have provided program development funds to participating nursing homes in the form of grants for admission of minimum numbers of these patients. In order to receive program development grant funding, a nursing home needed to admit at least four of these patients within a specific time frame. The grants were based on volume, rather than individual patients.

In this study, the first component identified hospital lengths of stay for patients admitted to nursing homes from the combined Syracuse hospitals and utilization associated with Difficult to Place patients for the combined Syracuse hospitals between 2011 and 2017. It also identified utilization of the Subacute and Complex Care Programs during this period. The study data also identified estimated expenses of these programs compared with estimated cost reductions

they have supported.

The second component of the study focused on the use of the monitoring of emergency department utilization by the Syracuse hospitals to support access to care in the community. This program has been implemented through a single software system that links the hospital emergency departments. It has been maintained by the Hospital Executive Council staff. The core activity of the software system has allowed each hospital to identify whether it is on ambulance diversion or open. This information is displayed for the two organizations that dispatch ambulances in the community and for the hospitals.

Using information obtained from the software system and the hospitals, the Hospital Executive Council staff has developed and distributed daily and monthly reports concerning utilization of the emergency departments in the community. These reports have included hours on ambulance diversion, numbers of ambulances received, and numbers of emergency department visits. These reports have been intended to encourage access to care and the efficient utilization of hospital emergency departments.

The study included summary data concerning ambulance diversion, ambulances received, and emergency department visits for the combined Syracuse hospitals between 2011 and 2017. It also included estimates of the costs involved in collecting and distributing this information.

The third component of the study involved the development of a single mechanism for collection and analysis of discharge data for the Syracuse hospitals. Hospital discharges are one of the most important indicators of health care costs. Like other providers as well as health care payers, these organizations use discharge data to evaluate inpatient market share and utilization per population in the service area.

Hospital discharge information is usually obtained from public data bases and private consultants. Each of these sources has advantages and disadvantages. Public data bases can provide information for large populations, such as health service areas and counties, however, this information is usually not available for at least six months. Private consultants can provide the information more expeditiously, but at substantial additional costs.

The Syracuse hospitals developed a mechanism for collection of monthly inpatient discharge data through the Hospital Executive Council, a small private not for profit organization. This approach made it possible to collect the information approximately 30 days after the end of each month, when abstracting was complete. The hospitals have also developed a joint mechanism for collection of population specific hospital discharge data.

The study identified annual inpatient discharges for adult medicine and adult surgery, the two largest services in the three Syracuse hospitals, between 2011 and 2017. It also identified annual population based admission/discharge rates for adult medicine, adult surgery and pediatrics combined for Syracuse and other upstate New York metropolitan areas for 2011-2016, the latest periods for which complete data were available. The study also includes estimates of the

costs of collecting and distributing this information.

4. Results

The initial component of the study involved a program for reduction of hospital stays through discharges to long term care in the health care system of Syracuse, New York. Data concerning the utilization and impact of the program are summarized in **Table 1**.

This information demonstrated that the Difficult to Place Program was used extensively between 2011 and 2017. It indicated that between 1247 and 1987 patients in the combined Syracuse hospitals were identified as Difficult to Place. This population accounted for between 19.6 and 28.1 percent of discharges to nursing homes.

The study data also demonstrated that approximately 100 patients per year were supported by the Subacute and Complex Care Programs during the period. Total annual Program Development Funds provided for these patients ranged from \$142,325 to \$368,850.

The data suggested that these frugal innovations had a positive impact on hospital lengths of stay between 2011 and 2017. The mean annual length of stay for medical-surgical discharges to nursing homes in the combined Syracuse hospitals declined from 8.96 to 8.81 days. This more than offset an increase in the severity of illness of this population. During the period, the number of excess patient days in the combined hospitals declined by 1570. This reduction also helped eliminate the excess days for medical-surgical patients in the combined hospitals.

A summary analysis suggested that utilization of the Difficult to Place and Subacute/Complex Care Programs justified their costs. The Difficult to Place Program was supported by annual staff expenses of approximately \$43,000 in the Hospital Executive Council and the hospitals. During the same period, annual staff expenses for the Subacute and Complex Care Programs amounted to \$28,000 with an additional \$280,000 for Program Development Funds. This resulted in approximately \$350,000 in expenses for these programs. It compared with \$942,000 in days saved at a conservative late stay rate of approximately \$600 per inpatient day.

The second component of the study involved the use of emergency department utilization data by the Syracuse hospitals to promote access to care in the community. This program is based on the software system that links the hospitals. Examples of this information are summarized in **Table 2**.

The data demonstrated that the use of ambulance diversion by the hospitals has changed over time. When numbers of hours on ambulance diversion were relatively high in 2011, 2012, and 2015, hospital emergency departments were redirecting patients to other hospitals where utilization was lower. This allowed the emergency departments experiencing overcrowding to relieve this condition and increased volume at less utilized facilities. Over time, the distribution of

Table 1. Inpatient medical-surgical mean lengths of stay, Syracuse hospitals, January – November 2011, 2013, 2015, 2017.

	2011	2013	2015	2017
Discharges to Nursing Homes				
Mean Length of Stay (Days)	8.96	9.12	9.33	8.81
Severity Adjusted National Average (Days)	6.40	6.85	6.67	6.61
Length of Stay Difference (Days)	2.56	2.27	2.66	2.20
Patient Days Difference	19,207.68	16,475.66	24,041.08	17,637.40
Total Discharges				
Mean Length of Stay (Days)	5.57	5.48	5.65	5.14
Number of Difficult to Place Patients	1247	1885	1987	1487
Percent of Total New Admissions to Nursing Homes that were Difficult to Place	17.0	19.6	28.1	18.6
Number of Subacute & Complex Care Patients	415	109	182	86
Subacute & Complex Care Program Development Funds	\$199,300	\$142,325	\$368,850	\$307,200

Source: Hospital Executive Council.

Table 2. Emergency department utilization, Syracuse hospitals, 2011-2017.

	2011	2012	2013	2014	2015	2016	2017
Hours on Ambulance Diversion	10,891	2832	262	849	2915	1196	341
Ambulance Transports	57,012	61,583	62,516	66,081	67,774	62,707	62,769
Emergency Department Visits	184,570	199,344	201,968	210,794	215,763	215,207	219,060

Source: Hospital Executive Council data.

reports concerning ambulance diversion by the Hospital Executive Council encouraged hospitals to address utilization issues and reduce diversion as demonstrated by the data for 2013, 2014, and 2017.

The data in **Table 2** demonstrated that annual numbers of ambulances received by the Syracuse hospitals increased between 2011 and 2015 before declining from the 2015 level in 2016 and 2017. This information also demonstrated that annual numbers of emergency department visits increased throughout the period by an average of approximately 3 percent per year. These data have been provided to the hospitals on a daily and monthly basis by the Hospital Executive Council in order to support utilization planning in this area.

A summary analysis suggested that this program has justified its expenses. The development and distribution of the daily and monthly reports by the Hospital Executive Council staff has resulted in annual expenses of approximately \$17,000. The annual license fee for the software system maintained by the Hospital Executive Council has been approximately \$19,000. These expenses made it possible for the hospital emergency departments to improve access to care

through ambulance diversion, when necessary, and reduction of diversion over time, although the costs of these benefits could not be quantified. The estimated number of additional annual emergency department visits during this period was 34,490. The annual costs of the program amounted to only \$1.04 per additional visit.

The third component of the study focused on a program for the collection and distribution of inpatient discharge data among the Syracuse hospitals. This included provider specific and population based information. Examples of these data for the period 2011-2017 are summarized in **Table 3**.

This information is based on annual discharges for adult medicine and adult surgery in the Syracuse hospitals. These services have accounted for more than 70 percent of inpatient utilization in the combined hospitals.

Adult medicine has been the largest service both in the Syracuse hospitals and the United States. The utilization of this service declined between 2011 and 2017 largely because of the implementation of medical observation programs beginning in 2013. These initiatives shifted many patients at low severity of illness from inpatient to outpatient status. Additional initiatives by Medicare and Medicaid have limited inpatient adult medicine discharges beginning in 2016.

Adult surgery discharges in the Syracuse hospitals increased between 2011 and 2017. This increase has been supported by payer incentives for surgical care, such as orthopedics.

The information in **Table 3** also includes examples of population based information collected by the Syracuse hospitals for Onondaga County and the immediate service area. This information demonstrates that inpatient discharges per population in the service area were conservative compared with those of other upstate New York metropolitan areas.

As a frugal innovations initiative, the Syracuse hospitals were able to develop the inpatient discharge data program at minimal costs. Annual expenses have been approximately \$29,000 for the inpatient provider data and \$8000 for the population based data. These expenses have included the development of the

Table 3. Inpatient discharges, Syracuse hospitals, 2011-2017.

	2011	2012	2013	2014	2015	2016	2017
Adult Medicine	32,460	34,224	33,204	32,700	32,949	32,371	33,863
Adult Surgery	17,305	18,273	18,551	19,163	19,778	20,706	20,866
Resident Inpatient Discharge Rates Per 1000 Population							
Erie County (Buffalo)	81.1	89.1	84.5	81.6	80.6	84.8	
Monroe County (Rochester)	85.3	80.8	78.8	76.0	77.3	81.9	
Onondaga County (Syracuse)	86.4	87.9	84.2	77.3	80.7	79.5	

Resident inpatient discharge rates include adult medicine, adult surgery, and pediatrics.

Sources: Hospital Executive Council; New York Statewide Planning and Research Cooperative System (SPARCS).

data bases as well as the distribution of reports and studies concerning specific subjects for providers and payers. The resulting program expenses, approximately \$36,000 per year, have supported monitoring of discharges by service among the hospitals and the maintenance of conservative hospital admission rates in the region.

5. Discussion

Recent experience in some countries has suggested that the development and implementation of frugal innovations can be valuable. These initiatives can reduce health care expenses by substituting less costly services for more expensive ones and by limiting the organizational costs of maintaining these programs.

In the programs developed by the Syracuse hospitals and the Hospital Executive Council, services such as hospital patient days, hospital admissions, and emergency department utilization were monitored and managed at the community wide level. This approach made it possible to limit the utilization of some expensive clinical services, such as inpatient hospital patient days and admissions. This was developed by shifting late stay hospital days to long term care services and by limiting inpatient admissions.

The frugal innovations also improved health care efficiency by reducing the technical and administrative costs associated with these initiatives. The implementation of these programs through cooperation between staffs of the individual hospitals and the Hospital Executive Council made it possible to plan and monitor the use of these programs with a small staff, rather than expensive additional administrative positions or consultants.

The three programs described in this study were implemented with annual staff expenses of approximately \$127,000. This amounted to only about \$42,000 annually per hospital, less than one full time salary not including benefits.

The development and use of these frugal innovations was made possible through cooperation among the hospitals and other providers in the community, such as nursing homes and emergency medical services. By working cooperatively, the individual health care services were able to extend the efficiencies of these programs through the community and limit the financial impact of maintaining them on individual providers. The use of the Hospital Executive Council staff to coordinate these programs has been consistent with the purposes of a community wide health care planning organization.

The results of this study suggest that hospitals and other health care providers should consider the use of frugal innovations as approaches to improving the efficiency and outcomes of care. These approaches can produce improvements in the efficiency of care with relatively limited expenditures. The study also suggested that the impact of these efforts can be increased through cooperation among providers.

Additional studies of the planning and operation of frugal innovation programs in health care would be useful. Such efforts could help extend the impact of these efforts at community and regional levels.

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