

MANAGING HOMELESS PATIENT RISK IN A U.S. HEALTHCARE SYSTEM

ERIC S. KYPER¹, MICHAEL J. DOUGLAS² & LUKAS S. LEES²

¹College of Business, University of Lynchburg, USA

²Lombardo College of Business, Millersville University, USA

ABSTRACT

Homeless patients are typically treated in emergency departments (EDs). EDs have the capability of treating a large variety of issues. Financial, staffing, and physical resources are often strained. ED visits for access to free food and hygiene facilities are common. Other times the ED is used to escape bad weather conditions. These visits strain the waiting room, use valuable staff resources to resolve non-critical care issues, and ultimately cost the hospital out-of-pocket money because the hospital receives no revenue. To improve ED performance, we studied a patient re-routing system for the homeless that better places these patients into hospital owned services that are separate from the ED. For example, transportation to a free health clinic (not walk-in) with an assigned primary care physician improves patient health for issues like diabetes. The hospital also owns a pharmacy clinic that now works closely with the free health clinic to provide medications and instructions for homeless patients. The program has been successful in reducing ED costs and hospital admissions for acute homeless patients.

Keywords: homeless, emergency department, risk management, overcrowding, re-routing, free clinic.

1 INTRODUCTION

Homelessness in the United States is a multi-faceted epidemic. Simultaneously homelessness is an economic problem, a housing problem, and a transportation problem. Widespread unemployment, poor living conditions, and walking as a primary means of transportation create societal issues involving every citizen in the U.S. This paper focuses on the healthcare issues involving homeless people and emergency department services in regional healthcare systems in the United States. According to the National Hospital Ambulatory Medical Care Survey [1], a homeless person is almost five times more likely to visit the emergency department (ED) than the general population.

A homeless person will use total healthcare less than an average individual [2] but instead uses the ED as their primary care facility. Difficult living conditions for the homeless lead to healthcare requirements that typically fall on ED services. The ED is an attractive option for the homeless because no appointment is necessary. However, the data analysed demonstrates that many ED visits by the homeless are for low acuity issues. These are often related to diet, hygiene, and lack of access to routine care of treatable conditions like diabetes. By law, a hospital must assess and treat all patients, regardless of the patients' ability to pay. Hospitals absorb almost all costs related to treating homeless patients. One option for the hospital to manage homeless care and costs is to enter patients into a risk management system designed to reduce costs and increase homeless patients' overall health.

In this paper, we analyse a hospital system that identifies homeless patients and re-routes them to more effective and lower cost treatment options within the hospital network. Homeless families with children and homeless with disabilities are particularly vulnerable [3] and ideally should have prioritized care. The re-routed patients are placed in the Excalibur system. The Excalibur system provides patients an alternative to using the ED as a primary care facility by giving the patients access to a free clinic with primary care physicians and a pharmacy, both owned by the hospital network.



2 RESEARCH METHODOLOGY

The research methodology used in this paper was to analyse secondary data. The data was collected through normal hospital operations and then manually extracted from hospital records. Identifying patient information was removed to comply with federal guidelines (HIPPA). A year worth of microdata from a regional ED from 2013 to 2014 was studied. The data consists of 6,288 homeless patient visits.

2.1 Data

The data included:

- Patient ID – an assigned number for each patient to remove identifying information.
- Patient status – a binary number to represent if the patient is in the Excalibur or not in the system at the time of visit to the ED.
- ESI acuity code [4] – a number between 1 and 5, where 1 is the highest priority and case severity, and 5 is considered non-urgent. Some patients do not qualify for an acuity code. Those cases were designated as ACUNASSIGNED. Examples of triage nurses using ACUNASSIGNED include homeless coming in the ED to ask what time it is or if they have any free food. All ACUNASSIGNED patients were discharged. In addition, false reports of abuse were also assigned ACUNASSIGNED.
- Status – a binary number represented if the patient was admitted to the hospital or discharged from the ED.

2.1.1 Research questions

Research question 1: Are there visitation differences in ESI Acuity Level between patients in Excalibur versus out of Excalibur? Research question 2: Does the re-routing of patients using Excalibur result in financial savings for the hospital?

2.1.2 Analysis

The primary analysis for research question 1 was to visualize the data, conduct a crosstab to describe the data and conduct a chi-square test using the patient status and ESI acuity code. Fig. 1 and Table 1 demonstrates that Excalibur is successful in reducing ED visits by the homeless across all acuity levels.

A chi-square test was conducted to see if the proportions of patients based on the ESI acuity levels were different between Excalibur and non-Excalibur patients (Table 2).

The chi-square test confirm statistically significant differences between the patients in and out of the Excalibur system. The Pearson chi-square test reports a p-value of .029 meaning at the .05 level, there is significant evidence of association between the two variables (ESI Acuity and pre/post Excalibur). However, when controlled for patient admission or discharge the chi-square test is statistically not significant for admitted patients. This supports the idea that if a patient is sick enough to be admitted to the hospital, then the free clinic and pharmacy is not going to make a difference. The ED discharge rates demonstrate reducing the number of ACUNASSIGNED patients, by giving them alternatives to going to the ED, makes a significant difference.

2.1.3 Financial analysis

Our second research question is related to financial savings. Fig. 2 demonstrates the substantial savings that result from the Excalibur program. Financial savings are necessary for Excalibur to be sustainable.



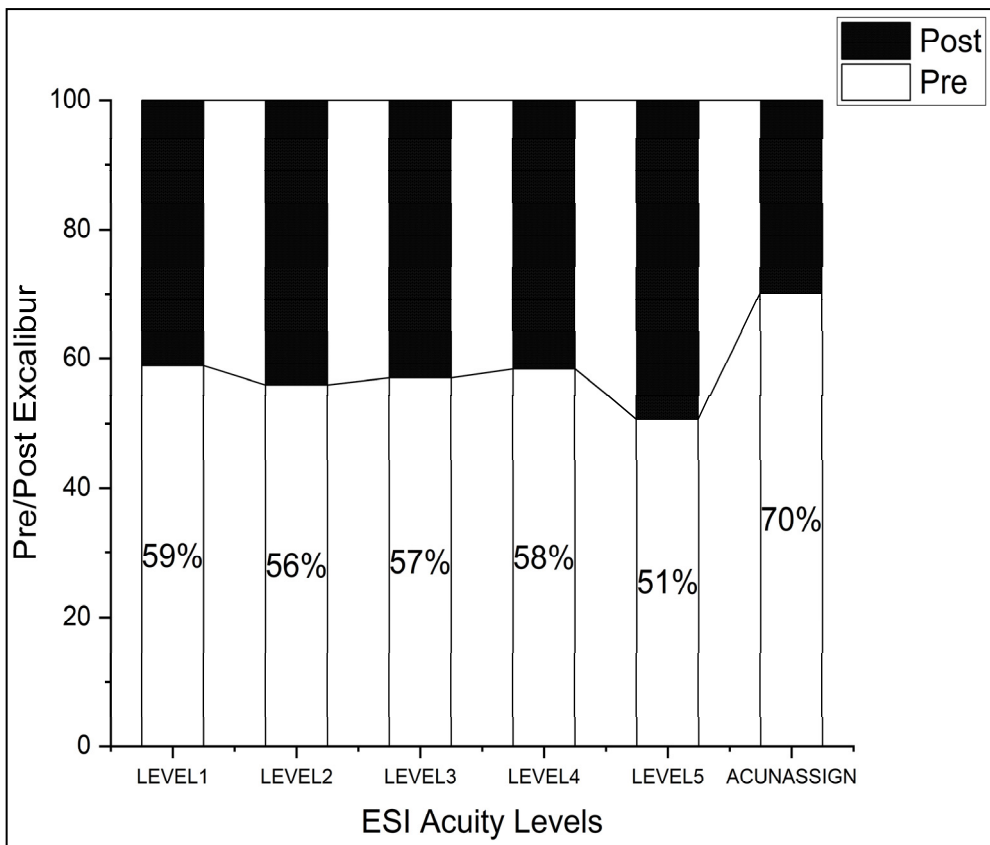


Figure 1: Percentage of visits by acuity level pre and post inclusion in Excalibur.

Table 1: Cross tabulation of visit counts by acuity level and inclusion in Excalibur.

		Pre/post Excalibur		Total
		Non-Excalibur patient	Excalibur patient	
Acuity code	LEVEL1	30	21	51
	LEVEL2	1,019	805	1,824
	LEVEL3	1,595	1,206	2,801
	LEVEL4	681	487	1,168
	LEVEL5	191	186	377
	ACUNASSIGN	47	20	67
Total		3,563	2,725	6,288

Table 2: Results for chi-square tests.

Chi-square tests			
	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	12.430 ^a	5	.029
Likelihood ratio	12.583	5	.028
Number of valid cases	6288		
^a 0 cells (.0%) have expected count less than 5. The minimum expected count is 22.10.			

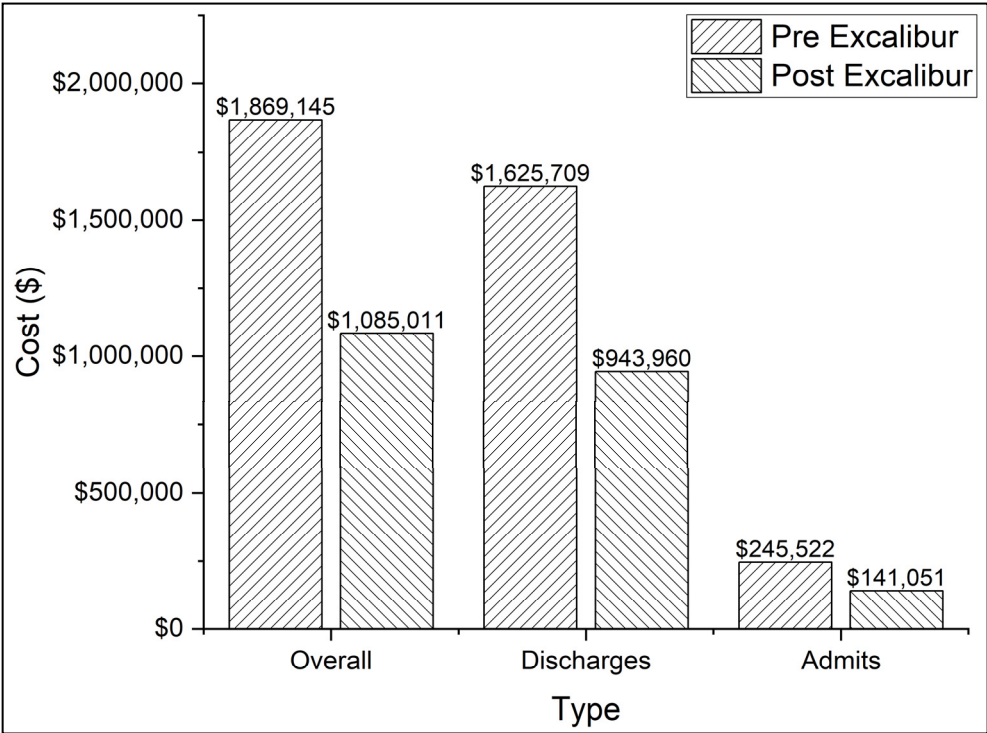


Figure 2: First year savings due to the Excalibur system.

The total savings for the first-year amount to \$784,134 overall with discharge savings of \$681,749 and admit savings of \$104,471.

3 IMPLICATIONS

Several benefits are expected from a system like this. From the hospital’s perspective, the cost savings are upfront and substantial. This system costs around \$100,000 to implement the first year. With first year savings of \$784,134 the return in investment is excellent. Continuing costs to maintain Excalibur are estimated at \$50,000 per year. If effective, we expect the cost savings per year to decrease, with the goal of getting every homeless person in the Excalibur system.

From the public perspective ED wait times will improve, all else being equal. Valuable resources are freed up to attend to high acuity cases benefiting everyone. Homeless people are better served in this system with access to an appointed primary care physician who can help manage their health. Homeless shelters and the like benefit from a healthier population and the knowledge they can direct individuals to proper care facilities. Society also benefits. Lower hospital costs help fight healthcare inflation. A healthier homeless community is less likely to contract or spread diseases such as tuberculosis and hepatitis.

4 FUTURE EXTENSIONS

Integrating a transportation component to coordinate patient pick-ups/drop-offs between shelters such as the Salvation Army and treatment facilities is the next step. Lack of transportation is the biggest challenge in getting homeless people the care they need.

Risk management through simulation is also possible. Hospital systems need to spend money to manage the monetary risk of non-paying homeless patients. The amount of money to spend can be analysed with simulation. While we do not want to change funding levels to see the differences in homeless level patients to the ED in real life, a simulation will allow for optimizing funding levels for the Excalibur system. The goal is to have close to 0 non-Excalibur patients. But the irony for management is that if every patient was an Excalibur patient, then there will be no cost savings of the program in the way the hospital system accounts for the homeless/non-payers. Even though the hospital system would be taking more than a one-million-dollar charge for not having the system at all. The benefits though will outweigh the low-cost savings.

REFERENCES

- [1] U.S. Department of Health and Human Services, QuickStats: Rate of emergency department (ED) visits, by homeless status and geographic region. National Hospital Ambulatory Medical Care Survey: United States, 2015–2018, 2020.
- [2] Zhou, R.A., Baicker, K., Taubman, S. & Finkelstein, A.N., The uninsured do not use the emergency department more-they use other care less. *Health Affairs*, **36**(12), pp. 2115–2122, 2017.
- [3] Shinn, M. & Richard, M.K., Allocating homeless services after the withdrawal of the vulnerability index service prioritization decision assistance tool. *American Journal of Public Health*, **112**(3), pp. 378–382, 2022.
- [4] Hong, R., Sexton, R., Sweet, B., Carroll, G., Tambussi, C. & Baumann, B.M., Comparison of START triage categories to emergency department triage levels to determine need for urgent care and to predict hospitalization. *American Journal of Disaster Medicine*, **10**(1), p. 9, 2015.

