12-2013

Mental Healthcare and Violent Crime: A Case Study of New York State

Juliana Carattini
Clemson University, JCARATT@G.CLEMSON.EDU

Follow this and additional works at: https://tigerprints.clemson.edu/all_theses

Part of the Economics Commons

MENTAL HEALTHCARE AND VIOLENT CRIME:
A CASE STUDY OF THE NEW YORK STATE MENTAL HEALTHCARE SYSTEM

―――――――――――――――――

A Thesis
Presented to
The Graduate School of
Clemson University

―――――――――――――――――

In Partial Fulfillment
Of the Requirements for the Degree
Master of Arts
Economics

―――――――――――――――――

by
Juliana Carattini
December 2013

―――――――――――――――――

Accepted by:
Dr. Daniel Miller, Committee Chair
Dr. Howard Bodenhorn
Dr. Robert Tollison

Abstract

New York State has been among the leaders of mental healthcare since the 19th century and today the state continues to promote innovative thinking in this system. Due to budgetary concerns across the nation New York has compiled a three-year plan to decrease Inpatient costs and increase community-based care. This is the second wave of rapid deinstitutionalization that has occurred in the state and the effect of deinstitutionalization on violent crime is still a major concern to the public. In the past the connection between mental illness and violent crime has at best been established as weak association and is often overlooked. This paper establishes a connection between the mentally ill and violent crime and uses this connection to further reveal how patients move throughout the mental healthcare system. Most importantly, the flow of patients provides a basis for a system of equations which can estimate how changes in budget allocation according to the goals established in New York State's plan will affect the violent crime rate in the state. The results find that ultimately there is a tradeoff between cutting costs and the violent crime rate. This tradeoff must become a part of the equation for improving the mental healthcare system if New York truly wishes to decrease it's budget and not to simply shift expenditure from the mental healthcare system to the criminal justice system.

Table of Contents

List of Tables and Figures

Introduction

Mental illness and deviant behavior have long been associated terms and though the two are not synonymous throughout history they've been treated as though they were. The question of how to treat mental illness in a way that is effective for both those suffering from some form of it and the general population has plagued all levels of government throughout the history of the United States. Social stigmas and a lack of understanding from the public has often led to less than satisfactory solutions, with reform being almost constant. As changes in beliefs about the origins of mental illness began to take place, new treatment options were suggested which were to be better suited to the patients. These changing beliefs were the source of most of the reform that has taken place in the 20th century United States. At the same time, the roles of doctors, psychiatrists, the government, and the community have shifted in order to match the needs of new treatment plans, the largest of which was the push for deinstitutionalization.

With long-term institutionalization having been the standard of care for most of the previous century, the mid-20th century saw a push towards community-based care. Mass discharges and the formation of localized treatment facilities were common but the call for quick action often led to disorganization. Coordination between the needs of local areas, the state, and the patients was difficult and New York State formed a number of committees to attempt to deal with the issue put forth by deinstitutionalization. At the same time crime rates in the United States were increasing.

Deinstitutionalization added to the public's concern about crime though the role of the mentally ill has seldom been studied. Federal and state expenditures are also of

1

great concern as the federal budget deficit continues to grow and many states are finding it difficult to balance their budgets. Previous research has focused on comparisons between state prison populations and mental health care facilities or has been done from the perspective of a historian or social worker. Now New York State is looking to completely overhaul their system of mental healthcare and decrease, if not eliminate, the need for state institutions. This paper will explore the connection between county-by-county Medicaid expenditures for 4 categories of treatment in New York State, readmission numbers, the presence of state psychiatric facilities, and the violent crime rate in those counties from 2007 to 2012.

Literature Review

In 1890, New York passed the State Care Act, making it the first state to become fully responsible for the caring of their mentally ill citizens.[1] This burden would prove to be incredibly large, especially considering that New York has historically had one of the highest populations of institutionalized citizens. Starting in the early 1950's there was a push towards deinstitutionalization, meaning that states began to discharge patients from state psychiatric institutions in an effort to lower populations and decrease costs. In 1954, New York passed the Community Mental Health Services Act (CMHSA) making local governments more accountable for the care of the mentally ill, rather than solely relying on the state.[2]

---

[1] Weddle, Bonita L. 1998. "Mental Health in New York State, 1945-1998". <u>New York State Archives</u>. pp.1
[2] Weddle, 2

Post World War II, views on the origins of mental illness as well as treatment methods began to change. Psychiatrists sought to assert their place in the medical field and the return of soldiers from World War II gave evidence to the benefits of outpatient treatment. "Psychiatrists who had treated military personnel suffering from combat-related mental illness found that this patient cohort responded best to immediate, short-term care furnished outside of the asylum environment."[3] Success in the treatment of veterans combined with a public outrage at the conditions of many state run facilities provided momentum to the community based care movement.[4] New antipsychotic and antidepressant medications were introduced in the mid 1950's, further propelling the sense of optimism surrounding the deinstitutionalization movement.[5]

The nature of Federal support also began to change during this period. As deinstitutionalization progressed it became clear that states could not continue to support their mental healthcare systems. The lack of coordination between the state and local governments of New York was evident and the Federal government began to step in. Programs to help defray some of the costs were put into place. In order to qualify for federal funds, states had to have plans for community mental health programs, the construction of adequate facilities, and an agency to oversee these plans, and an advisory council to guide state policies.[6] New York was one of the first states to receive federal funding.

---

[3] Weddle, 8
[4] Weddle, 9
[5] Mowbray, Carol T. and Holter, Mark C. 2002. "Mental Health and Mental Illness: Out of the Closet?". Social Service Review. Vol.76 No.1 pp.139
[6] Weddle, 20

The most significant change in federal funding came in the form of Medicare and Medicaid. Both programs began in 1965 and offered coverage for mental health treatment.[7] Initially, mentally ill persons under the age of 65 were not eligible for Medicaid. Eventually, both programs were expanded to cover alternative forms of care and other programs were enacted as well. Medicaid funding was given to community-based treatments for those needing long-term care for a severe mental illness. As of 1998, "about one-third of the costs of community mental health programs" were paid for by Medicaid.[8] Supplementary Security Income (SSI) and Social Security Disability Insurance (SSDI) were created in 1972, guaranteeing mentally and physically disabled persons a minimum income.[9]

Deinstitutionalization reached it's peak in the 1980's but like most policies it had unforeseen problems. In light of a wave of laws that supported patients' rights that changed the process for involuntary institutionalization and allowed patients to refuse treatment, New York State found it difficult to keep track of former patients. There was an "overwhelming majority of discharged state hospital patients that had no further contact with state or voluntary mental health personnel."[10] Many former patients found it difficult to find suitable housing, leaving them homeless. In fact, "a significant number of patients in mental institutions, particularly in state mental hospitals are or have been homeless, and a significant number become homeless upon discharge."[11] As a result,

---

[7] Weddle, 23
[8] Mowbary and Holter, 144
[9] Weddle, 38
[10] Weddle, 50
[11] Mowbary and Holter, 150

budgets were further increased when New York State began financing a number of

residential facilities; even with rapid growth, meeting the needs of discharged patients

was difficult.[12]

The time period during which deinstitutionalization occurred saw unprecedented

increases in crime rates across the United States. While there are a variety of reasons for

which this increase occurred, the extent to which mass discharges of the mentally ill

contributed is a little brought up point, though it was of major concern to many citizens.

In order to understand the role that mentally ill persons play in terms of the violent crime

rate, one must determine the answers to three questions:

First, why does any individual choose to become involved in illegal activities?

According to Becker crime is an economic activity and the decision to become involved

is made through a cost benefit analysis. "Crime rates depend on the risk and penalties

associated with apprehension and also on the difference between the potential gains from

crime and the associated opportunity costs."[13] If people are utility maximizers then a

person would chose to commit a crime only if the expected utility from the illegal action

was greater than the expected utility of using one's resources and time for other

activities.[14] Merton argues that criminal activity is not strictly an economic decision and

is driven, to some extent, by the social structure. There are two purposes to social

structure; to define goals, purposes and interests of society, and to regulate the acceptable

---

[12] Weddle, 51
[13] Becker, Gary S. 1968 "Crime and Punishment: An Economic Approach". <u>Columbia University</u> pp.1
[14] Becker, 176

modes of achieving said goals.[15] If one is not able to achieve through channels deemed

acceptable by society then a conflict arises between the desire to reach these goals and

the desire to resort to illegal means to do so.[16]

Second, how does this decision differ for the mentally ill? Following Becker's

analysis, it can be concluded that, "some persons become criminals, not because their

basic motivation differs from others but because their benefits and costs differ."[17] In the

case of the mentally ill, it is possible that both their motivation, and benefits and costs

differ because Becker is considering the process of a rational decision maker. A person

with a severe mental illness may not be a rational decision maker, in which case,

expected costs and benefits of committing a crime may differ. Punishments, for example,

should be perceived as a cost to crime. Yet, "unpremeditated murderers or robbers are

supposed to act impulsively and, therefore, to be relatively unresponsive to punishments;

likewise the insane or the young are probably less affected than other offenders by the

future consequences."[18] Becker also shows that offenders are risk preferers. Risk

preferers are generally considered irrational in economics. If it is true that offenders

prefer risk then "this implies that the real income of offenders would be lower, at the

margin, than the incomes they could receive in less risky legal activities."[19] Once again, it

may also be the case that a mentally ill individual may not be able to fully grasp the risk

---

[15] Merton, Robert K. 1938 "Social Structure and Anomie". <u>American Sociological Review</u>. Vol.3 No.5 pp.672

[16] Merton, 677

[17] Becker, 176

[18] Becker, 189

[19] Becker, 178-179

associated with criminal behavior. The strain theory put forth by Merton also lends itself to the understanding of why the mentally ill may become engaged in illegal activities. With less opportunity for educational attainment and employment, the deinstitutionalized may feel as though the state has cast them aside and made it difficult to achieve those societal goals.

The final question is, how prone to violence are the mentally ill? Robbins, Monahan, and Silver use data collected during the MacArthur Violence Risk Assessment Study to determine the gender differences in violence among people with a mental illness.[20] This study classifies acts into two categories, violence and other aggressive acts. The patients were followed for one year after their discharge and interviewed up to five times, or roughly every ten weeks during the one year period. "The proportion of patients with at least one act of violence during the 1-year follow-up was 29.7% for men and 24.6% for women."[21] Violence or aggressive acts were most common during the first two follow-up visits, rather than the last three.[22]

The authors also focus on who was targeted during acts of violence or aggression. Generally, family members, friends, and acquaintances were targeted, though targets differ for men and women. Women tended to target family members more than men did, while men targeted friends, acquaintances, and sometimes strangers.[23] Drug and alcohol abuse were also factors in the acts committed. Men were much more likely to be under

---

[20] Robbins, Pamela Clark; Monahan, John; Silver,Eric. 2003 "Mental Disorder, Violence, and Gender". Law and Human Behavior. Vol.27 No.6 pp. 562
[21] Robbins, Monahan, and Silver, 564
[22] Robbins, Monahan, and Silver, 566
[23] Robbins, Monahan, and Silver, 564

the influence of either drugs or alcohol at the time of one of the acts. They are also less likely to have been adhering to their medication regimen.[24]

To some extent, it seems as though violence acts are likely to occur immediately after discharge but are they severe enough to be reported and impact crime rates? While this depends on the target, there are studies, which suggest that the increasing prison population is made up of a large number of mentally ill individuals. There is an inverse relationship between prison populations and state psychiatric facility populations. In 1999, there were 288,000 mentally ill individuals incarcerated.[25] In this paper, Raphael focuses on how differing rates of deinstitutionalization among states affected prison incarceration rates. "With the exception of four states, there is a statistically significant (at the one percent confidence level) inverse correlation between state hospitalization and prison incarceration rates over the period studied for every state and D.C."[26] Overall, six regressions were run in which fixed effects for both year and state were taken into account, as well as, other factors contributing to high incarceration rates. Mental illness hospitalization rate was found to be statistically significant and negative in all six regressions, suggesting that lower mental illness hospitalization rates increase prison incarceration rates.[27]

---

[24] Robbins, Monahan, and Silver, 569
[25] Raphael, Steven. 2000. "The Deinstitutionalization of the Mentally Ill and Growth in the U.S. Prison Populations: 1971 to 1966". University of Berkeley. pp. 1
[26] Raphael, 5
[27] Raphael, 8

Treatment as a Production Function

As previously stated, treatment of the mentally ill is primarily the responsibility of the states, though the federal government does offer monetary support through Medicare and Medicaid. There are four categories of Medicaid expenditures comprising of the various treatment methods available. If we assume that the state has some finite budget and only a certain percentage is allocated to the treatment of the mentally ill then the state must find the most efficient way to allocate this budget. In other words, the state produces treatment, which can be proxied by dollars spent in the four Medicaid expenditure categories. When expenditures increase, treatment is increasing. This increase could be caused by an increase in the patient population or by an increase in quality. In this case, we will focus on patient admissions, specifically readmissions. The readmissions can be to either state psychiatric facilities or general hospitals with psychiatric services. Readmissions are used because you are either born with a mental illness or you are not; therefore there is a finite population, which needs to be treated. The only way to decrease expenditures is to decrease the care patients require. This yields a general production function:

$$\text{Treatment} = F(\text{Readmissions})$$

If treatment is efficient and effective then patients will be discharged from the inpatient settings to less costly treatment options. When treatment is not effective then patients cannot be discharged and if they are then they often end up readmitted a short period of time later. Readmissions has it's own production function:

$$\text{Readmissions} = F(\text{Violent Crime})$$

9

Readmissions are a function of the patients' behavior. If they adhere to their prescribed treatment then they will be better able to function successfully in society and there will be more opportunities available to them. If the patient choses to discontinue their treatment then their economic well being may be comprised as well as their level of functioning. The combination of the two could drive them to commit a violent crime, which would result in a readmission.

Figure 1.0: Flow of Patients through the Mental Healthcare System

The diagram above describes the flow of patients in the mental health care system in New York State. Patients can be in the community, a state psychiatric facility or

general hospital, or another treatment program. In this case, patients in the community are either not being treated at all or they were previously were bring treated and have discontinued their treatment. Patients can be admitted to a state psychiatric facility or a general hospital regardless of whether they are receiving treatment, though those who are not receiving treatment are more likely to admitted that those who are receiving treatment. Patients can also flow between each of the treatment programs, the community, state psychiatric facility, or general hospital.

Initially, all patients begin with no treatment so they are in the community. Some incident occurs that signals that an individual is mentally ill and needs treatment. Upon this incident occurring the individual becomes a patient and is brought to either facility shown in the diagram. Since there are a limited number of state psychiatric centers in New York State, it is more likely that a patient will initially be brought to a general hospital. Regression analysis, shown later in this paper, will offer evidence that general hospitals and state psychiatric facilities are substitutes even though the care given at each differs slightly. General hospitals tend to offer short-term care and state psychiatric facilities offer long-term care.

Once patients are admitted to a general hospital there are two options. The patient can either be discharged or sent back to the community or they can be discharged and sent to a state psychiatric facility. If the patient is initially brought to a state psychiatric facility then they only leave the facility if they are discharged back to the community or sent to another treatment program. If there is a treatment program in place then the patient has been discharged to a Case Management, Outpatient or Residential program.

Later regression analysis will show that patients who are put into state psychiatric facilities (Inpatient treatment) are most likely to be discharged to Case Management or Outpatient programs. Patients discharged to Case Management programs are more likely to be readmitted to a state psychiatric facility where as residential patients tend to be readmitted through general hospitals. Understanding the flow of patients throughout the healthcare system for the mentally ill is important because it may appear that progress is being made when in reality the patients are being shuffled back and forth to different parts of the system.

Model Formulation

In order to determine how Medicaid Expenditures on mental health care and readmissions to general hospitals or state psychiatric centers affect violent crime, several regressions will be run. The first model is presented below:

Violent Crime Rate= β_0+β_1Case Management+β_2Inpatient+ β_3Outpatient+ β_4Residential+ β_5Readmission to General Hospitals+ β_6Readmission to State Psychiatric Facilities+ β_7State Psychiatric Facility Present+ β_8Unemployment Rate+ β_9Income Per Capita+ β_{10}Educational Attainment+ β_{11}Percent of Population that is Nonwhite+ β_{12}Population Density

In this specification, the dependent variable is the violent crime rate in each county in New York State from 2007 to 2012. The first four independent variables are the Medicaid expenditure group, Case Management expenditures per capita, Inpatient expenditures per capita, Outpatient expenditure per capita and Residential expenditure per capita. The next two variables are readmission to general hospitals per capita and readmission to state psychiatric facilities per capita, within 30 days of their discharge. The fourth independent variable is a dummy variable for the presence of a state run

12

psychiatric institution in a given county. The remaining variables are controls for other causes of crime: the unemployment rate, income per capita, educational attainment, percent of the population that is nonwhite, and population density.

The four categories of Medicaid Expenditures are, Case Management, Inpatient, Outpatient, and Residential, which account for 12 treatment programs available for the mentally ill. Each of these categories serves as a signaling mechanism and individuals in each must share some general characteristics, such as, severity of mental illness, ability to work, function on their own, and perform in social situations. These characteristics may play a role in explaining an individual's proclivity to violent crime. As you can see, Outpatient therapy is the most prevalent, followed by Inpatient, then Case Management and Residential. These four expenditures were divided by the county population because counties with larger populations may simply have more mentally ill individuals than counties with smaller populations.

Table 1.0: Treatment Programs by Expenditure Category

Medicaid Expenditure Category	Type of Treatment
Case Management	- Targeted Case Management (ICM, BCM, SCM)
Inpatient	-Psychiatric Inpatient General (Article 28) and Private (Article 31) - Comprehensive Psychiatric Emergency Program (CPEP) - Psychiatric Inpatient OMH (State Psych IP)
Outpatient	-Assertive Community Treatment (ACT) -Continuing Day Treatment (CDT) - Intensive Psychiatric Rehabilitation Treatment (IPRT) - Clinic Treatment (MH Clinic) - Partial Hospitalization (PartHosp) - Personalized Recovery Oriented Services (PROS) - Recovery Services (PMHP - Prepaid Mental Health Plan)
Residential	- Community Residence (CR)

The numbers of patients readmitted are available for the years 2009 through 2011. Readmissions are patients who were discharged from either a general hospital or state psychiatric facility and were readmitted within 30 days of their discharge. Reasons for readmissions vary but one reason is that the patient may have committed a violent crime. Since the counties vary by population and readmissions may be a function of those populations, both readmission to general hospitals and readmission to state psychiatric facility have been divided by the county population.

A dummy variable for the presence of a psychiatric institution in a county will be included, where 1 indicates an institution is present and 0 indicates an there is no institution present. Patients who are institutionalized are the most severe cases or have

previously committed a violent crime. Those who are severely mentally ill have more to gain from committing a violent crime and a lower cost than most people. For example, a person discharged from an institution only faces the threat of returning if they are apprehended for a violent crime. Those who have committed violent crimes before and are institutionalized have already demonstrated that they are prone to and capable of committing violent crimes.

Other independent variables are used to control for causes of violent crime. According to Kelly, "inequality is correlated with both violent and property crime."[28] Indicators of inequality are the unemployment rate, income per capita, educational attainment, and percent of the population that is nonwhite.[29] Areas with high rates of unemployment should experience higher violent crime rates than areas with low unemployment rates because the cost of apprehension and punishment is generally less than the gain to the individual. The unemployment rate is lagged one year because someone does not become unemployed and instantly chose to become involved in illegal activity. Rather, an individual will collect unemployment for a period of time and when they cannot find a new job, illegal activity will become more attractive. Conversely, areas with high income per capita should experience less crime that those with low income per capita because security is a normal good. This means that as a person's income increases

---

[28] Kelly, Morgan. 2000 "Inequality and Crime". The Review of Economics and Statistics. Vol.82 No.4 pp.573
[29] Kelly, 572

they will purchase more of that good, in this case security or police protection.[30]

Educational Attainment is positively correlated with income. If income increases with education then those with more education will be less likely to commit violent crimes because the cost of committing a crime would increase as income increased. The Percent of the Population that is Nonwhite is the last indicator of inequality used because generally nonwhite individuals have lower economic success and less educational attainment than white individuals. The higher the Percent of the Population that is Nonwhite, the higher the Violent Crime Rate should be.

Population density was included because violent crime rate varies based on how urbanized a region is. Areas with higher population density are more urbanized and should be more prone to violent crime for two reasons. First, a region with higher population density has a larger supply of anonymous victims. Second, the chance of being apprehended is reduced. This specification will be run again using a fixed effects model to account for county specific effects that cannot be captured in the other explanatory variables.

The second model in this paper will address the flow of patients within the mental healthcare system of New York State. In this specification readmission to general hospital and readmission to state psychiatric facility are the dependent variables. The number of readmissions for each facility was divided by county population, yielding readmissions to each facility per capita in order to account for differences in county size.

---

[30] Fajnzylber, Pablo; Lederman, Daniel; Loayza, Norman. 2002 "Inequlity and Crime". <u>Journal of Law and Economics.</u> Vol.45 No.1 pp.2

Readmission to General Hospital= β_0+ β_1Violent Crime+ β_2Case Management+ β_3Inpatient+ β_4Outpatient+ β_5Residential+ β_6Readmission to State Psychiatric Facilities+ β_7State Psychiatric Facility Present

Readmission to State Psychiatric Facility= β_0+ β_1Violent Crime+ β_2Case Management+ β_3Inpatient+ β_4Outpatient+ β_5Residential+ β_6Readmission to General Hospitals+ β_7State Psychiatric Facility Present

The main independent variable is now the Violent Crime Rate. The next four independent variables are Case Management expenditure per capita, Inpatient expenditure per capita, Outpatient expenditure per capita, and Residential expenditure per capita, respectively. The next independent variable is the number of readmissions to the facility that is not the dependent variable, per capita. In other words, when the dependent variable is readmission to general hospital per capita then the independent variable will be the readmission to state psychiatric facility per capita. The last independent variable is the dummy variable for the presence of a State Psychiatric Facility.

Data Sources and Descriptive Statistics

Table 2.0: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Violent Crime Rate	336	196.7536	104.116	21.9	557
Case Management	336	1184406	2877088	0	1.91E+07
Inpatient	336	5298482	1.18E+07	0	7.42E+07
Outpatient	336	6297271	9976302	209673	5.32E+07
Residential	336	2609399	4444593	0	2.61E+07
Readmission to General Hospitals	168	91.72024	141.2994	0	798
Readmission to State Psychiatric Facility	168	6.77381	16.4075	0	92
State Psychiatric Facility Present	336	0.1785714	0.3835643	0	1
Unemployment Rate	336	7.320833	1.758522	3.4	10.8
Income Per Capita	280	36226.19	9088.613	24132	77741
Educational Attainment	336	87.74464	2.364886	83	93.1
Percent Nonwhite	336	9.676786	6.364397	2.4	24.9
Population Density	336	355.6479	733.3537	20.044	4758.475

There are 336 total observations, which are compiled from 56 of the 62 counties

in New York State. New York County, Queens County, Kings County, Richmond

County, and the Bronx were excluded from this study due to inconsistent data reporting

and the fact they are not representative of New York State as a whole would have made

them outliers and significantly affected the results. Hamilton County was also excluded

due to data inconsistency. The data spans a six-year period from 2007 to 2012.

Violent Crime Rate per 100,000 by county was obtained through the New York

State Division of Criminal Justice Services. The formula used to calculate the crime rate

is (Number of Crimes/ County Population) X 100,000. The number of crimes is based on

crime counts compiled from reports submitted to the New York State Division of

Criminal Justice Services through the Uniform Crime Reporting and Incident Based Reporting systems.[31]

The Medicaid Expenditures by category for each county, Readmission to General Hospital and Readmission to State Psychiatric Facility was collected from the New York State Office of Mental Health. The expenditures used in this study only pertain to adult patients (age 18 or more). The highest expenditure is Inpatient services, followed by, Outpatient, Residential, and Case Management. Readmission to a General Hospital is much higher than Readmission to a State Psychiatric Facility. This could be due to the fact that general hospitals are not equipped to deal with severe mental illness the way that state facilities are; therefore, they may discharge patients who would not have been discharged from a state facility. By discharging patients who are not yet ready to leave, the chance of patients being readmitted should increase. The dummy variable for presence of an institution was determined by using a list of state psychiatric centers from the New York State Office of Mental Health. There are eleven counties in this sample with a state run psychiatric center currently open; these are listed as adult facilities, though they also have children's services.

Unemployment rate for each county was collected using the Bureau of Labor Statistics and Income per Capita was found through the Bureau of Economic Analysis. Income per Capita was only available for 2007 to 2011. Educational Attainment and the Percent of the Population that is Nonwhite are available through the 2010 US Census Quickfacts. These numbers are presented as five-year averages from 2007 to 2011. The

---

[31] http://www.criminaljustice.ny.gov/crimnet/ojsa/countycrimestats.htm

population density of each county was calculated by dividing the county population,

obtained from the New York State Division of Criminal Justice Services, by county area

in square miles, which was obtained from the 2010 US Census Quickfacts.

Data Analysis

Below are the results for the first model specification:

Table 3.0: Specification 1: Violent Crime Rate per 100,000

Variable	Coefficient	Standard Error	T-Value	P>|t|
Case Management	1.12911	0.8144515	1.39	0.168
Inpatient	-0.0284742	0.0887612	-0.32	0.749
Outpatient	-1.712249	0.4066826	-4.21***	0
Residential	1.146633	0.4466876	2.57**	0.011
Readmission to General Hospitals Per Capita	46111.11	11630.3	3.96***	0
Readmission to State Psychiatric Facility Per Capita	99804.69	63572.27	1.57	0.118
State Psychiatric Facility Present	89.2953	21.87119	4.08***	0
Lagged Unemployment Rate	1.311353	3.820425	0.34	0.732
Per Capita Income	-0.0026538	0.0011966	-2.22**	0.028
Educational Attainment	0.1117655	2.708127	0.04	0.967
Percent Nonwhite	9.372913	1.451114	6.46***	0
Population Density	-0.0073814	0.0130015	-0.57	0.571
_cons	168.6449	236.9959	0.71	0.478

Number of Observations: 168
R-Squared: 0.5879
F-Value: 18.43
***, **, *: Significant at 1%, 5%, and 10% Respectively

Case Management expenditure per capita has a positive though not statistically

significant relationship to the violent crime rate per 100,000. An additional dollar per

capita spent on case management causes a 1.12 per 100,000 increase in violent crime

rate. Patients in case management are categorized as the highest functioning. There are

three case management programs, blended, intensive, and supportive. Patients in these treatment programs work with one more case managers and the goal is to provide access to services that can aid in helping patients to resolve problems that interfere with their independence.[32] Patients are responsible for taking their own medication and reporting to their case managers. Given this information the positive relationship is not what would be expected but based on New York State policies make sense. Since New York State is focused on discharging patients, the first patients sent to Case Management programs are the highest functioning and best suited to these programs. As more and more patients are discharged however, they are less qualified to be entered into Case Management programs because had they been qualified they would have been in said programs in the first place. If patients are in fact less qualified then they are probably not as high functioning and unable to be successful in a treatment program that imposes little structure on their daily lives. These patients may choose to discontinue their treatment program and are "lost" from the system. With little or no support these patients have the opportunity and the motive to commit crimes.

Though Inpatient expenditure per capita is not statistically significant, it has a negative relationship to the violent crime rate per 100,000. The magnitude of the decrease, however, is very small. Inpatient care should decrease violent crime because if patients are under constant supervision then the opportunity for them to commit violent crime decreases. It is significantly easier for patients in this setting to maintain their

---

[32]New York State Care Management Coalition. Accessed September 30, 2013
<http://www.nyscaremanagementcoalition.org/definitions.html>

treatment program because medication is given to them and schedules for therapy and increased learning opportunity are scheduled for them. In the event that a patient does not chose to adhere to their treatment then they are still under supervision mitigating many of the adverse effects that this choice can have.

Outpatient expenditure per capita has a statistically significant and negative relationship to violent crime rate. The magnitude at which Outpatient care decreases violent crime is significantly larger than Inpatient care, which as discussed has a near zero effect. Outpatient programs are for patients who do not require round the clock care. Patients learn how to deal with their illness as well as how to be successful within society. Programs are recovery oriented and therefore it makes sense that they would decrease crime rate. By working to maintain high levels of functioning and set goals for work and learning, patients are made aware of and able to take advantage of social and job opportunities. This raises the cost of involvement in violent crime making it a less desirable option.

Residential expenditure per capita has a positive and statistically significant effect on crime. The magnitude of this positive effect is about the same as the effect that Case Management expenditure has on violent crime. Patients in residential programs generally live in group homes, which are located within residential communities, hence, the name. These patients are supervised for most of the day and some may participate in work programs, though their mental illness tends to be fairly severe.

Readmission to general hospital per capita is positive and statistically significant at the 1% level. General Hospitals with psychiatric services are meant for short-term

stays, generally no longer than two weeks. As stated previously, these patients can either be sent to a state psychiatric facility or are simply discharged from the hospital without being given further care. Those who are discharged without further care have the opportunity to commit violent crimes. Readmission to state psychiatric facility per capita is positive but not statistically significant. The magnitude of readmissions to state facilities is about double the readmissions to general hospitals.

Having a state psychiatric facility present is statistically significant at the 1% level and has a positive relationship to violent crime. Counties where a state psychiatric facility is located are most likely have a higher concentration of mentally ill citizens. If New York State's primary goal is to discharge these patients then the 11 counties with state psychiatric facilities may see an increased number of patients present in the general community. The strong positive relationship indicates that a large number of patients are being sent to Case Management or Residential programs among discharge, since those two programs also have positive relationships to violent crime. It is also possible that patients are discharged with no continued treatment program, in which case they may not be able to function successfully in society and violent crime may become attractive to this group.

The remaining variables, meant to control for violent crime that is unrelated to mental illness, tend to yield the expected signs except for educational attainment and population density. The unemployment rate has a positive but not statistically significant relationship to violent crime. Both per capita income and percent of the population that is nonwhite were statistically significant in all four regressions with the expected signs. Per

capita income had a negative relationship to violent crime, meaning that as income

increases, violent crime decreases. The percent of the population that is nonwhite had a

positive relationship, so that when this percentage increases, violent crimes increase.

Below are the results to the second model specification:

Table 3.1: Specification 2: Readmission to General Hospitals per capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Violent Crime Rate	1.89E-06	4.36E-07	4.33***	0
Case Management	-5.14E-06	5.08E-06	-1.01	0.313
Inpatient	3.24E-06	5.18E-07	6.25***	0
Outpatient	6.78E-06	2.67E-06	2.54**	0.012
Residential	0.0000135	2.79E-06	4.84***	0
Readmission to State Psychiatric Facility Per Capita	-0.8507101	0.4097489	-2.08**	0.039
State Psychiatric Facility Present	-0.0004011	0.0001412	-2.84***	0.005
_cons	-0.0002243	0.0000935	-2.40	0.018

Number of Observations: 168
R-Squared: 0.6478
F-Value: 42.03
***, **, *: Significant at 1%, 5%, and 10%
Respectively

For the results above, readmission to general hospital per capita was the

dependent variable. Readmission to general hospital per capita play a large role in

determining the flow of patients under the care of various treatment programs; a majority

of the variables are statistically significant. Violent crime rate per 100,000 has a positive

relationship to readmissions to general hospital per capita and is statistically significant at

the 1% level. As stated previously, general hospital psychiatric services are designed for

short-term care. The positive relationship suggests that a reason for readmission to

general hospital is that patients who are not sent to state psychiatric centers are actually

24

becoming involved in violent crimes after the leave the hospital. This involvement in violent crime ultimately results in their readmission.

Case Management expenditure per capita is the only variable that is not found to be statistically significant. Case management strategies are successful at decreasing readmissions to general hospitals as illustrated by their negative relationship. Inpatient expenditure per capita, Outpatient expenditure per capita, and Residential expenditure per capita are all statistically significant and have a positive relationship to readmissions. The fact that an increase in these three expenditure categories causes an increase in readmissions to general hospital lend evidence to the flow of patients discussed earlier. As patients are readmitted to general hospitals, some are sent to other treatment programs meant for long-term care; hence causing expenditures of these treatment programs to increase. General hospitals act as the middlemen in funneling patients to various types of programs.

Readmission to state psychiatric facility per capita is statistically significant and negative; therefore state psychiatric facilities and general hospitals act as substitutes. In other words, when readmissions to general hospitals increase, readmissions to state psychiatric facilities decrease and vice versa. The statistically significant and negative relationships between readmission to general hospital per capita and presence of a state psychiatric facility further reinforces this idea. Having a state psychiatric facility present in a county decreases readmission to general hospitals because rather than discharging patients who need increased care they can be sent to state psychiatric facility for long-term care.

25

Table 3.2: Specification 2: Readmission to State Psychiatric Facilities per capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Violent Crime Rate	8.67E-08	8.75E-08	0.99	0.323
Case Management	3.16E-06	9.38E-07	3.37***	0.001
Inpatient	2.95E-08	1.10E-07	0.27	0.789
Outpatient	1.27E-06	5.09E-07	2.50**	0.014
Residential	-3.40E-09	5.68E-07	-0.01	0.995
Readmission to General Hospitals Per Capita	-0.0308376	0.0148531	-2.08**	0.039
State Psychiatric Facility Present	0.0000104	0.0000275	0.38	0.705
_cons	-0.0000274	0.000018	-1.52	0.13

Number of Observations: 168
R-Squared: 0.2299
F-Value: 19.62
***, **, *: Significant at 1%, 5%, and 10%
Respectively

The factors that contribute to readmission to state psychiatric facility per capita are different than those that contribute to readmission to general hospital per capita. In this case, violent crime rate is not statistically significant though there is still a positive relationship between the two. While violent crime does still play a role in increasing readmission to state psychiatric facility per capita, it does not play as large of a role as it did in readmission to general hospital per capita.

When the dependent variable becomes readmission to state psychiatric facility, the relationship to Case Management becomes positive. This means that patients who are readmitted to state psychiatric facilities tend to come from Case Management programs, as opposed to patients who are readmitted to general hospitals. Case Management expenditure per capita and Outpatient expenditure per capita are both statistically significant and Outpatient expenditure also has a positive relationship to readmission to

state psychiatric facility. Case Management and Outpatient treatment programs offer the most freedom to the patients involved; therefore, making it easy for patients to discontinue their treatment protocol. By not continuing to adhere to medications and therapy sessions along with the other service provided to patients in these programs, the chance of readmission increases because the protocol, specifically the medications are meant to help control mental illness and make functioning in society easier. While not statistically significant, inpatient expenditure per capita has a positive relationship to readmission to state psychiatric facility per capita. This simply reflects the fact that the more patients there are in state psychiatric facilities, the more patients there are to be discharged and the more patients discharged, the higher the chance of some patients being readmitted.

Residential expenditure per capita is the only treatment program that has a negative, though not statistically significant relationship to readmission to state psychiatric facilities. This differs from the relationship between readmission to general hospitals and Residential expenditure per capita, which has a positive relationship. This means that a majority of readmissions to general hospitals come from Residential programs. Patients discharged into residential settings still have constant supervision, though they often participate in work programs. This supervision decreases the likelihood that they will stray from treatment protocols, increasing their success of remaining discharged.

Once again, readmission to general hospital per capita is statistically significant and negatively related to readmission to state psychiatric facility per capita reinforcing

that idea that general hospitals and state psychiatric facilities are substitutes. The relationship between presence of a state psychiatric facility and readmission to a state psychiatric facility remains positive though not statistically significant in this case.

A Simultaneous Equations Approach

The regressions above provide reasonable estimates and begin to give us a picture of how patients move through the mental healthcare system of New York State; however, the above regressions do not take into account the fact that many of the estimates are being determined simultaneously. A simultaneous system of equations using five regressions, would better describe the movement of a patient throughout the mental healthcare system. Using this method, the previous three regressions would be rewritten with various exclusion restrictions and two additional regressions will be added. The table below lists the five regressions. For each of the five regressions, "X" refers to a set of control variables including: presence of a state psychiatric facility, unemployment rate, income per capita, educational attainment, percent of the population that is non white, and population density.

Table 4.0: System of Equations

Dependent Variable	Independent Variables							
Violent Crime Rate		CM		OUT	RES			X
Readmission to General Hospitals	VCR	CM		OUT	RES			X
Readmission to State Psychiatric Facilities$_{(t+1)}$		CM$_t$	IN$_t$	OUT$_t$	RES$_t$			X
Inpatient Expenditure per capita		CM		OUT	RES	ReAD. GH		X
Outpatient Expenditure per capita		CM	IN		RES		ReAD. SPC	X

In the first regression Inpatient expenditure per capita, readmission to general hospitals and readmission to state psychiatric facilities were excluded. Inpatient expenditures were excluded because they were not found to be statistically significant in the original set of regressions and had a very small effect on violent crime rate. Violent crime is a driving factor of readmissions to both general hospitals and state psychiatric facilities. By removing both from the first regression we can use the coefficients on each expenditure category to determine how an increase in expenditure per capita of each treatment category affects the violent crime rate.

In the second regression readmission to general hospitals is the dependent variable. Inpatient expenditure is excluded again because even though it is statistically significant, a majority of this expenditure category is dedicated to state psychiatric facilities. Readmission to state psychiatric facilities was also excluded because the previous set of regressions established that the two facilities are substitutes and this set is being used to determine the pattern of substitution. In other words, this system of equations will illuminate exactly how patients are flowing through the system.

The third regression has readmission to state psychiatric facilities as the dependent variable. In this regression, Case Management, Inpatient, Outpatient, and Residential expenditure per capita are lagged so that the estimated readmission to state psychiatric facilities in year $t+1$ is a function of each expenditure category in year t. All the expenditure categories were included because any person in one of the four treatment programs can be readmitted to a state psychiatric facility for a number of reasons. The results of the three regressions just discussed are reported in the appendix of the paper.

29

The last two regressions are added to this regression set in order to complete the cycle of a patient. Both Inpatient and Outpatient treatment programs have a strong connection to state psychiatric facilities where as Case Management and Residential treatment programs are based in the community. When Inpatient expenditure per capita is used as the dependent variable in the fourth regression, readmission to state psychiatric facilities is excluded because the magnitude of readmission to general hospitals is four times as large. The difference in magnitude indicates that readmission to general hospitals contributes more to Inpatient expenditure than readmission to state psychiatric facilities. The fifth regression using Outpatient expenditure per capita as the dependent variable excludes readmissions to general hospitals for a similar reason. The magnitude of the effect of readmission to state psychiatric facilities on Outpatient expenditure is much larger than the magnitude of the effect of readmission to general hospitals.

The results of the regression using Inpatient expenditure per capita as the dependent variable are listed on the following page.

Table 4.1: Specification 3: Inpatient Expenditure per Capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Case Management	-0.0405524	0.7026213	-0.06	0.954
Outpatient	0.6483429	0.3559669	1.82*	0.07
Residential	0.2021069	0.4013267	0.5	0.615
Readmission to General Hospitals Per Capita	58797.74	9238.293	6.36***	0
State Psychiatric Facility Present	-9.474854	19.57695	-0.48	0.629
Lagged Unemeployment Rate	1.869999	3.429139	0.55	0.586
Per Capita Income	0.0005292	0.0010753	0.49	0.623
Educational Attainment	0.186402	2.434842	0.08	0.939
Percent Nonwhite	-0.1767868	1.303534	-0.14	0.892
Population Density	0.0045164	0.0116879	0.39	0.7
_cons	-76.28997	212.9664	-0.36	0.721

Number of Observations: 168
R-Squared: 0.4461
F-Value: 12.64
***, **, *: Significant at 1%, 5%, and 10%
Respectively

Case Management expenditure per capita is the only expenditure category, which has a negative relationship with Inpatient expenditure per capita, though the results are not statistically significant. This negative relationship implies that patients are moving between Case Management treatment programs and Inpatient treatment programs. Both Outpatient expenditure per capita and Residential expenditure per capita have a positive relationship to Inpatient expenditure per capita, though only Outpatient expenditure is statistically significant. The positive relationship between Inpatient and, Outpatient and Residential expenditures suggests that patients discharged from state psychiatric facilities are more likely to be placed into one of these treatment programs as opposed to Case Management treatment programs. The coefficients on these expenditure categories are

also about six times larger than the coefficient on Case Management expenditure, meaning that patients are potentially being discharged as a faster rate than they are being readmitted.

Readmission to general hospitals per capita has a large, statistically significant effect on Inpatient expenditure. This large positive relationship reinforces the idea that patients who are readmitted to general hospitals tend to be placed in Inpatient treatment programs. Since it was established that general hospitals filter patients into state psychiatric facilities the large magnitude of the coefficient also suggests that more patients enter Inpatient treatment by first being readmitted to a general hospital some number of times. The negative relationship between presence of a state psychiatric facility and Inpatient expenditure seems unexpected, but given the fact that New York State has been moving towards deinstitutionalizing, particularly within the time period being analyzed here, this negative relationship is consistent with that fact and therefore patients are being directed to other treatment programs.

The next specification differs from the previous only in the fact that the dependent variable is now Outpatient expenditure per capita and Inpatient expenditure per capita was used as an independent variable. The results of this specification are reported below:

Table 4.2: Specification 3: Outpatient Expenditure per capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Case Management	-0.2756887	0.209856	-1.31	0.191
Inpatient	0.0417511	0.0155078	2.69***	0.008
Residential	0.4600696	0.0713619	6.45***	0
Readmission to State Psychiatric Facility Per Capita	0.0721316	0.1254441	0.58	0.566
State Psychiatric Facility Present	31.49679	4.629078	6.8***	0
Lagged Unemeployment Rate	-0.4731397	0.7625709	-0.62	0.536
Per Capita Income	0.000072	0.0002399	0.3	0.764
Educational Attainment	-0.5078742	0.5377754	-0.94	0.346
Percent Nonwhite	0.2702053	0.2897011	0.93	0.352
Population Density	-0.0035911	0.0025786	-1.39	0.166
_cons	61.36371	46.9195	1.31	0.193

Number of Observations: 168
R-Squared: 0.6143
F-Value: 25.00
***, **, *: Significant at 1%, 5%, and 10% Respectively

Once again Case Management expenditure per capita is negative, and this

relationship reinforces the idea that Case Management patients are likely to be moved out

of their treatment program and into a treatment program that has a connection with a state

psychiatric facility. The larger magnitude of the coefficient on Case Management

expenditure per capita related to Outpatient expenditure per capita suggests that patients

are more likely to be moved from Case Management treatment programs to Outpatient

treatment programs rather than to Inpatient programs. Inpatient expenditure per capita

and Residential expenditure per capita both have positive and statistically significant

relationships to Outpatient expenditure. The positive relationship reinforces the results

found in the previous specification. Readmission to state psychiatric facilities yields a

positive relationship to Outpatient expenditure, though it is not statistically significant.

The positive relationship implies that readmission to state psychiatric facilities leads to more patients being placed in Outpatient treatment.

Policy Implications

The positive correlations to the various expenditure categories, readmissions to both general hospitals and psychiatric facilities, and the presence of a state psychiatric center within a county reinforce the idea that the mentally ill have different costs of committing crimes than those without a mental illness. The worst-case scenario for an average individual often keeps them from committing a crime in the first place where as the worst case scenario for someone with a mental illness can actually offer them a number of benefits. For example, patients who were recently discharged or sent to a less structured treatment program may have trouble adjusting or find that it was simply easier to live in a psychiatric facility. This realization may induce this patient to commit a crime that will bring them back to their original circumstances. When making changes to the mental healthcare system, New York State should keeps these differing incentives in line and try to bring the incentives of the mentally ill to be more in line with those without mental illness.

Currently, New York State is in the midst of implementing a three-year plan during which time they will completely overhaul the mental health care system. Changes in the structure of Medicaid and the Affordable Care Act, coupled with the inefficiency of the current system are the strongest forces for change. The new plan calls for the opening of 15 Regional Centers of Excellence, which will focus on inpatient and

community-based services.[33] Another cause for change is the location of patients within the system. There are about 715,000 individuals accessing care in a specialty mental health setting each year. In 2012, 10,000 of those patients are served by inpatient hospitals run by the Office of Mental Health. With the total inpatient hospital census below 4,000, most of the patients are being served in the community.[34]

The new plan will offer services that promote access, resiliency, and recovery. Increased access to housing, education, and employment opportunities will help improve the lives of those being served by the mental health care system. Early detection will also become a primary focus. According to the state, the current system is too reliant on inpatient care, which used about one-fifth of the states totally budget for mental health care.[35] The current budget has also remained stable in recent years, while costs have continued to increase. Currently, it costs an average of $800 per day for one patient in a state psychiatric facility.[36] By moving towards a system that integrates mental health care with physical health care and management of chronic conditions, New York State hopes to have a more efficient system that decreases cost.[37]

The question becomes, is New York State focusing it's efforts of reallocation in the most effective way? Decreasing inpatient populations, as this new system would, would free up one-fifth of the current budget. Let's assume the current budget is reallocated and expenditures in each of the four categories are increase by $1000 per

[33]Cuomo, Andrew and Woodlock, Kristen M. 2013 "Office of Mental Health Regional Centers of Excellence". New York State Office of Mental Health. Pp. 3
[34] Cuomo and Woodlock, 7
[35] Cuomo and Woodlock, 8
[36] Cuomo and Woodlock, 49
[37] Cuomo and Woodlock, 52

capita. Using the first set of regressions, the increase per capita is applied to each

expenditure category while the other expenditures are held constant. The following

charts, using the estimates yielded in the original model show the results of this

assumption:

Table 5.0: Violent Crime Rate as a Result of Readmission to General Hospitals

Expenditure	Violent Crime Rate	Readmission to General Hospitals	Violent Crime Rate	Net Effect
Case Management	1129.11	2.13E-03	9.84E+01	1227.51
Inpatient	-28.4742	-5.38E-05	-2.48E+00	-30.96
Outpatient	-1712.249	-3.24E-03	-1.49E+02	-1861.47
Residential	1146.633	2.17E-03	9.99E+01	1246.56

Table 5.1: Violent Crime Rate as a Result of Readmission to State Psychiatric Facilities

Expenditure	Violent Crime Rate	Readmission to State Psychiatric Facilities	Violent Crime Rate	Net Effect
Case Management	1129.11	9.79E-05	9.77E+00	1138.88
Inpatient	-28.4742	-2.47E-06	-2.46E-01	-28.72
Outpatient	-1712.249	-1.48E-04	-1.48E+01	-1727.07
Residential	1146.633	9.94E-05	9.92E+00	1156.55

The first column takes the coefficients estimated for each of the Medicaid

Expenditure categories and multiplies them by $1000, yielding the estimated effect on

violent crime rate. The estimated violent crime rate is then multiplied by the coefficient

from violent crime rate in each regression from the second specification. This yields the

effect of violent crime on readmission to general hospitals and to state psychiatric

facilities when expenditure per capita has been increased. Those estimates are then

multiplied by the coefficients for readmission to general hospitals per capita and

readmission to state psychiatric facilities per capita from the regression used in the first specification. This yields the last two columns, which show the violent crime rate as a result of readmission to general hospitals and state psychiatric facilities.

Increasing expenditures per capita has some interesting results on the violent crime rate per 100,000. Before the increase of $1000 per capita, Case Management decreased readmission to general hospitals. After the increase, Case Management had a positive relationship to readmission to general hospitals. Readmission to state psychiatric facilities also increases when expenditure on Case Management is increased. The increases in readmission to general hospitals are of a larger magnitude than the readmissions to state psychiatric facilities. Readmissions to both general hospitals and state psychiatric facilities as a result of increased expenditure on case management have a positive effect on violent crime rate. The magnitude of violent crime rate calculated with readmissions to both general hospitals and state psychiatric facilities as a result of increased expenditure on Case Management is about the same.

Increasing expenditure on Inpatient programs has opposite effect of that estimated in the regressions. In the regressions, inpatient expenditure had a positive effect on readmissions to both facilities but after the $1000 increase in expenditure per capita, Inpatient expenditure has a negative effect on readmissions. Increased Inpatient expenditure has a negative effect on violent crime, consistent with what was found in the original regression estimation. The magnitude of these effects is about equal on violent crime.

On the other hand, when Outpatient expenditure is increased then readmission to general hospitals decreased, as shown by the sign change. Outpatient expenditure also decreases readmission to state psychiatric facilities but at a slightly smaller magnitude. Before the $1000 increase in expenditure per capita, Outpatient expenditure was positively related to readmission to state psychiatric facilities. Patients entering into Outpatient programs are successful at integrating into the community and so more resources should be focused here. Readmission to general hospitals and state psychiatric centers, as a result of increased expenditure on Outpatient programs has a negative effect on the violent crime rate.

When Residential expenditure per capita is increased, both readmission to general hospitals and readmission to state psychiatric facilities increase. This may be a sign that those being placed into Residential treatment programs are actually not suited from programs with that much freedom and should have been sent to Inpatient treatment facilities. The effect on violent crime rate based on the estimates for readmission to both general hospitals and state psychiatric facilities is positive, with large magnitudes similar to those found when Case Management expenditure per capita was increased.

Using the results from the simultaneous equations approach we assume that New York State has a finite budget and that an increase in one category results in decreases of the others. The state can determine the number of patients put into Case Management, Outpatient, and Residential treatment programs and therefore can control cost by placing patients into less costly programs. The number of patients placed in Inpatient treatment programs, on the other hand, is somewhat exogenously determined; for example, court

ordered institutionalization, so that the portion of the budget, which New York State can

determine, looks like this:

$$Total\ Budget = Case\ Management + Outpatient + Residential$$

The table below shows four different scenarios where the budget is altered

through various increases and decreases, and their net effect on violent crime.

Table 5.2: Violent Crime as a Result of Changes in Budget Allocation

	Violent Crime Rate (*t*)	Readmission to General Hospitals (*t*)	Inpatient Expenditure (*t*)	Readmission to State Psychiatric Facilities (*t+1*)	Outpatient Expenditure (*t+1*)	Violent Crime Rate (*t+1*)
1	2078.882	-1.76E-02	-1721.35	2.27E-03	1.64E-04	-1.65E-04
2	-2581.914	1.36E-03	647.38	-7.43E-04	-5.36E-05	5.40E-05
3	-2078.882	1.76E-02	1721.35	-2.27E-03	-1.64E-04	1.65E-04
4	-3084.946	-1.48E-02	-426.59	7.86E-04	5.67E-05	-5.71E-05
	Scenario 1: Case Management= $1000, Outpatient= -$1000					
	Scenario 2: Case Management= -$500, Outpatient= $1000, Residential= -$500					
	Scenario 3: Case Management= -$1000, Outpatient= $1000					
	Scenario 4: Outpatient= $1000, Residential= -$1000					

The first scenario assumes that the $1000 per capita increase will be applied to

Case Management treatment programs. This treatment category is chosen because if New

York State is looking to decrease costs, Case Management programs are the least

intensive as far as utilizing state resources and achieves the state's goal of moving

treatment from institution-based to community-based treatment. Since Residential

treatment is essentially the same level of care as an institution and it is more

decentralized we assume that no changes in expenditure are made to this category.

Finally, to offset the increase in Case Management, Outpatient expenditure will decrease

by $1000 per capita. Decreasing Outpatient expenditure would also aid in achieving the

state's goal of increasing community-based care while decreasing dependency on centralized Inpatient treatment centers. Summing these changes results in the first column, Violent Crime Rate in year *t*. As you can see, this results in a substantial increase in violent crime rate for the current year.

The estimated violent crime rate is then multiplied by the coefficient for violent crime in the second regression and the budget allocation changes are applied to their corresponding coefficients, yielding the readmission to general hospitals in year *t,* which decreases though only a small amount. Decreased readmission to general hospitals is then multiplied by its corresponding coefficient to estimate the effect on Inpatient expenditure per capita and the appropriate budget allocation changes are applied. Even though the decrease in readmission to general hospitals appears to be of a small magnitude, there is a substantial decrease in Inpatient treatment; therefore, New York State's goal of decreasing Inpatients costs is achieved.

The estimated Inpatient expenditure in year *t* determines readmission to state psychiatric facilities in year *t+1*, so when the estimated Inpatient expenditure is multiplied by the corresponding coefficient and the budget allocation changes are multiplied by their corresponding coefficients, the readmissions to state psychiatric facilities in the next year increases. This outcome is not desirable to New York State because it means that while the original goal of decreasing costs seems to have been achieved in the current year, the next year Inpatients costs will increase due to the increased number of readmissions to state psychiatric facilities. These readmissions could be a result of prematurely discharging patients.

When readmission to state psychiatric facilities is multiplied by its coefficient, estimated Outpatient expenditure per capita increases in that year. This increase is expected because if the state's goal is to decrease Inpatient treatment then Outpatient treatment would provide an option that is still tied to the psychiatric facility but with a lower cost. The benefit of this plan is that even though there is an initial increase in violent crime in year t, violent crime the next year will decrease. The decrease in violent crime is estimated by multiplying the estimated Outpatient expenditure by its corresponding coefficient in the first regression.

The second scenario begins with an increase in Outpatient expenditure by $1000 per capita. To offset the increase both Case Management and Residential expenditure per capita are decreased by $500. These expenditure changes result in a decrease of violent crime in the current year. Following the same formula for scenario one, we see that decreased violent crime in the current year leads to increased readmission to general hospitals in the current year. Since this is the opposite effect from the first scenario, we can conclude that a large portion of readmission to general hospitals comes from patients who are part of Outpatient programs. Increased readmission to general hospitals will result in increased Inpatient expenditure, the opposite of New York State's desired goal. When Inpatient expenditure in the current year is increased then readmission to state psychiatric facilities in the next year decreases, most likely due to the fact that if the patients are admitted in the current year it is unlikely that they will discharged and then readmitted the next year. With fewer patients in community-based treatment programs, there are fewer patients available for readmission in the next year. Outpatient expenditure

in the next year will decrease as well. This plan does not seem to meet the goals of New York State, but it does cause a large decrease in violent crime during the year in which the budget allocation changes are applied. Violent crime in the next year, however, increases by a small amount.

The third scenario analyzed has the opposite result of the second scenario because expenditure is adjusted in the opposite direction. Once again there is a $1000 per capita increase in Outpatient treatment but the increase is offset by a $1000 decrease in Case Management and Residential spending is kept the same. Using this budget reallocation, readmission to general hospitals in the current year and Inpatient expenditure in the current year increase; readmission to state psychiatric facilities in the next year and Outpatient expenditure in the next year all decrease. Violent crime rate in the next year however does increase, again at a small magnitude. The decrease of violent crime in the current year using this budget reallocation is smaller than the decrease in violent crime in the current year using the budget allocation in the second scenario.

The fourth scenario is the only plan, which yields decreases in violent crime in both the current year and the next year. In the budget reallocation, Outpatient expenditure is decreased by $1000 per capita and Residential Expenditure is increase by $1000 per capita. Following the same formula, readmissions to general hospitals and Inpatient expenditure in the current year are decreased. Readmissions to state psychiatric facilities in the next year increases, resulting in increased Outpatient expenditures in the next year, as patients are being discharged from Inpatient to Outpatient programs. Violent crime in the next year decreases.

42

Clearly, there is a trade off between achieving decreased spending on Inpatient treatment and the violent crime rate in New York State. The only scenario that predicts violent crime for both the current year and the next year will decrease is when the state increases Residential expenditure per capita. This scenario also provides the desired decrease in Inpatient expenditures. The first scenario results in the desired goal but the state faces causing a substantial increase in the violent crime rate during the current year, with only a small decrease in the next year. Both the second and third scenario cause large decreases in violent crime in the current year, offset by very small increases in violent crime the next year. Based on these findings, New York State must analyze the tradeoff between decreasing Inpatient expenditure and the violent crime rate. In order to ensure that costs are not simply being transferred from the mental healthcare system to the criminal justice system, they must put into place programs to create incentives that will make legal activity and maintaining treatment regimens more attractive than committing a violent crime and becoming reinstitutionlized.

Further Research

The methods used in this paper give a reasonable estimate of the effects of the mentally ill have on violent crime rates by examining the effects of expenditure per capita in four categories of treatment, readmissions to both general hospitals and state psychiatric facilities and the presence of a state psychiatric facility. The simultaneous equations approach begins to shed more light on the movement of patients throughout the system and what that flow means for New York State.

There is, however, a missing link in the flow of patients. Those who are successful with their treatment program face little motivation to commit a crime compared to those who are unsuccessful. In order to truly estimate how changes in budget allocation would affect violent crime, the number of patients who are discharged and who drop out of the system by no longer continuing their prescribed treatment should be accounted for. Unfortunately, because these numbers are constantly changing they are difficult to report and therefore not available. If the number of discharges were reported perhaps they could be included in the regression using readmission to a state psychiatric facility in the next year as a function of Inpatient expenditure per capita and number of patients discharged in the current year. It might also prove insightful to sum the number of discharges and the number of patients who drop out of the system and use this total as a dependent variable for a sixth regression. The inclusion of these numbers would include a more complete picture of the system since currently there is no way to account for patients who were once apart of the system.

Conclusion

Since the 1950's New York State has been working to implement a community based mental healthcare program. The push to deinstitutionalization was a nationwide initiative brought about by changing beliefs in the medical community, specifically, outpatient treatment of World War II veterans, the advent of new medications, and the reassertion of the importance of psychiatry. The Federal government also began incentivizing states to move towards community based treatment by offering financial incentives in exchanging for setting goals to create community based care and meeting

said goals. Currently, New York is looking to further deinstitutionalize and essentially eliminate the need for inpatient care. The goal is to create 15 Centers of Excellence in the next three years, where the mentally ill can be treated in more goal oriented programs. The new mental healthcare system will also make an effort to increase access to affordable housing and learning opportunities for patients.

In the current system patients can be in one of three locations, a state psychiatric center, a general hospital, or in the community, either in a treatment program or on their own. One of the largest problems with the initial mass discharges was that the state had difficulty monitoring patients who were put back into the community and actually lost track of a large number of them. During this discharge process patients should be more closely monitored in an effort to ensure that they maintain their treatment program and do not drop out. Closer monitoring of patients would also alleviate another problem in the current system. Patients get passed from one location to another while little to no improvements in their health are made. Both the original set of regressions and the simultaneous system of equations depict the flow of a patient throughout the system. If patients were monitored and encouraged to continue their treatment then the flow of patients through the system would slow.

The inability to monitor patients consistently led to concern for how the mentally ill affect violent crime rates. The first regression run in this paper established a connection between violent crime and mental illness. Positive relationships to violent crime were found for several key variables, including Case Management and Residential

expenditure, readmission to both general hospitals and state psychiatric facilities, and presence of a state psychiatric facility.

The estimated budget reallocations revealed similar results for the original set of regressions and the simultaneous system of equations, but the simultaneous system of equations revealed that there is a tradeoff between achieving New York State's desired goal and the violent crime rate. The initial results show that increased Outpatient expenditure per capita has a large negative net effect on violent crime rate. New York State should examine the differences between Outpatient treatment and the patients in this treatment category as compared to all other patients and treatment programs. Outpatient programs focus on goal setting and increasing opportunities available to the patients. Providing the tools to ensure that patients are successful in the community is consistent with Becker's theory of crime where crimes are less likely to be committed when the cost of committing a crime is greater than the benefit that the perpetrator would receive. Perhaps Outpatient treatment programs can better align the incentives of the mentally ill with those of a healthy individual, making deterrents already in place more effective.

In the simultaneous equations approach, Outpatient expenditure per capita also has a negative effect on the violent crime rate and therefore seems like the category in which New York State should increase it's spending. The budget allocation estimates however, do not concur with such a cut and dry conclusion. Increasing Outpatient expenditure by $1000 per capita in the current year decreases violent crime in the current year as well, but there are still increases in violent crime in the next year. The fourth

scenario results in the most significant decrease in violent crime between both the current

year and the next year and decreases Inpatient expenditure a significant magnitude. This

plan seems to be the best compromise but has its own set of costs. There are still

increases in readmissions and Outpatient expenditure, besides the fact that increasing the

use of Residential treatment will ultimately result in a decentralized Inpatient care

system. Monitoring this treatment system will be much more difficult and may result in

simply reallocating the costs rather than eliminating them. The four scenarios also

illuminate another tradeoff between decreasing Inpatient expenditure in the current year

and decreasing readmissions to state psychiatric facilities. Therefore, New York State

will have to choose between achieving their desired goal of decreasing the use of

Inpatient services and turning towards community-based treatment or increasing the

violent crime rate and the associated costs.

Overall, New York State's new mental healthcare system should focus on creating

treatment programs that provide more services to ensure that patients who are discharged

into the community are successful and do not end up readmitted to either a general

hospital or state facility. The success of patients is dependent upon changing the cost of

committing violent crimes. By increasing the cost of committing violent crimes through

educational programs and job placement programs, the mentally ill's decision will

become more similar to an individual without a mental illness. Providing housing to

patients will also lessen their economic burden and make monitoring patients easier. The

flow of patients mimics success when in reality the patient is just pushed to a different

location within the system. Monitoring patients more closely will decrease the number of

patients who are passed through the system without visible improvement. Readmissions should become a primary focus to the state because all expenditure categories experience positive relationships to readmission to either general hospitals, state psychiatric facilities or both. Cycling a patient in and out of treatment programs and in an out of various facilities does more to hurt than help. It is also a sign that the system of discharge is not working. New criteria for discharge should be established so that the likelihood of a readmission is smaller. The new plan set for by the Office of Mental Health seems to be tackling some of these issues and will hopefully usher in a new era of mental healthcare in New York State where the success of the patient is the primary goal.

Appendix

Below are the results of the first two specifications run using the regressions

derived for a simultaneous equations approach.

Table 6.0: Specification 1A: Violent Crime Rate per 100,0000

Variable	Coefficient	Standard Error	T-Value	P>|t|
Case Management	1.07118	0.7110337	1.51	0.133
Outpatient	-1.007702	0.3095377	-3.26***	0.001
Residential	2.077244	0.358639	5.79***	0
State Psychiatric Facility Present	66.77914	17.5482	3.81***	0
Lagged Unemployment Rate	-0.199882	2.551573	-0.08	0.938
Per Capita Income	-0.0027619	0.0009461	-2.92***	0.004
Educational Attainment	-1.742551	2.157966	-0.81	0.42
Percent Nonwhite	10.68841	1.190953	8.97***	0
Population Density	-0.0141642	0.0109958	-1.29	0.199
_cons	342.3344	185.6814	1.84	0.066

Number of Observations: 279
R-Squared: 0.4865
F-Value: 27.34
***, **, *: Significant at 1%, 5%, and 10% Respectively

Just as in the original set of regressions, Case Management expenditure per capita

and Residential expenditure per capita both have positive effects on violent crime, though

only Residential expenditure per capita is statistically significant. The magnitude of the

increase of violent crime due to Residential expenditure per capita is twice that of the

increase resulting from Case Management expenditure per capita. Outpatient Expenditure

per capita is statistically significant and negative once again. Having a state psychiatric

facility present is also positive and statistically significant.

Table 6.1: Specification 2: Readmission to General Hospitals per capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Violent Crime Rate	2.29E-06	5.59E-07	4.09***	0
Case Management	-0.0000125	5.75E-06	-2.17**	0.032
Outpatient	9.82E-06	2.97E-06	3.31***	0.001
Residential	0.0000176	3.06E-06	5.74***	0
State Psychiatric Facility Present	-0.0005468	0.000164	-3.33***	0.001
Lagged Unemeployment Rate	0.0000155	0.0000281	0.55	0.582
Per Capita Income	7.54E-09	8.95E-09	0.84	0.401
Educational Attainment	0.0000263	0.0000199	1.32	0.189
Percent Nonwhite	1.53E-06	0.000012	0.13	0.899
Population Density	-9.70E-08	9.58E-08	-1.01	0.313
_cons	-0.0030203	0.0017346	-1.74	0.084

Number of Observations: 168
R-Squared: 0.5603
F-Value: 20.01
***, **, *: Significant at 1%, 5%, and 10% Respectively

The results for the second regression of the simultaneous system of equations are similar to the results yielded in the original set of regressions. Violent crime rate has positive relationship with readmission to general hospitals and is statistically significant. Once again, only Case Management expenditure per capita has a negative relationship to readmission to general hospitals while Outpatient and Residential expenditure per capita have positive relationships. All three are found to be statistically significant. Lastly, having a state psychiatric facility present decreases readmissions to general hospitals, supporting the idea that general hospitals filter patients into psychiatric facilities.

Table 6.2: Specification 3: Readmission to State Psychiatric Facilities per capita

Variable	Coefficient	Standard Error	T-Value	P>|t|
Lagged Case Management	3.80E-06	9.47E-07	4.01***	0
Lagged Inpatient	5.12E-07	5.72E-07	0.9	0.372
Lagged Outpatient	6.47E-07	5.09E-07	1.27	0.206
Lagged Residential	-3.57E-07	5.05E-07	-0.71	0.48
State Psychiatric Facility Present	0.0000434	0.0000268	1.62*	0.107
Lagged Unemeployment Rate	1.96E-06	4.84E-06	0.4	0.687
Per Capita Income	-6.67E-10	1.56E-09	-0.43	0.669
Educational Attainment	5.86E-07	3.41E-06	0.17	0.864
Percent Nonwhite	-1.82E-06	1.83E-06	-1	0.32
Population Density	1.83E-09	1.64E-08	0.11	0.911
_cons	-0.0000446	0.0002975	-0.15	0.881

Number of Observations: 168
R-Squared: 0.2184
F-Value: 4.39
***, **, *: Significant at 1%, 5%, and 10% Respectively

The third regression in the simultaneous system of equations estimates how Case Management, Inpatient, Outpatient, and Residential expenditure per capita in the current year will affect readmission to state psychiatric facilities in the next year. The results yielded here indicate that when Case Management, Inpatient, and Outpatient expenditure per capita increases in the current year, readmission to state psychiatric facilities in the next year will increase. Residential expenditure per capita has a negative relationship to readmissions to state psychiatric facilities, indicating that patients placed in Residential treatment programs tend to stay there. This may have to do with the idea that Residential treatment is essentially a decentralized form of Inpatient treatment. Having a state psychiatric facility present also has a positive relationship.

Works Cited

Becker, Gary S. 1968 "Crime and Punishment: An Economic Approach". <u>Columbia University</u> pp.169-217

Bureau of Economic Analysis. GDP and Personal Income, Local Areas Personal Income and Employment. Accessed April 1, 2013.
<http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=5#reqid=70&step=30&isuri=1&7028=3&7083=Levels&7031=36000&7040=-1&7033=-1&7022=20&7023=7&7024=Non-Industry&7025=4&7026=XX&7001=720&7029=20&7090=70&7027=2011,2010,2009,2008,2007>

Bureau of Labor Statistics. Local Area Unemployment Statistics. Accessed April 1, 2013.
<http://www.bls.gov/lau/#cntyaa>

Cuomo, Andrew and Woodlock, Kristen M. 2013 "Office of Mental Health Regional Centers of Excellence". <u>New York State Office of Mental Health.</u> Pp. 1-57

Fajnzylber, Pablo; Lederman, Daniel; Loayza, Norman. 2002 "Inequlity and Crime". <u>Journal of Law and Economics.</u> Vol.45 No.1 pp.1-39

Kelly, Morgan. 2000 "The Review of Economics and Statistics". <u>The MIT Press.</u> Vol.82 No.4 pp.530-539

Merton, Robert K. 1938 "Social Structure and Anomie". <u>American Sociological Review</u>. Vol.3 No.5 pp.672-682

Mowbray, Carol T. and Holter, Mark C. 2002. "Mental Health and Mental Illness: Out of the Closet?". <u>Social Service Review</u>. Vol.76 No.1 pp.135-179

New York State Care Management Coalition. Accessed September 30, 2013
<http://www.nyscaremanagementcoalition.org/definitions.html>

New York State Division of Criminal Justice Services. 2011 Crime Statistics by County. Accessed April 2, 2013.
<http://www.criminaljustice.ny.gov/crimnet/ojsa/countycrimestats.htm>

New York State Office of Mental Health. Medicaid Mental Health Services Utilization. Accessed April 1, 2013.< http://bi.omh.ny.gov/cmhp/mh-services#western-ny>

New York State Office of Mental Health. Medicaid Mental Health Services Utilization. Accessed April 1, 2013.< http://bi.omh.ny.gov/cmhp/mh-services#central-ny>

New York State Office of Mental Health. Medicaid Mental Health Services Utilization. Accessed April 1, 2013.< http://bi.omh.ny.gov/cmhp/mh-services#hudson-river>

New York State Office of Mental Health. Medicaid Mental Health Services Utilization. Accessed April 1, 2013.< http://bi.omh.ny.gov/cmhp/mh-services#new-york-city>

New York State Office of Mental Health. Medicaid Mental Health Services Utilization. Accessed April 1, 2013.< http://bi.omh.ny.gov/cmhp/mh-services#long-island>

Robbins, Pamela Clark; Monahan, John; Silver,Eric. 2003 "Mental Disorder, Violence, and Gender". Law and Human Behavior. Vol.27 No.6 pp. 561-571

Raphael, Steven. 2000. "The Deinstitutionalization of the Mentally Ill and Growth in the U.S. Prison Populations: 1971 to 1966". University of Berkeley.

Weddle, Bonita L. 1998. "Mental Health in New York State, 1945-1998". New York State Archives.