

Crisis stabilization claims analysis: Technical report

*Assessing the impact of crisis stabilization
on utilization of healthcare services*

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Introduction

Mental illness affects millions of American each year. In 2010, the Substance Abuse and Mental Health Services Administration (SAMHSA) estimated that 45.1 million adults, or nearly 20 percent of the population, had a mental illness in the past year; 11 million adults had a serious mental illness in the past year. Additionally, nearly 9 million adults had a substance use disorder in the previous year.

Using estimates from SAMHSA and applying those estimates to the number of adults in Dakota, Ramsey, and Washington Counties, (1,235,402 residents - 2010 Census), it is estimated that 245,800 adults living in the east metro had a mental illness in the past year. An estimated 59,300 adults in the east metro had a serious mental illness, and 49,170 had a substance abuse problem in the past year.

Serious mental illnesses (SMI) are diagnosable mental disorders that interfere with or limit one or more major life activities for adults. Conditions include bipolar disorder, dual diagnosis, major depression, obsessive compulsive disorder, panic disorder, post-traumatic stress disorder, and schizophrenia.

East metro services

The east metro of the Twin Cities metro area offers a robust service delivery system for adults living with SMI, including crisis services. Mental health crisis stabilization services are available to adults with serious mental illness in the east metro. Community-based crisis stabilization provides short-term, intensive support, education, and treatment to address a specific mental health crisis. Individuals are supported until they are linked with community resources to address longer term needs. Additionally, providers in the east metro offer residential crisis stabilization, where individuals whose needs cannot be met by community-based services are housed for a period of time. As of October 2011, there were a total of 30 crisis stabilization beds available in the east metro.

Study overview

The Mental Health Crisis Alliance was interested in exploring the impact of community-based crisis stabilization services on healthcare utilization. A review of available literature found that some research has been completed assessing the impact of various types of crisis services, including research demonstrating cost savings to the mental health system for patients diverted from inpatient hospitalization to other community-based services. However, very little research was found related specifically to crisis stabilization

services, such as provided by the east metro partners. The following east metro community-based crisis stabilization service providers are included in this study:

- EMACS
- HSI
- People, Inc

Wilder Research was contracted to obtain claims data from the Department of Human Services and participating health plans, conduct analysis of claims data, and report findings to the Mental Health Crisis Alliance. Wilder worked with Alliance members to confirm the research questions of interest and determine the scope of the assessment. Key research questions included:

- To what extent does the use of emergency department services increase or decrease following crisis stabilization services compared to use prior to intervention?
- To what extent does use of hospital or clinic outpatient services increase or decrease following crisis stabilization compared to use prior to intervention?
- To what extent does inpatient hospitalization (all-cause and behavioral health-only) increase or decrease following crisis stabilization compared to use prior to intervention?
- To what extent does the cost of inpatient hospitalization (all-cause and behavioral health-only) increase or decrease post-crisis stabilization compared to costs prior to intervention?

Each of the above research questions was investigated for the overall patient population served during the identified time period, as well as those patients who were identified as “high-frequency” users. High-frequency emergency department patients were identified as those patients who had five or more emergency department claims in the six months prior to crisis stabilization. In contrast, low-frequency users are those who had fewer than five emergency department visits, including those who had no emergency department visits, in the prior six months.

The scope of this report is limited to claims data provided by DHS, which includes patients who were enrolled in state Medical Assistance (MA) programs between January 2008 and April 2010. At the time of this report, complete data sets from two of the four participating health plans had not yet been obtained. This study was approved by the DHS Institutional Review Board (IRB) in October 2011, and renewed in September 2012. A detailed methodology is described below.

Research methods

A sample of patients/clients who met the following criteria was requested from DHS:

- Received crisis stabilization from one of three east metro community-based crisis stabilization providers between January 2008 and April 2010
- Enrolled in Minnesota's fee-for-service or Prepaid Medical Assistance Program (PMAP)
- Age 18 and older

To access data for this sample, each of the crisis stabilization providers in the east metro submitted the National Provider Identified (NPI), or billing code, to Wilder Research/DHS for clients who received community- or residential-based crisis stabilization during the time period of interest. The Minnesota Department of Human Services then matched healthcare utilization records with the NPI code for individuals who met the criteria listed above.

Requested data

Pre- and post- crisis stabilization service claims were requested for the 6 months preceding the crisis stabilization service, and 7 months following the service. The average length of engagement for patients who received crisis stabilization services during 2011 from one of the crisis providers was around 30 days. Therefore, for the purposes of this assessment, the 30 days immediately following the first crisis stabilization claim were considered the time period of intervention, and thus excluded from further pre-/post-analysis. The following describes the specific fields requested:

- Date of service
- Provider Identification number (unique ID generated by DHS staff)
- Provider Specialty
- Procedure Code
- Place of Service
- Covered Pay (Fee-for-services clients only)
- Length of Stay (inpatient only)

In addition, demographic characteristics of the sampled patients were also included.

Data analysis

With the guidance of DHS Adult Mental Health staff, Wilder Research analyzed the DHS data set to determine the extent to which service utilization increased or decreased following crisis stabilization. The following describes the detailed data analysis plan.

Emergency department utilization

Emergency department utilization was identified using *place of service* code 23 (emergency department). No further criteria were used to identify emergency department claims. While the Alliance considered limiting emergency department utilization to only mental health concerns, after consultation with DHS staff and members of the Alliance measurement committee, it was determined that the optimal measure of emergency department utilization would be any emergency department usage, not only emergency department claims related to mental health concerns. It is known that emergency department visits that are connected to mental health concerns are often coded and billed as physical health concerns, and this study elected to include all-cause emergency department claims to avoid dramatically underreporting mental health-only related claims.

Outpatient services

Outpatient services were identified using *category of service* codes 46 and 71. These criteria limited claims to those related to mental health services and targeted case management mental health claims.

Inpatient hospitalization

Inpatient utilization was analyzed both as all-cause hospitalization and behavioral health-only hospitalization. All-cause hospitalization claims were identified using DRG (Diagnostic Related Group) numbers. In addition, *category of service* 74 and 29 were also included. These categories of service reflect 45-day contract beds and Community Behavioral Health Hospitals (CBHHs) that are covered by Medicaid. The costs associated with Anoka Metro Regional Treatment Center (AMRTC) and CBHHs are not generally Medicaid covered, and are largely missing from the available data set.

Behavioral health-related hospitalizations were identified using selected behavioral health DRGs. DHS staff confirmed that DRGs available in the data set generally represent the mental health inpatient hospitalizations for this population. There are some mental health cross over claims, claims that are largely paid under Medicare (not DHS), but MA usually covers a small co-pay. There are some additional costs associated with these types of claims, claim type U, which was not available in the requested data set. However, DHS

staff confirmed that this is likely a very small cost relative to the overall cost of care for this population.

Previously conducted literature reviews determined “high-frequency users” of emergency department services as those who had 5 or more Emergency Department visits within 6 months prior to their crisis stabilization as “high-frequency users.”

Statistical testing

Crosstabulation analyses with McNemar’s tests for marginal homogeneity were used to identify significant differences between pre- and post-stabilization service utilization. In this report, statistical significance is reported when the p-value is less than .05, which is a common threshold in social sciences. Confidence intervals (.95) were calculated using Jeffreys’ method.

Limitations

It is known that fee-for-service (FFS) data from DHS is likely more reliable than PMAP data. The data submitted by health plans (PMAP) may differ from what is reported under FFS, and may have undergone fewer quality checks compared to FFS data.

Results

Claims data from 1,721 Medicaid patients who received community-based crisis stabilization services from an east metro provider between January 2008 and April 2010 were analyzed by Wilder Research. Data were analyzed six months prior to the first crisis stabilization claim, and six months after the thirty-day crisis stabilization period.

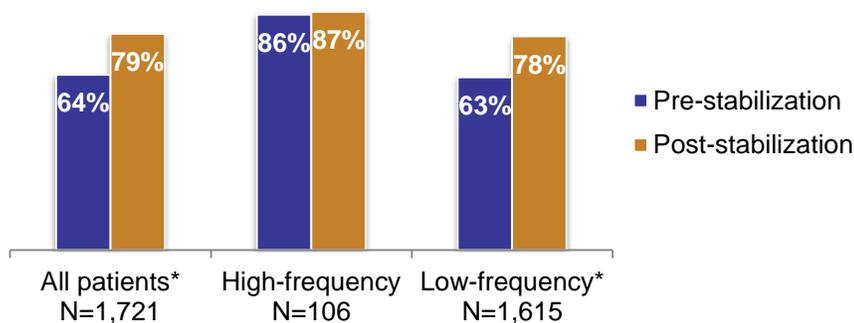
About six percent of patients (106 patients) included in the sample were identified as “high-frequency users” or those patients who had accessed the emergency department five or more times in the six months prior to a crisis stabilization service episode.

Mental Health outpatient services

The use of outpatient mental health services increased significantly post-crisis stabilization for patients. Prior to crisis stabilization, 64 percent of patients in the sample had received one or more outpatient mental health service. Following crisis stabilization, 79 percent of patients had one or more outpatient mental health service.

- High-frequency patients did not experience a significant change in outpatient mental health service utilization following crisis stabilization. Eighty-six percent of high-frequency users had one or more service prior to crisis stabilization, and 87 percent did following crisis stabilization services.
- Low-frequency patients were also significantly more likely to receive outpatient mental health services following crisis stabilization (63% pre. vs. 78% post)

1. Connection to outpatient services: prior to and following crisis stabilization

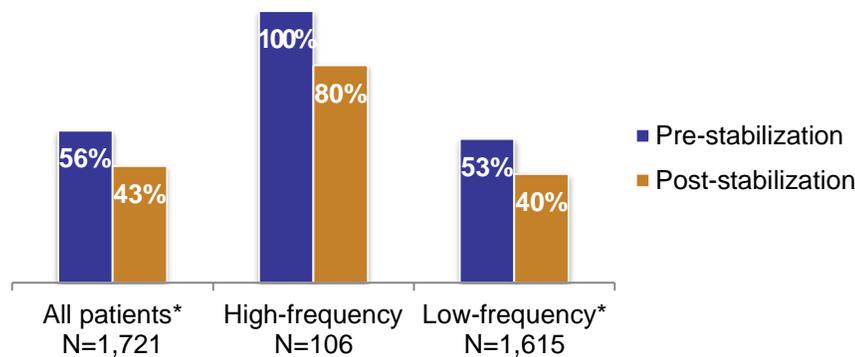


Emergency department services

A significant decrease in emergency department utilization was identified post-crisis stabilization for all patients. Prior to crisis stabilization, 56 percent of patients in the sample had one or more emergency department visits. Following crisis stabilization, 43 percent of patients had at least one emergency department service. This difference was statistically significant.

- High-frequency patients were also significantly less likely to have an emergency department service following crisis stabilization (100% pre vs. 80% post).
- Low-frequency patients were also significantly less likely to have an emergency department service following crisis stabilization (53% pre vs. 40% post)

2. Use of emergency department: prior to and following crisis stabilization



Inpatient hospitalization

Significant decreases in all-cause inpatient hospitalization were identified for patients.

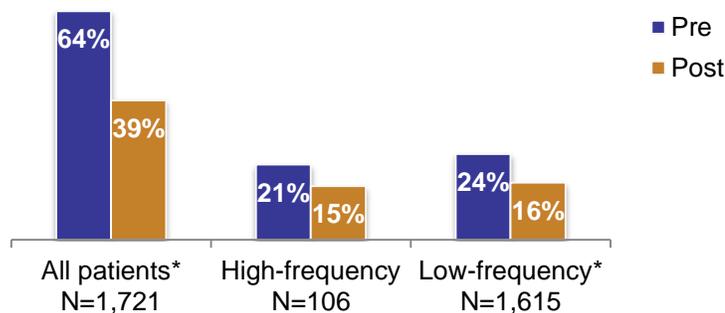
- Prior to crisis stabilization, 24 percent of patients in the sample had one or more all-cause inpatient hospitalization. Following crisis stabilization, 16 percent had one or more all-cause inpatient hospitalization. This difference was statistically significant.
- High-frequency patients experienced significantly fewer all-cause inpatient hospitalizations following stabilization (64% pre vs. 39% post).
- Low-frequency patients also experienced significantly fewer all-cause inpatient hospitalizations following stabilization (21% pre vs. 15% post).

Low- and high-frequency patients were also significantly less likely to have a mental health inpatient hospitalization following crisis stabilization.

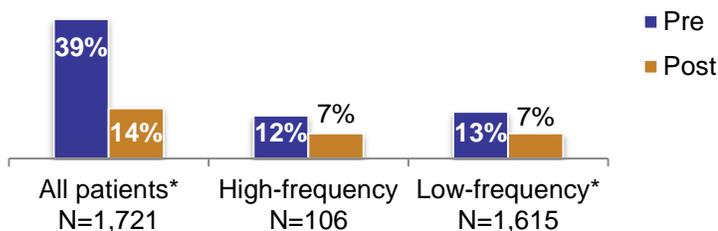
- Thirteen percent of the full sample had a mental health-specific hospitalization prior to crisis stabilization, while 7 percent did following stabilization. This difference is statistically significant.
- High-frequency patients experienced significantly fewer mental health-related hospitalizations following stabilization (39% pre vs. 14% post).
- Low-frequency patients also experienced significantly fewer mental health-related hospitalizations following stabilization (12% pre vs. 7% post).

3. Inpatient hospitalization (all-cause and behavioral health-only): prior to and following crisis stabilization

All cause



Mental health only

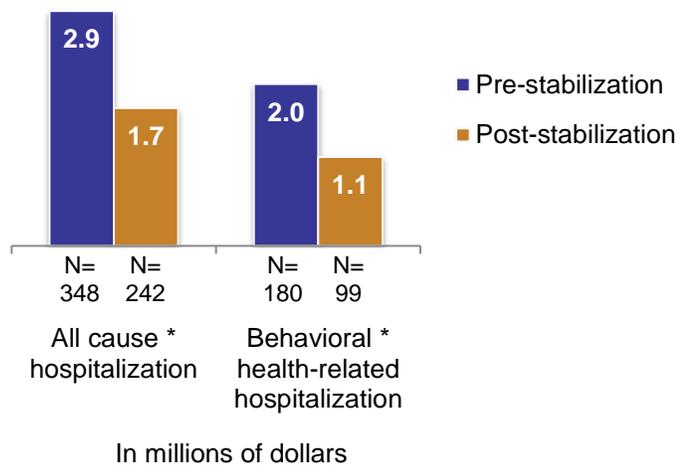


Cost of inpatient hospitalization

The Mental Health Crisis Alliance was interested in exploring potential cost implications of reduced inpatient hospitalization for patients who received crisis stabilization services. The following describes the inpatient hospitalization cost savings only. Future analyses will include a cost-benefit analysis to determine the extent to which inpatient cost savings are impacted by the cost of delivering crisis stabilization services. It should also be noted that the following cost savings are reflected only for MA patients who are fee-for-service patients. This represents 348 patients with all-cause hospitalization prior to stabilization, and 232 following intervention, and 180 patients with mental health-related hospitalization pre-stabilization, and 99 post. Patients who are part of a PMAP are excluded from these analyses.

- Total costs for all-cause inpatient hospitalization decreased from \$2.9 million prior to crisis stabilization to \$1.7 million post-stabilization. This decrease was statistically significant.
- Total costs for mental health hospitalization decreased from \$2.0 million prior to stabilization to \$1.1 million post-stabilization. This decrease was statistically significant.

4. Cost of inpatient hospitalization: prior to and following crisis stabilization



Cost-benefit estimation

The previous sections of this report demonstrated some economic savings associated with receiving mental health crisis stabilization services. Participants in the three programs evaluated experience fewer inpatient hospitalizations prior to and following crisis stabilization. However, crisis stabilization services require investment of economic resources. The hope is that this investment not only generates positive health outcomes, but also it makes economic sense. This section summarizes the results of a cost-benefit analysis (CBA) of the crisis stabilization programs evaluated in this report. The framework used for the analysis compares the economic benefits associated with the investment in mental health crisis programs that occur in a specific time period.

Assumption and parameters

- Time frame of the analysis: January 2008 – April 2010
- Benefits are defined as the reduction in cost of inpatient hospitalizations prior to and following crisis stabilization.
- Savings refer to patients who pay fee-for-service.
- Total costs refer to the unduplicated number of patients in the sample used to compute the savings (so benefits and costs refer to the same number of patients and time frame).
- Total costs are the operating budget of the east metro community-based crisis stabilization providers and are computed based on 2010 financial information and number of patients served.

Data

A sample of patients/clients who met the following criteria was requested from DHS:

- Received crisis stabilization from one of three east metro community-based crisis stabilization providers between January 2008 and April 2010
- Enrolled in Minnesota's fee-for-service
- Age 18 and older
- 315 unduplicated fee-for-service MA patients
- Per patient cost estimated from EMACS and HSI-Canvas financial data.

Savings in inpatient hospitalizations

Benefits are defined as the reduction in cost of inpatient hospitalizations prior to and following crisis stabilization. Pre- and post- crisis stabilization service claims were requested for the 6 months preceding the crisis stabilization service, and 7 months following the service. The specific data field used to compute savings was “Covered Pay” (Fee-for-services clients only). Some additional costs associated with these types of claims, claim type U, were not available in the requested data set. However, DHS staff confirmed that those claims are likely a very small cost relative to the overall cost of care for this population.

The sample contains 315 MA patients who pay fee-for-service patients with all-cause hospitalizations, and 163 with mental health-related hospitalizations pre-stabilization. Total costs for all-cause inpatient hospitalization decreased from \$1.7 million prior to crisis stabilization to \$1.1 million post-stabilization for a reduction of \$629,918. This decrease was statistically significant. Out of the total costs, the fee-for-service claims of mental health patients decreased from \$1.2 million before crisis stabilization to \$720,011 after stabilization, for savings of \$493,397, (Figure 1). The savings from mental health claims represent nearly 80 percent of the savings of all-cause hospitalizations, showing the importance of this item in the estimated savings.

5. Reduced cost of inpatient hospitalizations associated with crisis stabilization programs

	Before	After	Savings
All cause hospitalization claims (millions of dollars)	\$1.7	\$1.1	\$0.6
Mental health-related hospitalizations (millions of dollars)	\$1.2	\$0.7	\$0.5

Operating costs of crisis stabilization services

Costs are defined as the operating budgets of two of the east metro community-based crisis stabilization providers for 2010 (EMACS and HSI-Canvas). The estimation of the costs used in the cost benefit analysis has two factors to consider. First, many crisis stabilization programs operate as part of larger organizations providing other mental health services. Thus, the costs included in the cost-benefit analysis must refer to operating cost of serving only crisis stabilization patients. The second aspect to consider is that participating programs have different service models with variations in the intensity of services, health care staff, etc. These differences are reflected in the operating costs, and if each program would have been evaluated independently, different economic returns would be achieved. However, the goal of this analysis is to assess the total economic

value of the crisis stabilization services; thus, we compute and report the total cost of providing stabilization services to those patients included in the estimation of the benefits (i.e., the sample of fee-for-service patients described in the previous section).

The operating costs for the programs reached \$1.3 million in 2010. Programs served approximately 1,192 patients in that year, for a cost per patient of \$1,085¹. Note that 45 percent of this amount is reimbursed to providers. The per-patient costs refer to all patients receiving mental health crisis stabilization services (including the fee-for service patients). However, we are interested in the total cost of treating the fee-for-service individuals with inpatient claims. Programs served 315 patients, who have had inpatient hospitalization claims between January 2008 and April 2010. Using the average cost of mental health crisis stabilization of \$1,085, the total cost of treating these patients amounts to \$291,499. Similarly, we estimate that the total cost of providing mental health crisis stabilization services to patients with mental health related hospitalizations to be \$154,858.

6. Operating costs of crisis stabilization programs

	Cost
All cause hospitalization claims	\$291,499
Mental health-related hospitalizations	\$154,858

Return on investment in mental health crisis services

To compute the return on investment (ROI) of mental health crisis programs, we compare value of the resources invested in these programs and the benefits associated with this intervention. The net benefit for all cause hospitalization patients after receiving mental health crisis stabilization services is nearly \$0.3 million, with a return of \$2.16 dollars for every dollar invested. Patients with mental health related services generate a little over \$0.3 million in net benefits with a return of \$3.19 for every dollar invested.

7. Return on investment in crisis stabilization programs

	Benefit	Cost	Net benefit	ROI
All cause hospitalization Claims	\$0.6	\$0.3	\$0.3	\$2.16
Mental health-related hospitalizations	\$0.5	\$0.2	\$0.3	\$3.19

1 For reference purposes, note that the average charge for a depressive related hospitalization in the St. Paul area is \$18,826 for an average length of stay of 5.1 days. Similarly, the charge of a psychoses hospitalization is \$31,518 for an average length of stay of 9.5 days (Data retrieved from the Minnesota Hospital Association webpage: <http://www.mnhospitalpricecheck.org/>). These figure do not include professional services.

Appendix

Evidence of economic impact of crisis stabilization services

Crisis stabilization services are not specifically studied in the literature on mental health care costs or economic impacts. Instead, most of the literature on economic or cost effectiveness of mental health service focuses on general hospital settings or on community-based residential crisis care. In general, residential crisis care may be more cost effective than general hospital settings. Fenton, Hoch, Herrell, Mosher, and Dixon (2002) show that acute treatment episode costs in residential crisis settings are 44 percent lower than in general hospitals. In addition, 6-month treatment costs are 22 percent lower in residential crisis programs than in general hospitals. McCrone, Johnson, Nolan, Pilling, Sandor, Hoult, and Bebbington (2009) conducted a randomized experiment to compare costs of care for patients suffering mental health crisis treated by crisis resolution team (CRT) or in a standard setting. CRT patients have lower total costs (inpatient and outpatient) after a 6-month follow up than standard care patients. In an another study analyzing the cost impact of mobile crisis intervention (CI), Bengelsdorf, Church, Kaye, Orłowski, and Alden (1993) found that crisis intervention services can reduce care cost by approximately 79 percent in a 6-month follow-up period after the crises episode.

However, the outlays of costs of these services vary by age and type of diagnosis. For instance, Gilmer, Ojeda, Folsom, Fuentes, Criado, Garcia, and Jeste, (2006) found cost of care patterns that decline over time for older adults between ages 60 to 85, especially for patient with depression; but, costs remain fairly constant or increased for patients with schizophrenia and bipolar disorder.

General return on investment framework

To compute the ROI of mental health crisis stabilization programs, we need to assess the sources and amount of costs and benefits associated with this activity. The investments (costs) include all the monetary and resources used to pay for inputs used to provide stabilization services. These include cost of health care professionals, staff, equipment and supplies, etc. On the benefits side we focus on savings in MA payments for fee-for-service beneficiaries. However, note that there are many other sources of economic benefits that are not included in this analysis. These benefits include the following economic benefits:

A1. Economic outcomes associated with mental health crisis stabilization

Increased personal income from employment stability and/or improved educational attainment

Savings from reduced crime behavior (reduced incarcerations)

Changes (+/-) in public assistance (Minnesota Family Investment Program-MFIP, General Assistance-GA, Social Security Insurance-SSI, Unemployment Insurance, UI, etc.)

Prospective savings from improvement of a selected set of outcomes associated with housing stability (e.g., housing subsidy, child welfare, other health improvements, etc.)

Prospective savings from improvement of a selected set of outcomes associated with reduced substance abuse (e.g., housing subsidy, child welfare, other health improvements, etc.)

Prospective savings from other improved health outcomes associated with improved mental health

The general model to compute the ROI consists of a comparison of the estimated stream of benefits associated with crisis stabilization services in a given period of time to the stream of costs required to provide the services. The general form of the model is:

$$\frac{B}{C} = \frac{\sum_{t=part}^N Y_t x P_t}{\sum_{t=part}^N C_t} \frac{1}{(1 + disc)^t}$$

Where, B/C is the cost-benefit ratio or ROI, which is equal to the value of the sum of the monetary value of outcomes (Y_t) given the price or cost of the outcome (P) for all years since the year of participation ($t=part$) to period N divided by the present value of the sum of the cost of providing the services from the initial period of participation to period N. Some outcomes' benefits are accrued over several periods of time; therefore, N will depend on how far in the future the benefits of the outcome materialize, N will also depend on some other characteristics of the outcome. The discount rate is given by *disc*, and is usually established by the researcher given the opportunity cost of the resources invested in the activities being evaluated (e.g., interest rate of zero-risk bonds, or other standard measure of opportunity cost); for social programs this rate usually ranges from 2 to 4 percent. However, for the purpose of this analysis, N refers to a single period between January 2008 and April 2010. Therefore, no present value is computed.

The economic value of outcomes, noted as $Y_t x P_t$ in the model, reflects the change in an outcome caused by the services. For example, the number of emergency room visits prevented, times the economic value of each unit of this outcome, (e.g., the average cost of one emergency room visit of a typical crisis stabilization client). In some cases, outcomes are already defined in monetary terms like increased income or decreased public assistance, or as is the case in this report actual Medicare payments.

C, refer to total operating costs of providing mental health crisis stabilization services to the sample of fee-for-service patients used to estimate the savings. To estimate these costs, we use financial and operating data for programs from 2010 to compute per-patient served costs. Then, the per-patient cost is multiplied by the number of unduplicated cases of fee-for-service patients to obtain the total cost of serving these individuals.

The result of the model is interpreted as the return on every dollar invested in providing services; for example, a ROI of \$3 implies that for every dollar invested in the provision of crisis stabilization services, \$3 are returned to the relevant stakeholder (e.g., participants, taxpayers, funders, or the whole society).

Perspectives/Standings

The ROI analysis can be conducted from the perspective of participants, taxpayers, and society depending on who makes the investment and who accrues the benefits. For the purpose of this study, the investment comes from all sources financing the mental health stabilization programs. These sources include taxpayers (via grants, public insurance, etc.), private funders, private insurers, and participants' private payments. Taxpayers are likely to be the most important financier of these programs. On the other hand, benefits are assessed in terms of savings in Medicaid fee-for-services claims. Thus, the main receptors of benefits in this study are also taxpayers. Therefore, the ROI can be interpreted from the taxpayer's perspective and includes benefits and costs incurred by local, state, or federal governments.

Note that taxpayers are not the only stakeholders associated with the provision of mental health crisis stabilization services; patients are expected to accrue many other economic benefits derived from the stabilization services such as reduced health care costs, increased chances of finding and/or maintaining employment, and increased educational attainment. In addition, taxpayers and the rest of society may also receive benefits which include: savings to criminal justice system and crime victims' costs from reduced likelihood of committing crimes, increased tax revenues, savings in public assistance, etc. Consequently, the estimations of the economic returns of investing in mental health crisis stabilization services in this report are significantly conservative.

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