

**Final Report of the Evaluation of the NYC Health + Hospitals
ED Certified Recovery Peers Advocates (CRPA) Pilot Program**

Conducted by Tod Mijanovich, PhD and Beth C. Weitzman, PhD
New York University
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BACKGROUND

In late 2017, NYC Health + Hospitals Office of Behavioral Health and the New York Alliance for Careers in Healthcare (NYACH), an industry partnership with the New York City Department of Small Business Services (SBS), announced the hiring of 14 graduates of the Certified Recovery Peer Advocates (CRPA) program to work in three H+H facilities. The peer advocates, trained at Queensborough Community College as part of their second CRPA cohort, were to work within the Emergency Departments (EDs) at the three participating hospitals to engage patients with risky substance use behaviors and encourage them into treatment. Using their own lived experience with substance use, peer advocates would speak with target patients within the ED to help open them up to, and connect them with, appropriate treatment options. While NYC Health + Hospitals had previously engaged peer specialists in mental health, this was their first use of Certified Recovery Peer Advocates.

In piloting the ED Leads/Peers program, the system underscored the growing opiate crisis and the number of patients who enter NYC Health + Hospitals facilities experiencing opioid-related problems. The hospitals selected to participate in the pilot program were Harlem, Metropolitan, and Woodhull. One year into the pilot program, mental health counselors and social workers were added to work alongside the peers in the ED to provide services intended to engage patients who might benefit from treatment for substance use. The pilot program was intended to serve as a starting point for expansion of program into all NYC Health + Hospitals EDs; this expansion is now well underway across the system.

THE EVALUATION: AN OVERVIEW

NYC Health + Hospitals Office of Behavioral Health contracted with faculty members at New York University to conduct an evaluation of the ED Peers program. Funding of the research for this report was provided by the JPMorgan Chase Foundation, through the New York Alliance for Careers in Healthcare, and NYC Health + Hospitals. The evaluation included two key components. One focused on the analysis of Medicaid data to understand the extent to which the program achieved its stated purpose of increasing the utilization of substance use services at the three pilot sites. The second component aimed to better understand both early and later implementation of the program model across the three sites through a series of in-depth interviews. The evaluation was intended to inform the implementation and expansion of the model program in and beyond the pilot sites and test whether this program model has changed the pattern of care for the target patients. Periodic feedback has been provided to NYC Health + Hospitals' Office of Behavioral Health throughout the evaluation.

The time period for the analysis of Medicaid data focuses on the period just before and after the hiring of the first peers in the pilot sites, which is approximately calendar year 2018. In contrast, the first set of interviews was conducted in February and March of 2019 and the second set was conducted from October through December of 2019. In considering the findings presented below, it is important to bear in mind that the analyses of the Medicaid data focused

on the earlier stages of implementation, so it is possible that analyses of data for later stages would yield different results.

Evaluation of Program Implementation: Questions and Methods

The evaluation of program implementation was aimed at providing a better understanding of the “on the ground” experience of the ED Peers program from the perspectives of the peers, their colleagues and supervisors, and the clinical and administrative staff at the hospitals with whom they interact. It focused on the efficacy of integrating peers into the ED to better address the needs of the target patient population. The hope was that this portion of the evaluation would allow for a rich description of the program and the changes it has brought to the emergency departments and their patients with risky substance use behaviors.

As already noted, the evaluation of program implementation was conducted in two phases. Findings from the first phase were expected to provide opportunities to further strengthen the program. The specific research questions addressed in the evaluation of early implementation included:

- Was NYC Health + Hospitals able to identify, recruit, and maintain the desired CRPA peer advocates?
- How welcoming and supportive were existing ED staff of the program and of the new CRPA staff?
- How well does the program structure, such as hours of service, fit with the patient flow at the ED?
- Do CRPA and ED staff believe the program effectively addresses patient needs?
- To what degree do targeted patients seem receptive to the program and its offerings?

While the above questions remained relevant in the second phase of the implementation evaluation, the focus shifted to changes that had transpired since the first set of interviews. The aim was to see whether and how the program had grown and been strengthened and to consider what other issues remained or had emerged. The interviews continued to probe how well the program met patient needs and how easily it fit into the functioning of the ED. At the same time, these interviews centered on questions of programmatic change and growth, as well as remaining areas for improvement.

Findings from the first phase of the implementation evaluation were provided in a preliminary report in April 2019. In this report, we briefly review the methods and findings from the April report to give needed background for understanding and interpreting the findings from the second phase of the implementation evaluation. Also, the first phase of implementation more closely overlaps with the treatment period used in the Medicaid analyses.

In both phases, semi-structured interviews were conducted face-to-face and on site at each of the three participating hospitals.¹ Each interview lasted approximately thirty minutes. Notes were taken by a research assistant and, when permission was granted, the interviews were

¹ In a small number of cases, interviews were conducted by telephone.

taped.² NYC Health + Hospitals Office of Behavioral Health provided the evaluation team a list of staff to be interviewed; they also facilitated contact with these staff prior to the scheduling of interviews in both phases. In the early implementation phase, interviews were conducted with 27 staff members, including 7 of the peers, as well as their supervisors. While the ED Chief was interviewed in each of the three sites, other staff interviews varied reflecting differences in the hospitals' organizational structures and services relevant to the care and treatment of ED patients with needs related to unhealthy substance use.

A total of 30 interviews were conducted during the later implementation phase, including 8 peers, their supervisors, and the ED Chief at each hospital. Again, additional interviews varied to accommodate differences across sites. Of note, at least one interview was also conducted at each site with licensed mental health counselors (LMHCs) or social workers working alongside the peers as part of the program. The number of interviews from each site ranged from seven to 11. Approximately two-thirds of those individuals interviewed in the second phase had also been interviewed during the first phase. Those newly interviewed were either newly hired or had been missed in the first phase due to problems with scheduling.

Once interviews were completed, notes and tapes were reviewed and edited by the research assistant to best reflect the content and meaning of the conversation. These edited notes were then reviewed by the evaluator to identify key concepts and themes emerging from the interviews. The research assistant was provided with directions for coding according to these themes; the coding aimed to categorize and count common responses and pinpoint differences across hospitals and role types. Illustrative quotes were also identified.

FINDINGS

Summary from Phase One – Early Implementation (February-March 2019)

Nearly all of the peers and the majority of the clinicians interviewed expressed a generally positive attitude towards the ED Peers program, even as they also shared many things that they believed could and should be changed or improved. Most of the clinicians and staff who were interviewed indicated that they felt the peers to be well suited to patient needs and well suited to the needs of the ED. Prior to the initiation of the ED Peers Program, the EDs struggled to meet the needs of patients with substance use disorders. ED staff spoke of the lack of time to attend to this population's special needs, noting that these patients could be disruptive, impeding delivery of care to other patients with medical emergencies. There was a strong sense among the peers that this program was an opportunity to do something useful for individuals with an addiction, or engaging in risky substance use. There was a widespread belief that the introduction of the ED Peers had increased attention to engaging patients experiencing problems with their substance use and the hope that the peers' presence had increased referrals to treatment.

² Many thanks to Farnia Feiz for her able assistance in taking and coding these interview notes.

Yet, despite this general sense about the value of the initiative, concerns about the hours of operation, peer training, the relationship of peers to other staff, and the working conditions in the ED were repeatedly mentioned in the interviews across all three hospitals. While the introduction of the ED Peers program highlighted the growing opioid epidemic, nearly every person interviewed indicated that alcohol was the number one substance use problem in the emergency department. Further, many felt the program's success would be greatly limited by the lack of appropriate and available services for the patients once engaged by the peers.

In many ways, the program was being developed and rolled out all at once. Implementation across the three sites ranged from barely to fully operational. In general, recruiting, training and providing appropriate supervision for the peers proved challenging and made it difficult to fully staff up in a timely way. The training provided to the peers for their participation in the ED Pilot was seen to be valuable but insufficient. Peers desired more information on available treatment resources, more emphasis on patient engagement, and better preparation to help them deal with the emotional toll of frequent rejections from the patients they meet. Staff working with the peers and in the ED, more generally, also indicated that they believed the peers would benefit from more and better training about hospital rules and procedures.

As a result of the unique nature of each hospital's structure and approach to the target population, there were enormous differences in program specifics across pilot sites. Sites varied in terms of patient identification and referral to the peers; this was in no small part due to the transition of electronic medical records from Quadramed to EPIC across NYC Health + Hospitals sites during early implementation of the ED peer program. Further, the ease of connecting to the peers and having them find the relevant patients was dramatically uneven across sites, although, overall, it was estimated that peer contacts averaged 4-6 patients per shift per peer. The peers' physical presence in the ED appeared most relevant in this regard; that is, those located in the ED had more patient contact as compared to those who had to be called to the ED from other offices within the hospital. Even as the program model was developed to include social workers or mental health counselors working in tandem with the peers, such support was available in only one of the sites. There, the pairing of LMHCs with the peers was seen as strongly beneficial and allowing for flexibility to meet individual patient needs.

While many of the patients seem to welcome the conversations with the peers (and mental health counselors), peers often noted that the patients were too intoxicated for engagement or that patients were resistant, denying a problem with their substance use. Most of the peers said that their conversations with patients focused on treatment options and services, as well as building connections with patients; a couple of peers indicated their belief that these "seeds" might pay off for the patient in the longer run. While peers were intended to engage the patients so as to encourage and facilitate treatment, their role in the referral process was not only variable across sites but often unclear to the peers and to the other relevant hospital staff. This was also true in regard to the peers' responsibilities regarding patient follow up.

The results of the first implementation report provided many opportunities for mid-course correction. After the results were shared with the staff at H+H Office of Behavioral Health, the report was used to engage the sites and rethink the approach and structure, where needed.

Findings from Phase II – Later Implementation (October-December 2019)

To what degree has program implementation advanced since Phase I?

Across the interviews, several improvements were repeatedly mentioned by both the peers and other clinical staff. Many of these changes seem to have resulted directly from the feedback provided in the early implementation report while others have resulted from additional hires, growing familiarity with this innovative model, and broader changes to the context in which this program operates. A majority of changes since early implementation were seen as strengthening, rather than weakening, the Peer Program. Significantly, the use of mental health counselors or social workers, a feature of the program model that took time to roll out, has now been adopted as part of the program model in all sites.

In the one site that was fully operational by the time of the early implementation interviews, few changes were notable during this second round of interviews. Rather, that site had reached a level of maturity allowing key staff to raise questions about how to “tweak” or improve the model for the future. A second site had clearly moved from a position of partial, early implementation to one of near complete implementation of the full program model; that site was still in a period of ironing out the kinks and confusion associated with a still evolving program. *The most dramatic and positively received changes were found at the site that was least functional during the last round of interviews. Even so, that site lagged the other two in its trajectory towards full implementation.*

How has the context for the program changed?

Few changes were noted by those interviewed in regard to the general context in which the ED Peer program operates. *Alcohol use continued to be the most frequently mentioned substance causing problems for these patients; opioids were less frequently mentioned. Only two respondents, in total, indicated that opioids were the primary problem. Homelessness remained a critical challenge for the target patients, affecting all aspects of treatment and care.*

Approximately half of the respondents indicated a consistent and steady flow of patients facing issues related to substance use over the past year; the other half of the respondents felt that flow to be greater in recent months. *Changes to patient flow must be understood within the context of NYC Health + Hospitals transition from designated inpatient detoxification units to management of withdrawal and detoxification on inpatient medical floors and ambulatory detox.* In one site, there was a recent transition away from inpatient detox; several peers and staff at another site with a dedicated inpatient detox unit believed this resulted in an increasing stream of patients to their hospital although they did not offer specific numbers regarding this perceived increase.

The perceived lack (or limited number) of inpatient detoxification beds was repeatedly cited by peers and other staff as a challenge; patients, especially those who were homeless, frequently came to the ED seeking treatment attached to a bed. *The move away from traditional treatment in designated inpatient detoxification facilities was frequently mentioned as a concern by peers and other clinical staff*, even as they understood the limitations of inpatient detoxification for addressing long term patient needs. They felt other available services did not well suit patients' broader needs or choices for care, especially as so many patients are homeless or living in situations poorly suited to getting effective treatment. At the same time, the shift in service delivery away from inpatient detox beds was seen by some peers as making their work even more important. As one peer said in a site that no longer has a designated detoxification unit, "Detox is closed, so now they need us more, we got more engagement..."

EPIC is now fully functional in all three pilot sites. While a couple of respondents expressed frustration with the new electronic medical record (indicating it was hard and time consuming to use), *many others found the system to allow for better targeting of patients who may need the services of the CRPA staff.* Getting accustomed to the new system was, in some sense, a distraction, but most of the staff now seemed comfortable in using it. One peer praised the system saying, "doing notes is easier and more organized. It is easy to learn, too."

What has changed with the program? Is there a sense of forward motion?

The great majority of those interviewed expressed a strong sense that the ED Peer program was moving forward and had benefited from a number of recent improvements. Seven of the 8 peers interviewed said they had seen positive change over the past several months, as did nine out of 14 of other ED staff (e.g., medical directors and directors of nursing). Of the five counselors and social workers interviewed, four expressed positive views of the CRPA program.

The peers have grown more comfortable in their roles and, within the EDs, they have become better known and their roles better understood. Six out of 8 of the peers interviewed indicated they were more confident in their role. The same number also indicated that they felt more accepted by others within the ED. As one peer said about other clinical staff in the ED, "They have started communicating with us; it was not like that before." And another noted, "They [the peers] are more welcomed. The doctors say thank you for helping us, you did a great job." The peers' responses were echoed by many of the clinical staff who recognized the peers' growing confidence and indicated that other staff were increasingly likely to turn to the peers for their assistance. As one clinician said, "They are part of the team now." Yet, despite these clear improvements, it remains, as described by one peer, "a work in progress." This respondent went on to say, "Some people appreciate what we do, others still do not know why we are here."

A number of important changes within the program have contributed to this growing level of satisfaction among and with the peers. The peers' schedules have been modified to expand hours into the evenings across the sites. As a result, there is less "down time" for the peers;

they are busier and more available to meet the needs of patients and staff in the ED. According to one clinician, “They [the peers] are more physically present and their hours of coverage are better.” That said, during late afternoon and evening hours it is especially difficult for peers to provide a “warm-hand off” to treatment; detox units, rehabilitation facilities, and outpatient clinics are not open or accepting patients after hours. While peers might engage patients and provide encouragement and information, the patient too often leaves the ED without a firm next step or clear hand off. As one peer said, “we have patients at 5 or 7 p.m.” but the lab is closed and so they cannot be assessed for detoxification and outside facilities are no longer doing pick up. They may, in some cases, be offered an appointment in an outpatient clinic for the next day but peers and other clinicians repeatedly emphasized that once the patient leaves the ED, the likelihood of returning for that appointment were slim.

In addition to expanded hours, peer availability has also been enhanced through changes in the physical space, especially at one site; a few small modifications have made it possible for the peers to be present within the ED more of the time. But, still, the space situation is not ideal in any site. One nurse noted that the peers’ effectiveness was limited by the lack of “a private place to communicate with patients.” Several respondents felt the peers and their offices needed to be even more proximate to the ED. Others noted that it would be more effective for the peers to have offices adjacent to the mental health counselors or social workers assigned to the program. In general, as in the Phase I interviews, the importance of physical proximity to program success was a theme repeated by many of those interviewed. As one supervisor said in regard to the space provided to the peers, “it is not as what was supposed to be.”

Overall, the changes in hours and space are said to have enhanced flow and engagements. Peers, however, still indicate an average of 3 to 4 patients per day per peer, just as they had reported in the earlier phase of implementation. While their role continues to focus on patient engagement, helping patients to see the possibility and potential benefit of treatment, clinical staff also noted that the peers are helpful in keeping the target patients calm during the long waits before treatment and keeping patients motivated even after they might have been denied their requested treatment, i.e., in-bed detoxification.

Working with Social Workers and Mental Health Counselors

As noted earlier in this report, the program model includes social workers or mental health counselors working alongside the peers within the ED. At the time of the early implementation interviews, only one site had put that aspect of the model into practice. There, the peers and counselors were paired most of the time. Their work was not readily distinguished in that patients were divided rather randomly and each called on each other to provide additional support. There is general agreement among this team that the peers can handle themselves, independently within the ED, that is, they do not “need” the mental health counselors. At that site, both peers and counselors share a single supervisor and that supervisor is also responsible for overseeing a similar model of care on the inpatient service. That model continues to work well at that site. Shared supervision, linkages between the ED and the inpatient programs, and

close working relations between peers and counselors contribute to a valued team spirit. There is, however, a sense that the mental health counselors may become increasingly dissatisfied with a level of work that is seen as not making full or meaningful use of their advanced training.

At the other two sites, social workers dedicated to the program were only slowly being introduced at the time of the Phase II interviews. At one site, the social work team was staffed and had begun their work in the ED. That said, interviews throughout that site... with the peers, the social workers, and other clinical staff... indicated a great deal of confusion about how the peers and social workers were to work together. For example, the newly hired social workers indicated that they believed that they, and not the peers, were to do all of the initial engagement with the patients; this assumption is challenged by the fact that the peers were long accustomed to making those first contacts, peers were expected to make these initial contacts at the other pilot sites, and staffing hours for the peers and social workers were not sufficiently aligned to implement this practice. Split supervision, that is, with social workers being assigned to a different supervisor and unit than the peers, further exacerbated this confusion regarding roles and team work. That said, peers were reasonably enthusiastic about the social workers joining them in the work. As one peer said, "Having a social worker is great for me. They can refer patients. They know where to call and where to send patients."

At the third site, the first social worker had not yet begun to work in the ED, even as she had been offered and had accepted the position several months earlier. Complications with onboarding and EPIC training had greatly delayed her start. Even as she was about to begin, there was widespread confusion among the peers and other staff, as well as within the social work department, about how the social worker and peers were to work together and how supervision would be handled. Indeed, several respondents expressed total surprise when asked about the addition of the social worker; they did not know about this addition. While there was little expressed resistance to the oncoming change, there was little understanding of what it would mean in reality.

Continued and Ongoing Issues

Even though the pilot program has been working, on the ground, for an extended period in each of the sites, a number of important issues remain unresolved. The specific role of the peers remains variable across sites. In particular, the question of whether and how the peer should work in regard to patient referral and patient follow-up is still not well answered and a source of confusion and consternation. Meaningful follow up remains the exception rather than the rule. Further, making use of the peers in providing other support to the target patients remains uneven; for example, some peers have been involved in the distribution of and training related to the use of naloxone but there is a sense that this role could be expanded.

Questions and concerns about peer recruitment, training, and supervision continue to be raised. Several of the peers lack "lived experience." This was raised by a few respondents but their sense of whether or not this was a problem was inconsistent. Better defining the essential

qualities of a successful peer seems important since none of the sites have had a full complement of peers, even as some turnover among them has commenced. In one case, a peer had to be terminated. In another, the peer had moved on to a new job. Such turnover is likely to be an ongoing fact of life for the program.

Figuring out the right blend of training for newly hired peers remains to be accomplished; even as peers have been trained at Queensborough, central NYC Health + Hospitals, and on-site at the hospitals, there remain holes in what they and their clinical colleagues feel would be most beneficial. In particular, the peers continue to feel underprepared regarding resources and referrals, as well as ED policies and protocols.

The quality of peer supervision continues to be weak at some sites. While one peer enthusiastically described the supervisor as, “the glue that holds the team together, a peer at another site complained, “there is no supervision... I look for professional development [elsewhere].” The problems with supervision, as noted earlier, are likely exacerbated by a complex organizational structure in which the peers “sit” in a unit different from the social workers that have been hired to work with them. There is general confusion in all but one site about how the peers, the social workers, and their supervisors are supposed to interact. In some cases, supervision of the peers is divided between clinical and administrative supervision; this adds to the confusion. In all but one site, supervision remains relatively unstructured and unsettled. Further, it is generally unclear as to the level of independent work appropriate to the peer role; in the early phases of implementation, peers worked very independently and this is now difficult to change.

Overall, a general sense of uncertainty seems to have complicated and continues to challenge the successful functioning of the ED Leads Program. Respondents, across the board, expressed anxiety and confusion about a number of issues directly affecting the context and circumstances of their work. This uncertainty ranged from the transition from inpatient to ambulatory detox, the physical space provided to the program staff, the status of new hires, and so forth. Even at this late stage of implementation, the sense that the program was developing in real time was present in most of the interviews.

Recommendations

Those interviewed were asked, specifically, to provide recommendations to further improve the program. Three areas of recommendation were noted among at least several respondents. Several respondents requested further expansion of hours. At one site, a few people indicated the need for peers experienced in working with the transgendered population. Expansion of hours or focusing on special subpopulations (e.g., transgendered people or other language groups) would require the hiring of more peers which, as already noted, can be difficult. Finding staff willing to work night shift is especially challenging. Further, given the program model, it might require the hiring of additional counselors and social workers which has already been

difficult. But as one clinician said in arguing for expanded night hours, “I don’t think they [the peers] need to be paired.” That view was held by several others.

As noted several times throughout this report, respondents repeatedly noted the importance of physical space. Therefore, it is not surprising that a number of respondents indicated that providing permanent space for the peers in or adjacent to the ED would facilitate the work. While efforts have been made to accommodate them, the space offered is often temporary and uncertain. One supervisor urged, “if we could all be in one place, that would help... the peers feel more supported.”

Finally, a frequent recommendation among peers but also other clinical staff is for NYC Health + Hospitals to provide greater attention to thinking about the importance of follow-up, the limitations of available services, and the use of peers in the steps in supporting patients beyond early engagement. As many respondents said, engaging patients is but the earliest of steps; there was a widespread sense that the peers could be useful as patients move through treatment. As one clinician said, in order for this program to be truly effective, “they need to have good solid core services available to patients” when they are ready for them. Aligning the hours of follow-up service availability with peer engagement in the ED was repeatedly recommended, as was using the peers to assist with this follow through to other services. As one peer said in describing the warm hand off to the detox unit, “I give them my number... and tell them, do not give up.”

EVALUATION OF PROGRAM IMPACTS

The main research question we tried to answer in the impact analysis was: Did the ED Peer program succeed in achieving its main goal, which was to increase substance use service utilization among patients who could benefit from such services? To answer this question, we used New York State Department of Health (NYSDOH) Medicaid Data Warehouse (MDW) data to measure substance use service utilization among patients visiting the three pilot program EDs, and compared changes in service utilization after visiting the pilot EDs to utilization changes in a similar group of patients visiting other H+H EDs. Below we describe how we identified ED visitors who were exposed to the ED Peer program, how we identified a similar group of patients to use as a “counterfactual” or comparison group, and how we estimated impacts of the program. We then present our findings.

Identifying the ED Peer program group

In order to identify ED visitors who were likely to have been exposed to the ED peer program in the course of their ED visit, we used data downloaded from the MDW. The MDW contains all “fee-for-service” claims for Medicaid reimbursement submitted to and paid by NYSDOH, as well as records of all managed care “encounters” between patients and providers that were paid under a capitated (per-member-per-month) arrangement between NYSDOH and a Medicaid

managed care plan. MDW data include dates, places and categories of service, provider and patient identification numbers and demographics, diagnoses, procedures, and payments made to providers by NYSDOH or by a managed care plan. Thus the MDW provides a reasonably comprehensive record of the medical care utilization received by New York State Medicaid enrollees, which comprise the preponderance of H+H's patient population.

Medicaid patients had to meet two conditions to be included in the program group: 1) they visited any of the three participating EDs on or after program start dates provided by H+H (June 7, 2018 for Harlem, April 17, 2018 for Metropolitan, and May 7, 2018 for Woodhull), and before November 1, 2018, which ensured that we had sufficient follow-up data to measure outcomes, and that comparison group patients visiting other H+H EDs were not exposed to similar interventions being implemented across the H+H system; and 2) during their ED visit patients received either a primary or a secondary diagnosis indicating drug or alcohol use (such as "Substance Use Disorder," "Alcohol Poisoning," etc.). Approximately 2,500 Medicaid enrollees met these criteria and were thus considered to be program participants.

Identifying the ED Peer comparison group

The impact of a program is the difference between the average outcomes observed among program participants, and the outcomes that would have been observed among those same program participants had they not been exposed to the program. (This latter "what if" observation is known as the "counterfactual.") Since we couldn't (and could never) directly observe the counterfactual, we selected a comparison group as similar as possible to the program group in characteristics likely to be associated with the outcomes of interest.

First we selected a pool of potential comparison group members consisting of visitors to the other (non-CRPA) H+H EDs during the "program period" (April – October 2018) who received similar Substance Use Disorder or Alcohol Use Disorder (SUD/AUD) diagnoses and who never visited the three CRPA EDs during that time. We then matched these individuals to program participants using the following procedures:

- Step 1: We used Mahalanobis matching to select up to 5 "nearest neighbors" to each program group member "with replacement."
- Step 2: We developed matching weights combining three components: 1) a "kernel weight" (a weight that is inversely proportional to the Mahalanobis distance between the program and comparison observations), 2) an adjustment for the use of some comparison observations multiple times if they are "close" to multiple program group observations, and 3) a final "entropy balancing" weight adjustment that has been shown to achieve extremely close covariate balance between program and comparison groups.

The resulting weight is designed to estimate the Average Treatment effect on "Treated" individuals (known as an ATT weight). Under this weighting scheme, each program individual receives a weight of 1, and each member of the comparison group receives either a weight of 0

(reflecting their being too “far away” from any program observations for them to be used in impact estimation without biasing the results), or a weight reflecting the three weighting components described above. These weights were then used in regression models to estimate program impacts.

Defining baseline characteristics and outcomes for matching and impact estimation

Medicaid data were used to define important baseline characteristics for use as matching variables in the above-described procedures and as utilization outcomes for estimating program impacts. Program and comparison group members were matched on the following characteristics measured during a “baseline period” consisting of the 12 months before an “index” date, which was the date (as early as April 17 2018 and as early as October 31 2018) of the first visit to an ED Peer facility for program group members, and a randomly selected date in the program period for comparison group members:

- Demographics: age, sex, race, and ethnicity.
- Enrollment characteristics: SSI receipt, Medicare receipt, months on Medicaid.
- Diagnoses: Receipt of any of several chronic condition diagnoses, receipt of an SUD diagnosis, receipt of an AUD diagnosis.
- Cost and utilization: Total Medicaid payments, number of hospitalizations, and number of ED visits in each of the 12 months prior to the “index” date. Total Medicaid costs were also calculated for months 1-6 and 7-12 following the index date for use as outcome measures.
- Substance use services: These measures were used both for matching purposes (measured during the 12-month baseline period) and for estimating impacts (measured in months 1-2 and months 3-6 following the “index” date). Our team worked with a doctor with extensive experience in providing substance use services (Jennifer McNeely) to develop substance use service definitions using claim elements such as procedure codes, rate codes, diagnostic codes, and National Drug (NDC) codes. The resulting typology categorized substance use services as 1) Medication-Assisted Therapy (MAT), 2) Methadone Maintenance Treatment Program (MMTP), 3) rehab (primarily outpatient) or detox (primarily inpatient) visits/stays, and non-medication therapies (primarily counseling and psychotherapy). Program and control group members were matched on their receiving any or none of each of these types of services, and were also matched on the number of events they received in each service category, during the 12-month baseline period.

Estimating program impacts

We used “doubly robust” impact estimation methods: program and control group members were first matched as described above, and regression models were then estimated using a subset of the above matching characteristics as model covariates. Covariates were selected for each model by regressing the outcome on the full set of matching characteristics using a Least

Absolute Shrinkage and Selection Operator (LASSO) procedure, and a model appropriate to the form of that outcome was then estimated with the selected covariates (Poisson for count outcomes, logistic for binary outcomes, and gamma/log for cost outcomes). The comparison group for each subgroup analysis was selected and reweighted using the “Step 2” matching procedure described above. Robust standard errors were estimated for all models. No adjustments were made for multiple comparisons.

Results

Table 1 displays the characteristics of the program group. These SUD/AUD-diagnosed visitors to the CRPA EDs were 44 years old on average, 27% were female, 28% were on Supplemental Security Income (SSI), 28% were Hispanic, and 42% were Black. They also appear to be largely continuous Medicaid enrollees, with an average of 11 months of Medicaid enrollment in the prior 12 months.

Program group members were relatively high utilizers of health care services in the 12-month baseline period. Average Medicaid cost in the prior year was about \$27,000, 53% had been hospitalized at least once, and patients had visited EDs 7.5 times on average. Program group members were also frequent visitors to the CRPA EDs. In the program study period (April – October 2018), 52% of program group members visited a CRPA ED once, 23% visited twice, and 25% visited more often.

As well as being high utilizers, CRPA ED visitors appear to be in high need of care, judging by an average of six different chronic conditions identified by claim diagnoses received in the prior year (as defined by the Agency for Healthcare Research and Quality (AHRQ) Chronic Condition Indicator (CCI) system). Care for these conditions may be complicated by the high level of Serious Mental Illness (SMI) in this population (47%).

For most of these ED visitors, the SUD/AUD diagnosis they received during the index ED visit was not their first such diagnosis in the prior 12 months: 85% had at least one other visit or hospital stay in which SUD/AUD had been diagnosed. And over half (54%) had received some type of treatment for SUD/AUD in the last year: 44% had received at least some group or individual counseling, 32% had been in rehab or detox, 25% had received at least one prescription for medication-assisted therapy, and 15% had received methadone (MMTP) treatment. Some SUD/AUD treatment types occurred quite frequently in the prior year: Average number of visits/prescriptions were 24 (MAT), 24 (MMTP), 10 (counseling), and 2 (rehab/detox).

Tables 2a and 2b present the results of our matching and weighting procedures. Good matching is considered to be achieved when the absolute values of standardized differences (i.e., differences in “z-scores”) between the program and comparison groups are less than .1-.2. The rightmost column in Table 2b shows that matching and weighting were extremely successful in achieving covariate balance between the groups, with standardized differences in all covariates reduced to 0. Further, Table 2a shows that covariate balance was not achieved at the expense

of dropping cases with hard-to-match covariate patterns: only about 2% of program cases were dropped.

Program impacts were estimated for each of the four types of SUD-related treatments (MAT, non-MAT, MMTP, and rehab/detox) in two ways – presence/absence of any treatment of that type, and the number of treatment events of that type – for two time periods: 1-2 months after the “index” visit, and 3-6 months after the “index” visit. In addition, program impacts on total Medicaid costs were estimated for months 1-6 and 7-12 after the “index” visit. All impacts were estimated for the full sample and for the following subgroups:

- Those who received, and those who did not receive, any SUD/AUD treatment in the 12-month baseline period (2 subgroups).
- Those who received an AUD diagnosis only, an SUD diagnosis only, or both an AUD and an SUD diagnosis in the baseline period (3 subgroups).
- Frequent (2+) vs. infrequent (0-1) visitors to any ED in the 6 months before their “index” date (2 subgroups).
- Those whose initial CRPA ED visit was to Harlem, Metropolitan, or Woodhull (3 subgroups).

Impact results are presented in Table 3. The value in the “Impact” column is the regression-adjusted difference between the program and control group averages for that outcome, and represents the difference in the number of events, the difference in the percentages of each group that had at least one event, or the cost difference between the groups, for the indicated time period. Impacts that were unlikely to have been observed by chance ($p < .10$) are in **boldface**.

A quick scan of the impacts table reveals that the majority of statistically significant impacts are in the “no prior SUD/AUD treatment” subgroup, and in the subgroup of initial ED visitors to Metropolitan. Although there are scattered statistically significant impacts in other subgroups and in the full sample, it should be remembered that a large number of impacts was estimated, which increases the chance of observing a statistically significant impact by chance, and a liberal p-value cutoff of .1 was used (although the large majority of statistically significant impacts in the tables are less than the conventional cutoff of .05).

The most notable impact finding for the full sample appears to be the program impact on rehab/detox treatment. CRPA appears to have increased the likelihood of seeking rehab/detox treatment, from 17.0% to 20.4% in months 1-2 and from 15.8% to 18.3% in months 3-6. These represent substantial 15-20% increases over the base rates observed in the comparison group.

The “treatment number” (“Tx N”) column shows that ED visitors without any SUD/AUD treatment in the prior year represent over half the program group (1377/2480=56%), and it is this group that experienced the most substantial program impacts (hereafter referred to as “untreated”). The ED Peer program appears to have almost doubled the proportion of

untreated ED visitors going to rehab/detox in the first 2 months after their index visit (8.1% vs. 4.2%), and substantially increased the proportion attending counseling sessions in both months 1-2 (13.1% vs. 9.9%) and months 3-6 (17.4% vs. 11.5%) after the index visit. The program also almost doubled the proportion of untreated ED visitors who received SUD/AUD-related medications in months 3-6 (4.6% vs. 2.5%), and increased the proportion of those receiving methadone in months 1-2 (.9% vs .4%) and months 3-6 (1.9% vs. .7%), although these increases were relative to very small comparison group percentages.

The other major cluster of program impacts occurred in the subgroup of visitors to the Metropolitan ED. This subgroup experienced some increase in SUD/AUD service utilization in all four service categories, and especially in the proportion of those receiving rehab/detox treatment in months 1-2 (24.0% vs 19.0%) and 3-6 (22.5% vs. 17.9%), and in the proportion receiving counseling in months 1-2 (35.9% vs. 32.3%).

Several of the remaining impacts in other subgroups reflect the relatively strong overall impact of the program on rehab/detox treatment. The one program impact of potential concern is a seeming decrease in the proportion of individuals receiving counseling services in Harlem, where 9.7 percentage points fewer program group members received counseling in months 1-2 than in the comparison group. The program did not substantially affect the Medicaid costs in months 1-6 or 7-12 after the index date.

Conclusion

The ED Peer program represents a significant innovation in the delivery of care to people with substance use disorders. The implementation discussion in this report, as well as the earlier implementation report, documented many of the challenges the program faced in establishing a professional “home” and set of operating and workflow procedures as it tried to integrate a radically new kind of patient-facing service into the setting of a traditional emergency room. Similarly, this evaluation faced two major challenges to its methodological ability to detect program impacts. First, we evaluated this program early in its development, as procedures, lines of authority and responsibility, available resources for both peers and patients, and overall site and hospital integration were still evolving. In other words, we evaluated the program before it was likely to have achieved its full impact. Second, we adopted an “intent to treat” evaluation perspective in which all SUD/AUD diagnosed visitors to the peer EDs were considered to have been “treated,” even though many of these patients would not have had an opportunity to meet with a peer.

These two conditions significantly limit the methodological power of an evaluation to detect substantive program impacts. Nevertheless, we found that the H+H ED peer program had modest positive effects on the proportion of ED visitors who subsequently sought substance use services, especially rehab and detox services. This effect was especially notable for ED visitors who hadn’t used such services in at least the prior year. In keeping with the findings of the implementation study, however, we also found what appears to be site-level variation in

program impacts, with the Metropolitan hospital site appearing to be responsible for much of the impact attributable to the program. Although the program appears not to have achieved cost savings, neither does it appear to have increased costs, which latter can occur in programs designed to increase any form of service utilization.

Recommendations to the field and areas for further study

The introduction of Certified Recovery Peer Advocates into the emergency departments at three busy public hospitals represented a dramatically new approach to engaging patients in need of services to address issues stemming from their substance use. While peers have been frequently used in other areas of treatment, such as mental health, the use of peers in this area of care is relatively new and little studied. This evaluation provides some insight into the challenges and opportunities for successful implementation of this type of program and its likely impacts.

Program champions are critical to innovative programs that require changes in processes and culture. Having “buy in” from a senior member of the ED team, ideally the ED medical director or head of nursing, is an important starting point. Without such support, naysayers can stand in the way of program success. Further, unavoidable startup problems will go unaddressed.

Yet, a champion within the ED is not sufficient for implementation success. Hospitals are complex organizations. Each patient is touched by multiple departments and clinicians with differing titles and degrees and line of supervision. Situating an innovative and little known program, whose staff lack the level of credentials or education typical of a medical setting, requires a good deal of groundwork. A number of resources must be in place.

Strong training and ongoing supervision are essential. Peers must be effectively introduced to the hospital, its emergency department, and the other staff. Peer Advocates, lacking deep experience in a healthcare setting, will need to be familiarized with its rules and culture. Equally important, the ED staff must be helped to know and understand the role of the peers if the peers are to become part of the team. The more complex the organizational and supervisory structure for the peers and other program staff, the harder it is for the peers to become integrated into the delivery of service. Complexity can lead to friction and confusion for a program that already represents an organizational change.

Space is another critical resource. In order for the peers to be readily available to the ED staff and the target patients, the peers must be situated in (or, at least, near) the ED. But, space in many EDs is precious, and creative solutions are essential for this program to work.

Strong support from human resources is desired. Hiring appropriate staff in a timely way to work across the most needed hours will be difficult. The difficulty finding, training, and employing appropriate peer advocates, as well as the other clinical staff to work with them, should not be underestimated. Ideally, a full complement of staff should be in place at start up, though this may prove impossible. Challenges such as the need for staff at late night or

weekend sessions must be acknowledged. Plans for introducing replacement staff should be in place.

Despite these challenges, several things were learned in this evaluation that may make it easier for other sites adopting this innovation. The patients targeted by this program are challenging for ED staff focused on medical emergencies. We found that the peers can be an important resource to the ED staff in managing these patients and the ED in general. Highlighting this benefit can promote critical staff buy-in for the program.

Most importantly, this evaluation suggests that this approach will encourage more engagement in treatment services. In particular, patients without recent treatment appeared to experience the greatest increases in service utilization. This suggests that better targeting of peer services may be in order or, perhaps, better tailoring of peer services depending on recent treatment experience. But encouraging more engagement in treatment is only a first step. Before launching such an effort, scanning the treatment environment is of great importance. The peer advocates seem to be able to ready ED patients for treatment; such readiness will be of limited value if the peers are unable to provide a warm hand-off of the patient to effective services.

Table 1. Characteristics of CRPA treatment group in the baseline period (1-365 days before first visit to a CRPA emergency department)

Measure	N(%), Mean(SD), or Median(range) N = 2,507
On Medicare	90 (3.6%)
On SSI	700 (27.9%)
Female	668 (26.6%)
Age	
Mean (SD)	43.8 (12.3)
Median (range)	45 (18 - 88)
Age category	
18-29	403 (16.1%)
30-49	1,131 (45.1%)
50-64	932 (37.2%)
65+	41 (1.6%)
Hispanic	692 (27.6%)
Black	1,050 (41.9%)
Any substance/alcohol use disorder (SUD/AUD) diagnosis	2,129 (84.9%)
Any SUD/AUD treatment	1,346 (53.7%)
Any medication-assisted treatment	623 (24.9%)
Any methadone treatment	384 (15.3%)
Any rehab or detox treatment	791 (31.6%)
Any counseling/psychotherapy treatment for SUD/AUD	1,098 (43.8%)
# of medication-assisted treatments	
Mean (SD)	24.3 (67.1)
Median (range)	0 (0 - 310)
# of methadone treatments	
Mean (SD)	24.0 (67.6)
Median (range)	0 (0 - 329)
# of rehab or detox treatments	
Mean (SD)	1.6 (4.3)
Median (range)	0 (0 - 62)
# of counseling/psychotherapy treatments for SUD/AUD	
Mean (SD)	9.6 (23.7)
Median (range)	0 (0 - 249)
Any hospitalization	1,323 (52.8%)

Measure	N(%), Mean(SD), or Median(range) N = 2,507
Hospital stays	
Mean (SD)	2.1 (3.6)
Median (range)	1 (0 - 33)
Any emergency department visit	1,957 (78.1%)
Emergency department visits	
Mean (SD)	7.5 (15.7)
Median (range)	3 (0 - 220)
Total Medicaid payments	
Mean (SD)	\$27,087 (\$30,732)
Median (range)	\$15,374 (\$0 - \$137627)
Chronic conditions	
Mean (SD)	6.0 (4.6)
Median (range)	5 (0 - 32)
Any Serious Mental Illness (SMI) diagnosis	1,189 (47.4%)
Months enrolled in Medicaid	
Mean (SD)	10.7 (2.9)
Median (range)	12 (0 - 12)

Table 2a. Case (treated) and control (untreated) match results

	Treated (cases)			Untreated (controls)		
	Matched	Unmatched	Total	Matched	Unmatched	Total
N	2,480	45	2,525	5,931	19	5,950

Table 2b. Average standardized values and standardized differences for unmatched vs. matched and weighted observations

Average characteristic in 12-month baseline period (unless otherwise indicated)	Before matching/weighting			After matching/weighting		
	Treated	Untreated	StdDif	Treated	Untreated	StdDif
Days with any substance use-related encounters	31.11	22.09	0.14	31.11	31.11	0.00
Medication Assisted Therapy (MAT) encounters/prescriptions	23.95	17.29	0.11	23.95	23.95	0.00
Methadone Maintenance Treatment Program (MMTP) encounters	23.71	17.03	0.11	23.71	23.71	0.00
Rehab encounters/stays	1.32	0.83	0.17	1.32	1.32	0.00
Psychiatric encounters	9.28	6.52	0.13	9.28	9.28	0.00
Any psychiatric encounter	0.43	0.34	0.19	0.43	0.43	0.00
On Medicare	0.04	0.03	0.01	0.04	0.04	-0.00
Receiving SSI	0.28	0.21	0.17	0.28	0.28	0.00
Female	0.27	0.27	0.01	0.27	0.27	0.00
Any diabetes diagnosis	0.10	0.07	0.10	0.10	0.10	0.00
Any hypertension diagnosis	0.20	0.15	0.13	0.20	0.20	0.00
Any Serious Mental Illness (SMI) diagnosis	0.47	0.38	0.19	0.47	0.47	0.00
Any Alcohol/Substance Use Disorder (AUD/SUD) diagnosis	0.72	0.62	0.20	0.72	0.72	0.00
Any HIV diagnosis	0.04	0.03	0.06	0.04	0.04	0.00
Number of chronic conditions	5.89	4.59	0.32	5.89	5.89	0.00
Hospitalizations, 1 month before program	0.39	0.23	0.18	0.39	0.39	0.00

Average characteristic in 12-month baseline period (unless otherwise indicated)	Before matching/weighting			After matching/weighting		
	Treated	Untreated	StdDif	Treated	Untreated	StdDif
Hospitalizations, 2 months before program	0.30	0.18	0.16	0.30	0.30	0.00
Hospitalizations, 3 months before program	0.28	0.15	0.18	0.28	0.28	0.00
Hospitalizations, 4 months before program	0.25	0.14	0.15	0.25	0.25	0.00
Hospitalizations, 5 months before program	0.22	0.13	0.15	0.22	0.22	0.00
Hospitalizations, 6 months before program	0.18	0.12	0.11	0.18	0.18	0.00
Hospitalizations, 7 months before program	0.21	0.11	0.15	0.21	0.21	0.00
Hospitalizations, 8 months before program	0.18	0.11	0.13	0.18	0.18	0.00
Hospitalizations, 9 months before program	0.21	0.12	0.14	0.21	0.21	0.00
Hospitalizations, 10 months before program	0.20	0.11	0.15	0.20	0.20	0.00
Hospitalizations, 11 months before program	0.19	0.10	0.14	0.19	0.19	0.00
Hospitalizations, 12 months before program	0.18	0.10	0.13	0.18	0.18	0.00
Hospitalizations, months 2-6 before program	0.80	0.51	0.22	0.80	0.80	0.00
Hospitalizations, months 7-12 before program	0.75	0.44	0.24	0.75	0.75	0.00
ED visits, 1 month before program	1.02	0.75	0.13	1.02	1.02	0.00
ED visits, 2-6 months before program	3.16	2.51	0.10	3.16	3.16	0.00
ED visits, 7-12 months before program	2.94	1.95	0.15	2.94	2.94	0.00
Medicaid cost, 1 month before program	3035.50	2017.69	0.19	3035.50	3035.50	0.00
Medicaid cost, 2 months before program	2602.22	1728.03	0.17	2602.22	2602.22	0.00
Medicaid cost, 3 months before program	2389.03	1520.85	0.20	2389.03	2389.03	0.00
Medicaid cost, 4 months before program	2195.31	1435.10	0.18	2195.31	2195.31	0.00
Medicaid cost, 5 months before program	2052.60	1310.63	0.19	2052.60	2052.60	0.00

Average characteristic in 12-month baseline period (unless otherwise indicated)	Before matching/weighting			After matching/weighting		
	Treated	Untreated	StdDif	Treated	Untreated	StdDif
Medicaid cost, 6 months before program	1761.64	1121.85	0.19	1761.64	1761.64	0.00
Medicaid cost, 7 months before program	2022.05	1231.33	0.18	2022.05	2022.05	0.00
Medicaid cost, 8 months before program	1804.55	1156.00	0.17	1804.55	1804.55	0.00
Medicaid cost, 9 months before program	2005.56	1200.84	0.18	2005.56	2005.56	0.00
Medicaid cost, 10 months before program	1986.80	1162.55	0.20	1986.80	1986.80	0.00
Medicaid cost, 11 months before program	1876.81	1131.58	0.19	1876.81	1876.81	0.00
Medicaid cost, 12 months before program	1867.31	1161.65	0.18	1867.31	1867.31	0.00
Total claims	82.29	59.47	0.28	82.29	82.29	0.00
Age in years	43.45	41.02	0.19	43.45	43.45	0.00
Hispanic	0.28	0.23	0.10	0.28	0.28	0.00
Black	0.42	0.33	0.19	0.42	0.42	-0.00
Treatment start date (in days after 1/1/1960)	21390.80	21388.77	0.04	21390.80	21390.80	0.00
Evaluation and management encounters	4.42	3.47	0.16	4.42	4.42	0.00
Months of Medicaid enrollment	10.65	10.50	0.05	10.65	10.65	0.00

Table 3. CRPA Impact Results

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
All	Med-assisted txs (MAT)	1-2	4.0	4.0	0.0	0.77	-0.3	0.4	2480	5931
	% w/any med-assisted tx (MAT)	1-2	18.4%	17.7%	0.7pp	0.35	-0.8pp	2.2pp	2480	5931
	Med-assisted txs (MAT)	3-6	8.4	8.1	0.2	0.55	-0.5	1.0	2480	5931
	% w/any med-assisted tx (MAT)	3-6	20.5%	19.2%	1.3pp	0.13	-0.4pp	3.0pp	2480	5931
	Methadone maintenance txs (MMTP)	1-2	4.0	3.9	0.1	0.70	-0.3	0.4	2480	5931
	% w/any methadone maintenance tx (MMTP)	1-2	12.5%	12.2%	0.3pp	0.54	-0.6pp	1.2pp	2480	5931
	Methadone maintenance txs (MMTP)	3-6	8.1	7.9	0.3	0.46	-0.5	1.0	2480	5931
	% w/any methadone maintenance tx (MMTP)	3-6	13.3%	12.5%	0.8pp	0.17	-0.3pp	1.9pp	2480	5931
	Rehab/detox txs	1-2	0.5	0.4	0.1	0.21	-0.0	0.2	2480	5931
	% w/any rehab/detox tx	1-2	20.4%	17.0%	3.5pp	0.00	1.5pp	5.4pp	2480	5931
	Rehab/detox txs	3-6	0.6	0.5	0.1	0.03	0.0	0.2	2480	5931
	% w/any rehab/detox tx	3-6	18.3%	15.8%	2.4pp	0.01	0.6pp	4.2pp	2480	5931
	Non-medication txs	1-2	1.8	1.7	0.1	0.32	-0.1	0.4	2480	5931
	% w/any non-medication tx	1-2	28.7%	27.9%	0.7pp	0.47	-1.2pp	2.7pp	2480	5931
	Non-medication txs	3-6	3.9	3.5	0.4	0.16	-0.2	1.0	2480	5931
	% w/any non-medication tx	3-6	32.1%	30.0%	2.0pp	0.07	-0.1pp	4.2pp	2480	5931
Total Medicaid payments			16,747	15,649	1,098	0.14	-374	2,570	2480	5931
Total Medicaid payments			13,565	13,430	135	0.83	-1,102	1,373	2480	5931
No prior SUD tx	Med-assisted txs (MAT)	1-2	0.2	0.1	0.1	0.06	-0.0	0.2	1377	3731

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any med-assisted tx (MAT)	1-2	2.5%	1.6%	0.9pp	0.11	-0.2pp	1.9pp	1377	3731
	Med-assisted txs (MAT)	3-6	0.7	0.3	0.5	0.01	0.1	0.8	1377	3731
	% w/any med-assisted tx (MAT)	3-6	4.6%	2.5%	2.1pp	0.00	0.7pp	3.4pp	1377	3731
	Methadone maintenance txs (MMTP)	1-2	0.1	0.0	0.1	0.12	-0.0	0.2	1377	3731
	% w/any methadone maintenance tx (MMTP)	1-2	0.9%	0.4%	0.5pp	0.10	-0.1pp	1.1pp	1377	3731
	Methadone maintenance txs (MMTP)	3-6	0.6	0.2	0.4	0.04	0.0	0.8	1377	3731
	% w/any methadone maintenance tx (MMTP)	3-6	1.9%	0.7%	1.2pp	0.01	0.4pp	2.1pp	1377	3731
	Rehab/detox txs	1-2	0.1	0.1	0.1	0.00	0.0	0.1	1377	3731
	% w/any rehab/detox tx	1-2	8.1%	4.2%	3.8pp	0.00	2.0pp	5.7pp	1377	3731
	Rehab/detox txs	3-6	0.1	0.1	0.0	0.61	-0.1	0.1	1377	3731
	% w/any rehab/detox tx	3-6	5.7%	5.2%	0.5pp	0.65	-1.7pp	2.8pp	1377	3731
	Non-medication txs	1-2	1.0	0.6	0.4	0.01	0.1	0.7	1377	3731
	% w/any non-medication tx	1-2	13.1%	9.9%	3.2pp	0.00	1.0pp	5.4pp	1377	3731
	Non-medication txs	3-6	2.5	1.4	1.1	0.00	0.5	1.7	1377	3731
	% w/any non-medication tx	3-6	17.4%	11.5%	5.9pp	0.00	3.4pp	8.4pp	1377	3731
	Total Medicaid payments		11,123	10,221	901	0.25	-650	2,452	1377	3731
	Total Medicaid payments		9,100	9,048	52	0.94	-1,403	1,507	1377	3731
Prior SUD tx	Med-assisted txs (MAT)	1-2	9.2	8.9	0.3	0.53	-0.6	1.2	1066	2163
	% w/any med-assisted tx (MAT)	1-2	39.1%	38.8%	0.3pp	0.85	-3.2pp	3.9pp	1066	2163
	Med-assisted txs (MAT)	3-6	18.5	18.0	0.5	0.60	-1.4	2.4	1066	2163

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any med-assisted tx (MAT)	3-6	41.3%	39.6%	1.7pp	0.36	-2.0pp	5.5pp	1066	2163
	Methadone maintenance txs (MMTP)	1-2	9.1	8.7	0.3	0.45	-0.5	1.2	1066	2163
	% w/any methadone maintenance tx (MMTP)	1-2	27.9%	27.0%	0.8pp	0.53	-1.8pp	3.4pp	1066	2163
	Methadone maintenance txs (MMTP)	3-6	18.2	17.5	0.7	0.48	-1.2	2.6	1066	2163
	% w/any methadone maintenance tx (MMTP)	3-6	28.4%	27.9%	0.6pp	0.71	-2.3pp	3.4pp	1066	2163
	Rehab/detox txs	1-2	0.9	0.8	0.1	0.35	-0.1	0.3	1066	2163
	% w/any rehab/detox tx	1-2	36.7%	33.9%	2.7pp	0.20	-1.4pp	6.9pp	1066	2163
	Rehab/detox txs	3-6	1.2	1.0	0.2	0.12	-0.0	0.4	1066	2163
	% w/any rehab/detox tx	3-6	34.5%	30.5%	4.0pp	0.04	0.2pp	7.8pp	1066	2163
	Non-medication txs	1-2	2.9	2.9	-0.0	0.84	-0.5	0.4	1066	2163
	% w/any non-medication tx	1-2	49.3%	50.0%	-0.6pp	0.76	-4.7pp	3.4pp	1066	2163
	Non-medication txs	3-6	5.8	5.8	-0.0	0.99	-1.0	1.0	1066	2163
	% w/any non-medication tx	3-6	51.5%	52.5%	-1.0pp	0.65	-5.2pp	3.2pp	1066	2163
	Total Medicaid payments		26,329	24,561	1,769	0.17	-752	4,289	1066	2163
	Total Medicaid payments		21,234	21,905	-671	0.57	-2,999	1,657	1066	2163
Alcohol dx only	Med-assisted txs (MAT)	1-2	0.2	0.1	0.1	0.64	-0.3	0.5	199	406
	% w/any med-assisted tx (MAT)	1-2	1.6%	5.8%	-4.3pp	0.09	-9.2pp	0.7pp	199	406
	Med-assisted txs (MAT)	3-6	0.5	0.2	0.3	0.46	-0.6	1.3	199	406
	% w/any med-assisted tx (MAT)	3-6	3.7%	5.9%	-2.2pp	0.36	-7.1pp	2.6pp	199	406
	Methadone maintenance txs (MMTP)	1-2	0.2	0.0	0.2	.	.	.	199	406

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any methadone maintenance tx (MMTP)	1-2	0.5%	0.0%	0.5pp	.	.pp	.pp	199	406
	Methadone maintenance txs (MMTP)	3-6	0.5	0.0	0.5	0.31	-0.4	1.3	199	406
	% w/any methadone maintenance tx (MMTP)	3-6	1.0%	0.0%	1.0pp	.	.pp	.pp	199	406
	Rehab/detox txs	1-2	0.2	0.2	-0.1	0.59	-0.3	0.2	199	406
	% w/any rehab/detox tx	1-2	11.0%	6.4%	4.6pp	0.09	-0.7pp	9.9pp	199	406
	Rehab/detox txs	3-6	0.1	0.1	0.0	0.66	-0.1	0.1	199	406
	% w/any rehab/detox tx	3-6	7.9%	7.9%	0.0pp	0.99	-5.4pp	5.5pp	199	406
	Non-medication txs	1-2	0.6	0.6	0.0	1.00	-0.4	0.4	199	406
	% w/any non-medication tx	1-2	12.5%	10.7%	1.8pp	0.59	-4.7pp	8.3pp	199	406
	Non-medication txs	3-6	2.3	1.7	0.5	0.53	-1.1	2.2	199	406
	% w/any non-medication tx	3-6	18.0%	12.6%	5.4pp	0.13	-1.6pp	12.4pp	199	406
	Total Medicaid payments		13,627	11,086	2,541	0.23	-1,603	6,685	199	406
	Total Medicaid payments		11,068	7,921	3,147	0.12	-803	7,097	199	406
Substance dx only	Med-assisted txs (MAT)	1-2	8.3	7.4	0.9	0.22	-0.5	2.3	567	1531
	% w/any med-assisted tx (MAT)	1-2	30.7%	28.9%	1.8pp	0.45	-2.9pp	6.5pp	567	1531
	Med-assisted txs (MAT)	3-6	17.2	15.1	2.1	0.26	-1.6	5.8	567	1531
	% w/any med-assisted tx (MAT)	3-6	31.0%	27.2%	3.8pp	0.11	-0.9pp	8.6pp	567	1531
	Methadone maintenance txs (MMTP)	1-2	8.2	7.4	0.8	0.24	-0.6	2.3	567	1531
	% w/any methadone maintenance tx (MMTP)	1-2	25.2%	27.3%	-2.1pp	0.19	-5.4pp	1.1pp	567	1531
	Methadone maintenance txs (MMTP)	3-6	17.1	15.0	2.1	0.25	-1.5	5.6	567	1531

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any methadone maintenance tx (MMTP)	3-6	25.9%	28.0%	-2.0pp	0.23	-5.3pp	1.3pp	567	1531
	Rehab/detox txs	1-2	0.2	0.2	0.0	0.92	-0.1	0.2	567	1531
	% w/any rehab/detox tx	1-2	9.8%	10.4%	-0.6pp	0.85	-7.3pp	6.0pp	567	1531
	Rehab/detox txs	3-6	0.3	0.2	0.1	0.12	-0.0	0.3	567	1531
	% w/any rehab/detox tx	3-6	10.4%	7.7%	2.8pp	0.22	-1.7pp	7.2pp	567	1531
	Non-medication txs	1-2	1.9	1.6	0.3	0.23	-0.2	0.8	567	1531
	% w/any non-medication tx	1-2	33.9%	33.2%	0.7pp	0.81	-5.2pp	6.6pp	567	1531
	Non-medication txs	3-6	4.1	3.4	0.7	0.45	-1.1	2.5	567	1531
	% w/any non-medication tx	3-6	37.8%	35.9%	1.9pp	0.60	-5.1pp	8.9pp	567	1531
	Total Medicaid payments		12,771	10,944	1,827	0.28	-1,497	5,150	567	1531
	Total Medicaid payments		12,362	12,635	-273	0.93	-6,404	5,858	567	1531
Alcohol and substance dxs	Med-assisted txs (MAT)	1-2	3.9	3.9	0.0	0.88	-0.5	0.5	1304	2714
	% w/any med-assisted tx (MAT)	1-2	21.0%	20.3%	0.7pp	0.55	-1.6pp	3.1pp	1304	2714
	Med-assisted txs (MAT)	3-6	8.0	8.1	-0.0	0.94	-1.2	1.1	1304	2714
	% w/any med-assisted tx (MAT)	3-6	24.3%	21.8%	2.5pp	0.06	-0.1pp	5.2pp	1304	2714
	Methadone maintenance txs (MMTP)	1-2	3.8	3.7	0.0	0.93	-0.5	0.5	1304	2714
	% w/any methadone maintenance tx (MMTP)	1-2	12.4%	11.9%	0.5pp	0.51	-1.0pp	2.0pp	1304	2714
	Methadone maintenance txs (MMTP)	3-6	7.7	7.7	0.1	0.91	-1.1	1.2	1304	2714
	% w/any methadone maintenance tx (MMTP)	3-6	13.7%	12.4%	1.3pp	0.15	-0.5pp	3.1pp	1304	2714
	Rehab/detox txs	1-2	0.8	0.6	0.1	0.05	-0.0	0.3	1304	2714
	% w/any rehab/detox tx	1-2	31.4%	26.1%	5.3pp	0.00	2.1pp	8.5pp	1304	2714

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	Rehab/detox txs	3-6	0.9	0.8	0.1	0.11	-0.0	0.3	1304	2714
	% w/any rehab/detox tx	3-6	28.0%	24.5%	3.5pp	0.03	0.3pp	6.6pp	1304	2714
	Non-medication txs	1-2	2.4	2.3	0.0	0.83	-0.4	0.4	1304	2714
	% w/any non-medication tx	1-2	35.4%	37.0%	-1.6pp	0.33	-4.8pp	1.6pp	1304	2714
	Non-medication txs	3-6	4.9	4.7	0.1	0.82	-0.8	1.0	1304	2714
	% w/any non-medication tx	3-6	39.0%	38.7%	0.3pp	0.88	-3.1pp	3.7pp	1304	2714
	Total Medicaid payments		23,850	23,222	628	0.59	-1,663	2,920	1304	2714
	Total Medicaid payments		20,719	21,749	-1,030	0.38	-3,348	1,288	1304	2714
0-1 ED visit in prior 6 months	Med-assisted txs (MAT)	1-2	4.1	4.0	0.1	0.85	-1.0	1.2	1249	2966
	% w/any med-assisted tx (MAT)	1-2	17.9%	15.4%	2.5pp	0.21	-1.4pp	6.5pp	1249	2966
	Med-assisted txs (MAT)	3-6	8.7	9.7	-1.0	0.41	-3.4	1.4	1249	2966
	% w/any med-assisted tx (MAT)	3-6	19.9%	18.8%	1.1pp	0.64	-3.3pp	5.4pp	1249	2966
	Methadone maintenance txs (MMTP)	1-2	4.0	4.0	-0.0	0.97	-1.0	1.0	1249	2966
	% w/any methadone maintenance tx (MMTP)	1-2	12.7%	11.8%	0.9pp	0.54	-1.9pp	3.7pp	1249	2966
	Methadone maintenance txs (MMTP)	3-6	8.5	9.6	-1.1	0.35	-3.5	1.3	1249	2966
	% w/any methadone maintenance tx (MMTP)	3-6	13.7%	14.3%	-0.6pp	0.68	-3.6pp	2.4pp	1249	2966
	Rehab/detox txs	1-2	0.3	0.2	0.1	0.14	-0.0	0.2	1249	2966
	% w/any rehab/detox tx	1-2	15.2%	11.5%	3.8pp	0.15	-1.4pp	8.9pp	1249	2966
	Rehab/detox txs	3-6	0.4	0.2	0.2	0.00	0.1	0.3	1249	2966
	% w/any rehab/detox tx	3-6	12.5%	9.6%	2.9pp	0.30	-2.6pp	8.4pp	1249	2966
	Non-medication txs	1-2	1.9	1.3	0.6	0.05	0.0	1.2	1249	2966

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any non-medication tx	1-2	26.5%	22.0%	4.5pp	0.14	-1.5pp	10.5pp	1249	2966
	Non-medication txs	3-6	3.7	2.5	1.2	0.05	0.0	2.4	1249	2966
	% w/any non-medication tx	3-6	29.7%	23.1%	6.6pp	0.03	0.7pp	12.5pp	1249	2966
	Total Medicaid payments		11,359	11,049	311	0.85	-2,852	3,473	1249	2966
	Total Medicaid payments		8,988	8,810	178	0.90	-2,718	3,074	1249	2966
2+ ED visits in prior 6 months	Med-assisted txs (MAT)	1-2	4.0	4.0	-0.0	0.96	-0.5	0.5	1204	2767
	% w/any med-assisted tx (MAT)	1-2	19.2%	19.6%	-0.4pp	0.73	-2.7pp	1.9pp	1204	2767
	Med-assisted txs (MAT)	3-6	7.9	8.1	-0.2	0.74	-1.4	1.0	1204	2767
	% w/any med-assisted tx (MAT)	3-6	21.4%	20.8%	0.6pp	0.65	-2.1pp	3.4pp	1204	2767
	Methadone maintenance txs (MMTP)	1-2	3.8	3.9	-0.0	0.94	-0.5	0.5	1204	2767
	% w/any methadone maintenance tx (MMTP)	1-2	12.2%	12.4%	-0.1pp	0.85	-1.6pp	1.3pp	1204	2767
	Methadone maintenance txs (MMTP)	3-6	7.7	7.8	-0.1	0.84	-1.3	1.1	1204	2767
	% w/any methadone maintenance tx (MMTP)	3-6	12.8%	12.7%	0.1pp	0.86	-1.5pp	1.8pp	1204	2767
	Rehab/detox txs	1-2	0.7	0.5	0.1	0.03	0.0	0.3	1204	2767
	% w/any rehab/detox tx	1-2	26.7%	21.6%	5.1pp	0.00	1.9pp	8.2pp	1204	2767
	Rehab/detox txs	3-6	0.8	0.7	0.1	0.19	-0.1	0.3	1204	2767
	% w/any rehab/detox tx	3-6	24.2%	21.5%	2.7pp	0.08	-0.3pp	5.7pp	1204	2767
	Non-medication txs	1-2	1.7	1.8	-0.2	0.36	-0.5	0.2	1204	2767
	% w/any non-medication tx	1-2	30.5%	30.8%	-0.3pp	0.86	-3.3pp	2.8pp	1204	2767
	Non-medication txs	3-6	4.0	3.7	0.3	0.47	-0.6	1.2	1204	2767

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any non-medication tx	3-6	34.6%	33.7%	0.9pp	0.60	-2.5pp	4.3pp	1204	2767
	Total Medicaid payments		23,601	22,378	1,223	0.28	-1,005	3,451	1204	2767
	Total Medicaid payments		20,100	19,489	610	0.57	-1,510	2,731	1204	2767
Harlem	Med-assisted txs (MAT)	1-2	3.9	3.6	0.3	0.66	-1.0	1.6	562	5503
	% w/any med-assisted tx (MAT)	1-2	17.2%	20.8%	-3.6pp	0.42	-12.1pp	5.0pp	562	5503
	Med-assisted txs (MAT)	3-6	7.8	9.3	-1.5	0.32	-4.4	1.4	562	5503
	% w/any med-assisted tx (MAT)	3-6	19.6%	20.6%	-1.0pp	0.80	-8.6pp	6.6pp	562	5503
	Methadone maintenance txs (MMTP)	1-2	3.8	3.5	0.4	0.51	-0.7	1.5	562	5503
	% w/any methadone maintenance tx (MMTP)	1-2	12.0%	10.2%	1.8pp	0.19	-0.9pp	4.4pp	562	5503
	Methadone maintenance txs (MMTP)	3-6	7.6	8.8	-1.2	0.47	-4.5	2.0	562	5503
	% w/any methadone maintenance tx (MMTP)	3-6	12.5%	13.0%	-0.5pp	0.84	-6.0pp	4.9pp	562	5503
	Rehab/detox txs	1-2	0.4	0.3	0.1	0.30	-0.1	0.3	562	5503
	% w/any rehab/detox tx	1-2	19.0%	12.6%	6.3pp	0.08	-0.7pp	13.3pp	562	5503
	Rehab/detox txs	3-6	0.5	0.4	0.1	0.35	-0.1	0.4	562	5503
	% w/any rehab/detox tx	3-6	18.5%	15.3%	3.2pp	0.40	-4.2pp	10.5pp	562	5503
	Non-medication txs	1-2	1.7	1.9	-0.3	0.62	-1.3	0.8	562	5503
	% w/any non-medication tx	1-2	23.8%	33.6%	-9.7pp	0.05	-19.5pp	0.0pp	562	5503
	Non-medication txs	3-6	3.5	3.9	-0.4	0.63	-1.9	1.2	562	5503
	% w/any non-medication tx	3-6	31.0%	33.0%	-2.0pp	0.67	-11.0pp	7.0pp	562	5503
	Total Medicaid payments			16,775	14,588	2,188	0.47	-3,723	8,099	562
Total Medicaid payments			13,724	11,402	2,322	0.31	-2,121	6,766	562	5503

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
Metropolitan	Med-assisted txs (MAT)	1-2	5.8	5.3	0.5	0.15	-0.2	1.1	837	5882
	% w/any med-assisted tx (MAT)	1-2	23.6%	22.2%	1.4pp	0.25	-1.0pp	3.8pp	837	5882
	Med-assisted txs (MAT)	3-6	11.7	10.9	0.9	0.23	-0.6	2.3	837	5882
	% w/any med-assisted tx (MAT)	3-6	25.6%	23.0%	2.7pp	0.05	0.0pp	5.3pp	837	5882
	Methadone maintenance txs (MMTP)	1-2	5.7	5.3	0.4	0.17	-0.2	1.1	837	5882
	% w/any methadone maintenance tx (MMTP)	1-2	18.0%	16.7%	1.3pp	0.12	-0.3pp	3.0pp	837	5882
	Methadone maintenance txs (MMTP)	3-6	11.6	10.7	0.8	0.26	-0.6	2.3	837	5882
	% w/any methadone maintenance tx (MMTP)	3-6	19.0%	17.0%	2.0pp	0.06	-0.1pp	4.1pp	837	5882
	Rehab/detox txs	1-2	0.5	0.5	0.1	0.13	-0.0	0.2	837	5882
	% w/any rehab/detox tx	1-2	24.0%	19.0%	5.0pp	0.00	1.9pp	8.1pp	837	5882
	Rehab/detox txs	3-6	0.7	0.5	0.2	0.02	0.0	0.4	837	5882
	% w/any rehab/detox tx	3-6	22.5%	17.9%	4.6pp	0.00	1.6pp	7.6pp	837	5882
	Non-medication txs	1-2	2.3	1.8	0.5	0.01	0.1	0.9	837	5882
	% w/any non-medication tx	1-2	35.9%	32.3%	3.6pp	0.02	0.6pp	6.6pp	837	5882
	Non-medication txs	3-6	4.6	3.7	0.9	0.05	0.0	1.7	837	5882
	% w/any non-medication tx	3-6	36.1%	33.5%	2.6pp	0.12	-0.7pp	5.8pp	837	5882
	Total Medicaid payments			17,451	16,748	703	0.49	-1,284	2,691	837
Total Medicaid payments			14,961	14,535	426	0.66	-1,457	2,309	837	5882
Woodhull	Med-assisted txs (MAT)	1-2	2.8	3.1	-0.3	0.14	-0.7	0.1	1070	5873
	% w/any med-assisted tx (MAT)	1-2	14.8%	14.9%	-0.1pp	0.94	-2.1pp	1.9pp	1070	5873
	Med-assisted txs (MAT)	3-6	6.0	6.4	-0.4	0.42	-1.2	0.5	1070	5873

Sample	Outcome	Months post-tx	Tx mean	Ctl mean	Impact	P-value	Lower CL (95%)	Upper CL (95%)	Tx N	Ctl N
	% w/any med-assisted tx (MAT)	3-6	16.8%	16.3%	0.5pp	0.66	-1.7pp	2.7pp	1070	5873
	Methadone maintenance txs (MMTP)	1-2	2.7	3.0	-0.3	0.07	-0.7	0.0	1070	5873
	% w/any methadone maintenance tx (MMTP)	1-2	8.6%	9.5%	-0.9pp	0.10	-2.0pp	0.2pp	1070	5873
	Methadone maintenance txs (MMTP)	3-6	5.8	6.2	-0.4	0.40	-1.3	0.5	1070	5873
	% w/any methadone maintenance tx (MMTP)	3-6	9.4%	10.0%	-0.6pp	0.39	-1.9pp	0.7pp	1070	5873
	Rehab/detox txs	1-2	0.4	0.4	0.1	0.27	-0.0	0.2	1070	5873
	% w/any rehab/detox tx	1-2	17.5%	14.5%	3.1pp	0.01	0.6pp	5.6pp	1070	5873
	Rehab/detox txs	3-6	0.5	0.4	0.1	0.22	-0.0	0.2	1070	5873
	% w/any rehab/detox tx	3-6	14.0%	13.1%	0.9pp	0.44	-1.4pp	3.3pp	1070	5873
	Non-medication txs	1-2	1.4	1.5	-0.0	0.94	-0.4	0.3	1070	5873
	% w/any non-medication tx	1-2	25.1%	24.7%	0.4pp	0.75	-2.3pp	3.2pp	1070	5873
	Non-medication txs	3-6	3.6	2.9	0.6	0.10	-0.1	1.4	1070	5873
	% w/any non-medication tx	3-6	28.9%	26.9%	2.1pp	0.17	-0.9pp	5.0pp	1070	5873
	Total Medicaid payments		15,558	14,534	1,024	0.31	-963	3,011	1070	5873
	Total Medicaid payments		11,842	12,791	-949	0.24	-2,520	622	1070	5873