Care Management Dashboards for Community Mental Health Centers

Evaluation Report

Vendors:
Rhode Island Quality Institute

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Executive Summary:

The ability of the Community Mental Health Centers (CMHCs) to access timely data on their clients is an important step in their full integration into the system of care and improved behavioral healthcare integration. Therefore, the State Innovation Model Test Grant (SIM) supported the implementation costs of Care Management Dashboards (CMDs) for Community Mental Health Centers. These dashboards display real-time and historical information on hospital and Emergency Department (ED) utilization for the CMHC's patient population. It was anticipated that the CMDs would deliver accurate, up-to-date information about hospital and emergency department services to CMHCs to support care coordination between medical and behavioral health providers. The program intended to target high ED utilizers who require regular outreach and care coordination efforts by the CMHCs.

Using a mixed-methods approach with multiple data sources documented similar impacts across all data methodologies used, providing convergent evidence for utility of the Care Management Dashboards in Community Mental Health Centers.

Key findings include:
- The evaluation found support for the use of the CMDs in positively impacting the practices workflow
  - There was high utilization across sites
  - Survey respondents reported being more successful at identifying appropriate high-risk individuals with the use of the CMDs
  - Respondents indicated efficiency gains resulting in less time spent identifying high-risk individuals
  - The CMDs facilitated the creation of new, successful interventions and protocols to provide greater care coordination, management of discharges and transitions of care, and medication tracking

- In claims outcomes using Medicaid claims data for each CMHC's Integrated Health Home/Assertive Community Treatment (IHH/ACT) clients, the implementation of CMDs was associated with moderate to strong effect size changes
  - There was a significant reduction in the number of ED visits following CMD implementation
  - There were significant reductions in both inpatient and psychiatric stays following CMD implementation
  - There was a moderate effect linked to reducing total costs per member per month post-implementation

The evaluation did yield several broad recommendations:

- Strengthen the analysis using a more comprehensive data set. This would include data from all payers, a long post-implementation time frame, and a
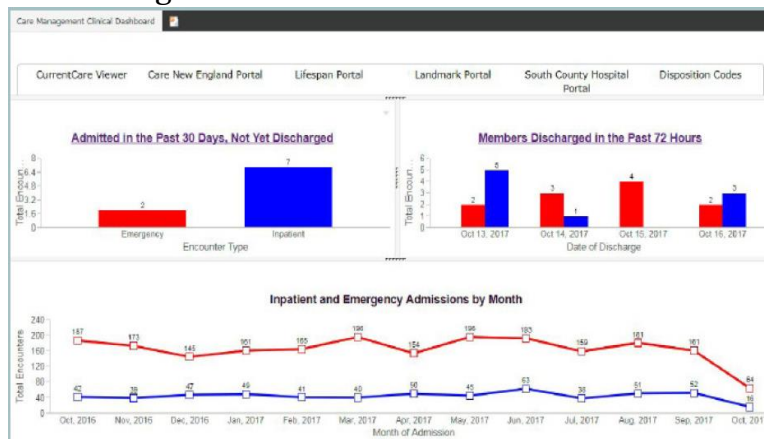
representation of the full panels used at the sites rather than only IHH/ACT members.

- Conduct more sensitive analyses with such a data set such as spline regression or autocorrelational time series tests to examine patterns of change as well as control for potential seasonality in the data.

- Explore approaches to expanding the available data sources for the CMD to include behavioral health inpatient units and hospitals as well as regional hospitals.

- Work to improve the interface and interoperability with Rhode Island's Health Information Exchange, CurrentCare. Overall, there seemed to be an underlying desire to make the dashboards more functional to specific practice needs and use-cases where possible.

- Given the overall positive results, the program should seek ways to sustain their relationships with the CMHCs. Improvements to the functionality of the CMDs will positively impact all users, not only the CMHCs.

Introduction:

The ability of the Community Mental Health Centers (CMHCs) to access timely data on their clients is an important step in their full integration into the system of care and improved behavioral healthcare integration. Therefore, the Rhode Island State Innovation Model Test Grant (SIM) supported the implementation costs of Care Management Dashboards (CMDs) for Community Mental Health Centers and the Medicaid Community Health Team known as Carelink. These dashboards display real-time and historical information on hospital and ED utilization for the site's patient population as identified by the site. Powered by CurrentCare infrastructure, these dashboards can show the exact location and status of patients being seen in all acute care hospitals in the state, as well as trending information about the user's patient panel. This enables immediate intervention by the patient's care team, especially in the IHH/ACT population as described later. Additionally, the CMDs retain information on patients for six months to provide trending information to users.

For each individual organization, the CMD displays near real-time hospital utilization (inpatient or ED) activity for patients on the organization's panel in a graphic web-based interface (an example dashboard screen is included in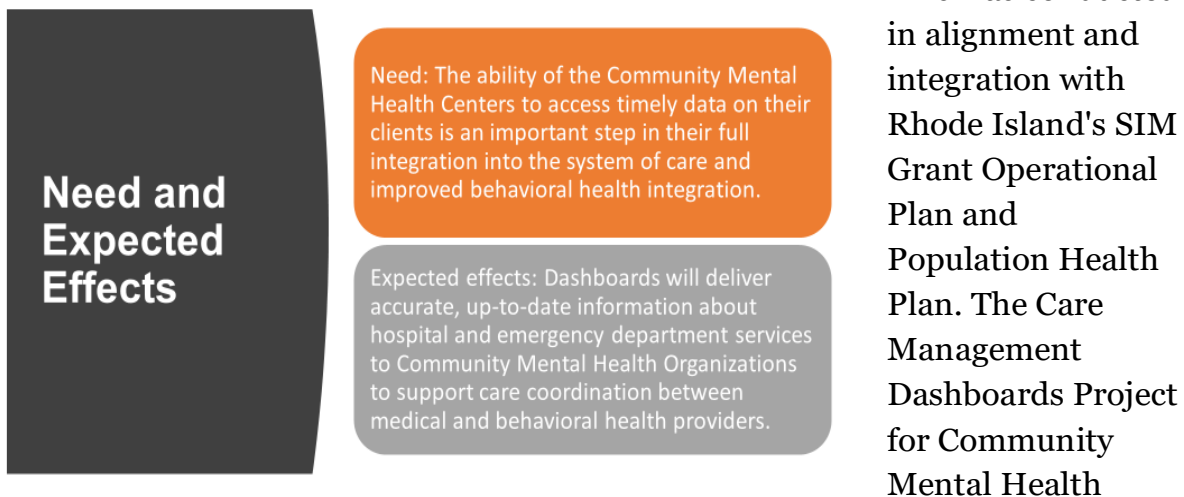 the figure). This product also includes the issuance of Direct, secure e-mail notifications of resulting admissions, transfers or discharges from all hospitals that Rhode Island Quality Institute (RIQI) receives data from for this purpose. Organizations had the option to set up both methods if desired to meet the needs of their organization and desired workflow.

The overall program goal was to deliver accurate, up-to-date information about hospital and emergency department services to Community Mental Health Centers to support care coordination between medical and behavioral health providers.

Integrated Health Homes and Assertive Community Treatment (IHH/ACT) are Medicaid services offered by all CMHCs in their respective geographic catchment area. IHH/ACT teams serve as a fixed point of responsibility to coordinate and ensure delivery of person-centered care for high-need behavioral health clients. Recipients of IHH/ACT services have a qualifying psychiatric disorder such as schizophrenia, bipolar disorder, or major depression; have a history of intensive psychiatric services utilization, such as a psychiatric hospitalization; and have been assessed by a behavioral health clinician using a functional assessment of activities of daily living as requiring additional daily support. ACT clients represent a more acute population than IHH clients. In both

cases, a care team provides: high level care coordination, including for chronic medical conditions; mental health and substance use treatment and recovery services; outreach clients and to their providers; and supportive services around social determinants of health, housing, and employment. The overall aim of IHH/ACT is to ensure the client is able to live in the least restrictive environment possible. IHH/ACT teams are reimbursed a flat fee per member per month by Medicaid and are expected to reduce healthcare costs and monitor and prevent unnecessary ED and inpatient utilization for all recipients, as well as provide timely post-discharge follow-up. With this background, it is reasonable to expect CMHCs would be incentivized to use CMDs to assist in treating the IHH/ACT population.

Need and Expected Effects

Need: The ability of the Community Mental Health Centers to access timely data on their clients is an important step in their full integration into the system of care and improved behavioral health integration.

Expected effects: Dashboards will deliver accurate, up-to-date information about hospital and emergency department services to Community Mental Health Organizations to support care coordination between medical and behavioral health providers.

This was conducted in alignment and integration with Rhode Island's SIM Grant Operational Plan and Population Health Plan. The Care Management Dashboards Project for Community Mental Health Centers and Medicaid was a system change initiative in Rhode Island that aligned with the guiding principles of the state's SIM Operational Plan and Population Health Plan. In support of improved health for all Rhode Islanders, both the SIM Operational Plan and Population Health Plan sought to:

1) Make investments that better integrate behavioral health and physical health.
2) Change the focus of the health care payment system toward value and less on volume.
3) Increase use of data to provide feedback to policy makers, providers and consumers about quality of care, outcomes and cost/benefits of specific health care interventions.
4) Address the social and environmental determinants that affect the overall health of individuals.
5) Empower consumers, both individuals and families, to assume greater control and choice over their own healthcare.
6) Support healthcare providers who are embarking on practice

transformations that emphasize value over volume and providing services in the least restrictive settings possible (such as community-based versus hospital interventions).

7) Identify and address disparities in health outcomes across various population groups or communities.

Overarching Evaluation Goals:

The Rhode Island SIM leadership engaged with the University of Rhode Island to design an evaluation plan to address the following core areas:

1. Assess the value of the Care Management Dashboards in the management of patients in the Community Mental Health Centers
2. Assess usage and workflow impacts of the dashboards at Community Mental Health Centers
3. Assess the benefits of the Dashboards to the Community Mental Health Centers
4. Assess the challenges and future opportunities for implementing the Dashboards to the Community Mental Health Centers

Subsequent pages will be used to step through the evaluation questions, present data where available, and offer interpretation and guidance for sustainability and future efforts when appropriate. This report only covers data available for analysis through March 31, 2019.

Care Management Dashboard Program Description:

Care Management Dashboards and Alerts provide near real-time data, giving up-to-date information on patient care within Rhode Island's hospital systems. This knowledge can greatly help to enhance care coordination. Additionally, it provides access to valuable data to help analyze ED and inpatient use over time based on specific patient panels within a practice. RIQI worked individually with each enrolled CMHC to provide training and guidance on best practices for implementation of the CMDs, aiming to operationalize site-specific workflow desires.

Information is provided based on a panel (or panels) of patients provided by organizations using the CMDs. Care Management Dashboards and Alerts can then provide information on high-risk patients, additional subsets of patients with specific co-morbidities, or the full patient population (full panel) depending on the needs of an organization.

Organizations can choose to receive a Care Management Alert each time a patient from an organization's panel list gets admitted to, transferred to/from, or discharged from a

hospital or skilled nursing facility. Care Management Alerts are email notifications sent via Direct secure email. At the same time, users are able to log into the web-based CMD to view the information for their panel and individual patients.

As a newer feature to the CMDs, RIQI added two risk scores to the recent encounters listing, which can help care managers with prioritization. The risk scores include the Charlson Comorbidity Index, which is a predictor of mortality risk based on a weighted score of chronic conditions, and the LACE index, which is an indicator of readmission risk based on the length of stay, acuity of admission, Charlson Comorbidity Index, and the 6-month ED visit count.

All RI CMHCs now have live access to the CMDs. RIQI also deployed a CMD with the Medicaid fee-for-service Community Health Team, which was called CareLink. The Medicaid CHT dashboard was shut down when the Medicaid CHT was closed in November 2017, and is therefore not included in any of the analyses presented in this report. The table below details the project status by CMHC site.

Table 1. Project site status

Project sites	Go-live Date
Community Care Alliance (CCA)	12/21/2016
East Bay Community Action Program (EBCAP)	3/2/2017
Carelink	3/22/2017 (then deactivated Nov 2017)
The Providence Center (TPC)	5/11/2017
Thrive Behavioral Health, formerly The Kent Center	5/25/2017 (Riverwood added Jan 2018)
Fellowship Health Resources	5/26/2017
Newport Mental Health	5/26/2017
Gateway Healthcare	1/18/18

While CurrentCare only includes data on patients that have enrolled in the service, the contract for CMDs gives CMHCs and others the ability to include data on all patients identified as part of the site's panel. RIQI negotiated with all acute care hospitals to have a real-time view of their patients' hospital and ED utilization, allowing an earlier start for follow-up care coordination. RIQI serves as a data intermediary in a HIPAA-compliant fashion and has established Business Associate Agreements and maintenance contracts with each recipient. In these agreements, the hospital allows for broad sharing of the clinical data via Admissions, Discharge, Transfer (ADT) and other feeds. For the time being, RIQI is only using these agreements with the data in ADT feeds.

The implementation of the Care Management Dashboards occurred within the context of Rhode Island's broader investment into health information technology efforts. Prior to the SIM program, RIQI developed the Care Management Dashboards product in response to demand from primary care practices. The current project represents a relatively smaller investment aimed to provide access to CMDs for Community Mental Health Centers, in order to allow them access to the same care coordination capabilities as other healthcare providers in the state.

The development of the Care Management Dashboards occurred through other funding mechanisms; therefore, the costs of that integral component are not included in this analysis. The focus is instead on the resources required to implement the system within the Community Mental Health Centers for the current evaluation.

There were four primary tasks required for implementation:

1) Execute an agreement with each entity and import their test patient panel file ($2500 per entity)
2) Test the patient panel file and secure the provision of users ($5000 per entity)
3) Train users at the entity ($2500 per entity)
4) Import production-ready panel file and go-live ($5000 per entity)

Taken together, this equated to a cost of $15,000 per onboarding of each new entity. There are existing monthly maintenance costs to the entity based upon panel membership, which was beyond the scope of this evaluation.

To ensure compliance with HIPAA and federal law regarding substance use disorder treatment status covered in 42 CFR, Part 2, the client organization entered into a qualified service agreement with RIQI and provided a select list of patients in their patient panel with whom the client has a treating relationship. These panels are updated in the RIQI system monthly.

Evaluation Design:

Overall Purpose & Overarching Evaluation Questions:

The goal of this evaluation was to assist the RI SIM project in determining if the following project goals were achieved:
1. Assess the value of the Care Management Dashboards to the management of patients in the Community Mental Health Centers
2. Assess usage and workflow impacts of the dashboards at Community Mental Health Centers
3. Assess the benefits of the Dashboards to the Community Mental Health Centers
4. Assess the challenges and future opportunities for implementing the Dashboards to the Community Mental Health Centers

The table below lists the overarching evaluation questions and their related sub-questions to be utilized as the focus of the evaluation.

Table 2. Fundamental evaluation questions for CMD in CMHCs evaluation

Evaluation Question	Specific sub-questions
Assess the value of the Care Management Dashboards to the management of patients in the Community Mental Health Centers	1. Does the CMD add value to Rhode Island's health system transformation work in moving from volume to value? 2. To what extent, if at all, does the CMD generate savings to the system due to the ability to intervene with high utilizers and reduce hospital utilization? 3. To what extent, if at all, does the CMD help improve patient outcomes due to the ability to intervene with patients with complex health conditions?

Assess usage and workflow impacts of the dashboards at Community Mental Health Centers	4. What changes to the workflow had to be made to use the CMD? How impactful were these changes on the workflow?
	5. Have the CMDs saved time in the clinic, or allowed for a more productive and/or rewarding use of time? How much time has been saved?
	6. How has the CMD impacted the relationship with patients?
	7. To what extent, if at all, has the CMDs at CMHCs project fostered collaboration?
	   a. Have the data available helped align efforts across sectors and between partners?
	   b. Has data sharing with outside organizations increased?

Assess the benefits of the Dashboards to the Community Mental Health Centers	8. Does the CMD add value to behavioral health practices?
	9. Does the CMD make information about hospital and emergency department utilizations more accessible to practices?
	10. What are the biggest benefits of the CMDs in the areas of:
	   a. Use of data for clinical purposes
	   b. Value of the data for practice decision making
	   c. Ease of use of the data within the product

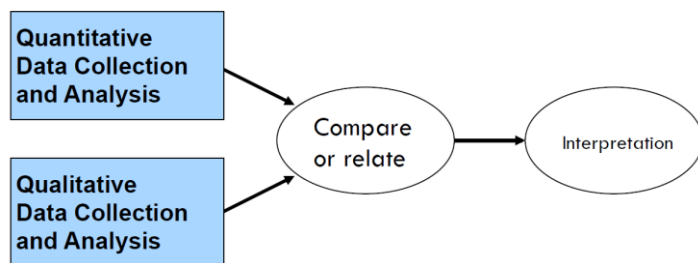| Assess the challenges and future opportunities for implementing the Dashboards to the Community Mental Health Centers	11. What are the biggest challenges found by users of the CMDs?
	    a. Use of data for clinical purposes
	    b. Value of the data for practice decision making
	    c. Ease of use of the data within the product
	12. To what extent, if at all, does the cost of the CMD affect its accessibility for users?
	13. Who has tried to use the CMDs but either failed to use it or found that it did not meet their needs? Why did it not meet your needs?
	14. What changes do users want in the CMD for the CMD to be more helpful?

Evaluation Methodology:

Data was collected using several data collection methods for our SIM evaluation, including both qualitative and quantitative methods. By using multiple procedures for gathering, analyzing, and interpreting data, the evaluation gains greater credibility and provides a clearer picture of the program. Although we are adopting a mixed-methods general approach, there are many evaluation questions in program-specific evaluations that will at least, initially, rely primarily on a single method of data collection, whether that be quantitative or qualitative.

We used a *convergent design* to compare findings from qualitative and quantitative data sources. It involved: collecting both types of data at roughly the same time; assessing information using parallel constructs for both types of data; separately analyzing both types of data; and comparing results through a side-by-side comparison in a discussion, transforming the qualitative data set into quantitative scores, and jointly displaying both forms of data. For example, the evaluation team gathered qualitative data to assess the personal experiences and program satisfaction while also gathering data from survey instruments measuring satisfaction. The two types of data can provide validation for each other and create a solid foundation for drawing conclusions about the program.

Convergent Parallel Design

Quantitative Data Collection and Analysis → Compare or relate → Interpretation

Qualitative Data Collection and Analysis → Compare or relate

We also used an *explanatory sequential design* which involved two phases: (1) an initial quantitative instrument phase, followed by (2) a qualitative data collection phase, in which the qualitative phase builds directly on the results from the quantitative phase. In this way, the quantitative results are explained in more detail through the qualitative data. For example, findings from instrument data about provider programmatic adoption rates were explored further with key informant questions to better understand how the personal experiences of individuals match up to the instrument results.

Explanatory Sequential Design

Quantitative Data Collection and Analysis → Follow up with → Qualitative Data Collection and Analysis → Interpretation
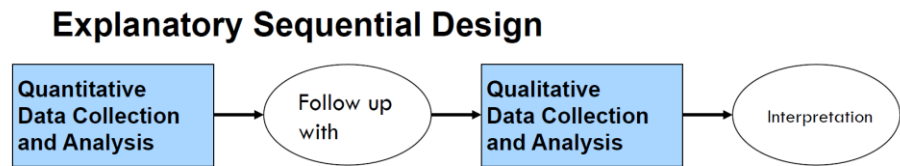
Data Sources:

There were three primary quantitative data sources used for the analysis of this project: Medicaid claims data provided by the Rhode Island Department of Behavioral Health, Developmental Disabilities, and Hospitals (BHDDH), dashboard usage information provided by RIQI, and survey questions from a study conducted by RIQI on dashboard utilizers that was funded by the Rhode Island Foundation (items in Appendix A).

1. Medicaid claims were pulled by staff at BHDDH using an enrollment table that is updated monthly in the Medicaid Management Information System (MMIS) with individuals in the Integrated Health Home/Assertive Community Treatment (IHH/ACT) programs and at which CMHC they are enrolled. This was then matched against Medicaid claims to get the number of Emergency Department (ED) visits (for any reason), inpatient stays (for any reason), psychiatric stays, and total medical costs. These data were then aggregated by program site to generate charts for those outcome variables per thousand IHH/ACT member months (total enrollment days in the programs/days in the month). A significant limitation in the analysis is that the data are for the entire population enrolled in IHH/ACT at each site, which does not necessarily represent the panel enrolled in the CMD at each site. Another limitation of this design is that this data represents Medicaid-only costs. Despite being a large target of the program, these costs do not necessarily represent the potential total costs. These limitations will be discussed in more depth in a limitations and recommendation section following the analytic results.

2. Dashboard usage information was provided by RIQI utilizing internal analytics tools that allowed them to determine the enrolled users of the system, their user status, how often they were engaging with the system in general, and how often they were accessing the different pages and reports of the dashboards.

3. <u>Survey data</u> was also provided in a de-identified manner from a study which RIQI conducted with dashboard utilizers, was funded by a grant from the Rhode Island Foundation. The survey focused on understanding practice usage patterns and practice. Full questions are included in Appendix A.

To complete the mixed-methods analytic approach, we conducted key informant interviews with representative users across six of the seven active program sites. This qualitative methodology allowed us to gather further evidence regarding dashboard utilization, satisfaction, barriers, and suggestions for further refinement. Six in-depth interviews were conducted with seven individuals (two people participated in one interview) via telephone between May 31 and June 18, 2019. The individuals interviewed were employed at six different CMHCs that have been using CMDs, and were identified by Mr. Luke Bruneaux, Director, Data Quality & Analytics, Rhode Island Quality Institute, as being key contacts for understanding dashboard use. All interviewees were first contacted via email, and then follow-up phone calls and emails were made if needed to schedule the telephone interviews. If the initial identified key contact believed that they were not the appropriate person to be interviewed, they were given the opportunity to identify a person who may be more knowledgeable about the use of the dashboards. One of the seven identified CMHCs did not respond to the email and phone requests for an interview. Interviews were conducted by a trained interviewer using a standardized interview guide. The interviews were then professionally transcribed and entered into Nvivo 12 for content analysis. Using an iterative process, content was coded and code verification was then performed by an additional qualitative researcher to enhance the methodological rigor. The codes were finalized via discussion and consensus and collapsed into themes to be utilized in this report.

The full qualitative report and interview guide can be found in Appendix B. For the purposes of this program analysis, the key themes and exemplar quotes have been included as per our convergent parallel and explanatory sequential design where appropriate to address the key evaluation questions.

Dashboard utilization:

As can be seen in the figure using data from the survey conducted by RIQI, most sites (60%) report that they are using the CMD many times per day. There was no one reporting that they were using the CMD only once a week or less. It has clearly become an integrated part of the normal workflow and operations for CMHCs. While all sites are viewing data in the dashboards, 60% also report downloading the data to an Excel file which could then be potentially used for other analytic purposes and shared with other individuals at their site.
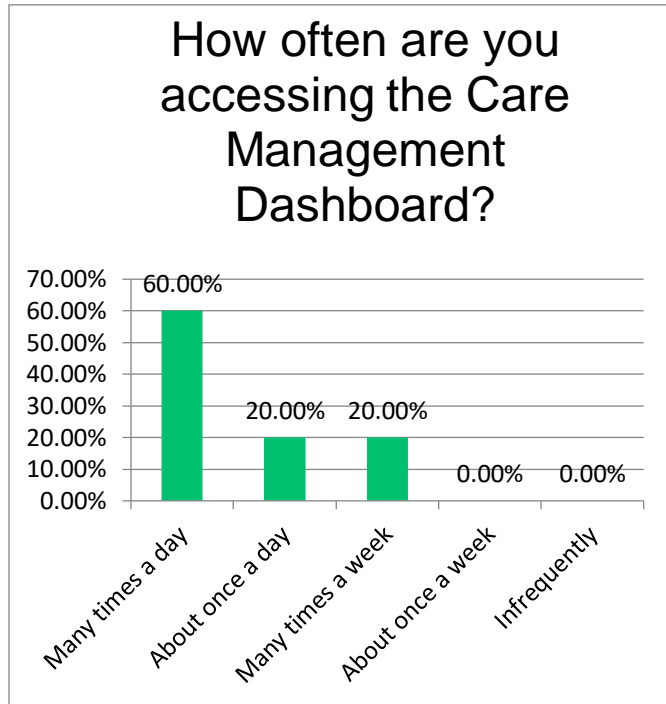
We also utilized data provided by RIQI as described in the data sources to examine actual CMD usage rates.

The data was collapsed for analytic purposes for each site per 100 panel members per month in order to standardize interpretation. Each site had different panel sizes and would therefore be expected to access the data at different frequencies. As can be seen in the table, there was a fair amount of variability between sites regarding what features of the CMD were being accessed which are probably related to different workflow uses of the CMD. As mentioned previously, some sites were downloading the data, which may lead to fewer "usage" counts as the system is only tracking the number of interactions within the dashboard and not usage of downloaded data. There are also sites which have primary dashboard utilizers who compile reports for other team members, while other sites have multiple individuals accessing the CMD. Finally, some sites also relied more heavily upon alerts rather than logging into the system.

Table 3. Care Management Dashboard utilization rates per 100 panel members per month

Site	Dashboard	30-Day Admission Report	72-Hour Discharge Report	Monthly Historical Chart	Monthly Encounter Report	Patient Encounter Report
Site A	20.7	16.3	42.2	1.4	0.6	3.3
Site B	4.8	4.7	0.0	0.1	0.1	0.0
Site C	1.5	1.1	1.1	0.3	0.2	0.7
Site D	1.7	1.4	2.4	0.1	0.0	0.1
Site E	37.0	1.6	1.0	1.9	1.5	5.9
Site F	35.7	29.4	47.9	0.4	0.1	9.5

When surveyed about whether the use of the CMD saved time in their clinic, the results were supportive of a clear and significant effect of a reduction in the time spent identifying high-risk patients (Chi square p < .05). As can be seen in the figure, over half of the care managers reported spending 11 or more hours on high-risk patient identification in 2016 and all reported spending at least 6-10 hours per week on the task. In 2018, after implementation of the CMDs, half of those surveyed were spending 5 hours less on the task, indicative of much greater efficiency in the process of identifying high-risk patients. Although it is possible that some of the increases were occurring due to other efficiencies, the qualitative data supported the direct contribution of the CMDs to their efficiency. A couple of quotes from CMD utilizers sum it up quite well:
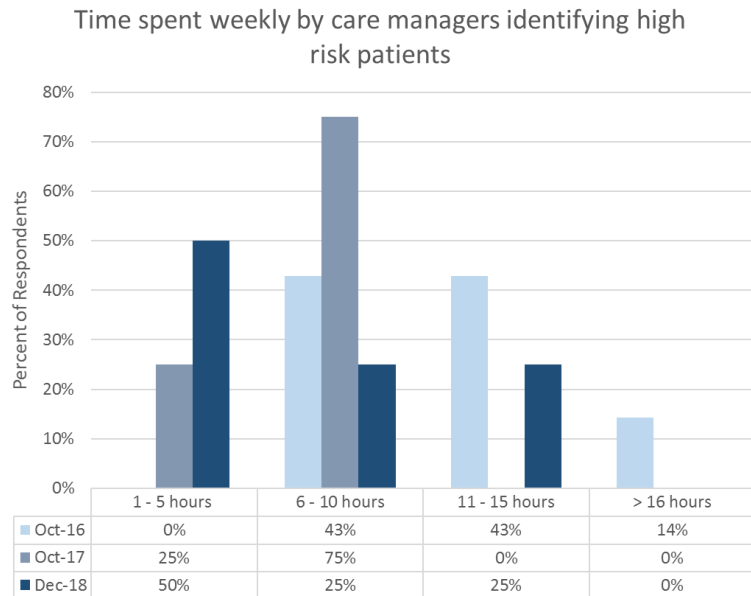
Time spent weekly by care managers identifying high risk patients

	1 - 5 hours	6 - 10 hours	11 - 15 hours	> 16 hours
Oct-16	0%	43%	43%	14%
Oct-17	25%	75%	0%	0%
Dec-18	50%	25%	25%	0%

*"**It frees up so much time**. Rather than our staff sitting at their desks and calling different hospitals and putting out police reports or anything along those lines, they talk about in morning meeting, which they have every day. That can free up some time-- I was a case manager and I would spend hours doing that sometimes. It definitely increases productivity and face-to-face time with clients because case managers aren't searching for people. They have the information at their hands."*
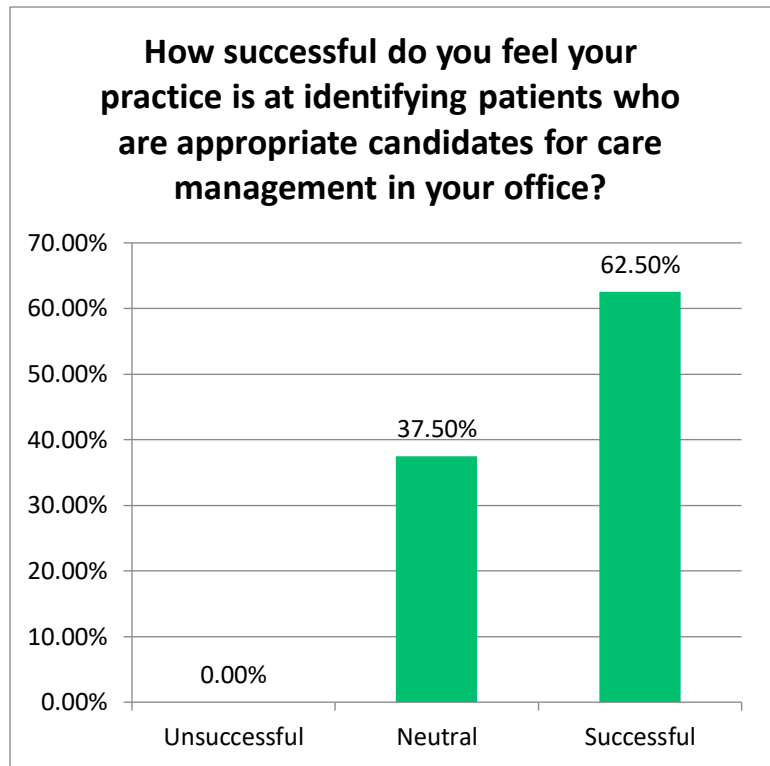
*"It definitely **makes it more efficient in tracking and following up** with the hospitals and also the clients, because if they're discharged then we want to make sure that we're reaching out to them. We're obviously not calling the hospital when we get the alert that they've been discharged -- I'll call the client instead."*

Not only has the program resulted in improved efficiency in identifying high-risk clients, it has also led to greater levels of perceived success at identifying appropriate candidates for care management. These perceptions were supported throughout the qualitative interview results, with a definite theme related to high-risk patient identification and planning across multiple interviews.
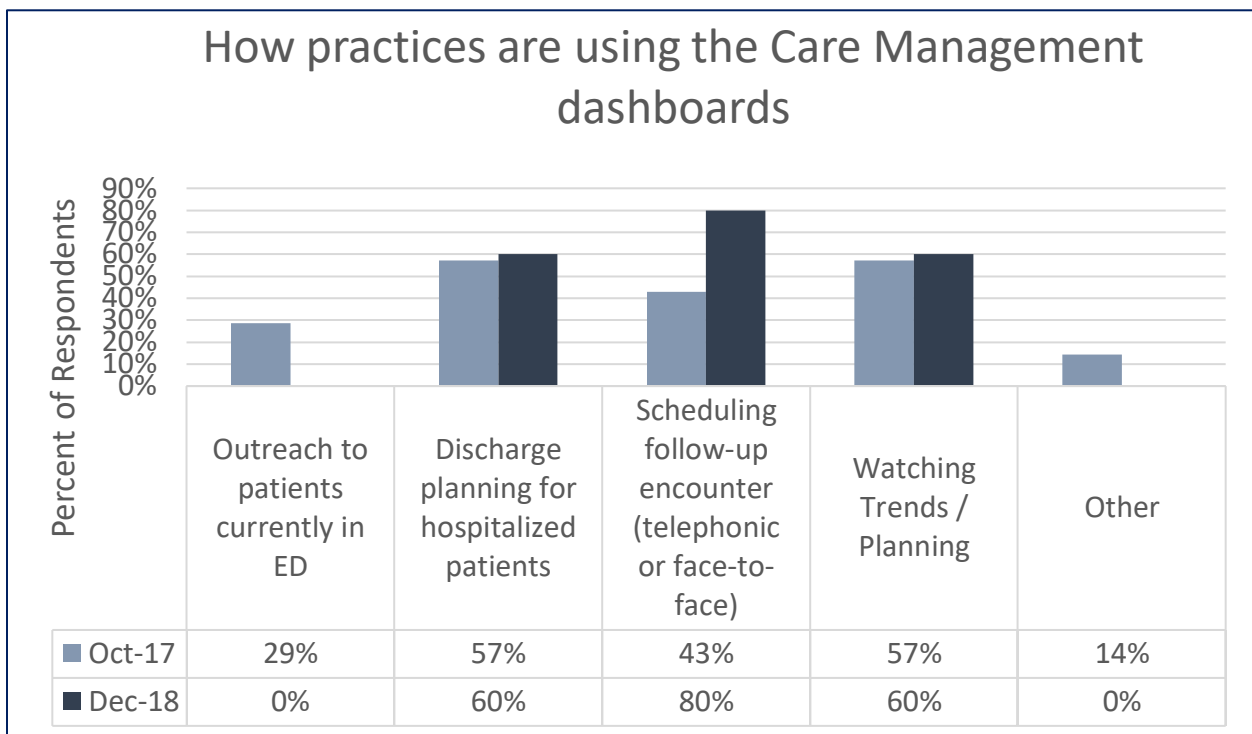
*"There's certain reports that I run to help the program where I am looking [at] our high-- I refer to them as our high utilizers. I send that to the teams and they are looking at these individuals and **coming up with plans to address their needs, so then this tool helps with that**. Anecdotally I've heard [from a client], "How come you know that I'm here in the hospital?" They're surprised and comforted that we are there and helping them."*

*"**We learned about people who were higher risk than we thought**, so they got more face-to-face time. I would say in some cases that actually decreased their usage of the ER."*

How successful do you feel your practice is at identifying patients who are appropriate candidates for care management in your office?

Category	Percentage
Unsuccessful	0.00%
Neutral	37.50%
Successful	62.50%

We were also interested in understanding what the sites were utilizing the CMDs for in their practice and how that impacted their workflow as seen below.

How practices are using the Care Management dashboards

Percent of Respondents

	Outreach to patients currently in ED	Discharge planning for hospitalized patients	Scheduling follow-up encounter (telephonic or face-to-face)	Watching Trends / Planning	Other
Oct-17	29%	57%	43%	57%	14%
Dec-18	0%	60%	80%	60%	0%

The quantitative survey data indicated that the sites were consistently using the CMD to assist in discharge planning, scheduling appropriate follow-ups, and for trends and other analytic functions. This is strong support for the use-cases of the CMDs, as they reflect the intended purposes and the training which RIQI provided the sites as to how best to incorporate the CMD into their practice workflow.

Qualitative results also supported substantial impacts upon workflow in multiple areas, with the theme emerging across multiple qualitative interviews.

"At first, it was just eye-opening. It changed the way we did our quality meetings, our clinical meetings, **_it changed the whole climate on how we provide care,_** *because now we have this ability to see who was using it, and how often they're using it, as opposed to relying on self-report. You could definitely feel a culture change in the way treatment was focused. Which is good because we're supposed to be providing intensive support, and now we were able to see how that intensive support could be provided"*

"I mentioned that you start to look at aggregating [...] the data just to see where your trends are and making program changes based on that [...]even though we've had a decrease in hospitalizations, we were noticing we had a little bit of an increase in ED visits for medical reasons, so needing to put some plans in place with our nurses following up with the clients and also with their primary care doctors to address some issues. **_As I mentioned with our high utilizer, those teams are focusing on those individuals to see what adjustments can be made in their plan of care."_**

"It's been really helpful for our nurses to know when people are hospitalized because they **_coordinate care with the hospitals_**_,_ *and it's been helpful."*

"I actually was excited about the dashboard, because we had been using the hospital alerts prior to having the dashboard where all that information was kind of kept, and we could see in the moment how many of our clients were in the hospital or how many were in the ED. I actually was even more excited when they added the active panel members [interface], where **_we could actually see our full list of clients and being able to just pick one and look at their history of hospitalizations from that view_**_."_

"Knowing that someone's hospitalized is incredibly important because medications, you see, change at hospitalization. **_We want to always be sure that we are delivering the medications that the orders have changed_**_. That's huge, obviously, for the quality of care."*

The use of the CMDs and enhanced awareness of the program goals have led numerous sites (71.43%) to develop a variety of practice-level interventions to help reduce ED visits and inpatient admissions. These programs include:

- Contacting all patients to conduct education about appropriate use of the ED.
- Educating patients on a PCP's protocol on ED use vs PCP visit.
- Working with Emergency Medical Services on a diversion project.
- Planning to give high utilizers a hotline for more timely outpatient care access.
- Inappropriate ED visit patients are contacted and educated as to how to access care at the organization

These interventions have been found to be beneficial and qualitative data supports their utility.

 "From a program level, we're tracking and seeing the utilization of hospitals more closely. I would like to think that __we're providing better care__."

"As far as improving their overall care__, our knowledge of when they were hospitalized or had an emergency room visit, it allows us to work with them better.__ Especially, we have a medication on time program where we have supervised medications that's delivered to clients anywhere from daily or twice a day."

Did you see a change in your results after the intervention(s)?

Yes	60.00%
No	40.00%
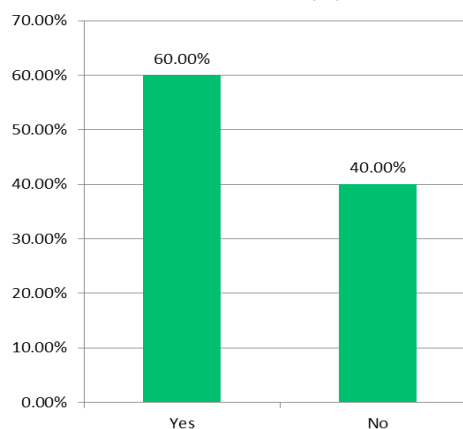
The qualitative data also supports a variety of different use-cases emphasizing care coordination and analytics. This is a definite strength of the program which reflects its utility across multiple domains, allowing it to integrate with desired workflow changes at sites with different needs.

"We use it to be able to review clients who perhaps are just __simply presenting [to] the emergency room for non-emergency visits__ so that we can address if it's medical, have they not seen their PCP, or if they have COPD, [their] pulmonologist, so that __we can coordinate their care with their medical specialists__."

"I'm pretty sure [clients] benefit pretty greatly. For many years, I did clinical work with clients. We never knew if they were hospitalized unless they called us or told somebody at the hospital who would call us ... We're able to- every day, __we are updating the staff who treat the hospitalized clients, and giving them all the information that we can find__ between, obviously, the dashboard, and CurrentCare... The staff that updated it to what's going on, what the needs are, what the concerns are, anything new, and to actually learn stuff that nobody ever knew before about the clients, so it's very valuable."

*"Once the team gets the information, **we try to book an appointment to get them to come in to see a nurse that's on their team**. Just so they can follow-up with them about their admission to see if there are any needs that they still have."*
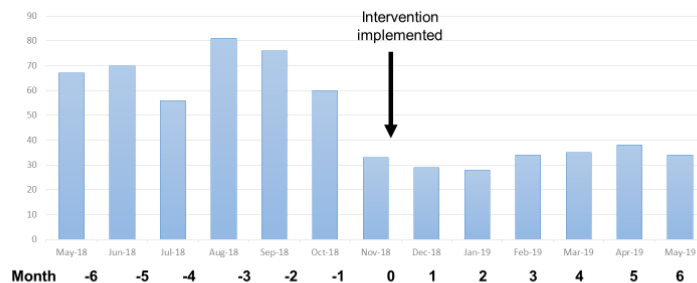
*"It's a great thing. Having worked for some many years clinically with people, and not knowing what the hell was going on with them medically was always a handicap. Now, we have some clients who are very on top of what's happening with them medically, and they give us feedback. Then others, not so much. Also, I guess down the road, **we can probably be looking more and more at what kinds of issues our clients are suffering from. It's a lot clearer. We used to think we knew what was going on,** but it's becoming more and more clear about what some of the key problems are medically."*

Impacts of CMD usage on Medicaid Outcomes:

As discussed in the data sources section, we were able to receive data from BHDDH related to Medicaid costs by project site on ED use, inpatient stays, psychiatric stays, and cost per member per month. These were based on claims data for the entire IHH/ACT membership at each site and as noted, this is not necessarily the same as the site's CMD panel

Example of time periods examined

membership. As evaluators we were provided with site-level, de-identified aggregate data from each site from January 2016 through August 2018 for each outcome variable of interest. As noted in Table 1, each program had a different start date, so we utilized a

Example of time periods examined

methodology as depicted in the figure to determine a 6-month pre-implementation baseline and a 6-month post implementation period. The 6-month time frame did not allow us to utilize the full range of data available for each site but was necessary to standardize the data periods given the available data from sites pre- or post-implementation.
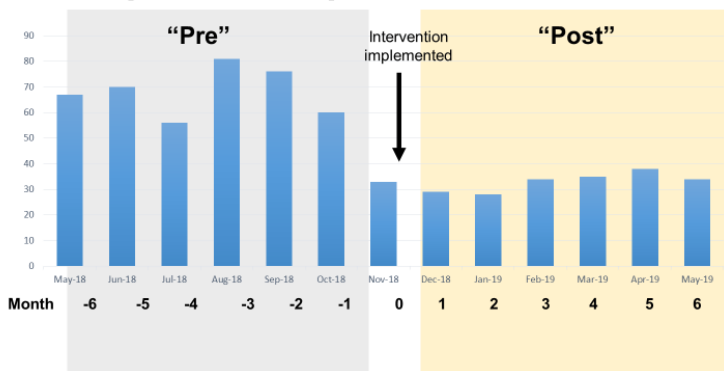
Our statistical analysis approach was to utilize dependent samples t-tests to examine average differences in each measure comparing pre- and post-implementation periods. We also calculated effect sizes using Cohen's D as an indicator of program outcomes that are independent of the relatively small sample size of sites available for analysis. The figure to the right provides some guidance in the interpretation of the strength of any effects.

Small effect = .2
Medium effect = .5
Large effect = .8
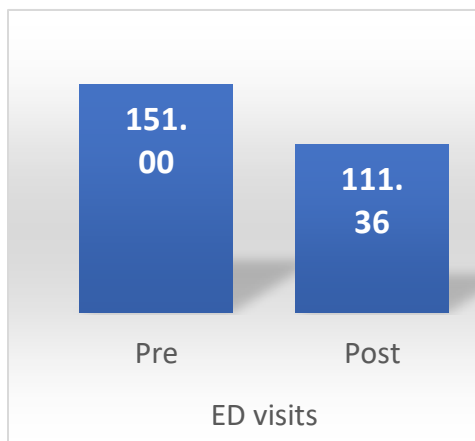
Examining the effect pre- and post-implementation for ED visits resulted in a significant difference between time periods, with a significant decrease ($p < .05$) in the number of visits per 1000 member months of nearly 40 visits. This is associated with a large effect size (Cohen's D= .88) supporting that following the implementation of the CMDs there was a meaningful reduction in ED visits found in the Medicaid claims data across sites.

When examining the impacts within each site, there was support for significant pre-post differences ($p < .05$) at each site as shown below.

## ED visits
(* indicates significant difference, $p < .05$)
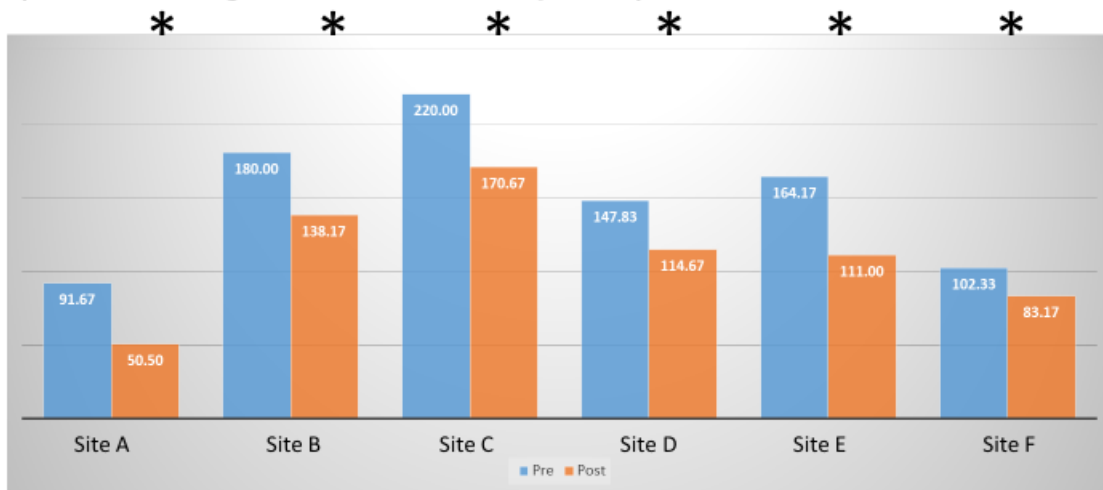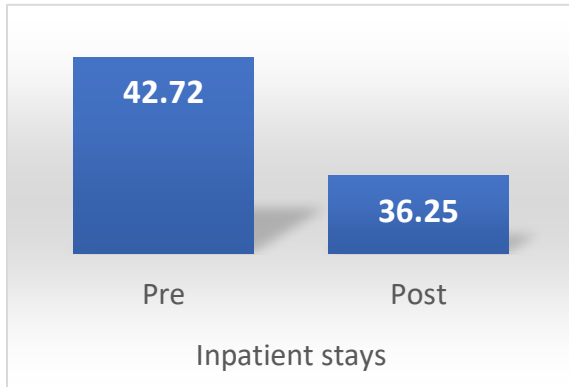
Examining the effect pre- and post-implementation for inpatient stays also demonstrated a significant difference between the time periods (p < .05). There were approximately 6 fewer inpatient stays per 1000 member months after CMD implementation. This represents a moderate effect (Cohen's D = .57), supporting the meaningful impact of implementation on inpatient stay reductions.
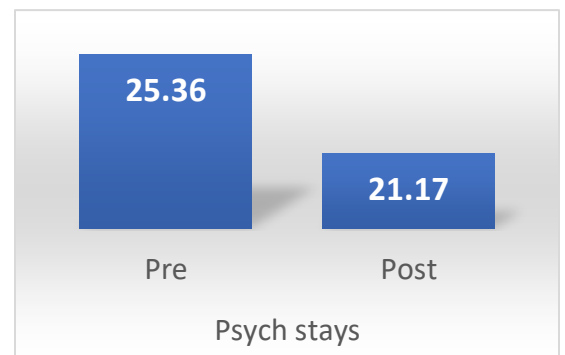
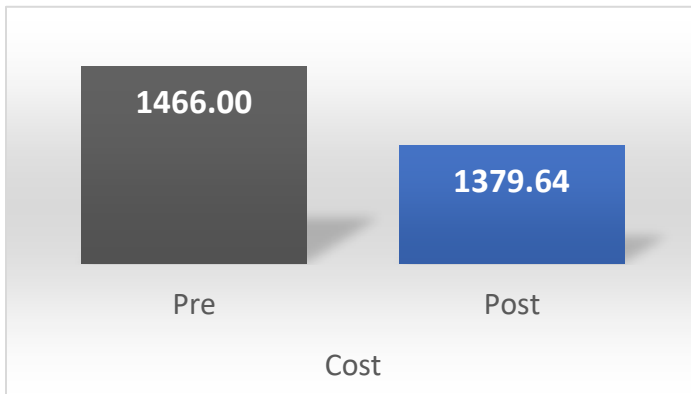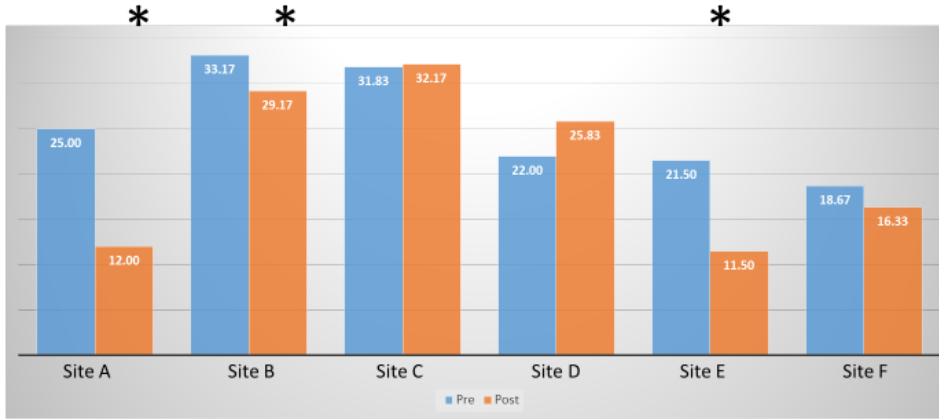There were similar impacts seen across many of the sites when they were examined individually.
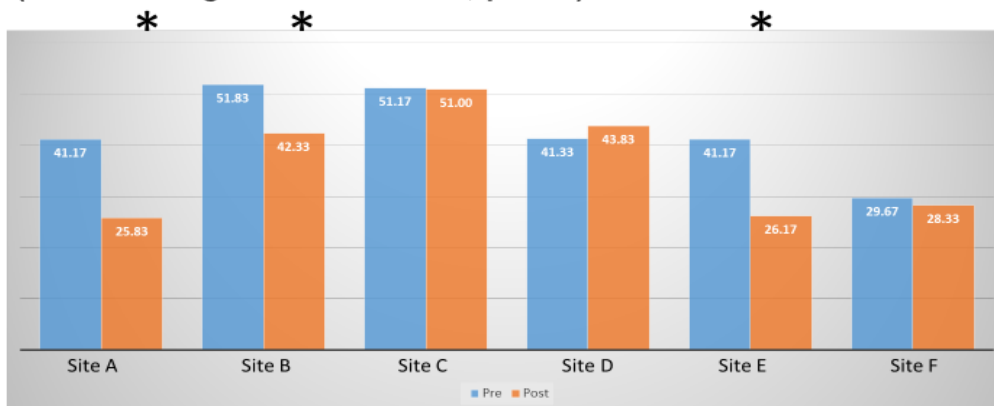
Similar findings were found when examining psychiatric stays, with significant reductions post-implementation (p < .05) of approximately 4 stays per 1000 member months and a moderate effect size (Cohen's D = .51). This is important to consider in light of the use of IHH/ACT data, which necessitates due to enrollment criteria that each member has a history of psychiatric inpatient stays. The results also replicated what was found when examining site level differences in inpatient stays.

Psychiatric stays
(* indicates significant difference, p < .05)

	Site A	Site B	Site C	Site D	Site E	Site F
Pre	25.00	33.17	31.83	22.00	21.50	18.67
Post	12.00	29.17	32.17	25.83	11.50	16.33

Cost
Pre 1466.00
Post 1379.64

When examining the impacts upon member costs per month, there was a similar pattern of reduction and a moderate effect size (Cohen's D = .47). However, because of large standard deviations and small sample sizes, the t-test did not yield significant results across sites or when examining site-specific results.

Cost per member per month ($)
(* indicates significant difference, p < .05)

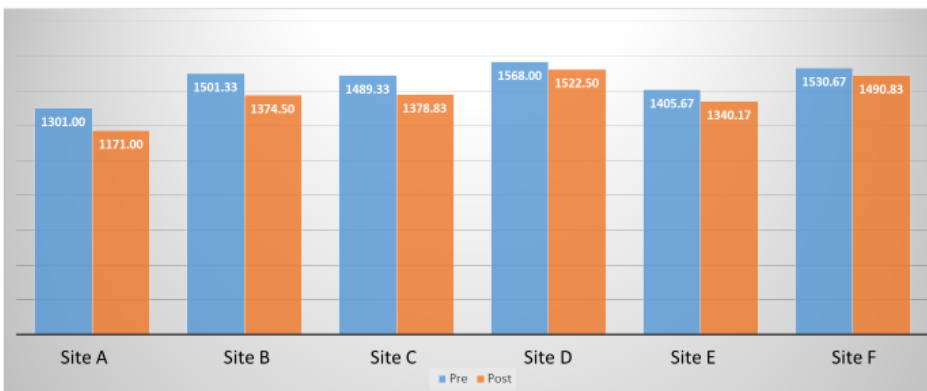|	Site A	Site B	Site C	Site D	Site E	Site F
Pre	1301.00	1501.33	1489.33	1568.00	1405.67	1530.67
Post	1171.00	1374.50	1378.83	1522.50	1340.17	1490.83

Table 4. Relationships between CMD usage and Medicaid claims outcomes (p values)

Measure	Change in ED visits	Change in Cost	Change in Inpatient Stays	Change in Psych Stays
Dashboard	0.266 (0.610)	-0.188 (0.721)	0.029 (0.957)	0.194 (0.713)
30-day admissions report	0.775 (0.070)	0.339 (0.511)	0.349 (0.497)	0.351 (0.495)
72-hours discharge report	0.551 (0.257)	0.184 (0.727)	0.070 (0.896)	0.049 (0.927)
Monthly historical chart	-0.474 (0.342)	-0.752 (0.085)	-0.613 (0.196)	-0.469 (0.348)
Monthly encounter report	-0.528 (0.282)	-0.727 (0.102)	-0.513 (0.298)	-0.334 (0.517)
Patient encounter report	0.514 (0.297)	0.151 (0.776)	0.190 (0.719)	0.331 (0.522)

As seen in the table above, although there were no significant results, we highlighted in green those areas in which greater CMD usage was linked with potentially impactful improvements in Medicaid claims outcomes. Greater frequency of accessing the monthly historical charts and monthly encounter reports may be associated with lower costs and lower numbers of ED visits and inpatient stays. We cannot assign causality in this case, but it is possible that the sites are accessing those reports for analytic purposes to assist the planning of care coordination of high-risk patients. The orange boxes represent instances in which higher CMD usage is related to greater numbers of ED visits. Again, no causality may be assigned, and it could be that the directionality is reversed - that is, because there is greater ED use, the sites are more frequently needing to access the admissions, patient encounters, and discharge reports.

Data limitations and analytic suggestions:

As has been mentioned earlier in the report, there are several significant limitations in the data being utilized that must be considered when interpreting these results. One major limitation is the use of Medicaid-only data for the analyses. This was the available data for the analysis and should capture the majority of costs in the target populations, but there exist other insurance-level data on costs and stays which could paint a fuller picture of the impacts of the CMDs on outcomes. Future analyses that can incorporate data from the All-Payer Claims Database (APCD) should yield richer results.

The reliance upon the Medicaid data also gave a narrower window of available data for analysis, as it was only available through August 2018, despite the ongoing operation of the CMDs in the clinics. Future approaches are encouraged to utilize as much post-implementation data as possible to allow an assessment of longer-term impacts.

The data available for analysis also only included those individuals in the IHH/ACT programs within the sites. Although these individuals are likely targets to be included in the sites' panels because of the requirements of the IHH/ACT program, which encourage ED and inpatient reductions due to potential penalties for utilization, we are unable to match the panel membership with the Medicaid claims outcomes in this report. This is a limitation of the analyses; however, it also speaks to the strength of the relationships found in this report. Given that it is possible that the Medicaid claims data includes individuals not in the site panel, and assuming use of the CMDs is having a positive effect on outcomes, the inclusion in the data of those not in the panel would weaken any results and relationships. Therefore, the moderate and strong effects seen in the available data may be even stronger in an analysis limited only to the panel sample.

The current analytic framework required us to standardize the pre/post periods to be fixed at 6 months to ensure adequate data across sites. This methodology, while appropriate, does provide some strength at smoothing out potential site differences, but that comes at the cost of understanding seasonal/calendar variation in ED use, costs, etc. As the programs launched at different calendar dates, future analyses that control for seasonality are warranted.

Finally, it would be advisable to conduct analyses that utilize the full month-to-month data available to examine patterns of change. Visual examination of the data suggests that there may have already been a pattern of reduction occurring prior to the CMD implementation, confounding the interpretation of the simple t-test difference results. It is important to consider the context in which these programs were being implemented, as part of the IHH/ACT initiatives were already encouraging the enrolled practices to identify and work with their high-risk populations to enhance care coordination and reduce unnecessary ED visits and stays. Spline regressions using the implementation time point as an initial knot could serve to examine changes in slope for pre- and post-implementation periods. Likewise, other autoregressive time-series analysis may be warranted to provide more detailed interpretations in the future.

Despite these limitations and suggestions for future analyses, the combined mixed-methods methodology presented in this report does present a strong case for the utility of the CMDs at impacting practice operations, and ultimately Medicaid claims data is in support of the proposed conceptual model.

Challenges reported by CMD utilizers:

We primarily used the key informant interviews to gather information regarding their reported challenges in using the CMD. There were three major themes which emerged from the analysis:

1. An overwhelming amount of information
2. Limitations in CMD completeness
3. Challenges with the interface

There were several interviews which indicated that occasionally the utilizers were overwhelmed by the amount of information available in the CMD, and there was even a suggestion that they rely upon the alerts rather than utilizing the dashboards.

> *"What we do now, is we have to weed a lot this stuff out that just does not apply to what our needs are. Every morning, I'm typically the first one here. I open up the dashboard, and I first of all go to discharges because some of our clients get discharged late the day before, and so we find the discharges first. Then __I whittle that dashboard down to just what we need for information__, and I print out a copy of the most recent currently hospitalized folks."*

> *"Truthfully, __we don't use the dashboard a lot, we rely on the alerts__. Because, actually, our nurses receive the alerts and enter it into our EHR, so we know when clients are hospitalized or visited the ER. So, we actually draw our data from our EHR rather than using the dashboard."*

> *"There's a lot of information on the dashboard, a tremendous amount. As I said, __we just weed out what we need__ and don't go getting into the statistics or anything."*

On the other hand, a repeated concern was that there was not enough data included in the CMD. A particular frustration appeared to reflect the lack of data available from psychiatric hospitals. Although this likely relates to concerns regarding federal law (42 CFR, Part 2) governing the sharing of substance use disorder treatment information, it may be an area worth examining more critically in future if the effort is to truly allow integrated care coordination. Interviewees also raised issues related to the inability to access data on regional hospitals given proximity to Massachusetts and Connecticut.

> *__"Even though this is a great tool, it's not the only thing I'm looking at__ as far as from the data standpoint, so the ideal world would be to have everything all in one place where I can just pull data from, instead of having to pull from here, cross-reference here. It's time-consuming to do that."*

> *"When our clients go to Butler Hospital and get admitted inpatient to the psych hospital, __we rely on some database email that comes in the morning__, and then can we get someone over to find the client when they're getting discharged so that we can follow up. That's just a whole other issue."*

> *"There is the drawback that we are a mental health center and __we [don't] get information from Butler [Hospital] and some of the other psychiatric hospitalizations.__"*

> *"I think it's done a good job for most of the things. __It's really unfortunate that we haven't been able to get the psychiatric hospitalization [data]__ and we still need to use other methods to find out if someone is in Butler [Hospital]... client*

report or such. That's always an issue… I don't believe we get alerts when people present that at Massachusetts hospital."

Finally, there were several interviewees that expressed concerns regarding the CMD interface. One concern was related to the ability to access the system and the password prompt system.

> *"…**actually logging into the dashboard, it's very difficult if you don't remember your password,** or if you type in your password wrong. You have to email them for a password—[…] It's not like logging into your email, and then they send you a link thing, type this pass code in, and then answer these questions, you'll get a new password. Now **you have to call the phone number and you have to get a new password. That's very difficult in this age** where we have to have a lot of passwords for different portals and dashboards, especially in healthcare."*

It is unclear if this is a resolvable issue given whatever security is required because of the nature of the data, but perhaps it would be possible to have a simpler system for assisting in password recall.

There also was discussion of some technical problems with the interface itself and its usability within certain browser frameworks that RIQI has already worked to resolve.

> *"I think the only part that's really difficult is-- They're working on it themselves, they said back in our last meeting, is that **sometimes it's hard to click on certain graphs or points to get the data.** You go to click somewhere but the actual link is to the left a couple of centimeters, but they know that and they were working on that, and it tends to only be in certain browsers. **I would say the user-friendliness of it could be a little bit better**."*

Program sustainability and cost issues:

Part of the interview process asked the interviewees to focus on the role of cost in sustaining the program beyond the initial SIM funding investment. Overall, there was strong support for continuing the program, but an acknowledgement that cost was a potential factor not only in continuing the program but also in how many individuals they placed into their panels, as panel size is a contributing factor in maintenance cost.

> *"**We've been there and we don't want to go back** but I understand there's a cost in maintaining all this and so, unfortunately, the funding too is not where it should be to be able to support some of these systems. I don't know if this was to go away, I don't know what we would do."*

> *"If everything remains as-is with the cost, because we are paying a small fee for each individual that we have in the dashboard, **I think that we would**

obviously continue to support this. If there's a change financially I can't say for sure."

"*It's only a subset (of our population) because of the cost factor*."

Suggestions for CMD improvement:

When asked about the areas in which the CMDs could be improved, there was a definite theme related to the earlier complaint regarding the incorporation of data from psychiatric facilities into the CMD data feed. Another theme which emerged had a focus around increased capabilities as related to the analytic power of the CMD. As sites look to enhance how the CMD impacts their practice, they want to use it as a planning tool to aid in decision-making and design of new interventions and protocols as illustrated by the quotes below:

> "*There's information around the reasons, the clinical reasons that a client was hospitalized or went to the ED. [Is there] any way to get a summary report of the utilization of our clients in the dashboard, the percentage of them who went to the ED for a particular complaint, the number of clients or percentage of who went to the hospital for another reason?*"

> "*When you start talking about population management, it'd be nice to see [if there] are similar populations that are in our dashboard, and looking at their hospitalizations, and what are the reasons why they're going in?*"

Finally, there were suggestions around the theme of seamless integration with other systems, such as CurrentCare. It may be possible that these are solutions which RIQI could execute with minimal investment to benefit not only the CMHCs using the CMD, but all CMD utilizers across the state.

> "*It would be helpful if there was a link from the Dashboard to the patient's discharge summary rather than logging into CurrentCare to access it.*"

Summary and Recommended Next Steps

Using a mixed-methods approach with multiple data sources documented similar impacts across all data methodologies used, providing convergent evidence for utility of the Care Management Dashboards in Community Mental Health Centers.
The evaluation found support for the use of the CMDs in positively impacting the practices' workflows. There was quantitative and qualitative support for the increased efficiency of using the CMDs to help identify and manage high-risk panel members. The CMDs facilitated the creation of new, successful interventions and protocols to provide

greater care coordination, management of discharges and transitions of care, and medication tracking. The implementation of CMDs was associated with moderate to strong effect size changes in the number of ED visits, inpatient and psychiatric stays, and total costs per member per month using Medicaid claims data for the site's IHH/ACT clients.

When queried regarding the challenges associated with using the dashboards, several themes emerged. There were concerns that there was too much information included on the dashboards, consistent issues regarding the completeness of the database with an emphasis on the absent data from behavioral health units and hospitals, and a few technological/interface challenges. Despite some limitations with the dashboards, there seems to be clear support for sustainability as long as costs do not change significantly. Individuals valued the contributions of the dashboards to their practice and workflows.

There were several suggestions and recommendations included throughout the report. One area of particular concern regarding future evaluation efforts is to gain a more comprehensive data set. This would include data from all payers, a long post-implementation time frame, and a representation of the full panels at the sites rather than only IHH/ACT members and/or a determination of the extent to which current panels consist of IHH/ACT members. It is also recommended to conduct more sensitive analyses with such a data set, such as spline regression or autocorrelational time series tests, to examine patterns of change as well as control for potential seasonality in the data.

The qualitative interviews highlighted several areas for potential improvement, including expanding the available data sources to include Butler Hospital and/or other regional hospitals. Current barriers are related to federal regulations around sharing substance use disorder data, but there may be other behavioral healthcare data which could be shared under current regulations. There were also suggestions to improve the interface and interoperability with CurrentCare. Overall, there seemed to be an underlying desire to make the dashboards more functional to specific practice needs and use-cases where possible.

When examining the project overall, it appears to be highly successful. The CMHCs are using the CMDs to change their practices to help facilitate care coordination as designed. This is having beneficial impacts with the practices, as well as showing signs of impacting care and cost parameters. The program should seek ways to sustain their relationships with the CMHCs, and improvements to the functionality of the CMDs will positively impact all users, not only the CMHCs.

List of Acronyms

CMHC: Community Mental Health Center

SIM: State Innovation Model Test Grant

ED: Emergency Department

RIQI: Rhode Island Quality Institute

CMD: Care Management Dashboard

ADT: Admissions, discharge, transfer

PCP: Primary Care Physician

IHH/ACT: Integrated Health Home/Assertive Community Treatment programs

Appendix A

Survey questions in the Rhode Island Foundation funded study evaluation

-       On average, how many hours per week does your staff spend identifying high risk patients (including searching for and culling lists, identifying patients as high risk, and prioritizing outreach)?
    - o 1-5 hours
    - o 6-10 hours
    - o 11-15 hours
    - o > 16 hours
-       How successful do you feel your practice is at identifying patients who are appropriate candidates for care management in your office?
    - o Unsuccessful
    - o Neutral
    - o Successful
-       After an encounter at a hospital or ED, what is the average time that passes before the notification reaches the hands of the person responsible for contacting the patient?
    - o <1 hour
    - o 1-2 hours
    - o 3-6 hours
    - o 1 day
    - o 2 days
    - o > 2 days
-       Does your practice have a process to connect with patients or their providers in the hospital, while a patient is still in the ED?
-       Does your practice have a process to connect with patients or their hospitalist while a patient is still in the hospital as an inpatient?
-       What is the high-level process that your practice follows when you are notified of ED and/or inpatient discharge?
-       How much administrative time is spent per patient per visit trying to find information about high risk patients' ED and hospital stays (such as managing faxes & Direct messages, logging into hospital systems, managing payer lists, etc.)?
    - o < 15 minutes
    - o 15-30 minutes
    - o 31-60 minutes
    - o > 60 minutes
-       Have you engaged in any interventions to reduce ED and inpatient admissions in the past 6 months?
-       Please describe the intervention(s) you have engaged in:
-       Did you see a change in your results after the intervention(s)?

- Are you currently using the Care Management Dashboard?
- How often are you accessing the Care Management Dashboard?
    - Many times a day
    - About once a day
    - Many times a week
    - About once a week
    - Infrequently
- What are you using the Dashboard for? (Select all that apply)
    - Outreach to patients currently in ED
    - Discharge planning for hospitalized patients
    - Scheduling follow-up encounter (telephonic or face-to-face)
    - Watching Trends / Planning
    - Other (please specify)
- How are you using the data in the Dashboard? (Select all that apply)
    - Downloading to Excel
    - Viewing within the Dashboard
- Are you currently receiving Care Management Alerts? (Note: these are separate from CurrentCare Hospital Alerts. You provide a panel of patients, and you will receive alerts if those patients go to the ED or inpatient, regardless of whether they are enrolled in CurrentCare)
- How are you benefiting from Care Management Alerts? (Select all that apply)
    - Outreach to patients currently in ED
    - Discharge planning for hospitalized patients
    - Scheduling follow-up encounter (telephonic or face-to-face)
    - Other (please specify):

Appendix B

Key Informant Report and Interview Guide

A Qualitative Exploration of the Use and Perceived Impact of the Community Mental Health Center Care Management Dashboards

Contents

Executive summary

One project supported by the State Innovation Model (SIM) Test Grant is the development of a system to allow "real-time" communication between Rhode Island hospital providers and Community Mental Health Centers. The system the Care Management Dashboards, deliver real-time, encrypted notifications to the CMHCs regarding client emergency department visits or hospitalizations, with the goal of facilitating targeted, appropriate clinical interventions, improving care coordination, and reducing readmissions (SIM, 2018).

Six in-depth interviews were conducted with seven individuals (two people participated in one interview) via telephone between May 31 and June 18, 2019. The interviews were conducted to explore the expectations for dashboards, use of the dashboards, perceived benefits and challenges associated with the use of the dashboard, and thoughts on future/continued use (SIM, 2018).

The dashboards were viewed as being beneficial for both patients/clients and providers including practice changes which improved coordination of care and agency workflow and programmatic changes, including a reduction in hospital utilization. Alerts of hospitalizations and ED visits were perceived as having important impacts on care coordination, with most respondents reporting that their use would likely have a positive impact on client health, especially patients considered to be at high risk. The timeliness of ED visits and hospitalizations alerts was seen as important and as increasing efficiency. Noted challenges associated with the use of the dashboard including difficulty in obtaining/resetting passwords, managing the increased volume of data, and some interviewees thought the system could be more user friendly, especially when it comes to accessing appropriate data. Nearly all participants stated that updates from Butler Hospital were not included in the dashboards, and this was a limitation. It seems several CMHCs are not utilizing the dashboards to the full potential in part due to time and/or staff constraints.

Respondents were interested and supported the continued use of the dashboards, but several people reported that future use may be dependent on the costs. When asked what would happen if the dashboards were no longer available all interviewees felt that there would be a negative impact on their clients as it would decrease the ability to have timely alerts, and therefore impact follow-up care. They also felt there would be a negative effect on the site efficiency, time management, and workflow.

When asked about additional suggestions and feedback related to the dashboards, having a better way to streamline data, reports, and records were included.

Introduction

As reported in Rhode Island State Innovation Model (SIM) Test Grant Operational Plan. One priority for the State Innovation Model (SIM) Test Grant has been to develop technology to allow "real-time" communication system between Rhode Island hospital providers and Community Mental Health Centers (CMHCs), which are mutually responsible for the care of approximately 8,500 publicly insured individuals with serious mental illness (SIM). To allow this real time communication, Rhode Island Quality Institute (RIQI) designed and implemented the Care Management Dashboards (referred to as dashboard henceforth) in all CMHCs (SIM, 2018).

The dashboards deliver real-time, encrypted notifications to the CMHCs when their clients visit the hospital emergency department (ED) or are hospitalized. The goal of the dashboards is "facilitating targeted, appropriate clinical interventions, improving care coordination, and reducing readmissions. The dashboards and associated alerts provide near real-time data, giving up-to-date information on patient care within Rhode Island's hospital systems." The use of the dashboard is paid for by per member per month (PMPM) cost to the CMHCs. In addition to implementation of the dashboard tool, SIM Test Grant covers the cost to train providers in use of this new technology (SIM, 2018).

Key informant interviews were conducted to explore the expectations for dashboards, use of the dashboards, perceived benefits and challenges associated with the use of the dashboard, and thoughts on future/continued use if the dashboards.

Key informant interviews

Six in-depth interviews were conducted with seven individuals (two people participated in one interview) via telephone between May 31 and June 18, 2019. The individuals interviewed, employed at six different the CMHCs that have adopted the dashboards, were identified as being key informants by Mr. Luke Bruneaux, Director, Data Quality & Analytics, Rhode Island Quality Institute (RIQI), for understanding dashboard use. All interviewees were first contacted via email, and follow-up phone calls and emails were made as needed to schedule the interviews. If the initial identified key informant believed that they were not the appropriate person to be interviewed, they were asked to identify a person who may be more knowledgeable about the use of the dashboards. One of the individuals identified as a key informant did not respond to the email and phone requests for an interview.

All interviews were conducted by a qualitative researcher from the University of Rhode Island (URI), and lasted between 10-20 minutes. One interview included two people, while the others were individual interviews. The interviewer used a semi-structured interview guide with prompts to guide that had been designed to explore the use of the dashboards, perceived value, and impacts of dashboard use.

Participants

Most participants were in upper level administrative positions, manager or director level staff at the CMHC where they were employed. As noted before, one interview was conducted with two individuals as the identified key informant was new to the CMHC and asked a colleague to join her in the interview.

Analysis and Results

All interviews were audio-recorded with the permission of each interviewee, and all recordings were professionally transcribed. The transcripts were then coded by each question. Codes were then reviewed and combined into themes, which were then grouped into domains: 1) expected effects of dashboards; 2) use dashboards; 3) program impacts; and 4) practice impacts.

Expected effects of the dashboard at the outset

Although two interviewees did not have any preconceived expectations for dashboards, the other four interviewees had anticipated that the dashboards would have a positive impact such as increasing the CMHC's ability to determine if clients have been to the ED or hospitalized in real time. It was anticipated that real time updates would improve coordination of care.

> "I was hoping that we would be able to integrate it and be able to help locate people we think are missing, use it as a way of-- Before we call the police, or something like that, use it as a way to check and see if someone's in the hospital somewhere first, before doing a missing person. Be able to see that clients are in the hospitals and try and coordinate care through that."

> "My expectation was that it would help and that it would provide us with information about hospitalizations and emergency room visits for our clients in a much better time-frame than the way that we were getting information prior to the dashboards."

Use of dashboards

We asked interviewees to describe how the dashboards were used by their organization to determine if all of their clients or a subset of clients were included.

Clients included in the dashboard

One interviewee stated that all their clients were on the dashboard, while most others spoke of limiting the dashboards to a subset of their client populations including those that may be considered at high risk and have complex conditions. One person stated that they use the dashboard for their community clients and their outpatients and that they "do not use it for residential folks, because we know where our residential folks are."

"We have all of our clients on the dashboard."

"It's a subset for our agency. It's all for my programs. Our department includes all of our integrated health home clients, our ACT clients, […], and also residential clients. We have them all in the dashboard. We also have an outpatient health home program that is in the dashboard, and I believe our healthy transition."

One participant reported that they "scaled back our dashboard. We had it on or all of our patients and then we had to cut it down to just our high-risk patients". The reasons for reducing the number of clients included in the dashboard was due to associated costs, workflow, and volume of data. However, they are considering changing their workflow so that they may include all of their clients.

"There are multiple reasons [scaled back]. We don't have anyone dedicated specifically to reviewing all of the hospital admissions. We found that because it was going to so many different people just getting lost and overwhelming for our employees and also it's extremely costly. We have scaled back to our nurse care managers and high-risk patients only because we have a designated set like a few people that are in there constantly and that's really their primary responsibility. We are looking at changing our workflow. We might have a designated person looking at hospital admissions. We might eventually do go back to the whole population. Something we have to look at the cost effectiveness"

Use of dashboard functions

All interviewees spoke of the alerts when asked about their use of the dashboard, with one interviewee reporting that their use centered on the alerts, and that they did not use other functions. Similarly, another interviewee spoke of only accessing limited information from the dashboard. It appears that the use of the dashboard varies between agencies based on their specific needs, computer skills, and the amount of support/staff that they have to utilize it.

"Truthfully, we don't use the dashboard a lot, we rely on the alerts … Because, actually, our nurses receive the alerts and enter it into our EHR (electronic health record), and so we know when clients are hospitalized or visited the ER. So, we actually draw our data from our EHR rather than using the dashboard."

"There's a lot of information on the dashboard, a tremendous amount. As I said, we just weed out what we need and don't go getting into the statistics or anything."

"There's certain reports that I run to help the program where I am looking our high—I refer to them as our high utilizers. I see that to the teams and they are looking at these individuals and coming up with plans to address their needs, so then this tool helps with that."

Program impacts of using the dashboards

Two program impacts were identified as being associated with the use of the dashboards and are discussed below.

Real time awareness of hospitalization and ED visits

Participants spoke of the dashboards allowing them to know when patients were hospitalized and had visited the ED in real time. Several interviewees noted that before the dashboards they had relied on clients reporting ED visits and hospitalizations, and that through the dashboards, they realized there was an underreporting of hospitalizations and ED visits. This enables CMHC staff to identify trends and higher risk patients/clients.

"We can't always count on knowing when our clients are hospitalized (before dashboards), so it's been a very valuable tool."

"I probably don't have to tell you, [hospitalizations] are pretty short these days for the most part. It doesn't do us a lot of good today to find out that four days ago somebody was admitted [to the hospital] because they've probably already gone home. So that's one of the very valuable things. We're finding stuff quicker than we would have if left to our own devices, I would say."

"We definitely were able to see that clients were utilizing the emergency room far more than they were reporting to us, and we definitely learned, in probably 98% of the time, the hospitals do not notify us that they are in the hospital. We only learn about emergency room visits and psychiatric visits-- We only learned about emergency room visits from self-reporting, but now we learn it through the dashboard, which is very helpful. If they're medically hospitalized we would only learn that from self-report and the occasional discharge summary, but we'd never learn of it during so that helped."

Benefits of real time information on hospitalizations and ED visits

Several participants spoke of the benefit of knowing when their clients were in the hospital or had been to the ED as this information enabled the CMHC /providers to respond quickly, gain information, and coordinate care, including scheduling needed follow-up appointments. Several interviewees reported that this information allowed for concerns to be identified and addressed.

"We were getting the hospital alerts right along, which has helped us respond to the hospital, but the dashboard allows us to check more information as far as if there's concern of where the client might be and we didn't get an alert, we now can go somewhere and verify information, even to the room number. It's been helpful in that way."

"It's been really helpful for our nurses to know when people are hospitalized because they coordinate care with the hospitals, and it's been helpful.

"Once the team gets the information [hospitalization or ED visit], we try to book an appointment to get them to come in to see a nurse that's on their team. Just so they can follow-up with them about their admission to see if there are any needs that they still have."

Interviewees were asked to discuss how their clients benefit from the use of the dashboards, and respondents felt that clients benefitted from the CMHC/providers having an increased awareness of client status and care received (e.g., hospitalized, visited ED). Interviewees noted that this awareness helped to increase care coordination including ways to educate the client on appropriate steps to take when in need of care, which could have a positive impact on health.

"I just finished a note on somebody who was in and out of the hospital medically very quickly, and guess what? She told him she doesn't take any of the meds they prescribe. Our staff has no way- we have no way of knowing that. But they know now because I just wrote that up and said she was not taking X, Y &, even though it's still prescribed for her by the medical folk. She's not taking it."

"As far as improving their [client's] overall care, our knowledge of when they were hospitalized or had an emergency room visit, it allows us to work with them better. Especially, we have medication on time program where we have supervised medications that's delivered to clients anywhere from daily or twice a day."

"Knowing that someone is hospitalized is incredibly important because medications, you see, change at hospitalization. We want to always be sure that we are delivering the medications that the orders have changed. That's huge, obviously, for the quality of care."

"I think we're hopefully able to coordinate care a little bit better"

Practice impacts of using the dashboards

Respondents included several beneficial practice impacts. The discussed benefits included saving time in locating clients and improved workflow of the CMHC. The three identified themes are discussed below.

Increased time and efficiency

Respondents spoke of the dashboards freeing up staff time that had previously been allotted to determine the location of clients, and that this increased efficacy of staff assigned to these duties.

"It frees up so much time, rather than our staff sitting at their desks, and calling different hospitals, and putting out police reports or anything along those lines, they talk about in the morning meeting, which they have every day. That can free up sometimes-- I was a case manager and I would spend hours doing that sometimes. It definitely increases productivity, and face-to-face time with clients, because case managers aren't searching for people. They have the information at their hands."

"It definitely makes it more efficient in tracking and following up with the hospitals and also the clients because if they're discharged then we want to make sure that we're reaching out to them. We're obviously not calling the hospital when we get the alert that they've been discharged, I'll call the client instead."

Workflow changes

Several respondents spoke of the information available via the dashboard as changing workflow, with noted changes including making adaptations in nurse and provider follow-up. One person also spoke of the need to find the best way to manage the data/work generated from dashboard notifications.

"At first, it was just eye-opening. It changed the way we did our quality meetings, our clinical meetings, it changed the whole climate on how we provide care, because now we have this ability to see who was using it, and how often they're using it, as opposed to relying on self-report. You could definitely feel a culture change in the way treatment was focused.

Which is good because we're supposed to be providing intensive support, and now we were able to see how that intensive support could be provided."

"I mentioned that you start to look at aggregating either the data just to see where your trends are and making program changes based on that we have done. We were obviously looking at, even though we've had a decrease in hospitalizations, we were noticing we had a little bit of an increase in ED visits for medical reasons, so needing to put some plans in place with our nurses following up with the clients and also with their primary care doctors to address some issues. As I mentioned with our high utilizer, those teams are focusing on those individuals to see what adjustments can be made in their plan of care."

Dashboards and provider burden

There was not a clear consensus as to whether the dashboards had an impact on provider burden. Some interviewees that the use of the dashboards did reduce burden, others felt that there was no impact or actually increased burden. However, it seemed the benefits outweighed the extra time/workload burden.

"Absolutely. Yes. It definitely reduces the burden on some level."

"I think it's neutral. I think the benefit outweighs whatever the additional step of having to check the mess. [chuckles]"

"The other thing is when we receive the attached COC [Continuity of Care], or discharge information is not the full discharge summary that the hospital has. It's much more basic information and our nurses still need to contact the hospital for the full COC document so that we actually have all the information of medication changes and any labs that were done. What is provided is not sufficient."

Challenges associated with dashboard use

Some challenges associated with the use of the dashboards were identified including technological and cost concerns and are discussed below.

Technological challenges

Several respondents reported that they have limited technical skills and resources and therefore relied on others for assistance with the dashboard and/or only used the alerts. Additionally, one person spoke of the lack of ability to reset passwords online as being a

challenge. Another spoke of a "glitch" in the dashboard, revealing information about clients from other health centers and that this curtailed their use of the dashboard.

> "But actually logging into the dashboard, it's very difficult if you don't remember your password, or if you type in your password wrong. You have to email them for a password, there's no-- It's not like logging into your email, and then they send you a link thing, type this pass code in, and then answer these questions, you'll get a new password. Now you have to call the phone number and you have to get a new password. That's very difficult in this age where we have to have a lot of passwords for different portals and dashboards, especially in healthcare."

> "Yes. It's just like another log in too. If it was somehow integrated in our medical record, I think that would be ideal. We have all these logins. They have log in to the dashboard. They can log in to the health systems like Lifespan Link and all other stuff to already see some of this information. It's just we have so many different logins to get the same information."

> "It's been about nine months now, and we haven't been able to really use the dashboard, because there's this glitch in the code that's letting us see a bunch of clients that aren't ours anymore. That's a federal violation, they're not ours anymore. For us to see that is really preventing us from being able to use the dashboard, and look at it, and use it in a quality way."

Working with Butler Hospital and out-of-state hospitals

Nearly all respondents felt that the lack of alerts and information about hospitalizations from Butler Hospital was problematic. Respondents felt that having this information would be valuable as part of the dashboard would be useful, and that it would eliminate the time and effort needed to determine if clients had been at Butler Hospital. Similarly, a few interviewees reported that a limitation was the lack of information from hospitals out-of-state (e.g., Massachusetts) which is not included in the dashboard.

> "It's really unfortunate that we haven't been able to get the psychiatric hospitalization and we still need to use other methods to find out if someone isn't Butler client report or such. That's always an issue. We also are in B-space [Butter Hospital Portal]. I don't believe we get alerts when people present that at Massachusetts hospitals."

> "There's still some challenges, the dashboard does not include Butler which Butler we do have quite a few clients that do ends up there at that hospital, but we're talking about one hospital versus seven of them were that we have information on so still better than nothing."

Volume of alerts

Two respondents spoke of the volume of alerts received as being a challenge, and as stated earlier this was one of several factors that resulted in one CMHC to limit patients included in the dashboard. They spoke of the need to revise workflow, with one of the interviewees reporting that they were continuing to revise workflow to determine who should handle notifications.

> "The alerts can be challenging because of the volume. When someone presents to the ER, you get that, and then you get the discharge from the ER, and then you get the ignition to the floor. There are times where just keeping up with the volume sometimes can be difficult for the staff."

> "Originally, when we implemented the Ingenix [electronic health record], we did for the whole population, but we actually just used the alerts part of the dashboard. Then it was just getting another notification. We already get all the hospital documents. We get the notice of admission, we get the COCs, discharge summary. I believe there's one more. Then on top of this was another alert. We're getting about five notifications on one patient. It's just becoming too overwhelming. That's why we had to change the workflow to just the nurse care managers and high-risk."

Looking ahead

Interviewees were asked to discuss what the impact would be if the dashboards were no longer available. Two themes were identified and presented below.

Less efficient awareness of hospitalizations/ED visits if dashboards unavailable

As discussed earlier, interviewees reported that the dashboards provided valuable up-to-date information via the alerts.

> "I think we [CMHC] wouldn't get as much information as we do, and I think some of these admissions would probably fall through the cracks."

> "Part of our health home program is to prevent hospital and ED visits and prior to the dashboard and the alerts, we had a very difficult time finding our clients....Getting these alerts helps us to know exactly where they are and show up if needed at the hospital to meet with a client and start coordinating care. So, it would definitely make things more difficult."

Nearly all respondents felt if the dashboard were no longer available, providers would be less informed about hospitalizations and ED visits. However, one person did state that they could do without the dashboards as the information was available elsewhere.

"We get notified pretty timely from the hospitals. I think it's just the whole streamlining all the different notifications. This is reliable, you can go in there and see it at a quick glance. Also, administrators there can look to see numbers of patients. Now, I think you have the numbers of times they run into the hospital and I'm able to get data out and look at it more administratively but I think it's something we probably could do without if we had to cut costs somewhere."

Negative impacts on client care if dashboards unavailable

Interviewees felt that the loss of the dashboard would have a deleterious effect on clients. Negative impact as the CMHC and their providers would be less informed about hospitalizations and ED visits. The alerts were viewed as allowing for the CMHC to have better client information which improved care coordination.

"If the alerts went away, that would be a huge impact, because we wouldn't have that knowledge of the hospitalization or ER visits within the amount of time to really react. I would say that getting the alerts has been incredibly useful for our staff. The care coordination will definitely decline. We do not have that available to us."

"I think they'd [clients] get admitted more too."

"The ability to be able to reach out and provide care within 24 hours to 48 hours after they've left the hospital, or the ER, it has been beneficial to the client to be able to receive their appropriate level of care. Being able to identify the clients who are at most risk for being a danger to themselves, being a danger to others, being homeless, being correctly medicated. Without this portal for the dashboard, I feel like it could possibly have a negative effect across the board for the people that we care."

Future use of dashboards

All interviewees felt that their CMHC would continue using the dashboards. However, a few did discuss that use may be limited due to costs. As one person explained, the CMHC would continue using the dashboards as "they're [the dashboards] useful to us. I think they're really part of what helps us to provide really effective care. One person did state hat the costs

associated with the dashboard use did cause them to limit the clients who were included in the dashboard.

> "I believe we would, yes. Unless it became some kind of cost that was something—We're a small agency that was something that we couldn't continue.

> "If everything remains as is with the cost because we are paying a small fee for each individual that we have in the dashboard, I think that we would obviously continue to support this. If there's a change financially I can't say for sure. Interviewer: Sure. The cost is definitely a factor in deciding whether or not to continue? Interviewee: Yes, and that's the reason why it's not all of our CCA clients. It's only a subset because of the cost factor."

Additional suggestions/recommendations

When asked if there were any additional thoughts/suggestions that weren't discussed, some interviewees had suggestions that they thought may be helpful in evaluating the implementation and effectiveness of the dashboards.

> "If it is in one place in the medical record where we could just import that information, it would be a lot easier."

> "I think if someone was able to facilitate best practices and use of that dashboard, I know they have practice facilitators that come out and meet with people individually, they actually think it's like they are nurses met with different agencies, nurses to figure out how they're using best practices, I think that would be beneficial."

Conclusion

Across the interviewees, participants viewed the dashboards very favorably, with the alerts of hospitalizations and ED visits being viewed as having important practice and program impacts. The importance of real time notifications versus a delay in notification or relying on client self-report was viewed as invaluable as it the notification allowed for a clearer understanding of hospitalization and ED visits, promoted better care coordination, and ultimately, has a positive impact on client health.

Nearly all participants stated that updates from Butler Hospital were not included in the dashboards and this was viewed as a limitation as it necessitated that CMHC staff contact Butler Hospital via telephone or use B-space to determine if a client has been to the ED or been admitted. Several interviewees also noted that the dashboard did not include hospitals in Massachusetts.

More and/or continued training regarding the functionality of the dashboards may be useful as several of the interviewees spoke of only knowledge of and use of limited information from the dashboards due to limited staffing, time and knowledge of the systems capability. One important issue with the functionality of the dashboards was discussed by one participant and this was the ability to see information about clients of other CMHCs. Due to this, the CMHC was not using the dashboard. Managing the volume of incoming data was also seen as a challenge.

Although all respondents were interested in continued use of the dashboards, several people acknowledge that future use of them was likely dependent on the costs. All interviewees when asked what would happen if the dashboards were no longer available felt that there would be a negative impact as it would decrease the ability to have just in time alerts for their clients and impact important follow up care planning for their clients. They also felt there would be a negative effect on the site efficiency and time management.

Abbreviations

COC   Continuity of Care

CMHC Community Mental Health Centers

EHR   Electronic health record

PMPM Per member per month

RIQI   Rhode Island Quality Improvement

SIM   State Innovation Model

URI   University of Rhode Island

Reference

Rhode Island State Innovation Model (SIM) Test Grant, version 3. April 25, 2018.

Available: eohhs.ri.gov/Portals/0/Uploads/Documents/SIM/RISIMOperationalPlanInitialAY4Submission4.26.2018.pdf. Accessed June 24, 2019/

KII Interview guide

Preamble
Hello, I am Faith Helm. I am a researcher at the University of Rhode Island. I am conducting these interviews as part of an in-depth evaluation of SIM's focus on developing a culture of collaboration. Thank you for participating.

The discussion today will explore the idea of a culture of collaboration and the structures and process that have been developed to support this such as the SIM Steering Committee, embedded staffing model, weekly Interagency meeting and SIM's public Workgroups, as well as the impacts of the culture of collaboration has had on reaching SIM's goals.

We are interviewing a wide range of people so not all questions may directly pertain to you, but we are interested in learning from everyone's perspective.

I will be recording this interview for data analyses purposes. We won't identify you by your name or title in any written reports. However, we will include direct quotes into written reports.

KII Questions

KII_Q1: Please describe your role/involvement in the SIM.

> *Prompt all:* How long have you been involved in SIM?

> *Prompt all:* What has been the extent of your involvement?
> * Prompt individualized by background review.

KII_Q2: Describe the benefits/barriers of SIM's governance and staffing model

> Would you like me to describe SIM governance and staffing model? (If KI needs more info)
> Governance/Structure: The SIM structure includes teams and workgroups that provide input and coordination of SIM efforts toward achieving the Triple AIM. This is done through "shared decision-making authority through a strong public/private partnership."
> <div align="center">Or</div>
> "By governance and staffing we are referring to the SIM core team staff who are embedded in many of the State Agencies, the Interagency Team, and SIM's governance by the Steering Committee, which is made up of public and private partners, as well as the workgroups that have been formed to consult on essential topics as they have arisen."

> *Prompt all: Describe the benefits/barriers of the SIM Steering Committee?*

> *Prompt all: Describe the benefits/barriers of other ways SIM has worked to promote public/private partnerships (aside from the Steering Committee)?*

> *Prompt all: Describe the benefits/barriers of the "Workgroups" which focused on essential topics?*

Prompt all: Any thought on the on the staffing model or any other SIM processes or structures such as Interagency, Quarterly vendor meetings or anything else?

==KII_Q3:== How has SIM fostered collaborations/relationships within your organization/state agency?

How has SIM fostered collaborations/relationships between your agency/organization and other SIM-related entities?

Prompt all: Please provide a specific example

State agency prompts: How has SIM fostered relationship building between your agency and other SIM-related groups/organizations/state agencies?

- *If no collaborations were fostered: Why do you believe no collaborations were developed?*

==KII_Q4:== Describe **the results/impact/outcomes** SIM's culture of collaboration has had within and beyond state governmental agencies.

Prompt all: Please provide a specific example

==KII_Q5:== Describe how SIM's focus on culture of collaboration has impacted **how you/your agency/organization works**?

Prompt all: Please provide a specific example

Prompt all: Reduced unnecessary duplication of health system transformation efforts?

Prompt all: If not, why not? Barriers?

==KII_Q6:== Describe any other specific impacts due to SIM's governance model/structure that we have not talked about

Prompt all: Any synergistic efforts/synergies

Prompt all: Policy Impacts?

Prompt all: Impacts on strategic outreach?

Prompt all: Impacts on joint strategies

Prompt all: How have SIM monies leveraged other funding opportunities?

KII_Q7: Describe the impact of SIM's Culture of Collaboration on SIM partners' participation in system reform or population health improvements or quest to achieve the Triple Aim?

> *Prompt all: Any specific examples?*

> *Prompt all: Impact on stakeholder engagement and retention?*

KII_Q8: Which of SIM's collaborative efforts has best supported RI's quest to achieve the Triple Aim?

> *Prompt: How has this effort supported this quest?*

KII_Q9: If starting the SIM Project over again, which initiative(s)/collaboration(s) would you be sure to pursue again (in the quest to promote system reform or population health improvements or achieve the Triple Aim)?

> *Prompt: What SIM component has had the greatest impact on the quest for the Triple Aim? Why?*

> *Prompt: What SIM strategies, projects, or processes worked the best?*

KII_Q10: Which initiative(s)/collaboration(s) would you not pursue again (in the quest to achieve the Triple Aim)? *Why?*

> *Prompt: What strategies, projects, or processes did not work well?*

> *Prompt: What components of SIM had have been least impactful? Why?*

KII_Q11: What impact will SIM's culture of collaboration have on the possibility of sustaining projects working toward the Triple Aim?

KII_Q12: Is there anything else you would like to add about SIM and the Culture of Collaboration that you think we should know?