

Mental Health Services Act

Collaborative Statewide Early Psychosis Program Evaluation

Annual Innovation Report:

Summary Report of the Activities of the LHCN

Fiscal Year 2022-2023

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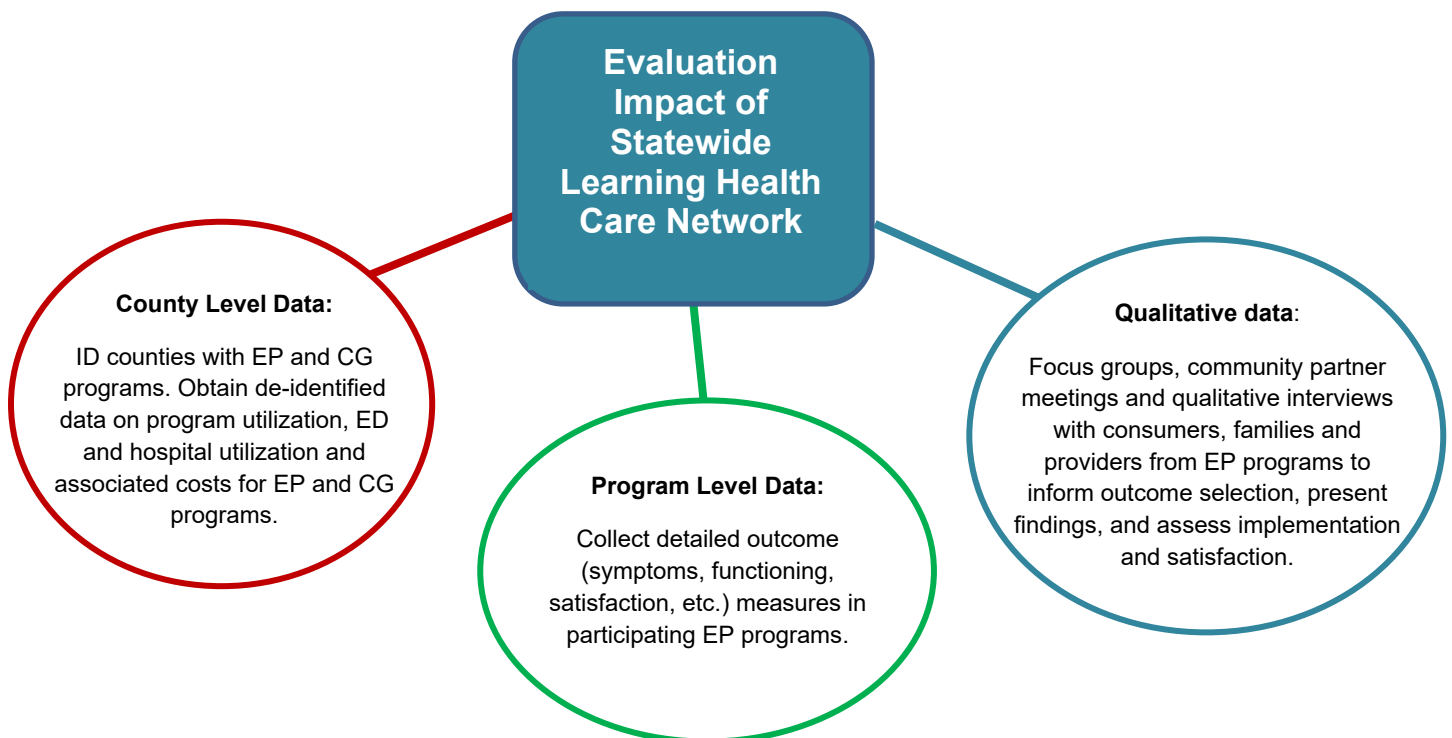
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Background

Multiple California counties in collaboration with the UC Davis Behavioral Health Center of Excellence received approval to use Innovation or other Prop 63 funds to develop infrastructure for a sustainable learning health care network (LHCN) for early psychosis (EP) programs. Of those counties with approved funding, the following counties have processed and executed contracts between their behavioral health services departments and UC Davis: San Diego, Solano, Sonoma, Los Angeles, Orange, Stanislaus, Napa, Lake, and the Multi-County Collaborative (MCC) which includes Nevada, Mono, and Colusa Counties. One Mind has also contributed \$1.5 million in funding to support the project. This Innovation project seeks to demonstrate the utility of the network via a collaborative statewide evaluation to assess the impact of the network and these programs on the consumers and communities that they serve. This project, led by UC Davis in partnership with UC San Francisco, UC San Diego, University of Calgary and multiple California counties, will bring consumer-level data to the providers' fingertips for real-time sharing with consumers, and allow programs to learn from each other through a training and technical assistance collaborative. This Statewide EP Evaluation and LHCN propose to 1) increase the quality of mental health services, including measurable outcomes, and 2) introduce a mental health practice or approach that is new to the overall mental health system. The project must comply with the regulatory and funding guidelines for evaluation as stipulated by the applicable Mental Health Services Act (MHSA) funding regulations, contract deliverables, and best practices.

There are three components to the data collected for the LHCN: County Level, Program Level, and Qualitative data (Figure 1). The protocol for collecting each component has been reviewed by an Institutional Review Board (IRB) and approved before commencement of data collection. Further, aspects of the data design have been and continue to be shaped by the input of community partners, including mental health consumers, family members, and providers.

Figure 1. Three Components of the Evaluation Associated with the Statewide LHCN.



This project was approved for funding using Innovation Funds by the MHSOAC in December of 2018 and

included Los Angeles, Solano, Orange, and San Diego counties. The California Early Psychosis Learning Health Care Network (LHCN) represents a unique partnership between the University of California, multiple California counties, and One Mind to build a network of California early psychosis (EP) programs. We were able to leverage this initial investment to obtain additional funding from the National Institutes of Health (NIH) in 2019, which enabled six university and two county early psychosis programs to join and also linked the California network to a national network of EP programs, including UCSF PATH, UCSD CARE, UCLA Aftercare & CAPPs, Stanford Inspire, San Mateo Felton BEAM UP/(re) MIND, UC Davis EDAPT and SacEDAPT programs. Since then, we have also had additional counties join EPI-CAL, including Napa, Stanislaus, Sonoma, Lake, Nevada, Mono, and Colusa. The overarching name of the project, which encompasses the LHCN and the NIH-funded components, is now “EPI-CAL.” In this report, we will refer to the LHCN only when describing components of the project that are specific to the LHCN evaluation (e.g., county data analysis).

The EPI-CAL team has made significant progress towards our goals outlined in the innovation proposal during the 22/23 fiscal year, which are summarized in the current report.

Executive Summary

The purpose of this document is to provide the EP LHCN Mental Health Services Act (MHSA) Annual Innovation Report to review EP LHCN goals accomplished during FY2022/2023. This report will include summaries and status updates on the infrastructure of the LHCN, steps taken towards implementation, and barriers that have been identified over the course of the last fiscal year. While the counties involved in the EP LHCN may be at different stages in the process, the overarching LHCN is moving forward as planned.

- As soon as a contract is executed between UC Davis and a county to join the LHCN, our team initiates recruitment activities so that the counties’ community partners can participate in our biannual Advisory Committee Meeting. In the past fiscal year, the Multi-County Collaborative (MCC, Colusa, Mono, Nevada) and Lake County EP programs joined EPI-CAL’s LHCN. For Mono, Colusa, and Nevada counties, CalMHSA has an executed Agreement UCD. The MCC Counties then executed a Participation Agreement with CalMHSA who acts as the intermediary between UCD and Counties. The counties do not have a direct agreement with UC Davis. Our team introduced the meeting to the EP program team and distributed flyers so that their community partners could be apprised of the upcoming LHCN meetings.
- We have held two LHCN Advisory Committee meetings in the last fiscal year, which was comprised of a county representative from each participating county, a clinical provider from each participating EP program, and consumers and family members who have been or are being served by the participating programs. We will continue to hold Advisory committee meetings on a bi-annual basis and summarize meetings activities in our deliverables and annual reports.
- As each new program joins the Learning Health Care Network, our team holds a synchronous EPI-CAL introductory meeting with all team members at participating programs to introduce the project in detail. This past fiscal year, we had two new programs join and the LHCN and attend the introductory meeting. At this introductory meeting, providers and staff are invited to complete baseline questionnaires that assess provider and program variables as these variables are hypothesized to influence the observed outcomes of clients in EP programs. We administer provider surveys that assess demographics, eHealth Readiness, Organizational Readiness for Change, Attitudes Toward Evidence Based Practice, Clinician Attitudes of Recovery and Stigma, Modified Practice Pattern Questionnaire, and Professional Quality Scale. This battery of questionnaires is termed the “baseline” surveys and have been designed to assess potential factors that could influence outcomes for EP consumers that are measured in the project.
- In the LHCN proposal, we proposed to ask clients and providers to complete self-report questionnaires in the pre-implementation period of the project. To examine adoption of a new technology in the EP

program, we proposed to compare providers with respect to their reporting use of data to determine treatment choices at two timepoints, prior to Beehive implementation and after training in and using Beehive. Prior to Beehive implementation in each EP program, providers completed “pre-implementation” surveys. We are now currently at the stage of the project where we want to evaluate change in these same variables after Beehive implementation. To do this, the same set of surveys are administered to EP programs who have sufficiently implemented Beehive in their program. During the past fiscal year, we have administered post-implementation surveys to three programs’ staff that meet the criteria for post-implementation.

- In the last year, we continued fidelity assessments in EPI-CAL LHCN clinics and by the end of the 22/23 FY we had completed a total of 17 fidelity assessments of programs in the LHCN. This included EPI-CAL LHCN county programs (San Diego, Solano, Orange, Sonoma, Los Angeles, Stanislaus, Sacramento, San Mateo, and Napa) as well as university programs (UCLA CAPPs, UCLA Aftercare, UCSD CARE, UCD EDAPT). We have submitted fidelity assessment reports to each program and met with individual program leadership to discuss their fidelity assessment results. We have scheduled fidelity assessments for all remaining participating programs in the LHCN network with an executed contract, including new programs who have recently joined the LHCN, with a goal of completing them in the current 23/24 fiscal year.
- Since the EPI-CAL project began, our team has conducted a total of 20 fidelity assessments (this includes non-LHCN programs as well that are part of EPI-CAL through the training and technical assistance program). In the current report, we present aggregate results from fidelity assessments of EP programs in EPI-CAL, including data from both the CHRPS and FEPS. Amongst those where a full or formative assessment could be conducted, the mean FEPS-FS score was 3.86 out of 5. With the CHRPS, mean scores were slightly higher at 3.96 out of 5.
- In the past year, we continued implementation of the Beehive application in EPI-CAL/LHCN clinics, which has included extensive training and site-specific support. We have refined our training approach and have completed Beehive training in 17 participating EPI-CAL programs, with a total of 21 programs completing at least some of the core training series.
- As a first step to assessing the successful implementation of the LHCN in EP programs across California, we assess preliminary data on feasibility and acceptability of LHCN app in all EP programs. To do this, we used a previously defined benchmark of enrollment of at least 70% of eligible participants and 50% of their available family members across the network as enrolled to meet our criteria as feasible and acceptable. We compare actual enrollment against this benchmark and summarize the results in this report.
- Over the last fiscal year, we have made a number of changes and improvements to Beehive based on feedback from programs and community partners. We summarize these changes in the current report.
- We conducted an interim analysis of Beehive enrollment, consumer demographics, data sharing preferences, and survey completion. The observed rate of enrollment across the LHCN is 412 clients across all diagnoses or 255 clients with a diagnosis that indicates FEP. There are an additional 258 clients who have been registered by the clinic in Beehive, but who have not engaged with Beehive by completing the EULA or starting their surveys. We found that a large majority of consumers (86%) opted in to sharing data for research purposes with UC Davis, and high completion rates of enrollment surveys (83%). We will shift our focus in the future to higher survey completion rates, as we know that while most consumers have completed some self-report surveys, not many have completed the full EPI-CAL bundle of surveys for each time point.
- In the current report, we describe a detailed statistical analysis plan for outcomes data collected via Beehive.
- In order to finalize the data collection process for our county-level data evaluation component of the LHCN, we met with new LHCN counties to introduce our data collection process for obtaining county-level utilization and cost data for a retrospective 3-year timeframe for preliminary evaluation for both EP and comparator group (CG) programs. We have also continued to meet with all participating counties to refine the process as we receive data from each county.
- During the last fiscal year, our team continued to hold meetings with the EP program managers and the county data analysts for each participating LHCN county to identify county-level available data and data

transfer methods. We discussed services provided by the EP program, description of consumers served, staffing specifics and billings codes for each service. We also reviewed details of funding sources, staffing levels during certain time-periods and other types of services provided for specific types of consumers (i.e., foster care). We have discussed time-periods for which the LHCN team will request data, description of the consumers from EP programs and how similar consumers served elsewhere in the county will be identified, services provided by each program, other services provided in the county to the EP consumers (i.e., hospitalization, crisis stabilization and substance use treatment), and data transfer methods. Our research team has gathered all the information from each program/county, including each new LHCN county, and summarized it in a multicounty data table included in this report.

- During the last fiscal year, our team finalized our plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and CG programs. One goal of this analysis was to provide a preliminary demonstration of the proposed method for accessing data regarding EP programs and CG groups across California. The secondary goal was to analyze service utilization and costs associated with those services across counties.

Current Project Goals

The current document summarizes project activities for the LHCN for fiscal year 2022/2023. This includes the following project activities:

- 1. Recruit EP community partners for external Advisory Committee meeting*
- 2. Establish a stakeholder (community partner) advisory committee that will meet at least every 6 months.*
- 3. Complete baseline and pre-LHCN implementation questionnaires for new LHCN counties.*
- 4. Report on post-LHCN implementation questionnaires administered to program and county staff.*
- 5. Schedule EP program for fidelity assessment.*
- 6. Present results from fidelity assessments of EP programs.*
- 7. Provide training and implementation of outcomes measurement on app in non-pilot EP programs and progress of data collection in all EP programs.*
- 8. Draft preliminary data on feasibility and acceptability of LHCN app in all EP programs.*
- 9. Submit report on LHCN enrollment and follow up completion rates for LHCN software application and dashboard in all EP Programs.*
- 10. Submit final data analysis plan for all data.*
- 11. Subcontractor to make additional revisions to dashboard to include feedback from programs and community partners.*
- 12. Establish data collection process for obtaining county-level utilization and cost data for prior 3-year timeframe for preliminary evaluation for both EP and comparator group (CG) programs.*
- 13. Identification of county-level available data and data transfer methods, and statistical analysis methods selected for integrated county-level data evaluation.*
- 14. Deliver a plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and CG programs.*

1. Recruit EP community partners for external Advisory Committee meeting

Once a contract for the LHCN between new counties and UC Davis is executed, the UC Davis team starts recruiting from each new county and program for the Advisory Committee. Our team sends program leadership our LHCN Advisory Committee recruitment flyer for distribution within the program to recruit clients and family members who wish to participate in the Advisory Committee. During the past fiscal year, Lake County and the Multi-County Collaborative (MCC) of Nevada, Colusa, and Mono counties joined the LHCN. We had representation from both the MCC and Lake County at our most recent Advisory Committee meeting, including EP program leadership. We will continue to work with the program to include other stakeholders from Nevada, Mono, Colusa, and Lake Counties, such as a client or other family member.

2. Establish a community partner advisory committee that will meet at least every 6 months

The Advisory Committee for the LHCN is comprised of a county representative from each participating county, a representative of each participating EP program, and up to five consumers and five family members who have been, or are being served, by EP programs. This committee is co-led by Bonnie Hotz, family advocate from Sacramento County. Recruitment for the Advisory Committee is ongoing, and we have confirmed membership with multiple community partners. These include past consumers, family members, clinic staff and providers. Even though we have already held several Advisory Committee meetings, we continue to distribute flyers to all participating clinics, as their contracts are coming through, to make sure the Advisory Committee is open to all LHCN member clinics.

November 29th, 2022

We held our first Advisory Committee meeting of the fiscal year on November 29th, 2022. The meeting was held remotely to enable statewide participation. During the meeting, we discussed recruitment and enrollment progress and challenges. Valerie Tryon gave a general overview of enrollment across the LHCN. While many programs are making progress using Beehive (i.e., enrolling clients and supporting completion of surveys), multiple programs have not integrated Beehive into their program to the degree necessary to achieve project aims. We discussed in the meeting that there are many reasons for this and considered ways in which programs could address these issues. Since the last Advisory Committee meeting, the rate of enrollment has improved significantly. The EPI-CAL team encouraged sites to keep up their pace of enrollment and make sure that surveys are also being completed. Sabrina Ereshefsky then gave a presentation summarizing how urgent clinical issue alerts are being addressed by clinic staff within Beehive. Her preliminary findings supported that the vast majority of urgent clinical issues are resolved within a few days. We received feedback from attendees at the meeting that they appreciated the integration of both client and support persons in risk assessment.

Mark Savill gave a presentation on the general analysis plan for the data collected via the LHCN project, with a particular focus on Beehive data. Variables of interest were prioritized during the extensive qualitative work done by our team in the first phase of the project. Functioning was a key area focus groups really cared about when discussing what outcomes to measure, whereas distal outcomes (homelessness, incarceration, mortality) may occur later than what is captured in many clinics' clientele. He elicited feedback from attendees to examine if we were considering the most important outcomes for our analysis. One attendee expressed interest in seeing a summary of the carceral data that is being collected via Beehive and said that this data may help us lobby the state for more urgent crisis response options.

Lindsay Banks then gave a brief presentation on fidelity assessment progress thus far, followed by a description of the duration of untreated psychosis (DUP) study by Rachel Loewy. Adrian Asbun reminded programs about an upcoming research opportunity for Spanish-speaking providers, family members, and clients to participate in focus groups regarding attitudes around data sharing best practices, which is used to inform the Beehive End User License Agreement (EULA). We then closed out the meeting by talking about how best to connect with programs for additional research opportunities as part of the larger EPINET and then proposed submitting a new innovation project to possibly examined long-term outcomes of clients in EP programs.

We recognize that we summarized a lot of information during this most recent Advisory Committee meeting and thus we sent a follow-up survey out after the meeting to give attendees an opportunity to provide additional feedback on the topics covered if they were not able to during the meeting.

June 6th, 2023

We held the second Advisory Committee meeting of the fiscal year on June 6th, 2023. The meeting was held remotely. During the meeting, we discussed recruitment and enrollment progress and challenges. Kathleen Nye gave a general overview of enrollment across the LHCN, including comparing enrollment today to the last progress report at the last Advisory Committee Meeting in November 2022. While there was a promising trajectory of enrollments in the second half of last year after having several meetings with individual programs, multiple programs' enrollment has now plateaued and several still have not integrated Beehive into their program to the degree necessary to achieve project aims. The EPI-CAL team encouraged sites increase the pace of enrollment and make sure that surveys are also being completed. Misha Carlson then gave a brief presentation on the DUP portion of the study, which is also struggling to enroll participants. We discussed in the meeting that FEP enrollments in EP programs seem to be particularly affected, which is affecting Beehive and DUP study enrollment, and asked programs to share their thoughts and experiences.

The next section of the meeting consisted of data presentations. Valerie Tryon presented preliminary data from Beehive, including data summarizing symptoms, quality of life, and functioning; these domains were selected for preliminary descriptive analysis because they were prioritized during the outcomes focus groups. Tara Niendam then gave a presentation on the how experiences of several adverse childhood experiences (ACEs) in individuals with early psychosis is associated with housing instability and suicidal ideation in our preliminary data collected in Beehive. This was particularly important to present to our committee because, while we found that our EP teams noted the importance of trauma in contributing to outcomes during qualitative data collection, they did not see justice involvement or homelessness as key issues early in care. However, our data show that their clients do face these challenges both in their lifetime history and in the present to a lesser degree. ACEs and other social determinants are likely drivers of poor outcome in early psychosis and should be addressed in treatment. Then, Sabrina Ereshefsky gave a presentation on the importance of lived and living experience integration in early psychosis coordinated specialty care. Her data evaluated whether the presence of peers, individuals with lived and living experience with psychosis, and/or family advocates affected attitudes towards recovery and stigma. She found that there were generally high rates of recovery-oriented attitudes and low variability across programs, despite team composition, but that the CSC teams with persons with lived or living experience could reduce stigma and bias.

We had a guest speaker at this Advisory Committee Meeting. Christina McCarthy provided a presentation on One Mind at Work, an organization that seeks to have mental health workers improve the design of their workplaces to benefit individuals and teams and grow access to mental health services and support. Participants were invited to have people from each organization nominate a colleague to participate in One Mind at Work and the application was distributed after the meeting. Lastly, we ended the meeting by

discussing preliminary renewal plans for the EPI-CAL R01 and proposed submitting a new innovation project to possibly examine outreach to improve enrollment in EP programs or examine long-term outcomes of clients in EP programs.

3. Complete baseline and pre-LHCN implementation questionnaires for new LHCN Counties

We have a standardized process for every county that joins the Learning Health Care Network which starts with the EPI-CAL team meeting with EP program staff to introduce the EPI-CAL project and administer pre-implementation surveys to program staff. As each new program joins the Learning Health Care Network, our team holds a synchronous EPI-CAL introductory meeting with all team members at participating programs to introduce the project in detail. At this introductory meeting, providers and staff are invited to complete baseline questionnaires that assess provider and program variables as these variables are hypothesized to influence the observed outcomes of clients in EP programs. At the introductory meeting, we administer provider surveys that assess demographics, eHealth Readiness, Organizational Readiness for Change, Attitudes Toward Evidence Based Practice, Clinician Attitudes of Recovery and Stigma, Modified Practice Pattern Questionnaire, and Professional Quality Scale. This battery of questionnaires is termed the “baseline” surveys and have been designed to assess potential factors that could influence outcomes for EP consumers that are measured in the project.

This past fiscal year, we had two new programs join the LHCN, including Lake County Early Intervention Services (EIS) program and the multi-county collaborative hub and spoke EP program of Nevada, Mono, and Colusa counties (MCC). MCC staff and providers who attended our EPI-CAL Introductory meeting on December 9th, 2022 and Lake County Behavioral Health Services (LCBHS) staff and providers attended our EPI-CAL Introductory meeting on February 23rd, 2023. The EP program staff were approached to participate in research as part of the LHCN EPI-CAL project. During the meeting, staff signed consents to participate in research to complete our baseline questionnaires. Staff completed measures assessing their comfort with technology and readiness to implement eHealth. Additional questionnaires on organizational readiness for change, level of burnout and compassion satisfaction in their work as a helper, their attitudes about evidence-based practice, stigma related views toward psychosis and help-seeking, and their recovery-orientation were sent to EP program staff following that initial meeting, due a couple of weeks after the initial meeting. Their results will be incorporated into the statewide data on these measures.

In the LHCN proposal, we proposed to ask consumers and providers to complete self-report questionnaires in the pre-implementation period of the project. Consumers are asked to complete self-report questionnaires about insight into illness, perceived utility of the application, satisfaction with treatment, treatment alliance, and comfort with technology. We also have providers at each clinic complete questionnaires on Treatment Alliance, Use of Data in Care Planning, Perceived Effect of Use for the LHCN, and Comfort with Technology. In addition to the originally planned pre-implementation surveys, we have provider surveys that assess demographics, eHealth Readiness, Organizational Readiness for Change, Attitudes Toward Evidence Based Practice, Clinician Attitudes of Recovery and Stigma, Modified Practice Pattern Questionnaire, and Professional Quality Scale. This battery of questionnaires is termed the “baseline” surveys and have been designed to assess potential factors that could influence outcomes for EP consumers that are measured in the project. Therefore, the study team felt it was important to assess these factors for inclusion in the future analysis of outcomes data. Clinicians with eligible clients were approached about completing these additional pre-implementation surveys described above. At this time, one clinician from LCBHS has completed surveys about their clients. This clinician is working with our team to recruit clients from their program to participate as well, but no client

has expressed interest at the time of this report. Our team is working closely with LCBHS staff to address concerns clients may have with participating in research activities.

4. Report on post-LHCN implementation questionnaires administered to program and county staff.

In the LHCN proposal, we proposed to ask clients and providers to complete self-report questionnaires in the pre-implementation period of the project. To examine adoption of a new technology in the EP program, we proposed to compare providers with respect to their reporting use of data to determine treatment choices at two timepoints, prior to Beehive implementation and after training in and using Beehive. Prior to Beehive implementation in each EP program, providers completed “pre-implementation” surveys about their demographic information (age, sex, race, ethnicity) and professional characteristics (years of education, degree type) and completed questionnaires on their Treatment Alliance, Use of Data in Care Planning, Perceived Effect of Use for the LHCN, and Comfort with Technology. Clients are also asked to complete self-report questionnaires about insight into illness, perceived utility of the application, satisfaction with treatment, treatment alliance, and comfort with technology. Beehive training materials were implemented consistently across participating EP program, highlighting the utility of data to identify treatment goals and metrics of improvement during treatment planning, and provided guidance on client-centered ways to review data to monitor progress during treatment.

At the stage of the project, we want to evaluate change in these same variables after Beehive implementation. To do this, the same set of surveys are administered to EP programs who have sufficiently implemented Beehive in their program. At this time, we have 11 provider-completed post-implementation survey packets completed across three participating EP programs (OC CREW, Kickstart, and Aldea Solano SOAR). These three programs were amongst the earlier programs to be trained to use Beehive in their program in the LHCN. We are continuing to recruit providers and clients from EP programs to complete these surveys once sufficient time has passed from initial Beehive implementation. These data will be used in analyses to assess changes in these variables prior to implementation of Beehive compared to after use of Beehive with clients in EP programs.

Additionally, our post-implementation analysis will include provider-rated “use of data in care” questions, which are intermittently presented to providers while they are reviewing a client’s data page in Beehive so that they may indicate 1) if the data was reviewed during a session with the client or family and, if yes, 2) how the data was used as part of care, such as “followed up by phone” or “scheduled follow up appointment,” or “no action taken.” These data use metrics allow analysis on rates of adoption and level of implementation of Beehive. Exploratory analysis will examine clinician expertise and training needed to effectively implement clinician review of client outcome data using Beehive at 80% of available time points.

5. Schedule EP program for fidelity assessment

Each early psychosis clinic undergoes a fidelity assessment to determine their adherence to evidence-based practices for first-episode services using a revised version of the First Episode Psychosis Services Fidelity Scale (FEPS-FS). The FEPS-FS represents a standardized measure of fidelity to EP program best practices (Addington et al., 2016; First Episode Psychosis Services Fidelity Scale: (FEPS-FS 1.0), 2015). The FEPS-FS was developed using an international expert consensus method, focused on six domains: (1) population-level interventions and access, (2) comprehensive assessment and care plan, (3) individual-level intervention, (4) group-level interventions, (5) service system and models of intervention, and (6) evaluation and quality

improvement. The FEPS-FS has been recently revised to meet the agreed upon standards of EP care in the US and allow large-scale fidelity evaluation. Additionally, most programs within EPI-CAL also provide services to individuals with the clinical high-risk syndrome (CHR), for whom evidence-based best practice differs from FEP care in a number of respects. Consequently, to provide a program assessment that most accurately represents the care delivered, alongside the FEP-FS, we are piloting a new scale under development designed to assess the components of care delivered to individuals with the diagnosis of CHR, known as the CHRPS-FS.

Each EP program participates in an assessment of EP program components using the revised FEPS-FS/CHRPS-FS, which is completed via web-based teleconference. The fidelity assessment is used to identify program strengths and possible areas for improvement, which can serve an important driver to improving early psychosis care delivered in EP programs in the LHCN. Additionally, the ability to evaluate the impact of service-level factors on consumer-level outcomes collected by Beehive can provide us with important new insights into what particular components of the EP program of care are associated with improved outcomes in different domains. These findings can then be disseminated across the network (and beyond), further informing care and shaping service delivery.

Assessments are completed in groups of 2-6 programs per quarter, which started in November 2021. Assessments are completed by trained clinical staff with expertise in early psychosis care and supported by evaluation administrative and research staff. Prior to the assessment taking place, the assessors and administrative/research support staff undergo a two-day training to go through the manual and conduct a mock site visit based on real cases. Prior to the evaluation, each EP program site participates in an introductory meeting, in which an overview of the FEPS will be provided and the components of the evaluation will be discussed. The assessments are conducted in consultation with Don Addington, M.D. from the University of Calgary, author of the FEPS-FS and CHRPS-FS scales.

At the end of the 2/23 FY, EP program fidelity assessments had been conducted for 17 programs in the LHCN. There are five remaining programs in the LHCN that need to complete their fidelity assessment. Of those, three are currently in progress, including the MCC multicounty collaborative, Stanford INSPIRE program, and UCSF Path program. Lake County Behavioral Health Services assessment is scheduled for Fall 2023. Kern County is the last remaining program, and finalizing their assessment is pending an executed LHCN contract with UC Davis.

6. Present results from fidelity assessments of EP programs

This section includes preliminary findings from the fidelity assessments that have been conducted with EPI-CAL EP programs, including programs that are not currently in the LHCN but have received a fidelity assessment from our team through their participation in the EPI-CAL's training and technical assistance program. The majority of participating programs serve clients with both clinical high-risk syndrome (CHR) in addition to first episode psychosis (FEP). Therefore, most fidelity assessments were conducted using the First Episode Psychosis Services – Fidelity Scale (FEPS-FS) version 1.1 and a pilot version of the Clinical High Risk for Psychosis Services – Fidelity Scale (CHRPS-FS) (Addington, 2021). In this assessment Version FEPS-FS 1.1 was used, which includes additional items from the published 1.0 version related to discharge planning and the delivery of peer services. Additionally, given the widespread treatment of CHR clients within California CSC programs, and the inherent differences in the treatment approach between FEP and CHR, we have collaborated with the FEPS-FS 1.1 author to pilot a complimentary assessment tool that adapts some items of the FEPS-FS 1.1 to be appropriate for CHR care (i.e., the CHRPS-FS). These tools were developed to rate the degree to which the care mental health teams deliver adheres to the Coordinated Specialty Care Model (CSC; Heinssen et al., 2014) for clients with a first episode of Schizophrenia Spectrum Disorder and

Clinical High Risk for Psychosis. The purpose of this fidelity assessment is to better understand the range and nature of services delivered by coordinated specialty care programs across the EPI-CAL network. Please see Table I for a detailed summary of the components that are assessed on the FEPS-FS 1.1 Scale. This differs slightly from the currently published scale with the inclusion of two additional items (items 36 and 37); one which focuses on the peer specialist role, and the second which focuses on transitions in care. These were added due to meet our state level clinical, policy and research priorities.

It is important to note that the findings come with multiple caveats:

- The field of early psychosis is a rapidly developing one, with evidence-base practices and recommendations evolving over time.
- While there is good evidence for coordinated specialty care leading to improved outcomes in early psychosis (i.e., Guo et al., 2010; Kane et al., 2016; Secher et al., 2015), understanding what the necessary specific components of coordinated specialty care are that leads to these improved outcomes, and how they should be optimally delivered, is in many cases still a matter of debate.
- The measure selected for use across the EPI-CAL network (the FEPS-FS v1.1), is one of multiple that exist. The FEPS-FS was selected due to the fact the tool is currently one of the most extensively used and validated in the field (Addington et al., 2020; Durbin et al., 2019)
- The FEPS-FS has been developed as an international standard, and so the tool has been designed to work across different systems of care. This may make high scores on some items much harder to achieve in the US due to the current structure of behavioral health service provision across the country.
- The ratings and the feasibility of meeting high-fidelity scores may vary widely depending upon the context in which the program is delivered. The FEPS-FS may include items where a high-fidelity score may be constrained by state, local, or insurance coverage decisions outside of the control of the specific program.

Table I: FEPS-FS 1.1 Components

FEPS-FS 1.1			
1	Practicing team leader	20	Antipsychotic dosing within recommendations
2	Participant/provider ratio	21	Clozapine for medication-resistant symptoms
3	Services delivered by team	22	Patient psychoeducation
4	Assignment of case manager/ care coordinator	23	Family education and support
5	Psychiatrist caseload	24	Cognitive behavior therapy (CBT)
6	Psychiatrist role on team	25	Supporting Health
7	Weekly multi-disciplinary team meetings	26	Annual formal comprehensive assessment
8	Explicit diagnostic admission criteria	27	Services for patients with Substance Use Disorders
9	Population served	28	Supported employment (SE)
10	Age range served	29	Supported education (SEd)
11	Duration of FEP program	30	Active engagement and retention
12	Targeted Education to community groups	31	Patient Retention
13	Early Intervention	32	Crisis intervention services

14	Timely contact with referred individual	33	Communication between FEP and inpatient services
15	Family involvement in assessments	34	Timely contact after discharge from hospital
16	Comprehensive clinical assessment	35	Assuring Fidelity
17	Comprehensive psychosocial needs assessment	36	Peer support specialist role on team
18	Treatment / care plan after initial assessment	37	Transition in Care
19	Antipsychotic medication prescription		

The results of this assessment can be used in multiple ways. First, when combined with systematic data collection of client outcomes across multiple programs, fidelity assessments can be used to assess how variation in service delivery may impact client outcomes. Available data on which service components lead to specific outcomes could be used to advance the field of early psychosis care, and to advocate for potential changes in program funding and structure. Second, fidelity assessment can inform quality improvement efforts, highlighting individual areas of strengths and areas for improvement. Furthermore, it can enable individual clinics to review how their program compares to validated international standards and other programs in the state. Third, this information can be vital for county leadership and other key community partners to understand exactly what is being delivered by programs in a concrete, standardized format.

Assessment Summary

To date, we have completed assessments in 20 programs. Thirteen provide services for both FEP and CHR clients, four serve FEP only, and three serve clinical high risk only. Some of the assessed programs are well-established programs, but others are new and haven't even seen their first client yet. As a result, they do not have the sufficient service data to complete the health record abstraction necessary for the full fidelity assessment. To address this, in collaboration with the author of the FEPS-FS, Dr. Don Addington, we developed different levels of assessments, and operationalized rules around how to implement them. These included full assessments, formative assessments, and quality improvement (QI) assessments in cases where there were insufficient health record data to do a formal assessment. To meet criteria for a full fidelity assessment, the program must be delivering CSC services to EP clients two or more years and have five or more clients enrolled for at least one year and the time of the assessment. If those criteria are not met, the program may have a formative fidelity assessment if they have served ten or more clients ever, have at least five clients who have been enrolled for six months or more, and have supervision and defined admission criteria, assessment, and treatment approach. If the above criteria are not met, the program may have a simply quality improvement assessment in which their plan for program implementation in assessed by our team for consultation and feedback purposes.

Table II: Fidelity Assessment Characteristics

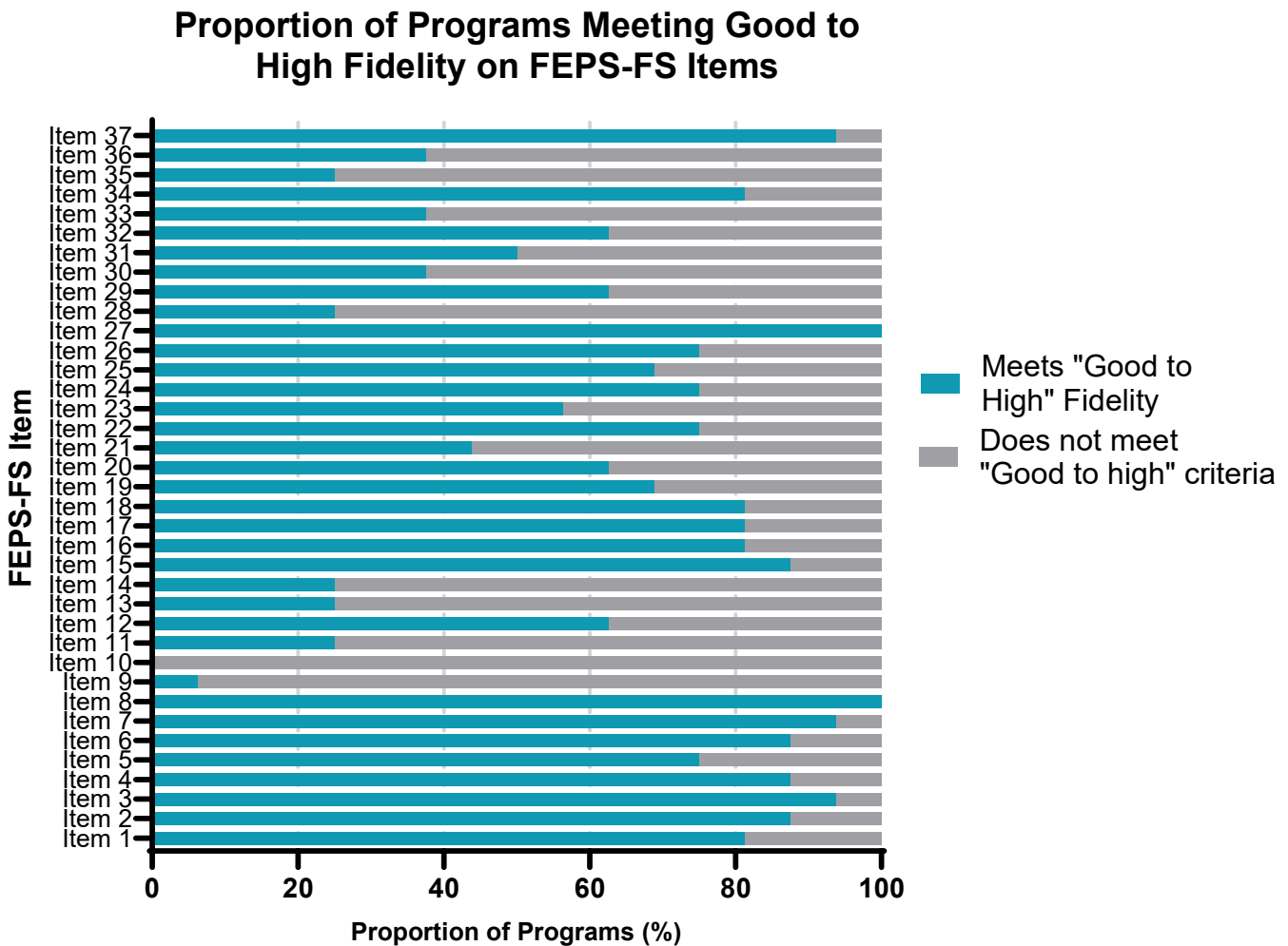
FEPS-FS n =17				CHRPS-FS n=16			
Assessment Types				Assessment Types			
	Full	14	82.4%		Full	11	68.8%
	Formative	0	0.0%		Formative	1	6.3%
	QI	3	17.7%		QI	4	25.0%

Program Type		
Community	14	82.4%
University	3	17.7%
Mean FEPS-FS Score*	3.86	0.25
% Items good to high fidelity*	66.6%	9.09

Program Type		
Community	14	87.5%
University	2	12.5%
Mean CHRPS-FS Score*	3.96	0.32
% Items good to high fidelity*	71.2%	8.15

For both FEPS and CHRPS, the full assessment was possible in the majority of programs. Amongst those where a full or formative assessment could be conducted, the mean FEPS-FS score was 3.86 out of 5. Figure 2 shows a breakdown of the proportion of programs meeting good to high fidelity by each FEPS-FS item. With the CHRPS, mean scores were slightly higher at 3.96 out of 5.

Figure 2: Proportion of programs meeting good to high fidelity on FEPS-FS Items

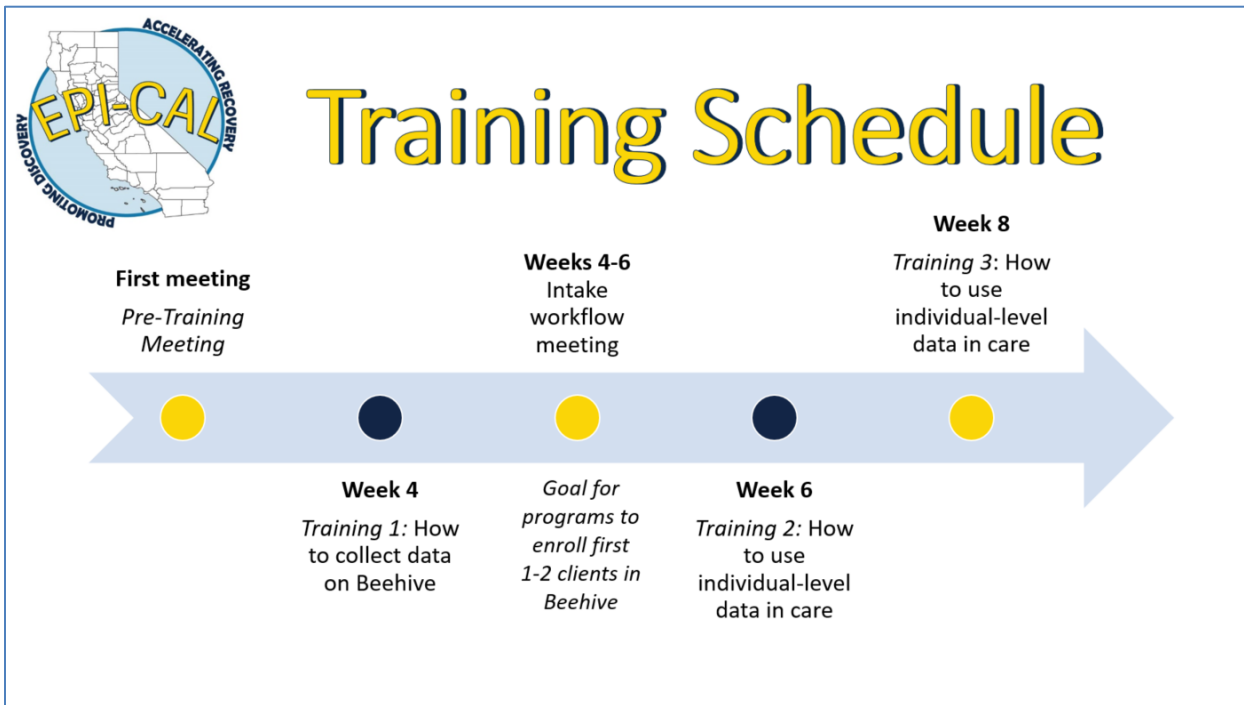


7. Provide training and implementation of outcomes measurement on app in non-pilot EP programs and progress of data collection in all EP programs

In our original LHCN proposal, we proposed in-person site visits to conduct the initial training for the Beehive application. However, due to the COVID-19 pandemic, we had to adjust our training plan and conduct the first training “site visits” remotely.

The core trainings begin with a pre-training meeting with leadership at the program to discuss which program staff members would be designated as providers, group analysts, or group and clinic admin in Beehive (roles described below), as well as to cover topics around integrating Beehive into their current data collection system. Next, we conducted a training series consisting of a pre-training meeting with program leadership to introduce the training plan, three training sessions to introduce Beehive to each program (Part 1, Part 2, and Part 3), and an intake-workflow meeting with key clinic staff to understand clinic workflow and brainstorm how to best implement Beehive within their program context.

Figure 3: Beehive Training Schedule



Our remote trainings began with our pilot programs in March 2021. In June 2021, we began to onboard non-pilot programs, starting with the Los Angeles County PIER programs. See table below for all core trainings conducted through June 2023. Note that booster trainings (for entire program or for individuals at the program) have also been conducted in addition to the core trainings and are not included on the table below. We are also in the process of adding all of the training modules for Beehive trainings part 1 through 3 to a learning management system, Cornerstone, we all staff and providers from participating programs will be able to access asynchronous training materials. The planned release date for LHCN Cornerstone materials in at the end of June or early July.

Table III: EPI-CAL Site Training Completion

Site	Pre-Training	Training 1	Intake Workflow	Training 2	Training 3
UCD SacEDAPT	3/10/2021	3/22/2021	3/10/2021	4/5/2021	6/14/2021
UCD EDAPT	3/10/2021	3/22/2021	3/10/2021	4/5/2021	6/14/2021
Solano SOAR	3/18/2021	3/22/2021	3/29/2021	4/12/2021	6/7/2021

Napa SOAR	7/23/2021	8/19/2021	10/21/2021	10/14/2021	12/2/2021
Sonoma SOAR	8/24/2021	9/29/2021	10/21/2021	10/14/2021	12/2/2021
Kickstart Pathways	3/24/2021	3/31/2021	6/8/2021	4/14/2021	7/28/2021
LAC- IMCES 3	5/10/2021	6/21/2021	8/11/2021	11/10/2021	12/8/2021
LAC - IMCES 4	5/10/2021	6/21/2021	8/11/2021	11/10/2021	12/8/2021
LAC - SFVCMHC	5/11/2021	6/18/2021	7/19/2021	11/18/2021	12/9/2021
LAC- The Whole Child	5/13/2021	6/17/2021	7/21/2021	11/23/2021	1/25/2022
LAC- The Help Group	5/14/2021	6/14/2021	8/10/2021	11/29/2021	1/5/2022
OC CREW	7/13/2021	8/12/2021	8/23/2021	10/13/2021	12/8/2021
San Mateo Felton	7/14/2021	10/20/2021	12/9/2021	7/13/2022	12/6/2022 & 6/13/2023
UCLA - Aftercare	7/29/21	9/1/2021	2/9/2022	5/20/2022	6/8/2023
UCLA - CAPPS	9/23/2021	11/22/2021	2/1/2022	5/3/2022	TBD
UCSF PATH	9/21/2021	5/6/2022	5/25/2022	10/28/2022	TBD
UCSD CARE	4/7/2022	5/23/2022	7/15/2022	9/30/2022	11/7/2022
Stanislaus LIFE PATH	2/23/2022	4/8/2022	5/10/2022	5/31/2022	9/22/2022
Stanford INSPIRE	3/21/2023	4/26/2023	5/23/2023	TBD	TBD
MCC	2/8/2023	3/9/2023 & 3/28/2023	4/7/2023	5/1/2023	6/9/2023
Lake County	4/21/2023	6/23/2023	TBD	TBD	TBD
Totals	21	20	20	19	17

Pre-Training Meeting

The pre-training meeting is conducted between EPI-CAL staff, including the site’s assigned point person, site leadership, and a site IT representative. The purpose of this meeting is to introduce the training schedule and gather information to facilitate the first Beehive training. For example, the site leadership are invited to Beehive to create their accounts and test network compatibility (e.g., ensure that invite emails are not blocked by institution, ensure that program staff can access web application). The IT representative is engaged as needed to resolve technical issues (e.g., add beehive email address to approved senders list). Site leadership complete their account registration ahead of the Part 1 training as they will be inviting all other program staff from their clinic to Beehive.

Part 1 Training

The general outline for the first training is as follows:

1. Re-introduction to the EPI-CAL project, including the overarching purpose and goals of data collection via Beehive
2. Presentation on the value of Beehive and data collection
3. Beehive Application training session (see Figure 3)

Presentation- “The Value of Beehive and Data Collection”

An EPI-CAL team member, Leigh Smith, Ph.D., gives a brief presentation that first focuses on how Beehive was developed using input from stakeholders and providers. Next, she provides a historical example of data collection that led to significant innovation in health care by giving a brief vignette of John Snow’s work with the Cholera outbreak in London in 1854. She then draws parallels between Snow’s work and how Beehive was designed, focusing on a meaningful connection between providers and stakeholders, a holistic approach to data collection, and prioritization of record keeping through automation and data consolidation. After, she speaks about Beehive’s power to facilitate dialogue between providers and consumers, and within/between clinics, through reports provided by the Beehive team or generated within Beehive. Dr. Smith covers the purpose of participating in a Learning Health Care Network (LHCN), and how valuable information collection can be in informing treatment. Finally, she emphasizes the ability of Beehive’s data collection in shaping care by illustrating how over a million points of data can be generated if each of the EPI-CAL clinics enrolled 80% of their consumers and completed the baseline and two follow-up surveys in the first year.

Figure 4: Training Agenda

Training Agenda

- **Part A: Beehive Support**
 - Using Beehive Support Resources
- **Eula Video**
- **Part B: Training Tasks**
 - Task 1: Set up Clinic Admin accounts
 - Task 2: Set up Provider Accounts
- **Part C: Your Next Steps**
 - Goal 1: Set up Client and Support Person Accounts & Send Survey Weblinks
 - Goal 2: Check in with Clients and Support People (re: Completing Surveys)
 - Goal 3: Complete Clinician Data Entry

Part A: Using Beehive Support Resources

We provide all EP program staff with the link to our detailed resource guide, accessed here: <https://sites.google.com/view/beehiveguide/home>

The resource guide was created so that EP program staff may reference, in detail, how to use the Beehive application and complete the tasks reviewed during the training. This includes: Creating Clinic or Group Admin Account & Inviting them to Beehive, Accepting Beehive Invite & Completing Registration, and Adding a Provider and Inviting them to Beehive. The resource guide also provides information on how to complete the “homework” that was assigned during the first training, including Adding a Consumer & Support Person and Completing Clinician Data Entry.

End User License Agreement (EULA) Video

We show the EULA video to all EP program staff for two reasons: 1) to streamline the registration process for staff during the training (as all users watch this video as part of the registration process), and 2) to orient them to what consumers and families also see when they first access the Beehive system. The EULA video can be accessed here: <https://youtu.be/3E8hiEkIvSQ>. (Spanish: <https://youtu.be/UgY7ZUhe-Fk> Vietnamese: <https://youtu.be/NqdC51TqGc0>). We developed the EULA video through focus groups with EPI-CAL

community partners (consumers, family members and providers) to ensure that core aspects of Beehive (e.g., security, consent, and data sharing) were clear to users. The EULA video describes what Beehive is and how it is part of the EPI-CAL project, the purpose of Beehive, how data is shared and stored, and users' options for data sharing. Every new user of Beehive will be presented with the EULA video before making their data sharing choices.

Part B: Training Tasks: Setting up Clinic Admin/Provider Accounts and Registering Consumers

There are three main types of accounts in Beehive; each account is associated with the ability to complete certain actions in the Beehive system in line with that person's job duties:

- Group Admin account: For program-level staff members who provide supervision and administrative support across clinics within a particular group – for example, a Group Admin is a person whose position includes oversight of activities at more than one clinic.
- Clinic Admin account: For staff members who provide supervision and administrative support within a specific clinic in a group.
- Provider account: For staff members providing direct services to consumers in a particular clinic, for example therapists, prescribers, and peer support specialists.

There is a general hierarchical structure to the relationship between these account types, such as who can invite new users and who can download data from Beehive.

The first training task is to set up Clinic Admin and Provider accounts in Beehive. For the initial Part 1 trainings, EPI-CAL staff created Group and Clinic Admin accounts prior to the first training meeting and sent those specific users their invitations during the live training (for trainings of non-pilot programs, EPI-CAL staff assist all admin users to register at the pre-training meeting). Once participants with Clinic Admin-level accounts accept their invitations and completed the registration process, EPI-CAL staff guide them through creating provider-level accounts for their staff and inviting those staff to complete registration in Beehive. For programs utilizing a Single Sign-On (SSO) authentication scheme, the EPI-CAL staff also walk them through the process to log in through their institution.

Part C: Next Steps

Once all providers conclude the registration process, EPI-CAL staff demonstrate the process of registering a consumer and their support persons. Next, the survey collection timeline is introduced. Baseline surveys are available for four months after the consumer's intake date. After baseline, follow up surveys are sent, which are due every 6 months from baseline will open two months prior to the due date and close four months after the due date. Next, the process for consumers and primary support persons to complete/request help to complete surveys is shown, along with the steps to manually resend surveys. Participants are then given the goal to register two consumers and their support persons (if applicable) in Beehive, and have the consumers complete their surveys before the next training session (see Figure 5). These consumers can be at any point in treatment when they are enrolled in Beehive. A Beehive consumer introductory script is provided to support the program staff in talking about Beehive to potential participants.

Figure 5: Training Checklist

TRAINING CHECKLIST	
Tasks we completed together	
<input checked="" type="checkbox"/>	Task: Set up Provider Accounts
Goals for you to work on before our next training together	
<input type="checkbox"/>	Goal 1: Set up Client & Support Person Accounts
<input type="checkbox"/>	Goal 2: Follow Up with Client & Support Person
<input type="checkbox"/>	Goal 3: Use our Support Resources

Intake Workflow Meeting

After the Part 1 Training, EPI-CAL staff, including the program’s point person, meet with the program’s key staff involved in intakes. The purpose of this meeting is to understand the program’s current workflow to facilitate a smooth transition to implementing Beehive. Once EPI-CAL team have a basic understanding of the program’s intake process, they ask questions to operationalize how Beehive will be integrated into this process (e.g., “Who will be responsible for registering clients in Beehive?”). They may offer suggestions or ideas based on what has worked at other programs. The goal of this meeting is to create an initial plan for the program to introduce Beehive into their current workflow. Please see Appendix I for a template of the questions asked at the intake workflow meeting.

Part 2 Training

The second Beehive training focuses on how providers can utilize individual level data in care. The Beehive team introduces the EPI-CAL Core Assessment Battery (CAB), including its domains and how these domains were selected from stakeholder input. Next, the trainer presents two surveys from the EPI-CAL CAB: the Modified Colorado Symptom Index (MCSI) and the Questionnaire about the Process of Recovery (QPR). Then, the trainer shows participants where to find consumer data in Beehive. The trainer then demonstrates how to present the data visualizations available in Beehive and asks the group what questions or concerns the sample visualizations elicit from them. Participants then participate in small group exercises focused on example data visualizations of the MCSI with the goals of 1) exercising their data comprehension skills and 2) practicing using data to explore a consumer’s story.

During small group exercises, an example consumer’s MCSI scores are displayed, and participants are prompted to discuss the “story” that could be illustrated by this data set. For example, providers are presented with a graph in which MCSI scores are going up over time (indicating more frequent and/or distressing symptoms; Figure 6A) and then asked to interpret possible situations that could be leading to these data trends for this sample consumer. After providers correctly identify that the example consumer is experiencing an increase in frequency and/or number of symptoms, they are asked how they might use this information in treatment (e.g., modify the consumer’s treatment plan to help reduce the frequency of these symptoms).

Figure 6: MCSI Example Graphs from Beehive

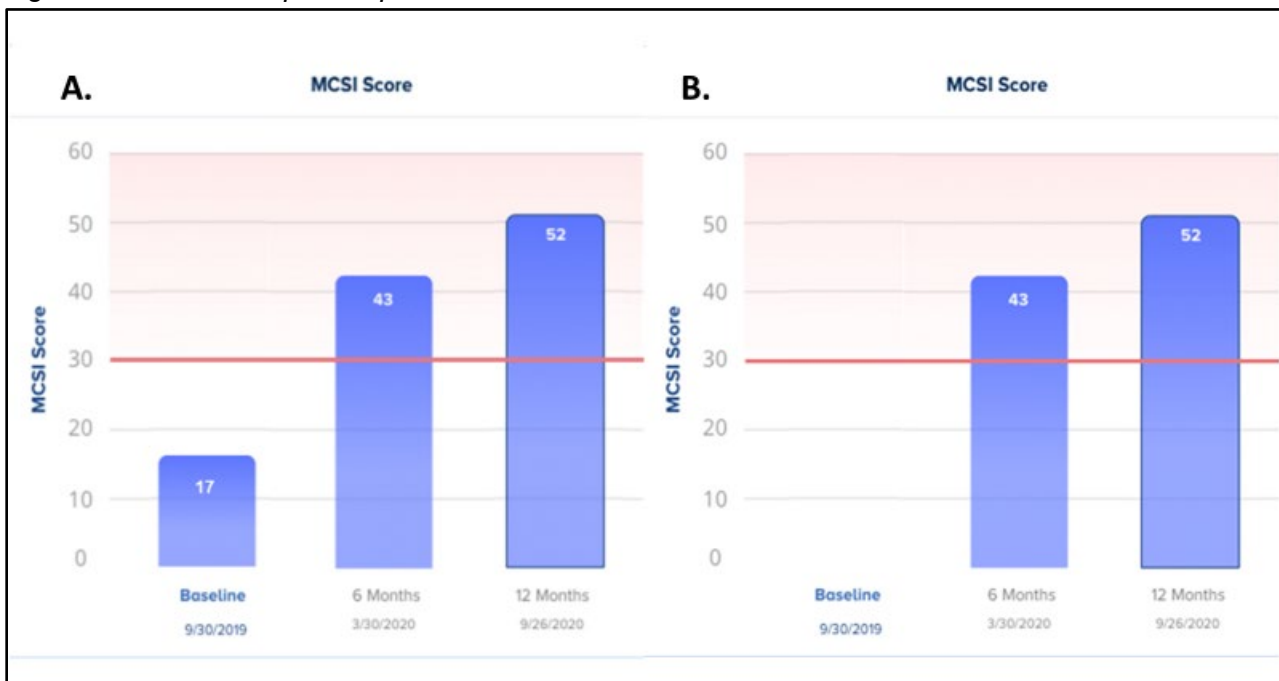


Figure legend: A. Representation of data showing increasing trend in MCSI symptom severity; B. Representation of how missing data (shown here at baseline) impacts the visualization

After these exercises conclude, small groups reconvene back into the larger group, with a member from each group presenting their group’s discussion/findings to the rest of the site as a whole. As each small group has different themes and discussions that come up during the exercises, the larger group discussion is meant to help to broaden participants’ understanding of data interpretation.

Next, the training details the types of urgent clinical issues that are currently tracked by Beehive, including “Risk to self”, “Risk to others”, “Risk of homelessness,” and “Plan to stop taking medication”. These issues were identified during focus groups with EP program stakeholders as critical moments for intervention during treatment. The training team also explains where each one of these alerts can be triggered within the assessment battery. Importantly, we stress that Urgent Clinical Issues in Beehive are not a replacement for each clinic’s standard risk management procedures; instead, Beehive can be used as an additional tool to inform their standard risk management approaches. We also cover how to resolve urgent clinical issues using the responses programmed into Beehive (i.e., “Modified treatment plan”, “Conducted risk assessment” or “Sent for emergency care”) as appropriate for these alerts.

To conclude the training, the trainer introduces the “Data Use in Care” question pop up and its different response options. This pop-up appears intermittently when a user leaves a page on Beehive which displays consumer’s data. It asks the user whether they reviewed the data with the consumer or family and then asks them how the data impacted treatment. These response options are the same as the response options programmed into the urgent clinical issues – the training team intentionally takes the approach of presenting these two Beehive features together to help maximize participant comprehension. These data will contribute to a data-driven understanding of Beehive’s impact (e.g., whether and how staff use data as part of treatment) on the participating programs of the LHCN.

Data-Entry Workflow Meeting

After the Part 2 Training, EPI-CAL staff, including the program's point person, meet with the program leadership. The purpose of this meeting is to help the program create a reasonably sustainable plan for completing clinic-entered data about each client's clinical outcomes in Beehive. EPI-CAL team will ask question to understand whether there is an existing data-entry workflow in place as well as which roles on the teams are involved in the process. Once EPI-CAL team have an understanding of the program's existing data-entry workflow, they ask questions to operationalize how Beehive will be integrated into this process (e.g., "Who will be responsible for entering clinic-entered data for clients?"). They may offer suggestions or ideas based on what has worked at other programs. The goal of this meeting is to support the program to create an initial plan to complete clinic-entered surveys about key client outcomes. This should include a plan for which team members will monitor and track completion and which team members will enter the data. Please see Appendix II for a template of the questions that will be asked as part of the data-entry workflow meeting.

Part 3 training revolves around applying and expanding the data interpreting skills gained in Part 2 training, with actual data from consumers that was collected after the last (Part 2) training. During Part 3 training, participants are oriented on how to input and view Clinic-entered data and how to assign additional surveys to consumers, and how to close and re-open client episodes in Beehive.

Part 3 training also familiarizes participants to two more measures included in the Core Assessment Battery: the SCORE-15 and the Burden Assessment Scale (BAS). These measures were selected because they both capture quantifiable scores on domains (family impact and family burden, respectively) that were identified as high priorities by EP community partners during EPI-CAL outcomes focus groups. These measures were chosen for this training as, like the Modified Colorado Symptom Index and Questionnaire on the Process of Recovery covered in Part 2 Training, they are scored measures which are visualized in Beehive.

Next, participants are split into small groups, and given a GUID of a consumer that receives services at their clinic and has completed surveys in Beehive. This is to ensure that each small group has real-world data to interpret. At the beginning of the small group, an EPI-CAL team member orients the group to a worksheet which includes training activities and discussion questions about finding, interpreting, and using consumer data as part of care. As these trainings require participants to examine their consumer's data (i.e., PHI), EPI-CAL training team members are only present for the beginning of the small group exercise to introduce the activity, but they leave prior to any discussion or sharing of PHI. EPI-CAL staff encourage each participant to take an active role within the small group: note taker, screen sharer, delegate to report during large group debrief, etc. Each small group uses the small group worksheet (Appendix III) to guide their time in the small group.

After the small group exercise, participants rejoin the larger group to share their findings. After each small group has presented their findings with the rest of the groups as a whole, the EPI-CAL team facilitates a large group discussion which encourages participants to look for trends and assess what they could mean. After encouraging pattern recognition of common patterns in the data, the training team encourage participants to view their consumer's data through this analytical lens and demonstrate how their treatment plans could benefit from this approach.

Implementation Support After Initial Beehive Trainings

Each program has an EPI-CAL staff point person to provide regular check-ins to provide training and implementation support. The point persons are introduced during pre-training and the Beehive training series. Initially, we request weekly meetings or calls with key program staff (as determined by the program). At these meetings, point persons can help programs troubleshoot issues and support staff with accessing resources and learning to use Beehive.

In addition to regular check-ins with key program staff, point persons may also provide booster trainings to individuals at the program or to groups of program staff. These may be conducted remotely via web conferencing or in-person for sites that have resumed in-office operations.

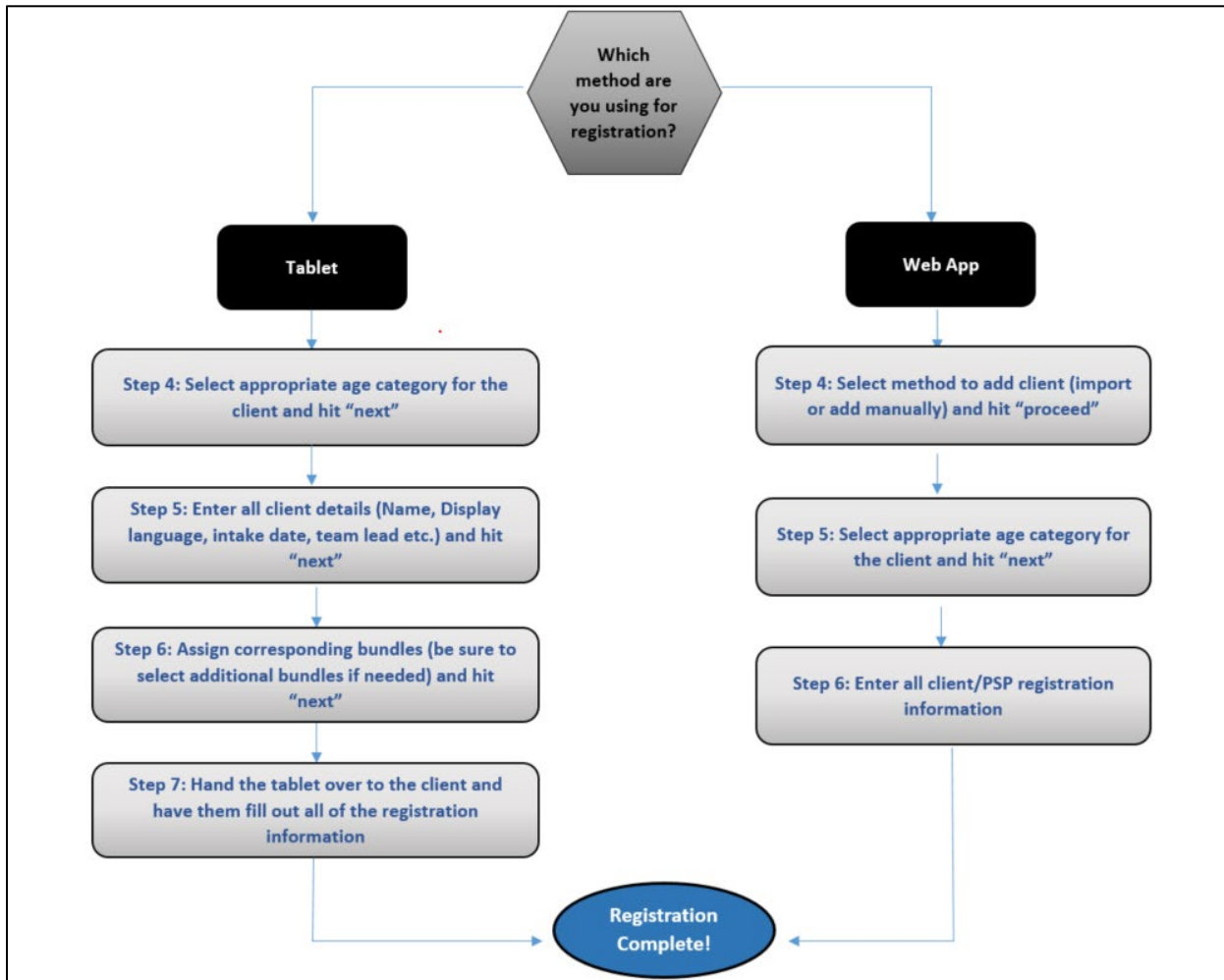
Point persons will also respond to ad hoc requests from the program for technical support and troubleshooting. For example, if a program experiences a bug or glitch while using Beehive, they are told to contact their point person who can help to troubleshoot or escalate this report.

Tablet Training

The Beehive application is available as both a web application and on tablets (i.e. iOS application). The tablet application is intended for clients who are receiving in-person services in the clinic or in the community. Due to the prevalence of telehealth and low incidence of in-person appointments, most sites did not plan to use the tablet application at the time of their initial core trainings. The EPI-CAL team developed a standalone tablet training to offer to sites on-demand whenever needed.

The tablet training covers the differences between registering clients and administering surveys on the iOS app as compared to the web application. It also covers several iOS app specific features such as the client individual check-in and group check-in features.

Figure 7: Diagram showing workflow differences in client registration based on environment



In the past year, only three programs have asked for this tablet training (OC CREW, San Mateo Felton, and Stanislaus LIFE Path). Other sites chose not to schedule a synchronous training, but rather have relied on the training materials and resource guide as they have begun to use the iOS application. We will continue to offer the live tablet training as needed or refer staff to our asynchronous training materials.

8. Draft preliminary data on feasibility and acceptability of LHCN app in all EP programs

One of our primary metrics to evaluate the feasibility and acceptability of the Beehive application in EP programs it to examine is whether we achieved adequate enrollment in Beehive. We examined this using a previously defined benchmark of enrollment of at least 70% of eligible participants, who are representative of the target population based on current program demographics, and 50% of their available family members, across the network were enrolled. To approximate the number of total clients eligible for enrollment, we have asked the programs to provide us with their current total census number. This was compared to clients currently enrolled in Beehive, and not including clients who have been discharged from Beehive. Clients must have completed their EULA to be considered enrolled. For the purposes of the preliminary analysis, we are only considering individuals who have agreed to share data with UCD as “enrolled”, but clients can decline this option and still use their data within their program for clinical purposes. Data on of the number of available family members is available in Beehive and we can assess whether a primary support person (PSP) has completed enrollment. Just like clients, primary support persons are not considered enrolled unless they have agreed to share data with UCD. Clients and support persons can make different choices regarding their data sharing permissions, i.e., a client can decline to share their data for research purposes while a support person can opt in. For the purpose of the preliminary feasibility analysis, we are only examining what proportion of enrolled clients also have an enrolled PSP, acknowledging that there may be more enrolled PSPs whose corresponding client opted out of data sharing. Programs who have not begun enrollment are not included in this analysis (Lake County, MCC, and Stanford INSPIRE).

Table IV: Preliminary client and PSP Beehive enrollment as of May 2023

Program Name	Current Census	Currently Enrolled	% Enrolled	Clients with an enrolled PSP	% with a Primary Support Person
UCD SacEDAPT	25	29	116%	17	59%
UCD EDAPT	61	35	59%	20	57%
Solano SOAR	11	8	73%	4	50%
Napa SOAR	17	14	82%	9	64%
Sonoma SOAR	18	15	83%	5	33%
Kickstart Pathways	95	4	4%	3	75%
LAC- IMCES 3	11	17	154%	3	18%
LAC - IMCES 4	28	17	61%	4	24%
LAC - SFVCMHC	18	6	33%	1	17%
LAC- The Whole Child	34	12	35%	3	25%

LAC- The Help Group	19	13	68%	9	69%
OC CREW	42	16	38%	3	19%
San Mateo Felton	70	13	19%	3	23%
UCLA - Aftercare	21	9	43%	5	56%
UCLA - CAPPs	45	0	0%	0	0%
UCSF PATH	100 ¹	20	20%	4	20%
UCSD CARE	244	23	9%	2	9%
Stanislaus LIFE PATH	8	7	86%	3	43%

As described in Table IV, there is quite a bit of variability across programs in the proportion of the program's census that are enrolled in Beehive (mean = 55%, range = 0-154%). Two programs have more clients enrolled in Beehive than currently in their program, indicating they have clients who have been discharged from the program but not Beehive. EPI-CAL point persons are working with the sites to make sure they discharge clients from Beehive in a timely manner moving forward. Five of the participating programs meet or exceed the previously defined benchmark of 70% of eligible clients are enrolled. There was also extensive variability in the number of PSPs enrolled in Beehive across the programs as well (mean = 37%, range = 0-75%). Seven of the participating programs meet or exceed the previously defined benchmark of 50% of PSPs enrolled in Beehive.

The heterogeneity of enrollment across sites supports the need for the qualitative barriers and facilitators interviews to understand the issues that sites are facing. Future analyses will examine survey data from clients in more detail, and survey data analysis procedures for clustered data (treating early psychosis programs as clusters) will summarize characteristics of enrolled clients who complete enrollment and at least one longitudinal assessment.

9. Submit report on LHCN enrollment and follow up completion rates for LHCN app in all EP programs

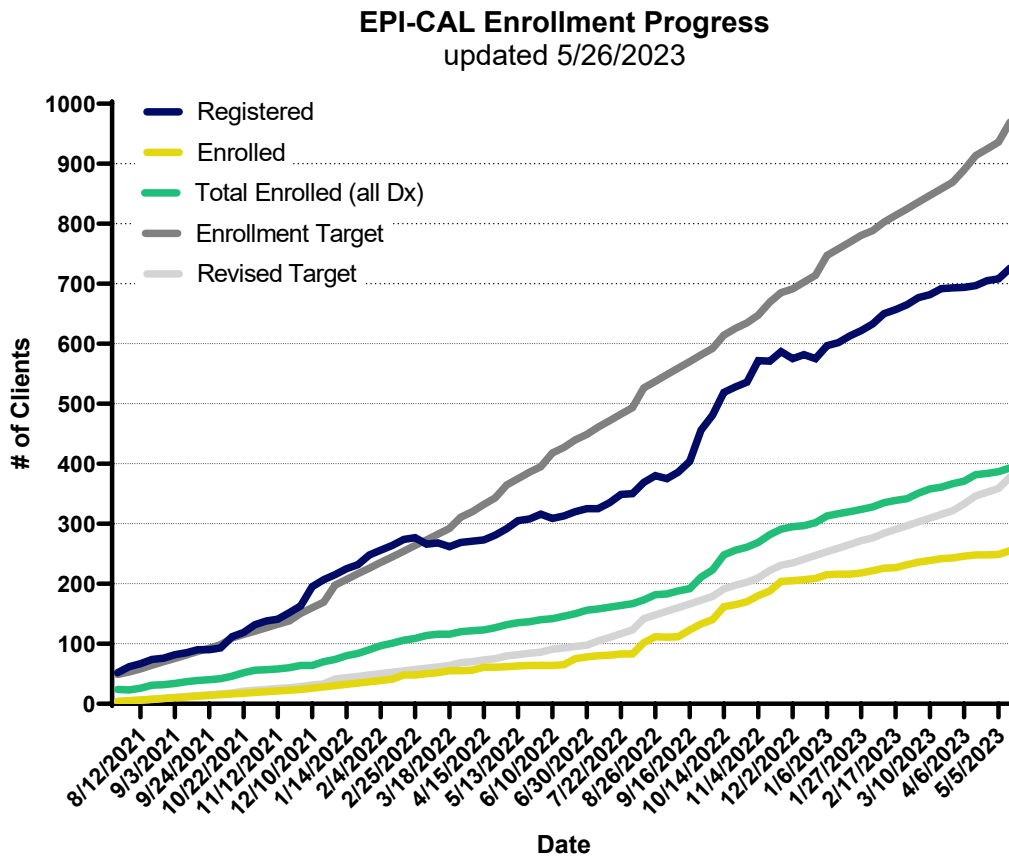
LHCN Overview

Figure 8 shows the LHCN Progress towards EPI-CAL Enrollment targets through May 26, 2023. Clients are considered enrolled if they have completed the Beehive EULA and agreed to share their data with UC Davis for use in research. If clients do not allow their data for use in research but agree to use Beehive as part of clinical care, their data may be used for quality management or quality assurance purposes only. The goal at this point in the project was to have 969 individuals enrolled (solid dark gray line in figure below). In summer of 2022, we worked with sites to create a revised enrollment target (light gray line) based on observed rates of enrollment up to that point. The observed rate of enrollment across the LHCN is 412 clients across all diagnoses (green line in figure below) or 255 clients with a diagnosis that indicates FEP, (the yellow line in figure below)). There are an additional 258 clients who have been registered by the clinic in Beehive (dark blue line in figure below), but who have not engaged with Beehive by completing the EULA or starting their surveys. We monitor the number of registered individuals because it serves as a proxy for program census (however we

¹ Updated census not provided; estimate from program-level survey used.

know that clinics may not yet have all active clients registered) and allows us to see what possible enrollment across the network could be.

Figure 8: LHCN Progress Towards EPI-CAL Enrollment Targets



Figures 9-10 show a site-by-site breakdown of the proportion of individuals who agreed to data sharing with UC Davis for research purposes as of May 26, 2023. Figure 9 shows all registered clients, regardless of EULA completion status. Hence this figure shows the room for growth if sites support clients to complete their EULA in Beehive if those clients agree to data sharing.

Figure 9: Proportion of Data Sharing with UCD for Research by Site

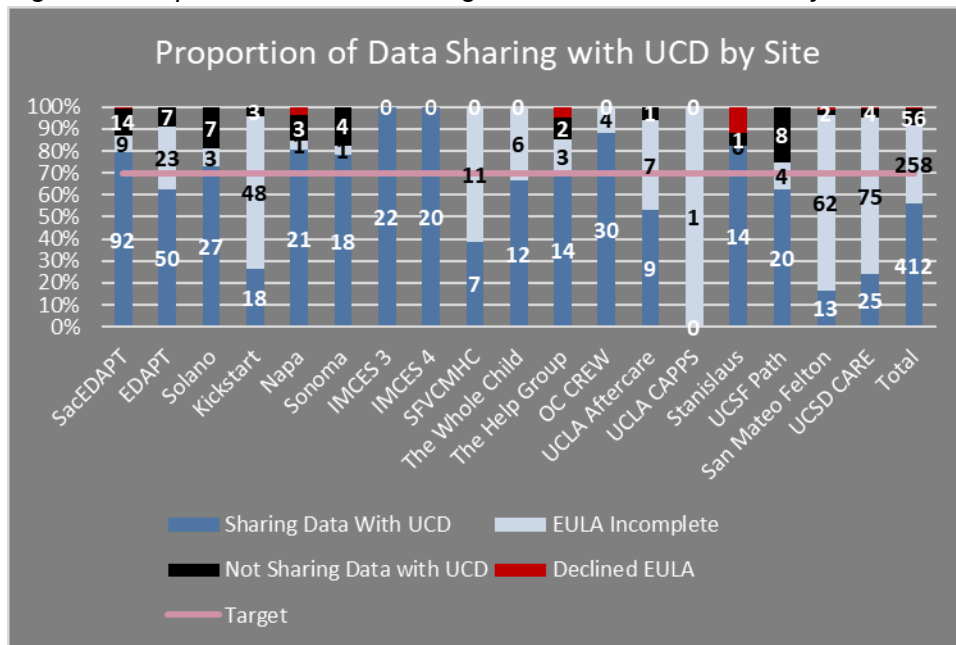
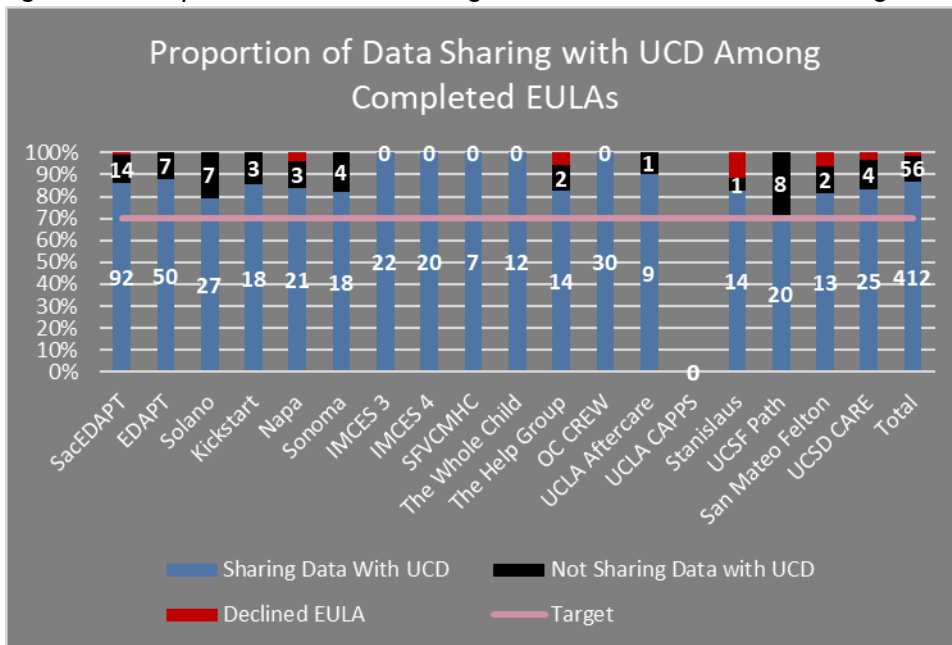


Figure 10 shows the proportion of data sharing choices made by those clients who have completed their EULA in Beehive. We can see that some sites on this graph do not have a bar at all because they do not have any clients who have been registered in Beehive.

Our goal is that 70% of active clients at each site agree to use Beehive and share their data for research purposes. When considering all clients known to EPI-CAL (i.e., all those registered in Beehive), we can see that only a few sites are meeting this metric. However, among those individuals who have actually engaged with Beehive and completed the EULA, we are exceeding our target across the network, and at most sites individually as well. When considering all enrolled clients across the LHCN, 86% of clients have agreed to share their data with UC Davis and 83% of clients agreed to share their data with NIH for research purposes.

Figure 10: Proportion of Data Sharing with UCD for Research among Completed EULAs

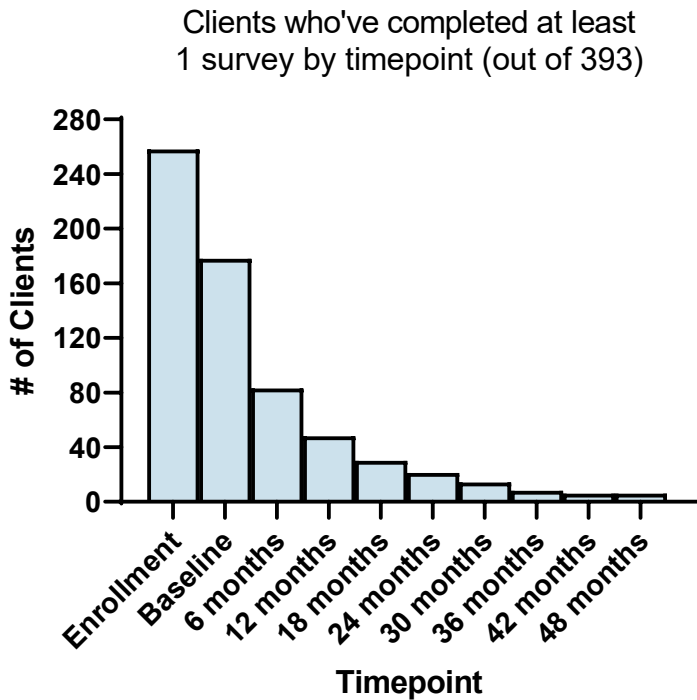


Progress of data collection in all EP programs

As of May 26, 2023, 18 EPI-CAL clinics have registered 733 clients in Beehive. Of those 733 clients who have been registered, 63% (n=468) have completed their Beehive EULA and are considered to be enrolled in Beehive. Of those who have completed their EULA, 83% (n=393) have agreed to share their de-identified data with NIH and 86% percent (n=412) have agreed to share their de-identified data with UCD.

Figure 11 shows network-level survey completion rates by time point as of May 26, 2023. Note that all clients can complete enrollment surveys regardless of when in their treatment they are enrolled. Clients are not able to complete some survey windows (e.g., baseline) if they are enrolled later in treatment. Some clients have completed surveys at more than one time point. Of the 468 clients who have been enrolled in Beehive, 88% (n=413) have completed at least one survey in Beehive.

Figure 11: Survey Completion Rates Across EPI-CAL Network



Here we report demographic information that is completed at registration, which is a subset of the demographic questions that are asked in Beehive (Table V). Complete demographic information, including all required PEI fields, are administered via a required client-entered Beehive survey. For any cell that has an N less than 5 individuals, this data was masked and both the N and proportion cells were updated with “<5” and “<2%”, respectively. If there were 0 individuals who endorsed a response option in the demographic surveys, the category is not represented on Table V (e.g., Genderqueer/gender non-conforming in the gender category); we will continue to add categories to each demographic variable if there are ≥1 individuals in each respective category.

Table V: Demographic Data from all Participating EPI-CAL Clinics

EPI-CAL Combined Demographics, n =413 (through 5/26/2023)		
Display Language	N	%
English	402	97%
Spanish	9	2%
Missing	<5	<2%
Age	N	%
<12	<5	<2%
12-17	157	38%
18-23	182	44%

≥24	72	17%
Sex at Birth	N	%
Female	202	49%
Male	206	50%
Intersex	<5	<2%
None of these describe me	<5	<2%
Prefer not to respond	<5	<2%
Gender	N	%
Female	176	43%
Male	192	46%
Non-binary	16	4%
Transgender	6	1%
Questioning or unsure of gender identity	<5	<2%
Other	5	1%
Prefer not to say	14	3%
Missing	<5	<2%
Pronouns	N	%
He/Him	173	42%
She/Her	149	36%
They/Them	19	5%
Other	<5	<2%
Missing	68	16%
Race	N	%
African/African American/Black	49	12%
Asian	44	11%
American Indian/Alaskan Native	<5	<2%
Hispanic/Latinx Only	139	34%
White/Caucasian	10	2%
More than one race	149	36%
Unsure/Don't Know	9	2%
Prefer not to say	<5	<2%

Missing	<5	<2%
Ethnicity	N	%
No - I do not identify as Hispanic/Latinx	208	50%
Yes - I identify as Hispanic/Latinx	153	37%
Unsure/Don't know	48	12%
Missing	<5	<2%

Additionally, providers are asked to enter a client's diagnosis when they register individuals in Beehive, which is reported in Table V. In the same manner as the table above, cells with less than 5 individuals were masked and both the N and proportion cells were updated with "<5" and "<2%", respectively. Diagnoses are grouped according to two classes of early psychosis: 1) individuals who are deemed to be at clinical high risk for psychosis (CHR), and 2) individuals who have experienced psychotic level symptoms (First Episode Psychosis, FEP). There is also a section for those individuals for which their FEP or CHR status is not yet confirmed. This reflects the wide range of psychosis diagnoses that are served by the EP clinics represented in this sample.

Table VI: Client Diagnoses from all Participating EPI-CAL Clinics

EPI-CAL Combined Diagnoses, n = 413 (through 11/28/22)	N	%
Clinical High Risk (CHR)		
Attenuated Psychosis Symptoms	26	6%
Genetic Risk and Deterioration Syndrome (GRDS)	<5	<2%
Other	52	13%
First Episode Psychosis (FEP)		
Substance Induced Psychotic Disorder with onset during intoxication	<5	<2%
Mood disorders with psychotic features	47	11%
Schizoaffective Disorder (Bipolar or Depressive Type Combined)	29	7%
Schizophrenia	50	12%
Schizophreniform Disorder	6	1%
Delusional Disorder	<5	<2%
Brief Psychotic Disorder	<5	<2%
Other Specified Schizophrenia Spectrum Disorder	14	3%
Unspecified Psychosis	48	12%
Other FEP	58	14%

CHR or FEP Status Not Confirmed		
Anxiety Disorders*	23	6%
Mood Disorders*	30	7%
Other Diagnoses*	11	3%
Not enough Information	<5	<2%
Missing	35	8%

**Individuals may be counted more than once for these diagnoses*

10. Submit final data analysis plan for all data

As a reminder, this project contains data collected via three components: program-level data, county-level data, and qualitative data (Figure 1). The county data analysis plan was described in prior deliverables. While we describe some qualitative analysis here, much of the qualitative data analysis was described in prior deliverables, including “Provide qualitative report on ongoing issues and suggestions on the app/dashboard from EP program staff and other community partners; including results of focus groups.”

Therefore, this analysis plan will focus on client data collected via Beehive, including client self-report data, data from the primary support person for the client, and clinician rated data. The majority of the data is designed to be collected longitudinally, i.e., at baseline and then every six months of treatment thereafter. For our purposes, baseline is associated with a client’s intake date, not when they are enrolled in Beehive. Therefore, any reference to “baseline” is referring to the client’s intake date or start in their program regardless of their interaction with Beehive, and “enrollment” is referring to when the client was enrolled in Beehive, which occurs after intake. There are several variables that are only assessed at enrollment in Beehive, including multiple items that are assessed if they occurred over the client’s lifetime. For example, clients are asked in the “EPI-CAL Baseline Only Questions” survey if they have ever, in their lifetime, experienced any legal interaction. Then, on follow-up surveys, clients are asked every 6 months thereafter if they have had legal involvement in the past 6 months. Therefore, the legal experiences variables represent variables that is assessed initially as a single lifetime variable and then longitudinally for more recent involvement. All clients can complete enrollment surveys regardless of when in their treatment they are enrolled. Clients are not able to complete some survey windows if they are enrolled later in their treatment (e.g., client enrolled at 6 months would complete the enrollment and 6-month bundle but would not be able to complete the baseline bundle). Please see Table VII for a list of all data domains collected in Beehive. This table outlines whether a domain is rated only at enrollment or longitudinally, and indicates who completes the survey. Who rates the data will also be included as a variable in the analysis as we want to differentiate between information that is client self-report or clinician rated.

RE-AIM provides a conceptual framework to facilitate the translation of research to clinical practice. We will use this framework to examine the real-world impact of the proposed core battery and Beehive based on five dimensions (Figure 12): 1) Reach – the number and representativeness of the participants who use Beehive; 2) Efficacy – the impact of the intervention on specific outcomes; 3) Adoption – proportion and representativeness of people and places that adopt the intervention; 4) Implementation – quality and consistency of intervention delivery in real-world settings; and 5) Maintenance – long term outcomes of the intervention and its sustainability over time. This implementation research framework provides structure to examine initial impact of the project.

Prior to analysis, we will complete descriptive summaries for all data collected in Beehive, including client and clinician demographics, survey completion for each survey at each timepoint, and survey scores for quantitative measures. The distribution and completeness of each analysis variable will be examined to determine appropriateness of different statistical methods. Availability of within-person longitudinal data will be reviewed to determine whether longitudinal or cross-sectional approaches are most appropriate. Descriptive summaries will be generated for each clinic individually as well as network wide.

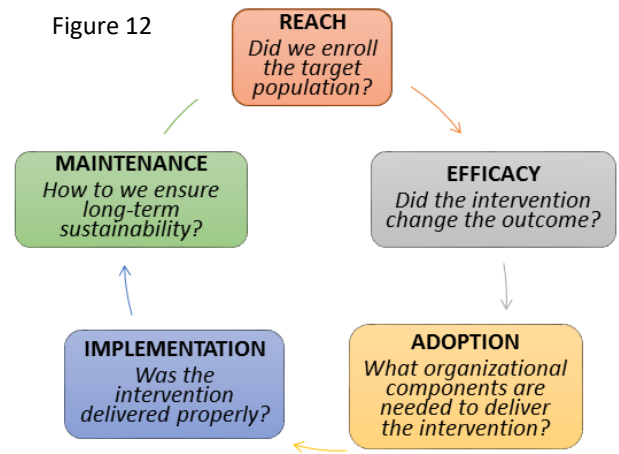


Table VII: Beehive Surveys by Timepoint and Respondent Type

Respondent	Measure	Timepoint
Client	Registration Demographics	Enrollment *
Client	EPI-CAL Baseline Only Questions	Enrollment
Client	Primary Caregiver background	Enrollment
Client	Adverse Childhood Experiences (ACES)	Enrollment
Client	Demographics & Background	Every 6 months (including Baseline)
Client	Education	Every 6 months (including Baseline)
Client	Employment and Related Activities	Every 6 months (including Baseline)
Client	Social Relationships	Every 6 months (including Baseline)
Client	SCORE-15	Every 6 months (including Baseline)
Client	Legal Involvement and Related	Every 6 months (including Baseline)
Client	Substance Use	Every 6 months (including Baseline)
Client	Medications	Every 6 months (including Baseline)
Client	Intent to Attend and Complete Treatment Scale	Every 6 months (including Baseline)
Client	Modified Colorado Symptom Index	Every 6 months (including Baseline)
Client	Questionnaire about the Process of Recovery (QPR)	Every 6 months (including Baseline)
Client	Life Outlook	Every 6 months (including Baseline)
Client	Hospitalizations	Every 6 months (including Baseline)
Client	Life Events Checklist (LEC-5) & PTSD Checklist for DSM-5 (PCL-5)	Every 6 months (including Baseline)
Client	Child and Adolescent Trauma Screen (CATS)	Every 6 months (including Baseline)
Clinician	Pathways to Care	Enrollment
Clinician	Diagnosis and DUP	Every 6 months (including Baseline)
Clinician	Family Involvement	Every 6 months (including Baseline)
Clinician	Risk to Self/Others	Every 6 months (including Baseline)
Clinician	Health	Every 6 months (including Baseline)
Clinician	Medications	Every 6 months (including Baseline)
Clinician	Service Use	Every 6 months (including Baseline)

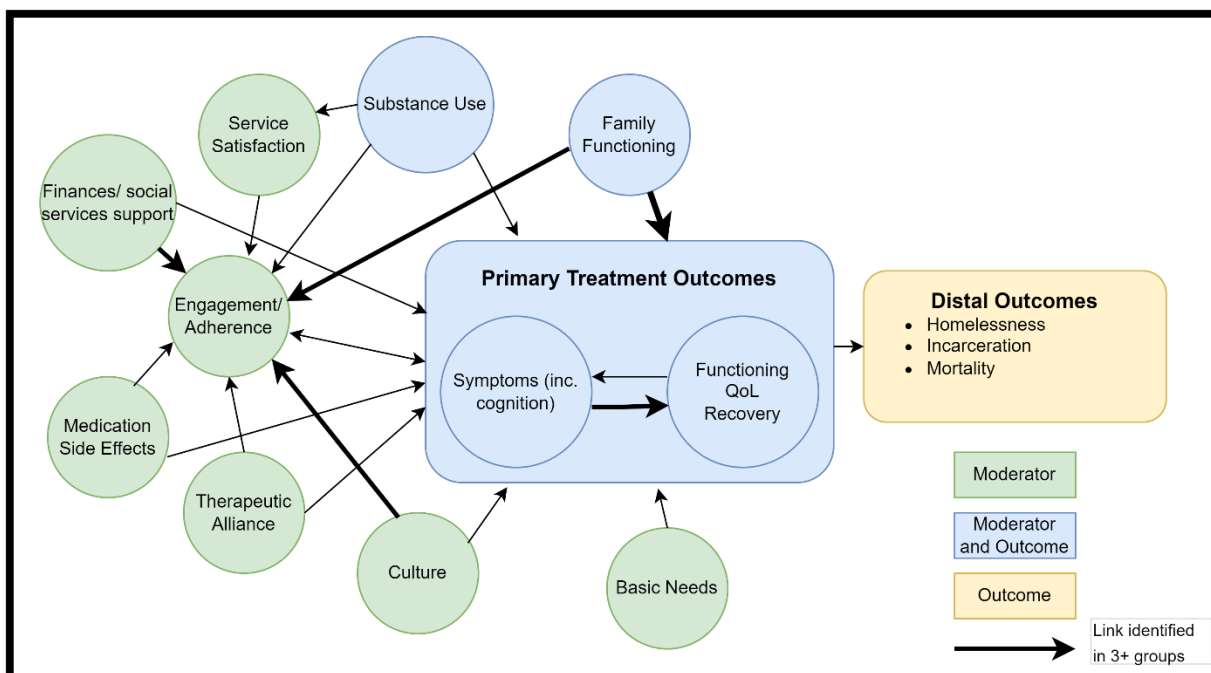
Clinician	Functioning	Every 6 months (including Baseline)
Clinician	Symptoms	Every 6 months (including Baseline)
PSP *	Baseline Only Questions	Enrollment
PSP	Demographics & Background	Every 6 months (including Baseline)
PSP	Legal Interactions & Related	Every 6 months (including Baseline)
PSP	SCORE-15	Every 6 months (including Baseline)
PSP	Burden Assessment Scale	Every 6 months (including Baseline)
PSP	Modified Colorado Symptom Index	Every 6 months (including Baseline)
PSP	Medications	Every 6 months (including Baseline)

* PSP = Primary support person; 0 = not available; 1 = available

First, we will examine is whether we achieved adequate enrollment in Beehive (*Reach*). We will examine this using descriptive statistics to see if at least 70% of eligible participants, who are representative of the target population based on current program demographics, and 50% of their available family members, across the network were enrolled and completed at least one survey timepoint. To approximate the number of total clients eligible for enrollment, we will pull the total census number from each programs' completed fidelity assessment and program-level core assessment battery (PL-CAB). Data on of the number of available family members is available in Beehive and we can assess whether a primary support person (PSP) has completed enrollment and any additional surveys. Survey data analysis procedures for clustered data (treating early psychosis programs as clusters) will summarize characteristics of enrolled clients who complete enrollment and at least one longitudinal assessment. Enrollment rates (with 95% confidence interval) will be computed for 1) all eligible clients and 2) potentially available family members. For the latter, we will report, for the denominator of eligible clients with available family members, what proportion of those clients had at least one family member complete a baseline or 6-month assessment.

Through the extensive qualitative work that was completed in the first phase of this project (Figure 13), a variety of key outcomes were identified by our program, client, and family workgroups. As described in the

Figure 13: Moderators and Outcomes of Interest



qualitative results from the Outcomes Focus groups, psychiatric symptoms, quality of life, and functioning were prioritized as key outcomes by all types of respondents and our analysis will center on these domains. Initially, as we continue to enroll and gather longitudinal data, our analyses will provide repeated cross-sectional assessment of these outcomes, with preliminary analyses of client's longitudinal trajectories when possible. As the longitudinal dataset grows, to account for the hierarchical structure of the data (nesting of measurements from clients, who are nested within clinicians within EP programs) and for continuous, binary, and count outcomes, generalized linear mixed models will be used to estimate the adjusted effects of exposures of interest on the key outcomes of interest, including quality of life, functioning, and recovery. Regression models will include independent variables (specified as fixed-effect terms) that operationalize relevant clinician metrics along with a parsimonious set of other clinician- and client-level covariates, to statistically adjust for confounders. Relevant clinician metrics may include clinician demographic information collected at registration, such as degree level, years working with this specific population, and other demographic variables. Random effects will be specified for sites, with additional effects specified for clinician and clients' effects if either/both improve model fit, according to Schwarz Information Criterion.

Next, we will examine *efficacy* of measurement-based care, comparing adjusted mean differences in baseline to 12-month change in psychotic symptom severity between groups defined by clinician metrics available from Beehive. When examining group-level differences, it is important to note that there is not a "Beehive" and "not Beehive" group of clients; all clients are assigned to the Beehive group and thus any analysis cannot examine the effect of Beehive use in treatment compared to a typical control group. Instead, clients will be classified according to the timeliness of clinician assessment of the client's Beehive data; the primary clinician metric will be a binary indicator for whether clinician accessed the patient's data within two weeks of surveys being completed. Exploratory metrics will include time spent reviewing Beehive data and whether the clinician reported that Beehive data impacted treatment plan. Our primary analysis will estimate impacts on mean baseline to 12-month changes in psychotic symptom severity, with separate regression models built for each of the primary and exploratory operationalizations of the Beehive clinician-usage metrics described above. Estimations of timepoint-specific changes (e.g. from baseline to 12-months) could either be done by computing the specific change score and using it as a dependent variable in a regression or, when data from other timepoints is also available, by analyzing the available data from each patient at each of multiple timepoints and including in the regression models terms for time, comparison group, and the interaction, to enable estimating timepoint-specific effects. When baseline data are available for a given outcome, we have opted to use regression approaches that pertain to estimating mean changes from baseline (e.g., a difference in differences type approach) instead of with baseline-adjusted mean differences at follow-up (e.g., an ANCOVA-type strategy) because our study is nonrandomized (Van Breukelen, 2006). Psychotic symptom severity data is available from both the client self-report Modified Colorado Symptom Index and a clinician-rated symptom measure, either the Brief Psychotic Rating Scale (BPRS) or the COMPASS-10. To address attrition, we will use multiple imputation to impute follow-up assessment scores and change scores based on them.

To assess the *maintenance* of measurement-based care via Beehive, we will assess timepoint-specific changes in psychotic symptom severity for each of the half-yearly assessment timepoints during the first 24 months, with the primary analysis based on a time-varying indicator for any endorsement of "impact on treatment plan" as a time-varying independent variable. We will also use data from the barriers and facilitator interviews to examine client-, provider- and program-level barriers to enrollment and completion. Separate models will be fit for each of the primary and alternative operationalization of Beehive clinician-usage metrics as the exposure variable of interest.

To examine *Adoption*, we will compare providers with respect to their reporting use of data to determine

treatment choices at two timepoints, prior to Beehive implementation and after training in and using Beehive. To assess *Implementation*, we will examine if EP providers use Beehive in direct care with clients for at least 50% of completed assessments. Prior to Beehive implementation in each EP program, providers completed “pre-implementation” surveys about their demographic information (age, sex, race, ethnicity) and professional characteristics (years of education, degree type) and completed questionnaires on their 1) beliefs about the utility of data in care planning and 2) skills in discussing data with clients. Beehive training materials were implemented consistently across participating EP program, highlighting the utility of data to identify treatment goals and metrics of improvement during treatment planning, and provided guidance on client-centered ways to review data to monitor progress during treatment. For post-implementation analysis of use of data in care, we will use provider-rated “use of data in care” questions, which are intermittently presented to providers while they are reviewing a client’s data page in Beehive so that they may indicate 1) if the data was reviewed during a session with the client or family and, if yes, 2) how the data was used as part of care, such as “followed up by phone” or “scheduled follow up appointment,” or “no action taken.” These data use metrics allow analysis on rates of adoption and level of implementation of Beehive. We will use a mixed effects regression model with robust standard errors to estimate site- and provider-adjusted pre-to-post differences in the proportion of client sessions where client-level data was used. The regression model will include fixed effects for site and a binary indicator for post-implementation and random effects for providers. If convergence can be obtained, we will use a linear link with a binomial variance. Otherwise, we will use a linear-normal model, relying on the robust variance estimator to correct for heteroscedasticity. Exploratory analysis will examine clinician expertise and training needed to effectively implement clinician review of FEP participant outcome data using Beehive at 80% of available time points.

To identify barriers and facilitators to Beehive implementation, our team is in the process of completing semi-structured qualitative interviews with clients and providers. Client-, provider- and program-level implementation barriers will be identified through analyses of qualitative data. Stratified purposeful sampling was and will continue to be used to recruit participants across clinics where Beehive adoption and implementation has been both high and low, and with clients who have and have not received data-integrated care. The data will be analyzed using an inductive approach to thematic analysis to identify data-driven themes to explain aspects of a phenomenon. Multiple coding will be adopted, and where possible, service users and providers will be involved in developing the topic guide and reviewing the data analysis and interpretation. Our goal is to have a total of 30 interviews completed by the Spring of 2023.

In addition to the program-level data described here, we also collected project data via fidelity assessments, program surveys, and the PL-CAB. Each program has completed a fidelity assessment to determine the components of coordinated specialty care (CSC) provided using the First Episode Psychosis Services Fidelity Scale (FEPS-FS), a standardized measure of fidelity to EP program best practices. Similar to the fidelity assessments, program surveys and the PL-CAB assess various components offered through the CSC program, program census, and staffing. The data from these other sources may also be used to inform the analysis of the program-level data described above.

Future analyses seek to examine the other relevant outcomes and moderators identified in Figure 13. Specifically, outcomes like homelessness, incarceration, and mortality are critically important for individuals with psychosis, but were not prioritized during the qualitative work given that these outcomes are not frequently observed in during the early course of illness. Therefore, these outcomes will be described for each of the programs, but not incorporated into statistical analyses for the purposes of the current report. Instead, we may need longer-term follow up data of those that transition out of the clinic and these domains have been identified as a priority for future work.

11. Subcontractor to make additional revisions to dashboard to include feedback from programs and community partners.

Over the last fiscal year, we have made a number of changes and improvements to Beehive based on feedback from programs and community partners. Annual penetration testing (“pentesting”) was conducted in June of 2022 and May 2023. Results from the first annual testing of the fiscal year changes to Beehive (release date of 8/25/2022) in order to maintain compliance with increasing security standards. Results of the pentesting from May 2023 resulted in changes to Beehive in our current fiscal year and are not summarized in the current report. Table VIII summarized changes made to Beehive over the last fiscal year. Please see the table below for more detail.

Table VIII: Changes to Beehive Implemented over the Fiscal Year 22/23

Date	Changes to Beehive
7/8/2022	<ul style="list-style-type: none"> • Performance updates (e.g., increased efficiency in application to reduce loading times) at login • Allow user to be logged into web browser and iOS app at the same time to prevent disruption in client survey completion • Added a link from Beehive dashboard to Beehive resource guide • Added a modal which shows survey expiration date when user hovers over survey due date • Added email notifications for urgent clinical issues • Alphabetized user dropdowns by first name
7/22/2022	<ul style="list-style-type: none"> • Added in-App notifications for urgent clinical issues Added ability for users to manage their email notifications (e.g. users can turn off email notifications if desired)
8/25/2022	<ul style="list-style-type: none"> • Group Admin (i.e. program leadership) are notified of screen-shots taken on the iOS app • Users see a reminder not to share PHI without client’s written permission when taking screenshots on the iOS app • Updated password policy (does not apply to SSO-users) • Added “change password” functionality • Added One-Time Password timeouts (e.g., user can request OTP for a maximum of 3 times before they are locked out for 15 minutes, user can enter an invalid OTP a maximum of 5 times before they are locked out for 15 minutes).
9/14/2022	<ul style="list-style-type: none"> • Improved workflow for editing client data (e.g. summary page shows all registration information, user can jump to sections for editing purposes, user may save and close at any screen of client’s profile when editing registration information) • Updates to weblink distribution frequency (reduction in frequency in response to longer survey windows)
10/03/2022	<ul style="list-style-type: none"> • Performance updates (e.g. increased efficiency in application to reduce loading times) during survey completion • Added email notification when clients use “ask for help” feature • Updated survey reports so that free text responses to “other (please specify)”, for example, are treated as a separate variable
10/14/2022	<ul style="list-style-type: none"> • Performance updates (e.g. increased efficiency in application to reduce loading times) throughout application • Added an OTP cool down to prevent users from requesting a new OTP before the first OTP has had time to arrive

11/21/2022	<ul style="list-style-type: none"> • Performance updates (e.g. increased efficiency in application to reduce loading times) on survey results and client data view page • Update to client registration feature: allowing users to save registration before it is completed to finish later • Added two additional response options to question asked when resolving urgent clinical issues based on user free-text responses from the past year
12/23/2022	<ul style="list-style-type: none"> • Weblink & OTP emails and text will be delivered to clients and support persons in their chosen display language (e.g., Spanish, Vietnamese) • Added an option for “no weblink” to “Weblink Delivery Method” in response to request from LHCN programs • Added an option to indicate when support persons decline to provide DOB in response to request from LHCN programs • Report file names generated by Beehive will include more detail, including survey name and relevant clinics in the report, in response to request from LHCN programs • To address request from LHCN programs, added in notifications relevant to track outstanding surveys: in-app survey notifications and weekly digest email
01/23/2023	<ul style="list-style-type: none"> • Launch of Vietnamese (CA threshold language) translations for Beehive interface (e.g., EULA video, all navigation text) & client & support person surveys
02/13/2023	<ul style="list-style-type: none"> • Added mobile phone validation and verification for client and support person weblinks
03/13/2023	<ul style="list-style-type: none"> • In response to feedback from LHCN programs, gave provider-level users permission to close client episodes. Prior to this update, this permission was restricted to admin users only • To support LHCN programs administer surveys to clients remotely, added an indication of the phone or email that OTP has been sent to • In response to request from LHCN programs, added in a “download as PDF” option on client surveys so that surveys may be easily included in medical record or for other reporting purposes
03/31/2023	<ul style="list-style-type: none"> • Performance updates (i.e., increased efficiency in application to reduce loading times) while loading data (e.g., client data view, survey results, clinic aggregate data)
6/15/2023	<ul style="list-style-type: none"> • Arabic is available as a display language for Beehive interface (e.g., EULA video, navigation buttons). Survey translations not yet available because EPI-CAL team needs time after this language becomes available in production to enter them. • Lengthened time before OTP expires from 5 minutes to 15 minutes to respond to institutional email screening procedures at sites which were slowing down email receipt and not delivering OTP before it would expire

12. Establish data collection process for obtaining county-level utilization and cost data for prior 3-year timeframe for preliminary evaluation for both EP and comparator group (CG) programs

We have previously reported on our data collection process in past annual reports. However, we continue to work on the data collection process as new counties join the LHCN. During the last annual year, we continued to have follow-up meetings with the counties that are involved in retrospective data collection (Los Angeles, San Diego, Orange, Solano, Stanislaus, and Napa). We held a series of initial meetings with the EP program

staff and county staff to address the collection of the county-level utilization and cost data for the prospective evaluation for both EP and comparator group (CG) programs (Los Angeles, San Diego, Orange, Solano, Stanislaus, Napa, and Lake). We identified EP program information, including a description of clients served, billing codes for each service, funding sources, and staffing personnel during the retrospective period. Meetings were also held with the county data analysts to discuss details about the data extraction. We reviewed all data elements that will be needed to define the EP and CG sample, including historical diagnostic and utilization data for both groups (January 1st, 2013- December 31st, 2016). We reviewed data categories, elements, and sources for utilization and cost to determine a) which services are provided in the county, and b) which data elements are available to be shared for the analysis. Any follow-up meetings with county data analysts are scheduled on an ongoing basis.

Lake and Kern counties will only be participating in the second phase of the evaluation, the prospective period, because their EP programs were not established until after the date range of the first evaluation phase concluded. In addition, Lake County will have a phase two timeframe that begins later due to the establishment of their EP program in 2022. Their prospective period will be January 1st, 2022- June 30th, 2024. This will allow for their EP program to have served more clients and collected service data for two and a half years for the prospective analysis.

Data Collection Process

The retrospective data extraction procedures have been completed for Los Angeles, Orange, and San Diego, and are in progress for Solano, Stanislaus, and Napa counties. The prospective data extraction procedures are in progress for San Diego, Los Angeles, Orange, Solano, Stanislaus, Napa, and Lake counties. The county data analysts have been asked to identify all clients served by the EP program for the retrospective period dates between January 1st, 2017 – December 31st, 2019, and the prospective period dates between January 1st, 2020 – June 30th, 2022, with an exception for Lake County. For the retrospective period, this includes individuals who started services with the EP program between January 1st, 2017 – December 31st, 2019 and excludes any individuals who received services from the EP program prior to January 1st, 2017. For prospective period this includes individuals who started services with the EP program between January 1st, 2020-June 30th, 2022 and excludes any individuals who received services from the EP program prior to January 1st, 2020. The county data analyst will send the list of clients to the EP program manager, who will then confirm the list of clients as new clients as of January 1st, 2017 – December 31st, 2019 (for retrospective period, if applicable) and January 1st, 2020-June 30th, 2022 (for prospective period) and identify whether they were: 1) clinical high risk (CHR) and enrolled in treatment; 2) first episode psychosis (FEP) and enrolled in treatment; 3) assessed and referred out during January 1st, 2017 – December 31st, 2019 (retrospective) or January 1st, 2020-June 30th, 2022 (prospective); or 4) other, with reason (e.g., incorrectly assigned to EP program in EHR or claims data). They will also add any individuals missed and repeat above 1-3 categorization, if necessary. They will also send any available data elements that are not available in the county EHR and claims data to the county data analyst, who will integrate them into the dataset. These data elements may include information on intake forms, such as regional center involvement and referral information, or other data elements. The county data analyst will integrate these data elements into the dataset and assign an ID to replace medical record numbers (MRN), names, and other identifying information, then save the key in order to create a limited dataset (dates and zip code included). The county data analyst will be sent a username and password to login to a secure UC Davis GoAnywhere portal, whereby each county can upload their county data securely and will not be able to access any other county's data.

We formally requested this information when we met with each county. A summary of what we asked for is described below for the retrospective and prospective periods, respectively.

Retrospective

We are requesting a limited dataset for all individuals served in the specified EP Program between these dates: January 1st, 2017 – December 31st, 2019. Data elements requested include: 1) all diagnoses (psychiatric, substance use, physical health) and dates of diagnoses; 2) year and month of birth (not date); 3) demographics, including: race; ethnicity; sex; gender; gender identity; sexual orientation; living arrangement (housing status); US military information/ veteran status; primary language; foster care/adoption; zip code; insurance status (i.e., insurance type); education level; marital status; and employment status; and 4) all county behavioral health services utilized, including: i) all outpatient mental health services; ii) all other mental health services including but not limited to (and as available): inpatient; crisis residential; crisis stabilization; urgent care; long-term care; forensic services and jail services; referral(s) from EP program to other services; law enforcement contacts; justice system involvement; and regional center involvement. For each service, each county will check for these data elements and include as available: service/procedure code; location code, facility code; date; EBP/supported service code; charge description; and service duration/minutes. We also requested a data dictionary from each county.

Based on our preliminary analysis of the data from Los Angeles, Orange, San Diego, and Solano counties, we determined that we also need historical diagnostic and service utilization data going back to January 1st, 2013 for both EP and CG clients. This will allow us to improve the comparability of individuals in the CG group with those in the EP group by either, a) appropriately matching individuals from the CG group to individuals in the EP group or b) weighting clients by their predicted pre-period probability of being observed in the EP program during the study period. Therefore, all counties also received this additional request:

We are now requesting to extend our service utilization data request for the EP group to the four years prior to our active period (January 1st, 2017 – December 31st, 2019), going back to January 1st, 2013.

Prospective

We are requesting a limited dataset for all individuals served in the specified EP Program between these dates: January 1st, 2020 – June 30th, 2022. Data elements requested include: 1) all diagnoses (psychiatric, substance use, physical health) and dates of diagnoses; 2) year and month of birth (not date); 3) demographics, including: race; ethnicity; sex; gender; gender identity; sexual orientation; living arrangement (housing status); US military information/ veteran status; primary language; foster care/adoption; zip code; insurance status (i.e., insurance type); education level; marital status; and employment status; and 4) all county behavioral health services utilized, including: i) all outpatient mental health services; ii) all other mental health services including but not limited to (and as available): inpatient; crisis residential; crisis stabilization; urgent care; long-term care; forensic services and jail services; referral(s) from EP program to other services; law enforcement contacts; justice system involvement; and regional center involvement. For each service, each county will check for these data elements and include as available: service/procedure code; location code, facility code; date; EBP/supported service code; charge description; and service duration/minutes. We also requested a data dictionary from each county.

Based on our preliminary analysis of the data from Los Angeles, Orange, San Diego and Solano counties, we determined that we also need historical diagnostic and service utilization data going back to January 1st, 2016 for both EP and CG clients. This will allow us to improve the comparability of individuals in the CG group with those in the EP group by either, a) appropriately matching individuals from the CG group to individuals in the EP group or b) weighting clients by their predicted pre-period probability of being observed in the EP program during the study period. Therefore, all counties also received this additional request:

We are now requesting to extend our service utilization data request for the EP group to the four years prior to our active period (January 1st, 2020 – June 30th, 2022), going back to January 1st, 2016.

13. Identification of county-level available data and data transfer methods, and statistical analysis methods selected for integrated county-level data evaluation

One component of the LHCN project is to identify and describe the services and related costs for individuals served by the EP programs in each county. We also examine services and costs associated with similar individuals served elsewhere in each county. We continue to work on harmonizing and integrating data across all LHCN counties in order to perform these analyses.

Specifically, in each county we identified an early psychosis (EP) group consisting of individuals served by the early psychosis program. We also identified a comparator group (CG), consisting of individuals with EP diagnoses, within the same age group, who entered standard care outpatient programs during that same time period. This analysis focuses on data from Los Angeles, San Diego, Orange, Napa, Stanislaus, Lake, and Solano counties. Inclusion of Kern County is pending an executed contract. For this component of the project, the evaluation has two phases: 1) the three years prior to the start of this project (e.g., January 1st, 2017 – December 31st, 2019) to harmonize data across counties and to account for potential historical trends and 2) for the 2.5-year period contemporaneous with the prospective EP program level data collection (January 1st, 2020 – June 30th, 2022).

Lake and Kern counties will only be participating in the second phase of the evaluation, the prospective period, because their EP programs were not established until after the date range of the first evaluation phase concluded. In addition, Lake County will have a phase two timeframe that begins later due to the establishment of their EP program in 2022. Their prospective period will be January 1st, 2022-June 30th, 2024. This will allow for their EP program to have served more clients and collected service data for two and a half years for the prospective analysis.

For each county, our team held meetings with the EP program managers and the county data analysts. The meetings with the program managers discussed services provided by the EP program, description of clients served, staffing specifics and billing codes for each service. A follow-up meeting was held with each county to review details of funding sources, staffing levels during certain time-periods and other types of services provided for specific types of clients (i.e., foster care). Meetings were held with the county data analysts to discuss details about the data the county will be pulling for the LHCN team. The discussion included time-periods for which the LHCN team will request data, description of the clients from EP programs and how similar clients served elsewhere in the county will be identified, services provided by each program, other services provided in the county to the EP clients (i.e., hospitalization, crisis stabilization, substance use treatment), and data transfer methods. We have met with the program managers and data analysts from all LHCN counties with active contracts and have scheduled follow-up meetings with the data analysts as necessary. Each meeting has been described in detail in the call log provided in the deliverables. Our research team has gathered all of the information from each program/county and summarized it in meeting notes and a multicounty data table. For the purposes of this report, we have provided a sample of the data collected from each county (see Table IX).

Table IX. Multicounty Program Services and Billing Information

County	San Diego	Orange	Solano	Napa	Stanislaus	Los Angeles	Lake
Program Name	Kickstart	OC CREW	Aldea SOAR	Aldea SOAR	LIFE Path	CAPPS	Early Intervention Services (EIS)

County	San Diego	Orange	Solano	Napa	Stanislaus	Los Angeles	Lake
Clients Served	FEP, CHR	FEP	FEP, CHR	FEP, CHR	FEP, CHR	CHR+	FEP and CHR
Census	140-160	42	26	15-Oct	Current 10-15, cap 40	60	30
Length of Services	(+/-) 2 yrs	2 - 4 yrs	(+/-) 2 yrs	(+/-) 2 yrs	2 yrs	2 years (case by case)	2-4 years
Inclusion - Ages	Ages 10-25	Ages 12-25	Ages 12-30	Ages 8-30	Ages 14 - 25	Ages 12-25	15-25 y/o
Inclusion - Diagnoses	Any type of psychoses (NOS) but not required, SIPS score of 6	FEP	CHR diagnosis or FEP within 2 yrs	All Psychotic D/Os (within 2 yrs of meeting dx criteria) & CHR diagnosis	Psychotic d/os within 1 year of meeting dx criteria including affective, & CHR diagnosis	CHR - based on SIPS, must have at least positive symptom score of 3-6.	Any type of psychoses, but not required.
Inclusion - Insurance	Medi-Cal, Uninsured	None	Medi-Cal, Uninsured	Medi-Cal, Private, Uninsured	Medi-Cal, Private, Uninsured	Medi-Cal, Uninsured	Medi-Cal, uninsured, Medicare. We are only contracted with Medi-Cal and Medicare. We bill all other insurances, but we are out-of-network.
Inclusion - Duration of Psychosis	First psychotic symptoms within 2 yrs	First psychosis within 2 yrs	First psychosis within 2 yrs	First psychotic episode within 2 years; Attenuated psychosis of any duration	First episode within 1 year	No longer than 30 days since onset	First break within last 2 years.
Exclusion - Cognition	IQ < 70 - Case by case discretion	IQ < 70	IQ < 70	IQ < 70	IQ < 70, Substance induced psychosis, psychosis due to medical conditions including TBI	IQ below 70	IQ <70

County	San Diego	Orange	Solano	Napa	Stanislaus	Los Angeles	Lake
Exclusion - Diagnoses	Case by case discretion: Medical diagnosis that better explains symptoms; substance use	No substance use or medical condition that better explains symptoms	Substance dependence would not allow to participate in treatment – refer to substance abuse treatment, Head injury or medical condition	Substance dependence would not allow to participate in treatment – refer to substance abuse treatment, Head injury or medical condition		Primary diagnosis of substance abuse	Primary substance use disorder
Exclusion - Other	Qualitative Judgement call: Physically aggressive, sexually inappropriate, safety issues	Not received counseling prior for psychotic disorder in the last 24 months	Qualitative Judgement call: Physically aggressive, sexually inappropriate, safety issues	Qualitative Judgement call: Physically aggressive, sexually inappropriate, safety issues	Qualitative: requires 24 hour care/higher level; staff/peer safety issues	Nothing beyond Specialty Health Services exclusions	We exclude when they are non-Specialty Mental Health Services.
Assessments - Billing Codes	10	90899-6 (H2015)	90791	10	10	90791	H2015 HE(SmartCare), 100 (Anasazi).
Assessments - Provider type	Clinicians	Clinician: master's level BHCI, BHCII, psychiatrist	Therapist; clinical supervisor	Therapist	LPHA	MD/DO, PA, PhD/PsyD (Licensed or Waivered), SW (Licensed, Registered or Waivered), MFT (Licensed, Registered or Waivered), NP or CNS (Certified), PCC (Licensed or Registered), Student professionals in these disciplines with co-signature*	Waivered Clinicians, LPHA, physician, nurse, case manager (other qualified provider).

County	San Diego	Orange	Solano	Napa	Stanislaus	Los Angeles	Lake
Assessments - Notes	Behavioral Health assessment and HRA (high risk assessment)	Code 90899-6 for each of multiple sessions leading up to intake completion; Same code for psychiatrist completing conservators hip evaluation, disability assessment, or eval for med services by telephone		Initial, Annual/ Periodic	Initial, periodic	n/a	Case managers provide screenings. Anasazi is the old electronic healthcare record. SmartCare has been utilized since 3/1/2023.

14. Deliver a plan and timeline for working with counties to support infrastructure to access final round of county-level cost and utilization data for EP and CG programs

Overview of Deliverable for Annual Report

Prospective Data Analysis

Over the last fiscal year, we continued to meet with each county that has already submitted data from the retrospective period (Los Angeles, Orange, San Diego, and Solano) to review and finalize the prospective data request. In these meetings, we discussed when claims data would become available for service utilization and estimating costs, as well as time needed for data extraction. Data availability ranged from 4-11 months after the service was billed. We also conferred with other LHCN team members about the timelines for program fidelity assessments to be completed and Beehive implementation to obtain client-level outcomes. Based on these pieces of information, we determined that the 2.5 year period of January 1, 2020 – June 30th, 2022 would be best aligned with the goals of this analysis. This period will allow us to obtain service and cost data for all counties Jan 2020 - June 2022, then finish cleaning, harmonizing and integrating data for a preliminary analysis to be completed by December 2023. That would allow for stakeholder feedback and a final analysis completed by June 2024 (see Table X). The process of harmonizing and integrating data for the initial retrospective period has been incredibly useful and will allow us to do the same for the new service period much more quickly. This prospective period would include almost all program fidelity assessments, with the last assessment scheduled for December 2022.

Table X. Proposed Timeline for Prospective Data Pull

County	Preliminary analysis due date	Length of time required for County to receive data	Data available by this date

Solano	June 2023	3 months	Sept 2022
Orange	September 2023	10 – 11 months for charge data	May 2023
LA	June 2024	3 months for charge data DHS Hospital data - 6 months other hospitals - 30 days	Jan 2023
San Diego	June 2023	3 months - for annual report, so that there will be enough time for clinic to input all data	CCBH data available end of Oct 2022 , Optum data available December 2023

Due to Covid-related delays in Beehive implementation (e.g., staffing shortages in county programs, reduced program censuses across the network), we do not expect to complete integrated analyses with sufficient statistical power by the end of the award period, but we do expect to conduct pilot analyses integrating client-level data from Beehive with county data.

Further, in our meetings with program and county staff, we discussed any changes to the county EHR or billing and claims systems, changes in data elements collected during the new time period, or any other relevant changes to data availability. We met with Solano County on June 2, 2022; Los Angeles County on May 23, 2022; Orange County on May 19, 2022; and held conversations with San Diego County on May 23, 2022. We will confirm this timeline with Napa and Stanislaus counties after we complete the retrospective data analysis with them.

Retrospective Data Request for Napa County

During the last project period, we held a series of meetings with the EP program staff and county staff to address collection of the county-level utilization and cost data for the prior 3-year timeframe for Napa County. We identified EP program information, including description of clients served, billing codes for each service, funding sources and staffing personnel during the retrospective period. Meetings were also held with the county data analysts to discuss details about the data extraction. The discussion included the time-period, January 1, 2017 – December 31, 2019, for which the LHCN team will formally request data. We reviewed all data elements that will be needed to define the EP and Comparator Group (CG) sample, including historical diagnostic and utilization data for both groups (Jan 2013-Dec 2016). We reviewed data categories, elements and sources for utilization and cost to determine a) which services are provided in the county and b) which are available to be shared for the analysis. Follow-up meetings with county data analysts have been scheduled.

Follow-up to Preliminary Retrospective Data Analysis

The County Data evaluation of the LHCN project examines the services and costs associated with individuals treated in Early Psychosis (EP) programs across several California counties in comparison to the services and associated costs for a comparator group (CG) of similar individuals treated in other outpatient clinics representing “standard care,” during a concurrent time frame in the same community. The primary goal of this component, submitted December 2021, was to provide a preliminary demonstration of the proposed method for accessing data regarding EP programs and CG groups across California. The secondary goal was to analyze service utilization and costs associated with those services across counties.

In the prior report, we were able to successfully complete our primary goal and the first part of our secondary goal (service utilization comparison). We were unable to complete the cost comparison analysis due to the complexity of the data required to be harmonized across counties and the variety of data sources. Nearly all programs and counties have been impacted by staff shortages due to unfilled positions and redeployment of staff during the COVID-19 pandemic, as well as our central team, which has delayed project coordination and data extraction.

Over the last fiscal year, we have continued to meet with counties with clarifying questions about received cost and utilization data, and to troubleshoot issues related to incomplete or unclear data elements. In these meetings, we requested that each county provide us with contracts and budgets for their EP programs to account for non-billable activities and other unaccounted-for costs of running the program. Further, we worked with counties to obtain actual costs per service, per client, rather than reimbursement amounts or fixed costs per unit of service, as these have differed.

In our efforts to thoroughly balance EP and CG groups, we decided to request historical data for the EP group from each county and have worked to modify data use agreements as necessary. For Napa County, they observed that the existing agreement between the county and UC Davis only covered de-identified data when it should have described a limited dataset for the county data analysis. To make sure data sharing was covered appropriately, UC Davis drafted a data use agreement (DUA) covering all data elements to be shared between the county and the university as part of the EPI-CAL project. The draft DUA is currently under review by Napa County's compliance department. Finally, we asked each county to provide us with clients' episode of care end dates for those clients who may have ended their services since the data was originally extracted.

Follow-up of preliminary analysis of service utilization data

After completion of the last report, the County Data evaluation team focused on addressing the limitations of the preliminary analysis of service utilization data. This effort is composed of three main activities: 1) improving the harmonization of variables across counties and the detection of episodes of care, 2) addressing missingness in county data, and 3) addressing selection bias into EP programs.

The County Data evaluation team is reviewing CG and EP group data to identify ways to improve the harmonization of data across the counties in the evaluation. This exercise will allow us to fully leverage the diversity of our service-level data. Additionally, we are working closely with county staff to improve how we detect client episodes of care in the data. Accurate identification of episodes of care are crucial to accurately measuring service utilization in both the CG and EP groups, improving the credibility and rigor of our estimates of the effects of EP programs.

Subsequent descriptive analyses of county-level service data after prior Deliverables revealed substantial variation in the number of variables with missing values across counties, as well as the degree to which data is missing within each county's data. The county data evaluation team is exploring the extent of missingness in the data from each group in each county, as well as the extent to which missingness is correlated with a client belonging to the CG group. Once the team has a clear understanding of missing data in our sample, we will explore solutions and determine the extent to which missingness is a limitation of the evaluation.

The preliminary analysis of service utilization data provided comparisons between the CG and EP group adjusted for a small initial set of observable client-level characteristics. However, we know clients are not randomly assigned to the EP group, so even adjusted analyses still suffer from selection bias. This selection bias arises from the likelihood that clients in the EP group differ systematically from those in the CG group such that they were a priori more likely to have been members of the EP group. Hence, a rigorous comparison of the EP and CG groups should correct for this selection bias. To address selection bias, the county data

evaluation team is implementing a generalized version of propensity score weighting, using augmented inverse probability weighting (AIPW) with Lasso covariate selection. The principal idea behind this method is to leverage historical data from each client to predict the probability we later observe them in the EP group during the study period by modeling selection into the EP group. Each client is then “weighted” by the inverse of this predicted probability, which statistically approximates random assignment of EP care. While powerful, the propensity score weighting method is dependent on the evaluation team’s ability to accurately predict the “true” probability a person is observed in the EP group. Lasso, a machine learning technique, allows us to find the best selection model within the available data. The combination of these methods will allow the evaluation team to correct for selection bias to the best of the data’s ability. Correcting for selection bias makes the comparison of the EP and CG groups as close to “apples-to-apples” as possible.

In addition to methodological improvements, the county data evaluation team is working with county staff to extract additional data required for the analytic methods. We requested historical data for clients in our county EP groups to be used in the weighting methodology described above. LA county staff were able to identify previously unavailable service data for 24-hour service categories for all clients. We are also working closely with Solano County to obtain inpatient service utilization data for the specific CG clients selected for our comparison. We are also working with two new counties that will contribute data to these combined utilization analyses, Napa and Stanislaus. We have met with both county and program staff to discuss the process for this element of the project and submitted the formal data requests on June 13th, 2022 for Stanislaus and May 26th, 2022 for Napa.

Cost Analysis

We presented a preliminary analysis comparing the EP and CG groups in San Diego County on service utilization and related costs data as an example of the cost comparisons in the last annual report. Due to the challenges outlined above, we were not yet able to integrate or analyze cost data from Solano, Orange, and Los Angeles County. We have not yet received cost data from Napa or Stanislaus Counties. We are confident that the cost comparison analysis, along with a finalized comparison analysis of service utilization, will be completed for the deliverable due December 2023.

Sample and Methods

We identified clients who initiated services in the San Diego EP program, “Kickstart,” from January 1, 2017 to December 31, 2019, and a comparison group of clients who were using outpatient services during the same time period. We identified Kickstart clients who first enrolled in the programs between January 1, 2017 and December 31, 2019. We limited the sample to clients ages 12-25 who did not have a diagnosis of psychosis (ICD-10 codes F20, F22, F23, F25, F28, F29, F31.2, F31.5, F31.64, F32.3 F33.3) greater than two years before enrollment (through October, 2008). We excluded clients with private insurance, due to an inability to capture all of their services in the public claims system, and clients who received a diagnosis of intellectual disability (ICD-10 codes F70-F79, ICD-9 codes 317-319), to harmonize the sample with our other counties’ exclusion criteria.

We shared a list of Kickstart clients with program staff who confirmed that these were past or current clients who had enrolled in services, and were identified as either First Episode Psychosis (FEP) or Clinical High Risk (CHR). FEP clients have threshold psychosis symptoms defined as having a Psychosis Syndrome on the Structured Interview for Prodromal Syndromes (SIPS), roughly corresponding to a score of 6 for Positive Symptoms on the Scale of Prodromal Symptoms (SOPS). CHR clients have subthreshold symptoms, defined roughly as having a SOPS score of 3-5.

We identified a comparison group (CG) of clients with likely FEP ages 12-25 who received an outpatient mental health service in San Diego County between January 1, 2017 and December 31, 2019, and who had a

first diagnosis of psychosis (same diagnoses as above) within two years prior to their first service during this time period. We defined the first outpatient service during January 1, 2017 to December 31, 2019 as the index outpatient visit. We similarly excluded clients with private insurance, clients who received a diagnosis of intellectual disability, and clients with a diagnosis of psychosis greater than two years before the index outpatient visit.

We summarized service use over 365 days prior and 365 days following enrollment in Kickstart or the index outpatient visit. Outpatient services included case management, crisis intervention, medication management, and mental health services including rehabilitation and therapy. We defined a visit as a unique day receiving services. We summarized psychiatric admissions including admissions to psychiatric hospitals, admissions to psychiatric units of acute care hospitals, and admissions to crisis residential facilities; and psychiatric emergency services including the emergency psychiatric unit and mobile psychiatric emergency response teams. We also summarized costs of outpatient mental health services covered by Medi-Cal, California's Medicaid program.

We estimated the numbers of services and visits during the year using negative binomial regression models. We estimated the probabilities of having a psychiatric inpatient admission and of using psychiatric emergency services using logistic regression models. We estimated costs using a generalized linear model with a gamma distribution and a log link function. In each model, we included covariates for age, gender, and race/ethnicity (included as indicator variables for Black and Latino), along with indicator variables for FEP and CHR. We calculated standardized estimates for each outcome using the estimated coefficients to generate predicted values for each client in the sample as if they were alternately assigned to each group: FEP, CHR, and CG. The standardized mean is the mean of the predicted values across the sample. We calculated standard errors using the non-parametric bootstrap, and significance values using non-parametric permutation.

Results

We identified 301 clients in the Kickstart program, of whom 104 were FEP and 197 were CHR, and 687 likely FEP clients in the CG (Table XI). Mean age in the FEP group was 18.3 years (SD=2.8) and the largest percentage of clients was 15-17 years (N=51, 49%). Mean age was lower among the CHR group (16.5 years, SD=2.8), due to a large percentage of clients under age 15 (N=63, 32%). Mean age was highest among the CG (19.5 years, SD=4.0), due to a large percentage of clients ages 21 and over (N=294, 43%). The FEP group had the largest percentage of clients who were male (N=73, 70%). The distribution of race/ethnicity was similar across the groups.

Table XII shows the mean number of services in the year prior and year post enrollment for Kickstart clients and in the year prior and year post the index outpatient visits for CG clients, as well as the difference in services from pre to post. Service use was highest for the FEP group in both the pre and post periods, followed by CHR and CG. The FEP group also had the greatest increase in services from pre to post (45.7, SE=6.6), followed by CHR (24.0, SE=3.1) and CG (12.3, SE=1.8).

Table XIII shows the mean number of visits in the year prior and year post enrollment or index outpatient visit and the difference between years. Visits were highest for the FEP group in both the pre and post periods, followed by CHR and CG. The FEP group also had the greatest increase in visits from pre to post (32.5 SE=4.2), followed by CHR (17.5, SE=1.9) and CG (8.9, SE=1.1).

Table XIV shows probabilities of psychiatric admission in the pre and post periods and the change in probability of admission from the pre to post period. The CG had the highest probability of admission in the pre period, when 14.4% (SE=1.3) of clients had admissions. The rate of psychiatric admission was similar among

FEP and CG, but slightly lower among the CHR group in the post period. As a result, the FEP group had the greatest increase in probability of admission with an 18.1 (SE=4.7) percentage point increase from pre to post.

Table XV shows the probabilities of using psychiatric emergency services. The CG had the highest probability of emergency service use in the pre period, when 12.4% (SE=1.5) of clients used services. The rate of emergency service use was similar among FEP and CG, but slightly lower among the CHR groups in the post period. As a result, the FEP group had the greatest increase in emergency service use with a 25.3 (SE=4.5) percentage point increase from pre to post.

Table XVI shows Medi-Cal reimbursed outpatient mental health services. Outpatient costs were similar in the year prior to enrollment or index outpatient visit. In the post period, costs were greatest among FEP (\$9,711, SE=\$910) followed by CHR (\$6,334, SE=\$451) and CG (\$4,620, SE=\$272). As a result, outpatient costs increased the most among FEP, followed by CHR and CG.

Summary

Youth clients enrolled in Kickstart had higher outpatient service use, visits, and costs than a comparable group of adolescent and young adult clients who were receiving services in standard outpatient programs. Services, visits, and costs were greater for clients with FEP than clients who were CHR. We did not find significant differences in psychiatric inpatient or emergency services use in the year following enrollment. However, since Kickstart clients had lower use of these services in the pre period, they appear to have greater increases in use from the pre to post period.

Table XI: Demographic Characteristics of Youth Clients of Kickstart and a Comparison Group

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups
N	104	197	687	
<i>Age N (%)</i>				P<.001
Age <15	9 (9%)	63 (32%)	113 (16%)	
Age 15-17	51 (49%)	88 (45%)	161 (23%)	
Age 18-20	25 (24%)	30 (15%)	119 (17%)	
Age 21+	19 (18%)	16 (8%)	294 (43%)	
<i>Gender N (%)</i>				P=.006
Male	73 (70%)	108 (55%)	368 (54%)	
Female	31 (30%)	89 (45%)	319 (46%)	
<i>Race/Ethnicity N (%)</i>				P=.002
Non-Latino White	23 (22%)	39 (20%)	158 (23%)	
Black	14 (13%)	19 (10%)	66 (10%)	

Latino	57 (55%)	118 (60%)	325 (47%)	
Other	4 (4%)	16 (8%)	60 (9%)	
Unknown	6 (6%)	5 (3%)	78 (11%)	

Table XII: Mean Annual Service Use, Standardized by Demographic Characteristics, in the Year Prior and Year Post Enrollment

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups
Pre	19.4 (3.9)	17.8 (2.5)	15.3 (1.4)	<.0001
Post	65.1 (5.5)	41.8 (2.7)	27.6 (1.5)	<.0001
Difference	45.7 (6.6)	24.0 (3.1)	12.3 (1.8)	<.0001

Table XIII: Mean Annual Visits, Standardized by Demographic Characteristics, in the Year Prior and Year Post Enrollment

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups
Pre	12.4 (2.2)	11.5 (1.4)	10.6 (.9)	<.0001
Post	44.9 (3.5)	29.0 (1.7)	19.5 (.9)	<.0001
Difference	32.5 (4.2)	17.5 (1.9)	8.9 (1.1)	<.0001

Table XIV: Mean Annual Probability of Psychiatric Inpatient Admission, Standardized by Demographic Characteristics, in the Year Prior and Year Post Enrollment

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups

Pre	5.4 (2.2)	3.8 (1.4)	14.4 (1.3)	.0002
Post	23.4 (4.3)	17.1 (2.8)	24.8 (1.6)	.095
Difference	18.1 (4.7)	13.3 (3.1)	10.3 (2.1)	<.001

Table XV: Mean Annual Probability of Use of Psychiatric Emergency Services, Standardized by Demographic Characteristics, in the Year Prior and Year Post Enrollment

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups
Pre	4.4 (1.9)	6.6 (1.8)	12.4 (1.5)	.011
Post	29.7 (4.3)	18.3 (2.7)	23.1 (1.6)	.075
Difference	25.3 (4.5)	11.7 (3.1)	10.8 (2.0)	.010

Table XVI: Mean Annual Costs of Outpatient Services, Standardized by Demographic Characteristics, in the Year Prior and Year Post Enrollment

	First Episode Psychosis	Clinical High Risk	Comparison Group	P-value for difference across groups
Pre	3606 (785)	3264 (484)	2915 (316)	.490
Post	9711 (910)	6334 (451)	4620 (272)	.001
Difference	6105 (1186)	3070 (640)	1704 (420)	.041

Future Analyses

During the next fiscal year, we will finalize our analysis of service utilization across the entire retrospective period (January 1, 2017 – December 31, 2019) rather than comparing services received during the year prior and the year post program enrollment. In addition, outcomes will be calculated as unique outpatient services accounting for varying durations of active treatment. We will also expand the scope of the cost analysis. Currently, costs are limited to the amounts paid for Medi-Cal reimbursable mental health outpatient services. In the next period, we will consider the costs incurred to the County for all outpatient services, including those services that are not reimbursable by Medi-Cal. We will also consider additional service types including inpatient and crisis residential, and the emergency psychiatric unit and the psychiatric emergency response team.

Although CHR clients enrolled in the EP program were included as a comparison group in the current analysis, these clients will be excluded from future planned analyses as they cannot be reliably identified for the comparator group using standard diagnostic codes. We will also refine the exclusion criteria for the CG group based on diagnostic and service utilization history of the EP group as well as utilizing a weighting strategy for included clients in both groups, as described previously. This will ensure that the CG group only contains clients most likely to have a first episode of psychosis, allowing for a more accurate comparison between FEP clients in the EP and CG groups on service utilization and related costs data.

Discussion and Next Steps

Discussion

Over this last fiscal year, the team has continued to meet each of the goals that were set to out for this project period. In addition to completing Deliverables laid out in our original Innovation plan timeline, the EPI-CAL team has also continued to bring in new counties to the multi-county collaborative to expand our Learning Health Care Network of EP programs. Through creating a Learning Health Care Network, all parties hope to have a larger impact on mental health services than any one county or program can create on their own. While the project has experienced some delays and challenges during the initial COVID-19 pandemic, the team works closely with counties and programs to adapt and adjust to the post-pandemic mental health landscape. We are confident that we are making excellent progress at meeting our goals and catching up with the original planned timeline.

We have completed Beehive training with all the original LHCN counties and are in the process of completing the Beehive training series for our newest LHCN county programs, including Lake County and the multi-county collaborative (MCC) programs. We are continuing to collect data on the core outcomes battery for the EPI-CAL project with 21 programs. Based on feedback from users in these programs, we have continued to work with Beehive developers to make modifications to the application, such as extending survey windows, printing survey results to PDF, accessing the Beehive resource guide in the application, as well as modify our training approach based on constructive feedback from programs, including creating a testimonials slide from users of Beehive that describe the benefits of using Beehive thus far from real clinic users. We are in the process of workshopping additional changes to the application, including the ability for clinics to edit data after survey completion as well as creating additional visualizations for more surveys for both client and clinic entered data.

We have also begun some of our planned feasibility analyses for the LHCN. While we have been monitoring LHCN enrollment and survey completion since EP programs began implementation of Beehive in their programs, we have just begun to assess whether current enrollment is meeting our pre-defined enrollment goals (70% of eligible clients enrolled in Beehive). Our preliminary analyses shows that a subset of programs are meeting this goal, and we are using our ongoing barriers and facilitators interviews to examine factors that

are influencing enrollment across programs differently and contributing to the heterogeneity of enrollment that we observe in the LHCN.

As noted previously, we were able to successfully complete our primary goal for the retrospective county data analysis, to provide a preliminary demonstration of the proposed method for accessing data regarding EP programs and CG groups across California, and the first part of our secondary goal, to analyze service utilization and costs associated with those services across counties. However, we are still gathering additional data to inform a final analysis of the 2017-2019 period, which we expect to complete by Spring 2023.

We are in the process of procuring the final datasets in order to complete the integrated cost and utilization data for all counties. This has taken longer than originally expected given staffing shortages and problem solving needed to harmonize variables across counties. Over the next project period, we hope to gather the final datasets from all counties.

Next Steps

In the next fiscal year, we will conclude fidelity assessments with EPI-CAL programs and meet with county and program leadership to provide detailed feedback on fidelity results. At the end of FY 22/23, 17 LHCN EP programs (20 total programs as part of EPI-CAL) have completed a fidelity assessment and there are only five remaining fidelity assessments to complete, three of which were in progress. We will also continue and complete training new EP programs from both the LHCN and larger EPI-CAL network. As implementation of Beehive continues, we will elicit feedback from EP programs how to improve both the training process and Beehive itself via feedback surveys, regular check-ins from point people, and qualitative interviews. Our goal is to continue to improve Beehive in an iterative process and to incorporate community partner feedback so that Beehive be a useful data collection and visualization tool for the programs using it. We are also working with sites to understand why enrollments are not matching the original projections and to support them to increase the degree to which they are integrating Beehive into their standard practice. We are collecting informal data on these factors via regular check-in meetings with programs, as well as through a qualitative research approach by examining barriers and facilitators to Beehive implementation through interviews with EP program participants. While we first focused on interviewing providers and staff over the last fiscal year, our efforts will shift to recruiting clients to elicit their feedback about using Beehive in the current fiscal year.

Over the next fiscal year, the LHCN team expects to receive and review data for both EP program and CG clients and their service utilization data from Napa and Stanislaus counties for the retrospective data period January 1st, 2017 – December 31st, 2019. Upon receiving the data, we will review the submitted datasets and problem-solve with counties regarding any missing data elements, particularly other mental health services received by EP program clients, which may need to be retrieved from different sources. We will harmonize these data with the prior counties' and integrate them into the final dataset. We will also be requesting all related cost data for the services received by clients in the EP programs and CG groups from Napa and Stanislaus counties.

This 23/24 fiscal year is the last project year for many of the counties and programs that were part of the original multi-county collaborative innovation plan and therefore our team in working to prepare a report that summarizes the overall progress of the LHCN to date. This report will include a summary of qualitative data that has been collected over the course of the project, outcomes data collected via Beehive, and a multi-county integrated analysis of cost and utilization data. The report will be prepared for review by our county and program partners, and we hope to have other community partners provide feedback on the overall success and challenges of implementing a Learning Health Care Network of EP Programs in California.

Appendix I: Intake Workflow Meeting Template

Our goal for this meeting: understand your intake workflow to help make transition to using Beehive at intakes smoother. Today we are focusing on how to integrate Beehive into your workflow, but remember (once Beehive is approved for use), you can also register existing clients.

Questions

- a. Current Intake process
 - i. What is program's general intake workflow?
 1. Do you do phone screenings before scheduling an intake? (review template of phone screen to compare with Beehive registration fields)
 2. Do you currently have clients complete surveys/paperwork with the intake appointment?
 - i. Treatment consent, research consent, ROIs?
 - ii. How are surveys administered?
 - iii. When surveys they sent (e.g., prior to intake date, morning of intake date)?
 3. At what stage in the process do you register clients into the Electronic Health Record
 4. How do you complete assessments or other paperwork for people who are in need of interpretive services?
 - b. Integration of Beehive
 - i. At what stage in the workflow would Beehive registration fit best?/When would you register clients into Beehive (takes about 15 minutes)
 1. In advance (Web app)? Is all of the information in registration already gathered? (see phone screen)
 2. Day of (tablet)?
 - ii. Which staff member(s) will complete registration?
 - iii. When would client complete the intake surveys (EPI-CAL battery takes about 45 minutes)?
 1. Do clinicians plan to use survey data as part of their intake assessment?
 2. Consider prioritization of surveys required for intake assessment
 - iv. Which staff member(s) will orient client to EULA/surveys on intake day?

(As needed) demonstration of registration process

Appendix II: Data-Entry Workflow Meeting

1. Questions to Understand Current Clinic Data *(can skip if already asked at Intake Workflow meeting)*

2. Is clinic already using a data-entry platform?
 - i. If so what? (excel, EMR, redcap, in-house platform (ex. MHOMS))
 - ii. Who designs the surveys on that platform?
 - iii. Do you first enter data on a CRF prior to entry in this system?
3. What roles on team currently complete data-entry? (QM, Clinic Coordinator, Clinicians)
4. How do you access/view data after it is entered?
5. Does your program have dedicated staff to analyze data?

2. Questions about Integration of Beehive for Survey Completion

- a. Who will be responsible for each of these items (one person? Each clinician for their caseload? Leadership?):
 - i. Following up with clients about completing their surveys?
 - ii. Entering clinician-entered data for each client?
 - iii. Monitoring urgent clinical issues? (our recommendation is that each clinician monitors their caseload)
- b. What level of support do you want with tracking survey completion (clients & clinicians) and urgent clinical issues?
- c. Are there other surveys that your clinic wants to collect through Beehive?
 - i. Standardized measures that are already built in: PSC-35, CATS-Guardian report
 - ii. Other measures can also be entered-- our team needs to review first to ensure that we can design the surveys in Beehive
- d. Who is assessing COMPASS & GFS/GFR? Who is monitoring ACES to determine if additional survey should be assigned?
 - i. We will want to make sure that they have completed the trainings for these trainings

Demonstration on how to access clinician-entered data, view survey status page (for client & PSP) as necessary

Appendix III: Beehive Part 3 Training Small-Group Worksheet

Beehive Part 3 Training Small Group

Identify a group note-taker and a person who will report back to the larger group

Survey 1 *(Identify a member of your group to screen share survey 1)*

1. Find one of the 3 measures we have introduced to you in trainings: **Modified Colorado Symptom Index (MCSI)**, **Questionnaire on the Process of Recovery (QPR)**, or **SCORE Index of Family Functioning and Change (SCORE-15)**. Next answer the following questions about that survey:
 - a. What is the global score?
 - b. Is there a clinical threshold?
 - c. Is there score severity shading? In which direction? What does that mean?
 - d. Is the global score above or below the threshold? What does that mean?
 - e. Which is the highest rated individual item(s)? What does that mean?
 - f. Which is the lowest rated individual item(s)? What does that mean?
-
2. Discussion Questions
 - a. How might you use this information in care?
 - b. Are the survey responses consistent with your knowledge of the client's experiences?
 - c. What questions do you have after viewing these surveys?

Survey 2-3 *(Identify a new member of your group to screen share survey(s) 2-3)*

3. Reference the Table of Contents for the EPI-CAL battery (next page). Find one to two additional surveys that you are interested in or that might answer the questions you have from the first survey.
 - a. Is there a global score? (i.e. is this survey visualized?). If yes,
 - i. Is there a clinical threshold?
 - ii. Is there score severity shading? In which direction? What does that mean?
 - iii. Is the global score above or below the threshold? What does that mean?
 - iv. Which is the highest rated individual item(s)? What does that mean?
 - v. Which is the lowest rated individual item(s)? What does that mean?
 - b. If there is no visualization, remember you can view the survey responses by clicking the "survey results" button at the top left of the page
-
4. Discussion Questions
 - a. How might you use this information in care?
 - b. Are the survey responses consistent with your knowledge of the client's experiences?
-
- Additional Discussion Questions
5. Does either survey help you understand the other survey better?
6. Think about the different roles in the clinic and how they might use this data differently
 - a. How might a family advocate or peer partner use this information compared to a clinician?
 - b. How might a prescriber use this information compared to a case manager?

Table of Contents

CLIENT Surveys

EPI-CAL ENROLLMENT LIFE QUESTIONS (“GETTING STARTED”)

- EPI-CAL Baseline Questions (“First Contact Questions”).....*
- Primary Caregiver Background.....*
- Adverse Childhood Experiences – ACES (“Stressful Life Events”).....*

EPI-CAL LIFE BUNDLE (“MY LIFE”).....

- Demographics And Background.....*
- Education.....*
- Employment And Related Activities.....*
- Social Relationships.....*
- SCORE-15 (“Family”).....*

EPI-CAL EXPERIENCES BUNDLE (“MY EXPERIENCES”).....

- Legal Involvement And Related.....*
- Substance Use.....*
- Modified Colorado Symptom Index (“Personal Experiences Inventory”).....*
- Questionnaire About The Process Of Recovery (“Staying Well Questionnaire”).....*
- Life Outlook.....*

EPI-CAL TREATMENT BUNDLE (“MY TREATMENT”).....

- Medications.....*
- Intent To Attend And Complete Treatment Scale (“Treatment”).....*
- Hospitalizations.....*
- Shared Decision Making Questionnaire (Sdm-Q-9) (“Shared Decision Making”).....*

EPI-CAL TRAUMA ADULT (“STRESSFUL LIFE EXPERIENCES”).....

- Life Events Checklist (LEC-5) & PTSD Checklist for DSM-5 (PCL-5) (“Stressful Life Experiences”).....*

EPI-CAL TRAUMA CHILD (“STRESSFUL LIFE EXPERIENCES”).....

- Child and Adolescent Trauma Screen (CATS) – Youth Report (Age 7-17) (“Stressful Life Events”).....*

Primary Support Person Surveys

EPI-CAL PSP ENROLLMENT QUESTIONS (“GETTING STARTED”).....

- PSP: Baseline Questions (“Demographics And Lifetime Questions”).....*

EPI-CAL PSP LIFE QUESTIONS (“MY LIFE”).....

PSP: Demographics And Background (“Demographics And Background”)

PSP: Score 15 (“Family”)

Burden Assessment Scale (“Family Impact”).....

EPI-CAL PSP EXPERIENCES QUESTIONS (“THEIR EXPERIENCES”).....

PSP: Legal Involvement And Related (“Legal Involvement And Related”)

PSP: Modified Colorado Symptom Index (Mcsi) (“Personal Experiences Inventory”).....

PSP: Medications (“Medications”).....

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