**National Network of Depression Centers (NNDC) Mood Outcomes Program**

**Overview**

# 1.0 Background/Objectives/Rationale

Mood disorders are a major public health concern in the US as it is expected that annually 9.5% of the US adult population will suffer from depression, bipolar illness, or other mood disorders (Kessler et al., 2005). These illnesses result in a negative impact on daily functioning and emotional and physical symptoms. There are effective treatments for these illnesses, if patients are able to connect with proper diagnosis and care. Up to 80% of those treated for depression show an improvement in their symptoms, usually within four to six weeks of beginning appropriate medication, psychotherapy, support groups or a combination of these approaches. However, patients often fail to receive optimal care for their mood problems and as a result endure needless suffering. Thus, there is a need for programs that provide support to clinicians and encourages them to adopt evidence-based best treatment practices tailored to the patients. Even when clinicians follow best practices, there are still high rates of relapse and many patients continue to experience on-going mood problems. As a result, more research is necessary to continue building the evidence base for new and improved treatment strategies. In an effort to address these gaps and provide better care for our patients with mood disorders, the National Network of Depression Centers (NNDC) has established the Mood Outcomes Program. The Mood Outcomes Program is designed to be a learning health system as defined by the Institute of Medicine [Institute of Medicine. The Learning Healthcare System: Workshop Summary. Olsen L, Aisner D, McGinnis JM, eds. Washington, DC: National Academies Press; 2007. Available at: *http://www.iom.edu/Reports/2007/The-Learning-Healthcare-System-Workshop-Summary.aspx*] in which the latest scientific evidence informs the clinical care we provide our patients while data gathered during clinical care feeds back into scientific research on strategies for more effective care. Central to the Mood Outcomes Program is a measurement based care program in which we will collect patient reported outcome measures at each clinic visit and present the results in real-time to clinicians who can use this information to provide higher quality care and improve the patient-provider relationship.

The NNDC is a 501(c)(3) nonprofit organization comprised of over twenty leading Centers of Excellence (COEs) and Associate Member Centers providing care for patients with mood disorders in academic medical centers around the country. The NNDC is dedicated to advancing research, treatment and public education regarding depression and bipolar disorder through comprehensive, multidisciplinary collaboration and national-scale networking of resources. The mission of the NNDC is to improve the quality, effectiveness, and availability of depression and bipolar diagnosis, treatment, and prevention so people can live better lives. The NNDC is sponsoring the Mood Outcomes Program to achieve this mission. It has partnered with the Altarum Institute (Altarum) to help design and develop the KnowledgeBase system that will support the Mood Outcomes Program. Altarum is a Michigan-based nonprofit whose mission is to serve the public good by solving complex systems problems to improve human health, integrating research, technology, analysis, and consulting skills. Altarum's health

information and technology strategies team brings the experience of working with numerous health care models to shape and accelerate information flows and advancing connected health. Altarum's wholly owned subsidiary, KAI Research, Inc. (KAI) provides the necessary background and expertise in health programs and will serve as the Program Coordinating Center (PCC) for the Mood Outcomes Program.

The primary objective of the NNDC Mood Outcomes Program is to provide a clinical program that will improve the care we provide our patients with mood disorders. To achieve this, the Mood Outcomes Program will**:**

- Promote measurement based care of patients with mood disorders by collecting from them four brief self-rated assessments at each clinical visit that clinicians will review with the patients during their visits to monitor their progress
- Provide clinical decision support tools for clinicians to help them tailor treatment to the needs of their patients, and
- Create a platform to facilitate quality improvement at the clinic and population level, while reducing overall data collection burden, by providing reports of aggregate data indicating the types of patients seen at our clinics, how they are doing as a group over time, and what care management strategies are most effective.

As stated above, the Mood Outcomes Program is first and foremost a clinical program which necessitates the use of protected health information (PHI), but as such a Program it does not require IRB review. However, to ensure the proper protection of data disclosed between parties engaged in the Mood Outcomes Program, the NNDC will enter into Business Associate Agreements (BAA) with participating Member Centers. Details regarding the BAAs are described further in Section 4.0, Privacy Considerations.

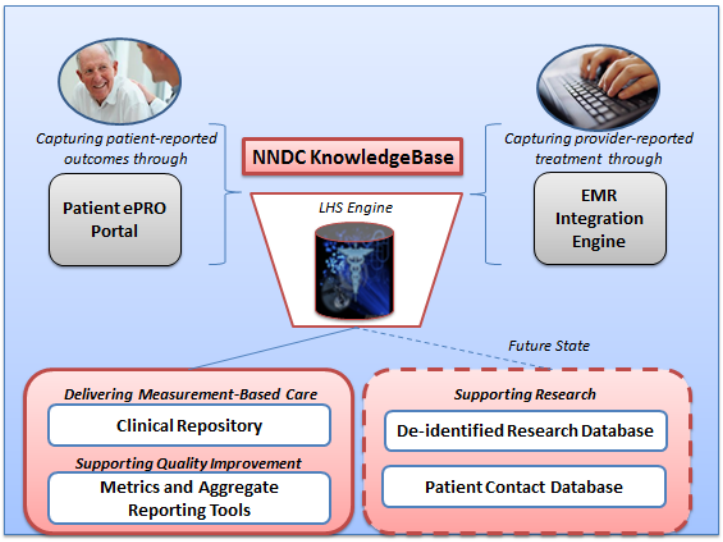
Additionally, we convened a panel of stakeholders and experts to advise us on the ethical implications of the Mood Outcomes Program. The panel met over several months during the course of developing the Mood Outcomes Program and included a clinical and a research champion with over thirty years combined experience researching and developing new models of care for patients with mood disorders, two legal experts who consult IRBs at major academic medical centers, a former chair of a standing IRB at a major academic medical center, a bioethicist with expertise in human subjects research, and a patient representative with experience in patient advocacy. The discussions of the panel were heavily influenced by an ethical framework put forth by bioethicists built on emerging learning health care system models (Faden et al, 2013). If and when we decide to use the clinical data we have collected as part of this Program for research purposes, then we will approach the local Institutional Review Boards (IRBs) for appropriate approval.

# 2.0 Methods

## Overview

The NNDC Mood Outcomes Program is designed to be a learning health care system *to improve care for patients with mood disorders*. A high-level overview of the KnowledgeBase System that will support the Mood Outcomes Program is provided in **Exhibit 1.**

**Exhibit 1. NNDC Mood Outcomes Program**




We have developed and will initially launch the electronic Patient Reported Outcomes (ePRO) system and the Clinical Repository modules to support clinical care and quality improvement Program at four COE pilot sites. The ePRO system will be used by patients with mood disorders in our Wave 1 pilot clinics as part of the standard clinical workflow to complete four self-rated health assessments at each clinical visit in order to measure their symptoms and health status. This data will then be displayed via the patient-level dashboard within the Clinical Repository accessed by the clinicians in real-time, during the patients' clinic appointment in order to provide personalized, evidence-based care. Collecting and displaying these measures will be like taking the blood pressure of a patient with hypertension. It has been shown that using measurement based care has the potential to improve the quality of life in patients with mood disorders through use of clinical reporting to impact clinical action (Katzen, 2014). To ensure the NNDC Program functionality is appropriately supporting quality care improvement, we will evaluate the pilot implementation and identify key lessons learned and best practices that can be applied when we expand the implementation of the program to the Wave 2 NNDC sites. We will eventually expand the functionality of the KnowledgeBase System to integrate clinical data from electronic medical records (EMR) at the participating NNDC sites. The goal will be to incorporate detailed clinical data from the EMR on diagnosis, course, and treatment without burdening the patients. The detailed data will allow us to provide more personalized clinical decision support to clinicians caring for their patients.

## Patient Population

The NNDC Member Centers will implement the Mood Outcomes Program in clinics where they see patients with mood disorders. Wave 1 will be used to conduct a pilot of the Mood Outcomes Program at

four NNDC sites. We will use what we learn from this pilot to refine the Mood Outcomes Program and then implement it across the remaining NNDC sites (Wave 2 sites). All current participating NNDC Member Centers are listed in the document "*NNDC Mood Outcomes Program Organizational Relationships*" (**Appendix A**) including an indication of the pilot sites. Patients who are 18 years or older and have a diagnosis of a mood disorder, including depression or bipolar disorder, will be enrolled in the program. The patients will have to be able to speak and read English in order to participate in the program because of the requirements to understand the self-rated assessments.

We estimate that approximately 20,000 patients are seen annually across all twenty-two member sites. For the purpose of the Mood Outcomes Program, we assume 50% of those patients will meet the appropriate criteria. With this we project that approximately 2,000 new patients will participate in the program in the first full year. As processes are implemented at each site, we imagine the number of new patients participating will grow by 50% each year over the next five years for a total of approximately 25,000 participants by the end of the fifth year. At that point, the growth rate will level off for existing centers with new patients holding steady at about 10,000 participants per year, and additional growth coming from new centers joining the NNDC Program. Participation estimates are outlined in **Exhibit 2.**

**Exhibit 2. NNDC Mood Outcomes Program Participation Estimates**

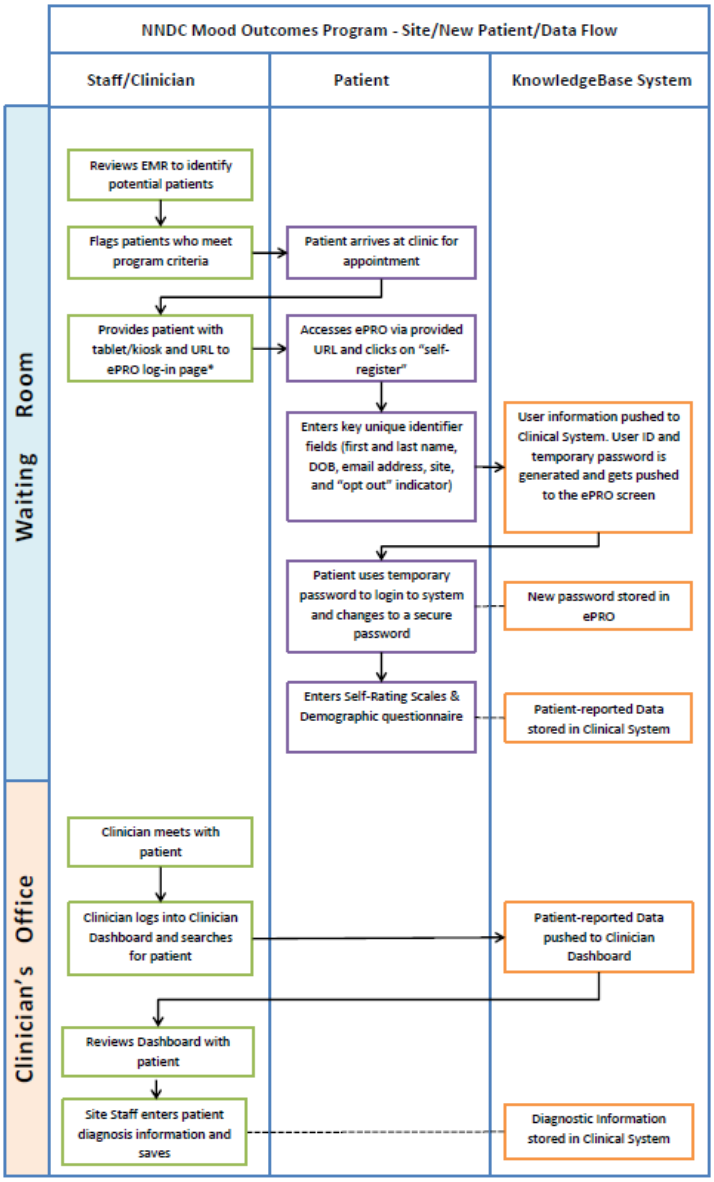
| Year | New Patients | Existing Patients | Total |
|---|---|---|---|
| **1** | 2000 | 0 | 2000 |
| **2** | 3000 | 2000 | 5000 |
| **3** | 4500 | 5000 | 9500 |
| **4** | 6750 | 9500 | 16250 |
| **5** | 10125 | 16250 | 26375 |

## Clinical Workflow

**Exhibit 3** shows the typical patient and site/clinician interaction with the system as they proceed from initial entry to the clinic through their patient appointment. The site staff/clinician will perform an initial review of upcoming patient appointments to identify those patients who will be utilizing the Program to ensure that these patients are provided with the appropriate hardware (laptop, tablet, kiosk, etc.) during their visit. Upon arriving to the clinic, the care process will be clearly explained to the patients in documented materials including the Mood Outcomes Program Site Brochure, and their clinicians will also be available to discuss the Program with the patients during visits. The patient will then use the hardware to enter several unique identifiers to register as a user in the ePRO of the Program to complete the patient self-rated assessments, each described in more detail below. At the time of initial patient login and authentication, patients will be assigned a system ID and user generated password

which will be used to securely access the ePRO system and complete the self-rating assessment scales at the clinic while waiting for their appointment.

**Exhibit 3. NNDC Mood Outcomes Program Flow Diagram**




During the patient visit, the clinician will log into the Clinical Repository portal and view the ePRO assessments that were just entered, using that data as a tool to inform the patient's clinical care. The patient encounter is completed when the site staff enters the patient's diagnostic data to the Clinical Repository which is then linked to the ePRO data from that encounter.

## Assessment Scales

The **Self-rating scales** to be completed by the patient via the ePRO system include the Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder Scale (GAD-7), Altman Self-Rating Mania Scale (ASRM), and Patient-rated Columbia-Suicide Severity Risk Scale (C-SSRS) which are described below in detail and displayed in **Exhibit 4**. These four measures were selected given their strong psychometric properties as well as their clinical utility.

### Patient Health Questionnaire (PHQ-9)

The PHQ-9 was developed to assist primary care clinicians in making criteria-based diagnoses of five types of DSM-IV disorders commonly encountered in medical patients: mood, anxiety, somatoform, alcohol, and eating. Comprised of 9 items, it is significantly shorter than other depression measures, has comparable sensitivity and specificity, and is based on the actual nine criteria on which the diagnosis of DSM-IV depressive disorders is based. The PHQ-9 is the most widely used instrument for assessing and monitoring depression severity in both clinical and research settings (Kroenke et al., 2002).

### Generalized Anxiety Disorder Scale (GAD-7)

The GAD-7 is widely used for screening for and measuring severity of general anxiety disorder (GAD) in primary care. The scale was developed in a large primary care patient sample and evidenced good reliability, as well as criterion, construct, factorial, and procedural validity (Spitzer et al., 2006).

### Altman Self-Rating Mania Scale (ASRM)

The ASRM is a 5-item self-rated mania scale, designed to assess the presence and severity of manic symptoms. It assesses differences in five areas: positive mood, self-confidence, sleep patterns, speech patterns and amount, and motor activity. Compatible with the DSM-IV criteria of mania, this psychometric instrument has been shown to effectively used to screen and facilitate diagnosis (Altman et al., 1997).

### Patient-rated Columbia-Suicide Severity Risk Scale (C-SSRS)

The Columbia-Suicide Severity Rate Scale is an evidence-supported, low-burden screening tool to rate an individual's degree of suicidal ideation and behavior. In a validation study, the C-SSRS demonstrated good convergent and divergent validity with other multi-informant suicidal ideation and behavior scales (Posner et al., 2011). This scale is widely used in both clinical and general settings, and is part of a national and international public health initiative involving the assessment of suicidal risk and behavior.

At their initial visit, patients will complete a basic Demographics Form which collects information on date of birth, race, ethnicity and marital status. Patients will then complete the four self-rated assessments at the initial and each subsequent visit to the clinic. The self-rated assessments will be collected for as long as the patient receives care at the clinic, and will be dependent upon how much and how often a patient receives treatment. It is anticipated that the baseline and continuing self-rated assessments will take the patient approximately 10-20 minutes to complete (20 minutes for initial registration and baseline assessments, then 10 minutes at all subsequent visits.) This time will be built-in to the patient scheduling process to allow them to finish the assessments prior to their visit with the clinicians (ideally using either tablets or kiosks at the clinic). The clinicians will then review the completed assessments with the patient during their visits as part of standard of care. The site coordinator will complete a **Clinical form (Exhibit 4, below)** for each patient to document the patient's primary and secondary diagnosis.

**Exhibit 4: Self Rating Patient Scales and Clinical Forms**

| Self-rating Patient Scales (entered by patient) | Clinical Forms at Initial Evaluation (collected by site staff) |
|---|---|
| • Demographics: Age, Gender, Race, Ethnicity, Marital Status (baseline visit)<br>• Patient Health Questionnaire (PHQ-9)<br>• Generalized Anxiety Disorder Scale (GAD-7)<br>• Altman Self-Rating Mania Scale (ASRM)<br>• Patient-rated Columbia-Suicide Severity Risk Scale (C-SSRS) | • Primary Diagnosis, additional diagnoses, if necessary<br>• Patient medical record number |

The PHQ-9, GAD-7, and ASRM self-rating scales are all available in the public domain. The NNDC developed the NNDC-specific C-SSRS in collaboration with the original CSSR-S authors and have permission to use the NNDC–specific version in the Mood Outcomes Program.

The primary objective of the Mood Outcomes Program is to promote measurement based care and enable quality improvement initiatives across sites. The Program will be implemented as a standard of care for all mood disorder patients. To facilitate user account creation and linkages between the patient self-rated assessments and the Clinical Repository and (ultimately) the EMR, the following patient identifiers will be collected at initial patient login:

- First/last name
- Date of birth
- Site
- Email address (with the caveat that this will be used **only** for future password/login support)

It is necessary to collect this information as it will be used to link the patient entering their ePRO data to the appropriate site-specific schema in the KnowledgeBase database platform, and also to populate the patient list box on the Clinical Repository homepage in order to utilize the ePRO information in real-time as part of the clinical visit. We will also obtain the patients' medical record number in order to facilitate the integration with the EMR in later stages of development. The collection of the PHI data will be managed by Altarum Institute as the PCC. Access to the data will be restricted to protect the privacy of the patients. Security measures to protect patient privacy are described in further detail below in **Section 5.0**.

# 3.0 Program Infrastructure

The current participating Member Centers of the NNDC are listed in the document "*NNDC Mood Outcomes Program Organizational Relationships*" (**Appendix A**) including an indication of the pilot sites. The contact information for the NNDC is:

***National Network of Depression Centers (NNDC)***
2350 Green Rd., Ste. 191
*Ann Arbor, MI 48105*
*Phone Number: 734.332.3914*
*Fax Number: 734.332.3939*
*Email: nndc@nndc.org*
*Mailing Address: P.O. Box 131581*
*Ann Arbor, MI 48113*
*Website: www.nndc.org*

Each NNDC Member Center contributes money to support the on-going activities of the NNDC. These funds are being used to support the development and implementation of the Mood Outcomes Program.

The NNDC Board of Directors has approved a formula for re-distributing a portion of the funding back to each NNDC site contingent upon successful enrollment of patients into the Mood Outcomes Program. Funding will start upon enrollment of 100 new patients with follow-up data in the Program within twelve months of the member site's Mood Outcome Program go-live date.

# 4.0 Risks and benefits of participation

As a measurement based care Program that will be implemented as standard of care in mood disorder clinics, the Mood Outcomes Program does not currently involve any aspects of research. In order to systematically improve the quality of care for these individuals, it is critical that clinicians have real time access to their self-rating scales to provide measurement based care and make informed decisions about the treatment path for their patients as well as to systematically track their patient's progress over time.

Patients who are being treated at the NNDC clinics will participate as part of their standard of care. The care process will be clearly defined by the sites and explained to the patients in documented materials and their clinicians will also be available to discuss the Program with the patients during visits. No recruitment activities will take place under the NNDC Mood Outcomes Program.

## Benefits of the Program

There are obvious benefits to the NNDC Program, as the design we are implementing promotes measurement based care and thus improves the standard of care directly to the patient and through quality program initiatives. The personally identifying information that will be collected will be used for clinical care or quality improvement purposes. In this model, the low risk program can proceed more rapidly to provide immediate benefits to the patient population (Faden, 2014.)

## Potential risks

The overall level of risk for the Mood Outcomes Program is 'No More than Minimal Risk.' There are two risks to participants – discomfort with completing the assessments and breach of confidentiality. The risk of discomfort with completing their assessments is minimized because they may cease answering surveys at any time, should they choose, without any negative impact on their clinical care. While some could find the information included in the self-assessments as sensitive, as it deals with medical and psychiatric matters, it is not anticipated to be disturbing or traumatic. Moreover, the collection of these measures will be part of standard of care, and will not go beyond what would be collected as part of the patient's care and will take place regardless of the Mood Outcomes Program. It is not possible to exactly calculate the likelihood of this risk, but the chance of significant harm is extremely low. This is a very small risk, since the content of the questionnaires will have been addressed in the psychiatric evaluation. The treating clinicians will review responses, and patients will be assessed immediately if their responses indicate a greater level of distress, for any reason.

The second risk is to confidentiality. Significant precautions and considerations have been taken to minimize this risk, and they are described in Section 5.0. The NNDC has entered into Business Associate Agreements (BAAs) with its Member Centers to define the appropriate use, disclosure and safeguards for the data collected as part of the Mood Outcomes Program. Entering into a BAA is a required step in the Member Centers Responsibilities Checklist (**Appendix B**.) In light of these risk minimization procedures, the likelihood of a breach of confidentiality is low. There is no risk of harm to the community or others due to the Program.

In light of the nature of the risks, and the risk reduction measures in place, the overall risks are reasonable in relation to the possible benefit to the individual's care and treatment for their mood disorder, as well as benefit to other patients in the future.

## Privacy Considerations

The Program is a quality improvement effort that will be integrated into the clinical work flow routines of the mood disorders program at our Member Centers. Mood Outcomes Program patients will provide data on their health condition(s) through the use of validated assessments which will then be reviewed in real-time by their clinicians at the patient appointment. As such, the Mood Outcomes Program constitutes PHI, and will fall under the appropriate regulations for ensuring the safety of PHI.

The Program cannot practically be initiated without access to PHI. Data security processes and programming will play a crucial role in of all modules of the KnowledgeBase System including the ePRO, Schemas, and Clinician Dashboard. As mentioned above, there are two essential components of the Mood Outcomes Program that require the collection of PHI data:

1. Patient self-registration will facilitate wide implementation of the reporting Program at the NNDC sites and individual clinics. By allowing the patient to control access and securely login without the assistance of site staff, the NNDC can dramatically expand support for patients with mood disorders.

2. The Quality Improvement component will utilize data from the patient-reported assessments in real-time during the clinic visit. Clinicians will access the patients' data via the Clinical Repository dashboard in order to assess trends and inform clinical care decisions.

As patients register for the Mood Outcomes Program, they will be provided with a general overview of the Mood Outcomes Program on the welcome landing page (see sample**, below**). In addition to this general information, patients will be provided with the NNDC Mood Outcomes Program Brochure which outlines the basic objectives of the program for the patient.

**Welcome to the Mood Outcomes Program!** We are using this program to help monitor the progress in treating your mood problems. Our healthcare center is one of over 20 centers participating in this Program as part of a National Network of Depression Centers (or NNDC) initiative to improve treatment for people with mood disorders. Each time you come in for an appointment you will complete four (4) assessment scales prior to seeing your clinician. This should take less than 10 minutes. Your clinician will review your responses with you during your visit to see how your symptoms are changing over time. Tracking your scores on the Mood Outcomes scales is just as important as tracking blood pressure for people with high blood pressure. It will allow us to see how you are doing and make sure we are providing you with the best possible care.

**What if I Have Questions?**

Please contact the Mood Outcomes Program Coordinator at *MoodOutcomesPCC@altarum.org* if you have any questions about this Program.

**CONTINUE (to Start Questionnaires)**

# 5.0 Data security

## Data management responsibilities

Data from the Mood Outcomes Program will be managed by the Altarum Institute in Ann Arbor, Michigan and its wholly owned subsidiary, KAI Research, Inc. located in Rockville, MD. Standard reports will be provided to review data quality, site performance, progress of the Mood Outcomes Program, and for metrics reporting purposes.

The KnowledgeBase System that will support the NNDC Mood Outcomes Program will be comprised of two modules that will be used to support NNDC program data collection, visualization, aggregation and analysis: a patient-facing ePRO component and a clinical component (the Clinical Repository) for clinicians and necessary site staff to access the patient reported data. The KnowledgeBase System needs to be both flexible and secure to support the main care component. Prior to each clinic visit, patients will complete the patient-reported outcomes via the ePRO system. The data gathered from the patients will be accessed in real time by the clinician who will view this information via the Clinician Dashboard during the visit.

The NNDC systems possess the ability to maintain an audit trail of the entire KnowledgeBase enabling traceability of entries and modifications of the collected data. Role-based access to the application and the underlying systems' infrastructure meet HIPAA security and privacy requirements. All users' access rights will be controlled by having to log into the KnowledgeBase data system applications. The system offers each user a secure and unique log-in with predetermined rights. Users will be required to enter a

username and password which will expire within a specified time frame. The user account roles will determine what the user can view and what the user can modify in the NNDC system.

Altarum hosted NNDC systems and websites exposed to the public Internet are required to use secure sockets layer (SSL) certificates that provide for encrypted and secure communications between the host and client. This encryption minimizes the likelihood of interception or modification of data during transmission. All communication between the application server where data are stored, and any workstation (laptop, tablet, kiosk, etc.) used to enter or access data via the web is SSL encrypted. KnowledgeBase System data will be stored on dedicated servers behind a secure firewall, which are physically located in Ann Arbor, Michigan. PHI and PII will be stored in compliance with HIPAA, HITECH, and industry-standard security of data at rest (DAR) encryption.

Altarum's network infrastructure (internal and external systems) is protected from the public Internet by various mechanisms including, but not limited to, firewalls (with restrictive policies in place), virtual private network (VPN) endpoints and software as well as antivirus and malware detection software. Certain aspects of the logs detailing action within the discussed protection systems are collected and reviewed daily. For further protection against disaster or loss of data, all data is backed up each night. In addition, NNDC systems will be hosted within the Altarum Secure Network (ASN). ASN is a secure network segment/enclave of systems used for collecting, storing, and manipulating sensitive (i.e., protected health information and personally identifiable information data used in analyses. The storage of such data will meet all applicable security requirements but will also be readily available to a geographically dispersed team. The ASN is used for systems where security and controlled network access are key requirements.

## Data system architecture

The design and architecture of the NNDC KnowledgeBase System is essential in maintaining a secure environment for the capture and storage of patient information. Secure, real-time access of the ePRO data via the Clinical Repository is a key aspect of the architecture and supports the Mood Outcomes Program objective of quality improvement at the patient, clinic, site and ultimately population level. The NNDC KnowledgeBase system is comprised of the following modules:

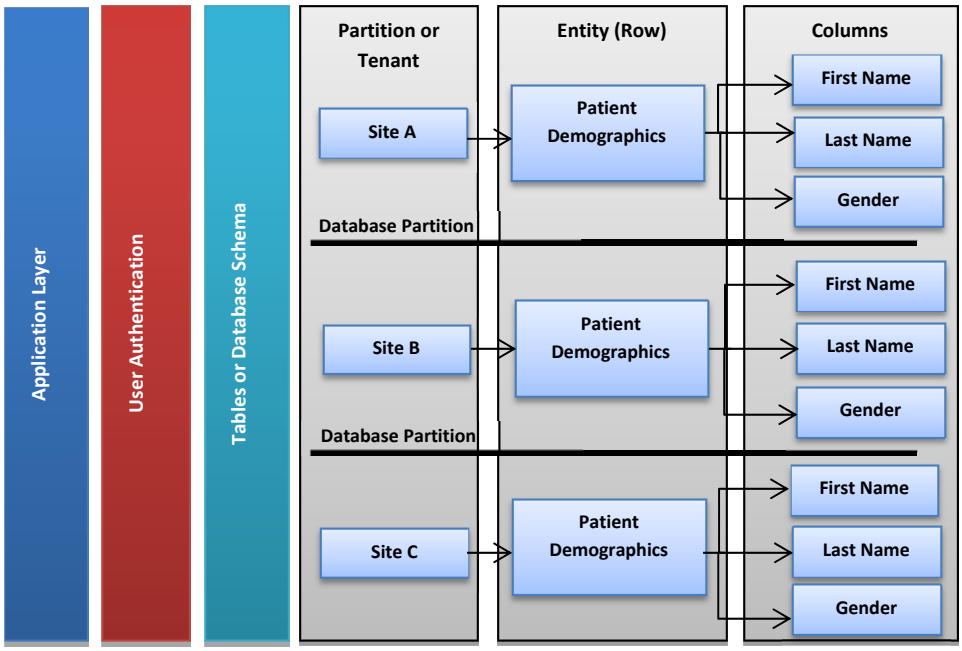
***1. Clinical Repository* -** Is a Web based system that allows clinical site staff to access patient level data. In version 1.0 of the Clinical Repository data not collected within ePRO will be entered directly into the Clinical Repository by the coordinator (e.g., diagnosis, medical record number). Within the Clinical Repository, clinical site staff will have access to the Clinician Dashboard, Demographic data, and Health Status (Diagnoses). The dashboard displays the self-rating scales in real time so clinicians can use this data during their visit with the patient. There are 4 graphs (one for each assessment). Each graph within the patient dashboard displays the current assessment score as well as the past 20 clinical visits; showing a total of 21 plotted assessment scores. This access to the patient data will promote a measurement-based care approach.

***2. Electronic Patient Reported Outcomes (ePRO)* -** The ePRO is a Web based system that allows patients to input the self-rating scales directly. This system will allow patients to enter their data immediately before each clinic visit.

The additional mechanism that will be used to collect data automatically will be the EMR. In later stages of the KnowledgeBase System development, data will be pulled from the EMR into the system which will help to further reduce manual data entry from the sites.

The NNDC KnowledgeBase System will be comprised of a clinical database schema which is a set of distinct/separate tables contained within a database. In a schema structure, each schema is encrypted & requires specific types of user profile validation in order for a user to access the data, or subset of data, within the intended schema.

## Clinical schema




The Clinical Schema is utilized to support the clinical care process and is architected as a multi-tenant schema. Multi-tenancy is a software architecture that allows an organization to work from a shared solution, but unlock only their data. In a multi-tenant software application, each organization's (or site's) environment is virtually partitioned (tenants) within the schema to ensure confidentiality of patient records. Due to the encryption and the database partitions within the tenant, the data remains isolated and secure from the activities of the other tenants. This architecture allows Altarum to provide the NNDC with a professional-grade environment at the fraction of the cost when compared to deploying a separate instance of the system at each of the over twenty Member Centers of the NNDC network. It also allows for increased security and prevents each member from sharing or having access to each other's data. Within this model data access is strictly enforced within each tenant and the data will be

fully encrypted at rest as an additional layer of security. The Clinical Schema within NNDC KnowledgeBase System will allow a user, with the user profile type of Clinical, to view and enter patient data for their site, or tenant, only.

# 6.0 Architecture security

## SSL/ database encryption

The NNDC KnowledgeBase System environment hosted on the Altarum Secure Network (ASN) will be compliant with all HIPAA standards for an SSL environment with an encrypted database. Data will be encrypted “at rest”, on the server itself and will also be encrypted “in flight” or during transmission between the application server and the web browser. In addition to encryption, auditing of user activities (access to and editing of information) within the environment will be tracked & made available to the NNDC if the need arises.

## Tenant Level Reporting

Tenant Level Reporting allows an organization to generate aggregate tenant reports or data sets regarding their site data only. Depending on the report generated and the type of user access the data set may or may not contain PHI from within the tenant. If the user is a clinical user and the user is provided with access to clinical reports within the system then they will be able to generate reports that may or may not contain PHI depending upon the report query.

## User Profile Management

All users must have an individual ID and password to access the secure Program system. Site user accounts (site staff, clinicians, etc.) and passwords will be issued and managed by Altarum, and will be terminated at the request of the PI or authorized site staff when site personnel leave the project and no longer need access. While site staff will be responsible for identifying eligible patients for the Mood Outcomes Program prior to patients’ clinic visits, these patients will have the ability to self-register in the system via the ePRO module. Upon entering key fields into the ePRO system, patients will be assigned a user ID and given a temporary password to login to the ePRO. Once logged in, the patient will be prompted to change that to a unique user-assigned password.

## Protected health information (PHI)

The Program is anticipated to generate information that, if revealed, might place the subjects at risk of personal safety, criminal or civil liability, or damage to their financial standing, employability, or reputation. PHI will be obtained from the following sources: ePRO, medical records; any records relating to the condition, treatment received, and response; demographic information; personal identifiers.

The information to be obtained is the minimum necessary to achieve the purpose of the Mood Outcomes Program, which is to improve quality of patient care. Access to PHI will be tightly controlled.

Subjects are directly identified at the individual sites. This is reasonable because a central purpose of the Mood Outcomes Program is to allow ongoing contact with participants, which requires identifiers. Identifiable data will not be stored on portable devices (e.g., laptops, tablets).

Because this Program is implemented as standard care, the windows for data collection will align with patient clinic appointments. In other words, data will be accepted at each clinic visit and the Program will not adhere to a pre-defined visit schedule.

In addition, there will not be any oversight or monitoring processes for Unanticipated Problems, Adverse events, etc. Given the non-interventional nature of the Program, site monitoring will not be conducted.

## Plan to handle potential self-harm uncovered through assessments

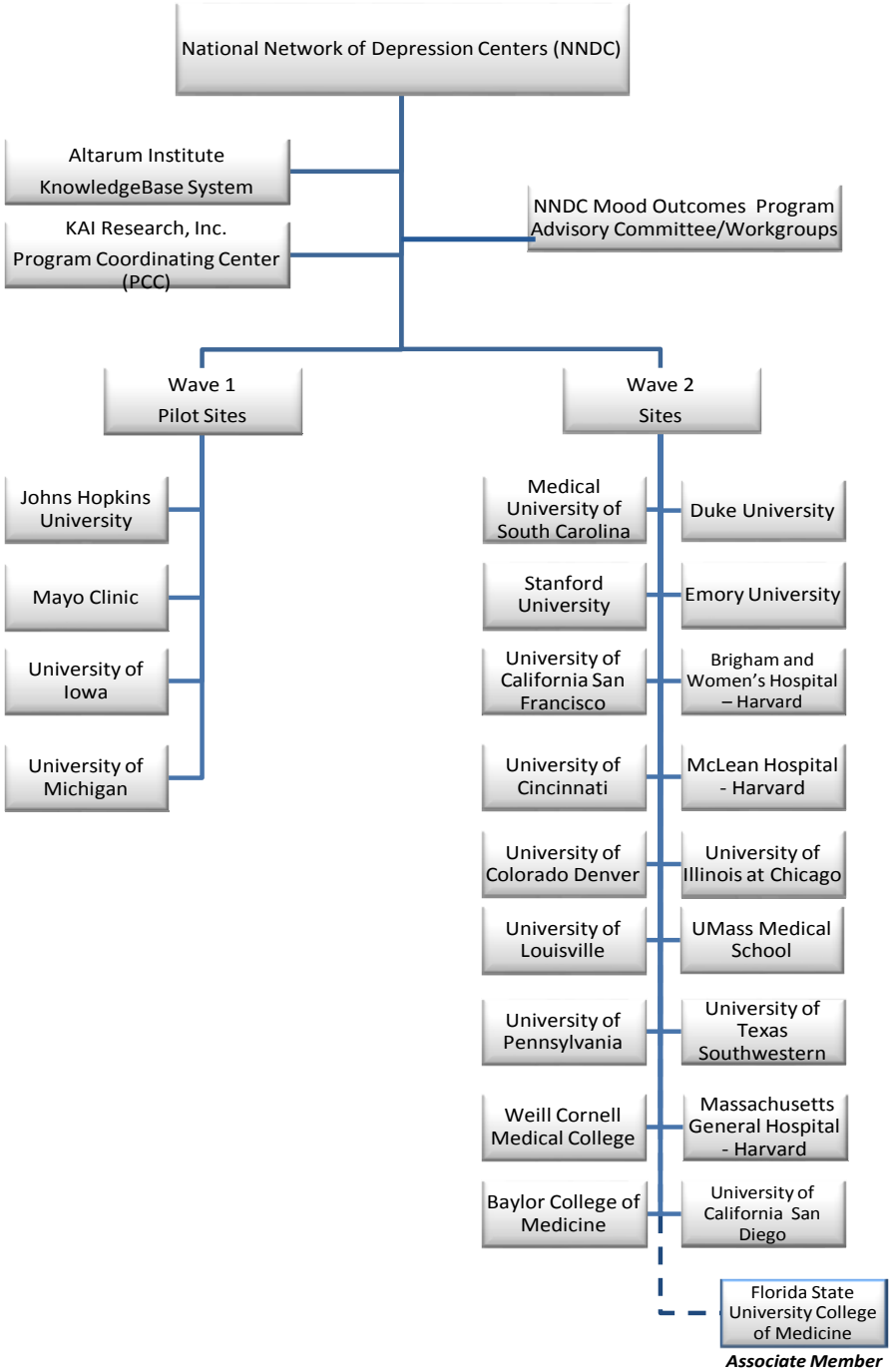
The assessments include several questions that address suicidal thoughts, plans and self-injurious behavior. Thoughts of self-harm, as well as self-harming behaviors are expected symptoms and behaviors of a major depressive episode, and these events will be recorded along with other symptoms. Nothing in the Mood Outcomes Program is expected to increase the likelihood of these events. The assessments will occur in the context of regular psychiatric care and follow-up, which should always include appropriate assessment of the risk of self-harm, per standards of good clinical practice. For patients who indicate a significant risk to self-harm on the assessment instruments, these items will be flagged in the system and the indicator will be displayed within the Clinical Repository on the Clinician Dashboard. Additionally, the PCC will obtain an assurance from the site investigator (or his/her delegate) that the clinical team managing the patient is aware of any potential risks of self harm and has or will have an appropriate management plan in place. The definition of 'significant risk' and timeliness of obtaining this assurance will be outlined in trainings and materials provided by the PCC.

Patient self-registration via the ePRO system is an essential component of the system design that will allow patients to move seamlessly from the presentation at the clinic through clinical care, based on their data assessments completed that day. However, important to data security and patient safety, we have implemented several safeguards to ensure that patients will only access the ePRO system during their office visit. We realize there is a risk, but we have put the following mechanisms in place to minimize the risk of a patient filling out the measures outside of the clinic. First, the ePRO patient portal URL will not be searchable on the internet, with a URL that is purposely complex to minimize the ability to recall. The URL will not be provided in the automated emails to patients when they activate the 'forgot my password.' Secondly, when presented to patients in the waiting room, the ePRO patient portal webpage view will be in full screen mode and will not readily display the URL. Ultimately, the self-registration approach is of benefit because it will enable the NNDC Mood Outcomes Program to systematically capture the information and document patient assessments.

# Appendices

A. NNDC Mood Outcomes Program Organizational Relationships
B. Member Centers Responsibility Checklist
C. NNDC Mood Outcomes Program Brochure

# Appendix A – NNDC Mood Outcomes Program Organizational Relationships



# Appendix B – Member Centers Responsibility Checklist

| Site Responsibility | Complete? | Comments |
|---|---|---|
| **Enter into Business Associate Agreement (BAA) with NNDC** | **Yes** ☐ **No** ☐ | |
| **Establish Mood Outcomes Program Clinical Workflow**<br>**Establish Patient Screening Process:**<br>• Patient identification<br>• Management plan for self-harm risk<br>**Develop Front Desk Script, including:**<br>• Patient instructions<br>• Hardware return<br>• Downtime support (access to paper assessments, etc.) | **Yes** ☐ **No** ☐<br><br>**Yes** ☐ **No** ☐ | |
| **Obtain Hardware**<br>• Hardware security reviewed at site<br>• Patient interface settings established<br>• Notify Altarum of type of Hardware<br>• Notify Altarum of Hardware specifics (Operating System type and version [e.g. Windows 8], and available browsers) | **Yes** ☐ **No** ☐ | Indicate type of hardware |
| **Participate in Site Training**<br>• Identify available training dates<br>• Send Altarum list of training participants | **Yes** ☐ **No** ☐ | Initial training conducted by Altarum; subsequent trainings conducted by site staff |
| **Access NNDC Mood Outcomes Program Test Platform**<br>• Provide Altarum user list | **Yes** ☐ **No** ☐ | Required users list form submitted to *MoodOutcomesProgramPCC@altarum.org* |
| **Launch Program**<br>• Determine appropriate site go-live date | **Yes** ☐ **No** ☐ | Confirmation will be emailed by *MoodOutcomesProgramPCC@altarum.org* |

# Appendix C – NNDC Mood Outcomes Program Brochure