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Title: A randomized control trial to study the effects of automated physician directed messaging on patient engagement in the digital diabetes prevention program

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Statement of Compliance

This study will be conducted in accordance with the Code of Federal Regulations on the Protection of Human Subjects (45 CFR Part 46), any other applicable US government research regulations, and institutional research policies and procedures. The Principal Investigator will assure that no deviation from, or changes to the protocol will take place without prior agreement from the sponsor and documented approval from the Institutional Review Board (IRB), except where necessary to eliminate an immediate hazard(s) to the trial participants. All personnel involved in the conduct of this study have completed Human Subjects Protection Training.

Table of Contents

List of Abbreviations

AE	Adverse Event/Adverse Experience
FDAAA	Food and Drug Administration Amendments Act
CFR	Code of Federal Regulations
CRF	Case Report Form
CSOC	Clinical Study Oversight Committee
DCC	Data Coordinating Center
dDPP	Digital Diabetes Prevention Program
DHHS	Department of Health and Human Services
DSMB	Data and Safety Monitoring Board
FFR	Federal Financial Report
FWA	Federalwide Assurance
GCP	Good Clinical Practice
HIPAA	Health Insurance Portability and Accountability Act
ICF	Informed Consent Form
IRB	Institutional Review Board
ISM	Independent Safety Monitor
MOP	Manual of Procedures
N	Number (typically refers to participants)
NIH	National Institutes of Health
OHRP	Office for Human Research Protections
OHSR	Office of Human Subjects Research
PAMS	Personalized Automated Messaging System
PI	Principal Investigator
QA	Quality Assurance
QC	Quality Control
SAE	Serious Adverse Event/Serious Adverse Experience
SOP	Standard Operating Procedure
US	United States

Protocol Summary

Title	*A randomized controlled trial to study the effects of automated physician directed messaging on patient engagement in the digital diabetes prevention program*
Short Title	
Brief Summary	*This study aims to understand the effects of the physician-directed personalized automated messaging systems (PAMS) on patient engagement in the digital diabetes prevention program (dDPP). The messages are tailored to patient engagement levels based on established engagement thresholds, which are based on the patient's use of the dDPP application. The system is designed to minimize work for providers by sending automated targeted messages to patients to potentially increase engagement, prevent onset of diabetes and improve clinical outcomes. The patients in the study are automatically nudged using a combination of text messaging and mychart messaging.* *Using a mixed-methods design, this study will be completed in three phases. The first phase was a quality improvement project to observe user engagement behavior in the dDPP program, and user test messages to potentially impact their behavior. Phase 2 will be recruiting up to 40 prediabetic patients from two sites within NYU Langone Health to adapt and iterate on the workflow to refine the study intervention. In addition, we will be conducting interviews with providers to build a provider-facing dashboard to report their patients' engagement behaviors and health outcomes. For Phase 3, we aim to conduct a randomized control trial with 432 pre-diabetic patients, all of whom will be using the dDPP application, randomized to the control group or one of 2 intervention groups who receive automated targeted messaging through PAMS. In addition, we surveying providers to gather feedback on the provider-facing dashboard and other study components.*
Phase	*Phase 1: Observational study for clinical workflow adaptation* *Phase 2: Pilot testing in NYU Langone Health clinics* *Phase 3: RCT in NYU Langone Health clinics*
Objectives	*Primary Objective: To observe change in weight* *Secondary Objective: To observe any change in clinical outcomes (hemoglobin A1c levels, BMI), diagnosis of diabetes and to asses impact of engagement messaging and user engagement scores*
Methodology	*Phase 2: User testing, workflow adaptation* *Phase 3: Randomized Control Trial*
Endpoint	***Primary endpoint**: weight (lb),* ***Secondary endpoint**: hemoglobin A1c levels, BMI, steps per day, diagnosis of diabetes, engagement score based on dDPP data logs and lesson completions, and patient demographics, social determinants, and other baseline descriptive data*
Study Duration	*Phase 2: 18 Months* *Phase 3: 42 Months*
Participant Duration	*18 months*
Duration of behavioral intervention	*12 months*

Population	*Pre-diabetic adult patients at NYU Langone Health (phase 2 and phase 3) and providers for the pre-diabetic patients (phase 2)*
Study Sites	*NYU Langone Health Faculty Group Practice (FGP), NYU Langone Family Health Center (FHC)*
Number of participants	*Phase 2: 40 patient participants and 40 provider participants* *Phase 3: 433 participants and 20-40 provider participants.*
Description of Study Intervention/Procedure	*Phase 2: 40 patients will be recruited to be part of the study. Patient participants will be asked to enroll virtually into Noom and willing to receive text messages based on engagement levels in Noom from the study team. This pilot testing will examine impact on workflow, uncover usability issues, and identify optimization opportunities to be included before large-scale implementation.* *Provider participants: The study team will be interviewing providers to understand useful components of a provider facing dashboard within the EHR which will display the study participants' adherence data and health outcomes based on the dDPP Noom application. Providers will also be asked to participate in workflow adaptation sessions and user testing sessions to examine impacts on workflow, usability issues, and potentially lead to additional refinements.* *Phase 3: 432 patients will be recruited to be part of the study, with 144 randomized to control arm (dDPP only), and to one of 2 intervention arm (dDPP+messaging). Participants will be asked to enroll into Noom and willing to receive text messages based on engagement levels in Noom from the study team. Providers will be asked to participate in an exit survey to gather feedback on their experience with the provider facing dashboard and other study components.*
Reference Therapy	*N/A*
Key Procedures	*N/A*
Statistical Analysis	*The primary analysis will follow the intention-to-treat framework.* *For phase 2, we will assess usability of the engagement messages to the patients and address any research and technical issues to prepare for phase 3, and also do workflow analysis and adaptation for the provider-facing interface.* *For phase 3, we will analyze the difference in means between the three arms in the RCT to assess impact of engagement messaging for our primary endpoint.*

Schematic of Study Design

Phase 1:

Prior to Enrollment

N=30 clinicians: Obtain informed consent from clinic directors. Conduct initial informational and question/answer sessions.

⇩

Assess provider workflows via in-clinic observations of providers

Workflow Analysis

⇩

Structured workgroup review, presentation of specific tool suite use-cases, group discussion of clinic workflow, creation of optimized visualizations and recommendations by research team, facilitated group adaptation session, revision of recommendations by research team with modified workflow diagrams, discussion of candidate workflows.

Tool Suite Optimization

⇩

Final Assessments
Discussion of needs for additional dDPP tool adaptation.

Tool Suite Rating and Debrief

Phase 2:

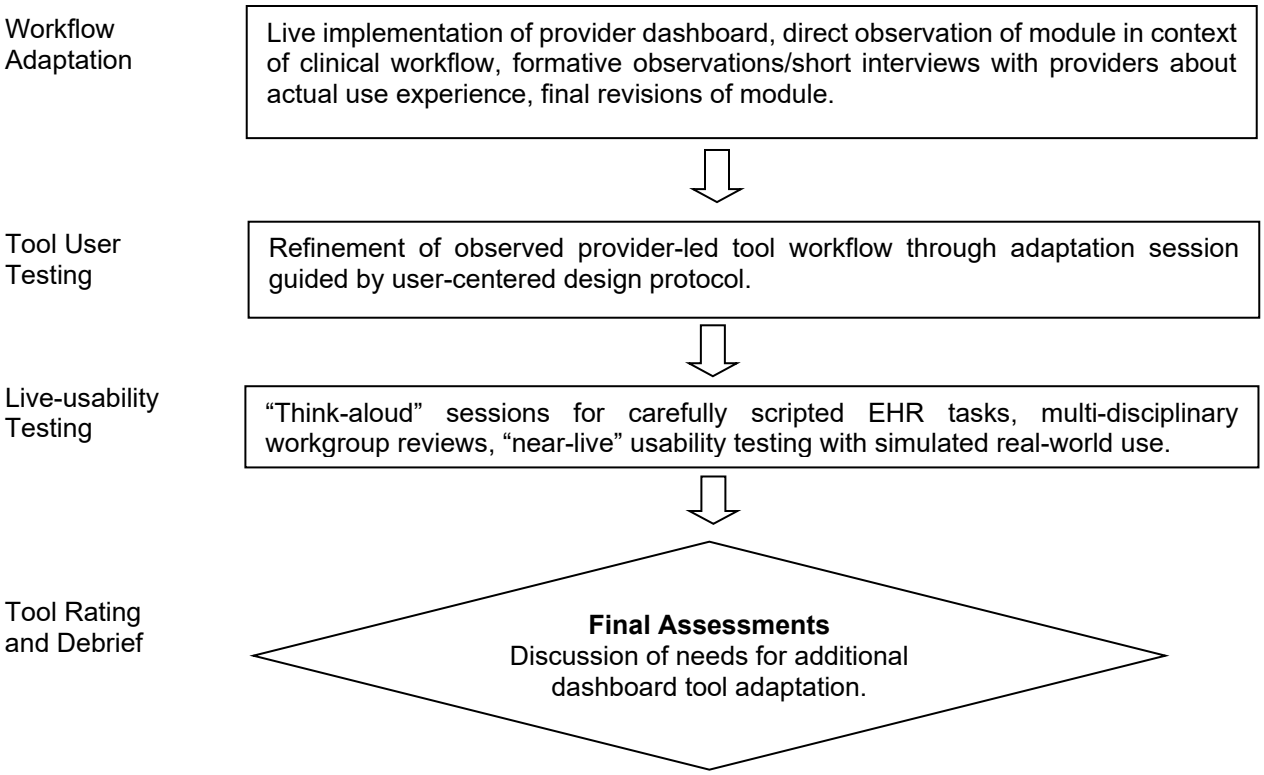
For Providers:

- Total n: 40, Obtain verbal consent from provider
- Conduct interviews regarding the provider-facing EHR dashboard

Workflow Observations & Analysis

Study team to assess provider workflows via short interviews about current scope of work

⇩


Workflow Adaptation
Live implementation of provider dashboard, direct observation of module in context of clinical workflow, formative observations/short interviews with providers about actual use experience, final revisions of module.
Tool User Testing
Refinement of observed provider-led tool workflow through adaptation session guided by user-centered design protocol.
Live-usability Testing
"Think-aloud" sessions for carefully scripted EHR tasks, multi-disciplinary workgroup reviews, "near-live" usability testing with simulated real-world use.
Tool Rating and Debrief
Final Assessments
Discussion of needs for additional dashboard tool adaptation.

For Patients:

Prior to Enrollment Day 0

Total 40: Screen potential participants by inclusion and exclusion criteria; obtain history, document, Send recruitment message via mychart or email for interest in research study.

Visit 1 Day 1

Obtain informed consent, collect Initial assessments (demographics, behavioral questionnaires: eHEALS, ATMS time management, WHOQL-BREF, GSE, Digital ID) Onboard patient into Noom and fitbit or ihealth accounts, and provide overview

Visit 2 Week 1 - 2

Follow up interview regarding week 1 experience
Technical trouble shooting as needed

Visit 3, 4, 5 Month 1, Month 3 Month 6

Follow-up assessments
(COMB questionnaires and follow up regarding experience in research study regarding text messages, Noom experience, and patient-provider relationship)

Visit 6 Month 12

Follow-up assessments
(COMB questionnaires and follow up regarding experience in research study regarding text messages, Noom experience, and patient-provider relationship)

Visit 7 Month 18

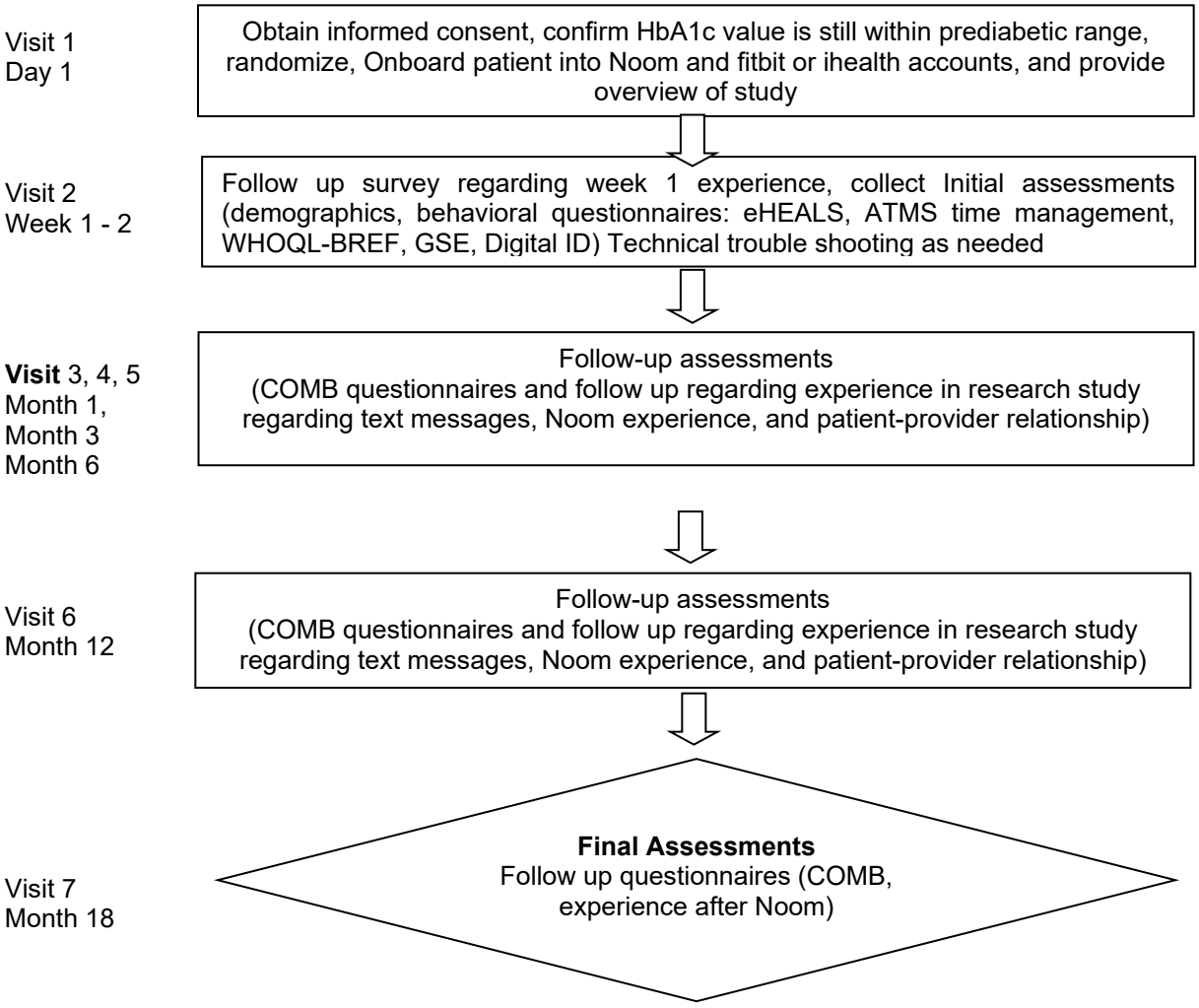
Final Assessments
Follow up questionnaires (COMB, experience after Noom)

Phase 3:

For Patients:

Prior to Enrollment Day 0

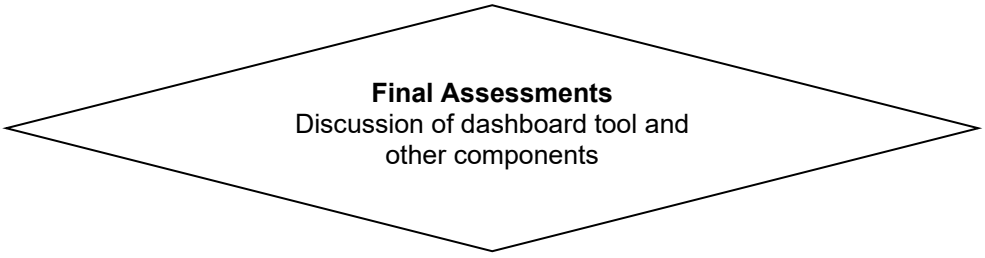
Total 432: Screen potential participants by inclusion and exclusion criteria; obtain history, document, Send recruitment message via mychart, email or phone call for interest in research stud.



Phase 3:

For Providers:

- Total n: 20-40, Obtain verbal consent from provider
- Survey regarding the provider-facing EHR dashboard



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2 Introduction, Background Information and Scientific Rationale

2.1 Background Information and Relevant Literature

Digital health interventions have become ubiquitous, promising to disrupt standards of care across many health conditions.[1,2] Their reach, enabled by the dissemination of high speed internet connections, now extends to most of the U.S. population, crossing geographical, socio-demographic and logistical barriers.[3,4] Despite this rapid expansion, only recently have clinically effective, reimbursable digital interventions become widely available, particularly for lifestyle-sensitive conditions such as diabetes. This expansion has led to growing interest in integrating the patient-generated digital data from these interventions in a useful, streamlined fashion into routine care for chronic conditions. However, there remains a lack of evidence about how to combine and effectively leverage widely available tools in the EHR to use these data to improve

clinician-patient interactions and patients' engagement in their own self-management and health outcomes.
The Diabetes Prevention Program (DPP) and several other studies have established that DM2 is largely preventable through behavior changes.[9,10] In the DPP, participants randomized to the comprehensive lifestyle intervention experienced a 58% reduction in diabetes incidence over 3 years and 34% over 10 years.[10,11]

2.2 Rationale

The proposed project will fill a critical gap in the evidence base and answer an important question: how can EHR tools work together to enhance patient engagement with dDPPs by amplifying providers' ability to support patients' self-management of their health in a meaningful, personalized and timely manner? The proposal is highly innovative in three ways:

1. It will create **a new evidence base** to guide the use of widely available EHR tools for the meaningful integration and display of dDPP patient-generated data, and create a framework for future integrations of other digital behavior change interventions.

2. It will leverage the EHR and its ability to **automate feedback loops** through PAMS to create an innovative process to facilitate provider involvement in their patients' use of the dDPP, **amplifying providers' motivational impac**t on patient engagement.

3. It will be evaluated and optimized using **evidence-based implementation frameworks** that will guide assessment of the acceptability, adoption, cost, and sustainability of the tool, an often ignored but key component of evaluating the integration of new care processes. This will provide comprehensive implementation measures, formative and summative, and enable a rigorous understanding of barriers and facilitators to implementing dDPP-EHR tools.

This study aims to adapt a previously developed suite of digital patient monitoring and engagement tools that will integrate patient dDPP data into the EHR workflow. End-user testing is critical in the development of a tool that is optimally effective and usable in practice. We will implement a user-centered design process to adapt the dDPP tool suite to the EHR by iteratively refining and testing and evaluating the acceptability and usability of the enhanced tool suite.

This study will partner with an existing third-party dDPP vendor ("Noom"), which provides a comprehensive digital diabetes prevention curriculum, plus individualized coaching, goal setting, and social groups to help prevent the progression to diabetes in patients who are at risk. This application ("app") is based on the evidence-based CDC DPP program, and will serve as the platform for the delivery of diabetes prevention education content for our patients.

The development and optimization process for the adapted dDPP tool suite involves a series of linked steps that we have successfully used to adapt similar tools in previous studies.[20-24] The process for phase 1, outlined in completion in IRB-approved study *19-A1-00-1000729*, includes a workflow analysis and tool optimization. We will conduct a workflow analysis adapted from the AHRQ recommendations on workflow assessments in five clinics in which these observations will involve seeing the clinician in their usual setting and documentation of existing workflow. We will then use the tool optimization through a structured workgroup review process with relevant clinicians, clinical decision support developers, and the research team.

Phase 2 of the study will be to pilot the adapted dDPP tool suite in NYU Langone clinics to account for real-world settings (i.e. provider/patient interaction with the updated tool). Early formative observations/short interviews, included in the appendices, will be conducted with care teams, particularly the provider, at each pilot clinic once sufficient patients from that site have enrolled in the dDPP to allow interaction with the new interface tool. This phase of testing will further examine impacts on workflow, usability issues, and potentially lead to additional refinements.

Once the phase 2 intervention has been tested and refined in the NYU Langone clinics, phase 3 of the study will be to recruit practices and patients for the full-scale clinical trial. The intervention will be rolled out to additional sites in a randomized control trial. Patients in the intervention group will receive the dDPP and their providers will have access to the adapted dDPP-EHR tool suite from the previous two phases, while the control patients will only receive the dDPP via mobile application (not integrated into the EHR). The overall outcomes of this phase will be both clinical (i.e. weight reduction, physical activity, HbA1C levels) and engagement-related (i.e. patient engagement and perceived provider involvement).

2.3 Potential Risks & Benefits

2.3.1 Known Potential Risks

Patient participants will be using their MyChart mobile health applications and receiving text messages. General risks of using mobile applications (“apps”) include the possibility of personal or financial information being (un)intentionally disseminated to parties outside of the app vendor. To address this, the mobile app partner (“Noom”) adheres to standard industry protocols for data safety and monitoring. Participants may also feel frustrated when sharing their opinions and completing questionnaires, in which case they will be instructed to skip as they see fit. All risks and benefits of participation will be explained to participants and included in the verbal consents and key information sheet. The primary risk to NYULH employee subjects would be anxiety about being observed or interviewed. We will reassure employee subjects that their responses will not be communicated to supervisors and will not be part of any performance evaluation.

2.3.2 Known Potential Benefits

All patient participants will receive a free 1 year subscription to the dDPP mobile health application, which they can use as they please. In terms of long-term benefits, prior similar research have helped participants improve their health maintenance, and relationship with their providers, by implementing the suggested health behavior changes using dDPP, and increased provider input in the healthcare decisions.

3 Objectives and Purpose

3.1 Primary Objective

Primary Objective: To observe percent change in weight

3.2 Secondary Objectives (if applicable)

Secondary Objective: To observe any change in clinical outcomes (steps per day, hemoglobin A1c levels) and to asses impact of engagement messaging and user engagement scores

4 Study Design and Endpoints

4.1 Description of Study Design

This study has 3 phases and is a mixed methods study.
Phase 1: Quality improvement study (Refer to prior approved study *19-A1-00-1000729 in appendices)*
Phase 2: Pilot study with 40 NYU patients across NYU Langone Health sites. This is an observational study to understand and assess the usability of workflows for both patients and providers, and adapt as needed
Phase 3: Randomized control trial with 3 arms, across FGP sites in NYU Langone Health. Both control arms and two intervention arms will receive the dDPP app. The intervention arms will receive messages through PAMS based on their engagement levels in the dDPP application. The intervention arms receive the same group of text messages with one group having the choice to select the time of day for the text messages and whether they would like a reminder to log into Noom on a daily, weekly, biweekly or month cadence.

4.2 Study Endpoints

4.2.1 Primary Study Endpoints

Primary endpoint: weight (lb)

4.2.2 Secondary Study Endpoints

Secondary endpoint: steps per day, hemoglobin A1c levels, diagnosis of diabetes, engagement score based on dDPP data logs and lesson completions, and patient demographics, social determinants, and other baseline descriptive data

4.2.3 Exploratory Endpoints

5 Study Enrollment and Withdrawal

5.1 Inclusion Criteria

In order to be eligible to participate in this study, an individual must meet all of the following criteria:

Provider Inclusion Criteria: (a) Fulltime primary care provider (MD/DO, NP) practicing at the participating FHCs or FGPs and, (b) Provide care to at least five patients with a diagnosis of pre-diabetes.

Patient Inclusion Criteria:
In order to be eligible to participate in this study, an individual must meet all of the following criteria:

1. 18 years or older, BMI ≥ 25 kg/m^2 (> 22 kg/m^2 if self-identified as Asian)
2. A diagnosis of prediabetes (either diagnosis of prediabetes or an HbA1C level of 5.7%-6.4% in past 18 months)
3. Baseline self-test a1c value of 5.4 to 6.4
4. Safe to engage in moderate physical exercise (as determined by their PCP)

5. Sufficient English to be able to complete the enrollment process
6. Has app capable device with data to use the dDPP application and receive text messages
7. NYU Langone Health Patient with assigned PCP on EPIC/EHR

5.2 Exclusion Criteria

An individual who meets any of the following criteria will be excluded from participation in this study:

Provider Exclusion Criteria: Refuse to participate

Patient Exclusion criteria:
An individual who meets any of the following criteria will be excluded from participation in this study:

1. Diagnosed with diabetes
2. Patients whose weight may vary considerably over the study's timeframe for reasons other than the intervention (e.g. cancer, pregnancy, ascites, severe CHF)
3. Patients with severe psychiatric disease or dementia
4. Active health condition that prevents them from engaging in moderate exercise

5.3 Vulnerable Subjects

Providers (MD/DO, NP) practicing at the participating FGPs, who are employees of the hospital system will be interviewed as part of Phase 2 of the study. They will not be affected by their decision to participate in this study. Their participation will not affect their employment, reputation, or be linked to their employment record.

Study personnel involved in recruitment do not have any supervisory role or performance evaluation. Consenting process emphasizes voluntary participation, minimizes any coercion and location is appropriate to ensure privacy and maintenance of confidentiality of the discussion. Consenting will be done in person, via email, or part of anonymous survey. Risks of breach of confidentiality are minimized. Investigator will ensure subjects full understanding of research and minimize undue influence. The research will not affect employment or performance evaluation.

5.4 Strategies for Recruitment and Retention

Provider participants will be identified based on their role at the study clinics and eligibility criteria. The study will be presented to the providers by the study team. A study team member will verbally consent the provider and scheduled a time for workflow assessment, group adaptation session, and live-usability tests. The participants will be given a key information sheet that outlines their research participation. The providers may be verbally consented and interviewed over video call due to covid19 restrictions.

Patient participants (Phase 2 and 3)

EPIC workbench report will be run once a day to screen patient subjects for eligibility for Phases 2 and 3 of the study. Once a list of potential subjects are generated, they will be sent a mychart recruitment letter, and contacted via phone call. (Scripts included) The list of prediabetic patients are obtained from EPIC.

If a patient is recruited through provider referral, or clinicaltrial.gov, they will be emailed the same recruitment letter via sendsafe email.

Providers will be able to refer patients via secure chat in EPIC to the research assistant or email the dedicated study email address, hibrid.lab@nyulangone.org, with the patient's best contact information via SendSafe email.

Potential subjects will be recruited electronically via redcap consent form and esignature. Each subject will be scheduled for a video visit with a study team member.

Signed informed consent will be obtained from participants who meet the study eligibility criteria. Subject will be provided ample time to review the consent form. A research team member will review each section with the subject, ask the subject if they understand each section, and clarify any questions they may have. The subject and the person obtaining consent will sign and date the consent form. The subject will get a copy of the signed informed consent document via email. Informed consent will be considered an ongoing process throughout the study, and subjects' questions regarding their rights and responsibilities will be addressed whenever they occur.

Due to COVID-19 and to keep the safety of both our research team and research subjects, we will be collecting consent via RedCap. A trained Research staff member will schedule a time with eligible interested participants to go over the informed consent via telephone. After going over the informed consent via telephone, research staff member will also send the consent via a RedCap link where the participant has the opportunity to read the consent and sign electronically, confirming that they read and understood the consent. Research staff member will also document on RedCap the time and date of the telephone consent and note that the consent process was done via telephone due to COVID-19.

Research assistants will recruit participant in person at participating FGP primary care clinics. Eligible patients will be identified prior to the appointments or clinical staff will refer patients to the research assistant during the recruitment shift. If patient is eligible, they will be consented in a private area of the clinic. Patients will be able to sign the research consent form on a NYU Langone encrypted iPAD or laptop. The consenting and onboarding procedure will be the same as for those who are onboarded virtually. In-person recruited patients will be tested for their HbA1c values immediately after the consent to verify eligibility.

Any information sent by email will utilize Send Safe email.

A waiver of consent is requested since the study involves using identifiable private information and presents no more than minimal risk to the subjects since the data will be stored in a HIPAA compliant database and only authorized study staff will have access to the data. The conduct of the study could not practicably be carried without the waiver because we are collecting the following PHI including name, date of birth, address, telephone number, diagnosis history, and medical record number. Data will be retained electronically for 3 years after close-out and 5 years after final reporting/publication. The rights and welfare of the participants will be protected

by emphasizing to them that the quality of their medical care will not be adversely affected if they decline to participate in this study.

5.4.1 Use of DataCore/Epic Information for Recruitment Purposes

Recruitment will be done via both direct and indirect contact. This study will utilize EPIC to identify subjects. Research staff will run reports once a day through EPIC reporting workbench through the course of the study to obtain a list of potential subjects meeting eligibility criteria at NYU Langone sites. All members of the study team (PI, study coordinator, study team members) will have access to the EPIC search results.

We will collect the following additional PHI: Name, date of birth, address, telephone number, diagnosis history, medical record number. Data will be retained electronically for 3 years after close-out, 5 years after final reporting/publication. No records will be destroyed without the written consent of the sponsor, if applicable. It is the responsibility of the sponsor to inform the investigator when these documents no longer need to be retained. NYU Langone MCIT will remove data from applicable sources at the time periods listed above.

Any recruitment information sent by email will utilize Send Safe email. (Refer to appendices)

Once potential subjects have been identified, the treating physician (TP) agrees to permit study team to directly contact potential subjects on behalf of TP.

Once contact is made, IRB approved recruitment language will be used to communicate the reason they are being contacted and subjects will be asked if they are interested in participating in this specific study. If the potential subjects agree, the study team will provide the subjects with information regarding the next steps for participation.

If a subject requests information regarding opting out of further recruitment for all research, subjects will be directed to contact research-contact-optout@nyumc.org or 1-855-777-7858.

5.5 Duration of Study Participation

Phase 2 and Phase 3 patient participants will be asked to participate in the study for 18 Months.

5.6 Total Number of Participants and Sites

For phase 2:

Recruitment will end when approximately 40 patient participants are enrolled. It is expected that approximately 40 participants will be enrolled in order to produce 40 evaluable participants.

Recruitment will end when approximately 40 provider participants are interviews around usability testing and workflow adaptation.

For phase 3:

Recruitment will end when approximately 432 participants are enrolled. It is expected that approximately 432 participants will be enrolled in order to produce 432 evaluable participants.

Recruitment will end when approximately 20-40 provider participants are surveyed around the provider-dashboard and other study components.

5.7 Participant Withdrawal or Termination

5.7.1 Reasons for Withdrawal or Termination

Participants are free to withdraw from participation in the study at any time upon request. An investigator may terminate participation in the study if:

- Any clinical adverse event (AE), laboratory abnormality, or other medical condition or situation occurs such that continued participation in the study would not be in the best interest of the participant
- The participant meets an exclusion criterion (either newly developed or not previously recognized) that precludes further study participation

5.7.2 Handling of Participant Withdrawals or Termination

Participants will be referred to the investigator for evaluation and management. Data collection will cease at the time of withdrawal. Data up until the point of withdrawal will be used in the analysis.

5.7.3 Premature Termination or Suspension of Study

This study may be temporarily suspended or prematurely terminated if there is sufficient reasonable cause. Written notification, documenting the reason for study suspension or termination, will be provided by the suspending or terminating party to the PI, Devin Mann. If the study is prematurely terminated or suspended, the PI will promptly inform the IRB and will provide the reason(s) for the termination or suspension.
Circumstances that may warrant termination or suspension include, but are not limited to:

- Determination of unexpected, significant, or unacceptable risk to participants
- Demonstration of efficacy that would warrant stopping
- Insufficient compliance to protocol requirements
- Data that are not sufficiently complete and/or evaluable
- Determination of futility

Study may resume once concerns about safety, protocol compliance, data quality are addressed and satisfy the sponsor and/or IRB.

6 Behavioral/Social Intervention

There are multiple phases. The general steps are outlined below:

6.1 Study Behavioral or Social Intervention(s) Description

Phase 2: Pilot Testing
The pilot testing phase of the study will be to pilot the adapted dDPP tool suite in two NYU Langone clinics to evaluate for real-world settings (i.e. provider/patient interaction with the updated tool). This pilot testing will examine impact on workflow, uncover usability issues, and

identify optimization opportunities to be included before large-scale implementation. The end result is an automated patient-provider feedback system designed to meaningfully connect patient dDPP data with the EHR to enhance patient engagement.

Patient participants for phase 2 will be asked to enroll and participate in the ddpp/Noom program from 12 months. The purpose of this research study is to explore the impact that automated messages sent from physicians can have on a patient's engagement when it comes to preventing diabetes. These messages are sent based on how low or high the patient's involvement with the program is. These patients will receive text messaging as part of the intervention. They will receive mychart messages, or email for study related correspondence. In this study, we focus on those who are pre-diabetic in efforts to ensure that we are preventing diabetes. We hold a series of 1:1 interviews and send out surveys to gather the users' thoughts on the impact of the automated provider messaging keeping them engaged in this program.

During their participation in the program, the study team will review their engagement metrics, and based on an algorithm determined based on algorithm developed from the phase 1 research, the participant's engagement scores will be calculated. The adherence scores are determined based on first calculating the weekly usage of each participant based on the 7 predefined engagement metrics (ie: step count, meal logs, exercise logs, number of weigh-ins, number of articles read, number of coach messages, and group posts). Their usage is then compared to a set of predefined thresholds, developed based on phase 1 research results, the average usage of Noom's historical cohort, and assigned an adherence score of low or high. (Refer to MCIT Documentation in appendices)

During phase 2, all participants will receive tailored text messages based on the adherence scores through PAMS. We will ask participants to provide feedback on the messages they receive as part of the project using two separate methods: (1) through two-way text messaging, during which they can respond to the text message directly through SMS and (2) during quarterly follow up interviews. Based on their feedback, we will further deduce patterns in ddpp usages, and further tailor messages to impact engagement(Screenshots are provided via "Sample Messages" in appendices). Additionally, In order to assess any barriers to behavior change as proposed by this study, the team will administer behavioral change assessments based on the COM-B framework, to the study participants via RedCap. (surveys attached)

Provider Participants for Phase 2: Formative observations and short interviews will be conducted with providers at each pilot clinic once sufficient patients from that site have enrolled in the dDPP to allow interaction with the new interface tool – PCP dashboard. This phase of testing will further examine impacts on workflow, usability issues, and potentially lead to additional refinements.

The PCP dashboard will provide clinicians with quantitative assessments of the extent to which patients are adhering to their ddpp program via the Noom app, as well as their self-reported in-app health outcomes.. Providers will be able to access reports of patients' reports during visits with the patient or asynchronously to track patients' progress between visits. We will encourage providers to use the reports to support patient engagement and shared decision-making in the clinic visit, set priorities for the visit, and discuss trends in their behavioral and clinical outcomes. Prior to the initiation of the trial, all participating PCPs will receive standardized training on how to utilize the provider dashboard as well as best practices for patient-centered discussions of the data visualizations.

Phase 3: RCT

Once the intervention has been tested and refined in the pilot NYU Langone clinics, the third phase of the study will recruit practices and patients for the full-scale clinical trial. The intervention will be rolled out to additional ambulatory sites in a randomized control trial. The intervention patients will receive the dDPP, messaging support system, and their providers will have access to the adapted dDPP-EHR tool suite from the previous two phases, while the control patients will only receive the dDPP via mobile application (not integrated into the EHR). The overall outcomes of this phase will be both clinical (i.e. weight reduction, physical activity, HbA1C levels) and engagement-related (i.e. patient engagement and perceived provider involvement).

All participants in this phase will receive access to the ddpp program. As in phase 2, during their participation in the program, the study team will review their engagement metrics, and based on an algorithm determined from phase 1 and phase 2 research, the participant's adherence scores will be calculated.

Patient participants randomized to the intervention arms will receive tailored text messages based on the study algorithm. Their providers will also have access to the EHR provider dashboard which can be reviewed during the patient visits, and improve patient-provider relationship. Participants randomized to intervention arm 2 will be given the option to choose the time of day they receive messages and frequency of reminder to use noom. Intervention arm 1 will be sent the messages and reminders at a set time.

Additionally, In order to assess any barriers to behavior change as proposed by this study, the team will administer behavioral change assessments based on the COM-B framework to the study participants via RedCap (surveys attached). Participants will also be asked to complete interviews at baseline, and follow up interviews at 6 months, 12 months, and 18 months where they will be queried about their experiences using the ddpp app and the messaging support tool over the past 12 months and recommendations for improvements.

Provider participants will receive requests to complete an exit survey where they will be queried about their experiences with the dashboard tool and other study components.

6.1.1 Administration of Intervention

Patient participants:

Due to COVID-19 and to keep the safety of both our research team and research subjects, both phase 2 and 3 interventions will be delivered online and through text messaging. Potential participants will be recruited via mychart messages, emails, phone calls and in-person. Those interested in the study will be scheduled for a virtual enrollment session over a video call during which they will be consented, and then onboarded into the study. After going over the informed consent via video call, research staff will also send the consent via a RedCap link where the participant has the opportunity to read the consent and sign electronically, confirming that they read and understood the consent. Research staff will also document on RedCap the time and date of the telephone consent and note that the consent process was done via telephone due to COVID-19.

During the enrollment, participants will receive education regarding the research study, the participant's responsibilities, and guidance on enrolling into the Noom ddpp program via phone app, tracking physical activity and linking via fitbit or ihealth tracker and fitbit or ihealth scale. They will also receive guidance on how to utilize the A1c self check kit.

6.1.2 Procedures for Training Interventionalists and Monitoring Intervention Fidelity

Study staff will be thoroughly trained to recruit and assess eligibility of subjects as well as assist with enrollment and onboarding of the study participants. Study staff will be trained in collecting data on the redcap data base during the interviews with participants.

6.1.3 Assessment of Subject Compliance with Study Intervention

Subject data will be captured and securely stored on NYULH enterprise supported Redcap. The study staff will send Redcap surveys at indicated time points to the study participants. The participants will be reminded twice to complete the survey via text message or redcap generated email. Additionally, study compliance will be assessed by reviewing ddpp-related engagement data and activity

7 Study Procedures and Schedule

7.1 Study Procedures/Evaluations

Phase 2: Pilot Testing
The pilot testing phase of the study will be to pilot the adapted dDPP tool suite in NYU Langone clinics to account for real-world settings (i.e. provider/patient interaction with the updated tool).

Early formative observations/short interviews will be conducted with providers in the care teams at each pilot clinic once sufficient patients from that site have enrolled in the dDPP to allow interaction with the new interface tool. This phase of testing will further examine impacts on workflow, usability issues, and potentially lead to additional refinements.

The patient participants in Phase 2 will receive text messages via their mobile smart phone, and will be requested to completed assessments via Redcap surveys and interviewed quarterly over the course of the study.

Phase 3: RCT
Once the intervention has been tested and refined in the NYU Langone clinics, the next phase of the study will be to recruit practices and patients for the full-scale clinical trial. The intervention will be rolled out to additional sites in a randomized control trial. The intervention patients will receive the dDPP, text messaging support and their providers will have access to the adapted dDPP-EHR tool suite from the previous two phases, while the control patients will only receive the dDPP via mobile application (not integrated into the EHR). The overall outcomes of this phase will be both clinical (i.e. weight reduction, physical activity, HbA1C levels) and engagement-related (i.e. patient engagement and perceived provider involvement).

The patient participants in Phase 3 will be randomized into intervention arm 1 or intervention arm 2 or control group. Those in the intervention group will receive text messages via their mobile smart phone. All participants will be part of the dDPP/ Noom program, and will be interviewed at baseline, 6 months, and 12 months over the course of the study. Participants randomized to intervention arm 2 will be given the option to choose the time of day they receive messages and frequency of reminder to use noom. Intervention arm 1 will not be given that option.

The provider participants in Phase 3 will receive requests to complete an exit survey where they will be queried about their experiences with the dashboard tool and other study components.

7.1.1 Study Specific Procedures

For Phase 2:

We will be conducting a 1 time survey with providers.

We will be doing the following procedures for patients:

1. Screen potential patients to determine medication history of pre-diabetes
2. Consent patient and collect Initial assessments (demographics, behavioral questionnaires: eHEALS, ATMS time management, WHOQL-BREF, GSE, Digital ID)
3. Onboard patient into Noom and Fitbit or ihealth accounts, and provider overview of study
4. Follow up interviews regarding study experience in research study regarding text messages, Noom experience, and patient-provider relationship at week 1, months 1, 3, 6, 12, 18.
5. COMB questionnaires at week 1, months 1, 3, 6, 12, 18.
6. Patient related costs will also be assessed at 12 months

For phase 3, we will be completing the same study procedures with the patients as phase 2.

7.1.2 Standard of Care Study Procedures

7.2 Laboratory Procedures/Evaluations

Not applicable.

7.3 Study Schedule

For provider participants in phase 2, they will have multiple interviews regarding the ddpp provider dashboard.

The following schedule is for patient participants in both phase 2 and phase 3. Patient participants in the control arm in phase 3 will not be asked about personalized messages through PAMS.

7.3.1 Screening

Provider participants:
Screening Visit (Day -14 to -1)
Eligible participants will be identified through each clinical practice, based on inclusion and exclusion criteria provided at onset of study.

Patient Participants:
Screening Visit (Day -14 to -1)

- Review medical history and demographics to determine eligibility based on inclusion/exclusion criteria.
- Send out recruitment message through mychart to potential participants
- Schedule study visits for participants who are eligible and available for the duration of the study.
- Provide participants with consent form via redcap link to review prior to study, and pre-enrollment questionnaire (Refer to appendices)

7.3.2 Enrollment/Baseline

Provider participants:
Enrollment/Baseline Visit. At the baseline visit, the study team will come to the clinic, describe the study, answer questions, and obtain consent from providers interested in participating. Specific visit components are described below.

- Verify inclusion/exclusion criteria.

- Provide study overview to potential provider participants.
- Obtain verbal consent from participating providers.
- Collect basic information about clinical functions and provider workflow.

Patient Participants:
Enrollment/Baseline Visit (Visit 1, Day 0)

- Obtain informed consent of potential participant verified by signature on study informed consent form.
- Verify inclusion/exclusion criteria.
- Collect Initial assessments (demographics, behavioral questionnaires: eHEALS, ATMS time management, WHOQL-BREF, GSE, Digital ID)
- Provide overview of study
- Provider and review onboarding documents for Noom and Fitbit or ihealth accounts

7.3.3 Intermediate Visits

7.3.3.1 Provider participants:

Workflow Analysis Stage. We anticipate that workflow analysis will require at least one visit to each of the sites. These visits will involve direct and indirect observation of the providers in the usual setting and documentation of existing workflow, to obtain input on possible improvements in workflow. Providers may be interviewed in person or over video call.

Workflow adaptation and Tool User testing Stage. Providers will review the EHR ddpp provider dashboard and provide feedback on the tool's design and implementation with pre-diabetic patients using ddpp.

Live usability Testing. The next step will be the think-aloud and near-live usability observation and analysis. The final step in this stage will involve pilot testing the adapted pcp-dashboard to observe and analyze the live-usability outputs. Feedback from each of these stages will be iteratively consolidated and incorporated to ensure and optimized tool. Specific components are described below.

- Structured workgroup review process
- Presentation and evaluation of specific tool use-cases
- Creation of optimization recommendations by research team
- Revision of recommendations by providers with modified workflow diagrams.
- Identification of workflow variation and discussion of candidate workflows

7.3.3.2 Patient Participants

Visit 2 (Between Week 1 and 2)

- Follow up interview regarding week 1 experience
- Technical trouble shooting as needed

Visit 3, 4, 5, 6 (Month 1, Month 3, Month 6, Month 12)

- Follow-up assessments (COMB questionnaires and follow up regarding experience in research study regarding text messages through PAMS (Phase 2 and Phase 3 intervention patient participants), Noom experience, associated costs and patient-provider relationship)

7.3.4 Final Study Visit

Provider participants: The final visit will be a short encounter to provide a summary of the tool development, usability etc., as well as exit-interview discussion with participants

Patient participants: Final Study Visit (18 month visit) Follow up questionnaires (COMB, experience after Noom)

7.3.5 Withdrawal Visit

In the event that involuntary withdrawal data collection will cease at the time of withdrawal. Data up until the point of withdrawal will be used in the analysis.

7.3.6 Unscheduled Visit

Visits will always be scheduled.

7.4 Concomitant Medications, Treatments, and Procedures

Not applicable

7.5 Justification for Sensitive Procedures

Not applicable

7.5.1 Precautionary Medications, Treatments, and Procedures

Not applicable

7.6 Prohibited Medications, Treatments, and Procedures

Not applicable

7.7 Prophylactic Medications, Treatments, and Procedures

Not applicable

7.8 Participant Access to Study Intervention at Study Closure

Participants may have continued access to the ddpp dashboard and ddpp program through Noom if the tool is adopted into the clinic EHR system

8 Assessment of Safety

8.1 Specification of Safety Parameters

To prevent and/or minimize any potential risks or discomfort, prior to beginning this study, the research team will read the study protocol and be thoroughly trained on the appropriate conduct of the recruitment, consent, enrollment, health education delivery and follow up procedures. They will be required to demonstrate comprehension of aforementioned procedures through a series of question and answer sessions with study staff before going into the field. If subjects sustain any injury during the course of the research or experience any side effect to a study treatment, they will contact the Principal Investigator, Dr. Devin Mann; contact information will be provided to participants as part of the consent process. If such a complication arises, the study doctor will assist subjects in obtaining appropriate medical treatment, but this study does not provide financial assistance for medical or other injury-related costs.

8.1.1 Definition of Adverse Events (AE)

An ***adverse event*** (AE) is any symptom, sign, illness or experience that develops or worsens in severity during the course of the study. Intercurrent illnesses or injuries should be regarded as adverse events. Abnormal results of diagnostic procedures are considered to be adverse events if the abnormality:

- results in study withdrawal
- is associated with a serious adverse event
- is associated with clinical signs or symptoms

- leads to additional treatment or to further diagnostic tests
- is considered by the investigator to be of clinical significance

8.1.2 Definition of Serious Adverse Events (SAE)

Serious Adverse Event
Adverse events are classified as serious or non-serious. A ***serious adverse event*** is any AE that is:

- fatal
- life-threatening
- requires or prolongs hospital stay
- results in persistent or significant disability or incapacity
- a congenital anomaly or birth defect
- an important medical event

Important medical events are those that may not be immediately life threatening, but are clearly of major clinical significance. They may jeopardize the subject, and may require intervention to prevent one of the other serious outcomes noted above. For example, drug overdose or abuse, a seizure that did not result in in-patient hospitalization, or intensive treatment of bronchospasm in an emergency department would typically be considered serious.

All adverse events that do not meet any of the criteria for serious should be regarded as ***non-serious adverse events***.

8.1.3 Definition of Unanticipated Problems (UP)

Unanticipated Problems Involving Risk to Subjects or Others
Any incident, experience, or outcome that meets all of the following criteria:

- Unexpected in nature, severity, or frequency (i.e. not described in study-related documents such as the IRB-approved protocol or consent form, the investigators brochure, etc)
- Related or possibly related to participation in the research (i.e. possibly related means there is a reasonable possibility that the incident experience, or outcome may have been caused by the procedures involved in the research)
- Suggests that the research places subjects or others at greater risk of harm (including physical, psychological, economic, or social harm).

8.2 Classification of an Adverse Event

8.2.1 Severity of Event

For AEs not included in the protocol defined grading system, the following guidelines will be used to describe severity.

- **Mild** – Events require minimal or no treatment and do not interfere with the participant's daily activities.
- **Moderate** – Events result in a low level of inconvenience or concern with the therapeutic measures. Moderate events may cause some interference with functioning.
- **Severe** – Events interrupt a participant's usual daily activity and may require systemic drug therapy or other treatment. Severe events are usually potentially life-threatening or incapacitating.

8.2.2 Relationship to Study Intervention

The clinician's assessment of an AE's relationship to study intervention is part of the documentation process, but it is not a factor in determining what is or is not reported in the study. If there is any doubt as to whether a clinical observation is an AE, the event should be reported. All AEs must have their relationship to study intervention assessed. In a clinical trial, the study intervention must always be suspect. To help assess, the following guidelines are used.

- **Related** – The AE is known to occur with the study intervention, there is a reasonable possibility that the study intervention caused the AE, or there is a temporal relationship between the study intervention and event. Reasonable possibility means that there is evidence to suggest a causal relationship between the study intervention and the AE.
- **Not Related** – There is not a reasonable possibility that the administration of the study intervention caused the event, there is no temporal relationship between the study intervention and event onset, or an alternate etiology has been established.

8.2.3 Expectedness

Dr. Devin Mann will be responsible for determining whether an AE is expected or unexpected. An AE will be considered unexpected if the nature, severity, or frequency of the event is not consistent with the risk information previously described for the study intervention.

8.3 Time Period and Frequency for Event Assessment and Follow-Up

The occurrence of an AE or SAE may come to the attention of study personnel during study visits and interviews of a study participant presenting for medical care, or upon review by a study monitor. All AEs including local and systemic reactions not meeting the criteria for SAEs will be captured on the appropriate RF. Information to be collected includes event description, time of onset, clinician's assessment of severity, relationship to study intervention (assessed only by those with the training and authority to make a diagnosis), and time of resolution/stabilization of the event. All AEs occurring while on study must be documented appropriately regardless of relationship. All AEs will be followed to adequate resolution.

Any medical condition that is present at the time that the participant is screened will be considered as baseline and not reported as an AE. However, if the study participant's condition deteriorates at any time during the study, it will be recorded as an AE. UPs will be recorded in the data collection system throughout the study.

Changes in the severity of an AE will be documented to allow an assessment of the duration of the event at each level of severity to be performed. AEs characterized as intermittent require documentation of onset and duration of each episode.

The PI will record all reportable events with start dates occurring any time after informed consent is obtained until 7 (for non-serious AEs) or 30 days (for SAEs) after the last day of study participation. At each study visit, the investigator will inquire about the occurrence of AE/SAEs since the last visit. Events will be followed for outcome information until resolution or stabilization.

All unresolved adverse events should be followed by the investigator until the events are resolved, the subject is lost to follow-up, or the adverse event is otherwise explained. At the last scheduled visit, the investigator should instruct each subject to report any subsequent event(s) that the subject, or the subject's personal physician, believes might reasonably be related to participation in this study. The investigator should notify the study sponsor of any death or adverse event occurring at any time after a subject has discontinued or terminated study participation that may reasonably be related to this study.

8.4 Reporting Procedures – Notifying the IRB

8.4.1 Adverse Event Reporting

AE's will be reported to the NYU School of Medicine IRB based on institution guidelines found here: https://med.nyu.edu/research/office-science-research/clinical-research/resources-researchers-study-teams/human-research-regulatory-affairs/nyu-school-medicine-institutional-review-boards#reportable-new-information

8.4.2 Serious Adverse Event Reporting

SAE's will be reported to the NYU School of Medicine IRB based on institution guidelines found here: https://med.nyu.edu/research/office-science-research/clinical-research/resources-researchers-study-teams/human-research-regulatory-affairs/nyu-school-medicine-institutional-review-boards#reportable-new-information

8.4.3 Unanticipated Problem Reporting

Incidents or events that meet the OHRP criteria for UPs require the creation and completion of an UP report form. It is the site investigator's responsibility to report UPs to their IRB and to the DCC/study sponsor. The UP report will include the following information:

- Protocol identifying information: protocol title and number, PI's name, and the IRB project number;
- A detailed description of the event, incident, experience, or outcome;
- An explanation of the basis for determining that the event, incident, experience, or outcome represents an UP;
- A description of any changes to the protocol or other corrective actions that have been taken or are proposed in response to the UP.

To satisfy the requirement for prompt reporting, UPs will be reported using the following timeline:

Incidents or events that meet the OHRP criteria for UPs require the creation and completion of an UP report form. It is the site investigator's responsibility to report UPs to their IRB and to the DCC/study sponsor. The UP report will include the following information:

- Protocol identifying information: protocol title and number, PI's name, and the IRB project number;
- A detailed description of the event, incident, experience, or outcome;
- An explanation of the basis for determining that the event, incident, experience, or outcome represents an UP;

- A description of any changes to the protocol or other corrective actions that have been taken or are proposed in response to the UP.

To satisfy the requirement for prompt reporting, UPs will be reported using the following timeline:

- UPs that are SAEs will be reported to the IRB and to the DCC/study sponsor within 5 days of the investigator becoming aware of the event.

- Any other UP will be reported to the IRB and to the DCC/study sponsor within 5 days of the investigator becoming aware of the problem.

All UPs should be reported to appropriate institutional officials (as required by an institution's written reporting procedures), the supporting agency head (or designee), and OHRP within 5 days of the IR's receipt of the report of the problem from the investigator.

8.4.4 Reporting of Pregnancy

Not applicable

8.5 Reporting Procedures – Notifying the Study Sponsor

The study clinician will complete a SAE Form within the following timelines:

- All deaths and immediately life-threatening events, whether related or unrelated, will be recorded on the SAE Form and submitted to the DCC/study sponsor within 24 hours of site awareness. See Section 1, Key Roles for contact information.
- Other SAEs regardless of relationship will be submitted to the DCC/study sponsor within 72 hours of site awareness.

All SAEs will be followed until satisfactory resolution or until the site investigator deems the event to be chronic or the adherence to be stable. Other supporting documentation of the event may be requested by the DCC/study sponsor and should be provided as soon as possible.

As a follow-up to the initial report, within the following 48 hours of awareness of the event, the investigator shall provide further information, as applicable, on the unanticipated event or the unanticipated problem in the form of a written narrative. This should include a copy of the completed Unanticipated Problem form, and any other diagnostic information that will assist the understanding of the event. Significant new information on ongoing unanticipated adverse effects shall be provided promptly to the study sponsor.

8.6 Reporting Procedures – Participating Investigators

Any adverse events will be appropriately communicated by the study team to study leadership at each of the participating institutions.

8.7 Study Halting Rules

Administration of study agent will be halted when three grade 3 AEs determined to be "probably related" are reported to the DCC. The DCC will notify the study sponsor and investigators immediately when the third grade 3 event is reported and enrollment screens will stop accepting new study participants.

8.8 Safety Oversight

It is the responsibility of the Principal Investigator to oversee the safety of the study at his/her site. This safety monitoring will include careful assessment and appropriate reporting of adverse events as noted above, as well as the construction and implementation of a site data and safety-monitoring plan. Medical monitoring will include a regular assessment of the number and type of serious adverse events.

Data Safety Monitoring (Security Risk Questionnaire can be found in the appendices)

Data Safety Monitoring Plan: Data management and security Each site will be responsible for maintaining their data and maintaining security. As a team, we intend to use standard IRB-approved and HIPAA-compliant measures to maintain confidentiality, privacy and data security. Data privacy and security procedures will include: a) training staff on data sensitivity and protocols for safeguarding confidentiality; b) storing and processing sensitive hardcopy in a secured, centralized location; c) securing sensitive hardcopy in locked files when not in use; d) removing names, addresses, and other direct identifiers from

hardcopy and computer-readable data when they are no longer necessary for patient tracking and then using encrypted codes for subsequent identification of participants; e) destroying all identifiable linkages to data after data accuracy has been verified and final analyses have been completed; f) using restricted logon identification and password protection computer protocols for all computerized entry, retrieval, and analysis. Participant safety and plan for detecting issues and minimizing participant risk during study Participants will be at minimal risk and have the right to withdraw from the study at any time. All identifiable information will be maintained by the investigators. The principal investigators and project managers at all sites will be responsible for monitoring the scientific integrity and participant safety for the full duration of the study. They will meet weekly to discuss the progress of the study. The proposed study will use survey instruments and EHR tools that are similar to those developed by the investigators in a previous study. We do not anticipate any significant physical, psychological, or social risk to the study patients. All risks and benefits of participation will be explained to participants and included in the written informed consent forms. The only adverse event that can be experienced in this study is a break in confidentiality of study participants. Any adverse events will be reported to the IRB as required.

9 Clinical Monitoring

Clinical site monitoring is conducted to ensure that the rights and well-being of human subjects are protected, that the reported trial data are accurate, complete, and verifiable, and that the conduct of the trial is in compliance with the currently approved protocol/amendment(s), with GCP, and with applicable regulatory requirement(s).

- Monitoring for this study will be performed by Dr. Devin Mann and Dr. Katharine Lawrence.
- Centralized monitoring will be performed throughout the study to ensure comprehensive data verification of endpoints, safety, and the distribution of monitoring reports
- Study staff will perform internal quality management of study conduct, data collection, documentation and completion.

10 Statistical Considerations

For phase 2:
Successful adaptation will be measured on three levels: user-centered adaptation, technical integration, and workflow integration. Successful user-centered adaptation will be defined by qualitative analysis of the stakeholder interviews, usability testing, and evaluation of the adaptation design document. Key domains for evaluation will include: alignment with providers and organizational practices, perceptions of tool relevance, and feasibility of PAMS. Successful technical integration will be determined by the site's EHR team, who will test the reliability of the ddpp provider dashboard tool within the local EHR environment. Workflow integration will be evaluated via the "near live" usability. This data will be used to drive refinement of the tool during piloting. Using EHR reporting systems, reports will be built to assess provider dashboard use at each site. EHR reports will also be used to determine need for additional clinical care by clinic, urgent care or emergency department visits for pre-diabetes management.

For phase 3 RCT, please see the following sections.

10.1 Statistical and Analytical Plans

For phase 3:

We will conduct a 1-year pragmatic patient-level randomized trial comparing primary care practices (400 patients across multiple NYU Langone Health clinics) using: 1) the dDPP and 2) the dDPP + the dDPP-EHR tool suite.

10.2 Statistical Hypotheses

Our primary hypothesis is that patients receiving the dDPP + the dDPP-EHR tool suite will have greater reduction in weight loss, greater increase in physical activity, and greater reduction in HbA1c.

Our secondary hypothesis is that patients receiving the dDPP + the dDPP-EHR tool suite will show higher engagement, assessed by number of logins and lessons completed. They will also report higher perceived provider involvement.

Our exploratory hypothesis posits that patients who engage more fully with the dDPP may engage in healthy behaviors more than those who are less engaged, which should lead to better weight loss outcomes. Hence, we hypothesize that patient engagement level can mediate the relationship between intervention and improvement in patient health outcome.

10.3 Analysis Datasets

Our primary analyses will use intention-to-treat (ITT) analysis dataset of all randomized participants. Participant baseline demographics and clinical characteristics will be collected. Repeated measurements of participant weight, physical activity, and HbA1c level at baseline, 6 and 12 months from baseline, and patient engagement and perceived provider involvement at 6 and 12 months from baseline will also be collected. Long-formatted data will be stored and analyzed.

10.4 Description of Statistical Methods

10.4.1 General Approach

The study trial will utilize a patient-level randomized design, with 1:2 randomization of 432 patients from FGP clinics. Analyses will proceed under the intention-to-treat principle. The distribution of primary and other variables for enrolled patients will be summarized and compared by treatment group. Means and standard deviations will be calculated for continuous variables. Counts and frequencies will be calculated for categorical variables. The comparison of distributions by treatment group will be conducted by the independent two-sample t-test for continuous variables and the Chi-square test for categorical variables. We will use generalized estimating equations (GEE) to compare treatment arms with time as a fixed effect and practice as a random effect, to adjust for clustering of patients within practices; a major advantage of GEE is the sandwich variance estimator that is asymptotically robust to misspecification of the correlation structure. We will also report the intra-cluster correlation and time effect from the fitted model. For the second outcome of 7% weight-loss achievement, we will use a similar GEE model with a logit link function. Missing data frequently occur in pragmatic clinical trials with long follow-up. Standard GEE will be unbiased only if data are missing completely at random, which rarely occurs in practice. Thus, we will apply weighted GEE to accommodate the more realistic missing at random assumption. Due to the large number of clinics, providers, and patients, we expect balance by study arm over patient, provider, and clinic characteristics. In case of imbalance, however, we will investigate propensity score weighting to adjust the observed differences. In addition to estimating the effect of the dDPP on weight loss directly, we will explore the extent to which engagement with the program acts as a mediator. We will examine differences primary

outcomes and engagement measures using sex as a biological variable. Mediation analysis is a recommended approach to test potential causal pathways to support plausibility of outcome effects being causally associated with select interventions. We posit that those who engage more fully with the dDPP may engage in healthy behaviors more than those who are less engaged, which should lead to better weight loss outcomes. Here, we propose using a single mediator causal model approach with bootstrap-derived confidence intervals to measure dDPP effect on weight loss through the specific mechanism of patient engagement. The statistical programming language R will be used for all analyses and statistical significance will be defined using two-sided tests with alpha=0.05.

10.4.2 Analysis of the Primary Efficacy Endpoint(s)

The table below outlines the study's main outcomes. Whenever possible, outcomes ascertained via automated or technology-facilitated objective approaches are used to enhance the pragmatic approach and minimize provider and patient burden; while weight and activity data will be collected more frequently (and be viewable to intervention patients and providers), 6- and 12- month assessments will be used to evaluate impact. To ensure data endpoint capture for weight and physical activity at 6 and 12 months, the study team will conduct outreach and troubleshoot with patients missing data at any of these intervals.

Construct	Measure	Data Source	Collected at (months)
Clinical outcomes	Weight reduction (kg)	Noom via wireless scale and survey, EHR	Baseline, 3, 6, 9, 12
	Physical activity (steps/day)	Noom via wireless pedometer	Baseline, 6, 12
	Hemoglobin A1C (%)	HbA1C home test kit and survey, EHR	Baseline, 6, 12
Engagement outcomes	Patient engagement (# dDPP logins) (# dDPP lessons completed) Perceived provider involvement with dDPP progress	Noom Patient portal 1-item survey	6, 12
Patient characteristics	Demographics, social determinants, and other baseline descriptive data	EHR	Baseline, 12

Change in body weight, a repeatedly measured continuous variable, will be our primary weight-based outcome. Secondarily, we will assess achievement of a 7% weight loss (the DPP weight goal), a binary outcome. Weight will be collected from the bluetooth linked wireless weight scale (Fitbit Aria or iHealth Fit/Nexus) that automatically reports weigh-ins to the Noom server. Mean steps per day, a repeatedly measured continuous variable, will be assessed using Fitbit or iHealth accelerometers integrated into the Noom platform. This objective device has been well-validated for the measurement of steps and found to be acceptable by study participants. HbA1C, the most common test used for prediabetes monitoring, will be assessed as a secondary outcome via HbA1C testing performed at home. HbA1C will be collected at baseline, 6 and 12 months. Patients will be sent a HbA1C testing kit upon enrollment, and prompted by

the study team at each time point to complete testing. HbA1C testing kits have been shown in prior studies to be safe and equivalent to laboratory testing, and are increasingly used in pragmatic digital studies to avoid unnecessary burden on participants.

For continuous outcomes including weight reduction, mean steps per day, and reduction in HbA1C level, we will use generalized estimating equations (GEE) to compare treatment arms with time and intervention as a fixed effect and practice as a random effect, to adjust for clustering of patients within practices. Participant demographic characteristics including age, gender, race/ethnicity and other potential confounders determined as a priori will be controlled for in GEE. We will also collect patient characteristics, such as demographic information, social determinants, and other baseline descriptive data, from the EHR. For the second outcome of 7% weight-loss achievement, we will use a similar GEE model with a logit link function. We will report the estimated effect of intervention and its associated 95% confidence interval calculated by using the robust variance estimator. We will also report the intra-cluster correlation and time effect from the fitted model.

Missing data frequently occur in pragmatic clinical trials with long follow-up. To supplement missing HbA1C and weight data from patients, we will conduct EHR data extractions. Our data analyst will run a query based on the appropriate time windows per patient to pull values and dates for HbA1C and weight, respectively. Standard GEE will be unbiased only if data are missing completely at random (MCAR), which rarely occurs in practice. Thus, we will apply weighted GEE to accommodate the more realistic missing at random (MAR) assumption. Due to the large number of clinics, providers, and patients, we expect balance by study arm over patient, provider, and clinic characteristics. In case of imbalance, however, we will investigate propensity score weighting to adjust the observed differences.

10.4.3 Analysis of the Secondary Endpoint(s)

Secondary endpoint is patient engagement defined as dDPP utilization, which serves as the key mediator. Patient engagement will be measured using data on logins and lesson completion from the Noom platform, and perceptions of provider involvement. Mean logins and lesson completion are both continuous variables measured at 6 and 12 months from baseline. Patient perceived provider involvement will be measured using a single item survey inspired by validated patient satisfaction instruments and delivered via the NYU patient portal.

We will utilize a linear mixed-effect model or GEE to examine the association of intervention with patient engagement and associations of patient engagement with concurrent or lagged clinical outcomes, with practice as a random effect. If significant associations were found, we will explore the extent to which engagement with the program acts as a mediator. We posit that those who engage more fully with the dDPP may engage in healthy behaviors more than those who are less engaged, which should lead to better weight loss outcomes. Here, we propose using a single mediator causal model approach with bootstrap-derived confidence intervals to measure dDPP effect on weight loss through the specific mechanism of patient engagement.

We will also examine differences in primary outcomes and engagement measures using sex as a biological variable. Techniques used to deal with missing data and potential imbalance between treatment arms will be similar to that in the analysis of primary endpoints.

10.4.4 Safety Analyses

We will periodically review participant records and report hospitalizations and deaths.

10.4.5 Adherence and Retention Analyses

Adherence and retention will be assessed using the engagement metrics described above.

10.4.6 Baseline Descriptive Statistics

The distribution of baseline demographics and clinical outcomes will be summarized and compared by treatment group. Means and standard deviations will be reported for continuous variables. Counts and percentages will be reported for categorical variables. The comparison of distributions by treatment group will be conducted by the two-sample independent t-test (or its non-parametric counterpart, the Wilcoxon's rank-sum test, as appropriate) for continuous variables and the chi-square test (or the Fisher's exact test, as appropriate) for categorical variables.

10.4.7 Planned Interim Analysis

No formal interim analyses are planned.

10.4.8 Additional Sub-Group Analyses

No sub-group analyses are planned.
The primary endpoint of weight loss will be analyzed using a two-sided Type I error rate of 0.05. Other outcomes are considered secondary outcomes and no adjustment is required.

10.4.9 Multiple Comparison/Multiplicity

We will start with univariate analysis of associations of intervention with each clinical and engagement outcome measured at 6 and 12 months. This enables us to see if effect of intervention clinical and engagement outcomes changes with time. If so, we may consider including interaction terms between intervention and time in GEE. We will also examine potential heterogeneity of intervention effect by participant baseline demographics and clinical measures by running stratified GEE. Other potential analyses of interest could be the analysis of association between changes in engagement and changes in clinical outcomes over time.

10.4.10 Exploratory Analyses

We will start with univariate analysis of associations of intervention with each clinical and engagement outcome measured at 6 and 12 months. This enables us to see if effect of intervention clinical and engagement outcomes changes with time. If so, we may consider including interaction terms between interventions and time in GEE. We will also examine potential heterogeneity of intervention effect by participant baseline demographics and clinical measures by running stratified GEE. Other potential analyses of interest could be the analysis of association between changes in engagement and changes in clinical outcomes over time.

10.5 Sample Size

The primary hypothesis is whether weight change among patients affiliated with practices enabled with the dDPP-EHR tool suite is significantly different from weight change in patients using the dDPP in conjunction with usual care. Based on the ~40% increase in dDPP lesson completion (17 vs 12) among patients reporting high levels of provider engagement (post hoc analysis conducted by Dr. McTigue on her GOALS dDPP), we estimated a range of expected effect sizes from 20-60% in lesson completion in the dDPP-EHR intervention arm (approximately equivalent to completing 2-8 more Noom dDPP lessons). We estimate that this increased lesson completion will translate into at least an additional 2.0 kg of weight loss in the intervention (dDPP-EHR) arm, a conservative estimate considering Noom's dDPP trial observed a 4 kg of weight loss difference (6.6 vs 2.4 kg) with the completion of 6 additional dDPP lessons and GOALS noted a 2.5 kg weight loss difference with 5 additional lessons completed. We estimate the 1 year weight loss will be 4.5 kg and 2.5kg for the dDPP-EHR and dDPP alone approaches, respectively. This is also conservative compared to the 6.2 vs 3.7 kg weight loss difference observed in the post-hoc analysis of GOALS dDPP participants reporting high vs. low provider engagement without any data integration (and the presumed enhanced lesson completion it would facilitate). We also assume a standard deviation of weight loss (at 1 year) of 5 kg based on data from Noom and another GOALS dDPPs. Empirical EHR data indicate that the average annual number of distinct eligible patients is approximately 200 per clinic. The proposed study sample provides 97% power to detect a conservative estimate of 30% increase in Noom dDPP session completion and a 2kg increased 12-month weight loss in the intervention arm if we have 200 patients/arm (a

conservative recruitment goal considering our prior experience). The same sample provides 93% power to detect a difference of 1.75 kg between arms. As an additional sensitivity analysis, we also calculated estimated power if only 80% of the anticipated patients/clinic and clinics/arm were collected (i.e., 160 patients/arm). This sample still provides 94% power to detect the expected difference of 2 kg between arms. Therefore, we expect to have adequate statistical power to detect a range of differences between arms (assuming two-sided tests with significance level of alpha = 0.05).

10.6 Measures to Minimize Bias

10.6.1 Enrollment/Randomization/Masking Procedures

Neither patients nor providers will be blinded for practical reasons.

11 Source Documents and Access to Source Data/Documents

Source data is all information, original records of clinical findings, observations, or other activities in a clinical trial necessary for the reconstruction and evaluation of the trial. Source data are contained in source documents. Examples of these original documents, and data records include: hospital records, clinical and office charts, laboratory notes, memoranda, subjects' diaries or evaluation checklists, pharmacy dispensing records, recorded data from automated instruments, copies or transcriptions certified after verification as being accurate and complete, microfiches, photographic negatives, microfilm or magnetic media, x-rays, subject files, and records kept at the pharmacy, at the laboratories, and at medico-technical departments involved in the clinical trial.

The study case report form (CRF) is the primary data collection instrument for the study. All data requested on the CRF must be recorded. All missing data must be explained. If a space on the CRF is left blank because the procedure was not done or the question was not asked, write "N/D". If the item is not applicable to the individual case, write "N/A". All entries should be printed legibly in black ink. If any entry error has been made, to correct such an error, draw a single straight line through the incorrect entry and enter the correct data above it. All such changes must be initialed and dated. DO NOT ERASE OR WHITE OUT ERRORS. For clarification of illegible or uncertain entries, print the clarification above the item, then initial and date it.

Access to study records will be limited to IRB-approved members of the study team. The investigator will permit study-related monitoring, audits, and inspections by the IRB/EC, the sponsor, government regulatory bodies, and University compliance and quality assurance groups of all study related documents (e.g. source documents, regulatory documents, data collection instruments, study data etc.). The investigator will ensure the capability for inspections of applicable study-related facilities (e.g. pharmacy, diagnostic laboratory, etc.).

Participation as an investigator in this study implies acceptance of potential inspection by government regulatory authorities and applicable University compliance and quality assurance offices.

12 Quality Assurance and Quality Control

QC procedures will be implemented beginning with the data entry system and data QC checks that will be run on the database will be generated. Any missing data or data anomalies will be communicated to the site(s) for clarification/resolution.

Following written SOPs, the monitors will verify that the clinical trial is conducted and data are generated, documented (recorded), and reported in compliance with the protocol, GCP, and the applicable regulatory requirements (e.g., Good Laboratory Practices (GLP), Good Manufacturing Practices (GMP)).

The investigational site will provide direct access to all trial related sites, source data/documents, and reports for the purpose of monitoring and auditing by the sponsor, and inspection by local and regulatory authorities.

13 Ethics/Protection of Human Subjects

13.1 Ethical Standard

The investigator will ensure that this study is conducted in full conformity with Regulations for the Protection of Human Subjects of Research codified in 45 CFR Part 46.

13.2 Institutional Review Board

The protocol, informed consent form(s), recruitment materials, and all participant materials will be submitted to the IRB for review and approval. Approval of both the protocol and the consent form must be obtained before any participant is enrolled. Any amendment to the protocol will require review and approval by the IRB before the changes are implemented to the study. All changes to the consent form will be IRB approved; a determination will be made regarding whether previously consented participants need to be re-consented.

13.3 Informed Consent Process

Eligible subjects will be consented before enrollment. A study staff will describe the nature of the study at the clinic and answer any questions. A full description of the study in clear, easy-to-understand language will be provided to the subject. Subjects will be provided ample time to review the consent form. If interest is expressed, the study staff member and subject will sign and date the consent. Informed consent will be considered an ongoing process throughout the study, and subjects' questions regarding their rights and responsibilities will be addressed whenever they occur. Subjects will be reminded that they may refuse to participate in the project or withdraw at any time without explanation, and that such an action will in no way affect their future interactions with the clinic or their physician. Consent forms will be signed virtually through Redcap due to limitation due to COVID19.

13.3.1 Consent/Assent and Other Informational Documents Provided to Participants

Consent forms describing in detail the study intervention, study procedures, and risks are given to the participant and written documentation of informed consent is required prior to starting intervention.
The following consent materials are submitted with this protocol.

- Provider verbal consent and key information sheet
- Patient full informed consent form

13.3.2 Consent Procedures and Documentation

Informed consent is a process that is initiated prior to the individual's agreeing to participate in the study and continues throughout the individual's study participation. Extensive discussion of risks and possible benefits of participation will be provided to the participants and their families. Consent forms will be IRB-approved and the participant will be asked to read and review the document. The investigator will explain the research study to the participant and answer any questions that may arise. All participants will receive a verbal explanation in terms suited to their comprehension of the purposes, procedures, and potential risks of the study and of their rights as research participants. Participants will have the opportunity to carefully review the written consent form and ask questions prior to signing. The participants should have

the opportunity to discuss the study with their surrogates or think about it prior to agreeing to participate. The participant will sign the informed consent document prior to any procedures being done specifically for the study. The participants may withdraw consent at any time throughout the course of the trial. A copy of the signed informed consent document will be given to the participants for their records. The rights and welfare of the participants will be protected by emphasizing to them that the quality of their medical care will not be adversely affected if they decline to participate in this study.

A copy of the signed informed consent document will be stored in the subject's research record. The consent process, including the name of the individual obtaining consent, will be thoroughly documented in the subject's research record. Any alteration to the standard consent process (e.g. use of a translator, consent from a legally authorized representative, consent document presented orally, etc.) and the justification for such alteration will likewise be documented.

13.4 Posting of Clinical Trial Consent Form

The informed consent form will be posted on the Federal website after the clinical trial is closed to recruitment, **and no later than 60 days after the last study visit by any subject**, as required by the protocol.

13.5 Participant and Data Confidentiality

Information about study subjects will be kept confidential and managed according to the requirements of the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Those regulations require a signed subject authorization informing the subject of the following:

- What protected health information (PHI) will be collected from subjects in this study
- Who will have access to that information and why
- Who will use or disclose that information
- The rights of a research subject to revoke their authorization for use of their PHI.

In the event that a subject revokes authorization to collect or use PHI, the investigator, by regulation, retains the ability to use all information collected prior to the revocation of subject authorization. For subjects that have revoked authorization to collect or use PHI, attempts should be made to obtain permission to collect at least vital status (i.e. that the subject is alive) at the end of their scheduled study period.

Participant confidentiality is strictly held in trust by the participating investigators, their staff, and the sponsor(s) and their agents. This confidentiality is extended to cover testing of biological samples and genetic tests in addition to the clinical information relating to participants. Therefore, the study protocol, documentation, data, and all other information generated will be held in strict confidence. No information concerning the study or the data will be released to any unauthorized third party without prior written approval of the sponsor.

The study monitor, other authorized representatives of the sponsor, or representatives of the IRB may inspect all documents and records required to be maintained by the investigator, including but not limited to, medical records (office, clinic, or hospital) and pharmacy records for the participants in this study. The clinical study site will permit access to such records.

The study participant's contact information will be securely stored at each clinical site for internal use during the study. At the end of the study, all records will continue to be kept in a secure location for as long a period as dictated by local IRB and Institutional regulations.

Study participant research data, which is for purposes of statistical analysis and scientific reporting, will be transmitted to and stored at the NYU Langone research drive. The study data entry and study

management systems used by clinical sites and by <specify name of Coordinating Center> research staff will be secured and password protected. At the end of the study, all study databases will be de-identified and archived at the <specify name of Coordinating Center>.

To further protect the privacy of study participants, a Certificate of Confidentiality will be obtained from the NIH. This certificate protects identifiable research information from forced disclosure. It allows the investigator and others who have access to research records to refuse to disclose identifying information on research participation in any civil, criminal, administrative, legislative, or other proceeding, whether at the federal, state, or local level. By protecting researchers and institutions from being compelled to disclose information that would identify research participants, Certificates of Confidentiality help achieve the research objectives and promote participation in studies by helping assure confidentiality and privacy to participants.

13.5.1 Research Use of Stored Human Samples, Specimens, or Data

Stored data will be used only for purposes of analysis within the context of this study. There are no human samples or specimens collected, and all electronic data will be collected and management as outlined in section 13. Data will be stored using codes assigned by the investigators.

Research data (including surveys and interviews, AEs, concomitant medications, and expected adverse reactions data) will be entered into the REDCap data capture system. The data system includes password protection and internal quality checks, such as automatic range checks, to identify data that appear inconsistent, incomplete, or inaccurate.

13.6 Future Use of Stored Specimens

Study data will not be stored for future studies.

14 Data Handling and Record Keeping

14.1 Data Collection and Management Responsibilities

To ensure confidentiality, individual subject data will be associated with an assigned identification number. Subject survey responses, if any, will also be stored on Research Electronic Data Capture (REDCap), a HIPAA compliant electronic data capture system. The assigned identification number and subject tracking information will be kept in a secure database and will only be accessible by the study team. Databases containing subject genetic and health information will be encrypted to ensure utmost confidentiality. Any additional data will be kept on the MCIT-managed network drive approved for storage of study data (“R drive”). Only investigators will have access to this data.

Data collection is the responsibility of the clinical trial staff at the site under the supervision of the site PI. The investigator is responsible for ensuring the accuracy, completeness, legibility, and timeliness of the data reported.

All source documents should be completed in a neat, legible manner to ensure accurate interpretation of data. Black ink is required to ensure clarity of reproduced copies. When making changes or corrections, cross out the original entry with a single line, and initial and date the change. DO NOT ERASE, OVERWRITE, OR USE CORRECTION FLUID OR TAPE ON THE ORIGINAL.

Copies of the electronic CRF (eCRF) will be provided for use as source documents and maintained for recording data for each participant enrolled in the study. Data reported in the eCRF derived from source documents should be consistent with the source documents or the discrepancies should be explained and captured in a progress note and maintained in the participant’s official electronic study record.

Clinical data (including AEs, concomitant medications, and expected adverse reactions data) and clinical laboratory data will be entered into REDCap, a HIPAA compliant electronic data capture system. The

data system includes password protection and internal quality checks, such as automatic range checks, to identify data that appear inconsistent, incomplete, or inaccurate. Clinical data will be entered directly from the source documents.

14.2 Study Records Retention

Study documents will be retained for the longer of 3 years after close out or 5 years after final reporting/publication. These documents should be retained for a longer period, however, if required by local regulations. No records will be destroyed without the written consent of the sponsor, if applicable. It is the responsibility of the sponsor to inform the investigator when these documents no longer need to be retained.

14.3 Protocol Deviations

A protocol deviation is any noncompliance with the clinical trial protocol, GCP, or MOP requirements. The noncompliance may be either on the part of the participant, the investigator, or the study site staff. As a result of deviations, corrective actions are to be developed by the site and implemented promptly.

These practices are consistent with ICH E6:

- 4.5 Compliance with Protocol, sections 4.5.1, 4.5.2, and 4.5.3
- 5.1 Quality Assurance and Quality Control, section 5.1.1
- 5.20 Noncompliance, sections 5.20.1, and 5.20.2.

It is the responsibility of the site to use continuous vigilance to identify and report deviations within 14 working days of identification of the protocol deviation, or within 5 working days of the scheduled protocol-required activity. All deviations must be addressed in study source documents, reported to NIDDK Program Official and NYU Langone DCC. Protocol deviations must be reported to the local IRB per their guidelines. The site PI/study staff is responsible for knowing and adhering to their IRB requirements. Further details about the handling of protocol deviations will be included in the MOP.

14.4 Publication and Data Sharing Policy

This study will comply with the NIH Public Access Policy, which ensures that the public has access to the published results of NIH funded research. It requires scientists to submit final peer-reviewed journal manuscripts that arise from NIH funds to the digital archive PubMed Central upon acceptance for publication.

The International Committee of Medical Journal Editors (ICMJE) member journals have adopted a clinical trials registration policy as a condition for publication. The ICMJE defines a clinical trial as any research project that prospectively assigns human subjects to intervention or concurrent comparison or control groups to study the cause-and-effect relationship between a medical intervention and a health outcome. Medical interventions include drugs, surgical procedures, devices, behavioral treatments, process-of-care changes, and the like. Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events. The ICMJE policy, and the Section 801 of the Food and Drug Administration Amendments Act of 2007, requires that all clinical trials be registered in a public trials registry such as ClinicalTrials.gov, which is sponsored by the National Library of Medicine. Other biomedical journals are considering adopting similar policies. For interventional clinical trials performed under NIH IC grants and cooperative agreements, it is the grantee’s responsibility to register the trial in an acceptable registry, so the research results may be considered for publication in ICMJE member journals. The ICMJE does not review specific studies to determine whether registration is necessary; instead, the committee recommends that researchers who have questions about the need to register err on the side of registration or consult the editorial office of the journal in which they wish to publish.

FDAAA mandates that a "responsible party" (i.e., the sponsor or designated principal investigator) register and report results of certain "applicable clinical trials":

- Trials of Drugs and Biologics: Controlled, clinical investigations, other than Phase I investigations of a product subject to FDA regulation;
- Trials of Devices: Controlled trials with health outcomes of a product subject to FDA regulation (other than small feasibility studies) and pediatric postmarket surveillance studies.
- NIH grantees must take specific steps to ensure compliance with NIH implementation of FDAAA.

15 Study Finances

15.1 Funding Source

NIDDK PAR18-925

15.2 Costs to the Participant

Subjects will not incur any costs as a result of participating in this study.

15.3 Participant Reimbursements or Payments

Participants only in phase 1 will receive a $40 amazon gift card for every interview that is completed. As part of the user testing iteration during phase 2, patient participants will be asked to interview at baseline, and months 1, 3, 6 and 12. In addition, patient participants in all three phases will be given a fitbit or ihealth weight scale, a fitbit or ihealth activity tracker, and a HbA1c self check kit to keep as part of the study.

Participants in phase 3 RCT will receive a $10 gift card for completing their 6 month and 12 month surveys each. In addition, we will raffle 4 $25 gift cards for each monthly cohort for completing the 6 month and 12 month surveys.

16 Study Administration

16.1 Study Leadership

The Steering Committee will govern the conduct of the study. The Steering Committee will be composed of the Study Chairman, the PI of the Coordinating Center, representatives of <sponsoring NIH IC>, the PI of the clinical sites, chairperson of the Study Coordinators subcommittee, and the PI of the Central Biochemistry Laboratory. The Steering Committee will meet in person at least annually.

17 Conflict of Interest Policy

The independence of this study from any actual or perceived influence, such as by the pharmaceutical industry, is critical. Therefore, any actual conflict of interest of persons who have a role in the design, conduct, analysis, publication, or any aspect of this trial will be disclosed and managed. Furthermore, persons who have a perceived conflict of interest will be required to have such conflicts managed in a way that is appropriate to their participation in the trial. The study leadership in conjunction with the NIDDK has established policies and procedures for all study group members to disclose all conflicts of interest and will establish a mechanism for the management of all reported dualities of interest.

Any investigator who has a conflict of interest with this study (patent ownership, royalties, or financial gain greater than the minimum allowable by their institution, etc.) must have the conflict reviewed by the NYU Langone Conflict of Interest Committee with a Committee-sanctioned conflict management plan that has been reviewed and approved by the study sponsor prior to participation in this study. All NYULMC investigators will follow the applicable conflict of interest policies.

18 References

1.Collier R. Rapid growth forecast for digital health sector. Canadian Medical Association Journal. 2014;186(4):E143-E144.
2.Dimitrov DV. Medical Internet of Things and Big Data in Healthcare. Healthcare Informatics Research. 2016;22(3):156-163.
3.Smith A. U.S. Smartphone Use in 2015. http://www.pewinternet.org/2015/04/01/introduction-20/ Accessed October 14, 2016.
4.Horrigan JB, Duggan M. Home Broadband 2015. http://www.pewinternet.org/2015/12/21/home-broadband-2015/ Accessed October 14, 2016.

19 Attachments

These documents are relevant to the protocol, but they are not considered part of the protocol. They are stored and modified separately. As such, modifications to these documents do not require protocol amendments.

- Phase 2 provider verbal consent and key information sheet
- Phase 2 Patient informed consent form
- Phase 3 Patient informed consent form
- Phase 2 and 3 recruitment scripts for patients - phone and mychart
- Provider semi-structured interview
- Prototype for provider dashboard
- Patient interviews
- Patient surveys