COVER PAGE

Protocol title: Disease Management Platform for Heart Failure (DMP-HF)

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PRINCIPAL/OVERALL INVESTIGATOR
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PROTOCOL TITLE
A novel disease management platform delivered via smartphone application for the management of patients with heart failure: pilot study

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I. SPECIFIC AIMS

Specific Aim 1: To test the feasibility of implementing the AMAZE™ disease management platform intervention after in-patient heart failure hospitalization and patient perceived value of the AMAZE™ disease management platform.

Specific Aim 2: [Exploratory] To test whether a digital health platform leads to heart failure symptom changes using the Kansas City Cardiomyopathy Questionnaire (KCCQ), patient daily log compliance, patient app usage, patient app messaging, changes in hospital readmissions and use of ancillary healthcare resources.

II. BACKGROUND AND SIGNIFICANCE

Public Health Significance

Heart failure (HF) management and readmissions remain at the top of the list of complex topics in cardiovascular medicine, in the United States. The CDC estimates 6.5 million adults in the United States have heart failure and costs in 2012 were approximately 30.7 billion dollars {Benjamin, 2019 #472}. This conversation spans across multiple sectors in our complex healthcare system; involving doctors, administrators, payors, patients and caretakers.

Current system-wide programs to curb HF-related hospital readmissions have shown inconsistent results. However, outpatient transitional care supportive programs have been linked to improved HF-related outcomes, including reduced hospital readmissions, in small studies. Small studies also indicate that remote transfer of non-invasive data through telemonitoring (e.g., blood pressure and weight) and structured telephone support may reduce hospital readmissions in a cost-effective manner. Advances in technologies, such as electronic health records (EHRs), smartphones {Chow, 2015 #475; Neubeck, 2015 #474; Hamilton, 2018 #473}, and wearable sensors {Martin, 2015 #479; McConnell, 2017 #478; Guo, 2019 #477; Perez, 2019 #476} may have prognostic implications beyond the conventional in-office clinical assessment. However, prior studies leveraging these technologies have focused on either (1) prognosis, which is often not transferable across health systems, or (2) automated risk reduction, which delivers simple therapies at scale with few personalized factors.

Current digital health endeavors have not had major successes yet for reasons including: (1) risk-averse investments; (2) key problems unaddressed, (3) lack of synergy between companies and healthcare; (4) misaligned financial incentives across patients, providers, payers, and companies; (5) the change-averse cultures and complex internal relationships of healthcare systems; (6) data interoperability that requires a long development cycle; and (7) healthcare distribution that is currently enterprise-facing and not consumer-aligned.

The present pandemic has placed significant strains on the link between clinicians and patients highlighting the need for rapid innovation for virtual care.

The primary goals of the present proposal are to demonstrate feasibility of this novel platform, to assess if the DMP can be feasibly implemented prior to hospital discharge for patients hospitalized for heart failure. This is a first necessary step before testing efficacy in a large multi-center study.

Description of AstraZeneca Platform

AstraZeneca has proposed a Disease Management Platform (DMP) to be used across multiple disease indications to provide a unified experience for the management of patients throughout their patient care journey. This DMP will integrate multiple systems, including a patient App where patients can enter mood, symptoms, weight measures, vital signs such as blood pressure (BP) and medication adherence. This input will feed directly to a clinician dashboard that will allow the clinical care team access to a real-time view of the patient's state both in and out of the clinic. An evidence generation study in patients with Heart Failure (HF) can be used to assess the implementation of the DMP in patients with HF discharged from the hospital.

AstraZeneca suggests the platform proposes to transform cardiovascular medicine by: (1) focusing on transformative development instead of just testing off-the-shelf solutions; (2) working with complex patients and data at an academic medical center who is invested in healthcare transformation; (3) amassing a diverse team of experts in cardiovascular medicine, investigation, engineering, and strategy; (4) focusing on the specific issue of HF, where current healthcare system strains are non-viable for patients, providers, and payers; and (5) improving the healthcare experience for both patients and healthcare professionals.

Patient Smartphone App

The disease management platform (DMP) was co-developed by AstraZeneca (research & development center), Gaithersburg, Maryland, USA and BrightInsight, Inc., a Silicon Valley, CA-based health care technology company. AstraZeneca aims to improve patient engagement in their health, and enable convenient, effective support by allowing for messaging between study staff and patients based on a patient's progress with their care plan. The DMP consists of a patient held smartphone App, a clinician dashboard and a suite of clinical programs embedded into EPIC electronic medical record with configurable rules. The DMP App allows enrolled patients with heart failure to record relevant symptoms, biometrics, and medication adherence, as well as access their personal health information and stay connected with their care team. Patient-provided input via the daily log and monthly surveys are available for the healthcare team to view and assess. Patients can also access curated education links, view upcoming appointments, review trends in their recorded data, and send messages to the care team. The DMP App was developed by means of user-experience and design elements to ensure ease of use for all participants. The registration process is streamlined and will only take a few minutes to set up. In addition

to requiring a password-secured account for the DMP App, patients will be encouraged to add a passcode to their mobile device for additional security during the study.

AstraZeneca Content Procurement for in App Education Feature

AstraZeneca considers the Smartphone App as "patient-support" and not 'commercial' use. All of the HF App education links are trusted and reputable third-party medical sources. See below for a list of sources; all referenced sources are cited in the references section for web content that appears in the patient smartphone App. All content has been reviewed by AstraZeneca and MGH clinical teams with a proficiency in health literacy and patient education guidelines.

Referenced sources include:

- American Heart Association (www.heart.org)
- American College of Cardiology (www.cardiosmart.org)
- Heart Failure Society of America (www.hfsa.org)

Study staff and participants will have tech support via email (amaze.support@brightinsight.com) tech support provided by BrightInsight, Inc. In addition to this participant support, additional support is provided to study staff by two identified IT professionals from LexTech.

Provider Dashboard

The clinician dashboard is also produced by BrightInsight, Inc to work in conjunction with the DMP App for patients. AstraZeneca aims to strengthen existing clinical resources and reduce the burden and time spent on patient preparation and follow-ups by surfacing real-time insights to clinical teams and providing the tools to support patients easily and efficiently. The dashboard features secure, 2-way messaging to individuals and groups of patients, enabling efficient follow-up to answer patients' questions and outreach to encourage engagement with the disease management platform. Clinicians can also reach out to patients through multi-channel communication methods, including email linked to Patient Gateway and a text chat feature in the App, to promote engagement and responses to surveys. The clinical team is alerted based on patients' survey responses and engagement patterns, allowing them to identify risks, intervene early through supportive messaging, and reduce post-admission recovery complications. In summary the goals here is to provide, the real-time information about patients' health status, combined with secure easy messaging with patients, which will enable an efficient, effective workflow for clinical teams to support patients through recovery and health maintenance.

III. RESEARCH DESIGN AND METHODS

Sample size: 70 post hospital admission at Massachusetts General Hospital (MGH), general cardiology with a diagnosis of heart failure with reduced ejection fraction (HFrEF), heart failure with moderate ejection fraction (HFmEF), or heart failure with preserved ejection fraction (HFpEF). Patients will be identified via an automated computer-based algorithm using information retrieved from electronic health records {Protocol #: 2020P002432}.

Inclusion/Exclusion Criteria for intervention study population

- **Intervention study population:** Patients 21 years and older with a diagnosis of heart failure [HFrEF(<40%), HFmEF(40-49%) HFpEF(≥50%)] admitted to MGH cardiology services (Ellison 10 and 11). Patients must have access to smartphone and email, be English speaking/reading and discharged home.

Non-recruited EHR-based control populations for the exploratory objectives for this single-arm interventional pilot:

- **Historical MGH control population:** Patients 21 years and older with a diagnosis of HF admitted to MGH cardiology services (Ellison 10 and 11) admitted in the year prior discharged home. Matched 1:2 based on age, sex, HFrEF(<40%), HFmEF(40-49%) HFpEF(≥50%), CAD, T2D, month admitted (minus 1y), number of prior 12mo hospital admissions.

- **Contemporaneous BWH control population:** Patients 21 years and older with a diagnosis of HF admitted to BWH cardiology services admitted during intervention study population enrollment and discharged home. Matched 1:2 based on age, sex, HFrEF(<40%), HFmEF(40-49%) HFpEF(≥50%), CAD, T2D, month admitted, number of prior 12mo hospital admissions.

- **Historical BWH control population:** Patients 21 years and older with a diagnosis of HF admitted to BWH cardiology services admitted in the year prior discharged home. Matched 1:2 based on age, sex, HFrEF(<40%), HFmEF(40-49%) HFpEF(≥50%), CAD, T2D, month admitted (minus 1y), number of prior 12mo hospital admissions.

Inclusion Criteria

- Adults (>21 years) admitted to MGH Cardiology services (Ellison 10 and 11) with a diagnosis of acute or chronic heart failure [HFrEF(<40%), HFmEF(40-49%) HFpEF(≥50%)] (or to BWH Cardiology services for BWH EHR-based controls)
- Has a smartphone or iPad and is willing to enter health metrics into DMP App and email willing to use for the study
- Access to the internet
- Established or with plan to establish primary cardiologist at MGH (or at BWH for BWH EHR-based controls)
- Discharged home or to self-care (with or without home services)

Exclusion Criteria

- Moderate or severe cognitive impairment
- Non-English-speaking
- Palliative management only (comfort measures)
- Does not own a smartphone or iPad (not considered for EHR-based controls)
- Incarcerated
- Enrolled in study with similar outcomes

Study Outcomes

Primary: To test the feasibility of implementing the AMAZE™ disease management platform intervention after in-patient heart failure hospitalization and patient perceived value of the AMAZE™ disease management platform. The feasibility will be measured using conversion rate (percent of patients approached who enroll on the disease management platform). The perceived value will be measured using the participants mHealth App Usability Questionnaire (MAUQ) score.

Exploratory: The following exploratory outcomes will be measured as follows:

1. Heart failure symptom changes using the Kansas City Cardiomyopathy Questionnaire (KCCQ).
    a. Heart failure symptoms will be measured as the changes in KCCQ scores between the 30 day and 60 day time-points.

2. Patient daily log compliance.
    a. Daily log compliance will be measured after 60 days using the total number of days patient completes daily log in the AMAZE™ app out of total days patient is enrolled in the app.

3. Patient app usage.
    a. Patient app usage will be measured as the number of days the patient engages (i.e. completes daily log, sends a message) with the app at least once a day during the study period.

4. Patient app messaging.
    a. Patient app messaging will be measured as the number of messages sent by the patient during the 60 day study period.

5. Changes in hospital readmissions.
    a. Hospital readmission rates in the enrolled study group will be compared to readmission rates in historical control groups.

6. Use of ancillary healthcare resources.
    a. Rates ancillary healthcare resources (i.e. emergency room visits, urgent care visits, unexpected ambulatory care visits, cardiac rehab) in the enrolled study group will be compared to rates of usage in a historical control group.

Subject Enrollment

Overview
Approximately 70 patients will be enrolled in the study. Patients admitted to MGH cardiology will be screened by study staff for inclusion/exclusion criteria. Study staff will obtain approval to approach eligible patients by the inpatient clinical team. Approximately 2-days prior to discharge, suitable patients will be consented and onboarded with study staff, with the technical support available 24/7 via email or phone through BrightInsight, Inc.

Procedure for obtaining informed consent

We will use Mass General Brigham electronic resources to identify and screen patients for the eligibility criteria listed above. Our internal (MGH) data and analytics team developed an automated process to screen and extract a list of eligible admitted patients on Ellison 10/11 through Research Patient Data Registry (RDPR) and Enterprise Data Warehouse (EDW) (IRB Protocol # 2020P002432). The list will be sent to the study staff daily; study staff will perform chart review of participants on the list to confirm eligibility.

We will focus on patients with a diagnosis of heart failure, who speak and read English.

We will also use the attached study flyer to advertise the study to patients on inpatient floors, with nurse manager approval for the respective floors.

We will create a database of potentially eligible subjects and contact their nurses to confirm eligibility and that they are suitable for the study. We will also verify that the nurse approves of a coordinator approaching their patient. A study coordinator will approach approved and eligible patients to introduce the study. The study coordinator will then review the consent form and study procedure and obtain written consent from the patient. Study coordinators will use an iPad to go over the consent form with the patient. The subject and the study coordinator will sign electronic copies of the consent form using Adobe eSign. Adobe and the iPad will be used whenever possible, but subjects also may be consented with a paper consent form. Subjects will be sent a copy of the consent form via email from Adobe, which automatically sends a pdf copy of the signed consent form to all parties, or they will be sent a scanned paper copy via the Partners send secure system. Subjects with any cognitive disability that prevents them from consenting for themselves will also prevent them from using the AMAZE application. Therefore, subjects who cannot consent for themselves will be excluded from the study. Staff will clearly explain that participation in the study is voluntary and the subject can choose to withdraw from the study at any time.

We will approach patients who are interested in joining the study but are transferred to other inpatient units for various reasons (procedures etc.) at their new location if permitted by their care team. We will verify that the patient is still interested in joining the study before consenting and onboarding them.

If we are unable to consent and/or onboard patients to the study while they are in the hospital, we will schedule a time to do so remotely using Partners Healthcare Enterprise Zoom once they have been discharged. In such cases, we will aim to enroll the patient within three days of being discharged from the hospital. With their consent, we will mail them their study devices: a blood pressure cuff and home scale. Patients can also refuse the study when talking to the research coordinator.

For enrolled subjects, we will send an email explaining the study to the subjects' outpatient cardiologist with information on how they can view the provider dashboard within EPIC. The demographics (age, sex, race/ethnicity) of those screened for our study will be collected for recruitment analyses. We will retain identifiers of screened subjects in our pre-screening log to ensure accurate recruitment of subjects and assist with algorithm development, since the algorithm developed under protocol 2020P002432 will be assessed and revised for accuracy during this study. Once the identifiable pre-screening log information is no longer needed in this study it will be stripped of all identifiers and we will only retain age, sex, and race/ethnicity

Onboarding with AMAZE application

STEP 1: Download AMAZE

- On a smartphone or iPad, patients go to IOS or Android App store and search for the AMAZE App.
- Install the AMAZE app on their smartphone or iPad.

STEP 2: Sign Up

- Open App – select **Create an account**.
- Review welcome screen with introduction to the App click **Next.**
- Pop-up appears regarding Invitation Code for the App – to be sent in email provided. Select **Okay** to continue.
- Enter your email address you would like to link to the App. Select **Continue**.
- Type in the **[PMRN]** and the **Invitation code** to sign up for an account (provided by study staff).
- Create a password and confirm password. Select checkbox next to "I have read and accept the Terms & Conditions and Privacy Policy."
    - AstraZeneca and Bright Insight will disclaim the Patient App Terms of Use and the AMAZE Privacy Policy, so they will not apply to a user of the app who is enrolled in this research study for purposes of the research.
- Add phone number (required)
- Select **Get Started.**
    - The patients will be asked daily if they took medications prescribed for Heart Failure, as part of the daily log. The list will integrate from EPIC; patients are not able to edit the medication list through the phone App.
    - They'll be prompted to accept push notifications from the App. Patients say "Yes/Accept/OK" to allow notifications for medication reminders, messages from the clinical team, and updates to instructions. These notifications will appear on the lock/home screen of the mobile device. They will never contain personal health information; they will simply prompt patients to open App for a new task, message, or instruction.

Devices

A blood pressure cuff and scale will be provided to all participants, along with instructions on how to use them.

<u>Study Procedures</u>

Study Staff and Nurse Navigator Role

A nurse navigator, with experience working with patients and cardiologists on cardiovascular disease prevention, management, and rehabilitation will also work with patients through the dashboard to promote adherence to care plans and provide support and encouragement throughout preparation and recovery. The nurse navigator will partner with research staff and the cardiology care team to ensure a seamless support system for patients. The nurse is a MGH staff who is a trained in coaching, patient

support, engagement, and encouragement. The nurse navigator builds a supportive, mentor-like partnership with the patient, fosters encouragement, goal setting and accountability to maximize engagement. The nurse sends encouraging messages and addresses patients' non-clinical and clinical needs, when possible. The nurse promotes and assists patients with adherence to completing the tasks in their DMP App including engagement in heart failure-related education, completing a daily log, monthly surveys and care team communication.

The nurse navigator partners with patients and the clinical team via the DMP dashboard messaging system. The nurse navigator facilitates triage of clinical needs and will act as a liaison between patients and the care team to bridge the gap and improve patient navigation, familiarity and stability in a complex medical system. Outgoing telephone calls to patients will be documented in EPIC as a Telephone Encounter, calls will be routed to a study physician for review and to clinical physicians when longitudinal care questions or follow-up may be indicated. The nurse operates under the supervision of MGH cardiology team of licensed physicians and nurse practitioners, and all patient communication adheres to structured protocols and guidelines set forth by MGH clinical leadership.

Clinical providers will be able to monitor the subjects' App entries within EPIC via the provider dashboard. Study staff will be able to access the Provider dashboard, the clinician messaging function will be used for study communications and clinical care team communications for Heart Failure; any clinical questions needing MD or NP expertise will be directed to the patient's cardiology team by the nurse navigator for review and feedback.

Messaging – patient ⟷ clinical care team ⟷ patient

1. The patient can only communicate to the clinical care team by writing and sending a message via the DMP HF App.
2. The patient can receive communication from the clinician care team by opening the HF app and reading any newly received messages.
3. The care team can only read and write messages back to the patient in the care team portal via the "Messages" tab. The care team cannot create a Telehealth interaction or similar from the portal. Only written messages are allowed.
4. In terms of UX, the Messaging feature for the patient functions very similar to MGB Patient Gateway but is not integrated into its in-basket feature.
5. For example, if the patient has a question, the patient will send a message to clinical care team from the App. The patient must wait for a message response. There's no "real-time" communication or chat feature.
6. A care team member won't instantly respond unless they happen to be in the portal, see the message, and respond directly

Clinical staff will be alerted within the provider dashboard when the following parameters are met, as patients enter information into their "daily log" within the HF DMP App.:

Metric	**Value with unit**	**Duration**

Medication Compliance	<75%	Over 7 days
Systolic increase	≥ 20 mmHg	Within 3 days
Systolic decrease	≥ 20 mmHg	Within 3 days
Diastolic increase	≥ 10 mmHg	Within 3 days
Diastolic decrease	≥ 10 mmHg	Within 3 days
Systolic greater than	150 mmHg	once
Systolic less than	100 mmHg	once
Diastolic greater than	90 mmHg	once
Diastolic less than	60 mmHg	once
Weight gain	3lbs or 6lbs	Within 2days or 7 days
Weight loss	6lbs	Within 7 days
# of New Symptoms	1 new symptom since previous log	once
New Shortness of Breath	At least 1 entry	Within 7 days
New Leg Swelling	At least 2 entries	Within 7 days
New Difficulty Sleeping Flat	At least 1 entry	Within 7 days
New fatigue	At least 3 entries	Within 7 days
New loss of appetite	At least 3 entries	Within 7 days
New Difficulty Concentrating	At least 3 entries	Within 7 days
New cough	At least 3 entries	Within 7 days
New weakness	At least 3 entries	Within 7 days
New Dizziness	At least 3 entries	Within 7 days
Activity	< 5 minutes total activity reported	Within 14 days
KCCQ score decrease	At least 25 points	Since previous KCCQ on file
Mood (Bad only)	At least 7 entries	Within 14 days
Heart Rate greater than	>100 bpm	once
Heart Rate less than	<60 bpm	once
Log Compliance	< 1 entry	Over 5 days

Participants will be asked and encouraged to enter information into the App daily. Information that will be entered into the App include:

- Physical well-being – How are you feeling today? [bad, okay, good]
- Medications – Have you taken all of your medications for heart failure today? [yes, no]
    - Medication list will be auto populated in the DMP App as part of the EPIC integration process. The list the patient can see in the HF DMP App will mimic what is in Patient Gateway.
- Symptoms – What symptoms do you have today? [cough, difficulty sleeping flat, dizziness, fatigue, leg/ankle/foot swelling, loss of appetite, shortness of breath, weakness, none of these]
- Activity – How active were you today? [Mild - none or <5 minutes, Moderate – 6 to >30minutes]
- Biometrics – weight, blood pressure, heart rate
- Kansas City Cardiomyopathy Questionnaire (see attachment) at 30-and 60-days

Participants without access to a home scale and/or blood pressure monitor to measure weight and blood pressure will be provided with device(s) purchased by the research study fund. Participants receiving a device will be able to keep the device(s) once the study has ended.

Participant Education Objectives and Outline

The educational components of this pilot study aim to provide key facts to individuals (and family) diagnosed with heart failure, to aide in their ability to stay active and well. Our education will focus on medication adherence, symptom recognition and management, communicating to your care team and lifestyle habits that can contribute to healthy living.

1. Participants will be able to identify the most common symptoms related to heart failure and recognize the importance of sharing specific changes in these symptoms to their doctor or care team or nurse navigator; to help with management and optimization of their disease.
2. Participants will become familiar with the names of their heart failure medications, maintain an accurate list of the medications and doses and co-create actions to ensure they take these medications daily.
3. Participants will gain knowledge about safe, regular activity and food choices that can impact their weight and heart failure symptoms.

Data Collection and Surveys

See "Study Schematic" Section for a visual overview of the study.

Patients will be surveyed for baseline demographics and study outcomes. Medical history, including labs, procedures, and diagnoses will be collected from the medical record and recorded in REDCap

At consent, subjects will be surveyed for demographics that cannot be obtained from the medical record (See "Baseline Demographics" attachment).

Quality of life will be collected through the patient-facing AMAZE app (See "KCCQ" attachment). Patient satisfaction will be collected through MAUQ (attached) administered through the app. The app will also track patient medication adherence, and facilitate symptom, blood pressure, weight, and activity tracking.

At roughly 30 days from enrollment and again at 60 days from enrollment, a research coordinator will call the patient to collect 1) current cardiac medications and any changes to medication regimen and 2) hospitalizations, ED presentations, urgent care visits, primary care or cardiology visits, and cardiac rehab enrollment at institutions outside MGB. Research coordinators will review subject medical records to determine these events at MGB.

EHR data for the control populations (MGH and BWH) will be obtained from RPDR. We may also review medical records for these patients to collect/confirm EHR data.

Optional interviews

Two rounds of interviews regarding the user experience of the AMAZE app may be conducted over the course of the study. The interview questions ask about usability and helpfulness of the app, along with the option to give feedback about technical issues and features that could use improvement. These interviews

are optional and do not affect the participants' overall participation in the study. This is reflected in the consent form, with a section allocated to participants' choice of whether they would like to be contacted for these interviews or not.

Participants who consent to being contacted for the interviews will be selected based on engagement with the app. We will measure engagement by percentage of daily log compliance over the past seven days. Participants who fill out the daily log more than half the days in a week will be classified as "engaged with the app" and those who fill out the daily log less than half the days in a week will be categorized as "disengaged with the app."

Research coordinators will conduct the two rounds of interviews at the 30- and 60-day follow-up calls respectively and record responses in REDCap. We will select four participants who are engaged with the app and one who is not to interview at their 30-day follow-up call. These same five participants will be interviewed at their 60-day follow-up call. A separate group of five participants, four who are engaged with the app and one who is not, will be interviewed only at their 60-day follow-up call.

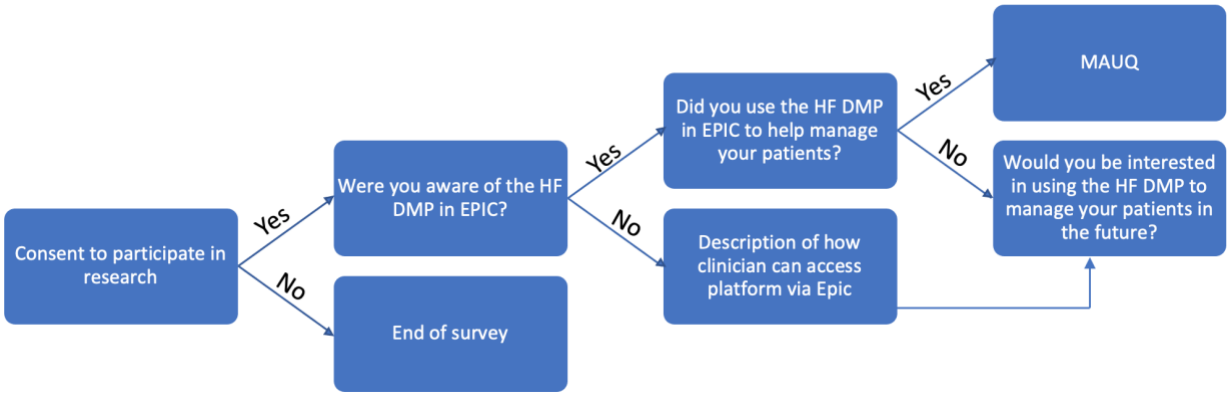
Study Closeout and Post Study Follow-up

Ongoing participation is voluntary; patients can stop using the app at any time and withdraw from the study with no associated risk. Study staff will not withdraw participants from the study based on a lack of engagement with the app. When participants withdraw or complete the study, the nurse will send patients an off-boarding summary with the most current clinical recommendations from their care team, symptom reporting tips and most current prescribed medications. We will send the off-boarding summary to patients via Patient Gateway or email.

A separate message will be sent to the cardiology care team to notify them of the participant's status change in the study. Subjects will be reminded during the 60-day phone call that they should delete the AMAZE app. For participants who do not delete the application, the ability to use the app will end once it is deactivated via BrightInsight, Inc. due to withdrawal or completion of the pilot study.

Clinician Surveying

At the close of the study (60 days) a brief survey will be sent to all MGH cardiology physicians and nurse practitioners related to knowledge of and/or use of the AZ-DMP provider platform. The survey will be sent via email with a link to complete the questions in REDCap. Since the online clinician surveying presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context, the consent procedure will include providing subjects (clinicians) with a written statement about the research followed by an option to click a button that states "I agree to participate in this research" or "I do not agree." This written statement will appear at the beginning of the REDCap survey (see "MAUQClinicianSurvey_RedCap" attachment). If the clinician chooses "I do not agree," the survey will end. If the clinician chooses "I agree to participate in this research," the survey will advance to the branching logic displayed below:



RISKS TO SUBJECTS

This study involves participant-completed measures for information purposes only; the study does not involve the use of an investigational drug or device. There are no known risks or benefits to participants. Patients may become more aware of how they feel about their condition—and how their condition may affect certain aspects of their life. Patients will be encouraged to talk with their heart failure provider about their questions or concerns. The elements of federal regulations pertaining to consent procedures, disclosure of potential risks and benefits, and patient confidentiality will be strictly observed.

Since the study involves adding a mobile health component to a treatment plan, risks posed to subjects are similar to those involved with following a HF discharge care plan. Subjects will be encouraged to contact the nurse navigator, their care team (physician or NP) with medical questions.

There is a small risk of unauthorized access of subject data in this study, which will be minimized by keeping patient health information in a secure database. Only study personnel who have undergone the proper human research training will have access to this data.

A Vendor Information Security Plan (VISP) (see "VISP_BrightInsight_Modular Final" attachment) was completed to evaluate the capacity of BrightInsight, Inc. to protect personally identifiable research data and other confidential information. In summary, BrightInsight is committed to the security and privacy of the platform and the digital solutions being built on top of the platform, whereby minimizing the risk for Astra Zeneca and Partners Health Care. To meet that end, BrightInsight has the following security and privacy certifications:

- HIPAA Compliant
- HITRUST CSF v9.1
- HITRUST Certification of the NIST Cybersecurity Framework
- ISO / IEC 27001: 2013
- EU-Swiss Privacy Shield
- Swiss-EU Privacy Shield
- GDPR Compliant
- French HDS Certification *(waiting for certificate)*

For medical appropriateness, a message does appear within the app consistent with other messaging tools instructing patients not to use the messaging system for medical emergencies. See language used below.

DISCLAIMER: Messages are not for medical emergencies. For medical emergencies call 911 immediately.

IV. PRIVACY AND CONFIDENTIALITY

Study Data

MGH
Screening and enrollment logs will be kept in the study e-regulatory binder in MGB Dropbox for Business. Study subject data will be kept in a password protected database (REDCap); subject records will be linked to unique subject IDs. Only study personnel who have undergone the proper human research training will have access to these data. Computers that will be used to access and analyze the data the data include MGB build computers, MGB Purchased Laptops, or study staff Personal Laptops encrypted to MGB standards.

Data for BWH controls will be obtained through RPDR/chart review, and stored in the study e-regulatory binder in Partners Enterprise Dropbox.

Data collected through the patient facing app that is sent to the sponsor (described below) will also be sent to MGH by BrightInsight to research staff via MGB secure file transfer https://rc.partners.org/kb/article/2729).

Sponsor
Summary metrics from recruitment data will be shared with the sponsor, including the percentage who joined the study out of those eligible, reasons patients did not join the study, and the demographics of eligible patients. Summary metrics and study results will be shared with the sponsor, but the individual level subject data collected in REDCap will not. Additionally, aggregated summary information about the controls used in the study will be shared with the sponsor, but individual-level control data will not be shared.

Data collected by the AMAZE™ app from the patient's medical record: their demographics including zip code, appointment information including dates and locations of appointments, PCP information, conditions and the dates associated with them, and their medications will be sent to the sponsor by BrightInsight. Additionally, information collected by the app directly from the app: user metrics, message information (not the content of the message), survey responses (KCCQ and MAUQ), and other tracked information: medication adherence, and facilitate symptom, blood pressure, weight, and activity tracking, will all be sent to the sponsor by BrightInsight. This information is included in the document "BrightInsight Data" attached.

V. EXPECTED BENEFITS

We hope that this study will help us better understand and improve heart failure management remotely via enhanced access to care and communication between the patient and the care team, using the patient App and provider dashboard. During the time between hospital discharge and a heart failure follow-up appointment, it is critical for patients to comply with the diet and exercise advice given to them and take their medications as prescribed. This study will help us better understand patient compliance with these activities when they leave the hospital, and guide future studies on patient mobile health application usage. We hope this study will also lead to development of better strategies to coordinate care between the time of discharge, the next follow up appointment and beyond. Potential benefits to subjects from this

study might include increased medication adherence and better adherence to health behaviors associated with decreased heart failure disease risk.

VI. POWER ANALYSIS

Our primary outcome will focus on changes in the patient's quality of life over the study period. This will be quantified by patients' Kansas City Cardiomyopathy Questionnaire scores. Using the pwr package in R, we have calculated greater than 80 percent power to detect at least a 0.40 SD change in KCCQ scores from the beginning to the end of the 60-day study period.

VII. REFERENCES

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VIII. STUDY SCHEMATIC