Title of Project: Evaluating the Effectiveness of an HIT Self---Management Program for Chronic Disease Patients

Principal Investigator and Team Members: PI: Barbara Sorondo, MD, MBA; Team Members: Amy Allen DPT, Janet Bayleran PhD, Stacy Doore MS, Samreen Fathima BDS, MPH, Lori Newcomb RN, Gail Tudor PhD, Iyad Sabbagh MD, MBA

Organization: Eastern Maine Medical Center

Inclusion Dates of Project: 07/05/2012 – 10/31/2015

Federal Project Officer: Steve Bernstein

Acknowledgment of Agency Support: Agency for Healthcare Research Quality

Grant Award Number: 5R21HS021005

1. Structured Abstract: (250 words)

Purpose: to demonstrate that the use of patient portals, will improve the care for care---managed chronic condition patients.

Scope: The project was implemented in primary care practices (PCP) with portal capable Electronic Health Records (EHR), and a nurse---lead care management program. The project aimed to: (1) Evaluate the implementation of patients entering Patient Health Information (PHI) into the EHR and communicating with providers using portals; (2) Assess the effects of portal use on healthcare utilization, patient experience and patient reported outcomes (PRO) such a: self---efficacy, health state, and functional status; and (3) Evaluate workflow implications within PCP.

Methods: A comprehensive wellness questionnaire that includes risk assessments and PRO was incorporated into the portal/EHR. Participants were enrolled and encouraged to use all portal functions including completing the wellness questionnaire at enrollment and months after.
Healthcare utilization was measured 12 months before enrollment and tracked for 12 months after. Patient experience was measured using the CG---CAPHS. Workflow implications were assessed by structured interviews and focus groups with patients and staff.

Results: 92 patients were enrolled in the study, 74 were considered users, and 90% completed a 7--- month follow---up. A total of 120 questionnaires were triaged. Follow---up data showed improvements in PRO, but only statistically significant for functional status. There were no differences in patient experience with the practice. Healthcare utilization was reduced in all groups. More than 80% of the wellness questionnaires required provider follow---up outside scheduled office visits, most commonly associated with mental health (PHQ9), physical function, fall risk, and pain.

Conclusions: Portals enable patients to enter PHI into their EHR and enhance current care management programs. However, it does not change patient experience with the PCP and their adoption is limited due to the need for changes in the PCP worklflow, perception of no direct care, and technology reliability.

Key Words: Delivery of Health Care, Patient Centered Care, Patient Care Management, Meaningful Use

2. Purpose:

The purpose of this project was to demonstrate the effectiveness of patient portals in improving the care and experience for patients with chronic conditions, and the impact of the implementation in the primary care environment. The study was implemented in two different phases. The first phase of the project had and met the following specific aims:

1. Development and implementation of the interface between the electronic health record (EHR) and the patient portal. This meant that patients were able to not only view their health record and communicate with their providers, but also transmit self---reported health information into the EHR.
2. Development of a comprehensive, self---administered, questionnaire to assess health risks and patient reported outcomes.
3. Design a primary care practice workflow associated to the patients risk level identified in the self--- reported questionnaire.
4. Provide physicians, care managers and other healthcare providers information in the use of the resulting enhanced web---based patient portal. Healthcare providers were made aware that their satisfaction with the patient portal as a way of communicating with their patients and as it affects practice workflow would be elicited at the conclusion of the study.

The second phase was the evaluation of the implementation of the patient portal which was achieved with the following specific aims:

1. Invite, enroll, and train patients to participate in the project;
2. Compare patient reported outcomes of self---efficacy using Chronic Disease Self---Efficacy Scales (CDSES), health state using the EuroQol Visual Analog Scale (EQVAS), functional status using Patient Reported Outcome Measurement Information System (PROMIS) scales and patient experience with the primary care practice using Clinician & Group Survey of Adult Primary Care
1.0 (CG---CAHPS) survey;
3. Compare healthcare utilization, defined as: 1) number of hospital admissions within the last 12 months for all causes; 2) number of hospital readmissions within 14 and 30 days in the last 12 months for all causes; and 3) number of ED visits for all causes within the last 12 months, before and after implementation of the patient portal among the enrolled patients;
4. Assess nurse care managers' and physicians' satisfaction with the patient portal;
5. Assess patient portal adoption: rates of adoption, rates of attrition, barriers and limitations to using the portal

3. Scope: (Background, Context, Settings, Participants, Incidence, Prevalence)

Studies have indicated that chronic disease patients have many barriers to care, leading to poor management of the diseases, and that part of the solution includes increasing access to evidence based programs and promoting patient self---management. Self---management of chronic disease has been recognized as a vital method to reduce healthcare utilization and prevent disability (1---3). By teaching patients to take responsibility for their own health, and coach them on how to do it, the quality of healthcare for chronic condition patients can improve. Care coordination has demonstrated to be effective in improving patient care, especially for those with chronic disease. Care coordination programs embedded in primary care practices are looking to increase self---management, improve the quality of care of patients and reduce the unnecessary healthcare utilization (6). Many primary care practices are adding nurse care coordinators in their offices to help patients develop goals and health care plans and assist them in navigating through the different care transitions, however their capacity to reach a higher number of patients is limited (9). Health Information Technology (HIT), including patient portals, has the potential to assist care management programs in their goal to improve patients' self---management and ultimately their care (1, 7---9). Health Information Technology (HIT) is a rapidly growing field in healthcare, allowing real---time exchange of information between patients and healthcare providers. In an era of ever---expanding technology, HIT can be used as a resource to improve medical care, including: a) Improving patient knowledge about specific conditions; b) Increasing patient self---efficacy for managing their condition(s); c) Improving patient outcomes; and d) Reducing administrative costs and time.

The Meaningful Use Criteria are a set of requirements healthcare organizations need to meet to be able to qualify for incentives for the adoption of health information technology. Some of the new objectives created for the criteria included: 1) to use secure electronic messaging to communicate with patients on relevant health information; and 2) to provide patients the ability to view online, download and transmit their health information (10). Despite the potential benefits of the use of patient portals to patients, caregivers and providers and the reimbursement from the US government for patient centered care, the evidence for the impact of HIT---based programs for chronic disease on outcomes is scarce (11).

The potential of web portals to improve health and quality of life outcomes has not been determined conclusively, as previous studies have not addressed the challenges of introducing interactive monitoring systems into patients' homes or the effects of the intervention on the work of health care providers or practices (Nicol et al., 2009).

This study incorporated an interactive patient portal within five accredited patient centered medical home practices with more than 48 providers and 30,000 active patients, located in northeast region of the United States, and evaluated the effectiveness and efficiency of care for the targeted high risk/high cost care managed patients, thus filling an important gap in knowledge regarding the impact of web---based portals o patient self---efficacy, functional status, health state and experience with the practice and the impact of web---based portal o the workflow in the primary care practices and satisfaction of the providers with the inclusion of those changes.

4. Methods:

This was quasi experimental study design, with combine qualitative and quantitative metrics. Data were obtained from: 1) the electronic medical records reports on the forms filled by participants using the portal; 2) electronic portal use report; 3) patient experience surveys; 4) the statewide Health Information Exchange; 5) focus groups with patients users and non users of the portal; 6) focus groups with the nurse care managers; and 7) structured interview with healthcare providers. Data collection included: 1) demographic characteristics at the date of enrollment: gender, age, Medicare part B enrollment, marriage status, smoking status, retiree status; 2) Portal use/adoption: adoption rate, number of days when patients log onto the portal, and type of use.

Portal use was defined and assessed by using the portal package electronic report (number of days when participants log---on into the portal) and, EHR documentation (number of days participants used the portal for relevant clinical criteria, that include all secure email messages sent by the patient to the provider from the date of consent to the date of completion of the follow up wellness questionnaire); 3) Healthcare utilization was assessed by examining number of emergency room visits and hospital admissions 12 months pre and post the date of study consent; 4) Patient reported outcomes patient self---efficacy was assessed by utilizing the Chronic Disease Self Efficacy Scale (CDSES),six item questionnaire developed by Lorig et al. (12). Functional status (PROMIS® Functional Status) was assessed from the participants' global physical and mental health scores. The patient self---rated health state EuroQol---Visual Analogue Scale (EQVAS) was used to measure a respondent's self---rated health; and 5) patient experience with the primary care practice, this was comprehensively evaluated using the AHRQ's CG---CAHPS survey. Each of the Clinician & Group Surveys produces the following measures: a) getting timely appointments, care, and information (composite of 5 items), b) how well providers communicate with patients (composite of 6 items), c) helpful, courteous, and respectful office staff (composite of 2 items), d) patients' rating of the provider (1 item) and e) follow u o test results (1 item).

We used 1) self---efficacy (CDSES) (12), 2) functional status (PROMIS®) (13), and 3) health state (EQVAS) (14) as primary endpoints. Secondary endpoints included: 1) patient experience with the primary care practice using the Clinician & Group Survey of Adult Primary Care 1.0 (CG---CAHPS) (15) and 2) healthcare utilization including hospital admissions and Emergency department (ED) visits.

5. Results:

By the completion of the phase I of the project, patients were able to sign on to the portal, review their electronic healthcare data, and communicate with the physicians, nurse care managers and office staff using the portal by completing a comprehensive wellness questionnaire that includes preventive measures, risk assessments, and patient reported outcomes, as well as, to continue the office related activities such as, changing appointments, prescription refills, and request referrals. Patients and providers were also able to communicate about non urgent health issues with the help of the secure email feature of the portal. Overall, patient users were satisfied with the enhanced features of the portal enabling them to view and update their electronic health records. Providers however had concerns to embrace the use of the portal the only communication tool because portal

use required restructuring their practice's workflow. Technology limitations as evidenced by the frequent updates, compatibility with different browsers and, lack of flexibility to share information seemed to affect patients and providers' adoption.

By the end of the second phase of the project, we were able to enroll 92 care managed patients from five primary care practices. Seventy two patients were categorized as users and 18 were considered non users based on the criteria defined above in methods. All patients were trained on how to use the portal in viewing and updating their electronic health information.

Sixty seven patients provided self---reported health information on their self---efficacy to manage chronic disease, functional status and overall quality of life before and 7 months after enrolling in the study. All patient reported outcomes improved, however, functional status was the only one that showed any statistically significant difference between the two time points. Healthcare utilization data as measured by the number of hospital admissions and ED visits 12 months before and after enrollment in the study seem to have reduced in all groups of patients (Users, nonusers and intent to treat group). Patient experience with the practice did not change before and after enrollment in the study. Three focus groups were completed among patients' users and non-users, and one among care managers. Eleven interviews were completed among providers.

Limitations in this study include short time for follow up, lack of an experimental study design and small sample size. The basic patient portal was available to all patients, which made it very difficult for us to randomize patients. Overall, our care---managed patients' interest in participating in a patient portal research project was lower than estimated. We were expecting a higher enrollment among care---managed patients who seem to be more motivated to use the patient portal, as they were motivated in participating in a care management program at their primary care practices, which wasn't the case. The preference of the majority of the patients was still communicating in person or by phone.

Some of the patient's comments for not being able to participate were the lack of time and the easy access to a computer. Apparently, in our community, patient portals for chronic condition patients, who tend to be an older population, may not be the preferred option for communication between patients and healthcare providers, nor be the option to access healthcare information or ask for new appointments. We could anticipate that although patient portals help to improve outcomes in patients in care management programs, portals may still not be suitable to all patients. There is still need to make portals more user friendly for providers, office staff, patients and caregivers, that help to reduce the apprehension of the use. Technical difficulties related to web---browsers, and software updates cannot be underestimated. The changes occurred every time we had an update of the portal, disabled the functionality of the portal and required extensive IT staff time to solve the problems, also creating dissatisfaction among current users of the portal.

Office workflow, and portal use buy---in among all office staff was also an important component of the implementation. The lack of productivity measures associated to the portal interaction between the patients and providers, seems to be a larger limitation that what we were expecting. The required time to address any patient concerns, outside of the regular office visits, requires office redesign.
Another limitation of our study was the use of informed consent forms. The need for a consent form

may had biased our sample to those who are more comfortable using computers and portals, not allowing us to have a larger sample among the Non---Users group.

6. List of Publications and Products:

Posters
1. Sorondo B, Allen A, Bayleran J. Using Patient Portal to Transmit Patient Self---Reported Health Information into the Electronic Record: Workflow Implications and Patient Experience. 2015--- Presented at AHRQ conference
2. Sorondo B, Allen A, Bayleran J. Patient Portal Experience in Primary Care Practices. 2015--- presented at Quality Counts Conference
3. Sorondo B, Allen A, Bayleran J. Evaluation of the Patient Portal as Tool for Enhancing Patient Care and Improving Quality of Care.2015---Presented at Concordium; Academy Health

Publications under review

1. Sorondo B, Allen A, Bayleran J. Using Patient Portal to Transmit Patient Self---Reported Health Information into the Electronic Record: Workflow Implications and Patient Experience. 2015

Publication to be submitted

2. Sorondo B, Allen A, Bayleran J. Evaluation of the Patient Portal as a Tool for Enhancing Patient Care and Improving Quality of Care.2015---Presented at Concordium; Academy Health

7. References:

1. Irizarry T, DeVito Dabbs A, Curran CR. Patient Portals and Patient Engagement: A State of the Science Review. Med Internet Res. 2015;17(6):e148. PubMed PMID: 26104044. Pubmed Central PMCID: 4526960.
2. Dorr D, Bonner LM, Cohen AN, Shoai RS, Perrin R, Chaney E, et al. Informatics systems to promote improved care for chronic illness: a literature review. J Am Med Inform Assoc. 2007;14(2):156---63.
3. Casalino L, Gillies RR, Shortell SM, Schmittdiel JA, Bodenheimer T, Robinson JC, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. JAMA. 2003;289(4):434---41.
4. Peters SG, Bunkers KS. Chronic care coordination. CHEST Journal. 2015.
5. Kobb R, Hoffman N, Lodge R, Kline S. Enhancing elder chronic care through technology and care coordination: report from pilot. Telemed J Health. 2003;9(2):189---95.
6. Bayliss EA, Balasubramianian BA, Gill JM, Stange KC. Perspectives in primary care: implementing patient---centered care coordination for individuals with multiple chronic

medical conditions. Annals of family medicine. 2014 Nov---Dec;12(6):500---3. PubMed PMID: 25384810. Pubmed Central PMCID: 4226769.

7. Tulu B, Trudel J, Strong DM, Johnson SA, Sundaresan D, Garber L. Patient Portals: An Underutilized Resource for Improving Patient Engagement. Chest. 2015 Jun 11. PubMed PMID: 26066707.

8. Turner A, Osterhage K, Joe J, Hartzler A, Lin L, Demiris G. Use of Patient Portals: Personal Health Information Management in Older Adults. Stud Health Technol Inform. 2015;216:978. PubMed PMID: 26262280.

9. Kruse CS, Argueta DA, Lopez L, Nair A. Patient and provider attitudes toward the use of patient portals for the management of chronic disease: a systematic review. J Med Internet Res. 2015;17(2):e40. PubMed PMID: 25707035. Pubmed Central PMCID: 4376181.

10. Office of the National Coordinator. How to attain meaningful use [updated January 15, 2013; cited 201 August 26]. Available from: http://www.healthit.gov/providers---professionals/how---attain---meaningful---use.

11. Chaudhry B, Wang J, Wu S, Maglione M, Mojica W, Roth E, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. An Intern Med. 2006;144(10):742---52.

12. Lorig KR, Sobel DS, Ritter PL, Laurent D, Hobbs M. Effect of a self---management program o patients with chronic disease. Effective clinical practice: ECP. 2000;4(6):256---62.

13. Hays RD, Bjorner JB, Revicki DA, Spritzer KL, Cella D. Development of physical and mental health summary scores from the patient---reported outcomes measurement information system (PROMIS) global items. Qual Life Res. 2009;18(7):873---80.

14. Group TE. EuroQol---a new facility for the measurement of health---related quality of life. Health Policy. 1990;16(3):199---208.

15. U.S. Agency for Healthcare Research and Quality. Clinician and Group---Consumer Assessment of Healthcare Providers and Systems (CG---CAHPS). Available from: https://www.cahps.ahrq.gov/surveys---guidance/cg/index.html.