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PROVIDER SUPPORT FOR PATIENT SELF-MANAGEMENT ON
PATIENT PORTAL USE**

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EXPLORING THE MAIN EFFECTS OF PATIENT ACTIVATION AND PROVIDER SUPPORT FOR
PATIENT SELF-MANAGEMENT ON PATIENT PORTAL USE

A DISSERTATION

by

LINDA ANNE GREENSPAN

Concentration: HEALTH POLICY AND MANAGEMENT

Presented to the Faculty at the Graduate School of Public Health and Health Policy in partial fulfillment
of the requirements for the degree of Doctor of Public Health

Graduate School of Public Health and Health Policy

City University of New York

New York, New York

April 2019

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ABSTRACT

Exploring the Main Effects of Patient Activation and Provider Support for Patient Self-Management on Patient Portal Use

by

Linda Anne Greenspan

Advisor: Alexis Pozen

Objectives:

This dissertation was designed to: (1) explore variations in clinicians' views about patient self-management, (2) explore variation in patient activation and (3) explore variation in patients' and their primary care physicians' characteristics in the use of a patient portal and the main effects of patient activation and primary care physician support for patient self-management on portal use in an understudied closed multi-specialty ambulatory center. The main hypothesis is that primary care physician support for patient self-management will be an effect modifier on the association between patient activation and patient portal use.

Setting:

The New York Hotel Trades Council and Hotel Association of New York City, Inc. Health Center, Inc. (HCI) provides multi-specialty ambulatory services to unionized hotel workers, retirees and their families (~90,000 lives) at one of four health centers located in Brooklyn, Midtown Manhattan, Harlem and Queens. Services include all primary and specialty care, radiology, laboratory and pharmacy services. All providers are salaried employees. Patients using the health centers receive are treated by

care teams that can include general medicine and specialist physicians, nurses, medical assistants, pharmacists, physical therapists and technicians (radiology, pharmacy and laboratory). HCI conducted surveys of all salaried clinicians from July through September of 2015 using the commercially licensed CS-PAM®. HCI also conducted surveys of patients using the commercially licensed PAM-10® from September 2015 to February 2016. Both of these surveys are available for licensing through Insignia, Inc. who scores the surveys using a proprietary scoring system. HCI introduced a patient portal in 2014 and offered all patients the opportunity to enroll and use the portal through a combination of mailings, in center advertising and information sessions. HCI offers six features: viewing laboratory results, requesting an appointment, viewing the medical record, viewing the patient's demographics, requesting a prescription refill and messaging the provider.

Methods:

Using de-identified clinician and patient data supplied by the New York Hotel Trades Council and Hotel Association of New York City, Inc. Health Center, Inc., analyses were conducted to (1) describe clinician characteristics associated with support of patient self-management (using CS-PAM® survey results), (2) describe patient characteristics associated with patient activation (using PAM-10® survey results) and (3) explore whether either of these two latent variables and/or patient and primary care physician characteristics were associated with the use of a patient portal and if primary care physician support for patient self-management modified the association between patient activation and patient portal use. CS-PAM® and PAM-10® levels were assessed for statistical significance using a chi-square test. CS-PAM® and PAM-10® scores were assessed for statistical significance using t-tests and ANOVA. Crude and adjusted logistic regression models were run to assess the association of clinician and patient characteristics with survey levels (high vs. medium and low for clinicians and level 4 vs. levels 1, 2, or 3 for patients). Crude and adjusted linear regression models were run to assess the association of clinician and patient characteristics with survey scores. To reduce the risk of making a type 2 error due to

oversaturation, we used backward stepwise linear and logistic regression for the clinician analyses with $\alpha=.02$ cutoff for retaining variables in the model. We assessed statistical significance of each patient and primary care physician variable on patient portal use using a chi-square test and with frequency of use with a t-test or ANOVA. We used univariate and multivariate logistic regression to assess the crude and adjusted association of each patient and provider characteristic with ever or never having used the portal and we used a t-test or ANOVA to assess statistical significance of portal use of each of the six portal features (used or never used). In multivariate analysis, we estimated the degree of clustering by calculating and intra-class correlation to account for observed clustering of multiple patients with individual primary care providers using a General Estimating Equation (GEE). Finally, we added the interaction term CS-PAM® level * PAM-10® level to the multivariable model to assess joint effects.

Results:

CS-PAM® scores were significantly lower for Specialty MDs and Technicians compared to General Medicine MDs and those clinicians employed for more than 11 years. The odds of scoring high vs. medium or low among clinicians were also significantly lower for Specialty MDs and Technicians and for those employed for 11 or more years. PAM-10® scores were significantly lower for those patients who were over 50 compared to those under 35. Those patients surveyed in Brooklyn scored significantly higher than those in Midtown Manhattan and those with circulatory diseases scored significantly lower than those with Endocrine disease. The odds of scoring level 4 vs. levels 1, 2, or 3 were significantly lower for those over age 65 and for those with circulatory diseases. Those patients surveyed in Brooklyn had significantly higher odds of scoring level 4 than those in Midtown Manhattan.

The patient portal was used by 8.5% of the study population. The odds of using the patient portal was significantly lower for those over the age of 35, decreasing with each age category. In the multivariable analysis, crude results showed that those surveyed in Midtown Manhattan, Harlem and

Queens were significantly less likely to use the portal than those in Brooklyn. Patients who had more than 11 years in the plan were also significantly less likely to use the portal; when assessing primary care clinician characteristics, patients whose primary care physician worked in Midtown Manhattan, Harlem or Queens were significantly less likely to use the portal than those whose primary care physician worked in Brooklyn. In the adjusted model, those patients with primary care physicians who worked in Harlem and who were aged 35 or older were significantly less likely to use the patient portal. We did not find evidence of joint effects between patient activation and physician support for patient self-management.

Conclusions:

While the results do not show evidence that patient activation or physician support for patient self-management are individually or jointly significantly associated with patient portal use, findings suggest approaches that HCI can take to improve patient activation, clinician support for patient self-management and patient portal use. Specifically, differences in results between older and younger clinicians suggest that older clinicians might benefit from training and coaching designed to engage patients and improve clinician support. Location differences suggest that there may be some underlying operational differences or patient or clinician characteristics that could account for more significant positive findings in the Brooklyn health center. Further studies might identify these differences and offer insight into results in other locations. Low usage of the patient portal could be explored qualitatively to identify patient and physician views of the features, ease of use or general applicability of the portal to the physician-patient relationship.

This study adds to the literature that has shown mixed results in patient activation and clinician support for patient self-management. Further exploration of the relationship between patient portal use and patient engagement might reveal opportunities for improving both. Understanding factors such as

organizational readiness and intent, marketing, and views of and use of technology by both patients and clinicians would further add to the body of knowledge needed to assess the success of patient portals.

Dedication

I dedicate this dissertation to my granddaughters, Logan, Maggie and Amelia who have tolerated missing Grandma on many days when playing would have been more fun for all of us. I hope the lesson shows that we sometimes forego immediate gratification for longer term results. Ultimately, I hope you understand that one can accomplish anything at any time in life and still make time for the ones we love. May you always challenge yourselves, set and achieve goals and have lots of fun along life's journey. Even when life throws those unexpected curveballs, keep your eye on the prize and always follow your heart. It will lead you to the most wonderful places!

Acknowledgements

There are many people who have contributed greatly to making this dissertation possible. First I must thank my committee, Dr. Barbara Berney, Dr. Shoshanna Sofaer and Dr. Elizabeth Kelvin for their undying help, support and encouragement throughout the process. Each has served as mentor, tutor, coach and advisor. Their professional guidance and wisdom helped to make this product one of which I can be truly proud.

I would also like to thank my husband Bob for his support, humor and realist view. He is my rock, comforter, confidant and best friend and has been by my side throughout the most challenging moments of this journey. I am grateful for the family time and adventures that we have shared which provided a welcome respite from the studying, writing and analyses. These gave me renewed energy and focus. My children and step-children have always been there rooting for me and encouraging me. Laura, Kimberly, Christopher (and Andi), Katie (and Mike), Mike (and Robin) and Jeff have been there to help, listen, or support with honesty and humor. I would also like to thank my brother Joe. He has always functioned as sounding board, editor, and steadfast supporter, always offering encouragement, words of wisdom and many moments of hearty laughter. This journey would not have been the same without the friends who were cheerleaders and steadfast supporters. Thank you Virginia Cuce, Joan Kuck, and Jeanne Pape. You have all helped me in immeasurable ways and I thank you all from the bottom of my heart.

I am also thankful for the teaching opportunities afforded me throughout the program. I am fortunate to have met such incredibly smart and passionate master's students, many of whom are now doctoral students. Even in the teaching I have been a student.

Finally I thank each and every one of my colleagues. You have all touched my life in a positive way during this process. In particular, I must thank Dr. Arlene Spark, Dr. Jessica Steier Chapin, Dr. Erin

Rogers, Dr. Sara Flowers, Dr. Sonia Gonzalez Gladstein and doctoral candidates Pamela Vossenos, Erin McKinney-Prupis, Christina Ventura-DiPersia and Dana Watnick for their friendship, shared understanding and yes, sometimes commiseration. I have learned so much from each of you and admire your intelligence, passion, drive and quest for improvement in a field that needs each one of us. I am humbled in your presence and wish you all continued success. I look forward to many opportunities to collaborate, support and celebrate!

I couldn't end this acknowledgement without giving credit to my incredible parents, Peggy and Joe Murray. Although they are no longer here, they instilled a lifelong love of learning and growth and I have felt their presence and love every step of the way.

Disclosure statement: I have no conflicts of interest to disclose.

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Chapter 1 - Introduction

Patients are being asked to take a greater role in their health as providers and health care organizations refocus their delivery systems to become more patient centric.¹ Clinicians' roles are also changing from provider to collaborator.² These expected changes in traditional roles have presented many challenges for patients and their providers. Patients are no longer viewed solely as passive recipients of care and instructions but are expected to understand their conditions, set goals for health improvement, understand their laboratory results and partner with their providers to achieve the best outcomes. Health plans and providers have introduced many methods to foster this change in roles including the introduction of electronic patient portals as a communication and engagement tool.³

Little is known about the views of patients or clinicians regarding this change in roles or how these views might influence patients' actions such as the use of patient portals. While some of the patient-clinician partnership occurs in face to face encounters, e-health technology such as an electronic patient portal is often seen as a mechanism to further engage patients. However, there is little to no research looking at factors that predict use of patient portals, such as patient activation, nor whether provider beliefs about patient self-management influence patient choice to use these portals. Therefore, the aim of this study is to explore the associations among patient activation, provider beliefs about patient self-management, and the use of online portals by patients.

The three main components of this study are data from a patient survey that measures patients' beliefs in their ability to self-manage (*called activation*), and a parallel survey that measures clinicians' beliefs about patients' abilities to self-manage. In addition, patient usage of

a newly implemented patient portal in a large multi-specialty ambulatory system in New York City will be examined. Each of these components is discussed in more detail below and will be used to produce three papers.

Patient Engagement and Activation

Engagement has been defined as “actions people take for their health and to benefit from health care”.⁴ Evidence suggests that patient engagement is associated with lower healthcare costs and better health outcomes.^{5,6} Patient activation, defined as having the understanding, knowledge, skills and confidence necessary to manage one’s health,⁷ can be thought of as a precursor to engagement and has been associated with use of patient portals. Evidence suggests that activated and engaged patients are healthier, more adherent and generally spend less on care.^{5,8-10} Conversely, less activated patients are associated with higher costs.¹⁰ Differences in activation have been observed for racial/ethnic minorities, with Blacks and Hispanic/Latinos typically less activated than Whites^{5,11,12} which may be reinforced by their interactions with physicians.^{13,14} In fact, these interactions may influence not only patient activation, but uptake of patient portals by patients.¹⁵

Only two studies have been published that look at the association between patient activation and patient portal usage. One study assessed 180 patients who had been given an access code to a patient portal and investigated the difference between those who used them and those who did not. Results showed no significant differences in patient activation between users and non-users of these patient portals.¹⁶ In another study of a larger patient population more highly activated patients were more likely to be referred to the portal by their physician and more highly activated patients were more likely to use it.¹⁷ Neither study explored use of portal

systems that were marketed directly to the patient rather than recommended by a physician, nor did they explore whether clinician beliefs or attitudes about patient self-management impacted patient portal use. No study to our knowledge has explored these constructs in a closed health system such as HCI.

Clinician Support for Patient Self-management

Clinician support for self-management (the degree to which clinicians believe patients can and should be a partner in their health care)¹⁸ may impact the extent to which patients have the skills and confidence needed to engage (patient activation) as well as whether or not they do engage given that they have the needed skills and confidence. This influence may be direct (i.e. encouraging or discouraging the patient use of the portal) or indirect (i.e. non-verbal cues, negative comments, etc.).

Despite the changing roles of patients and clinicians that are expected in healthcare today, clinicians may not be sufficiently skilled in the coaching and supportive behaviors that patients need to become active partners in their healthcare. Helping patients adopt self-management techniques such as developing care plans and health goals takes time, something clinicians complain they have too little of.¹⁹ Yet, clinicians who interact with patients may play a key role in the engagement process.

Studies have shown that less than two-thirds of patients indicate that their clinicians involve them in treatment choices or in helping to create a plan to manage their care.²⁰ While this collaboration between the patient and physician is particularly important in cases of chronic conditions, it is equally important in addressing other illnesses or in maintaining wellness. However, this approach to patient care is very different from the way many providers have

learned to practice medicine, and it may not be a favored approach.^{21,22} Clinicians have cited time constraints as an impediment to engagement with their patients;²³ others favor the didactic approach over interactive approaches.^{2,18,23}

Clinicians communicate differently with patients who are active participants at visits,²⁴ and those patients tend to get more information and support from their providers.²⁵ Studies of patient centered care indicate that patients are more trusting of their providers,²⁶ more likely to adhere to treatment recommendations²⁷ and less likely to die following a major medical event such as myocardial infarction when clinicians involve them in their care decisions.^{28,29} Power relationships between provider and patient may influence the interaction as well,^{21,30} depending on whether the provider views herself as simply a provider or a collaborator with the patient.³¹

Yet, little is known about clinician beliefs and attitudes about patient engagement, activation and ability to self-manage.^{2,18,32} Few studies explore clinician characteristics associated with their beliefs about patient engagement. Those studies have suggested that clinicians who are supportive of patient self-management tend to be younger and have fewer than 20 years of practice, but these associations were not statistically significant.^{2,32,33}

Information about the influence clinician support for patient self-management has on patient activation, engagement, and use of tools such as health portals can help health care organizations direct their coaching and training of providers. Ultimately, the quality, cost and outcomes of healthcare delivery may be influenced by actions taken by clinicians to improve patient activation and engagement.³⁴

Patient Portals

A patient portal is a secure online website, usually tethered to an electronic health record (EHR) and owned by a health care organization or provider,³⁵ that gives patients 24-hour access to personal health information from anywhere with an internet connection. Portals may offer patients the ability to schedule appointments,^{36,37} refill prescriptions,³⁶ and access laboratory or radiology results.^{38,39} These are the most frequently used features of portals and are usually positively viewed by patients.⁴⁰ Some portals also offer web based access to a patient's medical records including physician notes,⁴¹ and may allow patients to update their medical history and communicate securely with healthcare providers. Advanced systems will also allow the patient to upload real time results such as blood pressure, A1C levels, weight and physical activity from personal devices that can be shared with providers.⁴² However, not all of the above capabilities are offered by all providers.

Patient portals may serve administrative functions for the providers, allowing a redistribution of resources in a time-squeezed environment.⁴³ They also provide a means for patients to connect to their providers in a more interactive and potentially meaningful way, thereby facilitating shared decision making.⁴⁴ For instance, patients can learn their laboratory and radiology test results in advance of meeting with their providers, giving them time to learn more about their conditions thus fostering a more interactive visit. Other functions, such as reviewing visit summaries, can keep patients from forgetting information or instructions given at the visit. Email functions allow the patient and provider to communicate in near real time to further support communication. Appointment scheduling and prescription renewal functions serve a more administrative function that can be time saving for both the provider and the

patient. Portals can also provide patients with a means to engage with their health care, enhance personal empowerment, and improve preventive behaviors and medication adherence.⁴⁵⁻⁴⁷

Patient portal use is a potential indicator of patient engagement^{48,49} as it represents an action that a patient might take for their own health or to better benefit from the care received.^{4,50} Portal use has also been linked to better health outcomes and lower costs.^{17,34,36,38,40,51} While the evidence is inconsistent, most authors suggest that portals may have an impact on patient empowerment or engagement with health care providers.¹⁵ Studies suggest that provider encouragement can foster use of patient portals.⁵²

Patients may find portals appealing as a substitute for in-person visits or telephone calls, offering the convenience of contact or information seeking at times and places.⁵³ This access could be particularly beneficial to those in rural communities who may face travel challenges. From a patient perspective, portals have been said to compensate for short office visits and any lack of understanding of the doctor's communication by offering post-visit access to information.^{37,38}

Recent studies suggest that about 20% of physician offices have active patient portals⁵⁴ yet less than 50% of patients whose providers had portals were aware that their provider had a patient portal available.⁵⁵ Despite this, there is some promising evidence that health information technologies can improve many aspects of care. In a systematic review of the benefits of patient portals, Goldzweig et al. found that 62% of 154 studies found that use of patient portals was positively associated with one or more aspects of care (with no aspect worse off) and 92% were either positive or mixed (one or more positive and negative aspects).^{56,57} These aspects include improved efficiency and effectiveness of care,⁵⁸⁻⁶⁰ communication between the patient and

provider,⁶¹ health outcomes,⁵⁷ increased patient satisfaction,^{62,63} improved patient safety, more preventive care, better access to care,⁶⁴ and higher patient empowerment.⁶⁵ It is important to note, however, that many of these studies were exploratory or studied populations with specific chronic diseases such as diabetes or heart disease. These patient populations may be different from the general populations of patients.

Providers with electronic health records are strategically poised to implement and encourage use of patient portals. Providers can also benefit from implementing portals as they have been found to increase patient access and satisfaction, support care between visits and improve health outcomes through enhanced safety, while at the same time reducing costs and improving delivery processes.^{66,67} In 2012, 72% of ambulatory providers reported full or partial use of electronic health records (EHRs).⁶⁸ From the provider's perspective, patient portals can enhance the use of EHRs, improving communication and interaction between them and the patient⁶⁷ and thereby foster engagement.

Generalizations about enrollment and usage of patient portals are difficult to draw from existing studies because there is variation in the design and features of patient portals¹⁵ and portals may be introduced to patients through invitation by the clinician based on his belief about the patient's ability to self-manage⁶⁹ or, less commonly, by marketing directly to the patient from the healthcare organization sponsoring the portal. It may also be difficult to determine whether clinicians influence patient choice or whether patient use influences provider interaction.

Portal Enrollment and Usage

While patients may either be asked to or choose to enroll in patient portals, this is not an indicator of usage. Studies show that many more patients enroll in portals than actually use

them. If technology is going to be the disruptive force predicted in the literature,⁴³ it is necessary to understand how it is being used.

Previous studies have reported on enrollment and usage separately and many only focus on chronically ill patients or specific portal features.⁷⁰⁻⁷⁶ This is likely due to the focus on these populations by government programs and funders. Large integrated systems like Kaiser Permanente and the Veterans Administration (VA) and one New York City based FQHC (Federally Qualified Health Center) have done more detailed analysis with larger populations; however only the NYC FQHC has reported on all patients.⁷⁷⁻⁷⁹

Portal Enrollees

A systematic review of 16 studies of portal enrollment and usage⁵⁶ found that portal enrollment was associated with higher education,^{45,47,71,80-83} lower age^{71,80-82,84} and non-Hispanic or non-black race/ethnicity.^{45,47,71,81,82,85} Enrolled patients also had better controlled diabetes,^{81,82} were more likely to be non-smokers⁸² and had more chronic diseases.^{38,84,86} Regardless of association, the studies are generally not consistent in approach, nor were the quality or quantity sufficient to draw any definitive conclusions. Further research is recommended and clearly needed if we are to understand who uses patient portals⁵⁶ and how their use is influenced by clinicians.

Portal Users

There is also conflicting information about the users of patient portals depending on the source and timing of the studies. Early studies (2006) suggest that portal users are generally younger, more likely to be white, more affluent and healthier than the average patient;³⁹ however, later findings are mixed regarding the age, race/ethnicity, gender and clinical needs and outcomes^{45,47,75,87,88} of users versus non-users.^{81,85,86,89} Newer evidence suggests that the actual

features offered through the portal (i.e. refilling prescriptions, making appointments, reviewing laboratory or radiology reports, etc.) may influence who uses the portal and could influence adherence to medical advice and medication management.⁹⁰

Hypertensive patients were found to be significantly less likely to use the portal than those with other conditions⁷³ and previously hospitalized heart patients had higher rates of usage than heart patients who had never been hospitalized^{38,86} which might suggest that severity of illness could have an impact on portal use. One study found that 17% of senior citizens use personal health records, when compared to baby boomers (12%), generation x (8%) and generation y (11%).⁹¹ In general, however, non-users were older, single and lower educated.⁹²

Barriers to patient use of portals included several provider related issues: instructing the patient not to use the portal,⁸⁷ provider not engaged in portal use,⁹³ patient assumptions about whether the provider will engage, patient concern about potential interruptions of the provider or patient assumptions about a negative effect on provider reimbursements.^{71,87,93} Provider factors (encouragement, engagement, trust and better communication) were significantly associated with enrollment and use of patient portals.^{82,84-86,94} In qualitative studies of both portal enrollment and use, patients indicated that they would use the portal if providers or family members were advocating for its use.⁹⁵

Provider endorsement of the use of patient portals

Provider endorsement of patient portals is even less studied than portal use and we lack an understanding of provider beliefs about patient self-management. Of the seven studies in the US identified by Irizarry et al., four were pre-implementation exploratory studies which leave much to be learned about post-implementation results.^{92,96-100} These and others focused on one specialty, patient illness or feature of the patient portal.^{92,97,98,100} No studies of provider

endorsement have included the views of other clinicians than physicians, nurses or medical assistants; yet endorsement by other clinicians may affect the use of patient portals. Most researchers agree that portal usage requires further study.^{56,87,95,101}

Research has shown that people actually use electronic medical information when given access,⁴¹ but it is important to further describe and understand patient and provider beliefs, intentions, acceptance and use of patient portals. Ideal outcomes will occur only when consumers are prompted to accept and incorporate health recommendations (e.g. take prescribed medicines, follow therapeutic procedures, or adopt health promoting strategies)⁴² and when providers are able to adapt their communication to support patient engagement.¹⁰

Health systems need to understand patients' use of patient portals and examine the effect of both clinician and patient beliefs on this usage. To that end, this study examines portal usage among ~3500 patients who completed a survey about their beliefs about self-management and reports the results of over 300 of their clinicians who completed surveys about their beliefs about patients' abilities to self-manage. We examine and describe differences among the patient and clinician groups in survey responses, describe portal usage among the patients surveyed and examine the associations among primary care providers' survey responses, patient survey responses, and patient portal usage.

To our knowledge, no studies have examined clinician support for patient self-management as a potential predictor or moderator of patient portal use overall, nor whether clinician support interacts with patient activation or engagement in predicting use of health portals. Examining clinician beliefs and attitudes about patients' self-management, patient attitudes and beliefs about their own self-management and the interaction between the two on the use of patient portals may provide additional insight about the interaction of these attitudes and

beliefs and their potential effects on patients' use of the portal. The main hypothesis of this study is that clinicians' beliefs about the ability of patients to self-manage (and therefore be engaged in their health) influences the uptake and usage of patient portals overall, and does so differently among patients who are highly activated versus those who are not.

Specific aims

In these studies we look at the relationships among clinician and patient beliefs about patient activation and patient use of the newly implemented patient portal at four large multi-specialty ambulatory care centers serving a diverse population which is part of a single closed-system - the New York Hotel Trades Council and Hotel Association of NYC, Inc. Health Centers, Inc. (HCI) – which serves NYC- based unionized hotel workers, retirees and their families (~90,000 lives). The study design is cross-sectional with survey data collected for all salaried clinicians and a sample of patients using the health centers. In addition to demographic and survey information, data about patient portal usage since HCI's date of portal implementation (April, 2014), most recent medical diagnoses groups (using ICD-10 categories) and primary care providers was collected and analyzed. (See Appendix 1 for a list of study variables). The results of these studies provide data for three scientific papers, one for each specific aim.

Specifically our aims were as follows:

AIM 1: Describe clinician support for patient activation overall and by characteristics of clinicians including specialty (i.e. general practitioner, physician specialist, nurse, physical therapist, pharmacist, technologist [laboratory, radiology and pharmacy]) or medical assistant), years employed, practice location, age, race/ethnicity and gender

among 341 salaried clinicians in four large multi-specialty ambulatory centers in New York City.

AIM 2: Describe the level of activation among a sample of more than 3500 patients seeking care at one of four multi-specialty ambulatory health centers overall, and by patient characteristics including age, gender, race/ethnicity, marital status, primary language, survey location and ICD-10 diagnostic category.

AIM 3: Identify patient-level and provider-level predictors of portal use.

AIM 3a: Examine the main effect of patient characteristics, including, age, gender, race/ethnicity, marital status, and diagnoses, primary language, as well as activation level, survey location, and primary care provider characteristics including age, gender, race/ethnicity, years of practice, years employed and location, and provider survey results on patient portal use.

AIM 3b: Explore primary care provider support for activation as a potential effect modifier of the association between patient activation level and portal use.

Theoretical Framework

Patient activation is a latent variable that appears to involve four stages: (1) believing the patient role is important, (2) having the confidence and knowledge necessary to take action, (3) actually taking action to maintain and improve one's health, and (4) staying the course even under stress.⁸ This idea is incorporated into Bandura's theory of self-efficacy, which states that individuals will take action if there is a conviction that they can execute the behavior required.⁷ However, this theory alone may not fully explain a patient's use of patient portals. In fact,

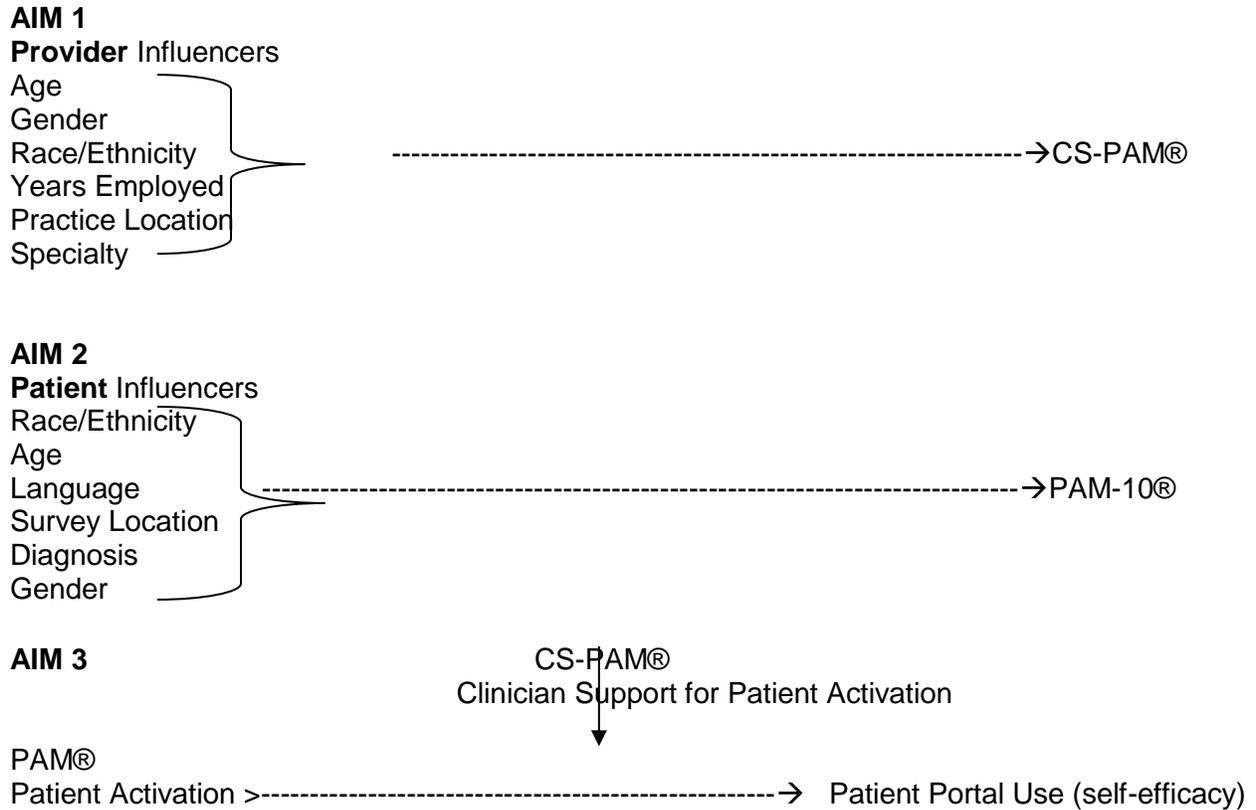
criticisms of behavior based theory have argued that they fail to take the influence of the environment into account. The Theory of Reasoned Action proposes that social factors or influences may also play a role.¹⁰² This is supported by other theorists such as Noblin and Holden and Karsh ¹⁰³

All of these theorists propose perceived norms which can include acceptance by a normative group or the belief that the usage is supported by trusted advisors. In the case of patients, this suggests that if the clinician (the trusted advisor) believes the patient should adopt this behavior, then the patient will be more likely to adopt it.

Based on Bandura's Self Efficacy Theory (SET), the models suggest that self-efficacy is a predictor of patient portal utilization but that the impact of self-efficacy on portal activation is likely moderated by the beliefs about and support of patient activation by the patient's clinician.

The figures below depict the model that will be tested for each AIM:

Figure 1: Theoretical Framework



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Chapter 2 - Exploring Variation in Clinicians Views about Patient Self-Management of their Health in a Multi-Specialty Ambulatory Setting

Abstract

Background: Clinicians have been asked to engage their patients in shared decision making and encourage patient self-management in order to improve healthcare quality, outcomes and costs. However, they have been slow to support this approach.

Objective: To explore beliefs about patient self-management among clinicians, including general practitioners, specialists, pharmacists, nurses, physical therapists, technologists and medical assistants.

Methods: Data from a survey of clinician beliefs about patient self-management (CS-PAM®) of employed clinicians (N = 341) at a large multi-site ambulatory health system in New York City were examined along with clinician demographic information.

Findings: Average score for clinicians were 79.4 (SD 16.8)) for patient self-management. Specialty clinicians and technicians scored significantly lower on the survey as did those employed more than 11 years.

Discussion: Overall, almost one third of the clinicians demonstrated a low of support for patient self-management. Clinicians can influence patient choices and ultimately outcomes. Coaching clinicians to help patients develop care plans and set health goals might influence the degree that patients engage in their own health care.

Keywords: CS-PAM®, Clinician support for patient self-management, doctor-patient communication, patient activation, patient-centered care, patient self-management.

Introduction

Health outcomes may be influenced by engaging patients through patient self-management,^{1,2} supporting patients as active partners with their clinicians. Patient engagement can increase quality of care, improve patient health, and reduce costs,^{1,3,4} thereby contributing to achievement of these triple aims.⁵ Clinicians who interact with patients play a key role in the engagement process. Yet, little is known about clinician beliefs and attitudes about patient engagement and patients' ability to self-manage.^{6,7}

Studies suggest that when clinicians involve patients in their care decisions, the patients are more trusting of their clinicians⁸ more likely to adhere to treatment recommendations⁹ and less likely to die following a major medical event such as myocardial infarction.^{10,11} Studies of patient-centered care show that patients want to be involved in their treatment decisions.¹² Yet studies have also shown that less than two-thirds of patients indicate that their clinicians involve them in treatment choices or in helping to create a plan to manage their care.¹³ In fact, this approach to patient care is very different from the way many clinicians have learned to practice healthcare, and it may not be a favored approach.^{12,14} For example, clinicians report favoring a didactic approach over interactive approaches when communicating with patients^{6,15} and have cited time constraints as an impediment to engagement.¹⁵ Most studies suggest that although clinicians believe that patients' behavior should change to address health issues, they are less likely to help patients become active partners who can think and act independently when making health decisions outside of the healthcare setting.^{4,6}

This lack of support for patient engagement may be influenced by a variety of factors. For instance, the literature suggests that clinicians may communicate differently with different

types of patients,¹⁶ and those who are active participants at visits may receive more information and support for their engagement from the clinician than more passive patients.¹⁷ Clinician-patient communication may also be influenced by power relationships between clinician and patient. Clinicians may exercise their power in clinician-patient interactions as a continuum from the clinician making all the decisions without patient input to patients being the sole decision makers after considering input from the clinician.¹⁸ Between these extremes lies shared decision making¹⁹ or decisions based on the clinician's understanding of the patient preferences.^{14,18,20} The clinician's preferences regarding these approaches will influence the type of interaction with patients. In addition, clinicians may have preferences in terms of the power balance in decision making which may be influenced by their beliefs in the ability of the patient to engage or be activated. Despite what is known about influencing factors, only a few studies examine clinicians' views about patients' self-management and none to our knowledge look at salaried clinicians.

Clinician characteristics may also influence this relationship. Studies of primary care clinicians suggest that younger clinicians and those with fewer years of practice are more supportive of patient self-management than those over the age of 50 with more than 20 years of practice; however these findings were not statistically significant.^{6,7} While findings about primary care clinicians are important, they fail to focus on other clinicians that might be influential in the role of patients and the actions they take. These include physician specialists, pharmacists, physical therapists, nurses, medical assistants and technicians (radiology, laboratory and pharmacy) who play a critical role in patients' care teams and frequently encounter and interact with the sickest patients. As organizations move to using care teams, the view of these clinicians becomes more critical.

Since the beliefs of clinicians at all levels may be influencing the actions patients take to improve their health, additional insight into the influence of clinician support for self-management can help health care organizations to direct their coaching, training and support efforts to the right constituencies so that more clinicians support patient activation and engagement. This study aims to explore clinician beliefs about patient self-management using results from a survey (CS-PAM®) of clinicians at a closed multi-site, multi-disciplinary ambulatory care organization serving unionized members, retirees and their families in New York City.

Methods

Study Setting

This study describes clinicians' beliefs about the role of the patient in self-management at a large integrated multi-specialty ambulatory system in New York City – the New York Hotel Trades Council and Hotel Association of NYC, Inc. Health Centers, Inc. (HCI) – which serves over 90,000 NYC- based unionized hotel workers, retirees and their families. In 2015, HCI employed 341 clinicians across four health centers (Brooklyn, Queens, Midtown Manhattan and Harlem). These salaried clinicians include general practitioners, specialists, physical therapists, pharmacists, nurses, medical assistants and technicians (radiology, pharmacy and laboratory). HCI provides health care to its patients using care teams comprised of all of the above mentioned clinician types.

Data Collection

The HCI contracted with Insignia Health to conduct a survey of their 341 clinicians in order to understand clinician views about patient self-management. This paper analyzes the survey results together with provider demographic information also provided by HCI. From July

through September, 2015, all clinicians (N=341) received an email from the HCI Chief Executive Officer with a Survey Monkey link to the CS-PAM® survey (Appendix 2) inviting them to participate in the survey. The CS-PAM® was scored by Insignia Health, Inc., the licensing organization for the tool, using a proprietary scoring system. These results were sent to the HCI as both a score (0 – 100) and support level of low, medium and high for recording in HCI's database. HCI provided de-identified survey results and demographic information for each clinician in a secure electronic file.

The CUNY Institutional Review Board has determined this study to be exempt from human subjects review.

Outcomes

The outcome of interest is the Clinician Support for patient self-management measure (CS-PAM®). The CS-PAM® is a 13 item scale that measures clinicians' attitudes about the importance of patients' self-management of their healthcare. The tool can acceptably differentiate clinicians on their beliefs and attitudes about the importance of patient self-management competencies and behaviors.¹ The scale measures four dimensions of clinician beliefs: 1) whether patients should follow medical advice, 2) whether patients can make independent judgments and actions, 3) whether patients are able to function as a member of a care team and 4) whether patients are independent information seekers.⁶

Studies have demonstrated the acceptable reliability and validity of the CS-PAM® in the US, UK and the Netherlands.^{1,7,21-24} The Cronbach's alpha in published studies ranged from 0.82 to 0.97, indicating good to very good internal consistency, and the *person reliability* (which indicates how well the responses conform to the model) was equally acceptable at 0.82.^{1,7,21-24}

The survey consists of 13 statements asking the clinician to rate how important it is to them that patients are able to self-manage. Some of these statements include “how important is it to you that your patients are able to take actions that will help prevent or minimize symptoms associated with their health conditions”, “how important is it to you that your patients can follow through on medical treatments you have told them they need to do at home”, “how important is it to you that your patients want to be involved as a full partner with me in making decisions about their care.” These are assessed using a 4 point Likert scale (ranging from “not important” [lowest] to “extremely important” [highest]). Respondents could choose not to answer individual questions by leaving them blank or checking “not applicable” (N/A). Those who left all answers blank or responded N/A to all questions were later set to missing; those who completed the survey answered all items.

The outcome is operationalized in two ways:

1. Continuous score (a summary score that has a theoretical range of 0 – 100). (See
2. Level, which was examined in two ways (1) a three category variable with indications for Low (score <65), Medium (65.1 – 77.2 and High (77.3 – 100) levels, which was used for descriptive analysis, and (2) a dichotomous indicator for High level versus Low and Medium, which was used in regression models.

Independent Variables

The dataset includes information about clinician gender, age, race/ethnicity, years employed at HCI, type of clinician, and location of practice. Age was categorized as < 35 (all clinicians are at least 18 years old), 35 – 49, 50 – 64 and 65+ for analyses, as has been done in other studies^{6,7,21-23,25} Race/ethnicity was collected in 4 categories: White, African-American, Hispanic, Asian/Pacific Islander. Due to the small cell size, other race was combined with White

for analysis. Years employed at HCI were categorized as 0 to 10 years and 11+. Clinician employment position was classified as: 1) general medicine (all general practice, family practice, and obstetrician/gynecologist); 2) specialty (all physician specialists not classified as general practice); 3) nurses (all RNs and LPNs); 4) pharmacists and physical therapists (combined due to small cell sizes), 5) technicians (laboratory, radiology and pharmacy technicians), and 6) medical assistants. Location of practice is Brooklyn, Queens, Midtown Manhattan or Harlem. This variable assists HCI in determining potential differences in practice locations and is consistent with other studies that examine geographic or multiple practice differences.^{23,26,27} Appendix 1 contains a list of variables used in this study.

Data Analysis

We describe the clinician population overall and by CS-PAM® score (summary statistics) and level. Differences in CS-PAM® score by clinician characteristics were assessed for statistical significance using a t-test or ANOVA and differences in CS-PAM® level were assessed for statistical significance using a chi-square test.

We assessed the association of clinician characteristics with CS-PAM® score using linear regression. We ran a crude model assessing the association of each clinician characteristic with CS-PAM® score in a separate model. We then ran a complete adjusted model in which all independent variables were included, and finally to find a more parsimonious model and reduce the risk of making a Type 2 error due to model over-saturation, we used backward stepwise linear regression with $\alpha=0.2$ as the cut-off for retaining variables in the final model. We also used logistic regression to assess the association of clinician characteristics with CS-PAM® level (high versus medium-low) using the same three step process described for the linear regression

modeling (crude, complete multivariate model and backward stepwise modeling). All analyses were conducted using SAS v9.4 at $\alpha=0.05$ for significance testing.

Missing Data

All independent variables were available for 100% of the clinicians (n=341). Survey response data were missing for 31 clinicians who failed to answer any questions on the survey or who responded N/A to all questions (N=31). Those clinicians are excluded from the complete case analyses, leaving an N of 310, each of whom answered all questions without indicating N/A for any question. This decrease in sample size made type 2 errors more likely. Therefore, in a sensitivity analysis, the missing CS-PAM® surveys were imputed with the overall mean score and level of all participants with valid survey data and the models were rerun to see if new significant associations appeared when we add data on the 31 clinicians who did not complete the survey. The results of the analyses with imputed data were not markedly different in direction of association compared to those of the complete case analysis. However, the backward stepwise regression in the imputed logistic regression model showed a statistical significance among those clinicians aged 50 to 64 ($p=0.008$) and among Pharmacists/Physical Therapists ($p=0.021$). The variances were statistically different but not substantive. We report the complete case analysis results in this paper.

Results

Description of the sample (Table 2.1)

About sixty percent (60.7%) of the clinicians were female. The majority of clinicians were White (40.7%) and Asian/Pacific Islanders (31.3%); African Americans and Hispanics were 15.5% and 12.6% respectively. Mean age of clinicians is 50.11 ranging from 20.2 to 83.98. General medicine, specialists and nurses comprised the largest percentage of the clinicians

(21.9%, 30.7 % and 18.4% respectively). Over 57% of the sample had been employed for less than 10 years. Mean CS-PAM® score was 79.4 (SD 16.8). Median CS-PAM® score was 80.4 with a range between 31.5 and 100. Mean CS-PAM® score differed significantly by position type ($p=0.026$), with the highest mean scores among those working as a nurse (84.2) and general medicine (83.0), compared to medical assistants (79.5), pharmacists/physical therapists (78.6), specialty MDs (76.9) and technicians (73.1). None of the other provider characteristics was significantly associated with CS-PAM® score and no characteristics were significantly associated with CS-PAM® level.

Linear regression model results (Table 2.2)

In the crude linear regression model, technicians scored significantly lower than general practitioners ($\beta=-8.9$, $p=0.015$). In the complete multivariable model, those aged 50-64 years had significantly lower CS-PAM® scores, on average, than those <35 ($\beta=-7.3$, $p=0.0359$). In addition, those working as specialty MDs and as technicians scored significantly lower compared to those working as general medicine practitioners ($\beta=-6.42$, $p=0.022$; $\beta=-10.37$, $p=0.011$, respectively). None of the other variables were significantly associated with CS-PAM® score in the complete multivariable model. In the final stepwise model, specialty clinicians ($\beta=-4.63$, $p=0.026$) and technicians ($\beta=-9.19$, $p=0.005$) had significantly lower CS-PAM® scores compared to general medicine practitioners, and those employed over 11 years ($\beta=-4.90$, $p=0.013$) also scored significantly lower than those employed 10 years or less.

Logistic regression model results (Table 2.3)

In the crude logistic regression models looking at predictors of scoring high vs. medium-low on the CS-PAM®, those age 50-64 had significantly lower odds of scoring high compared to those age <35 (OR=0.45, $p=0.036$). Specialty MDs had odds of scoring high on the CS-PAM®

that were 60% lower than that of general medicine practitioners ($p=0.011$), and technicians had odds of scoring high that were 0.68% lower compared to general medicine practitioners ($p=0.034$). None of the other clinician characteristics were significantly associated with CS-PAM® category in the crude models.

In the complete multivariable model including all predictors, those aged 50-64 ($OR=0.31$ $p=0.017$) had significantly lower odds of scoring high on the CS-PAM® compared to those aged <35. In addition, pharmacists/physical therapists ($OR=0.32$ $p=0.042$), specialty MD ($OR=0.30$ $p=0.003$) and technicians ($OR=0.20$ $p=0.012$) all had significantly lower odds of scoring high on the CS-PAM® compared to general medicine practitioners. In the final stepwise model, specialty clinicians ($OR=0.46$ $p=0.011$) and technicians ($OR=0.33$ $p=0.034$) had significantly lower odds of scoring high compared to general medicine practitioners, as did those with 11 or more years of service ($OR=0.46$ $p=0.007$).

Discussion

The CS-PAM® scores among the providers in our sample (mean=79.4 SD=16.8) were higher than those reported in other published studies (mean ranged between 65 and 72).^{7,21,22,23,24} This could be due to several factors: 1) patients at HCI have long-standing relationships with their care teams since they are covered by the same system throughout their employment (even if they take new jobs within the system), 2) patients are given the time at appointments to speak with their clinicians and 3) HCI encourages doctor-patient communication. In addition, this study included all salaried clinicians (with an 88% response rate) where other studies had lower participation rates (between 30% and 80% reported).^{6,7,22}

Our study findings were generally similar to that of previous research. We found that nurses and general medicine practitioners scored in the highest levels of support (84.2 and 82 respectively, which is consistent with findings in the NHS study which surveyed 1759 primary care clinicians in the UK (75.9 and 70.1 respectively)²³ and the Dutch study which surveyed 496 primary care clinicians in the Netherlands (67.2 and 63.7 respectively).⁷ Two other studies of primary care providers revealed lower scores than those in this study. Primary care practitioners in an accountable care organization in the US (n=141) scored 66²² while in another study those in a health system in the US scored 69 (n=77)²⁴ and those in a primary care trust in the UK (n=98) also scored 69.⁶ Our analyses showed that specialty MDs and technicians scored significantly lower (76.9 {p=0.026} and 73.1 {p=0.005}) than general practice clinicians. Previous studies did not include non-primary care clinicians such as pharmacists, technicians and physical therapists and so this finding is new and suggests that there may be an opportunity to further engage patients through a focused training of non-primary care clinicians. Given that these clinicians interact regularly with patients, the survey results for them, indicating limited supported of patient-centered care and self-management, are problematic. These clinicians often represent the front line in healthcare and play a critical support role for patients with the most severe and/or chronic diseases. It is possible that some in the specialty or peripheral healthcare fields (i.e. specialty MDs, technicians, pharmacists) do not see themselves as playing an important role in supporting and encouraging patient engagement; yet collaborative care in an environment such as that at HCI suggests that everyone who is part of the patient's care team should be on the same page in terms of supporting patient self-management in order to achieve maximum patient engagement, an HCI goal.

Our finding that clinicians who are younger and with fewer years of service tend to score higher on the CS-PAM® is also consistent with previous studies.^{6,22} This is likely a sign that newer healthcare clinicians are becoming more familiar with patient engagement that was absent in the training of older clinicians who received training a long time ago before patient engagement was the expected norm. The latter clinicians might be targeted for additional training around the current expectations regarding patient engagement.

Qualitative information gathered from clinicians in other studies indicate that those scoring at the highest level on the CS-PAM® are likely to involve their patients in problem-solving and planning for health management, and ask for patient preferences about the visit agenda and treatment options.^{22,23} However, research is needed to better understand the relationship among clinician support for patient self-management, patient activation and engagement in care, and patient outcomes. Understanding patient activation levels (the knowledge, skills and confidence to self-manage health), ways to improve activation, and how activation is related to patient outcomes might provide further insight into the role clinicians can play in engaging patients. Clinicians in the NHS study cited time constraints, patient inability or unwillingness to self-manage and the skill level of the clinician as barriers which could be addressed by longer appointments and training and education of both the patient and clinician.²³ Qualitative studies or observations might prove beneficial at HCI as they seek to understand clinician behaviors related to patient engagement.

Coaching skills for clinicians might influence the degree to which patients are part of a collaborative process that keeps them involved, allows them to share in the decision making and provides them with the support needed to be active and effective partners in their health.^{6,25} Training can be provided to all clinicians to help patients develop care plans and set health goals

pertinent to their role in the care team, thus enhancing the role they play in engaging their patients no matter what role they play in the process (i.e. direct care, ancillary care, etc.). However, no studies have been published which demonstrate the results of clinician training on the level of support for patient self-management nor are any specific forms of training identified. Even so, evidence continues to show that more activated patients have better health outcomes^{3,4,28} and that highly supportive clinicians demonstrate more inclusive behaviors.²⁹ It follows that clinician support for patient self-management could directly impact patient outcomes. Our results do show a wide variation of support for patient self-management (range 31.3 – 100). Although we found that 40.1% of clinicians are highly supportive of patient self-management, it is clear that more work needs to be done to promote patient engagement a clear intention of current policy promoting patient-centered care.

Limitations

There are some limitations in this study. Although all clinicians employed at HCI at the time of the study were included, the HCI clinicians may not be similar to clinicians in other organizations, making generalization difficult. Furthermore, the HCI clinicians who did not complete the survey may be more or less supportive than those that did complete the survey. Although we ran the models with the missing survey data imputed with the mean scores of those who did complete the survey to address possible type 2 error, we did not explore the possible impact the missing data might have had if those scores differed substantially from the scores of those who did complete the survey. In addition, since the survey was completed at the request of the organization's CEO, social desirability bias is possible if respondents were answering in a way that they thought their employer expected. The survey was self-report, and responses may differ from the way that clinicians actually practice or what they actually believe.

Conclusion

Patient self-management and clinician care teams are terms used in healthcare as approaches to improved quality, outcomes and cost. Our results indicate there is still some work to be done to improve clinician patient interaction such that patients become more confident in self-managing and partnering with their health care teams. Health care teams are critical to the provision of care at HCI and engaging patients has the potential to improve patient outcomes and perhaps reduce costs through a reduction in emergency room visits or hospital readmissions. Consistency in the levels of support among the entire health care team could translate to more activated and engaged patients. The variation in results among the position types may present an opportunity to understand the relationship of these results to patient activation and to identify barriers to supporting patients in this way. It remains to be seen if healthcare organizations will choose to implement the ideas presented here and if they do, will the programs be successful and produce the intended outcomes.

Table 2.1 Sample description, clinician demographics and other characteristics, CS-PAM® Levels – Low, Medium and High Scores – Means, Medians and Ranges for complete cases (N=310).

	Total Number (%)	Low Level. n (%) (< 65)	Medium Level, n (%) (65.1 – 77.2)	High Level, n (%) (77.3 – 100)	P-value for chi-square test	Mean Scores (SD)	Median Scores (Range)	P-value for *t-test or **ANOVA
Full Sample	310 (100.00)	95 (30.6)	89 (28.7)	126 (40.6)		79.4 (16.8)	80.4 (31.5-100)	
Gender					0.871			0.657*
Male	122 (39.4)	38 (31.1)	33 (27.0)	51 (41.8)		78.9 (16.6)	79.3 (39.3-100)	
Female	188 (60.7)	57 (30.3)	56 (29.8)	75 (39.9)		79.7 (16.9)	80.4 (31.5-100)	
Age					0.283			0.254**
<35	43 (13.9)	9 (20.9)	17 (39.5)	17 (39.5)		84.0 (16.4)	90.6 (45.7-100)	
35-49	117 (37.74)	41 (35.0)	34 (29.1)	42 (35.9)		78.6 (17.7)	79.4 (39.3-100)	
50-64	111 (35.81)	34 (30.6)	25 (22.5)	52 (46.8)		78.2 (15.9)	79.2 (31.5-100)	
65+	39 (12.58)	11 (28.2)	13 (33.3)	15 (38.5)		80.2(16.5)	77.2 (41.4-100)	
Race/Ethnicity					0.739			0.609**
White or other	126 (40.7)	38 (30.9)	40 (41.2)	48 (38.3)		80.4 (17.0)	80.4 (44.4-100)	
Hispanic	39 (12.6)	15 (38.5)	10 (26.6)	14 (35.9)		76.2 (16.5)	71.9 (39.3-100)	
African American	48 (15.5)	12 (25)	12 (25.0)	24 (50.0)		79.5 (15.4)	77.9 (51.1-100)	
Asian	97 (31.3)	30 (30.9)	27 (27.8)	40 (41.2)		79.3 (17.4)	80.4 (31.5-100)	
Position					0.087			0.026**
General Medicine	68 (21.9)	20 (29.4)	26 (38.2)	22 (32.4)		82.0 (17.2)	82.5 (51.1-100)	
Medical Assistant	30 (9.7)	8 (26.7)	8 (26.7)	14 (46.6)		79.5 (15.8)	78.8 (45.7-100)	
Nurse	57 (18.4)	15 (26.3)	24 (42.1)	18 (31.6)		84.2 (16.3)	90.6 (56.9-100)	
Pharmacist/Physical Therapist	30 (9.7)	9(30.0)	7 (23.3)	14 (46.7)		78.6 (16.7)	77.3 (51.1-100)	
Specialty MD	95 (30.7)	30 (31.6)	19 (20.0)	46 (48.4)		76.9 (16.5)	77.2 (31.5-100)	
Technician	30 (9.7)	13 (43.3)	5 (16.7)	12 (40.0)		73.1 (17.2)	72.5 (39.3-100)	
Location					0.372			0.706**
Brooklyn	57 (18.4)	21 (36.8)	20 (35.1)	16 (28.1)		79.0 (19.7)	80.4 (31.5-100)	
Midtown Manhattan	74 (23.9)	21 (28.4)	22 (29.7)	31 (41.9)		79.9 (17.3)	80.4 (39.3-100)	
Queens	102 (32.9)	27 (26.5)	30 (29.4)	45 (44.1)		80.6 (15.6)	79.85 (51.1-100)	
Harlem	77 (24.8)	26 (33.8)	17 (22.1)	34 (44.2)		77.7 (15.6)	77.2 (44.4-100)	
Years Employed					0.147			0.117*
0-10	178 (57.4)	52 (29.2)	57 (32.0)	69 (38.8)		80.7 (16.8)	80.4 (80.4-100)	
11+	132 (42.6)	43 (32.6)	32 (24.2)	57 (43.2)		77.7 (16.7)	77.2 (31.5-100)	

*t-test** Anova

Table 2.2 Linear Regression models looking at predictors of scores among those who completed the CS-PAM® (N=310)

	Crude model			Complete multivariate model (n=310)		Final Backward Stepwise Model (n=310)	
	Number	Beta (SE)	P-value	Beta (SE)	P-value	Beta (SE)	P-value
Gender							
Male	122	-0.87 (1.95)	0.657	1.22 (2.25)	0.588		
Female	188	Ref.		Ref.			
Age							
<35	43	Ref.		Ref.			
35-49	117	-5.38 (2.99)	0.073	-5.82 (3.24)	0.073		
50-64	111	-5.72 (3.01)	0.058	-7.31 (3.47)	0.036		
65+	39	-3.78 (3.70)	0.308	-5.88 (4.27)	0.169		
Race/Ethnicity							
White or other	126	Ref.		Ref.			
Hispanic	39	-4.17 (3.08)	0.177	-4.48 (3.42)	0.191		
African American	48	-0.91 (2.85)	0.750	-1.60 (3.00)	0.594		
Asian	97	-1.07 (2.27)	0.637	-2.69 (2.44)	0.271		
Position							
General Medicine	68	Ref.		Ref.			
Medical Assistant	30	-2.48 (3.64)	0.496	-2.40 (4.07)	0.555		
Nurse	57	2.23 (2.98)	0.456	1.06 (3.27)	0.745		
Pharmacist/Physical Therapist	30	-3.41 (3.63)	0.348	-5.81 (4.01)	0.149		
Specialty MD	95	-5.04 (2.64)	0.0570	-6.42 (2.80)	0.022	-4.63 (2.07)	0.026
Technician	30	-8.88 (3.64)	0.015	-10.37 (4.03)	0.011	-9.19 (1.97)	0.005
Location							
Brooklyn	57	-0.84 (2.96)	0.778	0.70 (2.97)	0.813		
Midtown Manhattan	74	Ref.		Ref.			
Queens	102	0.69 (2.57)	0.789	1.65 (2.61)	0.527		
Harlem	77	-2.22 (2.74)	0.419	-1.03 (2.84)	0.718		
Years Employed							
0-10	178	Ref.		Ref.			
11+	132	-3.02(1.92)	0.117	-2.84 (2.09)	0.174	-4.90 (1.97)	0.013

Table 2.3 Logistic Regression Model Looking at the Odds of Scoring High vs. Medium or Low among those who completed the CS-PAM® (N-310)

	Crude model			Complete multivariable model (n=310)		Final Backward Stepwise Model (n=310)	
	Number	Odds Ratio (95% Confidence Interval)	P-value	Odds Ratio (95% Confidence Interval)	P-value	Odds Ratio (95% Confidence Interval)	P-value
Gender							
Male	122	0.87 (0.53, 1.45)	0.603	1.14 (0.60, 2.17)	0.695		
Female	188	Ref.		Ref.			
Age							
<35	43	Ref.		Ref.			
35-49	117	0.63 (0.30, 1.30)	0.209	0.56 (0.24, 1.32)	0.182		
50-64	111	0.45 (0.21, 0.95)	0.036	0.31 (0.12, 0.81)	0.017		
65+	39	0.77 (0.31, 1.89)	0.561	0.48 (0.15, 1.51)	0.209		
Race/Ethnicity							
White or other	126	Ref.		Ref.			
Hispanic	39	0.74 (0.33, 1.67)	0.469	0.80 (0.30, 2.13)	0.648		
African American	48	0.72 (0.34, 1.52)	0.386	0.65 (0.27, 1.54)	0.320		
Asian	97	0.83 (0.46, 1.48)	0.528	0.65 (0.33, 1.28)	0.213		
Position							
General Medicine	68	Ref.		Ref.			
Medical Assistant	30	0.59 (0.23, 1.51)	0.270	0.47 (0.15, 1.47)	0.195		
Nurse	57	1.18 (0.57, 2.41)	0.660	0.99 (0.43, 2.30)	0.982		
Pharmacist/Physical Therapist	30	0.54 (0.19,1.30)	0.154	0.32 (0.09,0.96)	0.042		
Specialty MD	95	0.40 (0.20, 0.81)	0.011	0.30 (0.13, 0.65)	0.003	0.46 (0.26, 0.84)	0.011
Technician	30	0.32 (0.11, 0.95)	0.034	0.20 (0.06, 0.71)	0.012	0.33 (0.12, 0.92)	0.034
Location							
Brooklyn	57	1.28 (0.61, 2.67)	0.515	1.70 (0.75, 3.12)	0.202		
Midtown Manhattan	74	Ref.		Ref.			
Queens	102	0.99 (0.51, 1.90)	0.964	1.22 (0.58, 2.53)	0.602		
Harlem	77	0.67 (0.32, 1.40)	0.285	0.85 (0.37, 1.93)	0.696		
Years Employed							
0-10	178	Ref.		Ref.			
11+	132	2.12 (0.40,1.12)	0.135	0.66 (0.37, 1.19)	0.814	0.46 (0.26, 0.81)	0.007

Table 2.4 Imputed Model Linear Regression models looking at predictors of scores among those who completed the CS-PAM® (N=341)

	N= 341	Crude Beta(SE)	P	Adjusted Beta (SE)	P	Backward Stepwise Regression with p<.02(SE)	P
Gender							
Male	214	-0.81(1.79)	0.653	1.10(2.06)	0.59		
Female	127	Ref.		Ref.			
Age							
<35	52	Ref.		Ref.			
35-49	133	-4.50(2.61)	0.086	-6.01(2.79)	0.032	-3.20(2.13)	0.135
50-64	116	-4.89(2.67)	0.068	-6.86(3.10)	0.028	-4.06(2.28)	0.076
65+	40	-3.02(3.36)	0.370	-4.41(3.81)	0.248		
Race/Ethnicity							
White or other	137	Ref.		Ref.			
Hispanic	49	3.44(2.67)	0.198	-3.80(3.06)	0.216		
African American	54	-0.84(2.58)	0.745	-1.67(2.74)	0.542		
Asian	101	-0.99	0.638	-2.73(2.25)	0.226		
Position							
Gen Med	69	Ref.		Ref.			
Medical Assistant	33	-2.45(3.35)	0.465	-2.13(3.72)	0.568		
Nurse	60	2.02(2.79)	0.469	1.05(3.05)	0.730		
Pharmacist/Physical Therapist	33	-3.30(3.35)	0.326	-5.52(3.69)	0.136	-4.93(3.07)	0.110
Specialty MD	103	-4.81(2.46)	0.052	-5.60(2.57)	0.030	-4.99(1.99)	0.013
Technician	43	-6.93(3.08)	0.025	-8.55(3.57)	0.017		
Location							
Brooklyn	65	-0.75(2.67)	0.778	0.09(2.67)	0.973		
Midtown Manhattan	81	Ref.		Ref.			
Queens	109	0.65(2.35)	0.781	0.89(2.38)	0.707		
Harlem	86	-1.99(2.48)	0.422	-2.72(1.92)	0.158		
Years Employed							
0-10	203	Ref.		Ref.			
11+	138	-2.79(1.76)	0.114	-2.72(1.92)	0.158	-3.01(1.82)	0.098

Table 2.5 Imputed Model Logistic Regression Model Looking at the Odds of Scoring High vs. Medium or Low among those who completed the CS-PAM® (N=341)

	N	Crude Odds Ratio (CI)	p	Adjusted Odds Ratio (CI)	p	Backward stepwise regression using p < .02 (CI)	p
Gender							
Male	214	-0.99(0.60,1.63)	0.970	1.33(0.71,2.48)	0.375		
Female	127	Ref.		Ref.			
Age							
<35	52	Ref.		Ref.			
35-49	133	0.71(0.35,1.42)	0.330	0.51(0.23,1.16)	0.107	0.61(0.33,1.14)	0.120
50-64	116	0.57(0.27,1.17)	0.126	0.35(0.14,0.87)	0.024	0.41(0.21,0.79)	0.008
65+	40	0.99(0.41,2.4)	0.984	0.70(0.24,2.05)	0.511		
Race/Ethnicity							
White or other	137	Ref.		Ref.			
Hispanic	49	0.62(0.28,1.37)	0.236	0.71(0.27,1.84)	0.474		
African American	54	0.69(0.33,1.45)	0.331	0.65(0.28,1.50)	0.310		
Asian	101	0.89(0.50,1.57)	0.676	0.69(0.36,1.34)	0.277		
Position							
General Medicine	69	Ref.		Ref.			
Medical Assistant	33	0.53(0.21,1.35)	0.181	0.51(0.18,1.53)	0.232	0.48(0.20,1.18)	0.110
Nurse	60	1.10(0.54,1.17)	0.101	1.01(0.44,2.29)	0.986		
Pharmacist/Physical Therapist	33	0.45(0.17,1.17)	0.101	0.30(0.10,0.91)	0.034	0.33(0.13,0.85)	0.021
Specialty MD	103	0.37(0.19,0.75)	0.006	0.30(0.14,0.63)	0.002	0.25(0.19,0.65)	0.001
Technician	43	0.22(0.76,0.62)	0.005	0.16(0.05,0.55)	0.004	0.17(0.06,0.48)	0.001
Location							
Brooklyn	65	1.19(0.58,2.45)	0.632	1.42(0.66,3.08)	0.374		
Midtown Manhattan	81	Ref.		Ref.			
Queens	109	1.02(0.53,1.94)	0.9558	1.16(0.57,2.34)	0.4912		
Harlem	86	0.66(0.32,1.36)	0.2610	0.76(0.34,1.68)	0.2614	0.64(0.34,1.20)	0.1655
Years Employed							
0-10	203	Ref.		Ref.			
11+	138	0.77(0.47,1.28)	0.3135	0.72(0.40,1.28)	0.2614		

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Chapter 3 - Who is Activated? Exploring Variations in Patient Activation among Patients in a Closed Multi-Specialty Ambulatory System

Abstract:

Background: Activated patients are defined as having the knowledge, skills and confidence to manage their own health and health care. Activated patients are more likely to engage in their healthcare and to exhibit healthier behavior, have better outcomes and often present less of a cost burden to the healthcare system. More highly activated patients may be more active partners with their clinicians and share decision making related to their health.

Objective: Describe the level of activation among a sample of patients seeking care at one of four closed system multi-specialty ambulatory health centers overall and by patient age, gender, race/ethnicity, language, marital status, diagnoses, and survey location.

Methods: Data on activation measured with the PAM-10® was collected via a survey of patients (N = 3514) at a large closed multi-specialty ambulatory health system in New York City serving union members, retirees and their families, linked to demographic and health data and analyzed using linear and logistic regression.

Findings: The mean PAM-10® score for patients was 65.84 which is level 3 on a 4 level scale with higher levels indicating more activated. Over 75% of the patients scored in the top two levels (3 or 4). Scores of patients who were over age 50 were significantly lower than those under age 35. Those who were surveyed in Brooklyn scored significantly higher than those surveyed in Midtown Manhattan. The odds of scoring level 4 vs. levels 1, 2 or 3 were significantly lower for those over age 65 and higher for those surveyed in Brooklyn.

Discussion:

Organizations can use patient activation measures to best address patients' needs. Patients with low activation might improve their level of engagement through support and coaching from the health care teams. Patient activation and thus self-management could be improved with interventions designed to support both healthy patients and those with chronic conditions.

Keywords: Patient activation, patient engagement, ambulatory care, PAM-10®

Introduction

The Affordable Care Act reflects the most predominant concerns in the field of healthcare delivery. It includes the ambitious goals of improving access to health care, coordination of care, quality of care, health outcomes and to reducing costs¹ and provides a framework for patient centered care. Healthcare organizations face many challenges to achieving these goals, particularly for patients who have chronic conditions. One possible tool for achieving these goals is engaging patients in their care.² Patient activation (having the knowledge, skills, ability and confidence to manage one's health and healthcare)³ is considered a precursor to engagement (actions people take for their health and to benefit from health care).² Patients' choices about how they manage their health can affect the services they use, the costs of those services and their personal health outcomes⁴ and, in the aggregate, can affect the entire health care system. Although more is becoming known about which patients are more highly activated, results often vary by population or health status. We seek to explore patient activation in a closed multi-specialty ambulatory system that serves union members, retirees and their families.

Patient Engagement and Activation

Evidence suggests that activated and engaged patients are healthier, more adherent to healthcare advice and generally spend less on care.^{3,5-7} Conversely, less activated patients incurred 21% higher costs in one health system.⁷ Although not causally related, high levels of activation have been found to be predictive of and were significantly associated with better health outcomes such as normal range high density lipoproteins (HDL) and triglycerides, and healthy behaviors (non-smokers and not obese),⁸ and obtaining preventive screenings, and self-monitoring health.⁴ High levels of activation have also been found to be associated with lower

levels of unmet medical needs and higher levels of support for self-management from providers.^{4,9,10}

Patient activation is often measured by the Patient Activation Measure® (PAM) tool.(Appendix 3)³ Studies have found wide variation in patient activation level overall, ranging from 38% to 53%. Many of these studies explored results in single health systems.¹¹⁻¹⁴ Studies among patients of ambulatory centers and health centers found no association between activation and age,^{12,15-17} gender,^{13,16,17} race/ethnicity,^{12,13,16,17} education^{13,16} or income.¹³ Results from the National Health Tracking Household Survey, a broad national sample, found that 41% of the population scored at the highest activation level; those younger than 75, those with hypertension and heart disease and those who were white were significantly more likely to score at the highest level.⁴ Another study found that those who were older, white and had fewer health conditions were most activated.¹⁸ Differences in activation have been observed for racial/ethnic minorities, with African Americans and Hispanic/Latinos typically less activated than Whites.^{6,15,18,19} These differences in findings between healthcare system and national samples may be due to the homogeneity of the clinic populations vs. the national sample. In addition, some surveys were done telephonically and not in-person which may affect the responses. We have found no studies that explore associations in a closed system that serves a single population in a closed system.

The current study explores patient activation among a sample of patients who are covered for healthcare by the New York Hotel Trades Council and Hotel Association of NYC, Inc. Health Centers, Inc.(HCI) – which is a large integrated multi-specialty ambulatory healthcare system in New York City that serves only NYC-based unionized hotel workers, retirees and their families (about 90,000 lives). These members use HCI throughout their employment and

provide a rich study population as they are often employed for their entire careers. There are no studies which examine a similar system. Therefore, this study aimed to describe the level of activation (as determined from PAM-10®) overall and by demographic and health characteristics among a sample of 3514 patients seeking care at one of the four multi-specialty ambulatory health centers.

Methods

Data collection

Between September 2015 and February 2016, patients over the age of 18 were invited to complete a survey during their pre-visit triage by either a medical assistant or a nurse when they arrived for an appointment at one of the four HCI healthcare clinics located in Brooklyn, Harlem, Queens and midtown Manhattan. The survey included the PAM-10® measure of patient activation. Health center personnel provided patients with an iPad on which the survey application resided for self-administration. Patients completed the survey privately. Since each health center had a limited supply of iPads and many patient departments, the clinical areas surveyed were rotated each day according to the health center's department schedules so that a sample of patients from each department could be surveyed. Patients were surveyed only once during the study period. Surveys were available in English and Spanish. Patients who had difficulty reading the surveys were able to have the survey read to them by the medical assistant or nurse. In general, the survey took less than 5 minutes to complete.

Survey participation was voluntary. HCI did not determine the reason for refusal to complete the survey, but those patients who did not respond during the first visit were offered the opportunity to participate at each subsequent visit.

HCI provided data in an encrypted file which included patient demographic information and diagnostic codes along with the survey results that were included in the patient file.

Measures

Patient activation was assessed with the PAM-10®, which is a 10 item questionnaire that assesses patient knowledge, skill and confidence for self-care.²⁰ The patient survey consists of 10 belief statements about managing one's health which are answered using a four point Likert scale. The survey asks patients to indicate their level of agreement with statements such as “When all is said and done, I am the person who is responsible for taking care of my health”; “I am confident I can follow through on medical treatments I may need to do at home”; “I am confident I can maintain lifestyle changes like eating right and exercising, even during times of stress.” The 10 question version is derived from the initial 22 question version and the subsequent PAM-10®. The HCI has been and will continue to be administering the survey internally.

The reliability and validity of the PAM® surveys are well documented and described in the literature.^{5,13,21,22} The PAM-13® has high internal consistency with Cronbach's α ranging between 0.87 and 0.91^{3,5,23} in over 180 peer reviewed studies.²⁴ Although there are currently no published studies using results from the PAM-10®, there are comparative reliability statistics that confirm the reliability and validity of the instrument.²⁵ Insignia performed psychometric analysis using Rasch methodology, which creates interval level data from ordinal data (i.e. rating scale responses to survey questions). The resulting calibrations are used to create a theoretical scale of 0 (easy to agree) to 100 (difficult to agree).^{3,5,15} Based on the score, patients are assigned one of four levels of activation based on Insignia's proprietary scoring system. Level 1 indicates a passive recipient of care while Level 4 indicates a highly proactive patient. These levels

represent a continuum of four stages: 1) believes active role is important; 2) has confidence and knowledge to take action; 3) taking action; 4) staying the course under stress.^{3,5,15}

Insignia Health scored the surveys using its own proprietary scoring system and returned the scaled score (0 to 100) and Level (1 through 4) to the HCI electronic health record immediately after completion through an interface designed for this purpose. In these analyses we look at the PAM-10® as a continuous score, as a categorical variable with four categories for descriptive analysis, and dichotomized into an indicator for high (category 4) versus mid-low (categories 1-3) for logistic regression modeling.

Thus the PAM-10® scores were linked to patient record data, including patient demographic and health information, then de-identified and provided to the researcher for these analyses. The de-identified dataset included PAM-10® score and level, patient demographics (age, race/ethnicity, gender and marital status), years in plan, survey location, and ICD-10 diagnostic categories. To avoid potential identification, diagnoses were truncated to ICD-10 diagnostic categories so that individuals with unique diagnoses were not identifiable. ICD-10 diagnostic categories were assessed to determine the most frequently reported categories. Primary and secondary diagnostic categories were used in this study to improve the chances of accurately classifying chronic illness (endocrine, circulatory diseases (including hypertension, heart and vascular diseases), genitourinary or skin) as distinct from acute illness or preventive diagnoses (various symptoms and laboratory findings and factors influencing health status). Age was categorized as <35, 35 – 49, 50 – 64 and 65+. Race/ethnicity was categorized as African-American, Hispanic, White, Asian/Pacific Islander and other as collected by HCI. Marital status was reported as married, single, divorced and widowed. Due to low cell size, divorced and widowed were combined into one category. Languages were categorized as English, Spanish and

other. The location where the survey was administered was identified as Brooklyn, Queens, Midtown Manhattan and Harlem. Appendix 1 contains a list of all variables.

The CUNY Institutional Review Board has determined this study to be exempt from human subjects review.

Data Analysis

For this study, the outcome of interest is Patient Activation, as measured by the PAM-10® which was examined both as a continuous outcome (score) and categorical outcome (4 levels of activation), as is consistent with the literature.^{8,14,26} As calculated by Insignia, patients were classified as Level 1 when scores were at or below 47.3; Level 2 from 47.4 to 52.9; Level 3 from 53 to 72.1 and Level 4 from 72.2 to 100. These ranges are unique to the HCI.

We describe the patients overall and report their Patient Activation Score and Level by patient characteristic and health measures. To test for the statistical significance of differences by patient factors, we used ANOVA or t-tests for activation score as a continuous measure and chi-square test for categorical activation levels.

We then ran crude linear regression models looking at the association of each predictor with PAM-10® score in a separate multivariable model with all predictors in one model to assess adjusted associations. We also examined the crude and adjusted association between patient characteristics and PAM-10® category (4 versus 1-3) using logistic regression. Since race and ethnicity were unavailable for a large percentage of the sample (n=2267), we conducted the main analyses excluding race/ethnicity. However, we also ran the models including race/ethnicity in the smaller subsample for which this information was available to assess whether and how race/ethnicity was associated with patient activation and if the addition of this variable had a substantial impact on the association of other variables with patient activation (i.e. sensitivity

analysis). All analyses were conducted using SAS v9.4 at $\alpha=0.05$.

Results

The mean patient PAM-10® score was 65.84 (SD 16.75) which is level 3. (Table 3.1) The average age of the sample was 51.68 (SD=15.63), 41.9% of the sample was male, and the majority were married (59.2%) and spoke English (94.7%). Over 60% of the patients were between age 35 and 64. Over half of the patients had a chronic condition (53.4%). Survey location was fairly evenly distributed, ranging from 23.5% (Midtown Manhattan) to 26.1% (Harlem). Mean PAM-10® score was lower with age (age <35=67.7, age 35-49=66.15, age 50-64=65.22, age 65+=65.07, $p=0.011$), but those in the highest PAM-10® category were more likely to be in the middle age range (age <35=19.7%, age 35-49=26.4%, age 0-64=34.6%, age 65+=19.4%, $p=0.024$).) Mean PAM-10 score also varied by location (Brooklyn = 68.14, Midtown Manhattan =65.13, Harlem=65.70 and Queens=64.06, $p<0.0001$) but those in Brooklyn were more likely to be in the highest level (Brooklyn=34.5%, Midtown Manhattan=24.1%, Harlem=28.1%, and Queens=21.5%, $p<0.0001$) Those speaking languages other than English or Spanish were more likely to score in the highest level (Other=36.0%, English=27.2% and Spanish=25%, $p=0.004$). Data for race/ethnicity were limited since HCI only recently began collecting this information. However, for those for whom information was collected (N= 1247), African Americans and Hispanics represented the largest proportion of the population (25.4% and 27.2% respectively). Although we had race/ethnicity data for only about one-third of the population, results varied significantly in CS-PAM® score (White=66.04, African American=64.32, Hispanic=64.44 and Asian/Pacific Islander=68.08, $p=0.049$) and highest CS-PAM® level (White=26.2%, African American=23.6%, Hispanic=23.1%, Asian/Pacific Islander=25.4% and Other race=15.4%, $p=0.018$ (Table 3.1).

In the crude linear regression model, age was significantly negatively associated with PAM-10® score increasing by age category (age 35-49 $\beta=-1.5$, $p=0.82$; age 50-64 $\beta=-2.5$, $p=0.003$; age 65+ $\beta=-2.63$, $p=0.004$ all compared to age<35). PAM-10® scores were significantly positively associated among those surveyed in Brooklyn ($\beta=2.84$, $p=0.0004$) compared to Midtown Manhattan. Race was significantly negatively associated with PAM-10® score (African American $\beta=-2.03$, $p=0.035$, Hispanic $\beta=-1.91$, $p=0.020$ compared to White). Having circulatory diseases was significantly negatively associated with PAM-10® scores ($\beta=-3.22$, $p<0.0001$) when compared to endocrine disease. In the adjusted linear model including all predictors except race/ethnicity there was a significant negative association with ages 50-64 ($\beta=-2.04$, $p=0.023$) and 65+ ($\beta=-2.21$, $p=0.026$) compared to <35. Circulatory disease was significantly negatively associated with PAM-10® scores ($\beta=-3.16$, $p=0.003$). In the adjusted model where only those with race information were analyzed, being African American was significantly negatively associated with PAM-10® score ($\beta=-3.21$, $p=0.027$) compared to White and being surveyed in Brooklyn was significantly positively associated with CS-PAM® score ($\beta=3.16$, $p=0.040$) (Table 3.2).

In the crude logistic regression models the odds of scoring the highest level (level 4) was 0.77 times lower for those aged 50-64 ($p=0.015$) and 0.70 times lower for those over 65 ($p=0.003$) than for those age < 35 and these were significant. The odds for patients surveyed in Brooklyn were significantly higher than that of those surveyed in Midtown Manhattan (OR= 1.66, $p<0.000$). Significantly higher odds were found for those with a preventive diagnosis (Factors) (OR=1.20 $p=0.049$) and significantly lower odds for those with circulatory diseases (OR=.66, $p=0.001$) when compared to Endocrine disease. In the adjusted logistic model including all predictors except race/ethnicity, significantly lower odds were found among those

aged 65+ (OR=.73, p=0.021) compared to those <35. Significantly higher odds were found among those surveyed in Brooklyn (OR=1.67, p<0.000) compared to Midtown Manhattan. Those with circulatory diseases had significantly lower odds (OR=.67, p=0.009) compared to those with endocrine illness. In the model including only those for whom we had race/ethnicity, African Americans had significantly lower odds of scoring high compared to Whites (OR=.65, p=0.049) and those surveyed in Queens had significantly lower odds of scoring high compared to Midtown Manhattan (OR=.62, p=0.021) (Table 3.3).

Discussion

In our study, most patients scored level 3 (52.6%), followed by level 4 (27.2%). In other studies, a much higher proportion scored at the highest level of activation (38 – 53%).^{4,12,13,16,17} Our analyses suggest that patients who are younger than 35 score higher on the PAM-10® although this association was not significant.

Given that survey location was significantly associated with both PAM-10® scores and levels in our study, it is important to further analyze the reasons for these differences. These might be due to survey administration differences, location processes, clinicians or populations being served. Nevertheless, overall, patients at HCI did not score as high as patients in other studies. Since patients were often preselected to participate in prior studies it is possible that our study is more indicative of scores expected in populations that are more randomly selected. Regardless of the reasons, HCI has an opportunity to improve its patients' outcomes and perhaps to decrease costs by establishing programs to encourage patient engagement as those scoring in the lowest levels have been found to be predictive of higher costs in other studies.²⁰

Future studies about patient activation might examine patient costs and health outcomes to determine if there is an association between these and activation as this might provide an additional view of the role activation plays in these outcomes. Few studies have examined costs associated with lower activated patients although there is some evidence that higher levels of activation are associated with lower costs¹⁴. Patient activation has been shown to be a changeable attribute that health plans can affect through directed patient coaching and support provided by trained clinicians.²⁰ HCI might benefit from implementing such coaching for their patients. More activated patients tend to be more proactive in their health care and as a result often exhibit healthier behaviors and achieve better health outcomes.^{7,14,17} Future studies could evaluate the success of coaching by conducting follow-up surveys and analyzing changes in survey results, costs and health outcomes.

Limitations

This study has several limitations. The survey was self-administered and some may not have answered accurately due to misunderstanding of the question or social desirability bias. Since we only included patients from a single health system with a population that was fully insured, our ability to generalize to other settings and populations is limited. The method of survey administration was not observed so it is possible that there was selection bias in the way patients were invited to participate or in the way the survey was presented to potential participants, which may explain the differences in results by location. There could also be differences in the patient populations across health center locations which were not evaluated in this study. In addition, we do not have information about those who refused to participate or who were not invited to participate and it is possible that participants were systematically different from the non-participants. Finally, our population has access to healthcare that other

studied populations may not have. This could account for some of the observed scoring differences.

Conclusion

Knowing patient's activation scores may provide a way to target face-to-face support and counseling to those less activated. Low levels of activation have been associated with higher costs and poor health outcomes. With limited resources, healthcare organizations need to find methods to best utilize their resources while getting and keeping patients healthy. Patient activation levels might increase with interventions designed to increase patient self-management. Employing a patient-centered approach that uses patient activation measures to best address patient's needs can position organizations such as HCI to influence and improve a patient's ability to self-manage and engagement which can lead to improved health outcomes and reduced costs.

Table 3.1. Sample description, patient demographics and other characteristics, PAM10® Scores and Levels(n=3514)

	Number (%)	Mean PAM Scores (SD)	Median PAM Scores (Range)	P-value for *t-test or **ANOVA	Level 1 0-47.3, N (%)	Level 2 47.4-52.9, N (%)	Level 3 53-72.1, N (%)	Level 4 72.2-100, N (%)	P-value for chi-square test
Full Sample	3514	65.84 (16.75)	62.60 (0-100)		182 (5.2%)	528 (15.0%)	1848 (52.6%)	956 (27.2%)	
Gender				0.225*					0.427
Male	1473 (41.9%)	65.44 (16.30)	62.60 (0-100)		77 (5.2%)	221 (15%)	795 (54.0%)	380 (25.8%)	
Female	2041 (58.1%)	66.13 (17.07)	62.60 (0-100)		105 (5.1%)	307 (15.0%)	1053 (51.6%)	576 (28.2%)	
Age				0.011**					0.024
<35	601 (17.1%)	67.70 (16.57)	65.80 (0-100)		24 (4.0%)	80 (13.3%)	309 (51.4%)	188 (31.3%)	
35-49	865 (24.6%)	66.15 (17.52)	62.60 (0-100)		42 (4.9%)	142 (16.4%)	429 (56.6%)	252 (29.1%)	
50-64	1279 (36.4%)	65.22 (16.80)	59.30 (0-100)		76 (5.9%)	199 (15.6%)	673 (52.6%)	331 (25.9%)	
65+	769 (21.9%)	65.07 (15.81)	59.30 (0-100)		40 (5.2%)	107 (13.9%)	437 (56.8%)	185 (24.1%)	
Race/Ethnicity				0.049**					0.018
White	221 (17.7%)	66.04 (14.83)	62.60 (21.7-100)		8 (3.6%)	27 (12.2%)	128 (57.9%)	58 (26.2%)	
African American	343 (27.5%)	64.32 (16.63)	59.30 (0-100)		27 (7.9%)	63 (18.4%)	171 (49.6%)	81 (23.6%)	
Hispanic	497 (39.9%)	64.44 (16.31)	59.30 (0-100)		25 (5.0%)	74 (14.9%)	283 (56.9%)	115 (23.1%)	
Asian/Pacific Islander	173 (13.6%)	66.08 (15.03)	62.60 (40.9-100)		5 (2.9%)	23 (13.3%)	101 (58.4%)	44 (25.4%)	
Other	13 (0.01%)	58.68 (23.46)	56.00 (0-100)		2 (15.4%)	1 (7.7%)	8 (61.5%)	2 (15.4%)	
Marital Status				0.148**					0.679
Married	2081 (59.2%)	65.38 (16.85)	59.30 (0-100)		108 (5.2%)	324 (15.6%)	1105 (53.1%)	544 (26.1%)	
Single	1395 (39.7%)	66.49 (16.60)	62.60 (0-100)		73 (5.2%)	199 (14.3%)	722 (51.6%)	401 (28.7%)	
Divorced or Widowed	38 (1.1%)	67.06 (16.14)	62.60 (39-100)		1 (2.6%)	5 (13.2%)	21 (5.3%)	11 (28.9%)	
Language				0.230**					0.004
English	3328 (94.7%)	65.89 (16.58)	62.60 (0-100)		163 (4.8%)	493 (14.8%)	1768 (53.1%)	904 (27.2%)	
Spanish	136 (3.9%)	63.77 (20.25)	56.00 (0-100)		16 (11.8%)	27 (19.9%)	59 (43.4%)	34 (25.0%)	
Other	50 (1.4%)	67.99 (17.51)	62.60 (39-100)		3 (6.0%)	8 (16.0%)	21 (42.0%)	18 (36.0%)	
Survey Location				<.0001**					<0.0001
Brooklyn	913 (26.0%)	68.14 (17.77)	65.80 (0-100)		45 (4.9%)	122 (13.4%)	431 (47.2%)	315	
Midtown Manhattan	826 (23.5%)	65.30 (15.09)	62.60 (24.1-100)		34 (41.2%)	119 (14.4%)	474 (57.4%)	199 (24.1%)	
Harlem	918 (26.1%)	65.70 (18.18)	62.60 (0-100)		65 (7.1%)	163 (17.8%)	432 (46.8%)	258 (28.1%)	
Queens	857 (24.4%)	64.06 (15.25)	59.30 (0-100)		38 (44.3%)	124 (14.5%)	511 (59.6%)	184 (21.5%)	
ICD***				0.225**					0.029
Endocrine	918 (26.5%)	66.04 (16.46)	62.60 (0-100)		45 (4.9%)	127 (13.8%)	503 (54.8%)	243 (26.5%)	
Various	747 (21.6%)	65.12 (16.65)	59.30 (0-100)		45 (6.0%)	128 (17.1%)	373 (49.9%)	201 (26.9%)	
Factors Influencing Health									
Circulatory	490 (14.2%)	63.05 (15.96)	59.30 (0-100)		20 (22.2%)	63 (12.9%)	165 (33.7%)	63 (12.9%)	
Genitourinary	294 (8.5%)	65.36 (18.21)	59.30 (0-100)		8 (2.7%)	17 (5.8%)	78 (26.5%)	243 (82.7%)	
Skin	146 (4.2%)	66.89 (15.57)	65.80 (0-100)		4 (2.7%)	21 (14.4%)	77 (47.9%)	45 (30.8%)	

***ICD-10 Factors Influencing Health include preventive care diagnoses; Various includes reviewing results or episodic care

Table 3.2. Linear Regression models looking at predictors of scores on PAM10® among survey participants (N=3514)

N= 3514	N	Crude beta (SE) (n=3514)	P	Adjusted beta (SE)(excluding race variable) (n=3514)	P	Adjusted beta (SE) including race (n=1247)	P
Gender	3514						
Male	1473	-0.70 (0.57)	0.225	0.11(0.58)	0.849	-0.79(0.96)	0.410
Female	2041	Ref.				Ref.	
Age	3514						
<35	601	Ref.		Ref.		Ref.	
35-49	865	-1.54 (0.89)	0.082	-1.11(0.94)	0.239	0.47(1.76)	0.788
50-64	1279	-2.47 (0.83)	0.003	-2.04(0.90)	0.023	0.05(1.67)	0.977
65+	769	-2.63 (0.91)	0.004	-2.21(0.99)	0.026	0.84(1.77)	0.635
Race/ethnicity	1247						
White	221					Ref.	
African American	343	-2.03 (0.96)	0.035			-3.21(1.45)	0.027
Hispanic	497	-1.91 (0.82)	0.020			-1.49(1.32)	0.261
Asian/Pac Islander	173	-0.27 (1.32)	0.838			0.00(1.64)	0.999
Other race	13	-7.67 (4.65)	0.099			-6.58(4.64)	0.157
Marital status	3514						
Married	2081	Ref.		Ref.		Ref.	
Single	1395	1.10 (0.58)	0.057	0.29(0.63)	0.643	1.11(1.03)	0.284
Divorced or widowed	38	1.67 (2.74)	0.542	1.73(2.74)	0.528	3.80(4.36)	0.383
Language	3514						
English	3328	Ref.		Ref.		Ref.	
Spanish	136	-2.13 (1.47)	0.147	-1.96(1.48)	0.185	1.25(2.27)	0.582
Other	50	2.10 (2.39)	0.379	1.39(2.39)	0.561	3.42(2.90)	0.239
Location	3414						
Midtown Manhattan	826	Ref.				Ref.	
Brooklyn	913	2.84 (0.80)	0.0004	2.85(0.81)	0.0004	3.16(1.53)	0.040
Harlem	918	0.40 (0.80)	0.620	0.23(0.81)	0.775	-2.93(1.67)	0.081
Queens	857	-1.24 (0.81)	0.128	-1.34(0.82)	0.104	-1.90(1.39)	0.171
ICD							
Endocrine	918	Ref.		Ref.		Ref.	
Various	747	-0.86 (0.69)	0.211	-1.09(0.74))	0.065	-0.53(1.31)	0.687
Factors Influencing Health	718	1.14 (0.70)	0.105	0.85(0.80)	0.869	1.46(1.49)	0.326
Circulatory	490	-3.22 (0.82)	<.0001	-3.16(1.03)	0.003	-2.92(1.69)	0.084
Genitourinary	294	-0.26 (1.02)	0.800	-0.85(1.50)	0.413	0.90(2.62)	0.731
Skin	293	-1.11 (1.01)	0.915	0.68(1.45)	0.650	1.07(2.35)	0.647

Table 3.3. Logistic regression models looking at the odds of scoring Level 4 vs. Levels 1, 2, and 3 among all participants in PAM-10® survey (n=3514).

	Number in Crude Models	Crude Odds Ratio (95% CI) (excluding race variable) N=3514	P	Adjusted Odds Ratio (95% CI) (excluding race variable) (N=3514)	P	Adjusted Odds Ratio excluding race (95% CI) (N=1247)	P
Gender	3514						
Male	1473	0.88 (0.76, 1.3)	0.111	0.97(0.83, 1.14)	0.713	0.91(0.68,1.21)	0.514
	0.91(0.68,1.21)	0.5140	Ref.	Ref.		Ref.	
Age	3514						
<35	601	Ref.		Ref.		Ref.	
35-49	865	0.90 (0.72, 1.13)	0.377	0.96(0.75, 1.22)	0.731	1.06(0.64,1.77)	0.811
50-64	1279	0.77 (0.62, 0.95)	0.015	0.81(0.64,1.02)	0.075	0.99(0.61,1.60)	0.953
65+	769	0.70 (0.55, 0.88)	0.003	0.73(0.56,0.96)	0.021	0.94(0.56,1.57)	0.799
Race/Ethnicity	1247						
White	221	Ref.				Ref.	
African American	343	0.77 (0.59, 1.00)	0.050			0.65(0.43,1.00)	0.049
Hispanic	497	0.75 (0.60, 0.94)	0.012			0.86(0.59,1.26)	0.433
Asian/Pacific Islander	173	0.85 (0.60, 1.21)	0.358			0.92(0.58,1.48)	0.738
Other	13	0.45 (0.10,2.04)	0.302			0.47(0.10,2.27)	0.348
Marital status	3514						
Married	2081	Ref.		Ref.		Ref.	
Single	1395	1.14 (0.98, 1.33)	0.091	1.04(0.88,1.23)	0.662	1.12(0.83,1.51)	0.475
Divorced or widowed	38	1.15 (0.57, 2.34)	0.697	1.20(0.59,2.45)	0.618	1.62(0.52,5.12)	0.408
Language	3514						
English	3328	Ref.		Ref.		Ref.	
Spanish	136	0.89 (0.60, 1.33)	0.578	0.90(0.60,1.34)	0.601	0.92(0.47,1.80)	0.809
Other	50	1.51 (0.84, 2.70)	0.167	1.37(0.76,2.48)	0.295	1.61(0.77,3.35)	0.208
Location	3514						
Brooklyn	913	1.66 (1.35, 2.05)	<.0001	1.67(1.35,2.07)	<.0001	1.51(0.99,2.31)	0.053
Midtown Manhattan	826	Ref.		Ref.	Ref.	Ref.	
Harlem	918	1.23 (0.99, 1.53)	0.057	1.20(0.96,1.49)	0.1058	0.68(0.42,1.12)	0.129
Queens	857	0.86 (0.69, 1.08)	0.200	0.86(0.68,1.08)	0.1853	0.62(0.42,0.93)	0.021
ICD	*						
Endocrine	918	Ref.		Ref.		Ref.	
Various	747	0.99 (0.82, 1.19)	0.914	0.97(0.79,1.17)	0.396	1.06(0.72,1.58)	0.764
Factors Influencing Health	718	1.20 (1.00, 1.44)	0.049	1.13(0.92,1.39)	0.932	1.52(0.99,2.32)	0.052
Circulatory	490	0.66 (0.53, 0.94)	0.001	0.67(0.50,0.90)	0.009	0.89(0.53,1.48)	0.645
Genitourinary	294	0.89 (0.68, 1.18)	0.421	0.82(0.54,1.23)	0.206	0.86(0.38,1.97)	0.724
Skin	293	1.01 (0.77, 1.32)	0.937	1.17(0.81,1.69)	0.383	1.41(0.72,2.77)	0.317

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Chapter 4 - Does Primary Care Physician Support for Patient Self-Management Moderate the Association between Patient Activation and Patient Portal Use?

Abstract

Background: Clinicians have been asked to engage their patients in shared decision making and encourage patient self-management in order to improve healthcare quality, outcomes and costs. Patient portals are one way healthcare services encourage patients to become more engaged with their healthcare. Patient views about their ability to self-manage as well as primary care physician beliefs about their patients' self-management may be determinants of patient portal use.

Objective: To explore the association of primary care physician beliefs about patient self-management, patients' views about their own ability to self-manage and patient and provider characteristics with patient portal usage.

Methods: Data from a patient activation measure (PAM-10®) and a parallel survey on provider views about patient activation (CS-PAM®) conducted at a multi-specialty ambulatory health system in New York City were examined along with patient and provider characteristics to determine their potential association with patient portal usage.

Findings: Only 245 (8.5%) of the sample of 2886 patients used the patient portal during the study period, despite the fact that over 79% of the patients scored high on patient activation and 54.3% of the patients had physicians who also scored at high in their support for patient activation. Neither patient activation nor physician support for patient activation were significantly associated with patient portal usage. Both patient and physician age were the strongest predictor of overall portal usage, with both patients and physicians under age 35 most likely to use the portal.

Discussion: The low level of patient portal use despite high levels of patient activation and physician support for activation coupled with the association with both patient and physician age suggests that comfort with and access to technology may be a key barrier to portal usage among older patients and patients with older physicians.

Keywords: Patient portals, Clinician support for patient self-management, patient activation, patient self-management

Introduction

Many healthcare organizations and providers have implemented electronic patient portals to permit providers and patients to share data from electronic health records and allow patients to perform some administrative functions independently. Studies have investigated which patients are more likely to use portals, but no studies have looked at whether primary care physician characteristics and views about the importance of patient self-management might influence patients' use of these tools. In this study, we aim to identify the association of both patient and physician characteristics, including patient activation and physician support for patient activation, with use of an electronic patient portal.

A patient portal is a secure online website, usually tethered to an electronic health record (EHR) and owned by a health care organization or provider¹ that gives patients with an internet connection 24-hour access to personal health information from anywhere. Designs and features of portals vary, but often let patients schedule appointments,^{2,3} refill prescriptions,² and access laboratory or radiology results.^{4,56} Some portals also offer web-based access to a patient's medical records including physician notes,⁷ and may allow patients to update their medical history and communicate privately and securely with healthcare providers.⁸ Advanced systems are expected to let the patient upload real time results such as blood pressure, A1C levels, weight and physical activity from personal devices that can then be viewed by providers and patients.⁹

This technology has often been introduced as part of an electronic health record (EHR) to meet standards of meaningful use (a Medicare incentive for use of EHRs).^{10,11} Thus, health plans and providers are being incentivized to introduce patient portals and demonstrate usage; they may face penalties in Medicare reimbursement if they fail to adopt them.^{10,12} Portals are expected

to be a means to share information and keep patients (and potentially providers) informed about patients' health, thus improving patient engagement, defined as "actions people take for their health and to benefit from health care,"¹³ reduce costs¹⁴⁻¹⁶ and improve health outcomes.^{14,16-18}

Patient portals may provide a means to engage patients more fully with their health care providers¹⁹ through the use of the features that can inform patients about their health and health care. Portals may also enhance personal empowerment, and improve preventive behaviors and medication adherence^{20,21} and have been associated with better health outcomes and lower costs.^{22,23} Some of the functions of patient portals, such as scheduling appointments or refilling prescriptions, serve administrative functions for both patients and providers, allowing a redistribution of resources in a "time-squeezed environment".²⁴ Patient interaction with non-administrative functions (i.e. viewing laboratory results, emailing a provider or viewing a medical record) can be a potential indicator of patient engagement.^{25,26}

Patients may find portals appealing as a substitute for in-person visits or telephone calls, offering anytime contact or information at times most convenient to the patient.²⁷ From a patient perspective, portals can compensate for short office visits and any lack of understanding of the doctor's communication by offering post-visit access to information - thereby clarifying information that may not have been clear at the appointment.^{3,4} Providers can also benefit from using portals as they have been found to increase patient access to health care information and satisfaction with their care, support care between visits and improve health outcomes through enhanced safety, while at the same time reducing costs and improving delivery processes.^{28,29} Patient portals can also enhance the use of EHRs, improving communication and interaction between providers and their patients.²⁹

In 2012, over 72% of ambulatory providers surveyed reported full or partial use of electronic health records (EHRs) including patient portals,³⁰ but less than 50% of patients whose providers had portals were aware of them.³¹ Studies reporting patient usage vary in their findings, but range from 2.7% in a Markle study,³² 7% in a California study,³³ 9% in a 2007 national study³⁴ and 17% in a 2013 NYS study.³⁵ While these numbers seem to indicate increasing usage, it's important to note that patients are not reporting on a single system but overall use of any portal available to them such as through an individual or other provider or a health insurance plan.

Patient use of portals may be influenced by many factors including the system design and ease of use, provider endorsement and encouragement and patient characteristics such as age, gender, ethnicity, education, health literacy level, and health status.³⁶ Underutilization might also suggest that patients are not sufficiently engaged to take advantage of patient portals or that providers are not encouraging their patients to use portals. To take full advantage of portals, patients must also possess the “knowledge, skills, ability and confidence” (a typical definition of patient activation) to engage in their health care³⁷ and providers’ support of this activation and self-management may influence the degree to which patients do engage.

Hypertensive patients were found to be significantly less likely to use the portal than those with other conditions³⁸ and hospitalized heart patients had higher rates of usage than non-hospitalized heart patients,^{4,39} which might suggest that severity of illness could have an impact on portal use. However, small sample sizes, differences in features offered or varied study or system designs could also account for the differences in results.

An early study of portal usage (2006) suggests that portal users are generally younger, more likely to be white, more educated, more affluent and healthier than the average patient;⁵ however, later findings are mixed regarding the age, race/ethnicity, gender and clinical needs and outcomes ⁴⁰⁻⁴³ of users versus non-users.^{39,44-46} Many previous studies that report usage have been among chronically ill patients and/or examine specific portal features rather than portal use in general.⁴⁷⁻⁵⁰ Kaiser Permanente, a large integrated health system reported that their portal users were more likely to be females and between ages 40 and 60.⁵¹ The Veterans Administration (VA) found no significant associations with patient characteristics and portal use.⁵² Studies at primary care practices in the Virginia Ambulatory Care Outcomes Network (Acorn) report on all patients^{53,54} and found that older patient with more co-morbidities were more likely than other patients to use the portal. As these studies indicate, there are mixed results suggesting that research in organizations such as HCI can continue to add to the literature.

In most of these studies, providers selected the patients who would get access to the portal and other patients did not get access. Newer evidence suggests that the features offered through the portal (i.e. refilling prescriptions, making appointments, reviewing laboratory or radiology reports, etc.) may influence who uses the portal and could influence adherence to medical advice and medication management.⁵⁵ It is important to continue to identify patient characteristics that could influence portal usage using a broader cross section of patient populations and to try to understand whether and which patients are prepared to engage in health care (i.e. patients are activated) using portals.

Provider support of patient engagement and endorsement of patient portals is not well studied. However, provider factors (encouragement, engagement, trust and better communication) were significantly associated with enrollment and use of patient

portals.^{39,46,47,49,56} In qualitative studies of potential portal usage patients indicated that they would use the portal if providers or family members were advocating for its use.^{36,57} Provider specific barriers to patient use of portals include instructing the patient not to use the portal,⁴⁰ provider themselves not using the portal,⁵⁸ patient assumptions about whether the provider will use the technology or patient concern about potential interruptions of the provider's time or assumptions about a negative effect on provider reimbursements.^{40,58,59} However, it may be difficult to determine whether clinicians influence patient choice to use the portal and/or whether patient use influences provider interaction and support.

The aim of this study is to explore the association of both patient and physician factors with patient portal use, including a measure of patient activation and a parallel measure of primary care physician beliefs about patient engagement among a sample of patients from a large integrated multi-specialty ambulatory system in New York City – the New York Hotel Trades Council and Hotel Association of NYC, Inc. Health Centers, Inc. (HCI). Understanding how patient activation and clinician support for this activation are associated with the use of patient portal use may provide insight into some of the barriers patients face in adopting this new technology.

Methods

Study Setting

The study uses data from a sample of 3514 patients recruited from the waiting rooms of four large multi-specialty ambulatory centers in New York City (the New York Hotel Trades Council and Hotel Association of NYC, Inc. Health Centers, Inc. (HCI) that serve over 90,000 members all of which are NYC- based unionized hotel workers, retirees and their families). Patients were selected for analysis if they had a primary care provider (n=2586) along with their

46 salaried primary care physicians (PCPs). Clinician beliefs about patient self-management was determined based on a previously validated survey (CS-PAM®)¹⁵ and included level of provider support for patient self-management. Surveys were completed by all clinicians employed by HCI from July through September 2015 (n=341). Survey data were collected by HCI for patients over the age of 18 who were seen in pre-visit triage in clinical departments between September 10, 2015 and February 29, 2016.

Variables

We received de-identified patient data that included patient age, gender, marital status, ICD-10 diagnoses category, survey location, number of years enrolled in the health plan, patient portal usage and activation measure (levels 1 through 4). We categorized these variables to make comparisons to the literature when possible. Patient activation was determined based on a previously validated survey (PAM-10®)³⁷ and included patient level of activation (level 1 through 4). Primary and secondary diagnostic categories were used in this study to improve the chances of accurately classifying chronic illness. We categorized diagnostic data as chronic or non-chronic. Chronic illness includes Endocrine, Circulatory (which includes hypertension, heart and vascular diseases), Genitourinary and Skin. All other diagnoses plus well visits and episodic care were categorized as non-chronic. We categorized patient age as <35, 35 – 49, 50 – 64 and 65+. Marital status categories include single and married. Language was categorized as English, Spanish and other as reported by patients as their primary language to HCI. The survey locations were Brooklyn, Queens, Midtown Manhattan and Harlem. We categorized years in plan as 0-5, 6-10 and 11+. Patient portal usage since April 2014 (the date of portal implementation) was reported for all patients surveyed. We received frequency of use by each patient of each of the six portal features, (i.e. view laboratory results, schedule an appointment, renew prescriptions, view patient demographics, view health record and message physician). For

this study, we defined use as accessing one of the six features. We dichotomized portal use into “ever used portal” versus “never used portal” and dichotomized the use of specific features in the same way. Because of extreme scores skewed toward low usage, we analyzed median usage. This approach is a more representative number for this sample.

Primary care provider data included age, gender, race/ethnicity, location of practice, years of practice, years employed at HCI and measure of support for patient activation. Clinician Support for Patient Activation was determined based on a previously validated survey (CS-PAM®)^{60,61} and included primary care physician support for patient activation level (low (score <65, medium(65.1-77.2) or high(77.3-100). We categorized these variables to facilitate comparisons to the literature when possible. Primary care physician age was categorized as < 35, 35 – 49, 50 – 64 and 65+, consistent with the literature.⁶⁰⁻⁶³ Race/ethnicity was reported as White, African-American, Hispanic, and Asian/Pacific Islander as collected by HCI. Years of practice was categorized as zero – 5, 6 - 10, and 11+. Years employed at HCI were categorized as < 10 and, 10+. A full list of variables used in this study can be found in Appendix 1.

The CUNY Institutional Review Board has determined this study to be exempt from human subjects review.

Data Analysis

Frequencies and descriptive statistics were generated to describe the patient sample overall and by patient portal usage (ever versus never) and we describe portal use frequency by patient and their primary care provider characteristic. We assessed the statistical significance of each categorical variable with portal use (even/never) using a chi-square test and with frequency of use with a t-test or ANOVA. We also examined use of specific portal features (i.e. prescription refill, viewing laboratory results, requesting an appointment, viewing demographic

information, viewing health record and emailing provider) as a dichotomous indicator for ever used versus never used.

We used univariate and multivariate logistic regression models to assess the crude and adjusted association of each patient and primary care provider characteristics with ever or never having used the portal. In multivariate analysis, we estimated the degree of clustering by calculating an intra-class correlation to account for observed clustering of multiple patients with individual primary care providers using a General Estimating Equation (GEE) using survey procedures in Stata 13 which allowed us to calculate robust standard errors, thereby inflating the standard errors for within-clinician homogeneity.

To determine whether primary care provider support for patient activation was a potential modifier of the association between patient activation and portal use, we added the interaction term CS-PAM® Level *PAM Level to the multivariable model and, if it was significant, stratified on CS-PAM to assess the direction of the effect modification.

Since race and ethnicity were unavailable for a large percentage of the sample (n=1628), we conducted the main analyses excluding race/ethnicity. However, we also ran the models including race/ethnicity in the smaller subsample for which this information was available to assess whether and how race/ethnicity was associated with patient activation and if the addition of this variable had a substantial impact on the association of other variables with patient activation (i.e. sensitivity analysis).

Results

Over 57% of the patients were female and over 60% were over age 50 and married. About 74% of the patients had more than 11 years in the health plan and about 60% had a

chronic disease. More than 50% of those for whom we had race data were Non-Hispanic African American or Hispanic. Almost 80% of the patients scored level 3 or 4 on the PAM-10®. Most patients had a PCP who was white, female, over age 35 with less than 10 years of employment with HCI. Sixty percent of the patients had PCPs who scored medium or high on the PAM® (Table 4.1).

Overall, only 245 (8.5%) patients had ever used the patient portal. Patient age, survey location and years in plan were significantly association with portal use ($p<.001$, $p=.001$, and $p<.001$ respectively). Physician location was also significantly association with patient portal use ($p<.001$). (Table 4.1)

Patients who used the portal (N=245) used it a median of 10 times (range 1 – 241). Patients over age 65 using the portal had the highest median portal use (20 times), those age 18-24 had the second highest use (12 times) after which there was an apparent negative dose response with age up to age 50-64 years (age 35-49 median=8.5, age 50-64 median=7, $p=0.043$). None of the other variables examined were significantly associated with portal use frequency. (Table 4.1)

Viewing Lab Results (n=220) and viewing Health Records (n=210) (Table 4.2) were the most frequently used features. Those with chronic illness were more likely to use all features except messaging the provider and viewing demographics. Marital status, language and physician years employed were significantly associated with messaging the provider ($p=.039$, $p=.010$ and $p<.001$ respectively). Primary care physician length of employment was also significantly associated with making an appointment ($p=<.001$), messaging the provider ($<.001$) and viewing health records ($p=.030$). Primary care physician years employed was also

significantly associated with using the appointment ($p<.001$), messaging ($p<.001$) and viewing health record ($p=.030$) features.

In the crude multiple logistic regression models (Table 4.3) the odds of ever using the portal was significantly lower in every age group compared to the youngest group (age <35) increasing by age category (35-49 OR .65 $p=.022$; 50-64 OR .40 $p<.001$ and 65+ OR .17 $p<.001$). Patients who had been a member of the HCI for 11+ years (versus 0-5 years) as well as patients whose primary care physician was 65+ years of age (versus <35 years) also had significantly lower odds of portal use (OR=0.49 $p<.001$; OR=0.41 $p=.013$). Odds of using the portal were also significantly less for those surveyed in Midtown (OR .61 $p=.007$), Harlem (OR .59 $p=.010$) and Queens (OR .52 $p<.001$) compared to those surveyed in Brooklyn. Odds of using the portal were significantly less when the physician was located in Midtown Manhattan (OR .59 95% $p=.005$) Harlem (OR .46 $p<.001$) and Queens (OR .55 $p=.001$) than for patients with a physician in Brooklyn. No other variables were significantly associated with portal use. (Table 4.3)

In the adjusted multivariate model (Table 4.3) including all predictors, the lower odds associated with primary care physician located in Harlem (versus Brooklyn) (OR=0.28 $p=.005$) remained significant. The odds of using the portal decreased significantly by clinician age with those between 35 and 49 having an OR of .60, $p=.013$, those 50 to 64 having an odds ratio of .35, $p<.001$ and those over 65 having a OR of .15, $p<.001$. None of the other variables were significantly associated with portal use in the adjusted model. The p-value for joint effects between patient activation and physician support for patient self-management was not statistically significant (p value range .428 - .879) indicating no effect modification. (Appendix 4)

Discussion

If the HCI patient portal was an important and useful tool for more highly activated patients with more highly supportive providers, an association would have been detected between these variables and portal usage. However, this study did not find that more highly activated patients were more likely to use the portal. Neither was usage significantly associated with highly supportive providers.

Patient portal use in this population was low, with only 8.5% of the sample ever having accessed the portal. However, this is consistent with the rates found in other studies which ranged from 2.7% to 17%.^{32-34,64} Neither patient activation level nor physician support for patient self-management were associated with patient portal use, nor was there significant interaction between the two. However, we did find interesting patterns of portal usage by both patient and clinician age. In the crude model, there was a significant negative association between portal usage and age in a dose response pattern as well as a negative association with having been a member in the healthcare plan for more years. These associations, however, were no longer significant in the adjusted model. The age of the patient's primary care clinician, however, was significantly negatively associated with portal usage by the patient in both the crude and the adjusted models. This might indicate that patients with older clinicians are more accustomed to having face to face rather than electronic communication. Older clinicians may also not encourage patients to use the technology. Further qualitative studies might elucidate reasons for this by exploring both patient and physician views of the portal, its features and its applicability to the delivery of healthcare.

Compared to patients recruited from clinics in Brooklyn, those from the Midtown Manhattan, Harlem and Queens Health Centers had significantly lower odds of portal use in the crude models, but not in the adjusted model. However, as with age, location of clinician's practice was associated with portal use in both the crude and the adjusted models; and those with primary care physicians practicing outside of Brooklyn have lower odds of portal usage. This might signal location differences in patient composition (age, degree of illness, etc.), physician age, operations, administrative support or advertising use of the portal.

Of the patients who used the portal, the most common features used were viewing the lab results and viewing the health record. This is consistent with the literature for lab results;⁵ however, the literature suggests that patients also frequently use portals to refill prescriptions.²⁶ These differences may be due to operational differences between HCI and other study organizations. For example, at HCI patients are able to order refills by phone directly to the pharmacy or see their PCPs whenever they need reevaluation; this may minimize the need to use the portal to request prescription refills. Since the design of patient portals differs among organizations, future research might be clearer about the intent of the portal. Understanding usage over time would also help to assess whether portals continue to be attractive to patients. Organizations offering patient portals need to assess whether the physicians support the use of the portal and that there is a mechanism for encouraging its use.

Our findings did not find that the level of patient activation was significantly associated with the use of the portal nor did we find that PCP level of support for self-management modified the association between patient activation level and portal usage. In one study, more activated patients were more likely to use a portal⁶⁵ yet other studies found no differences in patient activation levels between the users and non-users.^{66,67}

Since portals are still fairly new and are designed and used differently by different organizations, comparing results may not be the most effective way to evaluate usage. While it is helpful to understand baseline characteristics of users, these do not fully explain the reasons why patients interact with portals or what benefit they derive. Organizations need to explore how portals are presented to patients and how they are supported by providers. Future research might include a more in-depth qualitative analysis of patients' reasons for using or not using portals and how patients perceive their meaningfulness. Additional qualitative information could also be elicited from the providers to assess their views of the value of the data and its impact on provider-patient communication.

Limitations

This study has several limitations. The patient activation level and clinician support for activation measures were determined based on responses to sets of questions and some may not have answered those questions accurately due to misunderstanding or social desirability bias. We did not observe the method of survey administration so it is possible that there was recruitment or interviewer bias, (e.g. the way patients were recruited for the survey or how the survey was introduced to the patients) which could account for the significant differences in results by location. Survey administration was not random and we do not have information from members of the healthcare plan who were not invited to participate or who refused to, therefore we cannot generalize the study results to those who did not participate in the survey let alone to others who are not members of the HCI plan. Additionally, the primary care physicians may not be similar to those in other organizations, making generalization difficult. For instance, physicians at HCI are salaried and are not compensated on a fee for service basis which might account for differences in practice. Since the physician survey was completed at the request of

the organization's CEO, it is possible that responders were answering in a way that they thought they were expected to respond. This might be different in other environments where physicians are compensated differently and do not engage as closely with management. The survey is a self-report and may differ from the way that physicians actually practice.

Conclusions

Current health policies support the use of patient portals and other technologies to achieve improvements in quality, costs and outcomes. Patient portals are likely here to stay but have not yet reached their fullest potential. Organizations need to continue to study motivators to using patient portals and assure they are meeting the needs of all constituencies. Portal features and functionality are important to consider when assessing patient usage. Future studies might include usability studies and focus groups with patients and providers to see what they find most or least helpful. These might help organizations implement portals in ways that will encourage use and serve the intended purpose.

Since the design and intent of patient portals vary across organizations, it is difficult to truly compare results. However, demographic indicators can point researchers to areas that need further exploration. HCI might also consider workflow changes that incorporate the portal during the clinician encounter. For instance, using the portal during physician encounters to review laboratory results, refill prescriptions or review the medical record might encourage patients to continue to use the technology. HCI is a unique delivery system and as such offers significant potential for additional research. It would be beneficial to HCI to study patient-provider communication and practice norms in their locations to see if differences in these could be influencing patient activation, clinician support for patient engagement and/or portal usage. A

longitudinal study would help to determine whether there is a temporal association between activation and portal use.

Table 4.1. Chi-square analysis testing the bivariate relationship between patient and primary care physician characteristics and portal use, N= 2886

<i>Independent Variables</i>	N(%)	Used Portal			Median Number of Times Used (among those using portal)	
		Yes, N (%)	No, N (%)	<i>p</i> -value for chi-square test	Median(Range)	<i>p</i> -value for ^t ttest or ^{**} ANOVA
Overall	2886	245(8.5%)	2641(91.5)		10(1-241)	
<i>Patient Characteristics</i>						
Patient Activation				.936		.910**
1 (Lowest Level)	161(5.6%)	14(8.7%)	147(91.3)		12(2-88)	
2	424(14.7%)	37(8.7%)	387(91.3)		10(1-211)	
3	1530(53.0%)	125(8.2%)	1405(91.8)		10(1-196)	
4 (Highest Level)	771(26.7%)	69(8.9%)	702(91.1)		8(1-241)	
Gender				.939		.253*
Female	1656(57.4%)	140(8.5%)	1516(91.5)		10(1-196)	
Male	1230(42.6%)	105(8.5%)	1125(91.5)		8(1-241)	
Age				<.001		.043**
18-34 years	447(15.5%)	71(15.9%)	376(84.1)		12(1-196)	
35-49 years	673(23.3%)	74(11.0%)	599(89.0)		8.5(1-211)	
50-64 years	1159(40.2%)	81(7.0%)	1078(93.0)		7(1-241)	
65+ years	607(21.0%)	19(3.1%)	588(96.9)		20(2-162)	
Race				.619		.623**
Non-Hispanic White	180(6.2%)	27(15.0)	153(85.0)		10(2-101)	
Non-Hispanic African American	288(10.0%)	21(7.3)	267(92.7)		9(1-235)	
Hispanic	309(10.7%)	34(11.0)	275(89.0)		14(1-220)	
Asian / PI	150(5.2%)	14(9.3)	136(90.7)		7(2-76)	
Other	231(8.0%)	32(13.9)	199(86.1)		9(1-176)	
Survey Location				.001		.355**
Brooklyn	756(26.3%)	91(12.0%)	665(88.0%)		7(1-196)	
Midtown Manhattan	580(20.0%)	55(17.9%)	536(92.4%)		13(1-114)	
Harlem	718(24.9%)	44(22.5%)	663(92.3%)		10(1-211)	
Queens	832(28.8%)	55(6.6%)	777(93.4%)		10(1-241)	
Years in plan				<.001		.433**
0-5 years	346(12.0%)	46(13.3%)	300(86.7%)		9.5(1-196)	
6-10 years	393(13.6%)	49(2.5%)	344(87.5%)		15(1-211)	
11+ years	2147(74.4%)	150(7.0%)	1997(93.0)		9(1-241)	
Disease State						
Chronic Disease	1747(60.5%)	134(8.4%)	1454(91.6%)	.109	9.5(1-196)	.675*
Non-chronic	1139(39.5%)	100(9.8%)	883(90.2%)	.284	10(1-241)	.599*
Marital Status				.771		.179*
Married	1753(60.7%)	141(8.0%)	1612(92.0%)		9(1-241)	
Single	1133(39.3%)	104(9.1%)	1029(90.9%)		13(1-211)	
<i>Primary Care Physician (PCP) Characteristics</i>						
PCP Location				<.001		.755**
Brooklyn	771(26.7%)	96(12.5%)	675(87.5%)		7(1-196)	
Midtown Manhattan	646(22.4%)	50(7.7%)	596(92.3%)		11.5(1-114)	
Harlem	608(21.1%)	37(6.1%)	571(93.9%)		10(1-211)	
Queens	861(29.8%)	62(7.2%)	799(92.8%)		10.5(1-241)	
CS-PAM® Level				.601		.940**
Low	867(30.0%)	69(8.0%)	798(92.0%)		10(1-162)	
Med	544(18.9%)	43(7.9%)	501(92.1%)		10(2-110)	
High	1475(51.1%)	133(9.0%)	1342(91.0%)		10(1-241)	
PCP Age				.063		.599**
Under 35	155(5.4%)	19(12.3%)	136(87.7%)		10(2-132)	
35-49	1300(45.0%)	119(9.2%)	1181(90.8%)		8(1-211)	
50-64	1114(38.6%)	90(8.1%)	1024(91.0%)		12(1-241)	
65+	317(11.0)	17(5.4%)	300(94.6%)		8(1-63)	

Table 4.1. Chi-square analysis testing the bivariate relationship between patient and primary care physician characteristics and portal use, N= 2886 (continued)

<i>Independent Variables</i>	N(%)	Used Portal			Median Number of Times Used (among those using portal)	
		Yes, N (%)	No, N (%)	<i>p</i> -value for chi-square test	Median(Range)	<i>p</i> -value for *t-test or **ANOVA
PCP Race/Ethnicity				.623		.627**
Non-Hispanic White	1710(59.3%)	59(3.5%)	1651(96.5)		17(2-104)	
Non-Hispanic African American	151(5.2%)	21(13.9%)	130(86.1)		11(1-241)	
Hispanic	189(6.5%)	34(18.0%)	155(82.0)		14.5(1-241)	
Asian / PI	836(29.0%)	14(1.7%)	822(98.3)		7(2-76)	
PCP Gender				.365		.282*
Male	1308(45.3%)	118(9.0%)	1190(91.0%)		11.5(1-211)	
Female	1578(54.7%)	127(8.0%)	1451(92.0%)		7(1-241)	
PCP Years Employed				.486		.294*
<10	2828(98.0%)	241(8.5%)	2587(91.5%)		10(1-241)	
10+	58(2.0%)	4(6.9%)	54(93.1%)		13(2-63)	

Table 4.2: Bivariate Relationship between patient and primary care physician (PCP) characteristics and feature use among those who ever used the portal (n=245).

*t-test **ANOVA	Total Users	Appointment		Lab		Pharmacy		Message	Demographics	View Health Record			
<i>Patient Characteristics</i>	N	Used N(%)	<i>p</i>	Used N(%)	<i>p</i>	Used N(%)	<i>p</i>	Used N(%)	<i>p</i>	Used N(%)	<i>p</i>	Used N(%)	<i>p</i>
	245	119(48.6%)		220(89.8%)		186(75.9%)		144(58.8%)		118(48.1%)		210(85.7%)	
Gender*			.235		.187		.835		.159		.889		.171
Male	105	46(43.8%)		91(86.7%)		79(75.2%)		56(53.3%)		50(47.6%)		86(81.9%)	
Female	140	73(52.1%)		129(92.1%)		33(23.6%)		52(37.1%)		68(48.6%)		124(88.6%)	
Years in Plan**			.372		.159		.998		.294		.532		.640
0-5 years	46	27(58.7%)		43(93.5%)		35(76.1%)		31(67.4%)		23(50.0%)		38(82.6%)	
5-10 years	49	23(47.0%)		47(95.9%)		37(75.5%)		31(63.3%)		27(55.1%)		44(81.6%)	
10+ years	150	69(46.0%)		130(86.7%)		114(76.0%)		82(53.3%)		68(45.3%)		128(85.3%)	
Race/Ethnicity**			.425		.091		.087		.524		.227		.179
White	180	67(37.2%)		19(10.6%)		14(7.8%)		15(8.3%)		13(7.2%)		19(10.6%)	
African American	288	93(32.3%)		17(5.9%)		14(4.9%)		11(3.8%)		8(2.8%)		16(20.8%)	
Hispanic	309	100(32.4%)		30(30.0%)		31(10.0%)		23(7.4%)		56(18.1%)		29(9.4%)	
Asian / Pacific Islander	150	50(33.3%)		12(8.0%)		10(6.7%)		5(3.3%)		7(4.7%)		12(8.0%)	
Other	231	87(37.7%)		13(5.6%)		8(3.5%)		5(2.2%)		6(1.9%)		9(3.9%)	
Age**			.059		.325		.113		.156		.441		.350
18-34	71	44(62.0%)		67(94.3%)		59(83.1%)		48(67.6%)		37(52.1%)		64(90.1%)	
35-49	74	35(47.3%)		66(89.2%)		55(74.3%)		43(58.1%)		37(40.5%)		62(83.8%)	
50-64	81	32(39.5%)		69(85.2%)		55(67.9%)		40(49.4%)		33(40.7%)		66(81.5%)	
65+	19	8(42.1%)		18(94.7%)		17(89.4%)		13(68.4%)		11(57.9%)		18(94.7%)	
Marital Status*			.262		.174		.034		.039		.191		.393
Married	141	61(43.3%)		121(85.8%)		102(72.3%)		74(53.2%)		62(44.0%)		116(82.3%)	
Single	104	58(55.8%)		99(95.2%)		84(80.8%)		70(67.3%)		56(53.8%)		94(90.3%)	

Survey Location**			.126		.091		.043		.093		.760		.189
Brooklyn	91	42(46.2%)		85(93.4%)		59(64.8%)		47(51.6%)		40(44.0%)		81(89.0%)	
Midtown Manhattan	44	25(56.8%)		40(90.9%)		37(84.1%)		33(75.0%)		24(54.5%)		40(44.0%)	
Harlem	55	32(58.2%)		51(92.7%)		46(83.6%)		34(61.8%)		27(49.1%)		47(85.5%)	
Queens	55	20(36.3%)		44(80.0%)		44(80.0%)		30(54.5%)		27(49.1%)		42(76.4%)	
PAM-10® Level**			.849		.729		.475		.646		.968		.986
1 (Lowest Level)	14	8(57.1%)		13(92.9%)		12(85.7%)		9(64.3%)		7(50.0%)		12(85.7%)	
2	37	19(51.4%)		35(94.6%)		30(81.1%)		25(67.6%)		17(45.9%)		31(83.8%)	
3	125	61(48.8%)		110(88.0%)		96(76.8%)		72(57.6%)		62(49.6%)		108(86.4%)	
4 (Highest Level)	69	31(44.9%)		62(89.9%)		48(69.6%)		38(55.1%)		32(46.4%)		59(85.5%)	
Chronic Disease	134	54(40.3%)	.009	113(84.3%)	.005	110(82.1%)	.019	86(64.2%)	.078	67(50.0%)	.563	105(78.4%)	.001
Non-Chronic Disease	111	76(69.0%)	<.001	110(99.0%)	<.000	74(67.0%)	.012	64(58.0%)	.850	51(46.0%)	.599	110(99.0%)	<.001
<i>Primary Care Physician (PCP) Characteristics</i>													
PCP Location**			.201		.190		.175		.312		.964		.382
Brooklyn	96	47(49.0%)		90(93.8%)		65(67.7%)		51(53.1%)		45(46.9%)		85(88.5%)	
Midtown Manhattan	50	28(56.0%)		45(90.0%)		41(82.0%)		35(70.0%)		25(50.0%)		45(90.0%)	
Harlem	37	21(56.8%)		34(91.9%)		29(78.4%)		23(62.2%)		19(51.4%)		31(83.8%)	
Queens	62	23(37.1%)		51(82.3%)		51(82.3%)		35(56.5%)		29(46.8%)		49(79.0%)	
CS-PAM® Level**			.727		.180		.145		.471		.526		.191
Low	69	36(52.2%)		58(84.1%)		57(82.6%)		38(55.1%)		29(42.0%)		57(82.6%)	
Medium	43	19(44.2%)		41(95.3%)		28(65.1%)		23(53.5%)		21(48.8%)		41(95.3%)	
High	133	64(48.1%)		121(90.9%)		101(75.9%)		83(62.4%)		68(51.1%)		112(84.2%)	

PCP Age**			.135		.678		.916		.630		.668		.384
Under 35	19	9(47.4%)		18(94.7%)		14(73.7%)		14(73.7%)		11(52.6%)		16(84.2%)	
35-49	119	50(42.0%)		104(87.4%)		91(76.5%)		67(56.3%)		54(45.4%)		99(83.2%)	
50-64	90	53(58.9%)		83(92.2%)		67(74.0%)		53(58.9%)		46(48.9%)		82(91.1%)	
65+	17	7(41.2%)		15(88.2%)		14(82.4%)		10(58.8%)		7(41.2%)		13(76.5%)	
PCP Gender*			.869		.428		.871		.171		.092		.537
Male	118	58(49.2%)		108(91.5%)		89(75.4%)		75(63.6%)		64(54.2%)		103(87.3%)	
Female	127	61(48.0%)		112(88.2%)		97(76.4%)		69(54.3%)		54(42.5%)		107(84.3%)	
PCP Years Employed*			<.001		.108		.758		<.001		.453		.030
<10	241	116(48.1%)		216(89.6%)		183(75.9%)		141(58.5%)		117(48.5%)		206(85.5%)	
10+	4	3(75.0%)		4(100.0%)		3(75.0%)		3(75.0%)		4(100%)		4(100%)	

Table 4.3. Logistic regression models with GEE looking at the relationship between demographic characteristics and Patient Portal Usage

<i>Independent Variables</i>	Crude N=2886		Adjusted (Excluding Race/Ethnicity) N=2886	
	Odds Ratio (95% Confidence Interval)	p-value	Odds Ratio (95% Confidence Interval)	p-value
Patient Measures				
Patient Activation Level				
1	Ref		Ref	
2	1.00(.52-1.96)	.991	.89(.44-1.79)	.747
3	.93(.51-1.70)	.824	.87(.47-1.62)	.671
4	1.03(.55-1.93)	.921	.82(.43-1.59)	.561
Gender				
Female	Ref		Ref	
Male	1.01(.77-1.33)	.939	1.22(.90-1.65)	.205
Race/Ethnicity				
White	Ref			
African American	.61(.30-1.23)	.168		
Hispanic	1.00(.50-1.81)	.969		
Asian/Pacific Islander	.69(.45-1.06)	.093		
Other	.39(.15-1.06)	.065		
Age				
< 35 years	Ref		Ref	
35-49 years	.65(.46-.94)	.022*	1.52(.74-3.14)	.254
50-64 years	.40(.28-.57)	<.001**	.70(.26-1.90)	.488
65+ years	.17(.10-.29)	<.001*	.90(.32-2.59)	.849
Survey Location				
Brooklyn	Ref		Ref	
Midtown Manhattan	.61(.42-.87)	.007**	1.08(.43-2.70)	.871
Harlem	.59(.41-.89)	.010*	1.29(.58-2.89)	.532
Queens	.52(.36-.74)	<.001**	.29(.07-1.10)	.068
Years in plan				
0-5 years	Ref		Ref	
6-10 years	.93(.59-1.45)	.746	1.11(.68-1.77)	.673
11+ years	.49(.34-.70)	<.001**	.75(.50-1.12)	.157
Chronic Disease				
Chronic Disease	.80(.61-1.05)	.110	1.12(.80-1.57)	.495
Non-Chronic Disease				
Non-Chronic Disease	1.16(.88-1.53)	.284	.99(.72-1.36)	.950
Marital Status				
Married	Ref		Ref	
Unmarried	1.16(.88-1.52)	.302	.82(.60-1.03)	.228
PCP Measures				
CS-PAM level				
Low	Ref		Ref	
Medium	.99(.66-1.49)	.972	.97(.56-1.67)	.914
High	1.15(.84-1.57)	.393	1.03(.69-1.52)	.896
PCP Location				
Brooklyn	Ref		Ref	
Midtown Manhattan	.59(.41-.86)	.005*	.40(.16-1.03)	.057
Harlem	.46(.30-.68)	<.001**	.28(.012-.68)	.005
Queens	.55(.39-.77)	.001*	1.32(.36-4.83)	.680
PCP Gender				
Female	Ref		Ref	
Male	1.13(.86-1.48)	.365	1.07(.70-1.64)	.739

Table 4.3. Logistic regression models with GEE looking at the relationship between demographic characteristics and Patient Portal Usage (continued)

<i>Independent Variables</i>	Crude N=2886		Adjusted N=2886	
	Odds Ratio (95% Confidence Interval)	<i>p</i> -value	Odds Ratio (95% Confidence Interval)	<i>p</i> -value
PCP Age				
< 35 years	Ref		Ref	
35-49 years	.72(.42-1.23)	.231	.60(.40-.90)	.013
50-64 years	.63(.36-1.09)	.096	.35(.23-.53)	<.001
65+ years	.41(.20-.82)	.013*	.15(.08-.29)	<.001
PCP Years Employed				
<10 years	Ref		Ref	
10+ years	.69(.24-1.97)	.489	.78(.22-2.73)	.699

Table 4.4. Logistic regression models with GEE looking at the relationship between demographic characteristics and Patient Portal Usage Including Race/Ethnicity) N=1158

<i>In.dependent Variables</i>	Adjusted Odds Ratio (95% Confidence Interval)	p-value
<i>Patient Measures</i>		
Patient Activation Level		
1	Ref	
2	0.78(.25-2.46)	0.672
3	0.98(.40-2.39)	0.969
4	1.12(.44-2.84)	0.815
Gender		
Female		
Male	1.27(.71-2.23)	0.415
Race/Ethnicity		
White	Ref	
African American	0.60(.27-1.35)	0.218
Hispanic	1.04(.52-2.09)	0.909
Asian/Pacific Islander	0.63(.35-1.11)	0.107
Other	0.43(.16-1.12)	0.085
Age		
<35	Ref	.
35-49 years	0.67(.39-1.16)	0.154
50-64 years	0.35(.19-.66)	0.001
65+ years	0.17(.05-.054)	0.003
Survey Location		
Brooklyn	Ref	
Midtown Manhattan	0.55(.16-1.90)	0.345
Harlem	0.73(.25-2.16)	0.571
Queens	1.065(.26-4.34)	0.930
Years in Plan		
0-5 years	Ref	.
6-10 years	1.43(.46-1.14)	0.241
11+ years	0.72(.46-1.14)	0.163
Chronic Disease	0.93(.60-1.44)	0.743
Non-Chronic Disease	0.64(.32-1.28)	0.206
Marital Status		
Married	Ref	
Unmarried	1.03(.65-1.65)	0.888
<i>PCP Measures</i>		
CS-PAM Level		
Low	Ref	
Medium	0.81(.62-1.07)	0.141
High	1.07(.70-1.64)	0.748
PCP Location		
Brooklyn	Ref	.
Midtown Manhattan	1.08(.32-3.62)	0.907
Harlem	0.85(.35-2.10)	0.732
Queens	0.39(.09-1.70)	0.211
PCP Gender		
Female	Ref	
Male	1.14(.90-1.45)	0.272
PCP Age		

Table 4.4. Logistic regression models with GEE looking at the relationship between demographic characteristics and Patient Portal Usage Including Race/Ethnicity) N=1158

<i>In.dependent Variables</i>	Adjusted Odds Ratio (95% Confidence Interval)	p-value
<35 years	Ref	.
35-49 years	0.86(.60-1.23)	0.414
50-64 years	0.78(.51-1.19)	0.243
65+ years	0.52(.24-1.11)	0.091
PCP Years Employed		
< 10 years	Ref	
10+ years	1.05(.08-14.52)	0.971

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Chapter 5 - Conclusion

The three studies included in this dissertation were designed to analyze clinician support for patient self-management (Chapter 2), patient activation (Chapter 3) and the association of these with patient portal usage (Chapter 4). Using data from the New York Hotel Trades Council and Hotel Association of New York City, Inc. Health Center Inc. (HCI) we were able to examine survey results from 341 salaried clinicians, and 3514 patients and patient portal usage for 2886 patients and their primary care providers. HCI is an organization that provides health benefits to union members, retirees and their families (90,000 lives) in four locations in New York City (NYC): Midtown Manhattan, Brooklyn, Queens and Harlem. These benefits/services are fully paid for by hotel industry employers in NYC so the population was fully insured and had ongoing access to healthcare with no out of pocket expenses.

De-identified data were received from HCI in two encrypted files. First we received clinician data which included CS-PAM® survey results along with clinician characteristics. Next we received patient data that included PAM-10® results as well as patient characteristics and patient portal use information. The portal used by HCI offered six features to HCI patients at the time of our study: scheduling an appointment; viewing laboratory results; requesting pharmacy refills; messaging the clinicians; viewing patient demographics and viewing the health record.

We used descriptive statistics, t-tests and ANOVA, and linear and logistic regression to analyze results for both clinician support for patient self-management and patient activation scores and levels. In addition, we conducted a stepwise regression for the clinician results. We analyzed patient portal use vs. non-use using chi-square analysis and used logistic regression to

determine the odds of portal use. In addition, we studied use of portal features with bivariate analysis.

This final chapter will summarize and synthesize the findings from these studies, discuss the public health practice and policy implications of the study findings and provide recommendations for future research.

Summary of Findings

In our samples, over 40% of clinicians scored at the highest level on the CS-PAM® and 27% of the patients scored at the highest levels. Usage of patient portals were low (8.5%) but consistent with the rates reported in other studies.¹⁻⁴

Chapter 2

In Chapter 2 we analyzed clinician support for patient self-management using CS-PAM® survey results and clinician characteristics among all 341 salaried clinicians employed across all four HCI Health Centers who were surveyed from July through September 2015. These clinicians included General Practitioners, Specialty MDs, Nurses, Pharmacists, Physical Therapists, Medical Assistants and Technicians (Laboratory, Radiology and Pharmacy). Overall, our findings found no evidence of association between CS-PAM® results and clinician gender, race/ethnicity, or location of practice. While there was evidence of statistically significant lower scores and lower odds of scoring high (vs. medium or low) among those clinicians aged 50-64 in the multivariate analysis, these results did not hold up in the stepwise analysis. However, in the final model specialist MDs and technicians scored significantly lower and had significantly lower odds of scoring high on the CS--PAM®. In addition, those clinicians employed for 11 or more years had significantly lower scores and also had significantly lower odds of scoring high.

Chapter 3

In Chapter 3 we analyzed associations between patient activation (a latent measure of the knowledge, skills, ability and confidence to self-manage using the PAM-10® survey) and patient demographic and health characteristics among 3514 patients. These patients were surveyed when they were receiving care at one of the health centers between September 2015 and February 2016. Many of the characteristics had significant associations with the survey results (i.e. age, race/ethnicity, language, survey location and ICD-10 diagnosis category) in bi-variate analysis. However, in multivariate analysis, only age (those 50 and over scored significantly lower), being surveyed in Brooklyn (scored significantly higher) and having circulatory diseases (scored significantly lower) were found to be associated with CS-PAM® score. When assessing the odds of scoring high (vs. medium or low), patients 65 and older had lower odds of scoring high, those who were surveyed in Brooklyn had significantly higher odds of scoring high and those with circulatory diseases had significantly lower odds of scoring high.

Chapter 4

In Chapter 4 we analyzed patient portal use among 2886 patients who had a primary care physician (PCP) listed in their record. This was a sample of those in the full surveyed population who had a primary care physician listed in their record. These patients were served by 46 primary care physicians. Of these patients, 245 used the portal at some point from the date of its implementation (April 2014) through the survey date (February 2016) a median of 10 times with a range of 1 to 241). Chi-square analysis showed that patient age, survey location, years in plan, and PCP practice location was significantly related to portal use. In the adjusted logistic model the odds of using the portal was significantly lower among those patients having a PCP in Brooklyn and also lower among those patients whose providers were 35 years or older. Neither the CS-PAM® nor PAM-10® level was associated with portal use. Our results did not show a

statistically significant interaction between CS-PAM® and PAM-10® levels and portal use. We also analyzed usage by feature. Viewing laboratory results and viewing the health record were accessed most by the users. Neither the CS-PAM® level nor PAM-10® level was associated with feature use.

Strengths of this study

This study provided an analysis of patient and clinician views and characteristics that might influence patient portal usage – which has not been previously studied. In addition, the study at HCI provides a unique opportunity to study a population that is employed and has continued access to good and fully paid healthcare.

Limitations

The data for these studies was compiled by HCI from a combination of medical record data, portal use data and personnel files (for the clinicians only). Misclassification of this data may be an issue since it was dependent on the entries made into human resources or electronic health records. This data may not have been recorded properly and may have created unknown errors.

These studies used results from two surveys, the CS-PAM® and the PAM-10®. While these surveys have been demonstrated to be reliable and valid indicators across many settings that are similar to the health centers and with similar demographics, (add refs) it is possible that this validation might not hold true for the HCI population.

Although all clinicians employed at HCI at the time of the study were included, the HCI clinicians may not be similar to clinicians in other organizations, making generalization difficult. Furthermore, the HCI clinicians who did not complete the survey may be more or less supportive

than those that did complete the survey. Although we ran the models with the missing survey data imputed with the mean scores of those who did complete the survey to address possible type 2 error, we did not explore the possible impact the missing data might have had if those scores differed substantially from the scores of those who did complete the survey. In addition, since the survey was completed at the request of the organization's CEO, social desirability bias is possible if respondents were answering in a way that they thought their employer expected. The survey was self-report, and responses may differ from the way that clinicians actually practice or what they actually believe. Although analyses were completed to address and minimize the effect of the missing survey responses, it is possible that complete participation might have produced different results. There are several reasons why clinicians might have submitted blank or N/A surveys. They might think the survey didn't apply to their patients; they might have submitted a blank survey in error or they might simply have chosen not to answer but felt pressed to respond to the CEO's request. Clinicians at HCI are salaried and physicians in particular may have responded differently than physicians who are in private or small practices making generalization difficult. For instance, physicians at HCI are salaried and are not compensated on a fee for service basis which might account for differences in practice. Since the physician survey was completed at the request of the organization's CEO, it is possible that responders were answering in a way that they thought they were expected to respond. This might be different in other environments where physicians are compensated differently. The survey is a self-report and may differ from the way that physicians actually practice.

The patient survey was self-administered and some patients may not have answered accurately due to misunderstanding of the question or social desirability bias. Since we only included patients from a single health system with a population that was fully insured, our ability

to generalize to other settings and populations is limited. The method of survey administration was not observed so it is possible that there was selection bias in the way patients were invited to participate or in the way the survey was presented to potential participants, which may explain the differences in results by location. We also did not have information from members of the healthcare plan who were not invited to participate in the PAM-10® survey nor the refusal rate, therefore we cannot generalize the study results to non-participants in the plan let alone to others who are not members of the HCI plan. Since HCI only began collecting race/ethnicity information in the months prior to this study it is possible that our results would have been different if this variable was available for the entire study population. Our main analyses were done without this variable, but we examined the results for those for whom we had this data and did not find markedly different results in direction of findings.

This study could have been strengthened by assessing differences in patient and clinician characteristics by location. It is possible that this analysis would have revealed differences in age, health condition or other characteristics that could explain the differences identified by location. These data would have provided for more robust results and could have identified associations that could not otherwise be known.

Synthesis and Implications of Findings

While we could not reject the null hypothesis for this dissertation, (i.e. that there would be an interaction between provider support for patient self-management and patient activation on portal use), there are many interesting findings in these three studies.

In Chapter 2, we examined clinician views of patient self-management. Among the clinicians who completed the CS-PAM®, specialty doctors, technicians and those employed over

11 years scored significantly lower and were significantly less likely to score high (vs. medium or low). The literature shows that physicians who scored in the highest level were significantly associated with actively engaging chronically ill patients in their care and care decisions.⁵ As HCI is an organization that drives patient centered care through care teams, this information presents an opportunity to identify resistance to patient self-management among those groups scoring at the lowest levels and take steps to improve it such as incorporating training for clinicians to encourage more patient self-management. Care teams (including all clinicians) would also benefit from this training as each type of clinician plays an important role in the patient's health and can help patients formulate questions for the physician, review care plans, find answers to basic questions and guide the healthcare process so the patient becomes more fully engaged.

In Chapter 3, we examined patients own views of self-management using activation scores. Among patients who completed the PAM-10®, those who were surveyed in Brooklyn scored significantly higher and were more likely to score at a level 4 (vs. 1,2,or 3). In addition, those with circulatory diseases scored significantly lower and were less likely to score at a level 4. HCI might consider doing more in-depth studies to determine differences in practice patterns in Brooklyn vs. the other locations. However, we did not analyze differences in patient or clinician characteristics by location. A further study of the differences among patients with chronic diseases might elucidate insightful characteristics, such as being sicker, older, etc. Patients with chronic conditions, e.g., circulatory diseases, diabetes, have been found to be more activated in other studies.⁶⁻¹² Clinicians who have been trained to coach their patients might help increase the knowledge, skills ability and confidence of their patients to self-manage although evidence of this intervention does not exist in the literature. Post training analysis of patient

activation scores would allow HCI to examine improvements in activation after having trained clinicians.

In Chapter 4 we examined patient and primary care provider associations with portal usage. Overall, we found that patient portal usage was low (8.5%) but as mentioned previously this is consistent with results reported in the literature. Chi-square analysis did not reveal an association with patient PAM-10® levels, gender, race, or marital status; or primary care physician CS-PAM® levels, age, race/ethnicity, gender or years employed. In logistic regression, patients aged 35 and older and who were surveyed in Midtown Manhattan, Harlem or Queens (and whose PCP worked in any of these locations) or whose clinician was aged 65 or older were significantly negatively associated with patient portal use in the crude model but only the clinician characteristics of working in Harlem and whose age was 35 or older remained negatively associated in the adjusted model. HCI might consider doing qualitative work with clinicians to discover their views of the features offered in the portal and how important they feel this may be to the provider-patient relationship. However, we did find that overall usage was low (8.5%), although as mentioned previously, this is consistent with the literature. Healthcare organizations might consider qualitative work with patients to uncover some of the reasons for or resistance to portal use. For instance, does the portal have features that patients find useful? easy to use? are there other features that would make the portal more useful to the patient?, are there other factors that are influencing portal use or non-use? HCI might also consider workflow changes that incorporate the portal during the clinician encounter. For instance, using the portal during physician encounters to review laboratory results, refilling prescriptions or reviewing the medical record might encourage patients to continue to use the technology.

Conclusion and Future Direction

HCI is a unique delivery system. Members retain the same health care as long as they work for participating employers. In NYC, this represents over 90% of the hotels and motels. Unlike other places of employment, members do not change insurance plans or providers if they change jobs within the industry. This continuity relieves patients of the anxiety and stress that is often associated with access and costs. Patients at HCI receive all of their health care without paying premiums, deductibles or coinsurance (except for prescriptions drugs). It is possible that this provides patients with a level of security that does not exist among patients outside this system. In addition, providers are salaried and are not compensated on the basis of productivity nor do they receive a fee for service. Turnover among PCPs is also low with most having worked for more than 5 years. This consistency can also facilitate ongoing relationships. Therefore the attitudes of both the providers and patients may be vastly different from those who need to pay for their healthcare or get paid based on services rendered resulting in different views about self-management than those found in the literature. For instance, since patients can see their providers as often as necessary and since the providers get to know their patients over time, there can be a comfortable relationship that truly focuses on the health of the patient. It is difficult to know whether this impacts the way patients and clinicians responded to the surveys or the way the patient portal is used. As health care organizations move more to group practices and salary-based payments to physicians, this might provide comparative study populations in the future.

Patient portals are still a new technology. Their design and functionality vary and are often driven by government programs such as Meaningful Use^{13,14} or to address specific patient populations such as those with specific diseases.¹⁵⁻¹⁸ These differences make comparisons of

portal use across systems difficult. Despite this, it is important to understand the organizational intent of the portal and the mindset of both the clinicians and the patients who are expected to use them or support their use. Understanding factors such as organizational readiness, marketing, ease of use, applicability to the patient-provider relationship and views of and use of technology by both patients and clinicians would add to the body of knowledge that is needed to assess the success of the portals. In this study, we only examined one element of patient engagement. There are other ways that organizations can engage their patients including the development of Patient and Family Advisory Councils that can be used to get information from patients about broader evidence of engagement as well as the factors affecting patient use of the portal.

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Appendix

Appendix 1 Description of Study Variables

Variable	Definition	Type	Received As	Aim
Primary Outcomes: Clinician Support				
Clinician Support for Patient Activation Score	Scores range from 1 (low activation) to 100 (highly activated)	Interval Continuous	Score	1
Clinician Support for Patient Activation Level	Low, Medium and High Level	Ordinal Categorical	Level	1,3*
Primary Outcomes: Patient Activation				
Patient Activation Level	Level 1 (low activation) to 4 (highly activated).	Ordinal Categorical	Level	2,3*
Patient Activation Score	Scores range from 1 (low activation) to 100 (highly activated)	Interval Continuous	Score	2
Primary Outcome: Portal Utilization				
Patient Portal Access	Signed on or did not sign on since April 2014	Nominal Categorical	Date of First Sign-On	3
Patient Portal Use Number of Times Accessed	Number of times the portal was accessed for 1)Lab Results 2)Prescription Refill 3)Appointment Scheduling 4)Health Record 5)Demographics 6)Message Provider	Ratio Continuous	Total number of times patient accessed the portal between April 2014 and September 2015 Number of portal uses for each service	3
Independent Variables: Clinician-level				
Years Employed	Calculated from date of hire: < 10 10+	Ordinal Categorical	Date of hire	1,3
Location of Practice	Brooklyn Queens Midtown Manhattan Harlem	Ordinal Categorical		1,3
Race/Ethnicity	White non-Hispanic Non-Hispanic African American Hispanic Asian/Pacific Islander Other	Nominal Categorical	Each clinician will have a race/ethnicity code	1,3
Age	Age (in years) <35 35-49 50-64 65+	Ordinal Categorical	Date of birth	1,3
Gender	Male or female	Nominal Categorical	Clinician gender code	1,3
Independent Variables: Patient Variables				
Age	Age (in years) 18-34 35-49 50-64 65+	Ordinal Categorical	Date of birth	2,3
Gender	Male or female	Nominal Categorical	Clinician gender code	2,3
Race/Ethnicity	White non-Hispanic African American Hispanic-Latino Asian/Pacific Islander Other	Nominal Categorical	Each patient will have a race/ethnicity code.	2,3
Primary Care Provider (PCP)	Unique Code for patient's provider			2,3
Survey Location	Location where survey was given	Nominal		2,3

	<ul style="list-style-type: none"> 1) Brooklyn 2) Queens 3) Harlem 4) Midtown Manhattan 	Categorical		
Years in Plan	<p>Calculated from date of hire:</p> <ul style="list-style-type: none"> 0 to 5 6 to 10 11+ 	Ordinal Categorical	Date of hire	2,3
Diagnoses	<p>Three most recent diagnoses (primary, secondary and tertiary) will be reported per patient. Chronic diseases will be categorized as Circulatory (includes hypertension, heart and vascular and disease), Endocrine, Genitourinary and Skin. Episodic care, well visits and preventive care are categorized as Various and Factors Influencing Health as identified in ICD-10 Chronic and Non-Chronic</p>	Nominal Categorical	<p>The first three diagnoses will be taken from the EHR.</p> <p>Non-chronic includes all non-chronic diagnoses, Various and Factors Influencing Health</p>	2 3

*This variable will be an independent variable for Aim 3

Appendix 2: CS-PAM® Survey

Clinician Support - Patient Activation Measure (CS-PAM)

Clinicians have different views and expectations about their patients. Please respond to the statements below as they apply to you and your practice. If the statement does not apply, select N/A.

As a Clinician, how important is it to you that your patients with chronic conditions:

1.	Are able to take actions that will help prevent or minimize symptoms associated with their health condition(s).	Not Important	Somewhat Important	Important	Extremely Important	N/A
2.	Are able to figure out solutions when new situations or problems arise with their health condition(s).	Not Important	Somewhat Important	Important	Extremely Important	N/A
3.	Bring a list of questions to their office visit.	Not Important	Somewhat Important	Important	Extremely Important	N/A
4.	Are able to make and maintain lifestyle changes needed to manage their chronic condition.	Not Important	Somewhat Important	Important	Extremely Important	N/A
5.	Can follow through on medical treatments you have told them they need to do at home.	Not Important	Somewhat Important	Important	Extremely Important	N/A
6.	Know what each of their prescribed medications is for.	Not Important	Somewhat Important	Important	Extremely Important	N/A
7.	Are able to determine when they need to go to a medical professional for care and when they can handle the problem on their own.	Not Important	Somewhat Important	Important	Extremely Important	N/A
8.	Understand which of their behaviors make their chronic condition better and which ones make it worse.	Not Important	Somewhat Important	Important	Extremely Important	N/A
9.	Understand the different medical treatment options available for their chronic condition(s).	Not Important	Somewhat Important	Important	Extremely Important	N/A
10.	Tell you the concerns they have about their health even when you do not ask.	Not Important	Somewhat Important	Important	Extremely Important	N/A
11.	Want to be involved as a full partner with me in making decisions about their care.	Not Important	Somewhat Important	Important	Extremely Important	N/A
12.	Look for trustworthy sources of information about their health and health choices, such as on the web, news stories, or books.	Not Important	Somewhat Important	Important	Extremely Important	N/A
13.	Want to know what procedures or treatments they will receive and why <u>before</u> the treatments or procedure are performed.	Not Important	Somewhat Important	Important	Extremely Important	N/A

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Appendix 3: PAM-10® Survey

Below are some statements that people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally by circling your answer. Your answers should be what is true for you and not just what you think the doctor wants you to say.

If the statement does not apply to you, circle N/A.

14. When all is said and done, I am the person who is responsible for taking care of my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
15. Taking an active role in my own health care is the most important thing that affects my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
16. I know what each of my prescribed medications do	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
17. I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
18. I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
19. I am confident that I can follow through on medical treatments I may need to do at home	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
20. I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
21. I know how to prevent problems with my health	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
22. I am confident I can figure out solutions when new problems arise with my health.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
23. I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A

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Appendix 4 Assessment of Joint Effects between CS-PAM® and PAM-10® Activation Levels

PAM*Activation Support			
1 vs. Low		Ref	
2 vs. Medium		1.33(.15-11.74)	.795
2 vs. High		1.98(.36-10.77)	.428
3 vs. Medium		.87(1.15-5.21)	.879
3 vs. High		.68(.16-2.94)	.604
4 vs. Medium		.54(.08-3.66)	.526
4 vs. High		.85(.18-3.93)	.832