

Final Report
Keystone Beacon Community
University of Wisconsin Research Team

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1. Introduction

As part of the Beacon Community Program funded by the Office of the National Coordinator of Health IT, Geisinger Health System began an innovative program in April 2010 to improve the health of chronically ill patients in a five-county region of central Pennsylvania. The Keystone Beacon Community (KBC) project is a three-year initiative to improve care coordination within and across organizations such as hospitals, clinics, skilled nursing facilities, and home health agencies. By sharing new and existing health IT applications, Keystone Beacon proactively identifies patients who have heart failure (HF) or chronic obstructive pulmonary disease (COPD) and assigns nurse care managers to work with these patients as a complement to their established healthcare team. The goal is to thereby achieve better health and a more satisfying care experience. By leveraging technology, the nurse care managers keep in close contact with their patients to engage them in their day to day care along with their long-term wellness. One of the goals of Keystone Beacon is to demonstrate how integrated care can be coordinated community-wide through the use of patient-focused technology and specialized nurse care managers.

Researchers from the Center for Quality and Productivity Improvement (CQPI) at the University of Wisconsin-Madison were asked to evaluate parts of the KBC project, particularly barriers and facilitators of KBC care management implementation and the role of health IT in supporting the care managers. Using an action research design, we analyzed these and other aspects of the project and provided feedback to KBC project management in a continuous improvement loop. We used various human factors methods, including observations, interviews, focus groups, and questionnaire surveys, to collect data. In all we completed 12 site visits, conducted several surveys using both web-based and paper distribution methods, and completed numerous telephone interviews. We also analyzed archival documents and a complex dataset extracted from the KBC care manager documentation system. Our measurement model (Figure 1.1) shows the conceptual organization of our data collection efforts. This report summarizes the methods and results of each analysis completed. Full reports on the analyses and other key documents are included in extensive appendices.

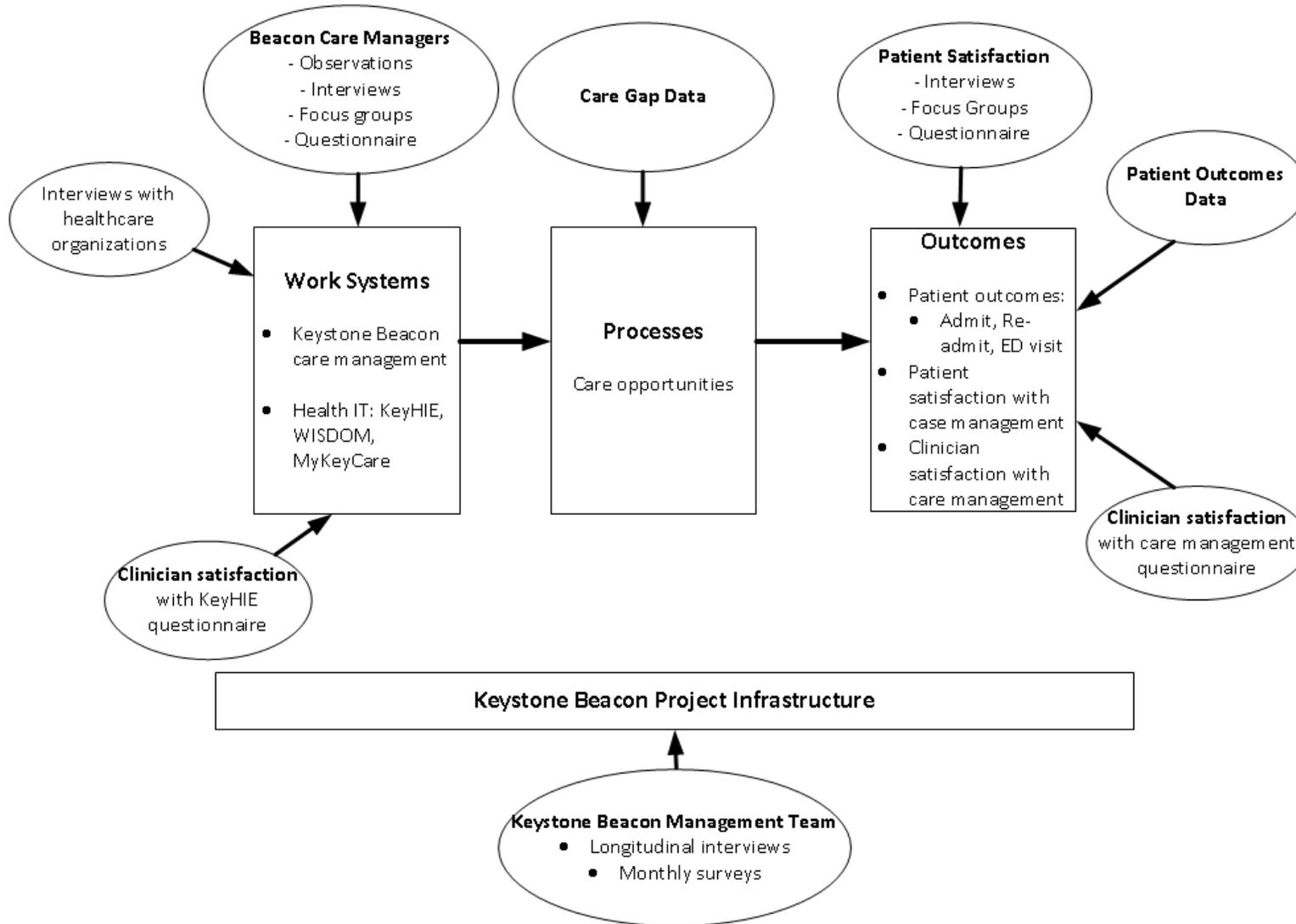


Figure 1.1: Keystone Beacon Measurement Model

1.1 Timeline

Using data from progress reports, meeting minutes, project documents and discussions with members of the Beacon management team, we created a timeline of significant events that occurred and successes that were achieved by each of the six teams that comprise the project: care coordination, health IT, community engagement, sustainability, evaluation and project management.

1.1.1 Data collection

In January 2011, a progress report template was shared with the leaders of the six teams. Each team was asked to report monthly on critical milestones in the next 6 months, successes since the last report, challenges or difficulties encountered since the last report, risks to be managed and opportunities for integration with other KBC teams. These reports were shared and discussed during KBC management team meetings each month, and a copy was provided to UW researchers. To create the timeline, a researcher reviewed these progress reports, all minutes of the KBC management team meetings and other subgroup team meetings, and various types of documents that were shared during the project. The timeline is designed to provide an overview of significant project events, not to record every detail of the project's progress.

1.1.2 Results

Table 1.1.2.1 shows the timeline for June-July 2011. See Appendix A.1 for the full timeline. Many of the events in the table are typical for the project teams. Examples include a quarterly report to ONC (project management), changes in Wisdom such as when care managers begin documenting care gaps (care coordination), information from specific organizations being added to KeyHIE (health IT), the Beacon website being updated (community engagement) and the CDIS team receiving billing data from participating hospitals (evaluation). Other events are less typical, such as Sharon Larson's departure from the project and a focus group being held by the health IT team.

1.1.3 Conclusion

The timeline created for the Beacon project records when significant events occurred for each of the six project teams. Although time consuming to create, it has proved to be useful for several research tasks, such as writing manuscripts on care coordination, accurately describing data collection activities in reports, and summarizing project tasks for other purposes.

Table 1.1.2.1: Timeline of major events in the Keystone Beacon project June-July 2011

Year	Month	Overall Project Management	Care Coordination	Health IT	Community Engagement	Sustainability	Evaluation
2011	June		All inpatient CMs are following surgical patients.	Patient consent policy established			CDIS team received hospital billing data from Shamokin and Bloomsburg.
			Inpatient CMs begin documenting care gaps in Wisdom.	Evan Hospital labs and Moses Taylor Hospital labs interfaced into KeyHIE.			Decision made on definition of Beacon patient
				KBC management team realizes that the length of time to connect a facility to KeyHIE depends on number of support staff in IT and lab of facility			UW research team sends a document to KBC management team describing care manager inefficiencies and redundancies identified in May 2011 site visit
				Evangelical Hospital labs go live on KeyHIE			
	July	ONC regional meeting in Philadelphia	Outpatient Wisdom goes live at TOC.	Focus group held with active clinicians (cardiac rehab nurse, KBC inpatient CMs, KBC TOC CM) on use of KeyHIE	KBC website updated; materials to publicize KeyHIE finalized		Sharon Larson leaves project; Andrea Hassol to lead Evaluation team
		Quarterly report submitted to ONC	GHP MMAs began assigning patients to TOC care managers				

1.2 University of Wisconsin Research Team



Figure 1.2.1: University of Wisconsin Research Team, May 2012

Name (left to right)	Title	Role on project
Dan Nathan Roberts, PhD	Post-doctoral fellow	Research staff
Sarah Kianfar, MS	Doctoral student	Research assistant
Peter Hoonakker, PhD	CQPI Director of Research	Research scientist
Pascale Carayon, PhD	CQPI Director and Procter & Gamble Bascom Professor in Total Quality, Industrial and Systems Engineering	Principal investigator
Ann Schoofs Hundt, PhD	CQPI Director of Education	Research scientist
Bashar Alyousef, MS	Doctoral student	Research assistant
Abigail Wooldridge, MEng	Doctoral student	Research assistant
Randi Cartmill, MS	Researcher	Project manager
Yaqiong Li (not in photo)	Doctoral student	Research assistant

2.1 SEIPS Model

Our research is grounded in the UW Systems Engineering Initiative for Patient Safety (SEIPS) Model of Work System and Patient Safety,(Carayon et al. 2006) which has three main parts. The work system describes how a person at work performs a range of tasks using specific technology and tools, within a physical environment and within certain organizational conditions. The work system influences processes, or workflows, that often involve several workers and patients. These care processes create outcomes for the patient and the organization.(Carayon et al. 2006)

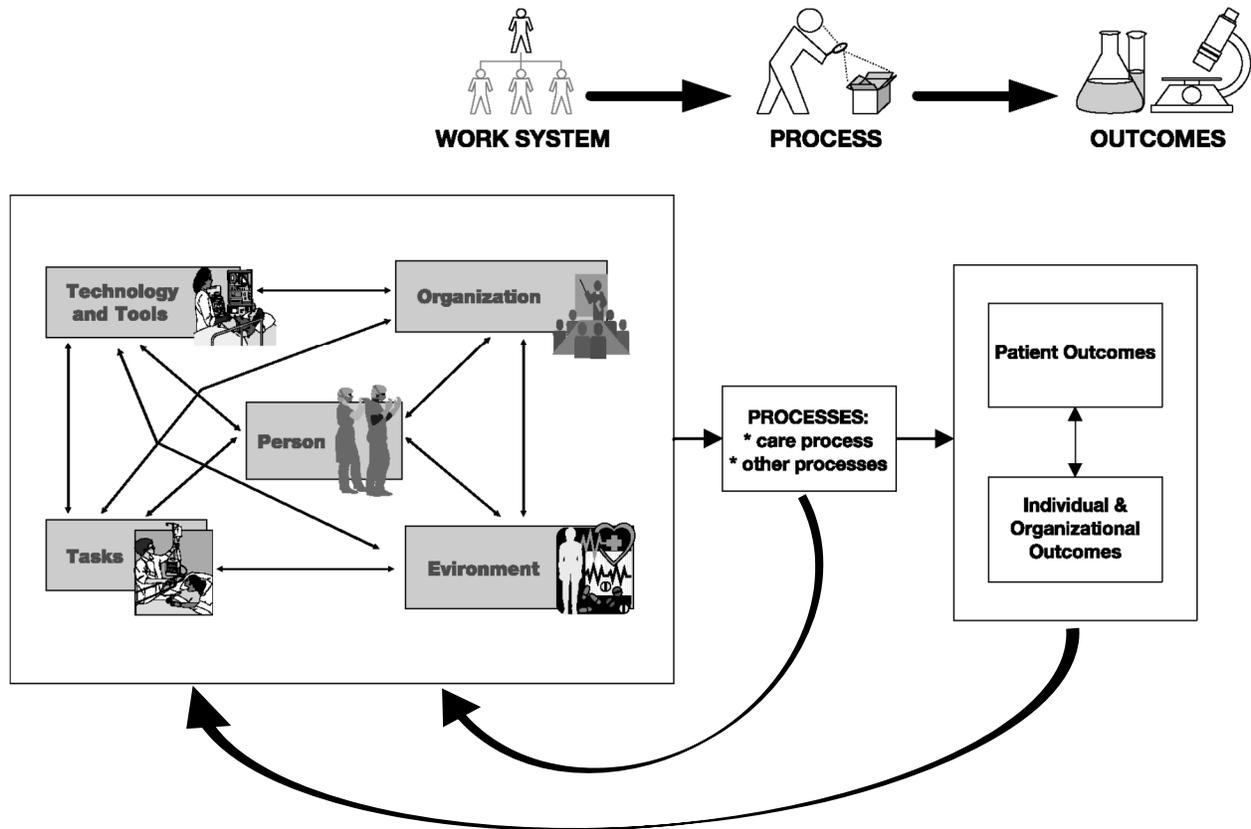


Figure 2.1.1: The SEIPS Model of Work System and Patient Safety

In terms of the SEIPS model, our analyses can be understood as examining how particular elements of the work system, such as health IT applications, affect processes including care coordination. These processes in turn have impacts on the key Beacon metrics of patient readmissions and emergency department visits.

2.2 Patient pathways

KBC patient pathways describe the ways that patients are identified as eligible for KBC care management, stages of the patient journey (inpatient vs. outpatient) and exposure to KBC care management. Prior to admission, a KBC-eligible patient may be managed by a GHP CM, KBC outpatient CM, non-GHP insurance CM, or may receive no outpatient care management. When admitted to a KBC hospital, KBC-eligible patient may receive KBC inpatient care management, be managed by a non-KBC CM or discharge planner (DP), or receive no inpatient care management. The reasons KBC-eligible patients would not receive inpatient KBC care management are (1) the patient is admitted and discharged when no KBC CMs are working (e.g., weekends), (2) due to high workload, the KBC CM triaged eligible patients decided to provide care management to those who are more ill, and (3) the KBC CM failed to identify the patient as being KBC-eligible. On discharge from a KBC hospital, patients may be followed by a GHP CM or KBC outpatient CM, or if there is no GHP or KBC CM working in their outpatient clinic, the

patient may be managed by a Transitions of Care (TOC) CM for 30 days. There are 4 categories of potential patient pathways depending on when the patient is identified as KBC patient (i.e. inpatient vs. outpatient), patient condition (HF/COPD vs. relevant surgical procedures) and type of care manager (CM) that KBC-eligible patients are exposed to during the patient care journey. The four categories are shown in Figures 1-4.

Figure 2.2.1 describes KBC patient pathways for patients with a diagnosis of HF/COPD who are managed by a KBC outpatient CM. When admitted to a KBC hospital, KBC-eligible patient may receive KBC inpatient care management or be managed by a non-KBC CM or DP. When discharged, patients will again be followed by a KBC outpatient CM.

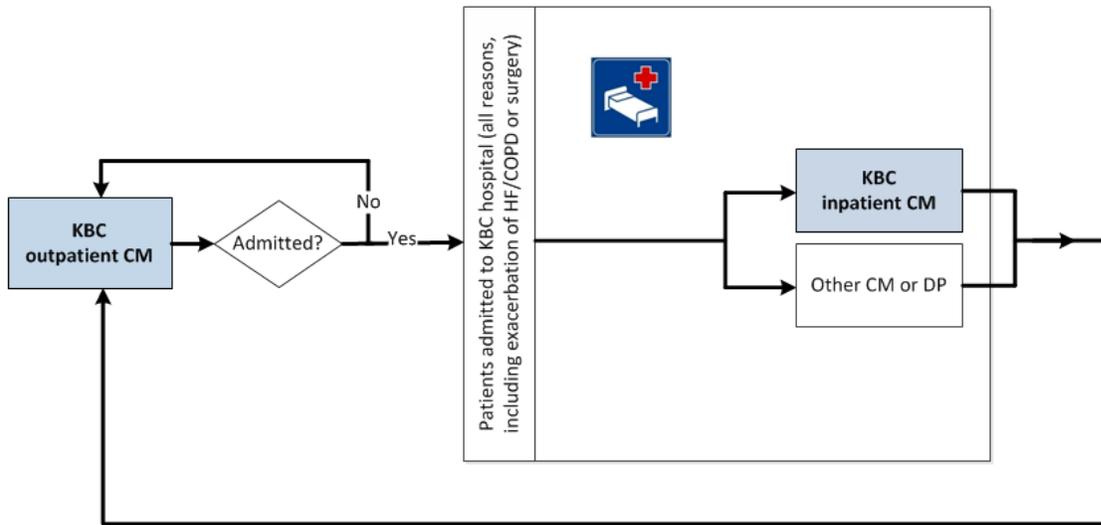


Figure 2.2.1: KBC patient pathways: patients with diagnosis of HF/COPD who are managed by a KBC outpatient care manager

Figure 2.2.2 describes KBC patient pathways for patients with a diagnosis of HF/COPD who are outpatient care managed by a GHP CM. When admitted to a KBC hospital, the KBC-eligible patient may receive KBC inpatient care management or be managed by a non-KBC CM or DP. When discharged, patients will again be followed by a GHP CM.

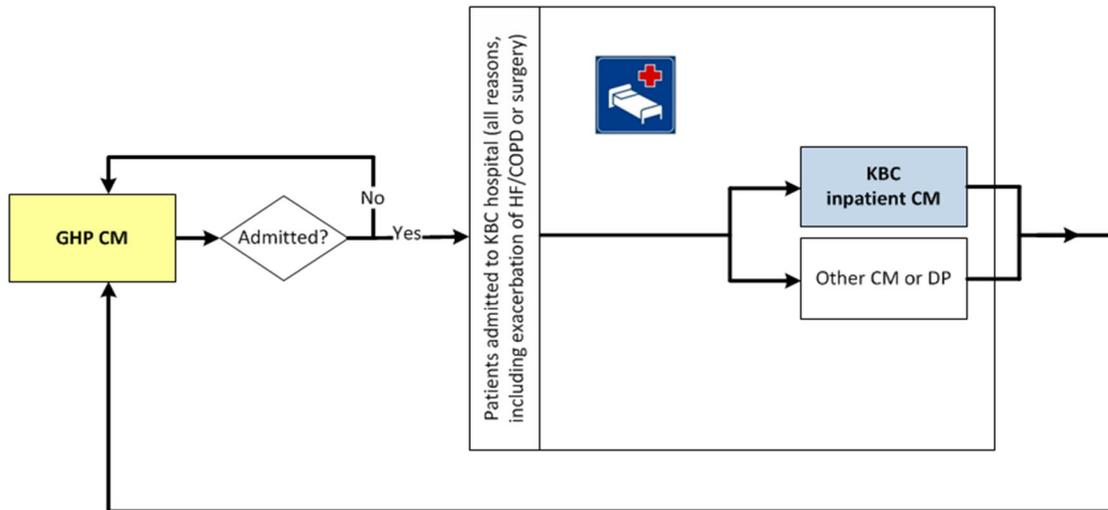


Figure 2.2.2: KBC patient pathways: patients with diagnosis of HF/COPD and GHP insurance who are managed by a GHP CM

Figure 2.2.3 describes KBC patient pathways for patients with a diagnosis of HF/COPD who are outpatient care managed by a non-GHP insurance CM or have no CM. When admitted to a KBC hospital, KBC-eligible patient may receive KBC inpatient care management or be managed by a non-KBC CM or DP. When discharged, patients may be followed by a KBC outpatient CM, or if there is no GHP or KBC CM working in their outpatient clinic, the patient may be managed by a Transitions of Care (TOC) CM for 30 days.

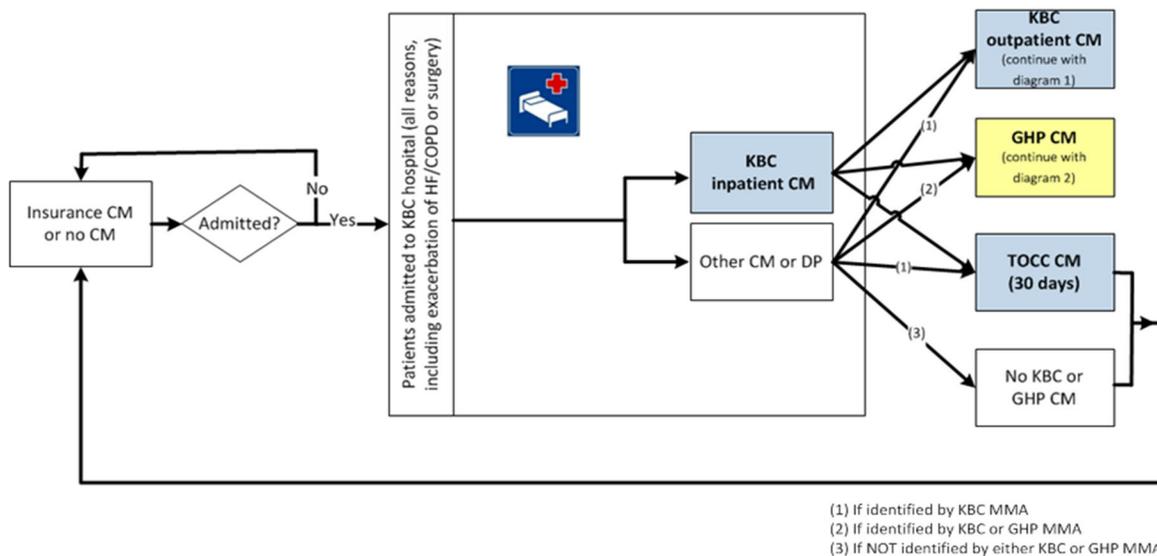


Figure 2.2.3: KBC patient pathways: patients with diagnosis of HF/COPD who are managed by a non-GHP insurance CM or have no CM

Figure 2.2.4 describes KBC patient pathways for patients admitted to a KBC hospital for relevant surgical procedures or who are diagnosed with HF/COPD during this admission. The KBC-eligible patient may receive KBC inpatient care management or be managed by a non-KBC CM

or DP. When discharged, patients may be followed by a KBC outpatient CM, or if there is no GHP or KBC CM working in their outpatient clinic, the patient may be managed by a Transitions of Care (TOC) CM for 30 days.

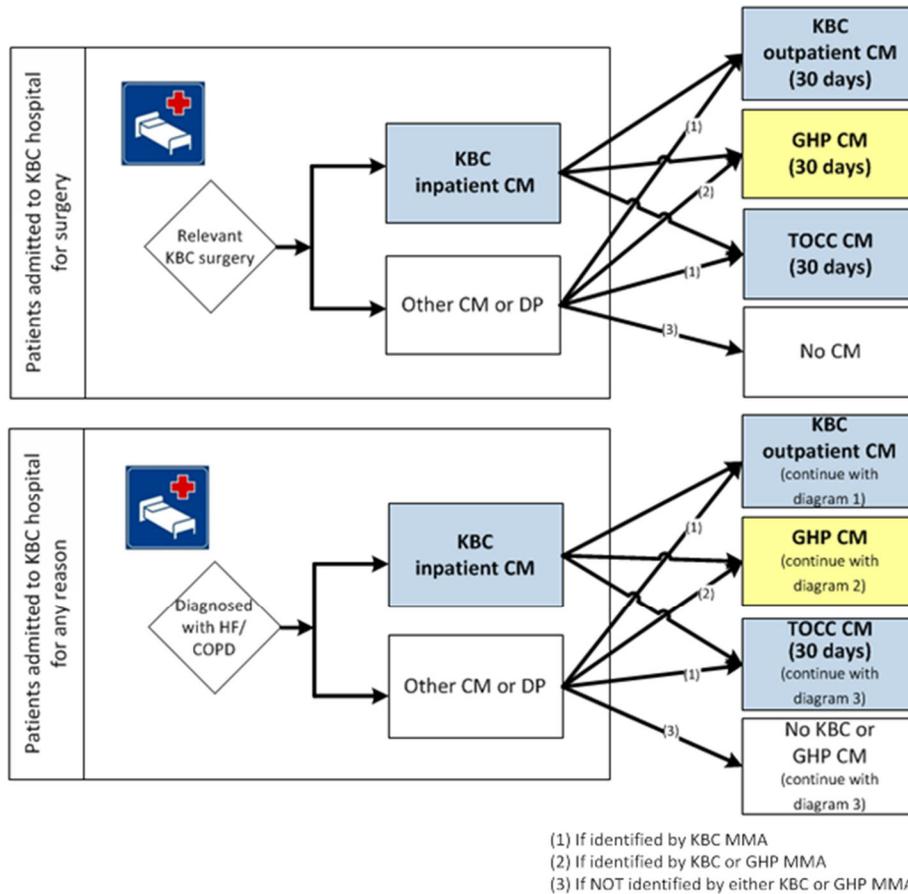


Figure 2.2.4: KBC patient pathways: patients admitted to a KBC hospital for relevant surgical procedures or that are diagnosed with HF/COPD during this admission

3.1 Observation/interviews of CMs

We conducted a longitudinal study that aims (1) to assess the work of CMs and (2) to understand the CMs' role in care coordination. Our assessment of CMs' work included examining their use of health IT, identifying work system barriers and facilitators and understanding their perceptions of the impact of their work on KBC outcomes.

3.1.1 Methods

We conducted 68 hours of interviews or combined interviews and observations in seven rounds of data collection over a 21-month period (May 2011-February 2013).

3.1.1.1 Participants

A total of 17 CMs in 4 hospitals, 4 outpatient clinics and the TOC center participated in interviews and observations as part of the longitudinal study, specifically 5 inpatient, 5 TOC, 5 outpatient and 2 float CMs. Participation was voluntary for both CMs and their patients. In a few instances, a patient refused to be observed or a CM asked the researchers to stay outside of the patient room. Table 3.1.1.1.1 describes the data collection rounds.

Table 3.1.1.1.1: Data collection with CMs

Data collection round	# of HCOs	IP CM	OP CM	TOC CM	Float CM	Total # of CMs	Data collection method*	Total duration
May 2011	4	5	-	2	-	7	Int/obs	19hrs 20min
August 2011	4	5	-	3	-	8	Int/obs	6hrs 35min
October 2011	2	-	2	1	1	4	Int/obs	5hrs 50min
January 2012	4	3	2	-	-	5	Int/obs	7hrs 39min
May 2012	5	5	1	3	2	11	Int	14hrs 52min
December 2012	4	2	2	4	1	9	Int / phone int	7hrs42min
February 2013	5	4	2	0	0	6	Int	5hrs 47min
							Total	67hrs 45min

* “Int/obs” indicates that CMs participated in a combined interview and observation. “Int” means that CMs completed an interview, while “Int/phone int” indicates that some CMs completed interviews in person and others participated in interviews via phone during the same data collection period.

3.1.1.2 Procedure

In the initial data collection, the CMs were first interviewed for 30-40 minutes, observed for 90-120 minutes, and again interviewed for 30-45 minutes. By combining interviews and observations the CMs were better able to explain their work challenges and facilitators by providing examples and other detailed information while they worked. We used a semi-structured interview guide with open-ended questions aimed at understanding the work of CMs, identifying work system challenges and facilitators, and examining the CMs’ role in care coordination (Appendices B.4a-B.4e2). All interviews were audio-recorded and later transcribed. An observation-recording document facilitated observers’ note taking (Appendix B.1). This document is based on the work system model (Carayon et al., 2006; Carayon & Smith, 2000; Smith & Carayon-Sainfort, 1989), and facilitates the capture of information on all elements of the CMs’ work system: individual, tasks, tools and technologies, organization and environment. In subsequent data collection, CMs were interviewed at their workplace for, on average, one hour to capture any new barriers that they experienced.

3.1.1.3 Data analysis

3.1.1.3.1 The work of CMs

Combined interview and observation data were used to develop process maps of CMs’ work in each organization where care managers were observed. The process maps describe the work of CMs and their use of health IT applications. The maps were developed after the initial observation and interview in each organization and reviewed for accuracy by the CMs and the director of Keystone Beacon care management. The process maps were updated after each round of data collection. Finally, a single process map was created that temporally displayed the work

activities of all types of CMs, their interactions, and the tools and technologies they use for each activity (see Appendix B.2a). An accompanying document describes each activity on the process map (see Appendix B.2b).

3.1.1.3.2 Longitudinal analysis of the work of CMs

We conducted content analysis of 36 interviews with Keystone Beacon CMs working in hospitals, physician practices and the TOC. A total of 56 hours, 44 minutes of interview data were analyzed, including some that were interview/observations. The goal of these analyses was to capture changes in performance obstacles and facilitators from the time that the first CMs were hired to the end of the project. In each round, between 2 and 11 CMs participated in the interviews we analyzed.

Interview data were analyzed and coded using the qualitative data analysis software QSR NVivo[®]. Codes were developed to identify work system obstacles and facilitators. Obstacles are work system factors that are closely associated with the immediate work setting of care managers and that inhibit their ability to optimally perform their job. Facilitators are work system factors that are closely associated with the immediate work setting of care managers that increase or maintain their ability to optimally perform their job. Several transcripts were analyzed by two researchers to ensure coding consistency. Multiple meetings were held to resolve any discrepancy or disagreement in coding and to refine the coding scheme. When inter-rater reliability between the two researchers reached 88%, one researcher became the principal coder and the other performed spot-checks of the coding.

3.1.2 Results

3.1.2.1 The work of care managers

The final process map combines the work of the care managers in each organization, including inpatient, outpatient, and TOC CMs in one display (see Appendix B.2a). Figure 3.1.2.1.1 is an example of a process map for an inpatient Beacon CM. Moving down the rows of the process map shows the flow of the CM's work over the period that the patient is in the hospital: (1) initial patient interaction, (2) subsequent patient interaction, and (3) final patient interaction. The columns of the process map show the location of the activities: CM office, hospital unit and patient room. The various technologies used for the activities are represented by icons.

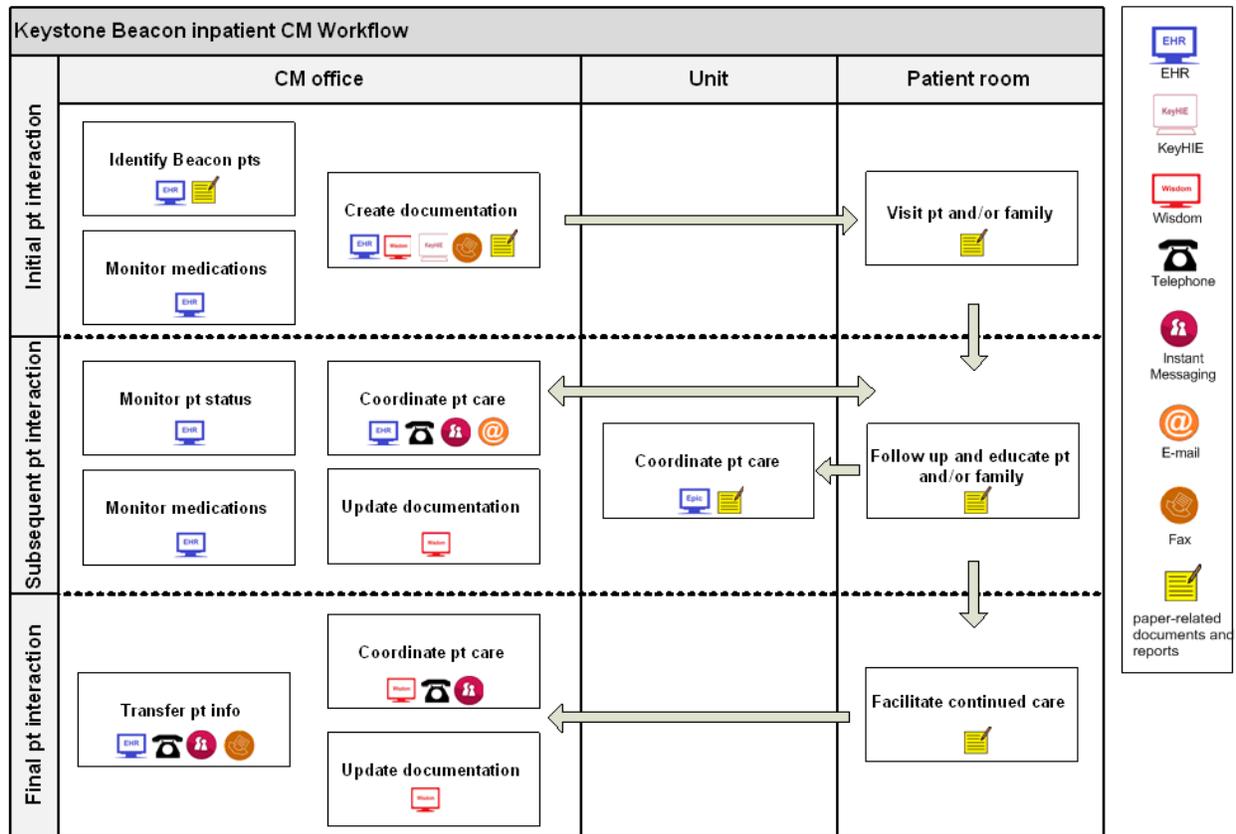


Figure 3.1.2.1.1: Simplified process map of Keystone Beacon inpatient CM work

In the example provided in Figure 3.1.2.1.1, the CM performs several activities prior to and during the initial patient interaction. First, the Beacon patient must be identified as eligible to receive KBC care management. The CM reviews the census report of patients with relevant ICD-9 codes and prioritizes newly admitted patients with diagnoses of COPD and/or HF. The CM creates documentation on the patient by printing the patient's face sheet and list of medications, checking if the patient has a universal authorization, and then faxing the face sheet to the medical management assistants (MMAs) for entry into the care manager documentation system, Wisdom. Once the MMAs have created the initial “record” for the patient hospitalization, the CM enters patient clinical information into Wisdom. The CM also monitors the patient’s medication lists and lab results in the EHR and notes inconsistencies. In addition, the CM visits the patient and/or family to introduce her or himself, explain the role of Beacon inpatient CM, explain the difference between Beacon CMs and other CMs/discharge planners, and ask the patient to sign a universal authorization, if needed. The CM confirms with the patient whether s/he has an outpatient CM, reviews the home medication list with the patient and/or family members, and asks the patient for verbal agreement to be referred to the TOC for 30 days post discharge if the patient does not have an outpatient CM.

In subsequent patient interaction(s), the CM monitors the patient’s status by reviewing the patient’s EHR daily for changes in medications, test results, procedures performed, and lab results. Any inconsistencies identified in medication review are noted for follow up. The CM also coordinates patient care in two ways (1) by following up with other care providers and

updating documentation in Wisdom and (2) by using the EHR to update patient information (e.g., the universal authorization) and print educational materials. In addition, the CM follows up and educates the patient and/or family, asks about the patient's health status and his/her latest interventions and medications, explains next steps in care, and inquires if the patient has additional support needs.

In the period related to the final patient interaction, the care manager transfers patient information by faxing a summary sheet and patient records to the patient's PCP (if the patient has no outpatient CM), entering notes about patient discharge in the EHR, and if applicable, updating the TOC or KBC outpatient CM verbally or electronically. The CM also coordinates patient care by asking the MMAs to schedule future appointments with the patient's PCP and other care providers. The CM updates documentation in Wisdom by adding the care manager discharge summary and note. Finally, the CM facilitates continued care by explaining the transition process to the patient, providing the patient and/or family with discharge instructions, and providing the patient and/or family with any other educational materials (e.g., need for daily weight monitoring for HF patients).

3.1.2.2 Longitudinal analysis of the work of care managers

Analysis of the interview data produced quantitative data including both the number of interviews in which obstacles and facilitators were reported, and the number of separate obstacles and facilitators stated. Because of the longitudinal nature of the analysis, we grouped the interviews into three categories indicating the phase of the care management program at the time of the interview: start-up, steady state, and final. This allows us to describe how the obstacles and facilitators changed over time. "Start-up" refers to the initial phase of the Beacon program and includes data collected from May 2011 through December 2011. "Steady state" refers to the period during which the care management program was fully functioning and includes data collected in January 2012 and May 2012. "Final" refers to the last few months of the Beacon program and includes the interviews we conducted in December 2012 and February 2013.

Through an iterative coding process we identified eight categories of barriers/facilitators: 1) health IT, 2) job task performance, 3) organization set-up or design, 4) physical environment, 5) tools, 6) training, 7) understanding of Beacon program by clinicians and 8) understanding of Beacon program by patients and families. [For detailed results see Appendix B.4.1].

Health IT-related barriers and facilitators existed throughout the project. Initially, care managers had difficulty gaining access to health IT applications and found it challenging to learn and use many of the various applications; most of these barriers disappeared over time. Care managers consistently had technical problems throughout the life of the project, such as connection issues and slowness of health IT applications. Use of multiple health IT applications presented the care managers both barriers and facilitators. For instance, duplicate documentation and the lack of interoperability between the applications was a barrier, whereas having access to multiple sources of patient data to obtain a complete picture of a patient's clinical and social status was a facilitator.

Job task performance-related barriers included difficulty in identifying patients on admission and a frequent lack of awareness of Beacon patients being discharged. Other barriers included an excessive workload due to the number of patients the care manager was attempting to manage and the lack of staff to cover when a care manager had a high workload or was scheduled to be gone from work. Having other care managers and clinicians keep care managers about patient admission and discharge was helpful for care managers, as well as the assistance of MMAs in performing clerical tasks and identifying and assigning patients on admission. Support from other care managers, clinicians, and the MMAs increased over time and care managers appreciated that their peers provided them with necessary additional information. This afforded the care managers more time to spend with patients.

Barriers related to *organizational set-up or design* decreased as the Beacon project progressed. Initially, the care managers did not receive sufficient feedback and support from their supervisor, there was insufficient planning for care managers to optimally function in their job, and the goals of the Beacon program were not clearly communicated to the care managers. Over time care managers received more support and feedback from their supervisor and the goals of the Beacon program were clear.

Barriers related to the *physical environment* faced by care managers were related to limited workspace, a noisy work environment, and having an office that was far from patient units. Some care managers had workspaces that were more optimal and computers that were readily available for them to use throughout the hospital.

Barriers related to *tools*, such as not having a direct dedicated phone line, primarily existed at the inception of Beacon care management. Facilitators related to tools existed at all time periods. For example, care managers found it helpful to use tools such as the Internet and instant messaging and tended to have sufficient resources to help them solve problems that arose.

Barriers associated with *training* of care managers were related to insufficient initial training, which care managers overcame as they became more experienced in their work. Training facilitators included the ongoing training the care managers received as well as the skills and experience they brought to their job.

Barriers related to *understanding of Beacon by clinicians* were generally due to the fact that clinicians initially did not understand the role of care managers or the Beacon project. Over time, however, their understanding and recognition of the care managers' role improved. There were fewer instances when barriers related to *understanding of Beacon by patients* existed, however an understanding of the care managers' role by the patients also improved as the project progressed.

3.2 Focus groups with CMs

We conducted focus groups with KBC CMs to learn more about the work activities that they believe contribute to positive patient and clinician outcomes.

3.2.1 Method

3.2.1.1 Participants

Twelve Keystone Beacon CMs were invited to participate in one of two focus groups, including all those who had held their positions between 3 and 10 months at the time of data collection. Ten of the 12 CMs participated. Because inpatient, outpatient, and TOC CMs differ in their interventions, the duration of patient interaction, and the type of interaction with patients, separate focus groups were conducted. Five inpatient CMs and a “float” CM (who covers for other CMs during vacation) participated in the inpatient focus group, and two outpatient CMs and two TOC CMs participated in the outpatient focus group.

3.2.1.2 Procedure

The focus groups took place in a private meeting room on two consecutive days. The room was organized to facilitate discussion and participation from all CMs. The main question addressed by the focus groups was: “*What is it that you do as a CM that you believe is responsible for preventing [a Beacon patient population] from being (re)admitted to the hospital or presenting to the emergency department? Please be as specific as possible.*” The question was changed so that the focus group addressed the question for each Beacon patient population separately: COPD, HF and post-surgical. CMs were asked to consider all elements of the work system model (Smith and Carayon-Sainfort 1989) when responding to the question. Three posters affixed to the walls displayed the work system model (Smith and Carayon-Sainfort 1989) (Smith and Carayon-Sainfort 1989) (Smith and Carayon-Sainfort 1989) (Smith and Carayon-Sainfort 1989) (Smith and Carayon-Sainfort 1989), questions to be addressed by the participants, and the Keystone Beacon project target outcomes. To assist them in understanding the question, we provided examples of how CMs’ work can contribute to patient and clinician outcomes using data from interviews previously conducted with the CMs. CMs were asked to write responses to the question for each patient population on a specific color of post-it note and post each note on large sheets of paper attached to the wall (see Figure 3.2.1.2.1.) Subsequently, the CMs as a group combined similar activities in categories and sub-categories for each patient population. The CMs were also asked to indicate the activities that had the most impact on outcomes by placing dot stickers next to the respective activity. Each CM was given five stickers per patient population, which they could place next to a single activity or multiple activities to denote impact. More stickers indicated greater perceived impact.

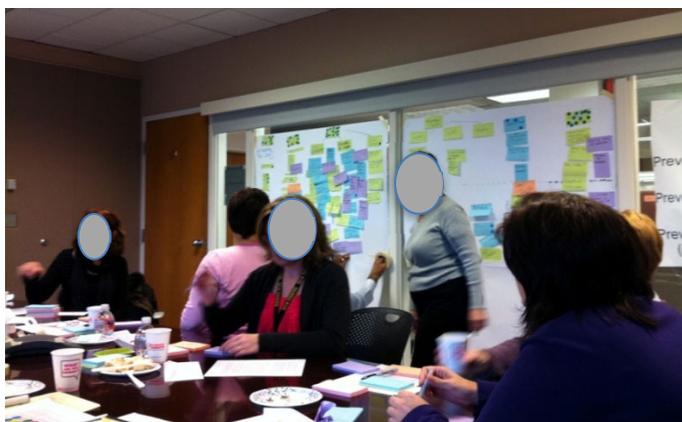


Figure 3.1.2.2.1: Focus group of inpatient CMs

3.2.1.3 *Data analysis*

After the focus group, two researchers transcribed into spreadsheets the data recorded on the large sheets of paper and post-it notes during the focus groups. Three researchers reviewed the categories and sub-categories and made changes by grouping similar activities and clarifying category names. The categories were refined through a series of 6 meetings that lasted a total of 12 hours. Researchers then reviewed the interview transcripts of 12 CMs from the period May 2011-January 2012 and identified specific instances of CMs' contributions to patient and clinician outcomes and quotations for these instances. These transcripts were from five CMs working in four hospitals, two CMs in two clinics and five CMs in the TOC. (See section 3.1.1 for more information about the interview data collection.) Ten of these CMs participated in the focus groups. This review of the interview data complemented the focus group data by providing relevant examples for the various categories and sub-categories of activities affecting the outcomes.

3.2.2 *Results*

The final list of CMs' contributions to patient and clinician outcomes includes 10 categories of activities that, according to CMs, have an impact on patient and clinician outcomes. These activities are: (1) ensuring PCP follow-up, (2) ensuring appropriate referrals, (3) providing patient education, including general patient education, education on signs and symptoms, and education on medications, (4) using health IT, including case management software, EHRs, and KeyHIE, (5) ensuring patients have proper equipment, (6) performing medication reconciliation, (7) focusing on specific patients, (8) building relationships with patients, (9) supporting or helping clinicians, and (10) building trust with clinicians.

3.2.2.1 *CM contributions to patient and clinician outcomes*

CMs *ensure that patients follow-up with their PCPs*; this includes ensuring that patients have a PCP and that follow-up appointments are scheduled within seven days of hospital discharge. CMs sometimes follow-up with PCPs when a patient has a question or experiences a problem. CMs *ensure appropriate referrals* of patients to home health agencies, hospice, skilled nursing facilities, outpatient CMs, or a TOC CM. They contact facilities such as a home health agency or pharmacy to follow-up on patients. CMs also provide patients with contact information of outpatient or TOC CMs so patients can contact them when needed. CMs *educate patients* on diet, weight monitoring, smoking cessation, discharge instructions, disease management, and prevention of disease exacerbations or complications. They also ask patients whether they have any questions about their disease or condition. CMs also *educate patients about specific signs and symptoms of disease and associated conditions* (e.g., weight gain for HF, continued shortness of breath for COPD, and infection or bleeding with surgery) and what to do if signs or symptoms occur. CMs *use health IT* applications, such as Wisdom, to communicate with each other and document care activities and patient progress. EHRs provide CMs access to patient-related information and can also be used for communicating with clinicians. Moreover, CMs have access to KeyHIE to obtain patient-related information from participating facilities as long as the patient has provided authorization. CMs *ensure patients have proper equipment or devices* needed for disease management by following-up with clinicians and care facilities that provide patients with the required equipment. CMs *perform medication reconciliation* by comparing medications the patient took prior to being seen or admitted with those subsequently prescribed to ensure orders for medications were not overlooked or lapsed, contraindicated, or duplicated

(e.g., generic and trade name medication both ordered). CMs *focus on specific patients* who are at higher risk, such as patients with frequent readmissions, patients with a history of non-compliance, patients with comorbidities, and other patients they are concerned about. *Building relationships with patients* is another activity performed by CMs. As a result patients feel valued and know that someone, i.e., the CM, will follow-up with them after discharge. CMs *support and help clinicians* by contacting doctors, educating clinicians about the role of Beacon and the CMs, identifying and following up on inaccuracies and mistakes, and helping clinicians achieve their goals such as decreasing hospital readmissions. CMs *build trust with clinicians* by working closely and collaboratively with them.

3.2.2.2 Inpatient vs. outpatient CM activities

Figure 3.2.2.2 compares the impact of care management activities on KBC outcomes from the perspective of inpatient and outpatient/TOC CMs. Inpatient CMs perceive that activities such as *performing medication reconciliation*, *ensuring appropriate referrals*, and *ensuring PCP follow-up* have a greater impact on outcomes as compared to outpatient and TOC CMs. All CMs perceive that *providing patient education* and *supporting or helping clinicians* significantly contribute to outcomes. Outpatient and TOC CMs perceive that *building relationships with patients*, *focusing on specific patients*, and *building trust with clinicians* have more impact on outcomes when compared to inpatient CMs. Overall, compared to other activities, both groups of CMs perceive that the use of health IT has less impact on KBC outcomes than other activities.

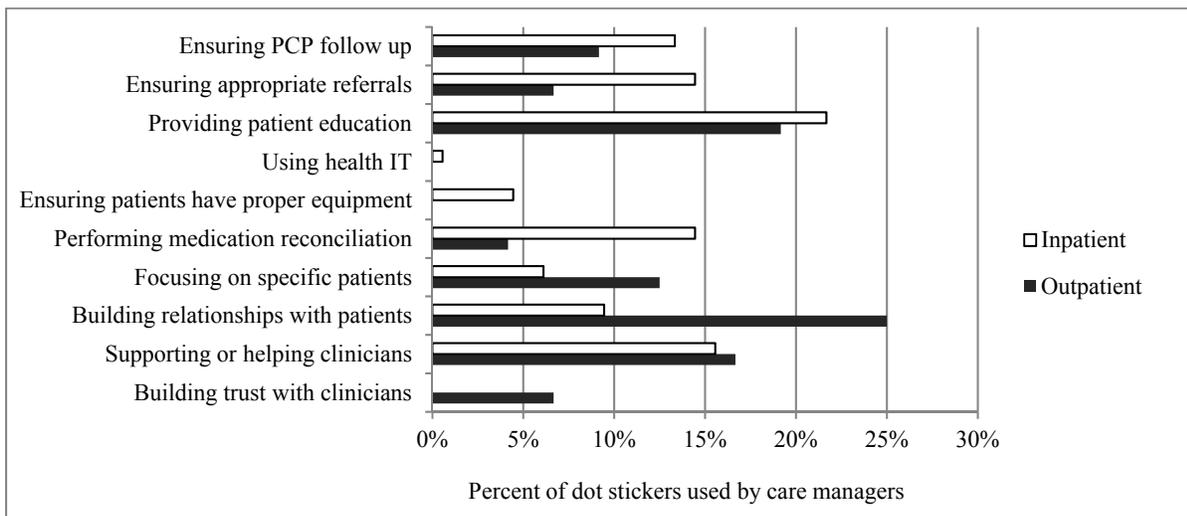


Figure 3.2.2.2: Perceived impact of inpatient vs. outpatient CMs' activities on KBC outcomes

3.3 Care manager survey

3.3.1 Methods

3.3.1.1 Design

In this study we conducted a survey with a combined repeated measures and longitudinal design. The first round of data collection (R1) in November-December 2011 was used as baseline data; the second round of data collection (R2), one year later in December 2012-January 2013, was used to examine changes over time.

3.3.1.2 Respondents

The survey for the first round was distributed to a total of 108 CMs, including 10 KBC CMs and 98 CMs employed by Geisinger Health Plan (GHP). The survey for the second round was distributed to total of 138 CMs, including 18 KBC care manager and 120 GHP CMs. Forty-six CMs filled out the survey in both rounds of data collection. See Appendices B.6 and B.7 for full reports of the two rounds of this survey.

3.3.1.3 Setting

The Beacon care managers who were invited to complete the survey worked in hospitals, skilled nursing facilities, a Transitions of Care (TOC) call center and in outpatient clinics. Most GHP case managers worked in outpatient clinics. Float case managers replace fill in for other case managers during vacations.

3.3.1.4 Procedure

A web-based survey program was used to administer the questionnaires. CMs first received an e-mail from the project PI, informing them of the survey and explaining the goal of the study. The notification was followed by an e-mail inviting the care managers to complete the survey. Three weekly reminders were sent to CMs who had not yet completed the survey. The survey was closed 5 weeks after the survey invitation. The response rate for the first survey was 71%, with 9 KBC and 67 GHP CMs responding; for the second it was 61%, with 13 KBC and 76 GHP CMs completing the survey.

3.3.1.5 Questionnaire

A questionnaire was developed to examine the use of health IT by care managers. Questions are asked about usability and usefulness of the case management documentation system (Wisdom), use and usefulness of KeyHIE, training on KeyHIE, the usefulness and importance of current and future functionalities of KeyHIE, and barriers in the work of care managers with regard to using multiple information systems. For a complete version copy of the surveys with descriptive findings for each question, see Appendices B.6 and B.7.

3.3.1.6 Data Analysis

Our analyses include descriptive statistics such as frequencies, means, standard deviations, and ranges. We describe the results for each round of data collection, compare the results for KBC and GHP CMs and compare the results of the two rounds. We also complete a longitudinal analysis of respondents who participated in both rounds of data collection. See Appendices B.6 and B.7 for full reports of the findings, including descriptive statistics on respondents' demographics and job characteristics.

3.3.2 Results

This section summarizes the main results of the analyses; see Appendices B.6 and B.7 for more details.

3.3.2.1 Use of Wisdom and KeyHIE

All CMs are required to use the Wisdom documentation system, but the survey results show that most CMs (70% in R1, 59% in R2) never use KeyHIE. Only 10% of CMs in each round use

KeyHIE a few times a week or more often. The respondents who do not use KeyHIE were asked why not. Many respondents (28% in R1 and 41% in R2) do not have access to KeyHIE or cannot access the patient information they need because patients have not signed an authorization for their records to be shared in KeyHIE. Some do not know about KeyHIE (9% in R1 and 13% in R2), think KeyHIE does not fit into their workflow (8% in R1 and 14% in R2), do not see a need for using KeyHIE (7% in R1 and 5% in R2), or do not have enough time to use KeyHIE (4% in R1 and 3% in R2). The majority of the CMs who use KeyHIE have received training (96% in R1 and 94% in R2). Overall the training is rated as good, with an average rating of 2.8 in R1 and of 3.3 in R2, on a scale from 1 (poor) to 4 (very good).

3.3.2.2 *Finding patient information in KeyHIE*

In R1, 22 CMs were asked for what percentage of patients they check KeyHIE. Most CMs (72%) checked for 25% of patients or fewer, but 10% of CMs checked KeyHIE for 76% of their patients or more. In the second round of data collection, 76% of the 32 respondents indicated that they check KeyHIE for 25% of patients or fewer and 12% checked for 76% of patients or more. As these percentages show, use of KeyHIE to check for patient information has not increased. Another related question asked CMs how often they found useful patient information in KeyHIE. In R1, 40% of CMs said that they found useful information for less than one-quarter of patients and 40% of CMs said that they found useful information for over three-quarters of patients. In R2, 53% of respondents said that they found useful information for less than one-quarter of patients and only 19% of CMs said that they found useful information for over three-quarters of patients.

3.3.2.3 *Current sources of information in KeyHIE*

GHP CMs (N=22 in R1 and N=31 in R2) were asked how often they used the various types of information available in KeyHIE: (1) hardly or never use it, (2) use it sometimes, and (3) use it very often. The information CMs use most frequently are discharge summaries, which 33% of R1 CMs and 45% of R2 CMs reported using often. Similarly, H&Ps were used frequently by 36% of CMs in R1 and 41% in R2; lab results were used often by 23% of CMs in R1 and 32% in R2.

Respondents were asked two questions about completeness and accuracy of the information in KeyHIE. Thirteen percent of the respondents in R1 and 29% in R2 reported that the information in KeyHIE is usually complete, while 31% in R1 (45% in R2) believe it varies. Forty-four percent in R1 and 19% in R2 believe it is usually incomplete, and 13% in R1 (7% in R2) do not know. Similarly, 35% of respondents in R1 and 58% in R2 think that the information in KeyHIE is very accurate, while 22% in R1 (26% in R2) think it varies, and 44% in R1 (16% in R2) do not know. No respondents indicated that the information in KeyHIE was very inaccurate.

3.3.2.4 *Usability of Wisdom and KeyHIE*

CMs reported several usability issues with the Wisdom software. On a scale from 1 (difficult) to 10 (easy), the average respondent score is below the midpoint of 5.5 for most features of Wisdom. Usability ratings of KeyHIE software were more positive, scoring above the midpoint for all features of the software.

3.3.2.5 *End user satisfaction with Wisdom and KeyHIE*

CMs were not very satisfied with Wisdom, averaging a score of 3.7 on a scale from 1 -7. This score is slightly below the midpoint of 4. All of the items related to satisfaction were scored on a scale of 1-7. CMs reported that the system is moderately reliable (mean of 4.5), and respondents can find support (mean of 4.6). However, CMs do not believe that Wisdom improves decision making (mean of 3.7), productivity (mean of 2.7), quality of care (mean of 3.3), or patient safety (mean of 3.2).

Overall, the CMs were moderately satisfied with the KeyHIE software (mean of 4.3). Respondents indicate that the system is generally reliable (mean of 4.8), and respondents can often find support (mean of 4.4). They also believe that KeyHIE tends to improve the quality of care (mean of 5.0) and patient safety (mean of 4.6). However, respondents less often report that KeyHIE improves decision making (mean of 3.9) or productivity (mean of 3.6).

Overall acceptance of Wisdom is moderate: an average of 5.2 on a scale from 1 (dislike very much) to 10 (like very much). Overall acceptance of KeyHIE was slightly better, averaging 5.9 in R1 and 6.2 in R2. No questions about Wisdom were included in the R2 questionnaire.

3.3.2.6 *Information technology barriers in the work of CMs*

In both rounds, we asked CMs to rank 16 potential barriers related to health IT and the impact that each barrier was having upon their work. CMs were asked to indicate if each item was (1) a major barrier, (2) a minor barrier or (3) not a barrier. In R2, four additional items were added. Inefficient use of the health IT applications, such as duplicate data entry, is one of the major barriers for CMs. Seventy-one percent of the CMs in R1 and 68% in R2 consider this a major barrier. The fact that not all hospitals and clinics are participating in KeyHIE was indicated as another major barrier by 60% of CMs in R2. Other major barriers include having to transfer data from one system to another (55% of respondents in R1 and 45% in R2); learning whether the patient has signed a universal authorization in order to transfer his or her data to other information systems (47% in R1, 42% in R2), and having to log into multiple systems (49% in R2). The computer skills of CMs were not considered to be a barrier by the majority of respondents (51% in R1 and 65% in R2). Similarly 46% of CMs in R1 (and 51% in R2) reported that a lack of computer support was not a barrier, and 38% of CMs in R1 (and 46% in R2) reported that finding and retrieving information created by other CMs in Wisdom was not a barrier. The results show that many barriers have not changed between rounds but that several have become less serious, such as a lack of training, searching for a patient's universal authorization, identifying patients eligible for case management and documenting in Wisdom.

3.3.2.7 *Impact of case management*

In R2, care managers were asked to rate the impact of case management. Case managers perceived their work as having a substantial impact on patient outcomes. On a scale ranging from 1 (none) to 3 (a lot) they felt that patient education and medication reconciliation had the most impact (average rating of 2.9). Other activities were rated nearly as high on average, including a patient action plan for acute exacerbation (mean of 2.8), help with referrals to the primary care provider (mean of 2.7) and help with other referrals (mean of 2.8). Similarly, CMs perceived that they were having a large impact on clinical outcomes, readmissions and ED visits. On a scale from 1 (no impact) to 5 (large impact), the average responses of case managers ranged from 4.5

for reducing readmissions and ED visits of COPD patients to 4.7 for improving clinical outcomes of CHF patients.

3.3.2.8 Comparison of KBC case managers and other case managers

Because their work crosses organizational boundaries, KBC case managers use some types of health IT differently than GHP case managers. Both KBC and GHP case managers use Wisdom to document patient care, the local EHR to find patient information, and often other software. However, more KBC case managers use KeyHIE (89% in round 1 and 100% in round 2), compared to 13% of GHP case managers in round 1 and 12% in round 2. There were few other notable differences between KBC and GHP care managers found in this survey.

3.4 Interviews with staff of health care organizations (HCOs) participating in Beacon

To learn about KBC implementation from the perspective of participating HCOs, we interviewed HCO staff in nine organizations over the period August 2011 to December 2012.

3.4.1. Methods

In all, 23 interviews were completed with 21 staff members in hospitals, primary care clinics, skilled nursing facilities, and home health agencies, for a total of 14.5 hours of interviews. The questions specifically addressed the use of KeyHIE, challenges experienced in KBC implementation, how those challenges have been overcome, experiences in working with KBC care managers, perceived effects of KBC on the care of patients with targeted conditions (HF, COPD, and post-surgery), the effects of KBC on the work of the interview participant, care coordination and membership of the care coordination team.

Table 3.4.1.1: Summary of interview data collection with staff of HCOs

Position	# of respondents	HCO type	Data collection times				
			Aug'11	Jan'12	May'12	Dec'12	Total
Physicians	4	Primary care clinic	45 min	2 hr, 15 min		49 min	3 hr, 49 min
Case managers	3	hospital		1 hour, 44 min			30 min
Administrators	2	hospital	41 min	58 min			1 hour, 39 min
Case management supervisor	1	hospital	17 min				17 min
Staff nurse	1	hospital	15 min				15 min
Nurse manager	1	Primary care clinic	25 min				25 min
Social worker	1	hospital	26 min	30 min			26 min
Social work supervisor	1	hospital	36 min			1 hr	1 hr, 36 min
Nurse	1	Primary care clinic		18 min			18 min
Administrator	1	SNF			28 min	32 min	1 hr
Nurse manager	1	SNF			17 min		17 min
Nurse	1	SNF			20 min		20 min
Case manager	1	Primary care clinic				1 hr, 3 min	1 hr, 3 min
Administrator	1	Home health agency				51 min	51 min
		# of Interviews	7	8	3	5	23
		Total duration	3 hrs, 25 min	5 hrs, 45 min	1 hr, 5 min	4 hrs, 15 min	14 hrs, 30 min

3.4.2 Results

The data from the HCO interviews was used to gain insight into the effects of the Beacon project on participating organizations and to learn about the perspectives of staff working in those organizations regarding the project. We also used the interview data for several analyses: assessing communication between the KBC project and HCOs (see section 3.4.1.2.1), adding information to the dashboard on characteristics of participating Beacon HCOs (section 3.4.2), analyzing membership in the care coordination team (section 3.5.1), and developing the clinician survey of satisfaction with KBC care management (see section 6.3).

3.4.2.1 *Difficulties in Engaging and Communicating with Beacon HCOs*

This section summarizes the insights gained during the HCO interviews about difficulties in engaging and communicating with KBC healthcare organizations. Several difficulties relate to awareness of the Beacon project. Several staff reported that it would be useful to increase the awareness of all staff who interact with patients in Beacon healthcare organizations. One care manager said that non-Beacon inpatient case managers and nurses saw the care managers as “a little bit of a threat” and could not understand why they were going over the things the nurses just did.

Another key issue was that some HCO staff failed to see the value of the Beacon project. One frequently mentioned reason for this is the fact that the healthcare organizations have not received feedback from KBC. One care manager mentioned that communication gaps between Wisdom and the EHR make it difficult for the physicians in her clinic to know what she has been doing and therefore to see the benefit of her work. Another reason mentioned is the fact that the physicians in one healthcare organization do not use KeyHIE and therefore do not understand or see the usefulness of the IT side of the Beacon project.

Other challenges include the fact that physicians in an outpatient clinic may not take the time to introduce the KBC care manager to patients and suggest that the patients should talk with her; staff on the inpatient unit may not inform care managers when a patient is likely to be discharged; and health educators have had difficulty scheduling times for informational presentations on KBC in clinics and get low turnout at the presentations they do schedule. Sometimes nursing homes may not allow the care manager to speak with their patients because they feel that care managers are duplicating the work of nurses in the facility.

Also, care managers reported that some physicians and organizations do not seem to accept and agree with the goals of the KBC project. One primary care physician persists in telling his hospitalized patients that they do not need to schedule a follow-up seven days after discharge, suggesting a two-week follow-up instead. Some physicians at another hospital do not see the benefit of hospice, home health and other services, so the care manager spends a lot of time persuading the physician, family and patient to use outpatient services and provide/accept rescue kits. TOCC care managers reported several problems: some physicians do not respond to repeated requests for a change in a patient’s care (e.g., medication regimen); nursing homes do not send requested medical information about patients; and home health nurses tell their patients that they do not need to talk with the KBC care manager because the home health nurse will take care of everything.

Other issues are related to KeyHIE. A health educator and a KBC outpatient care manager reported that some clinics do not fully understand KeyHIE and therefore do not try to obtain authorizations from their patients. Another care manager reported that the hospital she works in does not submit information into KeyHIE in a timely way. The head nurse in one clinic did not know much about KeyHIE and was not aware that her clinic had access to it. One hospital administrator said that physicians are wary of KeyHIE after having bad experiences using it years before. Another hospital administrator was concerned about data security in KeyHIE, the hard work that would be involved in mitigating the harm of a security breach and the importance

of educating physicians about the proper use of the system. An administrator at the same hospital reported that it was difficult for non-physicians to be granted access to KeyHIE, and therefore the non-KBC case managers did not even ask for access. The hospital case managers ask the KBC care manager for information from KeyHIE when they need it.

In conclusion, the HCO interviews provided useful information about the difficulties in engaging and communicating with Beacon HCOs. We provided a brief report on this topic to the KBC management team in December 2011 with a short list of suggestions, such as publicizing the KBC project, performing outreach to HCOs and providing feedback. In the months that followed, engagement and communication with participating organizations improved.

3.4.2.2 Barriers and facilitators of working with nursing homes

This section provides examples of barriers and facilitators in building relationships between Keystone Beacon and nursing homes. Interviews and observations of 12 Keystone Beacon care managers (CMs) and interviews of 14 members of Keystone Beacon healthcare organizations were conducted in May, August, and October of 2011 and January of 2012. A researcher reviewed all 2011 interviews and identified barriers in the relationships with nursing homes. Another researcher reviewed all 2012 interview and observation data and searched for the words: “nursing home,” “SNF,” and “challenge.” The coding allowed the identification of barriers and facilitators or strategies of working with nursing homes.

This section summarizes barriers and facilitators or strategies that were identified. For a detailed description, see Appendix B.11.1. Barriers to working with nursing homes include

- nursing home staff may not know which patients are managed by Keystone Beacon CMs and this can create problems for discharge preparation,
- there is no EHR available in the nursing home and Keystone Beacon CMs have to update paper lists of medications and send them to nursing homes, and
- there is a lack of awareness and acceptance of Keystone Beacon by nursing homes.

Facilitators of working with nursing homes include

- ability of Keystone Beacon CM to contact a discharge planner in the nursing home,
- effective interaction between Keystone Beacon CM and nurse manager at the nursing home,
- nursing homes have a strategy (e.g., a tag or sticker on patient’s chart) to identify patients followed by Keystone Beacon CMs, and
- use of KeyHIE by nursing home staff enables them to see if a patient is managed by a Keystone Beacon CM.

3.5 Organizational characteristics of KBC hospitals

A main focus of the KBC project was the improvement of patient outcomes, specifically reducing patient readmissions and emergency department visits. The project goals were to improve patient care through expanded use of KBC care management supported by health IT for both clinicians and patients. There are four hospitals participating in the project: Geisinger

Medical Center (GMC), Evangelical Community Hospital, Shamokin Area Community Hospital, and Bloomsburg Hospital. In this section we examine differences in organizational characteristics of the four hospitals, differences that may have an impact on the outcomes of the project.

3.5.1 *Methods*

The information in the dashboard was taken from a variety of sources. Some information regarding organizational characteristics was found on the organization’s website, from press releases, or other sources online. Additional information regarding characteristics of each hospital was taken from interviews with the management team, care managers, and other clinicians at each hospital. A major portion of information used in this dashboard was taken from results of the first round of the clinician survey on KeyHIE. The survey was administered in November 2011 when KeyHIE was not fully operational and contained limited information (see section 6.1 for more information on the survey). The response rates varied substantially across the hospitals. A total of 53 respondents at Geisinger Medical Center completed the survey, while the number of respondents for Evangelical Community Hospital, Shamokin Area Community Hospital and Bloomsburg Hospital were much smaller: 18, 8 and 2 respectively. The average score of the 2 respondents in Bloomsburg hospital are shown in Table 1, but due to the small number of respondents, cannot be considered reliable.

3.5.2 *Results*

Table 3.5.2.1 describes the organizational characteristics of the KBC hospitals, including information on health IT.

Table 3.5.2.1: Organizational characteristics of the participating hospitals

Organization	Geisinger	Evangelical	Shamokin	Bloomsburg
Size	600+-bed	135-bed	68-bed	72-bed
Discharges (from hospital's most recent Medicare cost report)	26,211	5,601	2,363	3,267
Date incorporated into Geisinger Health System	n/a	n/a	1/1/2012	7/1/2012
EHR implemented	Yes	Yes, limited	Yes	Yes, limited
EHR-type	EpicCare	iMed	Heartland (at the time of the survey. As of Jan 1, 2012 EPIC)	Chartlink (at the time of the survey)
EHR-elements	Full	No physician progress notes.	Full	Mainly paper-based. Some nursing charts
Registered KeyHIE Users	198	52	19	15

Results in Table 3.5.2.2 – 3.5.2.4 show that there are few differences between the four participating hospitals. Respondents in Shamokin hospital are more slightly positive about KeyHIE than respondents in the other hospitals, but the differences are small, as are the number of respondents.

Table 3.5.2.2: Beacon clinician survey results for the 4 participating hospitals

Beacon Clinician Survey Results	Geisinger (N=53)	Evangelical (N=18)	Shamokin (N=8)	Bloomsburg (N=2)
Average KeyHIE usage (1 = Never, 4 = Sometimes, 7 = Every day)	2.8	2.8	3.8	4.0
Percent who received training on use of KeyHIE	65%	65%	65%	50%
Organizational readiness for change (Scale 0-100)	69.9	64.2	64.8	53.1
Information received about KeyHIE implementation (Scale 0-100)	45.2	50.0	66.0	88.9
Average usability of KeyHIE (Scale 0-100)	43.0	47.9	67.5	57.1
Average ranking about the completeness of information in KeyHIE (1=usually incomplete, 3 = usually complete)	2.2	2.7	2.8	3.0
Average ranking about the accuracy of the information in KeyHIE (1=very inaccurate, 3=very accurate)	2.8	3.0	2.8	3.0
Average satisfaction with KeyHIE (Scale 0-100)	52.5	58.1	58.8	60.0

Table 3.5.2.3 Importance of different types of information in KeyHIE by hospital, mean scores

Currently, the KeyHIE website for clinicians contains different kinds of information. How important is each kind of information to you? (1=not important, 2=somewhat important, 3=very important)				
	Geisinger (N=28)	Evangelical (N=9)	Shamokin (N=8)	Bloomsburg (N=1)
H&P's	2.4	2.8	3.0	3.0
Discharge Summaries	2.6	3.0	3.0	3.0
Lab Results	2.8	2.8	3.0	2.0
Radiology Reports	2.8	2.7	2.8	2.0
Patient Demographics	2.0	2.1	2.2	1.0
Outpatient Notes	2.4	2.4	2.8	2.0

Table 3.5.2.4 Quality of working life of employees in the 4 hospitals, mean scores

Quality of Working Life of Respondents	Geisinger (N=28)	Evangelical (N=9)	Shamokin (N=8)	Bloomsburg (N=1)
Average Satisfaction with Provided Care (Scale 0-100)	79.7	78.7	90.6	83.3

Average Job Satisfaction (Scale 0-4)	3.3	3.4	3.3	4.0
Average Workload (Scale 0-100)	57.9	57.8	61.9	44.4
Average Burnout (Scale 0-100)	42.0	48.1	55.4	10.0

3.5.3 *Conclusion*

The objective of this dashboard was to examine whether differences in hospital characteristics could explain some variation in Beacon outcomes. During the project, two of the participating hospitals joined Geisinger Health System which resulted in more uniformity in hospital characteristics (e.g., use of the same EHR system and creation of uniform policies). For this reason and because of limited data on clinician satisfaction, we realized that the goal would be difficult to achieve and decided not to pursue these analyses further.

3.6 Care Coordination Team

Using data from interviews of CMs, clinicians, and administrators, we identified members of care coordination teams.

3.6.1 *Data collection*

Twenty one interviews were conducted with CMs and members of Keystone Beacon healthcare organizations in January and May of 2012 (see Table 3.6.1.1). As part of the interview, each person was asked, “Who are the members of the care coordination team?” and “Who is the leader of the team?”

Table 3.6.1.1: Interview participants by role

Role	# interviewees
Administrator	2
Inpatient KBC CM	5
Outpatient Keystone Beacon CM	2
Inpatient case manager	2
Outpatient/SNF CM	4
Physician	3
Nurse and LPN	3
TOTAL	21

3.6.2 *Methods*

The data analysis was performed in multiples stages. First, a researcher reviewed all of the interview transcripts and recorded the care coordination team members identified by the interviewees along with the number of interviewees that stated a role as the team leader. In some instances, the interviewee mentioned the venue of care at which a care coordination team member works (e.g., inpatient, skilled nursing facility (SNF), outpatient). In the instances where the venue of care was not provided by the interviewee, researchers used their knowledge to determine the most likely venue of care where the team member worked.

Subsequently, two additional researchers reviewed the results, refined the content and combined comparable roles. A group of researchers then reviewed the analysis and provided feedback to

further refine the means of presenting the data. Finally, the two additional researchers reviewed and refined the final document.

Results

The roles most frequently identified as being members of the care coordination team were

- therapist, including occupational, physical and recreation therapists and rehabilitation specialists (n=17);
- the patient, the patient's family or household coordinator (n=15);
- outpatient CM (n=13);
- social worker (n=12);
- physician (n=9);
- home health agency or hospice (n=9);
- nurse (n=8) and
- inpatient CM (n=8).

The roles most frequently identified by KBC CMs as team members were

- outpatient CM (n=7);
- therapist (n=7);
- patient, family or household coordinator (n=5);
- physician (n=5);
- social worker (n=4);
- inpatient CM (n=4); and
- TOC CM (n=4).

The roles most frequently identified as leading the care coordination team were physician (n=8 overall and n=5 for KBC CMs) or specifically the PCP (n=3 overall and n=1 for KBC CMs). For the full results of the analysis, see Appendix B.12.

4. Primary Care Redesign

To aid the Geisinger Community Practice Service Line (CPSL) team in practice redesign of primary care clinics, University of Wisconsin-Madison researchers conducted observations and interviews of clinic staff. Three processes were studied. In anticipatory management process 1 (AMP 1), a nurse calls patients who have appointments scheduled in the clinic and informs them of the tests and procedures that they should do before the appointment. As needed, the nurse will write orders and schedule appointments for patients. Anticipatory management process 2 (AMP 2) involves senior patient access representatives (PARs) contacting patients who have not had a recent appointment with their primary care physician (PCP) and encouraging them to make an appointment for a physical exam. If the patient is willing, the senior PAR will schedule the appointment. In the checkout process, senior PARs schedule all specialty appointments for patients before or after the patient leaves the clinic. Six UW-Madison researchers and fourteen staff from the Bellefonte and Scenery Park Clinics participated in the data collection. This report provides a summary of the research and our findings.

4.1 Background

The Geisinger Community Practice Service Line is undertaking a primary care redesign (PCR) project in response to the trends toward increased patient volume and a decrease in physician providers. Additionally, the PCR project is addressing the need to meet federal electronic health record (EHR) meaningful use requirements. The intent of the redesign is to promote efficient use of providers' time and the provision of high quality care for clinic patients through the integrated use of Geisinger's health information technologies (ITs): the Epic EHR and CDIS.

4.2 Methods

Data collection was completed during three visits to the Bellefonte and Scenery Park Clinics in February, March and June 2013. Clinic tours were conducted during the February visit when the research team also gained an understanding of how the clinics functioned, the roles of the various individuals and how they contributed to the AMP 1, AMP 2 and checkout processes. The second data collection, conducted in March, aimed to improve the team's understanding of the AMP 1 and 2 and checkout processes from the worker's perspective. They also aimed to understand the patient's perspective as he went through the intake process in the clinic. One of the researchers served as a "mock patient" while a research colleague observed and asked questions to remind the intake nurse to explain her cognitive process as she evaluated the patient. After this data collection the team created preliminary process maps of the three processes at each clinic, identified barriers and facilitators associated with activities depicted in the maps and determined areas in which further understanding was needed. The June data collection was used to collect more detailed information on the processes, answering the team's remaining questions.

All interviews were audio recorded and transcribed. The observations were conducted with researchers sitting or standing behind the nurse or senior PAR as she worked. This method allowed the researcher to view the computer screen as the work progressed. Each researcher recorded the time an activity began, the tasks, tools and technology, work environment and aspects of the clinic associated with the activity. Included in the observations were notations indicating interruptions that occurred as the worker attempted to complete her work.

4.3 Process maps

Analysis of the interview transcripts and observation notes identified the activities completed by each staff member (LPN or senior PAR), the sequence of tasks, her use of technology and tools, and barriers and facilitators in her work system. These were arranged temporally and by role in process maps. Supplemental tables were also created that include greater detail about the activities depicted in the process maps and the facilitators and barriers associated with each activity. Development and refinement of process maps and supplemental tables were discussed and agreed upon by all researchers. The process maps and tables were updated to ensure their accuracy after the final visit.

4.4 Results

These analyses were used to create six process maps and accompanying tables, one for each process in each clinic. The AMP1 process at Scenery Park was later dropped from the analysis because it was in flux at the times we collected data. The process maps and tables can be found in appendix C1.

4.5 Discussion

During the observations and interviews, some common themes emerged that were expressed frequently. Several were related to technology. All users noted that a link between the CDIS and EHR systems would improve the efficiency of their work, eliminating the need to frequently cut and paste from CDIS and search for records in the EHR. Several other barriers were also associated with CDIS: users are automatically logged out of the system after a period of inactivity, and substantial time is required to log into the CDIS system and open the report. Several users found this frustrating. Users also noted that some aspects of the CDIS reports are not useful to them. For example, users did not know the meaning of the color coding on the AMP 1 report and assumed it had no meaning.

Other themes were related to the resources – both tools and people – available to the participants. All users noted that having two computer monitors facilitates their work. Also, the participants all found that familiarity with the clinic and its providers was very helpful to them. Past experience and shared understandings could be leveraged to make decisions quickly and improve efficiency of processes.

The third and final set of themes relates to the impacts of the processes. All three processes are perceived to be beneficial to clinicians and patients. However, it is noted that AMP 2 is perceived to be less beneficial and less effective because many patients cannot be reached or decline to schedule an appointment. AMP 1 is thought to be beneficial at Bellefonte, however the process was in flux at Scenery Park.

4.6 Conclusion

At this point, no further data collection or analysis is planned. Our findings suggest some useful changes could be made, however. The first recommendation is to consider linking the EHR and CDIS, to alleviate problems noted by participants. Also, the period of time before a user is automatically logged out of CDIS could be extended for users who anticipatory management processes. Additionally, the report layout for AMP 1 and AMP 2 could be re-evaluated considering the needs of the user and the goals of the processes. Separate reports for each clinic would likely open more quickly, eliminating delays.

5. Care gaps

The objectives of this study are to examine gaps in the coordination of care, or care gaps, detected by the KBC care managers and the strategies that they use to resolve these gaps. Our findings will increase general knowledge about the types of activities that care managers do and how those activities may improve patient outcomes.

5.1 Care gaps methods

5.1.1 Design

In this study we analyzed *secondary data*, retrieved from the proprietary documentation system used by care managers, Wisdom. We created a dataset including patient characteristics, details about the inpatient stay (if any), care gaps identified, and strategies used by care managers. All

KBC care management in the period November 15, 2011 - March 31, 2013 was included in the dataset. IRB approval was obtained for this study.

5.1.2 Setting

The KBC care managers were employed in 4 hospitals, 17 clinics, 3 skilled nursing facilities and the TOC.

5.1.3 Data

The number of care managers participating in the Beacon project varied over time. At the height of the project, July-September 2012, 23 KBC care managers were at work: 5 inpatient CMs, 3 TOC CMs, 14 outpatient CMs and a float care manager.

Care managers document patient data and their own activities in Wisdom each time they contact a patient or work on the patient's behalf. When a care gap is identified, it is documented along with the strategies used by the CM to close the gap. The care management data are structured differently for each type of CM. Inpatient CMs may contact a patient several times during a hospital stay, but all care gaps and strategies are documented within a single data record, known as an assessment. TOC care managers follow patients for 30 days after hospital discharge or sometimes longer and have one assessment for each week. Outpatient care managers work with patients who are discharged from the hospital or referred by a primary care physician. For most of the project, they documented all patient contacts in a single assessment, meaning that one assessment could include data from a single patient contact or from continuous care management occurring over many months. In August 2012, outpatient CMs gained the ability to create an assessment for each contact with the patient (see Figure 5.1.3.1).

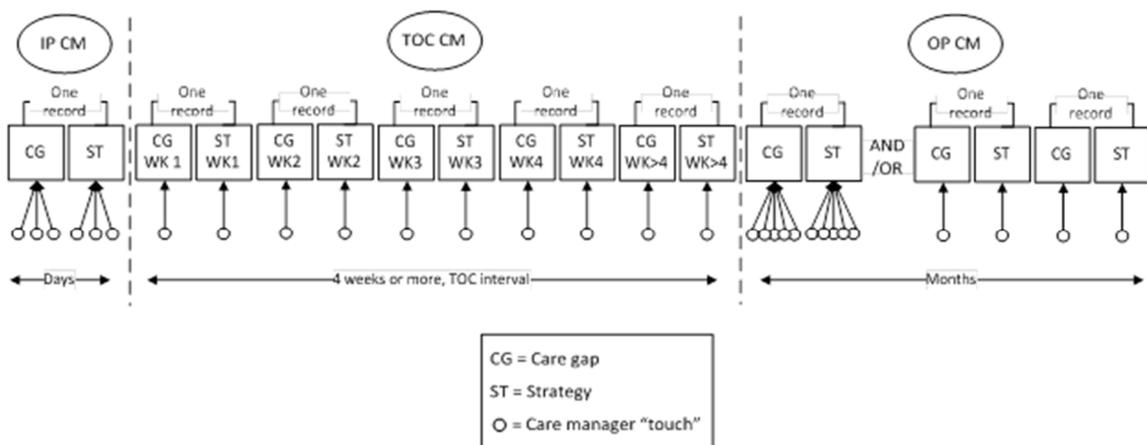


Figure 5.1.3.1: WISDOM documentation database structure

5.1.4 Data Analysis

This report contains descriptive analyses on the characteristics of care managed Beacon patients, and types of care gaps and strategies.

5.2 Care gaps results

The dataset contains the data of 4871 patients, 4137 of whom received Beacon inpatient care management in the study period. Most of the patients had a diagnosis of HF (53%), COPD (44%), or post-surgery (16%). Many patients had multiple diagnoses or serious comorbidities such as diabetes.

The dataset contains information from 10,739 KBC care manager assessments in the study period, which included 503 days or 344 workdays. Of the 5,851 inpatient assessments, 2063 (35.3%) were for readmissions during the study period. Most patients (69%) were re-admitted only once in this period, but others were re-admitted as many as 12 times.

5.2.1 Care manager assessments

Figure 5.2.1.1 summarizes the assessments per month, showing that most of the outpatient CMs began managing patients in or after May 2012. This figure also shows the effects of TOC closing in December 2012. Some inpatient care managers acted as TOC CMs in 2013, contacting a small number of their patients after discharge and documenting the care management in TOC assessments. Note that November 2011 is excluded from this figure because we do not have data for the first two weeks of this month.

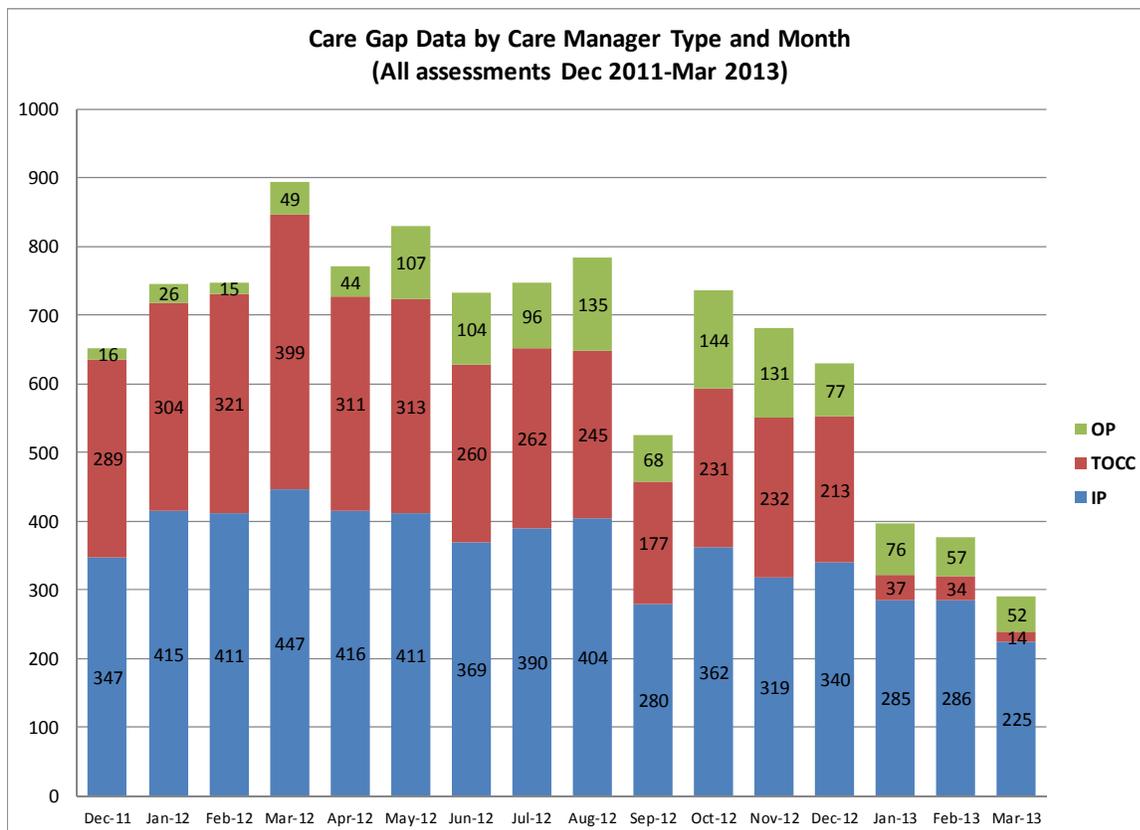


Figure 5.2.1.1: Number of KBC care manager assessments by care manager type, December 2011-March 2013

5.2.2 Care gaps

Table 5.2.2.1 summarizes the number of times that each care gaps was identified by each type of care manager and the percent of assessments in which the care gap was found. Note that several gaps can be identified in a single assessment. Definitions of the care gap categories can be found in Appendix D.1.

Table 5.2.2.1: Summary of care gaps by type of KBC care manager

Care Gaps	Frequency and percent of inpatient assessments		
	Inpatient assessments (N=5,851)	TOC assessments (N=1,143)	Outpatient assessments (N=1,208)
Advanced Illness Planning	229 (3.9%)	10 (0.9%)	135 (11.2%)
Discharge Disposition	431 (7.4%)	34 (3.0%)	16 (1.3%)
Discharge Instructions	688 (11.8%)	178 (15.6%)	82 (6.8%)
Discharge Summary Not Available	85 (1.0%)	2 (0.2%)	1 (0%)
Follow-up Appointment Not Scheduled	2,132 (36.4%)	202 (17.6%)	116 (9.6%)
Medication Errors	613 (10.5%)	240 (21.0%)	176 (14.6%)
Treatment Plan Revision	484 (8.3%)	50 (4.4%)	135 (11.2%)
Other	120 (2.1%)	53 (4.7%)	69 (5.7%)
None	2,717 (46.2%)	604 (52.8%)	678 (56.1%)

Note: During one “assessment” care managers can detect several care gaps and therefore the column percentages can exceed 100%.

5.2.3 Strategies

Care managers employed various strategies to resolve the care gaps identified. Note that strategies are only documented in the assessment if they are used to close a care gap. The strategies used by each type of care manager are summarized in Table 5.2.3.1. Definitions of the strategies can be found in Appendix D.2.

Table 5.2.3.1: Strategies by type of care manager

Strategies	As frequency and percentage of all assessments with a care gap		
	Inpatient (N=3,134)	TOC (N=539)	Outpatient (N=530)
All Documentation Updated and Provided	379 (12.0%)	186 (34.5%)	268 (50.6%)
CM Communicates Changes to Post-Discharge Providers	1032 (32.8%)	107 (19.9%)	99 (18.6%)
CM Informs CM	75 (0.2%)	0 (0%)	2 (0.4%)
CM Informs Provider	885 (28.1%)	246 (45.6%)	271 (51.1%)
CM Requests Appointment Be Scheduled	175 (5.6%)	10 (1.9%)	1 (0.2%)
CM Reviews Changes with Patient	867 (27.6%)	155 (28.7%)	240 (45.3%)
Coordinate Services	699 (22.2%)	171 (31.7%)	186 (35.1%)
Patient Education	1171 (37.2%)	175 (32.5%)	283 (53.4%)
Patient Will Schedule Appointment	45 (1.4%)	42 (7.8%)	5 (0.9%)
Provider Makes Necessary Changes	404 (12.8%)	144 (26.7%)	180 (34.0%)
Referral to Outpatient CM	1900 (60.3%)	2 (0.4%)	5 (0.9%)

Scheduled Follow-up Appointments	1014 (32.2%)	60 (11.1%)	176 (33.2%)
Other	123 (3.9%)	37 (6.9%)	35 (6.6%)
Total	8,769	1,335	1,751

Note: Several strategies can be documented in each assessment. Therefore the column percentages can exceed 100%.

5.3 Conclusion

Our results demonstrate the importance of care management in resolving problems related to care transitions. Over the 16-month study period, 5 inpatient, 3 TOC and up to 12 outpatient KBC CMs provided care management for a total of 4,871 patients and identified 6,351 gaps. Overall, they detected coordination care gaps in approximately half of all cases and employed 11,855 strategies to resolve the gaps. The work of KBC care managers thus had a substantial impact on the quality of care for Beacon patients.

6. Clinician Survey

6.1 Methods

Two clinician surveys were developed and conducted for the Beacon project. The first measured clinician satisfaction with the Keystone Beacon health information exchange (KeyHIE) and was conducted in two rounds. The second survey assessed clinician and staff satisfaction with KBC care management in a single round that was distributed with the second round of the survey on satisfaction with KeyHIE. Algorithms were developed in the web-based survey software to determine which participant received each survey.

6.1.1 Clinician Satisfaction with KeyHIE survey

Design

The survey on clinician satisfaction with KeyHIE had a repeated cross-sectional design with two rounds of data collection. Round 1 (R1) was conducted in November 2011 and Round 2 (R2) in January 2013.

Sample

A total of 81 people working in KBC organizations responded to the survey in round 1 (response rate: 33%) and 271 in round 2 (response rate 22%).

Questionnaire

The questionnaire was designed to assess clinician's use of KeyHIE, usability of KeyHIE, clinician's satisfaction with KeyHIE, and barriers to acceptance and use of KeyHIE. The questionnaire was developed based on previous studies that evaluated health information technologies in healthcare settings (Hoonakker et al. 2011; Simon et al. 2007). The questionnaire was pilot tested.

Data analysis

Data analysis was performed using SPSS. After data cleaning, relevant questions were combined to create scales, and simple descriptive statistics such as mean, median, mode, standard deviation, and frequency were examined. Most of the results of these analyses have been

published in the Abt report *Keystone Beacon Community: Report on Clinician Survey, 2011 and 2013*. However, while analyzing the data, Abt combined respondents of the KeyHIE clinician survey and the KBC care manager survey. We have analyzed the care manager’s responses separately (see sections 3.3.1 and 3.3.2) and therefore the results of our analyses may be slightly different from the analyses conducted by Abt.

6.1.2 Clinician and staff satisfaction with KBC care management survey

Design

This survey is a cross-section “snapshot” of clinician satisfaction with Beacon care management in January 2013 when the project was beginning to wind down.

Sample

All clinicians and staff in the 14 primary clinics where an embedded KBC outpatient care manager was employed received a questionnaire, either as a web-based survey (WBS) or a paper version. In all 26 invitations were sent out to participate in the WBS and 32 invitations by postal mail. Twelve persons responded to the WBS and 14 people returned completed copies of the postal mail survey for a total response rate of 45%. Eight of the 26 respondents were primary care physicians (31%), 6 were nurses (23%), 4 were nurse practitioners or physician assistants (15%), 4 were medical assistants or clerks (15%), 2 were case managers, care coordinators, social workers or discharge planners (8%) and 1 was a specialist or sub-specialist physician (4%).

Questionnaire

The questionnaire was designed to assess the level of satisfaction with the Keystone Beacon care management program in outpatient clinics. This survey included questions about the helpfulness of Keystone Beacon care managers, the impact of care management on patients and clinical outcomes, the effect of care management activities on patients, reductions in emergency department visits or readmissions, and overall satisfaction with Keystone Beacon care management.

Analysis

Simple descriptive statistics such as mean, median, mode, standard deviation, and frequency were examined.

6.2 Results on clinician satisfaction with KeyHIE

In R1, only 19% of respondents indicated that they use KeyHIE on a regular basis (i.e., at least once a week), while in R2 14% used KeyHIE regularly (see table 6.2.1).

Table 6.2.1: How often do you use KeyHIE?

	2011	2013
Never	20 (28%)	83 (44%)
A few times a year	18 (25%)	39 (21%)
Once a month	7 (10%)	25 (13%)
A few times a month	13 (18%)	17 (9%)

Once a week	6 (8%)	13 (7%)
A few times a week	5 (7%)	8 (4%)
Every day	3 (4%)	5 (3%)
Total	72 (100%)	190 (100%)

In both samples, many clinicians registered for KeyHIE but never used it (R1: 28%; R2: 44%). Reasons for not using KeyHIE were (a) not being informed about KeyHIE, (b) KeyHIE does not fit in my workflow, (c) not enough time to use KeyHIE, and (d) other reasons that for the most part had to do with difficulties in accessing KeyHIE or data in KeyHIE.

6.2.1 Barriers to the use of KeyHIE

In round 1, respondents who use KeyHIE indicated that some difficulties were major barriers to use of KeyHIE. Twenty-five percent said they had to use many different information systems, 22% mentioned they did not have enough time to learn about KeyHIE, 19% indicated difficulty in fitting KeyHIE in their regular work, and 15% had patient privacy or information security concerns (see Figure 6.2.1).

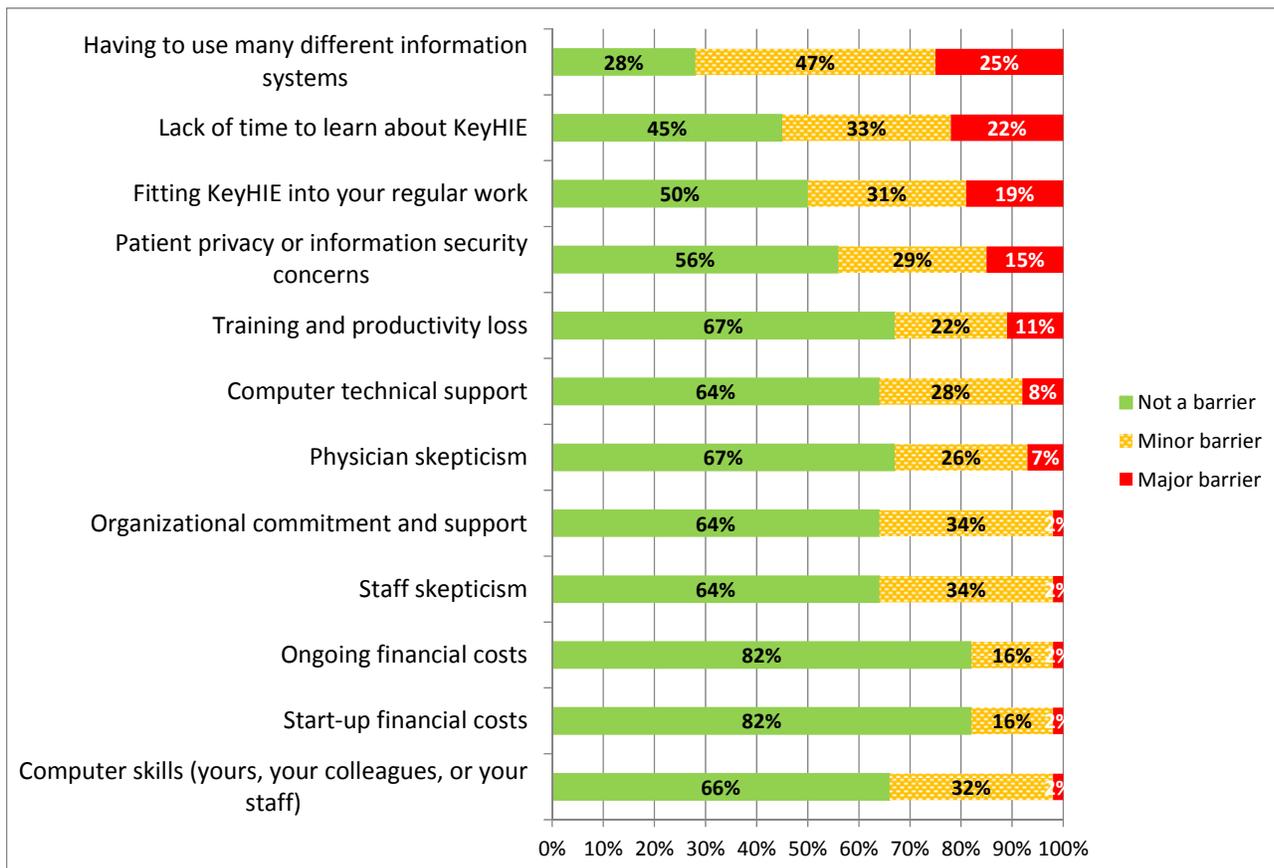


Figure 6.2.1: Barriers against the use of KeyHIE, Round 1

6.2.2 End-user satisfaction with KeyHIE

On average, users are moderately satisfied with KeyHIE (see Figure 6.2.2). Respondents believe that KeyHIE improves quality of care and the information in KeyHIE does have an impact on their decision making; the mean score on overall user satisfaction was 4.1 (on a scale from 1-7).

However, results also show that respondents could benefit from refresher classes on how to use KeyHIE; that it is relatively difficult to find help when using KeyHIE; and that KeyHIE does not seem to save time. Note that two items in Figure 6.2.2 are negatively worded (“KeyHIE has a negative impact on patient care” and “system response time on KeyHIE is slow”), while all other items are positively worded.

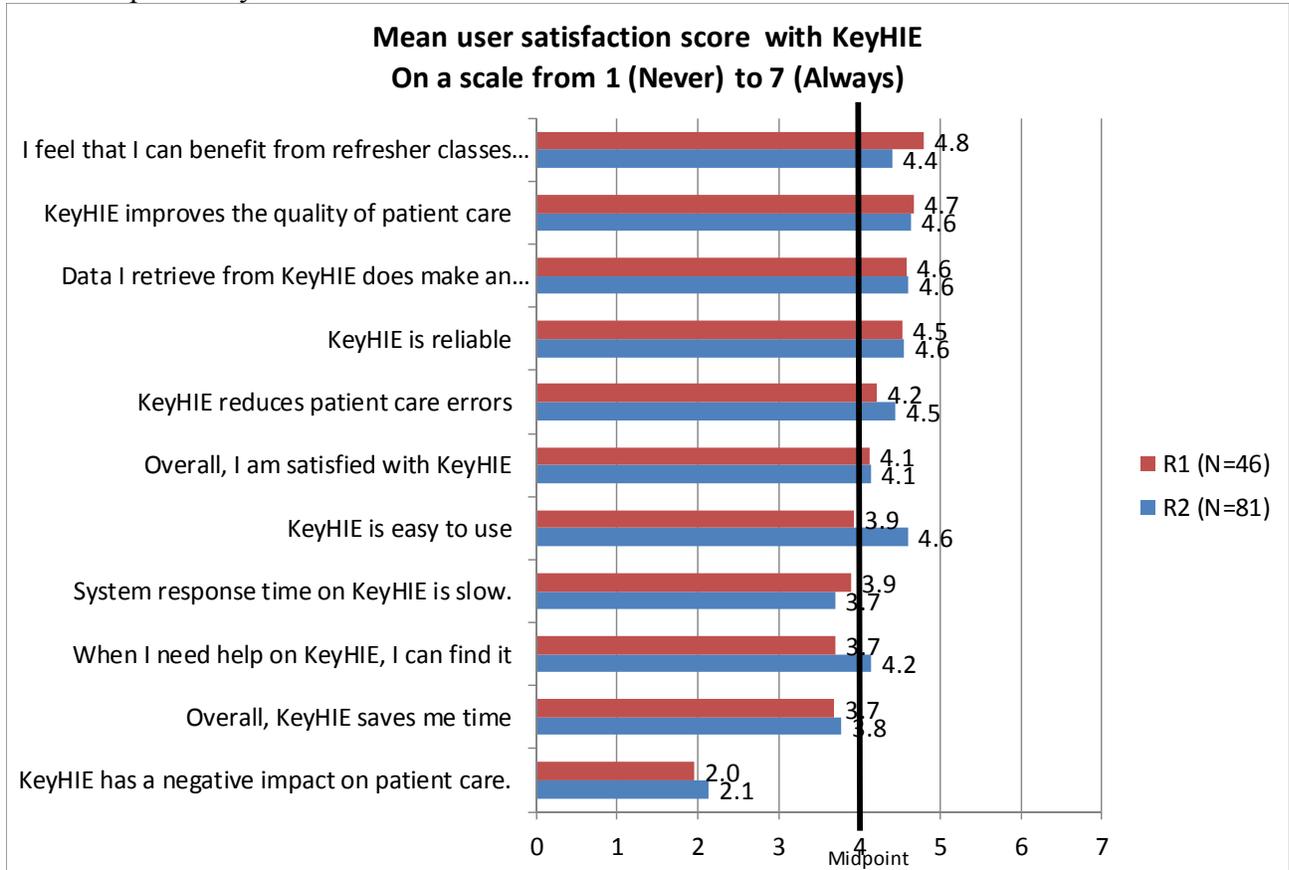


Figure 6.2.2: End-user satisfaction with KeyHIE, 2011 and 2013

6.2.3 Conclusion

In this survey, questions addressed the use of KeyHIE, its implementation process, barriers against use, usability, and end-user satisfaction with KeyHIE. Many of the clinicians responding had registered for KeyHIE but have never used it (28% in 2011 and 44% in 2013). Major barriers to using KeyHIE included clinicians having to use too many different IT systems, lack of time to learn about KeyHIE, fitting KeyHIE into their regular work, and concerns about privacy and security. Clinicians who used KeyHIE rated its usability to be below the scale midpoint. This underlines the importance of usability evaluation, preferably in an early stage of technology development. Only when clinicians can find useful information in a health IT system, and the system is easy to use, will they use it. Perhaps because of the barriers to use of KeyHIE, clinicians who used KeyHIE were only moderately satisfied with it. It is important to note that KeyHIE is a system that is still in development. More healthcare organizations, more patient information, and more functionalities will be added to KeyHIE.

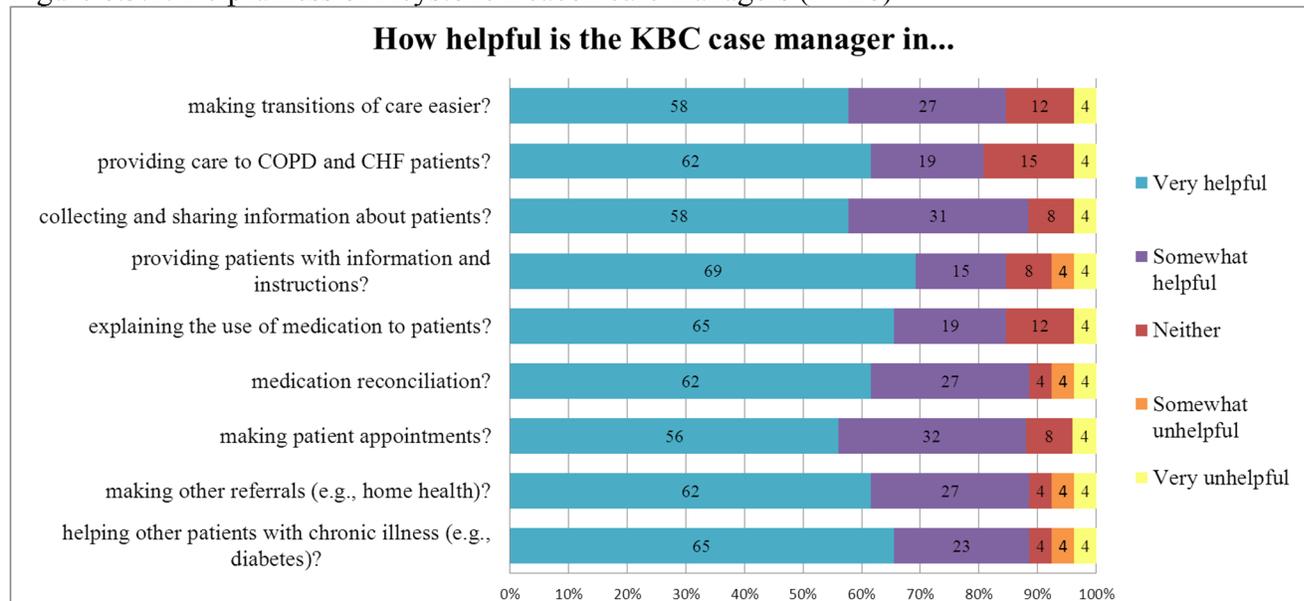
6.3 Results clinician and staff satisfaction with KBC care management

In all, clinician and staff satisfaction with Keystone Beacon care management was high. Most respondents (58%) reported that they were very satisfied with care management. Another 27% were somewhat satisfied, while the remaining 16% were “not too satisfied” or “not at all satisfied.”

6.3.1 Helpfulness of Keystone Beacon care managers

As Figure 6.3.1 shows, most respondents found that Keystone Beacon care manager to be “very helpful” or “somewhat helpful” in making transitions of care easier (85%). The vast majority of respondents (88%) said that Keystone Beacon care management would be “very helpful” or “somewhat helpful” for other patients with chronic illness, such as diabetic patients.

Figure 6.3.1: Helpfulness of Keystone Beacon care managers (N=26)



6.3.2 Effectiveness of Keystone Beacon care management

As Table 6.3.2 shows, nearly half of respondents believed that Keystone Beacon care management “definitely improved” clinical outcomes for patients with COPD (44%) or HF (48%). Another 20% of respondents believed that care management “possibly improved” clinical outcomes for Beacon patients. Most of the remainder was unsure, with only 12% of respondents indicating that KBC care management did not improve clinical outcomes.

Figure 6.3.2: Improvement of clinical outcomes (N=25)

	Definitely improved	Possibly improved	Unsure	Possibly no improvement	Definitely no improvement
Does KBC case management improve the clinical outcomes of your patients with <i>COPD</i> ?	44%	20%	24%	8%	4%
Does KBC case management improve the clinical outcomes of your patients with <i>CHF</i> ?	48%	20%	20%	8%	4%

Table 6.3.3 describes the effect of care management on readmissions and emergency department (ED) visits of Beacon COPD and HF patients, as perceived by survey respondents.

Approximately half of respondents indicated that Keystone Beacon care management definitely reduced these outcomes for COPD (46%) or HF (50%) patients. Only 12% of respondents believed that care management had no effect on reducing these outcomes for these Beacon patients.

Table 6.3.3: Keystone Beacon care management’s impact on emergency department visits and hospital readmissions (N=26)

	Definitely reduced	Possibly reduced	Unsure	Possibly no reduction	Definitely no reduction
How much does KBC case management reduce ED visits or hospital readmissions of COPD patients?	46%	15%	27%	8%	4%
How much does KBC case management reduce ED visits or hospital readmissions of CHF patients?	50%	15%	23%	8%	4%

The effect of care manager activities on patient outcomes is shown in Table 6.3.4.

Approximately two-thirds of respondents believe that specific tasks of Keystone Beacon care managers had “a lot” of impact on improving patient outcomes. Only 8-12% of respondents believed that care manager activities had no effect on patient outcomes.

Table 6.3.4: Improvement in patient outcomes related to Keystone Beacon care management activities (N=26)

	A lot	Some	None
Patient education	69%	19%	12%
Help with referrals to PCP	62%	27%	12%
Help with other referrals	62%	31%	8%
Acute care exacerbation management	62%	27%	12%
Medication reconciliation	60%	32%	8%

6.3.5 Conclusion

Overall, the level of satisfaction with Keystone Beacon care management was consistently high in this small sample of outpatient clinicians and staff. Nearly 60% of respondents were very satisfied with Keystone Beacon care management, and another 27% were somewhat satisfied. Most respondents perceived that others were also satisfied or very satisfied, including patients (80%), patient families (81%), physicians (77%) and nurses (74%). Up to two-thirds of the respondents indicated positive effects on clinical outcomes for care managed patients: reductions in emergency department visits and hospital readmissions, and improved patient outcomes.

7. Patient Interviews and Focus Groups

This section summarizes patient interviews and focus groups conducted September - November 2012. The main objective was to understand the experience of hospitalized patients with Keystone Beacon care management. Some of the data were also used to refine the patient survey of inpatient care management.

Methods

A recruitment population of 378 eligible patients was generated in two steps. First the KBC CMs flagged patients they considered suitable. Second, all KBC care managed patients were filtered using the following criteria:

- (1) admitting or discharge diagnosis of HF or COPD,
- (2) discharged from Evangelical Community Hospital or Geisinger Medical Center within the 90 days before data collection,
- (3) discharged home, not to rehab, a skilled nursing facility, or an assisted living facility,
- (4) patient and family reviewed and understood the discharge plan,
- (5) no diagnosis of altered mental status,
- (6) caregiver support, if needed, is provided by someone living close to the patient, and
- (7) the patient does not have Geisinger Health Plan (GHP) insurance.

Patients identified using either method were eligible for the study. Those who were willing to participate were scheduled for an interview or focus group, and the KBC MMAs confirmed their availability one to two days prior to their scheduled date. Great lengths were taken to protect participant privacy and anonymity. For example, all contacts before and after the interview or focus group were by the MMAs. Fictitious names, such as Julia Roberts, were chosen by the participants and were the only patient names known by the researchers.

Nineteen participants took part in either an individual face-to-face interview (n=6), a focus group at a hospital in central Pennsylvania (n=9), or an individual phone interview (n=4). Twenty-eight participants were scheduled, but one did not answer their door for an interview. Eight were either re-admitted or unable to attend the focus group for other reasons. Characteristics of the participants are in table 6.1.

Table 6.1: Characteristics of patient focus group and interview participants

Characteristic	Number	Percent
<i>Gender</i>		
Female	12	63%
Male	7	37%
<i>Age</i>		
41-50 years	1	5%
51-60 years	2	11%
61-70 years	7	37%
71-80 years	6	32%
Over 80 years	3	16%
<i>Primary diagnosis</i>		
HF	13	68%
COPD	6	32%
<i>Hospital recently discharged from</i>		

Evangelical Medical Center	8	42%
Geisinger Medical Center	11	58%

Participants saw an inpatient CM an average of 2.1 times during their most recent hospital stay and all but one was contacted by an outpatient CM or TOC CM their first day out of the hospital. Two participants were readmitted after discharge, one five days after and another ten days after.

All interviews and focus groups followed a specific script (Appendices F1 & F2) in which participants were asked about their experience with inpatient and outpatient care managers. Questions related to five main topics: background information about the patient, medication reconciliation, education, referral to primary care physician, and arrangement of other services.

In the interviews, focus groups, and phone interviews, a primary facilitator asked most of the questions, while 1-3 additional researchers occasionally asked follow-up questions to clarify participant answers. During interviews, participants were asked to answer some questions by selecting an answer from a list (e.g., poor, fair, good, very good, excellent). During the focus groups, a facilitator recorded participant ideas on poster paper.

Both interviews and focus groups were audio recorded and transcribed. Other sources of data were the notes from focus groups and researchers' personal notes. Each transcript was analyzed by a research team member, who separated data by CM type (inpatient, outpatient, and TOC care managers) and into the main topics of the interview and focus group guides.

Results

The participants have very complex medical conditions. While all had a primary KBC diagnosis of either HF or COPD, many had diabetes and both HF and COPD, or also suffered from chronic conditions such as rheumatoid arthritis. Although very ill, the participants emphasized how much they knew about managing their conditions and how eager they were to provide feedback that may help others. Eight of nineteen participants could not remember or were unsure if they remembered their inpatient CM, compared to five for outpatient CMs. Participants cited the time since hospitalization and their memory during hospitalization as reasons for the difference.

Not every participant was asked or answered every question because of the nature of the discussions. Interview participants who answered closed questions were very happy with their care, with four of five participants rating it as excellent. Participants rated their health as poor (n=3), fair (n=3), and very good (n=1). The responses to all of the closed questions are available in Appendix F3, tables 6 through 9.

Inpatient care managers

The large number of clinicians interacting with patients in the hospital made it difficult to determine if a participant was referring to a CM. However, themes from the inpatient CM data were that the CMs served as patient advocates, were confidants for the participants, performed medication reconciliation, educated patients (including translating instructions), scheduled appointments with their primary care physician, and arranged other services.

Participants valued the inpatient CMs for their service as patient advocates, conveying information such as their discharge date, and for being a confidant who was not part of their family. Seven participants mentioned inpatient care managers providing education or translating doctors' instructions into "*terms that you could understand and yet [they] didn't talk down to [me].*" Participants also said that care managers discussed how to avoid being readmitted (n=3), provided education (n=7), reviewed diet and orders (n=1), and performed medication reconciliation (n=3). Seven participants remembered medication reconciliation during their stay, but only two remembered medication reconciliation at both admission and discharge, and all were unsure or doubtful that the inpatient CM had performed this task. Participants were also unsure who had made their follow-up primary care physician appointments for them.

Outpatient care managers

Participants remembered outpatient CMs better than their inpatient counterparts but found it challenging to distinguish outpatient CMs from others contacting them by phone, including physician office staff and home health or service providers. Five of the participants opted out of receiving outpatient care management. Four of these were not newly diagnosed and felt knowledgeable enough to not need the outpatient education that CMs provide. Participants with outpatient CMs appreciated having someone who cared about them and reminded them to adhere to their regimens. Three participants mentioned the weekly phone conversation with their CM was helpful as it improved their diet and weight management, reminded them of what they could do and provided a "bump" in their behavior.

"Bumping you about little things... You know, that the doctor doesn't, the doctor or the heart doctor doesn't have time to. You know; just reminding you, keep bumping you."

– Focus group participant on the biggest impact of the Keystone Beacon project on him.

Four participants remembered their outpatient CM explicitly reviewing their medications with them. In contacts with patients, outpatient CMs answered questions, listened, checked on weight, diet, medication changes, and asked what the participants needed help with. While most participants said they felt comfortable calling their outpatient CM, few actually did, preferring to wait to hear from the CM.

Participants did use their outpatient CMs as a conduit to the doctor, using them to schedule visits or arrange other services, such as home health equipment, home health services, or home oxygen. Four participants mentioned asking the CMs for help making appointments. Two limitations mentioned were that participants did not feel comfortable contacting their outpatient CM on nights or weekends and that an outpatient CM was not accessible to a participant who was severely hard of hearing.

Overall findings

When interviewing participants, two more general themes emerged; that surprises were stressful (e.g., not knowing when they would be discharged), and that participants did not know what the CMs could do for them. All in all, participants had a positive experience with their CM. The CMs helped the participants in a number of ways.

“The fact that they’re there, that, you know, if you need them, you can get someone in to help you, and they can get someone to help you”; “They’re the central dispatchers.”; “Big plus: taking workload off of the staff; can better concentrate on patient care.”

– Focus group participant

Conclusion

Keystone Beacon patients represent a very sick and complex patient population. This population presented some challenges in data collection such as participants not showing up when scheduled and confirmed for participation. For patients, the Keystone Beacon project is complex and therefore a challenge to fully understand. Patients see many clinicians during a hospital stay, and often more than one organization regularly calls them at home to check up on them. Participants were eager to help and were clearly motivated to participate because of their desire to help improve care for other people.

8 Survey on patient satisfaction with KBC care management

To assess the effect of KBC care management on care coordination, knowledge, activation and satisfaction of hospitalized patients, survey data was collected from recently discharged Beacon patients and a control group of similar non-Beacon patients in February-March and August-September 2013. Patients were also asked whether they received key care management services during their inpatient stay, such as education and medication reconciliation. This section reports the results of the survey analysis.

8.1 Methods

8.1.1 Design

The design used in this study was a post-test only control group design. Cases have not been randomly assigned to the two groups.

8.1.2 Setting and data

The intervention group consisted of 204 patients with a diagnosis of COPD or HF who had been admitted to one of the four participating Beacon hospitals. These patients received KBC inpatient care management, and some may have received KBC outpatient care management after discharge. The control group consisted of 200 COPD and HF patients who were hospitalized at Geisinger Wyoming Valley (GWV). They may have received care management services from case managers, social workers or discharge planners during their hospital stay but they did not receive KBC care management. A total of 78 patients in the intervention group and 88 in the control group returned completed surveys. After removing potential respondents who were deceased or opted out, the response rate for the intervention group was 41% and for the control group was 46%

8.1.3 Procedure

One week after discharge the patients in the intervention and the control group were sent a questionnaire by postal mail, with an attached cover letter requesting participation and a preaddressed stamped return envelope. Reminder letters with additional copies of the questionnaire were sent one, two, and three weeks after the original mailing to any participants who had not returned their survey. A caregiver could complete the survey for the patient, and this

occurred for 19% of intervention group surveys and 17% of control group surveys. Patients discharged on weekends were excluded because they may not have received all of the services provided by care managers. The study was approved by the Geisinger Institutional Review Board.

8.1.4 Questionnaire

The questionnaire (Appendix G.2) consisted of three parts. Part 1 consisted of 15 questions asking about the patient’s health, and questions about the core services provided by care managers to patients, specifically patient education, medication reconciliation, patient-specific action plan for acute care exacerbation management, PCP referral, and other referrals, such as home health or physical therapy. Part 2 consisted of the 10 questions from the Patient Activation Survey (Hibbard et al. 2007; Hibbard et al. 2005; Hibbard et al. 2004) which was adapted for care management. Part 3 consisted of six questions about patient demographics, such as age and gender.

8.1.5 Analyses

Prior to the study we conducted a power analysis. Results showed that at least 55 respondents each were needed in the intervention and control groups to be able to detect an anticipated treatment effect of 10% increase. With 78 patients in the intervention group and 88 in the control group, we have sufficient statistical power. Our analyses consist of descriptive statistics with tests of statistically significant differences between the two groups.

8.2 Results

There were no statistically significant differences between the control and intervention group with regard to age, race, education, work status, medical conditions (e.g., COPD, HF, and diabetes) or self-reported health status.

Respondents are unclear about the identity of staff they spoke with during their inpatient stay. Only 29% of the intervention group recalled speaking with a Beacon care manager in the hospital, while a similar percentage (26%) of the control group incorrectly believed that they had spoken with a Beacon care manager. More than half of the patients in both control and intervention groups do not recall whether they talked to a KBC care manager.

They were more certain about outpatient care management. Of intervention group respondents, 54% indicated that they had a current care manager who helps them manage their condition, as did 36% of the control group. Nearly 20% of respondents in both groups were unsure whether they currently have a care manager.

Surprisingly, the intervention and control groups report having received core care management services equally often. None of the differences in Table 8.2.1 are statistically significant.

Table 8.2.1 Percent of respondents who received core care management services

	Intervention	Control
Before you left the hospital, did someone explain your medical condition to you? (Yes)	86%	89%
Before you left the hospital, did someone go over your medications	86%	83%

with you? (Yes)		
Before you left the hospital, did someone offer to make an appointment with your family doctor for you? (Yes)	67%	63%
Before you left the hospital, did someone offer to set up assistance at home (e.g. home health care, an appointment with a physical therapist, or special equipment such as an oxygen tank, etc.) for you? (Yes)	70%	67%
Before you left the hospital, did someone explain your medical condition to you, and how to take care of yourself when you got home? (Yes)	84%	78%
Before you left the hospital, did someone give you information on how to prevent being re-admitted to the hospital? (Yes)	62%	56%

Similarly, no statistically significant differences were found in patient activation of the intervention and control groups (see table 8.2.2).

Table 8.2.2 Patient activation, in percentages per group

	Group	Strongly disagree	Disagree	Agree	Strongly agree
I understand the nature and causes of my health condition(s).	Control	0%	3%	65%	33%
	Intervention	0%	1%	68%	31%
I know the different medical treatment options available for my health condition.	Control	1%	9%	63%	28%
	Intervention	1%	8%	67%	24%
I am confident that I can follow through on medical treatments I need to do at home.	Control	1%	5%	54%	40%
	Intervention	0%	5%	68%	26%
I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition.	Control	2%	6%	56%	35%
	Intervention	1%	6%	69%	24%
I know what each of my prescribed medications do.	Control	4%	12%	59%	26%
	Intervention	1%	7%	65%	27%
I am confident that I can tell when I need to go get medical care and when I can handle a health problem myself.	Control	2%	5%	58%	35%
	Intervention	1%	7%	64%	28%
I am confident I can tell my care manager or doctor concerns I have even when he or she does not ask.	Control	2%	4%	56%	38%
	Intervention	0%	6%	73%	21%
I am confident that I can maintain lifestyle changes like diet and exercise even during times of stress.	Control	1%	10%	57%	32%
	Intervention	0%	12%	62%	26%
I am confident I can figure out solutions when new situations or problems arise with my health condition.	Control	3%	15%	59%	23%
	Intervention	1%	13%	67%	19%
I know how to prevent further problems with my health condition.	Control	4%	11%	61%	24%
	Intervention	3%	14%	65%	18%

8.3 Conclusion

Results of our analyses show that more than half of patients do not remember whether they talked to an inpatient Beacon CM during their hospital stay, and a quarter of control group respondents incorrectly believe that they spoke with a Beacon care manager. These findings suggest that patients and their caregivers are confused about the identity of staff providing care coordination in the hospital.

The lack of significant differences in patient activation and the receipt of core care management services is more surprising. It is possible that the impact of Beacon care management is not well captured by the items listed in table 8.2.1. For example, a patient could respond affirmatively that someone “went over his medications” because a nurse quickly discussed them on discharge. Having a care manger discuss the medication changes thoroughly and ensure that the patient understands would clearly provide a higher quality of care, but the difference between these two circumstances would not be captured by the survey question. Finally, more research may be needed to understand the relationship between care management and patient activation.

9. Heuristic Usability Evaluation of KeyHIE

The objective of this heuristic usability evaluation was to assess adherence to human factors design principles in the case of the computer interface of KeyHIE. Aspects of design such as the appropriate use of color (e.g., red is associated with high risk actions), the consistency of design throughout the application’s interface (e.g., tasks or views that are repeatedly available to the user are consistently displayed) and the avoidance of potential errors associated with programming or misleading directions (e.g., ensuring accurate patient identification) are searched for as an evaluator systematically navigates through an interface.

Three groups from the University of Wisconsin KBC research team each conducted 2 ½ hour semi-structured heuristic evaluations of KeyHIE in March 2011. The heuristics utilized are a combination of the work by Zhang et al. (Zhang et al. 2003) and Horsky et al. (Horsky et al. 2003). When a heuristic was not met, the respective group identified the design convention(s) violated and took a screen shot of the interface, noting the heuristic. Time constraints precluded the teams from evaluating every potential output screen of KeyHIE. The groups convened after conducting the heuristic usability evaluations and shared findings; duplicate findings (which occurred frequently) were noted to avoid double reporting. A detailed report that included every heuristic violated was compiled (see Appendix F). Table 1 contains the incidence of non-compliance with the various heuristics or combinations of them in the KeyHIE screens reviewed.

Table 1 – Type and frequency of heuristics not met

Heuristic	# of designs identified as not in compliance with heuristic	% of 61 total designs not in compliance with heuristic
Consistency	15	25%
Match	9	15%
Control	8	13%
Error/safety	7	11%
Minimalist	6	10%
Language	3	5%

Consistency & Language	2	3%
Feedback	2	3%
Message	2	3%
Consistency & Error	1	2%
Flexibility	1	2%
Match & Language	1	2%
Memory	1	2%
Message & Minimalist	1	2%
Visibility	1	2%
Visibility & Control	1	2%
TOTAL	61	100.0%

Five of the 11 heuristics were associated with 51 of the 61 (84%) instances of heuristic violations. The **consistency** heuristic was most frequently violated (n=18) and included times when conflicting or different instructions or information were displayed on the same screen. Examples include

- terms used inconsistently (e.g., “help” and “questions, comments, or suggestions” are found on one screen yet both direct the user to the same screen),
- a lack of consistent convention for presenting dates (e.g., day/month/year – mix of alpha and numeric, and month/day/year – all numeric, appeared on the same screen),
- full phrases used as some field headers and elsewhere, on the same screen, appeared abbreviated (e.g., “attending physician” and “attending”) and
- inconsistency in how patient names appeared (e.g., first name, last name and last name, first name on the same screen).

The second most commonly violated heuristic was **match** (n=10). In these instances, the manner in which information was presented did not coincide with users’ probable expectations. For example,

- when icons are used they must be intuitive,
- all users must be familiar with abbreviations included on a site and
- a navigation “button” should be in close proximity to instructions and actions associated with it.

The **control** heuristic was violated 9 times. Included in violations of this heuristic are instances of

- limited/incomplete options given to the user (e.g., “contact us” only provides users an email address and no phone number or other means of contact),
- misleading information/options presented to the user (e.g., the user is given an option to sort but no other sorting order is possible) and
- canceling a request returns the user to the home page rather than the page where the user initiated the request.

Violation of the **error/safety** heuristic (n=7) is always a significant concern as the consequence of the error could have negative impact on the patient or violate patient confidentiality. For example,

- instances where patient authorization had not been given to view documents from an organization but patient-level information from the organization appeared on the screen,
- the name of one patient appeared on a search panel on the right side of the screen but information on a different patient filled the remainder of the screen and
- dates appeared that were in the future when that could not be correct for a specific field.

The **minimalist** heuristic (n=6) points out that in design, “less is better.” For example, KeyHIE’s home screen displayed extensive information, much (if not all) of which most users would ignore and proceed further into KeyHIE. The excessive information also consumes significant screen “real estate.” In many instances in KeyHIE the information provided could be condensed and still sufficiently inform the user. Additionally, when a user attempts to identify a patient in KeyHIE, significant “extraneous” information (e.g., patient telephone number) is prompted.

These findings, as well as the full report, were presented to the KBC management team members associated with the IT portion of the project. Subsequent discussions with IT representatives occurred; heuristics were explained and examples shared, as we “walked through” the report. This gave the IT representatives a better understanding of human factor design heuristics for computer interface design and why or how they were violated.

10.1 Monthly surveys of KBC management team

The objective of this analysis is to evaluate the implementation of the Beacon project from the perspective of management team members and improve the project’s implementation process through continuous evaluation. We distributed monthly surveys to the KBC management team from August 2011- January 2013, with a final survey distributed in March 2013. The surveys contained several questions on the project’s progress and also helped us to identify and record lessons learned in the project. The management team includes the KBC program director; leaders and key members of the business development team, community leadership team, care coordination team, patient activation team, information technology management team, and project evaluation team; and other high-level management of the Geisinger Health System. The results of the survey were shared with the management team each month by email and presented at weekly team meetings. The results were used in developing some of the questions in the management team interviews (see section 10.2).

10.1.1 Methods

Initially, the survey asked

- “What is your overall evaluation of the KBC project as of now?” with three seven-point response scales:
 1. “going poorly” to “going well,”
 2. “behind schedule” to “on schedule,” and
 3. “not achieving objectives” to “achieving objectives.”

- The survey also asked for comments: “Please share any additional comments about the KBC project, including concerns and successes.”

Two additional questions were added for the period January 2012-January 2013.

- The first was “How confident are you that the project team is meeting the challenges of the KBC project?” with responses on a seven-point scale from “not at all confident” to “completely confident.”
- The second asked “How is the KBC project performing with regard to ONC’s expectations?” with a three-point scale of responses: “Below ONC expectations,” “Meeting ONC expectations” and “Above ONC expectations.”

The final survey, distributed in March 2013, asked respondents to reflect on the entire life of the project in responding to similar questions.

- The first question was “What is your overall evaluation of the KBC project?” with three seven-point response scales:
 1. “went poorly” to “went well,”
 2. “did not stay on schedule” to “stayed on schedule,” and
 3. “did not achieve objectives” to “achieved objectives.”
- A second question asked “Overall how did the KBC project perform with regard to ONC’s expectations?” with a three-point scale of responses: “Below ONC expectations,” “Met ONC expectations” and “Above ONC expectations.”
- The final item in the March 2013 survey asked for comments: “Please share any additional comments about the overall KBC project, including concerns and successes.”

10.1.2 Results

The number of surveys distributed each month ranged from 13 to 16. Response rates were generally high, averaging 86 percent across the months of the survey (range: 69-100%). The results of the first question and its three response scales will be presented here. See Appendix I.1.4 for the full survey results.

As can be seen in Figure 10.1.1, respondents’ views of overall project progress started relatively low (a mean of 4 on a 1-7 scale), but rose significantly by the fourth month to a mean of 5.4. After that point they remained relatively stable, ranging from 5.0-5.4 until the end of 2012, with a slightly lower mean of 4.9 in January 2013. Reflecting on the whole project, respondents in the March 2013 survey gave relatively high scores on average, with a mean of 5.4.

Figure 10.1.1: Responses on overall project progress

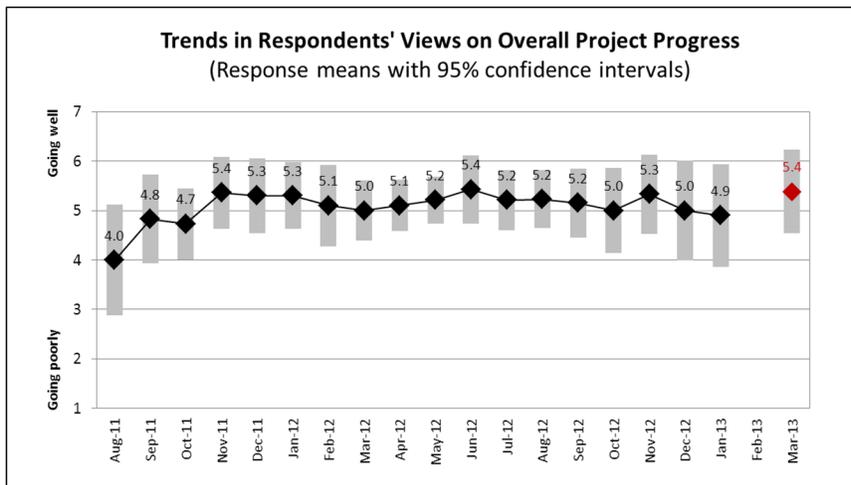
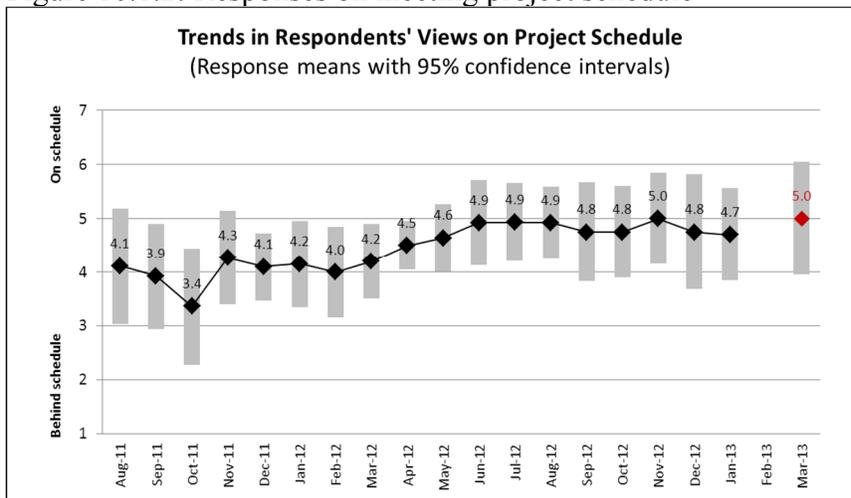


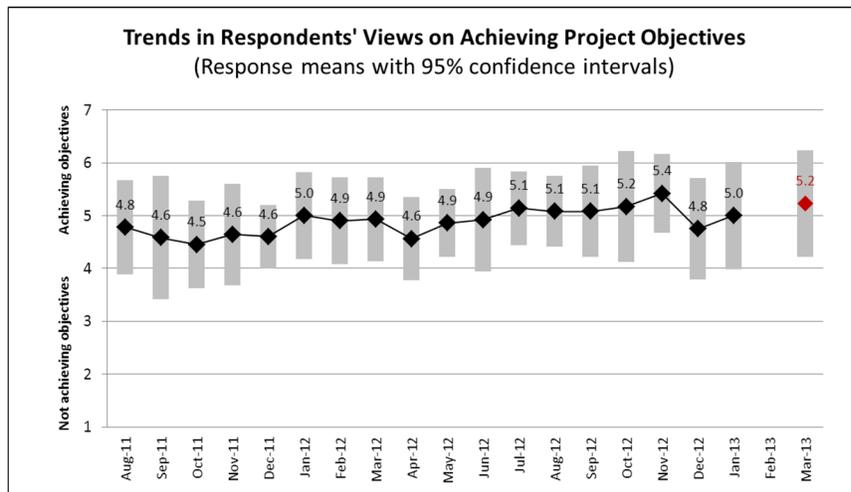
Figure 10.1.2 contains the results on whether the project stayed on schedule. These results dipped in the early months of the survey to a mean of 3.4 in October 2011. At the time, comments indicated that the team was concerned about delays in health IT implementation that were causing the project to fall behind. The average responses climbed to a significantly improved average of 4.5 – 5.0 in the months after April 2012. Reflecting on the project overall, management team members’ average response to the March 2013 survey was a relatively high 5.0.

Figure 10.1.2: Responses on meeting project schedule



The results in Figure 10.1.3 show responses related to achieving the objectives of the Beacon project. The average responses were stable with a slight upward trend from 4.5 in October 2011 to 5.4 in November 2012. The comments suggest that the upward trend reflects the success that the project was having in lowering the rates of readmissions and ED visits for patients receiving KBC case management. After this point, the average response declined, although not significantly. The mean response in March 2013 was a relatively high 5.2, as management team members reflected on the project as a whole.

Figure 10.1.3: Responses on achieving project objectives



In conclusion, the management team gave relatively low average assessments of the overall project progress, the project being on schedule and achieving KBC objectives in late 2011, perhaps because of difficulties that the project faced with delays in the implementation of health IT. However, the more positive assessments of 2012 suggest that the team may have been focused on the positive impact that case management had on patient readmissions and ED visits. On average, the team’s reflections on the project as a whole were relatively positive, approaching or equaling the highest average monthly rating.

10.2 Management Team Interviews

The University of Wisconsin Beacon research team conducted interviews of the management team with two goals: (1) to evaluate the implementation of the Keystone Beacon project and (2) to provide feedback to the management team on members’ perceptions of project progress, including successes and challenges faced.

10.2.1 Methods

Forty interviews were conducted in three rounds over a 20-month period, with nineteen team in all. Interviews averaged 41 minutes overall. See table 10.2.1 for details on the interviews.

Table 10.2.1 Interview summary

Interview period	# interviews	Total # hours, minutes (mean, range)
Aug-Sept 2011	12	7 hrs., 28 min. (37 min., 18-60 min.)
Jan-Mar 2012	15	10 hrs., 5 min. (40 min., 9-60 min.)
Feb-Mar 2013	13	9 hrs., 53 min. (46 min., 28-97 min.)
<i>TOTAL</i>	<i>40 interviews (19 different interviewees)</i>	<i>27 hrs., 26 min (41 min., 9-97 min.)</i>

Questions were slightly modified in each round to evolve with the natural progression of the project. (See Table 10.2.2 for a list of the interview questions by round.) All interviews were conducted over a University of Wisconsin conference telephone line that offered audio recording. At the beginning of each interview, participants were asked if the interview could be

recorded; all participants agreed. Upon completion of the interview, the recording was electronically downloaded and transferred to a professional transcription service. The completed transcripts were analyzed separately by three researchers, who later met to finalize the analysis.

Table 10.2.2 Interview questions for Rounds 1, 2 and 3

Round 1 questions (N = 12)	Round 2 questions (N = 15)	Final Round questions (N=13)
How did you get involved in the KBC project? What is your role?	Has your role in the KBC project changed? How has it evolved since your last interview in <i>[month]</i> ?	
In your own words, please describe the KBC project. What are the objectives of the project?		What were the goals of the Beacon project? What goals was the team successful in achieving? What goes was the team less successful or not successful in achieving?
How has the project been going so far? What has worked well so far in the KBC project?	How has the project been going since your last interview? What has been working well for the KBC project since then?	
What challenges or difficulties has the KBC project encountered so far? Have you experienced any critical incidents, i.e. something that you have been especially concerned about?	What challenges or difficulties has the KBC project encountered since your last interview? Have you experienced any critical incidents, i.e. something that you have been especially concerned about?	During the life of the project were there any critical incidents that you believe had an impact – positive or negative – on the project?
Do you have any suggestions for improving the likelihood of success of the KBC project? What does the future look like for the KBC project?	Do you have any suggestions for improving the likelihood of success of the KBC project? What does the future look like for the KBC project? Are you optimistic, pessimistic or neutral that the KBC project will succeed?	What do you think the team has learned from the Beacon project? What do you think Geisinger has learned or should have learned from the Beacon project? What have you learned from the Beacon project? What are take-away messages for you related to the Beacon project (that may affect you in your job, your career...)?
Is there anything else you	Is there anything else you think	Do you have anything else to

think I should be asking you?	I should be asking you?	share? Is there anything else you think I should have asked you today? Do you have any questions for us?
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10.2.2 Results

Round 1

Participants in the first round of management team interviews recognized the complexity and magnitude of the Keystone Beacon project yet were optimistic of its success because of the organization’s commitment to the project. Similarly, interviewees believed that the patients taking part in the project would experience significant benefit, both clinically and socially, and that re-hospitalizations and emergency department visits would decrease. Interviewees also pointed out that the project was building on and integrating two strengths of the organization – its health IT infrastructure and its case management program – and that management team members from these and supporting areas were committed to the project’s success. Interviewees believed that the project promoted collaboration with clinicians and healthcare providers external to Geisinger. Other positive comments related to the valuable input received from advisory groups and that a sustainable model for IT-mediated care management appeared to be in development. See Table 10.2.3 for the positive aspects of the project noted during the interviews.

Table 10.2.3 Positive aspects of project noted during Round 1 management team interviews

Positive aspects of the KBC project (from 12 interviews)	# stating this
Project builds on existing systems/models (care management and IT)	10
Project promotes collaboration with partners	8
Positive impact of care managers / care management model	7
Team members cooperative, committed	5
GHS leadership support and management	5
Feedback from Advisory Boards, ONC support	3
<i>Total times positive aspects were noted</i>	38

Conversely, interviewees noted challenges associated with the Beacon project. These challenges can be grouped to three major categories, issues associated with delays, project management and organization/project-level characteristics. Details for each category and the number of interviewees identifying the respective challenge are found in Table 10.2.4.

Table 10.2.4 Challenges of project noted during Round 1 Management Team interviews

Challenges of the KBC project	# stating this
A. Timeline management	
Delays: hiring, IT, analytics	32
Insufficient planning	9
Short timeline (3 years)	7

Total timeline/delay issues were noted	48
B. Team issues	
Insufficient feedback/communication/information access	16
Inadequate meeting and team management	12
Insufficient personnel allocation	4
Total Management Team issues were noted	32
C. Organization/project-level issues	
Community engagement/working with “outsiders”	11
Project complexity	9
Personnel turnover/training	8
Legal issues	4
Sustainability	4
Total GHS / Project-level issues were noted	36
<i>Total times challenges were noted</i>	<i>116</i>

Round 2

Round 2 participants noted progress that occurred in the seven months since the Round 1 interviews. Notably, operational issues had improved due to activities of the work groups created in August 2011, and many issues had been addressed and resolved. There was also progress in the continuing development of the care management model and a heightened awareness of its importance. Comments related to data acquisition (from participating Beacon organizations) were both positive and negative. Respondents recognized the progress made since the previous interview round, including two successful quarterly reports being submitted to ONC. However, they realized the continued challenges associated with the data, including quality and content. The concerns expressed were related to insufficient resources to manage and support the project, including both personnel and time, and the challenges of working with the health IT vendor hired to create systems to support the project. The most significant and consistent concern expressed was the apparent lack of a sustainability plan for the project. Results of these responses are found in Table 10.2.5.

Table 10.2.5 Key aspects of project noted during Round 2 Management Team interviews

Response category	# of members noting positive aspects	# of members noting difficulties
Progress of project	8	0
Progress of care management model	10	0
Data acquisition and use	4	7
Sufficiency of resources	0	5
Vendor; health IT development	1	4
KeyHIE progress	1	4
Care management system progress	1	4
Patient portal progress	0	1
Lack of a sustainability plan	0	10

During this round of interviews, members frequently made comments concerning what they had learned by being part of the Keystone Beacon project, what the team had learned and what the

organization might learn from the experience. This led us to focus on the concept of learning during the final round of interviews one year later.

Round 3

Round 3 interviews focused primarily on what the interviewees learned from the perspective of the individual, team and organization, as well as the opportunities for organizational learning that resulted from the Keystone Beacon project. At the organization level, interviewees noted the criticality of the organization's leadership support to such a large-scale project and the complexity associated with creating a sustainability plan. At the team and project level, participants noted the challenges associated with the multi-faceted project, the value of having team members with diverse backgrounds and expertise, the importance of measurable significant goals and the positive consequences of looking at "barriers" as opportunities. Three aspects of the project were recognized as being both critical and far more difficult and complex than previously anticipated or understood: (1) health IT development, (2) the transfer of the care management model outside the organization, and (3) the necessity to provide data and feedback during the development processes. What the interviewed team members felt the organization could or should learn from the project included:

- 1) that sufficient resources must be assigned to highly visible projects,
- 2) the need to develop a culture for project management and team-building,
- 3) the importance of understanding "user" needs at all levels,
- 4) that external "customers," the team and individual team members need to be provided regular feedback to keep them informed and to aid in decision making, and
- 5) that involving groups external to the organization provides useful insights, as these groups can ask difficult questions because of their "distance" from the organization.

The results from these three rounds of interviews were summarized and served as the basis for the group process that occurred during the team debriefing at the end of the project, summarized in section 11 of this report.

11 KBC project debriefing

On March 22, 2013, the University of Wisconsin (UW) Beacon research team led a project debriefing with 13 current or former members of the Keystone Beacon management team, 3 project support staff and 2 participants from other Geisinger projects. The objectives of the debriefing were to

- share the results of the monthly management team surveys (see section 11.1) and three rounds of management team interviews (see section 11.2) and
- facilitate a discussion of how the learning achieved in the Beacon Project could be institutionalized within Geisinger.

Background

The concept of organizational learning was first introduced by Cyert and March (1963) and expanded by Argyris and Schon (1978) in their *theory of action*. Here they pointed out that learning and experience must be communicated in order to be stored in an organization's memory. Recently Bohmer and Edmondson (2001) reiterated this when they stated "individuals learn naturally, but teams and organization do not". The process of organizational learning

includes capturing knowledge (learning), sharing it, and then using it (DiBella, Nevis, and Gould 1996; Garvin 1993; Huber 1991; Popper and Lipshitz 1998; Simon 1991).

Given the need for healthcare organizations to continuously improve and streamline operations, a debriefing of the Keystone Beacon Project was planned (Tannenbaum and Cerasoli 2013). This debriefing presented an opportunity to promote organizational learning, and therefore focused on the process of organizational learning from the perspective of those within Geisinger.

Methods & Results

Dr. Pascale Carayon led the debriefing, giving a brief overview of research on organizational learning followed by the results from the management team surveys (section 11.1) and interviews (section 11.2). Finally those present were asked to brainstorm answers to the following questions:

- 1) How does Geisinger as an organization capture what was learned from the Beacon Project?
- 2) How does Geisinger as an organization share and use the knowledge gained?

The recommendations that arose during the brainstorming session included

- 1) Geisinger must ensure that sufficient resources (including time and funding) are assigned to highly visible risky projects.
- 2) Skills and a culture for managing and building project teams must be developed, especially by project managers and leaders.
- 3) The needs of “users” or “customers” of projects – both internal and external to Geisinger, at all levels within Geisinger and in the external environment – must be understood to successfully accomplish and sustain the project objectives.
- 4) Users/customers as well as the project team need to be provided regular feedback that demonstrates progress and facilitates decision making.
- 5) By having outsiders (e.g., UW Research Team and Abt Associates) actively participate on the Keystone Beacon Project, challenging objective questions were posed to the project team. At minimum, this should occur for similar highly visible and risky projects.

12. Discussion

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