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THE AROOSTOOK MEDICAL CENTER'S (TAMC) CHRONIC CARE TECHNOLOGY PROJECT

AN EVALUATION OF THE AROOSTOOK AND BANGOR
TECHNOLOGY COLLABORATIVES



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I. SUMMARY

Introduction

The Institute for Medical Improvement at Eastern Maine Healthcare Systems worked with providers at The Aroostook Medical Center (TAMC) to develop the Chronic Care Technology Project (CCTP), an initiative intended to identify technology solutions that support elements of the Planned Care Model. This initiative was intended to address the need for healthcare quality improvement and Health Information Technology (HIT) in rural areas of Maine. Specific technology solutions were identified by teams from health care organizations during regional learning Collaboratives, or Learning Sessions, of health care providers and related stakeholders. The format of these Learning Sessions is based on the Institute of Healthcare Improvement's (IHI) Breakthrough Series (BTS) collaborative learning model. The project also draws upon the Planned Care Model and the Model for Improvement.

There are several unique aspects of this project compared with other BTS-type initiatives.

- The BTS model is used in this project to implement technology solutions. This poses a unique set of challenges to healthcare organizations compared with using the model to focus on a health topic (e.g., diabetes, COPD) and implementing evidence-based changes to address the particular health topic.
- Rather than addressing changes within one organization, in this project, the BTS model was also intended to be applied to projects in which two or more organizations are changing the way they share information. This poses a unique set of challenges because success requires the commitment of more than one organization and coordination between organizations.

The evaluation described in this document addresses the effectiveness of two Collaboratives conducted during CCTP implementation (Aroostook and Bangor Collaboratives). It focuses on whether the model is appropriate for quality improvement projects that occur *between* organizations and whether it has utility for the adoption of changes requiring *technology solutions*.

In this evaluation, components of both process evaluation (e.g., the degree to which goals for program implementation were met) and outcome evaluation (e.g., the effectiveness of the program, as indicated through a set of measures) are included. Data on these measures were collected before, during, and after the program to evaluate the impact of the CCTP.

Project Methods

Prior to the first Collaborative meeting, the project leadership team met regularly to prepare for a series of BTS Learning Sessions and practice teams from Aroostook County were recruited. Three Learning Sessions were then held during a year-long period to provide information on goals and objectives of the initiative and information on potential technology solutions outlined in a Technology Change Package. These Learning Sessions also provided a forum for teams to share their accomplishments, challenges and barriers,

and to brainstorm solutions. Between Learning Sessions were Action Periods in which teams tested and implemented changes at their organizations and received support from Collaborative faculty through conference calls and ongoing site visits. Upon completion of the Aroostook Collaborative, practice teams from the Bangor area were recruited for the second year of project implementation. To address lessons learned from the first year, adjustments were made to the Learning Session content and process.

The most common changes that the organizations made were the implementation and use of secure email, scanners for the transfer of information from one location to another, referral templates, and electronic prescribing. Another commonality was 'access to patient information' through the use of technology.

Evaluation Methods

The evaluation was designed to address four main domains:

- Process evaluation
- Effectiveness of the BTS for adopting and implementing technology changes in health care systems
- Impact of technology adoption on organizational efficiencies and patient safety, and
- Impact of technology adoption on managing patient care.

Data to address these domains was collected through a variety of sources, including:

- *Team presentations* given at the Learning Sessions describing the impact of accomplishments on information exchange processes and managing patient care;
- *Reports from collaborative faculty* on meetings with practice teams;
- *Surveys administered to providers and staff* to measure perceptions of project participants about Learning Sessions and Action Periods;
- *Surveys administered to team leaders* to measure changes in health information exchange processes and patient care;
- *Interviews with team leaders* about accomplishments and barriers faced by the team, perceptions of the BTS model, utility of the Learning Sessions and support during the action periods, and the impact of technology and process changes made over a one year period;
- *Interviews with collaborative faculty* about the support given to teams, the barriers faced during the project, and the possible reasons that some teams were more successful than others.
- *Feedback* on "barriers to change" from participants at second and third Learning Sessions of each collaborative.

Results

The main findings of this evaluation are:

- Project activities were implemented as planned and on schedule despite the challenges of project staff and leadership turnover.
- Additional information and support prior to the first Learning Session might have improved team quality and effectiveness, ensuring that the commitment required is

understood by all, that resources and leadership are available, and that the project is appropriate.

- While the benefits of attendance at the Learning Sessions were greater for some organizational teams than others, most participants perceived that the Learning Sessions had some degree of value for exchanging information with other teams.
- Although most organizational teams did not meet regularly, participants still expressed optimism about their teams and reported that it was not difficult to work together. The Collaborative also made it easier for organizational teams to work with external customers or other departments within each healthcare system.
- For the teams that were self-starters and dedicated to the project, coaching was not especially useful because teams did not need the additional support. For teams that were having difficulty getting focused and finding time to meet, the coaching was more likely to help teams stay on track and to help them overcome barriers.
- Overall, participants in the Bangor Collaborative tended to have more positive perceptions about the organizational support, particularly leadership support, they received throughout the Collaborative compared with Aroostook participants. This may be because one of the key senior leaders from the Aroostook Collaborative left his position part-way through the project.
- The degree to which organizations were able to implement their chosen technology solutions varied. Some quickly completed their initial goals and, in some cases, completed additional goals that they initially had not expected to tackle, while others changed their initial goals and struggled to find an appropriate goal that they could feasibly complete. In general, teams improved their planning and technology implementation skills as a result of the Collaboratives and being exposed to the concepts and tools used.
- Successful teams tended to have strong leadership (both within the team and within the organization) and an organizational culture that empowers the team. They also tended to choose projects in which the organization perceived value.
- The project's greatest value appeared to be its role in getting teams to allocate time to making technology/process changes and helping them secure the required technologies to complete the changes. The project appeared to have less value for getting staff/leadership buy-in and for brainstorming new ideas.
- The BTS model is traditionally applied in disease-focused collaboratives (e.g., COPD, diabetes). However, using the BTS model to implement technology seemed to be more complicated than disease-specific applications of the model. Some possible reasons for this were a general lack of understanding of technology, an initial lack of prescriptive evidence-based goals, and a wide variety of potential projects and focus areas among participants (as opposed to concentrated goals addressing a specific condition).
- Because the nature of the changes implemented by participating practices varied so widely, the impact of the changes on practice workflow and on staff responsibilities

varied widely. In addition, the impact on practice efficiency and patient safety varied widely. In general, the changes made by participating organizations reduced errors in information transfer processes and improved completeness of information transferred.

- Among most of the participating team leaders, there was a perception that the changes their organizations had made improved quality of care for patients with chronic illnesses, enabled the organization to improve the processes of care, enabled their organization to make technology changes to other parts of the organization (beyond the team's initial focus), and produced feelings of accomplishment in the team's work.

Our findings affirm the challenging nature of implementing technology solutions between organizations. Specifically, we learned that some organizations had difficulty developing viable projects and working with external customers to achieve their objectives. Success appears to be fostered when leadership at the system level and organizational level are engaged in the project before the learning session and are willing to commit resources needed.

We found that, despite the barriers faced by participating practices and associated frustrations, participation and interest in the project was maintained. For certain teams, the BTS Collaborative generally was effective at getting teams together to start working on technological issues and prompting organizations to begin to use existing technology or to identify additional needs for advancing technology. In some cases, small projects had significant impacts on practice efficiency and patient care, and, even among teams that made little progress, the identification of new needs and the team building that occurred as a result of the BTS process are expected to lead to additional changes in the future. For still other teams that were planning to implement more advanced technology changes (e.g., Problem Knowledge Coupler, e-prescribing), the BTS Collaborative was used to facilitate those changes and forge new relationships in the health system for future projects. Perhaps one of the most important lessons learned from this project was that, for many of the small, rural Maine organizations who participated in our Collaborative, even simple, comparatively inexpensive technologies like secure email or scanning capabilities can have important and significant impacts on organizational efficiencies and patient safety.

II. INTRODUCTION

BACKGROUND

National Quality Improvement Efforts

During the last decade, improving quality of healthcare has become an important national goal. The Institute of Medicine (IOM), which has been on the forefront of this effort, launched a concerted, ongoing Quality Initiative focused on assessing and improving the nation's quality of care in 1996. In November 1999, the IOM released the report, "To Err is Human: Building a Safer Health System", effectively spotlighting the tens of thousands of Americans who die each year from medical errors. In 2001, a follow-up report, "Crossing the Quality Chasm: A New Health System for the 21st Century", described broader quality issues and asserted that care should be safe, effective, patient-centered, timely, efficient, and equitable. The Quality Chasm report also highlighted the need for healthcare to become more patient-centered, evidence-based, and coordinated among providers.

In response to the Quality Chasm report, the US Agency for Healthcare Quality and Research (AHRQ) made funding available for Health Information Technology (HIT) projects in 2004, especially for rural areas. Projects were funded to promote the goals and strategies of the 2004 "Framework for Strategic Action". These goals included:

- 1) inform clinical practice (electronic health record adoption),
- 2) interconnect clinicians,
- 3) personalize care (consumer-centric information), and
- 4) improve population health.

Improving Quality in the State of Maine

At the same time as these federal quality improvement efforts, the State of Maine began initiatives to improve quality in health care and to spread health information technology (HIT) on the local level. On February 1, 2000, Governor Angus King appointed a Blue Ribbon Commission on Health Care, which was charged with recommending potential strategies for stabilizing health care costs. The Commission released a report in December, stating the importance of improving medical records and clinical information systems in Maine. In August 2004, the State of Maine launched the Maine Health Information Network Technology (MHINT) project, a feasibility study to determine the readiness of Maine's healthcare community to develop a statewide clinical data sharing network.

Studies in the northern, eastern, and central regions of Maine also identified a need for health care quality improvement efforts that focus on chronic disease care in those rural areas. The assessment found that compared to statistics for the nation and peer groups elsewhere in Maine, residents of this region are not particularly healthy; it substantiated a need for comprehensive efforts to address chronic health conditions, to reduce the high

cost of care, and to expand critical access to comprehensive services in rural areas of Maine.

In response to the 2001 Community Health Needs Assessment, Eastern Maine Healthcare Systems established the Institute for Medical Improvement (IMI). The IMI was intended to be a collaborative effort involving physicians, employers, payers, hospitals, and patients that would take a proactive approach to ensure the delivery of evidence-based health care services in rural settings. To address chronic conditions such as tobacco use among pregnant women and Chronic Obstructive Pulmonary Disease (COPD), the IMI initiated learning collaboratives. It also identified a clear need to improve quality of care and HIT in the region and, in 2004, IMI began working with providers at The Aroostook Medical Center (TAMC), the IMI Leadership Team, and others at EMHS to develop the Chronic Care Technology Project (CCTP).

The Chronic Care Technology Project (CCTP)

The IMI initiated preliminary planning for the CCTP in October 2004. The planning project was designed to examine information technology systems among regional health care organizations, to determine readiness to change, and to create a network of organizations with a common goal of advancing the sharing of healthcare information electronically. An overriding goal was to create a roadmap for implementing information technology (HIT) that improves care for those patients with chronic medical conditions in rural Maine.

The project objective of the CCTP was to identify technology solutions that support elements of the Planned Care Model by facilitating the transfer of information a) between different providers and b) between providers and patients. Specific technology solutions were determined through regional learning Collaboratives, consisting of health care providers and related stakeholders; these forums were also used for planning and implementation. The format of these learning sessions is based on the Institute of Healthcare Improvement's (IHI) BTS Collaborative Learning Model.¹

This evaluation addresses the effectiveness of the two year-long collaboratives conducted under CCTP implementation (the Aroostook and Bangor Collaborative). In particular, it examines whether the collaborative learning process that has proved so successful in evidence-based practice change can be successfully used in the adoption of technology solutions that improve chronic disease care in rural areas.

PROJECT FRAMEWORK

The CCTP is designed to use the Planned Care Model, the IHI “Breakthrough Series” (BTS) change methods, and the Model for Improvement.

The Planned Care Model was developed by Ed Wagner, MD, MPH, the national program director of Improving Chronic Illness Care. The model, which has shown to improve systematic care for chronic illnesses, identifies six essential elements of systems

¹ *The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement*. IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2003.

that promote high-quality chronic disease management. According to the Planned Care Model, a health system ideally should:

- be linked to community programs and organizations that provide support;
- have improved patient care as part of the organizational goals;
- support patients in managing their disease outside of the physician's office;
- identify clear roles for those involved with delivering care to patients specifically, a care team;
- have a clearly outlined care and treatment process based on proven guidelines;
- include a patient registry to allow tracking of individual patients as well as groups of patients.

The vision behind the **BTS model** is that although there is ample scientific information on best practices that could improve the outcomes of health care delivery and reduce costs, health care organizations often have difficulty implementing these changes into their daily workflow. The BTS model is designed to help organizations close that gap by creating a structure in which organizations can share ideas and learn more about Quality Improvement tools and resources.

The BTS model generally includes a series of three to four learning sessions to train practice staff on ideas for implementing technology changes in a healthcare environment. Learning sessions are face-to-face meetings where multidisciplinary teams from each organization and expert faculty come together to exchange ideas, plan interventions, and follow-up on post improvement action. During the learning sessions, information and resources are shared and practice teams work together to develop practice-specific interventions that align with strategic goals in their organization. BTS change methods rely on group collaboration as a means of educating health care providers and support staff in new ideas.

Teams learn about the “**Model for Improvement**” during the first learning session. The “Model for Improvement,” an approach for organizing and carrying out improvement work, is a key piece of a BTS learning collaborative . The key ideas in the Model for Improvement are to determine 1) What are we trying to accomplish (e.g., goal or aim)? 2) How will we know if we have made our improvements (e.g., measures)? 3) What changes will we make to reach our goal (e.g., e-prescribing)?

Once teams have determined the changes they will make, they use cycles known as “plan-do-study-act” (PDSA) cycles. Under these cycles, they *plan* who will do what when, *do* (or implement) changes, *study* results, and finally *act* on those changes. Using a PDSA for several tests of ideas/changes before full implementation is key.

While the BTS model and the Model for Improvement have been tested and proven in many healthcare systems, including in rural areas of Maine, there are several unique aspects of this project compared with other BTS-type initiatives.

- In this initiative, the BTS model is being used to implement technology solutions to chronic care improvement. Prior BTS-type initiatives in Maine focused on improving

quality of care for individual diseases, but technology adoption and implementation poses a unique set of challenges.

- The BTS model traditionally has been used to implement practice change within an individual healthcare organization. In this project, however, the model is being applied to technology-focused projects where two or more organizations are improving the transfer of information.

The evaluation focuses on the applicability of the BTS model to these two unique aspects of this project and its ability to improve elements of care as specified by the Planned Care Model. In short we want to determine whether the model is appropriate for quality improvement projects that occur between organizations and whether it has utility for the adoption of changes within an organization requiring technology solutions.

III. PROJECT METHODS

PROJECT PLANNING AND ORGANIZATION/TEAM RECRUITMENT

During the first 6 months of the project, the project leadership team met regularly to prepare for the Aroostook Collaborative Learning Sessions and, generally, to plan the Collaborative. During this planning phase, the leadership team determined specific needs for the Collaborative, identified potential speakers for the Learning Sessions, and began developing materials for the Learning Sessions, the Action Periods, and the evaluation. These activities were repeated at the end of the Aroostook Collaborative in preparation for the Bangor Area Collaborative.

Prior to the Aroostook Collaborative, a systematic recruitment effort took place. Initially, the goal was to recruit organizations within a 50 mile radius of Presque Isle, Maine. However, due to the rural nature of Aroostook County, the recruitment area had to be expanded to ensure enough participants. Recruitment focused on getting a mixture of organizations from different components of the health care system, including physician practices, home health organizations, nursing homes, hospitals, etc. Direct mailings were sent out to organizations throughout the region and potential participants. Recruitment materials included a postcard and a flyer and were followed by a phone call with more information to those who were interested. One of the most important aspects of getting practices to participate in the Aroostook Collaborative was the influence of a senior level administrator, Dr. Jim Haley, who encouraged attendance. Generally, the Collaborative was portrayed as an information sharing opportunity that would provide resources and guidance on technology issues.

For the Bangor Area Collaborative, a more informal recruitment process was used. Although there was still an attempt to get a mixture of organizations from various components of the health care system, this was done informally. Most of the recruitment by project staff focused on EMHS and its affiliates, and the effort was made more difficult because there was no senior level administrator involved during the recruitment period and there was turnover in Collaborative staff during this recruiting time. Prior to the start of the two Collaboratives, team leaders from the participating organizations also completed surveys that provided baseline data for the evaluation and that also served to assess organizational technology needs.

LEARNING SESSIONS

Three Learning Sessions were held during each Collaborative. For the Aroostook Collaborative, the first was held in April 2006, the second in September 2006 and the third in April 2007. For the Bangor Collaborative, the first was held in June 2007, the second in November 2007, and the third in June 2008.

The Learning Sessions had a variety of objectives. They were intended provide participants with information on the project, to provide them with tools needed to select and implement changes, to facilitate team-building, and to facilitate work across the organizations.

Of all the Learning Sessions, Learning Session 1 was particularly important for setting the stage, providing background information, and helping teams to initially plan the changes that were priority to their organization.. During each of the Collaboratives, the first Learning Session lasted two days and provided information on goals and objectives of the initiative and an introduction to the IHI Collaborative Process, the Planned Care Model, and the Model for Improvement. There were presentations on technology topics, on the evaluation methods, and on the development of effective change teams. There was also a panel discussion on the integration of healthcare information. In addition, there were opportunities for teams to get together and brainstorm ideas for change and to develop goals and to meet with other organizational teams participating in the collaborative with which they share information (their organizations' external customers).

During the second Learning Session, teams had been implementing changes for more than four months. At the Learning Session, they were given the opportunity to share their accomplishments and discuss challenges and barriers. Teams spent time brainstorming solutions to barriers, with input from other participants. The Learning Session was also used to educate participants about a Web Portal that was under development as part of the project to provide information to practices and patients on available community resources for improving health. In the afternoon, teams assembled to review and update their goals. Each team reported briefly on their additional goals and plans for the future.

During the third Learning Session, teams again reported on their overall cumulative successes and on the challenges they had faced during the project. Participants were also presented with information on telehealth, information on recent HIT projects implemented at EMHS, and a demonstration of the Aroostook Web Portal (<http://www.arostookhealth.org/>) or the Bangor Area Web Portal (www.WhatYouDoMatters.org). At the end of the day, teams met to plan for sustaining and expanding technology improvements in the future.

ACTION PERIODS

Between learning sessions, teams tested and implemented changes at their organizations. Collaborative faculty with quality improvement knowledge and skills supported them through conference calls and on site visits. Faculty were not experts in technology but motivational “coaches” who helped to keep things moving and who could identify people to contact about various aspects of the project, facilitating tasks in some cases. Teams met periodically to discuss how improvements and plans were advancing and to assist them. The goal was for faculty to meet monthly with each team either by telephone or in person. These meetings were mainly intended to keep teams on task by ensuring that they would make progress in advance of the meeting.

Success during the action periods relies on a variety of organizational factors. For example, practice teams, senior leadership, resources, and support from project professional staff were deemed as important factors in success for each organization in identifying and successfully implementing IT. The role of these factors is as follows:

- **Senior leaders** or sponsors within participating organizations are expected to guide, support, and encourage the improvement teams and to bear responsibility for the sustainability of the team's effective changes. Without strong senior leaders to guide

the project and ensure that time and resource barriers can be surmounted, the project will not succeed.

- Organizations assembled a **technology collaborative team** to identify and steer changes. Teams – and how they work - are an important component of the success of a project. Teams are more effective if they include members familiar with all different parts of the health care system and if they enable staff with a wide variety of experiences and knowledge to give input into the process. Teams also need leaders who can help garner support within the organization.
- Organizations were given **assistance** in a variety of ways in this project. The Learning Sessions were intended to provide them with information to plan changes, overcome barriers, and adjust. Visits and phone calls from the project staff were also intended to help them overcome barriers. Project staff also provided information and resources on an ongoing basis during the Action Periods. Information technology specialists and internal staff members (coworkers) are also needed to give support to the changes.

IV. EVALUATION METHODS

OVERVIEW

This evaluation assesses the use of the BTS model to improve the quality of chronic disease care by adopting and implementing technology solutions in health care organizations, including solutions that involve the transfer of information between organizations. The evaluation is designed to address the following four main domains:

- Process evaluation;
- Effectiveness of the BTS model for adopting and implementing technology changes in a health care system;
- Impact of technology adoption on practice efficiency and patient safety; and
- Impact of technology adoption on patient care management.

DESIGN/INDICATORS

The evaluation focuses on a variety of questions under the four main domains (see Table 1).

Process Evaluation

The goal of the process evaluation is to document and analyze the development and implementation of the project. It explores recruitment of practices into the Collaborative and engagement of stakeholders in the planning and implementation of the project. Additionally, it describes the extent to which activities were accomplished on schedule, how implementation differed from what was planned, problems encountered, and lessons learned.

Effectiveness of the IHI's Breakthrough Series Model

The evaluation also determines the effectiveness of BTS model (e.g., learning sessions; team approach; use of Model for Improvement; professional quality coaching between learning sessions) for technology adoption and implementation. This includes an examination of the effectiveness of the learning sessions and action periods for engaging participants, building teams, helping teams choose changes and adjust when necessary. This also includes an examination of qualities that made certain organizations successful while others were not and a comparison of the BTS model to traditional technology adoption models for adopting data transfer systems individually and across organizations.

Impact of Technology Adoption on Practice Efficiency and Patient Safety

Ideally, technology changes should increase the efficiency of a health care organization by increasing the speed of information transfer and reducing the time it takes to prepare information for transfer. Technology changes may also improve patient safety by improving the quality and security of information, reducing errors, and ensuring that

more comprehensive information is collected. The evaluation explores the impact of technology changes adopted by health care organizations on efficiency and patient safety.

Impact of Technology Adoption on Managing Patient Care and Patient Health Status

Ideally, technology changes that focus on patients with chronic medical conditions should improve the quality of care. The evaluation explores to the extent possible the impact of technology changes adopted by health care organizations on managing patient care. We examine the extent to which practice work flows and staff responsibilities changed, as well as provider and staff satisfaction with workflow and managing patient care. We also examine coordination and communication across providers, use of evidence-based clinical guidelines, sharing information with external providers as part of patient care activities, and the availability of patient data.

Table 1: Evaluation Domains, Indicators, Data Sources, and Measures

Dimension	Questions	Measures	Data Sources
Process evaluation	Basic Question: To what extent was the project conducted as articulated in the proposal? Were the goals, objectives and outcomes delineated in the proposal completed? If not why?		
	Were organizations successfully recruited into two Collaboratives (Bangor area and Aroostook County)?	<ul style="list-style-type: none"> • Number of organizations recruited • Number of individuals participating • Documentation of recruitment processes 	<ul style="list-style-type: none"> • Interviews with project directors and key staff
	Were stakeholders and experts effectively engaged in the planning and implementation of the project?	<ul style="list-style-type: none"> • Types of stakeholders and experts who participated • Roles played by stakeholders and experts • Barriers to engaging stakeholders and experts 	<ul style="list-style-type: none"> • Minutes from project meetings
	What problems were encountered during implementation of the project? What lessons were learned?	<ul style="list-style-type: none"> • Project activities and time of completion • Barriers to implementing planned activities • Lessons learned 	<ul style="list-style-type: none"> • Email communication between key staff
Effectiveness of the Breakthrough Series Model for adopting and implementing technology changes in health care systems	Basic Question: To what extent was the IHI model effective in planning and implementing patient information sharing technologies within and between organizations?		
	<p>To what extent did the learning sessions engage participants and provide appropriate information on technologies that would meet identified needs of patient information sharing within and between provider organizations. To what extent did they identify and support activities to complete the project?</p> <ul style="list-style-type: none"> • Were cross organizational teams developed and • Did participants understand project objectives? • Did they get the information needed to make informed decisions? • Were they able to reach consensus within their teams? • Did they find the learning sessions to be worthwhile and interesting? • Did the learning sessions offer opportunity for sharing of ideas across organizations? 	<ul style="list-style-type: none"> • Participant perceptions (Likert Scale) • Changes in participant perceptions over time (pre/post) • Team leader perceptions • Perceptions of coaching staff, other key staff, and project directors 	<ul style="list-style-type: none"> • Surveys of participants • Interviews with team leaders • Interviews with project directors and key staff • Team reports at learning sessions
	To what extent did the learning sessions help organizations build internal teams?		
	To what extent did the learning sessions help organizations build cross-organizational teams?		
	What was the role of coaching support in developing team structure?		
	To what extent did members of the teams work together effectively?		
	To what extent did the first learning session - and the period before the first learning session - prepare teams to identify appropriate		

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	technology solutions for their organizations?		
	To what extent did the professional quality coaching during the action periods help the teams: <ul style="list-style-type: none"> • Gain support for changes in their organization and in the larger health system; • Communicate with external customers; • Plan changes; • Change course/adjust when necessary; • Track progress; • Overcome barriers. 		
	To what extent were interest and participation maintained throughout the project?	<ul style="list-style-type: none"> • Number of teams beginning project versus number of teams completing project 	<ul style="list-style-type: none"> • Documentation of team participation
	What factors influenced whether teams maintained participation?	<ul style="list-style-type: none"> • Coaches' perceptions of reasons team dropped out of project or remained in project 	<ul style="list-style-type: none"> • Interviews with coaches
	Are there certain qualities that made organizations more likely to successfully implement technology changes through this model? If so, what organizational qualities are associated with success?	<ul style="list-style-type: none"> • Common qualities of successful teams 	<ul style="list-style-type: none"> • Surveys of participants • Organizational survey
	How do results achieved under the Breakthrough Series Model for technology adoption compare to a traditional technology adoption model?	<ul style="list-style-type: none"> • Benefits of Breakthrough Series model compared to traditional technology adoption model • Difficulties of Breakthrough Series model compared with a traditional technology adoption model 	<ul style="list-style-type: none"> • Interviews with team leaders • Interviews with project directors and key staff
Compared with traditional uses of the Breakthrough Series Model, what are some of the unique benefits and/or challenges of using the model to implement technology?	<ul style="list-style-type: none"> • Benefits of using Breakthrough Series model for implementing technology • Difficulties of using Breakthrough Series model for implementing technology 	<ul style="list-style-type: none"> • Team reports at learning sessions 	
Impact of Technology Adoption on Practice Efficiency and Patient Safety	<i>Basic Question: How useful were the technology/process changes made by the teams/organizations in addressing the patient information exchange?</i>		
	How useful are technology/process changes made during this project to the organization?	<ul style="list-style-type: none"> • Perceptions of the usefulness of changes 	<ul style="list-style-type: none"> • Interviews with team leaders • Surveys of participants • Team reports at learning sessions
	What is the impact of the technology/process changes on: <ul style="list-style-type: none"> • Resource expenditures to complete the process; 	<ul style="list-style-type: none"> • Resources required to complete process (pre/post) 	<ul style="list-style-type: none"> • Organizational surveys

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	<ul style="list-style-type: none"> • Frequency of patient health information errors; • Staff and provider time required to transfer/receive information; • Completeness of information; • Compliance with health standards; • Security of health data. 	<ul style="list-style-type: none"> • Estimates of frequency of patient health information errors (pre/post) • Time to transfer/receive information (pre/post) • Estimates of completeness rate of information (pre/post) • Compliance with health standards (pre/post) • Security of health data (pre/post) 	<ul style="list-style-type: none"> • Team reports at learning sessions • Interviews with team leaders
Impact of Technology Adoption on Patient Care Management	<i>Basic Question: How useful were the technologies/process changes made by the teams/organizations in improving the care management of patients with chronic medical conditions?</i>		
	How has the project affected collaboration between providers?	<ul style="list-style-type: none"> • Description of new collaboration between providers 	<ul style="list-style-type: none"> • Organizational surveys
	Are providers more likely to share information with external customers because of the project?	<ul style="list-style-type: none"> • Likelihood of sharing information with external customers (pre/post) 	<ul style="list-style-type: none"> • Team reports at learning sessions
	How has the project affected availability of patient data?	<ul style="list-style-type: none"> • Description of changes in availability of patient data 	<ul style="list-style-type: none"> • Interviews with team leaders
	To what extent has the project affected provider and staff satisfaction with workflow and with management of patient care?	<ul style="list-style-type: none"> • Provider and staff satisfaction (pre/post) 	
	To what extent has the project affected use of evidence-based guidelines at participating organizations?	<ul style="list-style-type: none"> • Description of the impact of the project on use of evidence-based guidelines 	
Compared with traditional uses of the Breakthrough Series Model, what are some of the unique benefits and/or challenges of using the model to implement technology?	<ul style="list-style-type: none"> • Benefits of using Breakthrough Series model for implementing technology • Difficulties of using Breakthrough Series model for implementing technology 		

DATA COLLECTION

Learning Session Presentations

At the second and third Learning Sessions, each of the teams gave a presentation on their activities and accomplishments. In the presentations, they also described the impact of those accomplishments on information exchange and on patient care management. Finally, they discussed barriers and highlighted lessons learned. These presentations provide qualitative information on the changes that practices have adopted and the impact of those changes.

Coaching Reports

During the Action Periods, collaborative faculty met with practice teams to provide support and coaching on each team's project. After these meetings, the faculty developed summary reports that described progress, barriers and challenges, and future action steps. These reports inform the evaluation by giving insight into the struggles practices were facing between the Learning Sessions and decisions they made to address barriers. They also provide an understanding of the types of support given to practices by collaborative faculty.

Participant Surveys

A series of three surveys were administered to providers and staff at the participating organizations. These surveys were administered at the end of each of the three learning sessions and were designed to measure participant perceptions about a variety of topics, including the learning session content, changes they had planned, and activities that occurred during the prior action period (See Appendix A). Likert-type scale questions were used to measure participant perceptions. Data were analyzed and changes in attitudes and perceptions over time were measured. Where relevant, Pearson Chi Square tests were used to highlight significant differences over time.

The first survey was administered at the conclusion of Learning Session 1. This survey asked questions about participants' understandings of the BTS process, about the information imparted during the Learning Session, about the consensus-building process that was undertaken at the Learning Session, about difficulties and barriers anticipated for the project, and anticipated participation.

The interim and final surveys were administered at the conclusion of Learning Sessions 2 and 3, respectively. These surveys focused on activities undertaken during the Action Periods, difficulties and barriers faced, support received from Collaborative faculty, organizational support and resources, and aspects of team functionality.

Organization Surveys

Surveys on processes of health information exchange processes and patient care were administered to team leaders to assess changes in these areas during the project. Two different surveys on these topics were administered in the Aroostook Collaborative. These were revised and consolidated into one survey for the Bangor Area Collaborative

to improve the information collected. An initial survey was administered before the first Learning Session (pre-) and a final survey was administered after the final Learning Session (post-) (See Appendix B).

Interviews

After the completion of Learning Session 3, team leaders from each of the organizations were contacted about being interviewed for the project. An email was sent to each of the team leaders with information on topics for discussion. After the introductory email, the team leaders were contacted by phone to set up a time for the interview. Interviews were completed with 7 of the team leaders of organizations who completed the Aroostook Collaborative and 5 of the team leaders of organizations who completed the Bangor Area Collaborative.

Topics for discussion in the interview included:

- Description of the team's changes and how they affect the organization's workflow and staff.
- Accomplishments since Learning Session 3 and ability to sustain changes.
- Benefits and challenges of using the BTS model to implement technology.
- Utility of information discussed at the Learning Sessions.
- Coaching support during the Action Periods
- Team's level of interest and participation during the project.
- Changes in efficiency and patient safety due to technology changes.
- Staff satisfaction with changes
- Impact of changes on chronic care delivery

V. RESULTS

PROCESS EVALUATION

To what extent was the project conducted as articulated in the proposal? Were the goals, objectives and outcomes delineated in the proposal completed? If not why?

Recruitment

For the Aroostook Collaborative, recruitment was carried out more systematically than for the Bangor Collaborative. The main advantages in Aroostook recruitment were 1) the presence of a strong senior level administrator promoting the Collaborative and encouraging participation and 2) project staff committed to the recruitment effort. During the Bangor Collaborative, a senior level physician champion was not involved until after the recruitment period, and several key project staff, including the Principal Investigator and project coordinator, had left their positions and others were beginning to transition into the roles.

Initially, 16 organizations were recruited into the Aroostook Collaborative and attended the first Learning Session. Of these, 10 completed the year-long Collaborative. In total, 44 individuals participated in at least one of the Aroostook Learning Sessions.

Although collaborative faculty had hoped to increase recruitment to 20 teams in the Bangor Area, this goal was not reached. A total of 16 organizations were recruited into the Bangor Area Collaborative (14 prior to the first Learning Session; 2 during or after the first Learning Session). Of these, 10 completed the Collaborative. In total, 41 individuals participated in at least one of the Bangor Area Learning Sessions.

Engagement of Stakeholders and Experts

The planning team consisted of experts trained in quality improvement, evaluators, IT experts, medical leaders, and health system project managers. The project was also aided by experts from the Eastern Maine Medical Center and EMHS IT departments. Because IT support was so crucial to the project, during the Bangor Area Collaborative, a full team of IT specialists were invited to the first Learning Session to ensure that support and advice would be available from the start because the lack of such specialists early on in the Aroostook Collaborative made some projects more difficult. Additionally, the Chief Information Officer position at EMHS was vacant at the beginning of the grant, which made it difficult to gain senior level support from the IT department and to prioritize IT needs initially.

Other stakeholders and experts also contributed to the learning sessions and/or helped teams during the Action Periods on an as needed basis. To some extent, it was difficult to determine what specific types of experts would be needed for each of the collaboratives because, prior to the first Learning Session, it was not clear what projects the teams would be working on.

Problems Encountered and Lessons Learned

In general, project activities were implemented as planned and on schedule. Staff and leadership turnover during the project, including loss of the Aroostook senior level administrator, TAMC's project coordinator, the Principal Investigator for the project, and the coordinator of the Institute for Medical Improvement, was a significant barrier to implementing planned activities. Despite the challenges of staff and leadership turn-over, activities were generally implemented on time. However, changes made continuity of the project more difficult than it would have otherwise been.

In the Aroostook Collaborative, a major issue was that the "Together Project", an EMR implementation project was going on at the same time as our Collaborative. The Together Project consumed many of the same staff resources that were also required by this project. In retrospect, it would have been more beneficial to do the first Collaborative in the Bangor area and the second in Aroostook County to avoid this conflict.

There were also some differences between the initial goals for change and the changes that were actually implemented by participating teams. Mainly, the project was intended to facilitate the development of projects for transferring patient and related information between organizations to improve chronic care. During the Aroostook Collaborative, there was a greater focus in the first Learning Session on setting up teams to work together on projects that would transfer information between organizations. However, many of the teams found it difficult to work with the organizations they had been paired with, and in some cases, one of the partners dropped out of the Collaborative. Because of this, some teams had to adjust their goals. During the Bangor Collaborative, teams were given the opportunity to work together – and many chose to do so – but it was not promoted as strongly. In addition, the Collaborative evolved to encourage all types of technology implementation and process change projects, not just those that involved transfer of information.

Another problem that was encountered during both Collaboratives was that many of the teams came to the first Learning Session without a clear idea of the types of changes that would be appropriate for their organization and supported by their leadership. One way to improve the likelihood that teams would choose appropriate projects and be supported in their choice would be to do more preliminary work with the teams and their leadership prior to the first Learning Session to ensure that the commitment required is understood by all, that resources and leadership are available, and that the project is appropriate. At this time, a contract could be signed by a lead physician to commit to the various elements of the project and ensure that the team will not drop out. By doing more work up front, the drop-out rate might be reduced and there would be a greater chance that teams could complete their work within the year timeframe.

EFFECTIVENESS OF THE BTS MODEL

To what extent was the IHI model effective for planning and implementing patient information sharing technologies within and between organizations?

Table 2 presents the perceptions of participants at the Learning Sessions on various aspects of the Collaborative. These, along with interviews with team leaders and collaborative faculty, provide insight into the effectiveness of the BTS model as applied to this project.

Table 2: Perceptions of Learning Session Participants

Before the Learning Session 1:	% Who Agreed (N=64)
There were people available to answer our questions about the goals of the collaborative and the expectations for our team.	83
My organization received the information it needed to assemble a team that would have all the skills and interests necessary to make this project successful.	67
Now that I have attended Learning Session 1:	% Who Agreed (N=64)
I have a better understanding of the goals of the Collaborative.	97
My team has the tools and understanding to form an effective change team.	95
I have a better understanding of how a PDSA cycle can be used to help implement technology changes.	95
Our team was able to successfully create organizational goals that are in line with the Collaborative goals.	95
My team has the information it needs to work with other organizations to adopt technology.	94
I have a better understanding of the Planned Care Model and Model for Improvement.	91
My team has the information it needs to make informed decisions about technology adoption.	91
Teams and Consensus-Building during Learning Session 1:	% Who Agreed (N=64)
Our team was able to reach consensus on how our organization will implement our identified changes.	86
Because of our involvement in this Learning Session, a wide variety of people in our organization will have input into the changes we make.	81
Our team was able to reach consensus on the changes we will make.	79
During the brainstorming session, our team came up with ideas we wouldn't have otherwise have considered.	77
Responses after Learning Session 3:	% Who Agreed, (N=55)
Our team had an adequate understanding of technology to implement our action plans.	89
Our team has developed realistic, workable action plans.	87
The information gained through participation in LS1 and LS 2 enabled us to overcome barriers and adjust when changes were not working.	58
Our team's action plans have changed significantly since the first learning session.	51

Recruitment Period: Additional Information and Communication Might Have Helped Organizations Assemble Appropriate Teams

Additional information prior to the first Learning Session might have improved team quality and effectiveness. In interviews, several of the team leaders reported that their teams did not have the right people involved at the first Learning Session because they did not have enough information before the Learning Session to assemble an appropriate team. In one case, the team leader reported that the team lost about 5 or 6 weeks due to the lack of an organizational leader on the team. Another team leader reported that an IT expert was not included on the team initially because it was not clear that one was needed.

While approximately 83% of all participants felt that there were people available to answer questions about the goals of the collaborative and expectations for the team before the first Learning Session, only 67% of participants felt that they received adequate information prior to the learning session to assemble an appropriate team (See Table 2).

The Benefits of Learning Sessions Were Greater for Some Organizations than Others, and Most Participants Appreciated Opportunities for Information Exchange with other Teams

The Learning Sessions were intended to provide teams with background information on technologies, to introduce them to potential partners, and to provide them with brainstorming and team building opportunities to develop goals. Some team leaders we interviewed felt that the Learning Sessions had served these purposes and this had been useful for their teams, while other team leaders did not find the Learning Sessions to be as beneficial. Most of the team leaders, however, reported that they appreciated the opportunity to learn about other teams' projects and to exchange ideas with others on overcoming barriers. Some team leaders also reported that one of the main benefits of the Learning Sessions was that they were a milestone that forced them to focus on the project.

At the completion of Learning Session 1, almost all participants (more than 90%) felt that they had received information and tools needed to make informed decisions, create goals, and form effective teams (See Table 2). Most Learning Session 1 participants (77-86%) also felt that the first Learning Session played an important role in helping teams reach consensus on what changes to make and how to implement changes. This included providing help to the team in coming up with ideas it wouldn't have otherwise considered and enabling a wide variety of people in the organization to have input into changes.

However, by the close of Learning Session 3, participants were less optimistic about the effectiveness of the information they had received during the first two Learning Sessions. Only 58% felt that the information gained through participation in the Learning Sessions enabled their team to overcome barriers and adjust, while 51% reported that team's action plans changed significantly since the first Learning Session, indicating that the first Learning Session was not adequate for developing feasible, lasting goals.

Although Organizational Teams Found it Difficult to Meet on a Regular Basis, They Found it Easy to Work Together

In interviews, however, team leaders reported that they generally did not feel that the Learning Sessions played a role in team building. Most teams had already been working together on other projects and were already cohesive. Participants, however, tended to feel optimistic about their teams by the end of the project. More than three quarters (76.4%) reported that working together as a team had not been difficult, while 16.4% found it to be somewhat difficult, and 5.5% thought it was very difficult.

Small, Incremental Technology Changes Can Result in Substantial Improvements

Case Study A

Team A came into the Collaborative without a clear idea of what was expected of it. The team joined mainly because it wanted to learn more about technology and did not initially realize that the Collaborative would require it to plan and implement technology changes. The team also initially lacked some of the team members that would be needed to make the project a success, including an IT expert who could serve as a resource. Although the lack of IT specialists was never solved, the other members of the team had a good working relationship from previous projects, which helped it accomplish goals.

At the first Learning Session, Team A developed an initial goal of adopting electronic faxing. When that goal was reached, a new goal was developed. Each time one goal was completed, Team A immediately began to tackle a new project. By giving the team a full day away from the office to meet and plan new changes, Learning Sessions helped spur on progress. On a weekly basis, it was difficult for the team to find time to meet.

Although the technology changes adopted by Team A were each relatively small, in aggregate, they resulted in great improvements for the organization. Projects varied widely. Scanning capabilities were introduced to the front desk, allowing patient insurance information to be scanned in to the system and kept electronically. Noise conditioners were added to the waiting room to keep conversations with patients private and confidential. The addition of LAN faxing saved time and paper. Screen savers were added to computers in exam rooms to display patient education information.

For teams to be successful, it is crucial that they make time to meet and communicate. Teams in the Bangor Collaborative were significantly more likely to meet regularly than Aroostook Collaborative teams (see Table 3). Teams in the Aroostook Collaborative were more likely to meet just once or twice or to get together informally. Overall, only 37% of all participants (both Collaboratives) reported their team met regularly. In interviews, many of the team leaders acknowledged that finding time to meet as a team was one of the main barriers that the team faced during the Action Periods. Some reported that they worked around this by talking to their team members individually or meeting informally. Still others reported that scheduled meetings with the coaches were the only time they were able to meet as a team.

Table 3: Perceptions of Learning Session Participants on Frequency of Meetings (by Collaborative)

How did you meet with your team during the Action period?*	Results of Learning Session 3 Survey			
	Aroostook	Bangor	Total	P-value
Met regularly	19%	53%	37%	0.009
Met once or twice	27%	11%	19%	0.125
Did not have formal meetings but got together informally when possible	54%	32%	43%	0.091
Communicated in other ways (phone, email)	42%	39%	41%	0.520
We did not communicate	0%	0%	0%	--

* Respondents could check more than one response.

The Collaborative Made it Easier for Teams to Work with External Customers

Many of the projects teams chose to implement during the Collaborative required coordination with external customers. In some cases, external customers were other Collaborative participants, but they also included non-participating organizations. Ideally, the Collaborative would improve teams’ capacities to work with external organizations. After Learning Session 3, approximately 71% of participants reported that their team had been able to work with external organizations and that participation in the Collaborative had made it easier to do so. Participants in the Bangor Collaborative were more likely than Aroostook participants to report that the Collaborative facilitated interactions with external customers (See Table 4). Many of the Aroostook Collaborative teams were teamed with external customers at the initial Learning Session. In some cases teams dropped out of the Collaborative, which caused frustration among the remaining partner. Bangor Area teams were less likely to be paired up initially.

Table 4: Perceptions of Working with External Customers (by Collaborative)

	% Who Agreed, Learning Session 3 Survey			
	Aroostook (N=27)	Bangor (N=28)	Total (N=55)	P-Value
My team was able to work with other organizations to advance our technology capabilities.	63%	79%	71%	0.025
Our participation in this Collaborative <i>made it easier</i> to work with other organizations to advance our technology capabilities.	67%	75%	71%	0.101

Coaches Provided Effective Support during the Action Periods, Particularly for Teams who Struggled

A high percentage of participants in both Collaboratives (87-95%) reported that they received appropriate follow-up from the coaching staff during the action period, including number of visits, communication by phone and email, and other resources provided to the organization. In addition, 95% felt that the coaching staff was available during the action period to assist in implementing action plans.

	% Who Agreed, Learning Session 3 Survey (N=55)
Appropriate follow-up by coaching staff, including:	
Number of visits	89%
Communication by phone/email	95%
Other information/resources provided to the organization	87%
Coaching staff were available during the action period to assist in implementing action plans	95%

Interviews with team leaders revealed that, for the teams that were self-starters and dedicated to the project, coaching was not especially useful because teams did not need the additional support. For teams that were having difficulty getting focused and finding time to meet, the coaching was more likely to help teams stay on track and to help them overcome barriers. In some cases, meetings with coaches helped to renew interest in the project between Learning Sessions and pushed the teams to accomplish tasks prior to the meetings.

Senior Leadership Was Perceived More Favorably by Bangor-Area Participants than Aroostook Participants

After the third Learning Session, participants were asked about the commitment of their organization to the project, including support from senior leadership and IT specialists. Approximately 84-90% of all participants felt that their organization was interested in and committed to the project, that senior leaders cared about improving quality of care and services, and that adequate support was received from IT specialists within and outside of the organization (See Table 5). However, general perceptions of senior leaders were somewhat less favorable (e.g., whether they saw success as a high priority, provided resources needed for implementation, ensured that staff had time to work on the project, etc.). This was because a significant percentage of Aroostook participants did not view the role of their senior leaders favorably. One of the Aroostook team leaders attributed this lack of confidence in senior leaders to the loss of Jim Haley, the administrative level physician champion, part-way through the Collaborative. After he left his position, there was nobody at his level who had been participating in the Collaborative since its inception, which made it difficult for some organizations to receive the support they required. Overall, participants in the Bangor Collaborative tended to have more positive perceptions about the support they received throughout the Collaborative compared with Aroostook participants.

Table 5: Perceptions of Working with External Customers (by Collaborative)

	Results of Learning Session 3 Survey			
	Aroostook	Bangor	Total	P-value
My organization was interested in and committed to this project.	81%	100%	90%	0.001
Senior leaders cared about improving quality of care and services we provide.	89%	89%	89%	0.490
We received adequate support from IT specialists (within and outside of) our organization.	81%	86%	84%	0.065
Senior leaders saw success as a high priority for our organization.	57%	93%	75%	0.002
Senior leaders provided resources we needed for implementation.	59%	86%	73%	0.007
Senior leaders demonstrated an ability to manage technology changes.	59%	86%	73%	0.094
Senior leaders ensured that staff have time to work on the project.	56%	85%	71%	0.016
Senior leaders informed other staff that this project is a priority.	41%	86%	64%	0.003

Participants Had Less Favorable Perceptions of Leadership and Resources over Time

In most cases, participant perceptions did not change significantly over the course of the project. However, for some aspects of the project significant changes over time did occur.²

In general, as the Collaborative progressed, participants tended to have a less favorable perception of many aspects of leadership and resources available to them (See Table 6). By the second and third Learning Sessions, participants were significantly less likely to agree that senior leaders saw success as a high priority, that senior leaders demonstrated an ability to manage technology changes, that senior leaders ensured that staff had time to work on the project, and that senior leaders provided the resources the team needed. They also tended to have a low perception of their organizations’ interest and commitment to the project at the second Learning Session.

² Chi-squared tests were used to determine whether there were changes over time in perceptions of aspects of the project among participants (i.e., whether differences in participant responses between learning sessions were statistically significant).

Table 6: Perceptions during the Collaborative

	Agreed At LS 1 (N=64)	Agreed At LS2 (n=43)	Agreed At LS3 (n=53)	P-Value
Leadership and Resources				
Senior leaders cared about improving quality of care and services.	96%	73%	79%	0.09
Senior leaders saw success in the project as a high priority.	81%	65%	73%	0.04*
Senior leaders demonstrated an ability to manage technology changes needed to improve quality of care.	82%	79%	72%	0.05*
Senior leaders ensured that staff has time to work on the project.	64%	88%	70%	0.02*
Senior leaders provided the resources that we needed.	100%	42%	72%	0.01*
Senior leaders informed other staff that this is a priority.	79%	70%	62%	0.21
We received adequate support from IT specialists (within or outside of our organization).	82%	88%	83%	0.76
My organization was interested in and committed to this project.	89%	60%	91%	0.007*
Composite measure: average percentage of agreement	84%	71%	75%	--
Teams				
A wide variety of people in our organization had input into the changes we attempted to make.	87%	52%	62%	0.02*
Our team had an adequate understanding of technology to successfully implement action plans.	91%	88%	91%	0.51
Our team included leaders who helped us get support for our ideas in our organization	87%	73%	76%	0.26
Our team developed realistic, workable goals and action plans	90%	88%	87%	0.73
I am satisfied with the progress our team made in implementing its action plans.	--	76%	87%	0.61
My team had participants with the right skills and knowledge to make this project successful.	90%	93%	85%	0.30
Even though this project is ending, our team will continue to work together in the future to implement technology and improve workflow processes to transfer patient data.	--	100%	94%	0.56
Composite measure: total percentage of agreement	89%	81%	83%	--
Activities and Support				
The information gained through participation in Learning Sessions enabled the team to adjust when changes were not working	--	79%	59%	0.29
The visits and phone calls from IMI project staff during the action period gave useful guidance to implement changes and overcome barriers.	--	74%	81%	0.50
During the action periods, there were IT specialists available to assist in implementing our action plans.	--	69%	91%	0.01*
During the action periods, there were internal staff members available to assist in implementing our action plans.	--	88%	92%	0.08
During the action periods, there were coaches available to assist in implementing our action plans.	--	75%	94%	0.02
There was appropriate follow-up by coaches during the action periods, including NUMBER OF VISITS.	--	74%	89%	0.37
There was appropriate follow-up by coaches during the action periods, including COMMUNICATION BY PHONE AND EMAIL.	--	76%	94%	0.02
There was appropriate follow-up by project staff from the IMI during the action periods, including OTHER INFORMATION AND RESOURCES.	--	71%	87%	0.27
Composite measure: total percentage of agreement	--	76%	86%	--

* Differences significant at 95% confidence level

Organizations Implemented Changes with Varying Levels of Success

The degree to which organizations were able to implement their chosen technology solutions varied. Some quickly completed their initial goals and, in some cases, completed additional goals that they initially had not expected to tackle, while others changed their initial goals and struggled to find an appropriate goal that they could feasibly complete.

In interviews with team leaders, we found that many of the organizations that entered the Collaborative with a specific project in mind and a mandate from their leadership to work on that project tended to achieve success in implementation. These organizations often narrowed their focus or made minor changes to their goals but largely stuck to the same main goals. In some cases, team leaders reported that the changes would have happened with or without the Collaborative.

On the other hand, many of the organizations that entered the Collaborative without a specific project in mind tended to have more difficulty developing adequate goals. These

were more likely to drop out of the Collaborative or change goals. Some organizations quickly completed initial goals and then moved on to additional goals.

Organizations Planning Major Technology Changes Can Use the Collaborative to Facilitate their Projects

Case Study B

Team B was planning a major technology implementation project (e-prescribing) when it learned about the Collaborative. The team had developed goals and had a good idea of how implementation would go. The team consisted of a strong team leader who had the confidence of senior leadership in the organization and other self-starters who understood the issues and challenges associated with the project. The team had worked together on prior projects and met regularly even before this project. IT specialists who understood the technologies being implemented were integral to the team. Because senior leaders understood the importance of the project and made it a priority for the organization, Team B had no issues getting the financial and staff resources needed to successfully complete the project.

It seems that, even without the Collaborative, Team B would have implemented e-prescribing because the project was a priority to the organization. However, the Collaborative did facilitate the work of Team B by opening the door to reach out to an external partner to work with on e-prescribing. It also connected the Team with other organizations who were interested in e-prescribing and might be good partners for e-prescribing and other projects in the future. Participation in the Collaborative also gave Team B the opportunity to address and discuss challenges and to gather information on challenges (including the legislative environment) from other sources.

Team B successfully completed a major technology implementation project was completed during the time period of the Collaborative. Participation in the Collaborative helped facilitate changes and connected the team with potential partners and resources, but success was achieved not because of the Collaborative but because Team B chose a project that was important to the organization, was ready to change, assembled a strong team with a strong team leader, and had the full support of organizational leadership.

Some of the organizations that struggled with their goals faced problems with their external customers or did not have adequate IT support. Some also had team leaders that were less experienced or had less seniority within the organization and had difficulty securing resources and support from the organization.

Organization Retention Was an Issue

Of the 32 organizations that were recruited for the two Collaboratives, 20 organizations completed the year-long project. Some teams did not continue after the initial stages of the project. Interviews with collaborative faculty who interacted with these teams indicated that the teams that dropped out tended to not be engaged from the start. Organizational issues beyond the scope of the Collaborative were also a factor. For example, one organization (Micmac Clinic) was forced to close due to funding problems and, thus, could not continue its work. For other organizations, staff turnover and/or competing projects resulted in drop-out. Although it would be impossible to retain 100 percent of teams, the collaborative faculty felt that retention could be improved by providing more information to teams prior to the first Learning Session, only including the most qualified organizations in the Collaborative, and requiring organizations to sign agreements outlining the expectations of the Collaborative prior to joining.

Successful Teams Tended to Have Strong Leadership, an Organizational Culture of Empowerment, and Chose Projects in which the Organization Perceived Value

Organizations attempted a wide variety of changes during this project with a varying level of success. Some organizations chose to focus on small changes that involved relatively inexpensive and “simple” technologies (e.g., scanning and faxing capabilities, secure email). Some successfully implemented a variety of small projects within a short time frame, while others were less successful and struggled to implement even one simple technology or process change. Still other organizations chose more complicated technologies/process changes (e.g., e-prescribing, Problem Knowledge Coupler) and focused on one substantial project throughout the entire year, reaching a high level of success by the end of the year.

In interviews with collaborative faculty and team leaders, several themes emerged as qualities of teams that had a high level of success (either in implementing a variety of small projects or one big project) compared to those who struggled. These qualities included:

- **Senior Leadership:** Interviews revealed that organizations who had the support of senior leaders within the organization, particularly leaders who understood the value of the project and saw that the project was creating advantages for the practice, tended to be more successful.
- **Team Leadership:** Leadership within the team was also crucial. Successful teams were far more likely to have a team leader who felt empowered within the organization, had confidence to advocate for the team and request additional resources, and were able to keep things moving.
- **Culture of the Organization/Team:** The team’s personality and climate also was a predictor of whether the team was able to achieve success. Success was not

determined by how technologically savvy the team members were but how empowered they felt to make changes and to try new things. Some teams, by nature, were more motivated than other teams and more willing to take risks.

- **Perceived Value in Project:** Organizations (e.g., leadership, staff, and participating team members) that perceived value in the project they were implemented tended to be more successful. In cases where the project was perceived to be low priority compared to other organizational commitments, teams had trouble finding time and resources to allocate to the project. In particular, interviews revealed that those organizations that entered the Collaborative with an idea that they wanted to implement - and in some cases had been considering implementing through other means - tended to do better than those organizations that entered the Collaborative without a clear idea of which changes would be useful to the organization. The selection of a project that was thought to be valuable and a priority for the organization, whether it was the impetus for joining the Collaborative or a project that was developed during the Collaborative, was a main key to success.

The BTS Model Facilitated Technology Adoption Compared to Traditional Technology Adoption Processes

The BTS Model has been proven to be an effective model for adopting and implementing a variety of changes in health care organizations; however, the collaborative nature of the BTS Model differs from the traditional model used to adopt technology.

In interviews, team leaders were asked if using the BTS Model, which required them to attend Learning Sessions and plan projects collaboratively with team members, facilitated the process of technology adoption or made the process more difficult. Each of the team leaders replied that the BTS Model had made the process easier than it would otherwise have been. In surveys, approximately 75% of team members felt that the participation in the Collaborative had made it easier to gain support for changes within the organization.

Project participants assessed the difficulty of various components of the project. By the end of the project (Learning Session 3), participants reported that working together with other organizations to adopt technology was particularly difficult (See Table 7), while getting support from leadership and working together as a team tended to be less difficult. Although it appears that Aroostook participants found most aspects of the Collaborative to be more difficult than Bangor Area participants, the differences between the two groups in responses were not statistically significant.

Table 7: Difficulties Encountered during the Collaborative

	Reported "Somewhat or Very" Difficult (LS 3)			
	Aroostook	Bangor Area	Total	P-Value
Getting support for work from leadership in the organization	26%	15%	20%	0.26
Getting support for work from other members of the organization	37%	27%	32%	0.31
Working together as a team	22%	23%	23%	0.17
Working together with other organizations who are adopting this technology	71%	48%	61%	0.12
Adopting technology that fits our needs.	41%	27%	34%	0.19
Training staff to use new technologies.	35%	42%	39%	0.08
Adjusting when changes are not working	23%	48%	35%	0.18

When asked what the greatest successes of the project had been for their organizations, many participants felt that the greatest success was improvements in communication as a result of the project. For example, one participant said that "being able to speak and hear from other organizations that might have the same problems they had was very helpful". This was echoed by other participants who felt that sharing ideas, meeting new people and learning from other groups was the greatest success. Many of the participants felt that the greatest success of this project was using technology already available and in place in their organization or in being able to identify additional needs for technology. Others felt that working with a team for a common goal was the greatest success.

When members of various organizations were asked about their greatest disappointments, many focused on aspects of their action plans that they did not complete, on not having time or staff to devote to the project, or on failed attempts to work with external customers.

Teams Must Have Strong Leadership and Organizational Support for Technology Projects

Case Study C

Team C came into the Collaborative without a strong idea of the commitment expected. The team did not have enough information to get an effective group together in advance and did not have a strong leader. Support from the organization was minimal. The team did not come into the first Learning Session with a specific project in mind and the goals developed during that Learning Session, as a result, were not particularly strategic. Some parts of the organization did not see the value in the project chosen. In addition, because information on the project was not spread throughout the organization, Team C learned mid-way through the Collaborative that another team in their organization had been assembled during the year to work on the same topic.

One of the major challenges faced by Team C was lack of leadership. Because the team leader did not have the ability to go back to the organization's senior leaders and get buy-in, there was very little support from the organization. By the end of the Collaborative, Team C had achieved very little progress and had not seen any real outcomes from the work it had accomplished

By the end of the project, 50% of participants felt that the Collaborative had exceeded their expectations, while 39% found that it met their expectations; just 11% found that the Collaborative was below their expectations (See Table 8). Bangor Area participants were more likely to report that the project exceeded their expectations. Compared with Aroostook participants, Bangor Area participants were also more likely to report that the project added “great value” to their effort to implement technology changes. Overall, more than half (53%) of all participants felt that the project had added great value to the effort, while 45% of all participants felt that it had added some value.

Table 8: Comparison of Project with Expectations

	How did the Project Compare to Your Expectations?		
	Exceeded	Met	Below
Aroostook	37%	48%	15%
Bangor Area	63%	30%	7%
Total	50%	39%	11%
	How much Value Has Participation in the Collaborative Added to the Effort to Implement Technology Changes?		
	Great Value	Some Value	Little or No Value
Aroostook	35%	65%	0%
Bangor Area	69%	27%	4%
Total	53%	45%	2%

When team leaders in the Bangor-Area Collaborative were asked why they had not previously implemented the project through other means, 63% of team leaders reported that their organization did not have the technology available, 63% said that they did not have the time to implement the project, and 63% reported that they needed a project like this to focus on making changes. Only 25% reported that their team had not thought about the idea before the Collaborative, and even fewer (13%) said that their senior leaders or staff had not been supportive. This indicates that the project’s greatest value was in getting teams to allocate time to making technology/process changes and helping them secure the required technologies to complete the changes. The project appeared to have less value for getting staff/leadership buy-in and for brainstorming new ideas.

Developing Focused Technology Implementation Projects Appears to Have Been More Difficult than Developing Projects in Disease-Specific Collaboratives

The BTS model is traditionally applied in disease-focused Collaboratives and previously has been used by the leadership team to conduct Collaboratives on tobacco treatment for pregnant women and Chronic Obstructive Pulmonary Disease (COPD) Management. In interviews, collaborative faculty described some of the specific challenges of applying the BTS model to a technology project compared with the disease-specific Collaboratives in which they had previously been involved.

One of the main differences described by collaborative faculty between the technology collaborative and prior disease-specific collaboratives is that, in disease-specific collaboratives, organizations enter the collaborative with a clear focus: improving evidence-based care for that disease. Evidence-based protocols exist for various conditions and generally have been highly researched and accepted, so the value of implementing them in the practice setting is established and there is no requirement to

convince participants and organizational leaders of the value of change. It is relatively easy to use the evidence-based protocols to suggest a variety of ideas for change that practices can choose from to adopt and implement.

In contrast, collaborative faculty perceived that applying the BTS model to implement technology was more complicated. Many of the participants were exposed to a new set of terms (e.g., web portals, IT networks, etc.) that were foreign to them. In order to allow for the Collaborative to meet the needs of a variety of types of organizations and health systems, options for change were not prescribed. Most teams did not come to the Collaborative with a pre-conceived idea of changes they wanted to implement, so it was a significant challenge to initially develop a useful and feasible goals for change. As the Collaborative proceeded, collaborative faculty noticed that teams began to identify new ideas for change on their own; however, the initial lack of prescriptive evidence-based goals made it more difficult for teams to focus and get started.

In disease-specific collaboratives, teams focus on many of the same changes and can learn from others' successes and failures. In contrast, teams chose a variety of projects to meet their own needs in the technology collaborative. Many of the projects were unrelated. Interviews with team leaders revealed that there were advantages to this approach. For example, organizations learned about technologies (e.g., e-prescribing, electronic medical records, Problem Knowledge Coupler) that they were not implementing but might be interested in implementing in the future. Team leaders also tended to appreciate the opportunity to network with organizations that were different from them (e.g., family practices networking with pharmacies). However, some team leaders felt that they got little benefit from hearing about projects that were so different from what they were doing and would have preferred a collaborative in which all teams were implementing similar projects.

IMPACT OF TECHNOLOGY ADOPTION ON PRACTICE EFFICIENCY AND PATIENT SAFETY

How useful were the technology/process changes made by the organizations in addressing patient information exchange issues?

The initial goal of this project was to provide assistance through the BTS model for organizations to address patient information exchange issues. While some organizations identified information exchange projects, some organizations focused on implementing other technology and process changes that did not directly affect patient information exchange processes (although changes may have had indirect effects).

The most common changes among the organizations were the implementation of a secure email system and/or the use of a scanner to improve the efficient transfer of documents with patient information. At least 4 organizations also developed a referral template that could be used with the secure email system, while 3 focused on e-prescribing. Some organizations experimented with other technologies as well (See Table 9). The Aroostook practices tended to have a strong focus on secure email, scanners, and referral templates. The projects that were undertaken by the Bangor-Area practices were more

diverse and ranged from patient registries to the addition of laptops to access patient records to Problem Knowledge Coupler (PKC) for phone triage to electronic-prescribing.

Table 9: Summary of Changes

Main Changes	Number of Organizations Reporting Implementation of Technology or Process		
	Aroostook	Bangor Area	Total
Secure Email	7	2	9
Scanner	6	1	7
Referral template	4		4
E-prescribing	1	2	3
Implementation of Problem Knowledge Coupler (PKC) for phone triage		2	2
Added laptops or other workstations to improve access to patient records throughout the building		2	2
Improved virtual private network access to Powerchart/EMR		2	2
Improved faxing processes		2	2
Created template for moving patients internally	1		1
Email Protocols	1		1
System to track patient information and print physician orders	1		1
Sending physician orders using EMR	1		1
Wireless Internet access	1		1
Development of database to track medication safety issues		1	1
Improved access to EMRs of referring hospitals		1	1
Tanberg conferencing equipment		1	1
Electronic supply ordering		1	1
Live answering of phone system		1	1
Improved access to hospital system for medical reports		1	1
New patient registries created which extract information from EMR		1	1
Electronic Prior Authorization form created		1	1

Because the nature of the changes implemented by participating practices varied so widely, the impact of the changes on practice workflow and on staff responsibilities varied widely. In addition, the impact on practice efficiency and patient safety varied widely. Appendix C describes the changes implemented by each of the individual organizations and their potential impact in greater detail.

Team Leaders' Perceptions of the Utility of Changes Varied

Interviews with team leaders revealed that some team leaders perceived changes made during the project as very useful to their organization, citing improvements in practice workflow, patient safety, provider/staff satisfaction, etc. Other team leaders did not perceive the changes made by their organization as being particularly useful. Although changes were initially intended to be geared toward projects that would address patient

information exchange issues, many of the organizations focused on technology and process changes that addressed other improvements needed in their organizations.

Some team leaders reported that the changes were very useful for the organization. For example, one Aroostook team leader reported that secure email and scanners made a big difference to his/her practice in terms of time and postage savings. A Bangor area physician reported that e-prescribing resulted in improvements in patient safety, as drug-drug interaction was less likely; the physician also reported improvements in patient satisfaction due to quicker processing. A Bangor Area team leader whose organization had implemented Problem Knowledge Coupler reported improvements in patient satisfaction, in staff and provider satisfaction, and in patient safety. Additionally, another Bangor Area team leader reported a variety of improvements in practice efficiency and in patient/staff satisfaction.

In other cases, team leaders anticipated that technology/process changes would become more useful as time went on because they had not yet been completed. For example, one Aroostook organization was still waiting for the IT department to conduct training on secure email and to implement scanning capabilities. Another organization was waiting for a contract to be signed to initiate e-prescribing. The team had accomplished all that it could without the contract being signed but the actual signing of the contract was outside of the team's control.

Still other team leaders reported that they would become more useful as they became more accepted among external customers. For example, the pharmacies working on e-prescribing reported that the changes were currently more cumbersome to their workflow because they were not yet widely used but that once e-prescribing becomes a standard and used by half of their clients, it will be more efficient than the prior process.

Finally, some team leaders reported that the changes would have occurred with or without the participation in the Collaborative. This was particularly evident among the Aroostook County organizations. One Aroostook County team leader said, "The changes had little effect on the workflow/process at our organization." Another said, "We made some accomplishments, but they were things we were working on already... We didn't really accomplish anything that was due to this project." A third Aroostook leader expressed frustration with his/her team's attempts to develop an electronic referral process with another organization, "We ended up getting frustrated as we tried to follow through and reverted back to doing it the old way." Although Bangor Area team leaders appeared to be more likely to perceive that the changes were useful, at least one Bangor Area team leader reported that, "There were no real outcomes related to our goals."

Changes Resulted in Technologies/Processes that Tended to Be More Efficient, that Reduced Errors, and that Improved Security of Information

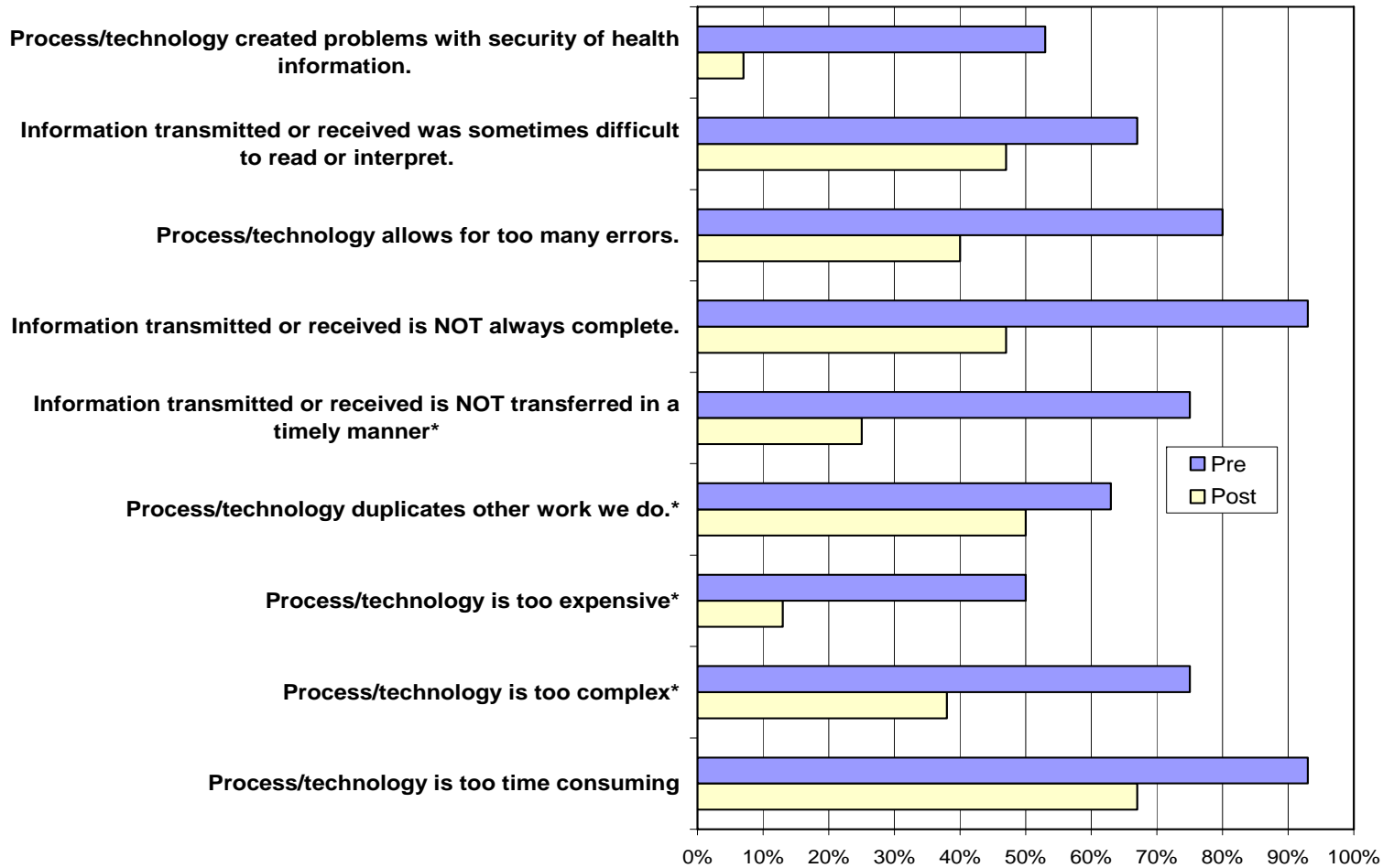
Team leaders were asked their opinions on the process/technology used prior to the beginning of the project (pre-) and the process used by the end of the project (post-) (See Figure 1). Some questions were asked during both Collaboratives, while others were

asked only to the Bangor-Area participants. A total of 15 team leaders completed both pre- and post- surveys.

Figure 1 shows that, by the end of the Collaborative, team leaders tended to report that the new processes/technologies they were using required fewer resources, resulted in fewer errors, and were more secure. In most cases, substantial changes occurred. For example, before the project, more than 60% of team leaders reported that the process/technology they were using created problems with the security of health information; after the project, less than 10% reported that there were security issues with the new process/technology. With the new process/technology, a substantial portion of team leaders reported reductions in errors, improvements in completeness of information that is received and transmitted, more timely receipt/transmittal of information, and reductions in cost to the organization. By the end of the project 100% of the Bangor area team leaders also reported that they felt comfortable that health information was secure with the new processes they were using.

Additional data collected in the Bangor-Area collaborative confirms that the changes made during this project reduced errors and improved the frequency that information transferred and received is complete and easy to read and interpret (See Figures 2 and 3).

Figure 1: Team Leader Perceptions of Technology/Process (% Team Leaders who Agreed with Statements)



* Question only asked to Bangor-Area team leaders. Data does not include Aroostook practices.

Figure 2: Team Leader Perceptions of Errors in Process and in Information before Project Began (Bangor Collaborative only)

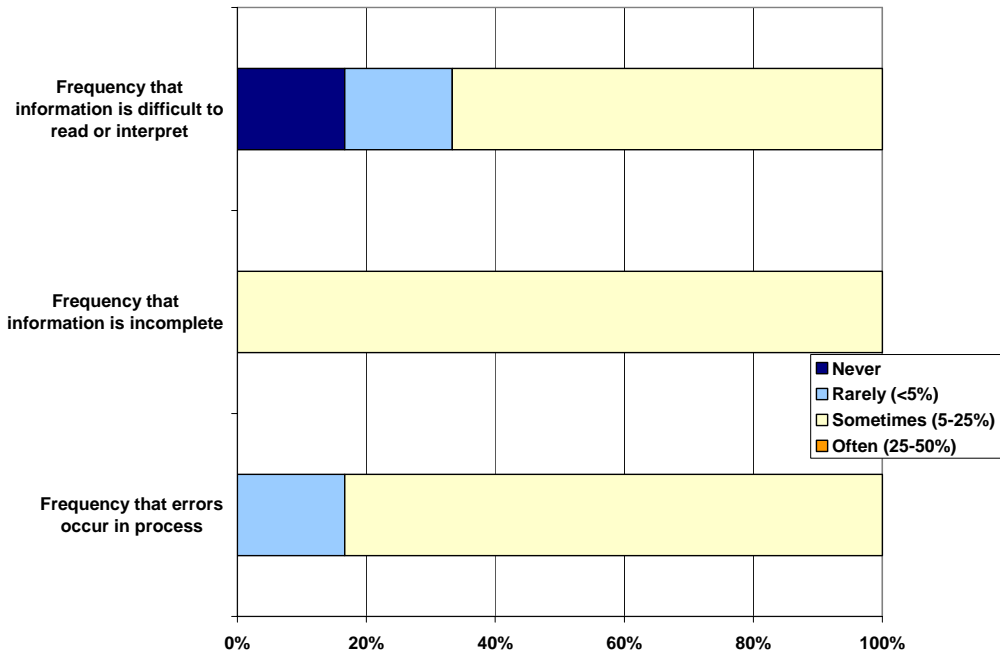
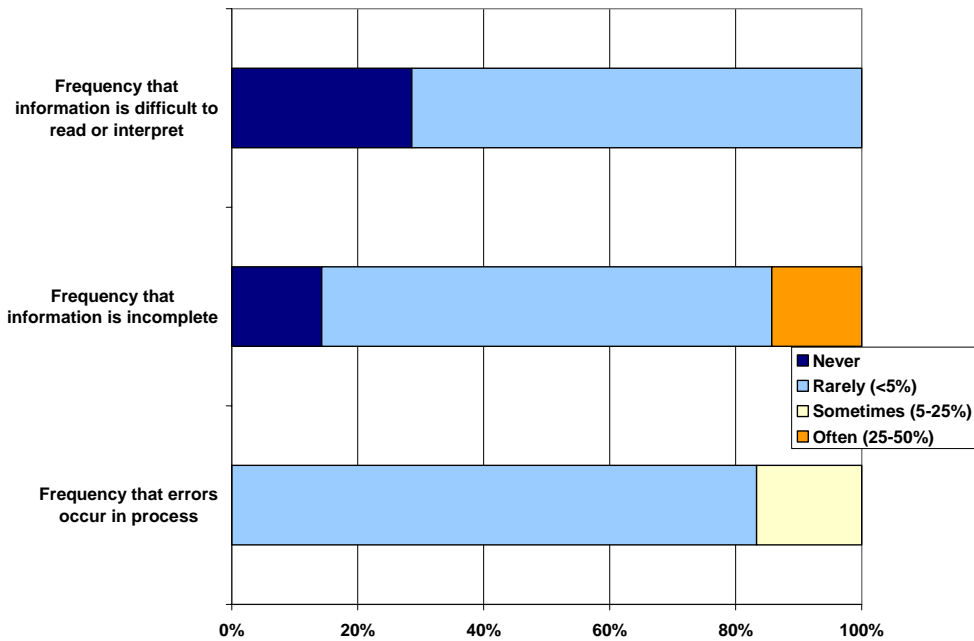


Figure 3: Team Leader Perceptions of Errors in Process and in Information at End of Project (Bangor Collaborative only)



IMPACT OF TECHNOLOGY ADOPTION ON MANAGING PATIENT CARE

How useful were the technology/process changes made by the organizations in improving the care management of patients with chronic medical conditions?

One of the main goals of this project was to implement technology solutions that would improve care for patients with chronic medical conditions. As described in the Planned Care Model, health systems ideally would improve chronic care by:

- Improving linkages to community programs and organizations,
- Supporting patients in managing their disease outside of the physician's office,
- Clarifying roles for a care team,
- Delivering care based on proven guidelines, and
- Tracking patients and groups of patients through a registry.

As described in the prior section, the projects undertaken by participating organizations varied widely. Thus, while some projects may have achieved progress in one of these areas (e.g., data registries), other projects may have achieved progress in other areas (e.g., improving linkages to community programs/organizations). Overall, however, progress was made in improving chronic care management at most practices.

The Project Improved Provider and Staff Satisfaction with the Quality of Care they Provided

At the end of each Collaborative, team leaders were surveyed on their perceptions of the impact of the project on chronic care at the organization (See Figure 4). Among most of the participating team leaders (62-77%), there was a perception that the changes their organizations had made improved quality of care for patients with chronic illnesses, enabled the organization to improve the process of care, enabled their organization to make changes to other parts of the organization (beyond the team's initial focus), and improved feelings of accomplishment in the team's work.

On the other hand, in most cases, these perceived improvements were not expected to lead to improved patient satisfaction and improved clinical outcomes. Only 31-39% of team leaders felt that changes in patient care had resulted in improvements to patient satisfaction or improved patient clinical outcomes.

Figure 5 and 6 show Bangor-Area team leader perceptions of satisfaction with the process/technology that was changed during the project before the changes were made and after they were made. As these figures demonstrate, all stakeholders (providers, other staff, external customers, and patients) tended to be more satisfied with the process/technology in question after changes were made. These stakeholders were less likely to be dissatisfied and more likely to be somewhat or very satisfied. These questions were not asked to Aroostook Collaborative team leaders.

Figure 4: Team Leader Perceptions of the Impacts of the Project on Chronic Care

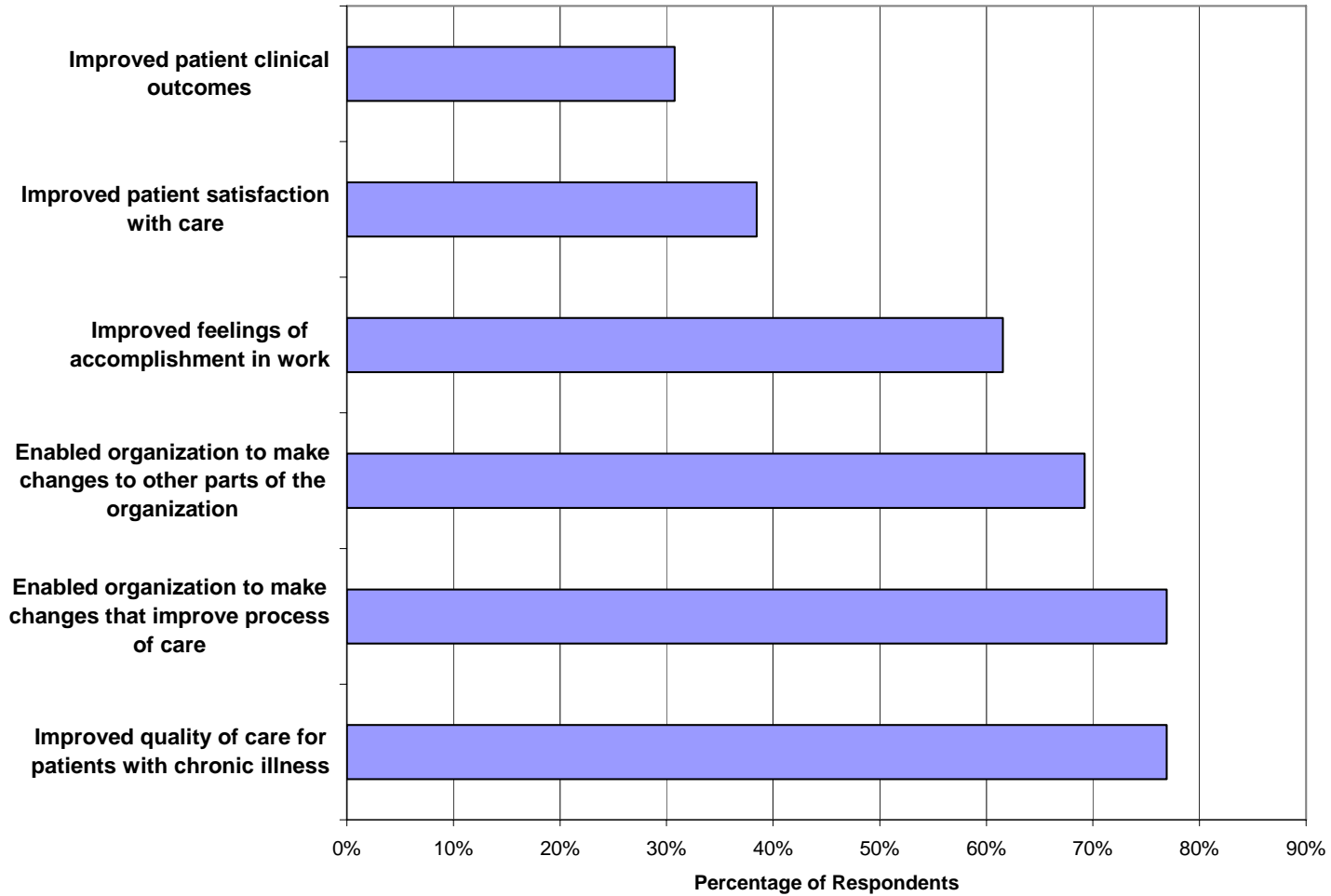


Figure 5: Team Leader Perceptions of Satisfaction with Process/Technology before Changes Made (Bangor Collaborative only)

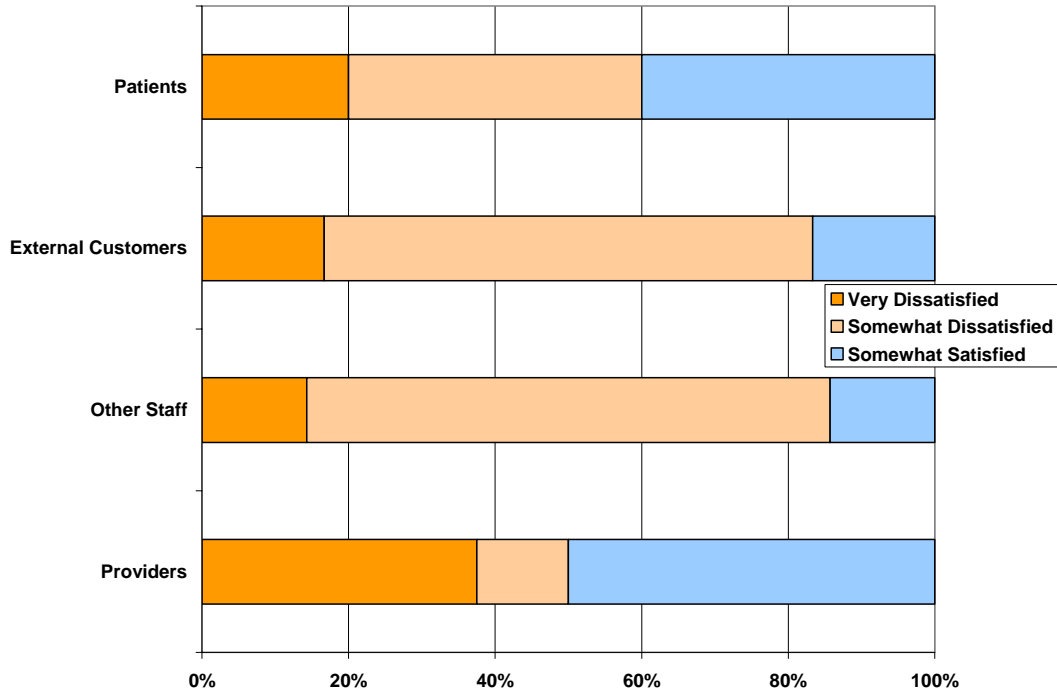
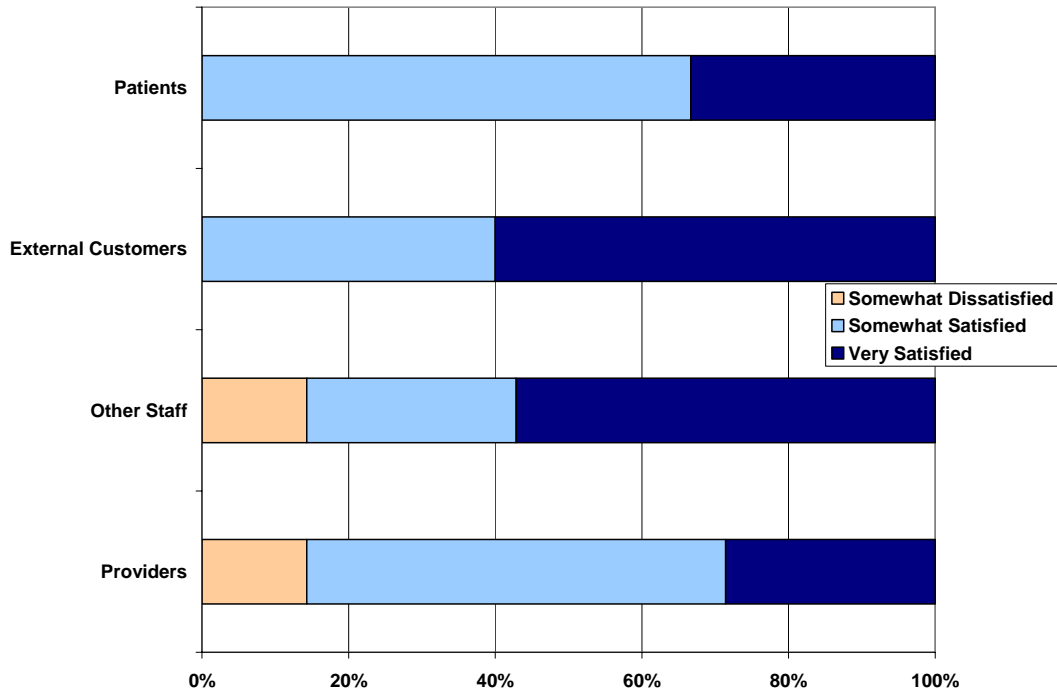


Figure 6: Team Leader Perceptions of Satisfaction with Process/Technology at the End of the Project (Bangor Collaborative only)



The Changes Enabled Some Organizations to Share Information with New Customers and Improved Satisfaction among Existing Customers

In general, the organizations that collaborated with external customers in the process used prior to the collaborative continued to collaborate with those customers. For most organizations, the Collaborative did not result in new partnerships for the process/technology that was being changed. However, three of the team leaders in the Bangor Area Collaborative did report that the new process/technology enabled their organization to share information with new customers/partners. In addition, as shown in Figures 5 and 6, team leaders perceived that their existing external customers were more satisfied after the technology/process changes were made, and the completed changes likely improved efficiency in these existing collaborative relationships.

Some of the projects that improved the sharing of information with external customers and community resources included: secure email, scanning and faxing capabilities, revised referral templates, e-prescribing, and improved access to external EMRs. Most of these projects did not directly address the need for better coordination with community resources. However, as part of this project, community health web portals were developed for both the Aroostook and Bangor areas to help connect patients and providers to local community resources. See <http://www.arostookhealth.org/> as an example. Participating teams in the Collaboratives were engaged during Learning Sessions and Action Periods to develop a web portal that would meet their needs and the needs of others in the community.

Many of the Projects are Expected to Improve Evidence-Based Care

Our evaluation did not directly document whether practices were more likely to provide evidence-based care at the end of the project compared with the beginning of the project. However, as shown in Figure 4, the majority of team leaders perceived that the project improved care for patients with chronic illnesses.

In addition, many of the organizations focused on projects that were expected to improve evidence-based care. For example, three organizations implemented e-prescribing, which allows the prescriber to check the medication with patient-specific information (other drugs that might interact, allergies, dosage, etc.). Problem Knowledge Coupler (PKC) was implemented by two organizations. This software program ensures that patients who call the office are given support according to established guidelines. Several organizations also improved access to patient registries or EMRs, which allows organizations to track patient care over time. EMR templates can help organizations with decision support and can allow them to embed evidence-based practice into their standards of care.

At Many Organizations, Changes Improved Access to Patient Data

Although many of the participating organizations focused on projects that did not address patient data, approximately 50% of team leaders in the Bangor-Area Collaborative reported that the changes made by their organization improved providers' access to individual patient information. In addition, 50% of team leaders reported that changes improved providers' access to data on groups of patients. (The question was not asked to

Aroostook team leaders). Data on this topic was collected only for the Aroostook Collaborative. Projects that improved access to patient data included: referral templates, e-prescribing, laptops and workstations, systems for tracking physician orders, improved access to EMR, and databases for medication.

VI. DISCUSSION

PROCESS EVALUATION

Planning and organizing a BTS Collaborative around technology issues in rural Maine posed some significant challenges, including the recruitment of an adequate number of team. The project team found that the recruitment process was more difficult than expected and was particularly difficult in the second year (Bangor-Area Collaborative) because of project staff turn-over and the lack of a senior-level administrator in the Bangor Area to promote the Collaborative. For recruitment to proceed smoothly, senior leadership at the systems level must promote the value of a Collaborative and engage leadership at the organizational and practice level early on. Organizational leaders must see the benefits of participation and be willing to make a significant commitment to participation before signing up. Senior level leadership at the health systems level should be accompanied by dedicated project staff who can carry out the day-to-day work of recruitment, including identifying potential participants and answering questions and doing extensive work with teams and leadership before the first Learning Session to ensure that teams have a full understanding of the commitment required. Both of these levels of recruitment (administrator level and project staff level) were lacking in the Bangor-Area Collaborative, which made recruitment efforts more difficult. Ideally, enough teams would be recruited to enable a selective process in which only teams that appear to be "ready for change" and have the elements necessary for success (e.g., leadership, organizational buy-in, IT support) would be included.

Beyond recruitment, the project team learned that involvement of IT specialists from the first Learning Session onward – both organizational level specialists and system level specialists – is essential. Involvement of IT support from the start ensures that projects are in-line with system-level priorities, that they are feasible, and that they will not be duplicative with other planned projects.

EFFECTIVENESS OF THE BREAKTHROUGH SERIES MODEL

This project tests whether the BTS model – which has been shown to be effective for the adopting and implementing changes around specific chronic diseases in medical practices - is effective for adopting and implementing technologies for information exchange between health care organizations. In this evaluation, we test the effectiveness of the various components of the BTS model (learning sessions, support during the action periods, and team and leadership issues) for selecting and implementing technologies in health care organizations.

Learning Sessions are important parts of BTS Collaboratives, and the Learning Sessions in the CCTP were intended to serve the typical functions that they serve in a BTS collaborative (e.g., providing teams with the information they needed to plan and implement changes; guiding teams through the process of developing goals and reaching consensus on changes; and bringing participants from different organizations together to share approaches, barriers, and solutions). For many of the teams participating in the

CCTP, particularly those who came into the project with a well-formed team and with ideas they wanted to accomplish, the Learning Sessions provided little benefit for planning changes or overcoming barriers because these teams already knew what they wanted to do. Rather, the main benefit to these sessions was the opportunity to exchange ideas with other teams and make connections. For teams who were unprepared coming into the first Learning Session, the Session helped to develop goals, but often the goals were not feasible and the teams had to change the goals later. Additional emphasis on preparatory work in advance of the first Learning Session might help such teams to develop projects that will be valuable to the organization and in alignment with its strategic goals and feasible to implement. It might also reduce drop-out.

As noted earlier, one of the initial goals of the CCTP was to implement technology projects that would facilitate the transfer of information between organizations. Compared with a typical BTS collaborative, this goal presents additional challenges because it requires teams from more than one organization to come together and identify changes and develop action plans. For the CCTP to be effective, the Learning Sessions in the CCTP must, therefore, provide a forum for teams to find appropriate partners and begin to work together to meet the needs of their organizations. In the Aroostook Collaborative, organizations were grouped with external customers during Learning Session 1 to develop projects that would improve information exchange between the partners. However, many were unable to develop viable projects with external customers. As a result, when the organizations began to work on their changes during the Action Periods, most did not end up working on their initial goals. There were a variety of reasons for this. Some organizations dropped out of the project, forcing partners to revise their goals; some could not find time to dedicate to the project until the simultaneously-occurring Together Project EMR implementation had ended; some persisted in working with one or more of the initial external customers on different goals; some worked with different external customers or implemented a new technology within their organization that did not involve an external customers. In the Bangor-Area Collaborative, the goal of partnering with other organizations to transfer information was not emphasized. While many of the teams did work with external customers (including some who participated in the Collaborative and some who did not), such partnerships only took place where they made sense and tended to be more successful. Overall, while the CCTP Learning Sessions were generally informative and brought participants together to discuss changes and share approaches, partnering teams with external organizations to develop feasible projects can be difficult.

Implementing technology to improve information exchange between organizations poses unique challenges, including significant resource requirements (IT staff, training, equipment, time) and coordination with external organizations. The main factors that predicted success were the culture of the team, the perceived value to the organization, and leadership – both within the team and at higher levels of the organization. Those teams who had a specific project in mind from the outset or a mandate from their organization to implement that project tended to be successful. Teams who lacked organizational and/or team leadership and, therefore, did not choose a project that the organization saw as valuable tended to have difficulty. Unlike disease-specific BTS Collaboratives we have implemented in the past, the CCTP was not based upon the implementation of evidence-based protocols for a specific condition. Thus, teams had

more leeway to develop their own projects. This flexibility may have made it more difficult for teams to choose feasible goals that would be accepted in their organization or within the health system. One way to address this in the future might be to organize BTS Collaboratives around very specific technology implementation projects (e.g., e-prescribing with EMR or non EMR organizations) registry implementation, Problem Knowledge Coupler, etc) and invite organizations interested in these topics to participate. Although this would take away some of the flexibility for teams to choose their own projects, it would make it easier for teams to share barriers and successes and would eliminate the need for teams to choose a project from scratch.

Time was the most significant barrier faced by teams in this project. Without tangible incentives, allocating time to a quality improvement project can be a significant barrier. During the Aroostook Collaborative, the Together Project, an EMR implementation project, appears to have created unique difficulties. Our experience in this Collaborative indicates that, before enrolling organizations into a Collaborative such as this, it is pertinent to make sure that other similar projects are not being implemented simultaneously to ensure that this Collaborative project will be a priority.

Despite the barriers faced by participating practices and associated frustrations, participation and interest in the project was maintained. For certain teams, the BTS Collaborative generally was effective at getting teams together to start working on technological issues and prompting organizations to begin to use existing technology or that identify additional needs for technology. In some cases, small projects had significant impacts on practice efficiency and patient care, and, even among teams that made little progress, the identification of new needs and the team building that occurred as a result of the BTS process are expected to lead to additional changes in the future. For still other teams that were planning to make technology advancements within their organization(s), the BTS Collaborative was used to facilitate those changes faster and forge new relationships in the health system for future projects.

For the most part, participants in the collaborative came to the meeting with far greater clinical and administrative skills than knowledge and experience with technology. Previously, the vast majority of IT projects were driven by information technology departments. The activity of this project significantly improved the technology literacy of the project participants and made them not only more knowledgeable about what was available to aide their processes, but also provided them with the ability to better communicate information technology solutions and be a better partner with their technology departments.

IMPACT OF TECHNOLOGY ADOPTION ON PRACTICE EFFICIENCY AND PATIENT SAFETY

For most organizations, the technologies adopted in this project tended to be relatively simple in nature (secure email, scanners, development of referral templates, addition of work stations). However, some practices did implement more technically challenging projects (e-prescribing, Problem Knowledge Coupler). In general, the new processes/technologies implemented through the Collaboratives required fewer resources,

resulted in fewer errors, and were perceived to be more secure. They improved the frequency that information transferred/received was complete and was easy to read and interpret.

It is interesting that, even in those practices that made only small changes, changes resulted in significant improvements in practice efficiency. Perhaps one of the most important take-away messages from this project was that, for many of the small, rural Maine practices who participated in our Collaborative, even simple, comparatively cheap technologies like secure email or scanning systems can have important and significant impacts on practice efficiency and patient safety. Additionally, unlike organizations who came into the Collaborative with major technology projects they were planning to focus on, the organizations that focused on small, incremental changes were less likely to have completed their projects without the impetus of the Collaborative. Thus, these improvements to practice efficiency and patient safety would not have been achieved without the BTS Collaborative.

IMPACT OF TECHNOLOGY ADOPTION ON PATIENT CARE MANAGEMENT

This project was intended to help organizations implement technology solutions that would improve care as described in the Planned Care Model. Although actual improvements in patient care and patient health outcomes were not documented quantitatively, our interviews with team leaders and surveys of team leaders indicated that team leaders tended to perceive that their projects improved patient care in some way, whether that was improving the process of care, strengthening the care team, improving the efficiency of interactions with existing collaborators in the community, providing support for delivering evidence-based care, or providing better access to patient data.

Most of the projects implemented resulted in process improvements. In many cases, improvements occurred within one organization. These improvements, by nature, have the potential to impact care positively over time. But the impact is an indirect one and is difficult to quantify.

VII. APPENDIX A: PARTICIPANT SURVEY EXAMPLE

IHI Collaborative Questionnaire—Part 3

TAMC Chronic Care Technology Implementation Project
June 2008

In collaboration with The Aroostook Medical Center (TAMC), UNE's Center for Health Policy, Planning & Research (CHPPR) is conducting an evaluation of the IHI Collaborative and its usefulness in this technology adoption project. This survey asks your opinions on the Collaborative. Thank you for your cooperation.

A. BACKGROUND QUESTIONS

A1. Name: _____ A2. Organization: _____

A3. Job Title _____

A4. What is your profession?

- Physician Nurse Practitioner Nurse
 Physician Assistant Medical Assistant Practice Manager
 Other: _____

B. PARTICIPATION AND GENERAL PERCEPTIONS

B1)
During the action period, did your team use PDSA cycles to plan changes and adjust when changes weren't working?

- No Yes

B1a)→ If PDSA cycles were NOT used, why not?

- Used other methods to plan changes
 Did not find PDSA cycles useful
 Did not understand PDSA cycles
 NA
 Other (specify) _____

B2. In which of the following activities associated with this project have you participated in since Learning Session 1?	No	Yes
	a) Conference Calls	0
b) Visits to/from other Collaborative participants	0	1
c) Visits or phone calls between our site and Collaborative faculty	0	1
d) Other (Specify): _____	0	1

B3. How difficult have each of the following been during this project?	Not Difficult	Somewhat Difficult	Very Difficult	NA
	a. Getting support for our work from the leadership in our practice/organization.	0	1	2
b. Getting support for our work from other members of our organization.	0	1	2	8
c. Working together as a team.	0	1	2	8
d. Adopting technology that fits our needs	0	1	2	8
e. Working together with the other organizations who are adopting this technology.	0	1	2	8
f. Training staff to use new technologies.	0	1	2	8
g. Adjusting when our changes are not working.	0	1	2	8

B4) For the amount of work we needed to accomplish, the length of this project was:

- Too Short
 Just Right
 Too Long

C. SUPPORT AND ACTIVITIES DURING THE ACTION PERIOD

C1-C4. <i>What is your level of agreement with the following statements?</i>	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	NA
C1) The information we gained through our participation in the two Learning Sessions enabled us to overcome barriers and to adjust when changes weren't working.	0	1	2	3	4	8
C2) The visits from project staff to our organization during the action periods gave us useful guidance to implement our changes and to overcome barriers.	0	1	2	3	4	8
C3) During the action period, the following people were available to assist us in implementing our action plans:						
a) Information Technology Specialists (within or outside of our organization)	0	1	2	3	4	8
b) Internal staff members	0	1	2	3	4	8
c) Collaborative project staff	0	1	2	3	4	8
C4) There was an appropriate amount of follow-up by Collaborative staff, including:						
a) Number of visits to our organization	0	1	2	3	4	8
b) Communication by phone and email	0	1	2	3	4	8
c) Other information/resources provided to our organization during the Action Period	0	1	2	3	4	8

D. RESOURCES AND LEADERSHIP

D1-D6. <i>What is your level of agreement with the following statements?</i>	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	NA
D1) Our participation in this Collaborative made it easier to gain support for technology changes within our organization	0	1	2	3	4	8
D2) We are getting adequate support from information technology specialists within and outside of our organization.	0	1	2	3	4	8
D3) My organization is interested in and committed to this project.	0	1	2	3	4	8
D4) A wide variety of people in our organization had input into the technology changes we attempted to make.	0	1	2	3	4	8
D5) Senior leaders in my organization:						
a) See success in this project as a high priority for our organization.	0	1	2	3	4	8
b) Provide resources we needed for technology implementation	0	1	2	3	4	8
c) Inform other staff that this project is a priority	0	1	2	3	4	8
d) Ensure that staff have time to work on this project	0	1	2	3	4	8
e) Care about improving quality of care and services we provide	0	1	2	3	4	8
f) Demonstrate an ability to manage technology changes needed to improve quality of care and services	0	1	2	3	4	8
D6) We will be able to sustain changes after the project ends	0	1	2	3	4	8
D8) I have been able to set aside enough time to work on this project, despite my other responsibilities.	0	1	2	3	4	8

E. TEAMS

E1 – E6. <i>What is your level of agreement with the following statements about your team?</i>	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	NA
E1) Our team had an adequate understanding of technology to successfully implement our action plans.	0	1	2	3	4	8
E2) Our team included leaders who help us get support for our ideas in our organization.	0	1	2	3	4	8
E3) Our team developed realistic, workable action plans.	0	1	2	3	4	8
E4) I am satisfied with the progress my team has made in implementing its action plans.	0	1	2	3	4	8
E5) Even though the project is ending, our team will continue to work together in the future to implement technology and improve workflow processes.						
E6) My team had participants with the right skills and knowledge to make this project successful.	0	1	2	3	4	8

<p>E7) If you <u>disagreed somewhat or strongly</u>, on E6, why? <i>(check all that apply)</i></p> <p>a) <input type="checkbox"/> Did not have enough information prior to the project about types of participants who needed to be involved</p> <p>b) <input type="checkbox"/> Team changes have occurred</p> <p>c) <input type="checkbox"/> Skill sets/knowledge not available among members of our organization</p> <p>d) <input type="checkbox"/> This project is not a priority in our organization</p> <p>e) <input type="checkbox"/> Other → Specify: _____</p> <p>f) <input type="checkbox"/> NA</p>	<p>E8) How did your team meet/communicate during the action period? <i>(check all that apply)</i></p> <p>a) <input type="checkbox"/> Met regularly</p> <p>b) <input type="checkbox"/> Met once or twice</p> <p>c) <input type="checkbox"/> Did not have formal meetings, but got together informally when possible</p> <p>d) <input type="checkbox"/> We communicated in other ways (e.g., phone, email)</p> <p>e) <input type="checkbox"/> We did not communicate</p> <p>f) <input type="checkbox"/> Other → Specify: _____</p>
<p>E9) Have your team <u>GOALS</u> changed significantly since the first learning session? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>E9a) → IF YES, how was the decision made to change <u>GOALS</u>? <i>(check all that apply)</i></p> <p>1) <input type="checkbox"/> Team consensus</p> <p>2) <input type="checkbox"/> Team Leadership</p> <p>3) <input type="checkbox"/> Organizational Leadership</p> <p>4) <input type="checkbox"/> Other → Specify: _____</p> <p>5) <input type="checkbox"/> NA</p>	<p>E10) Have your team <u>ACTION PLANS</u> changed significantly since the first learning session? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA</p> <p>E10a) → IF YES, how was the decision made to change the <u>ACTION PLANS</u>? <i>(check all that apply)</i></p> <p>1) <input type="checkbox"/> Team consensus</p> <p>2) <input type="checkbox"/> Team Leadership</p> <p>3) <input type="checkbox"/> Organizational Leadership</p> <p>4) <input type="checkbox"/> Other → Specify: _____</p> <p>5) <input type="checkbox"/> NA</p>

E11 - E14 <i>What is your level of agreement with the following statements about working with other organizations or departments?</i>	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	NA
E11) My team has been able to work with other organizations/departments to adopt technology, when needed.	0	1	2	3	4	8
E12) Our participation in this Collaborative has made it easier to work with other organizations/departments to adopt technology.	0	1	2	3	4	8

What is your level of agreement with the following statements about working with other organizations from the group you were teamed with at LS1?	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	NA
E13) We are working with the “right” partners to achieve our goals.	0	1	2	3	4	8
E14) After this project ends, we will continue to work with other organizations/departments to continue improving the way that patient data is exchanged among organizations	0	1	2	3	4	8
E15) How does your team meet/communicate with the organizations you are working with? (check all that apply) a) <input type="checkbox"/> Regular meetings b) <input type="checkbox"/> Occasional meetings c) <input type="checkbox"/> Conference calls d) <input type="checkbox"/> Emails e) <input type="checkbox"/> Team leaders communicate only f) <input type="checkbox"/> We do not communicate g) <input type="checkbox"/> Other → Specify: _____ h) <input type="checkbox"/> NA	E16) What were some of the barriers your team faced in working with other organizations? (check all that apply) a) <input type="checkbox"/> None b) <input type="checkbox"/> Communication c) <input type="checkbox"/> Coordinating between organizations d) <input type="checkbox"/> Different objectives e) <input type="checkbox"/> Technology mismatch f) <input type="checkbox"/> Other → Specify: _____ g) <input type="checkbox"/> NA					

F. OTHER

F1. a) What are some of the greatest barriers that your team has faced during this project? _____

b) Were you able to overcome those barriers? Yes No NA

c) How? _____

F2. How have you been updating other staff and providers in your organization about the activities you are working on? (check all that apply)

- General staff meetings
 Special meetings for this project
 Email updates
 Informally
 Not at all
 Other → Specify: _____

F3. How much value do you think that your organization’s participation in this IHI Collaborative has added to this effort to implement technology changes?

- Great value
 Some Value
 Little or no value
 Don’t Know

F4. To what extent has this project met your expectations?

- Greatly exceeded expectations
 Somewhat exceeded expectations
 Met expectations
 Somewhat below expectations
 Far below expectations

F5. In your opinion, what were the greatest successes of this project? _____

F6. What were the greatest disappointments of this project? _____

F7 a. Would you recommend participation in this Collaborative to other organizations?

- Yes No Don't know

b. Please explain your answer above. _____

c. If yes, please provide a Testimonial if you wish: _____

F8. Additional Comments: _____

THANK YOU FOR YOUR PARTICIPATION

VIII. APPENDIX B: PRACTICE SURVEY EXAMPLES

Organizational Questionnaire

TAMC Chronic Care Technology Project

JUNE 2008

In collaboration with The Aroostook Medical Center (TAMC), The Center for Health Policy, Planning & Research (CHPPR) is conducting an evaluation of the chronic care technology project. We are interested in learning about the changes your organization is planning to make as part of this project and how they will effect your practice and the care you provide. Please contact Amy Kinner at CHPPR at 207-221-4560 if you have any questions. Thank you

Organization: _____

Provider Name: _____ Job Title: _____

Date: __ / __ / __

A. GOALS

Last summer, your organization reported that it had developed the following goal to improve a process in your organization during this Collaborative:

Improve communication with prescribers by using e-prescribing for new prescriptions and refills through the implementation of Powerchart and Centricity in collaboration with Dr. Hanna.

A1. Has this goal changed? Yes No

A2. IF YES, please write your revised goal here. _____

Please answer the questions in this survey as they relate to the goal stated above.

B. NEW PROCESS/TECHNOLOGY

Your organization attempted to implement changes to improve the process or technology in your organization. **Please answer the following questions about that process/technology.**

B1. What progress have you made toward meeting your goal stated in Part A?

B2. Please describe your process or technology you are currently using (e.g. the current process for communicating with prescribers). Your current process may be the process listed in Part A (your goal), but if you have not reached that goal, please describe the process in place currently.

B3. What were the main steps/changes that occurred to move from your former process to the process/technology you are now using?

B4. What were additional changes are still needed to reach your goal?

B5. Please mark your level of agreement with the following statements about the process/technology you are currently using.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Disagree	NA
a. It is too time consuming.	4	3	2	1	9
b. It is too complex.	4	3	2	1	9
c. It is too expensive	4	3	2	1	9
d. It allows for too many errors.	4	3	2	1	9
e. It creates problems with security of health information.	4	3	2	1	9
f. It duplicates other work we do.	4	3	2	1	9
g. Information transmitted or received is NOT always complete.	4	3	2	1	9
h. Information transmitted or received is NOT transferred in a timely manner.	4	3	2	1	9
i. Information transmitted or received is sometimes difficult to read or interpret.	4	3	2	1	9
j. It allows us to share information with new customers/partners.	4	3	2	1	9
k. It enables us to meet organization or system policies/requirements	4	3	2	1	9

B6. During this project, your organization made changes to improve a process/technology. Please mark your level of agreement with the following statements about the changes made to that process/technology.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Disagree	NA
a. They improved our ability to make informed decisions about patient care.	4	3	2	1	9
b. They increased patients' involvement in their care.	4	3	2	1	9
c. They decreased the length of patient visits.	4	3	2	1	9
d. They improved providers' access to individual patient information.	4	3	2	1	9
e. They improved providers' access to data on groups of patients.	4	3	2	1	9
f. They improved patient satisfaction with the process/technology.	4	3	2	1	9
g. They improved provider and staff satisfaction with the process/technology.	4	3	2	1	9
h. They improved external customer satisfaction with the process/technology.	4	3	2	1	9

B7. In your opinion, what were some of the greatest benefits of the changes made during this project (e.g., improved patient care, improved staff satisfaction, etc.)?

B8. How much estimated staff and provider time does your new process/technology take? (e.g., 2 hours per week, 20 min per patient, 2 min per referral, etc.)

- a. Physicians/Nurse Practitioners/Physician Asst. Time: _____
- b. Nurses Time: _____
- c. Medical Assistants Time: _____
- d. Practice Manager/other Administrators Time: _____
- e. Receptionists Time: _____
- f. Other: _____ Time: _____

Please answer the following questions about the process/technology you are now using.

B9a. Are other resources (besides staff time) required for this process? (e.g., postage, paper, etc.)? Yes No

b → IF YES, please estimate the cost of those resources (itemize if possible). _____

B10a. Do errors ever occur in the use of this process/technology? Yes No NA

b → IF YES, please estimate the frequency of errors.

- Very often (>50% of the time) Often (25-50% of the time) Sometimes (5-25% of the time)
- Rarely (<5% of the time) Never

B11a. Is information transferred/received to/from external or internal customers in this process/technology? Yes No

b → IF YES, please estimate the time between transmittal and receipt of information in your current process. (e.g. 2 hr, 1 day, 10 min) _____

c → IF YES, please estimate the frequency that information transmitted/received is incomplete.

- Very often (>50% of the time) Often (25-50% of the time) Sometimes (5-25% of the time)
- Rarely (<5% of the time) Never

d → IF YES, please estimate the frequency that information transmitted/received is difficult to read or interpret.

- Very often (>50% of the time) Often (25-50% of the time) Sometimes (5-25% of the time)
- Rarely (<5% of the time) Never

B12. How comfortable are you that patient health information is secure in this process/technology?

- Very comfortable Somewhat comfortable Somewhat uncomfortable Very uncomfortable NA

B13a. Does this process/technology have any impact on patient visit length? Yes No

b → IF YES, please estimate the current average length of patients visits (for patients where this process is involved). _____ minutes

B14a. Does this process/technology require you to collaborate with internal/external partners? Yes No

b → IF YES, please list. _____

B15. In your estimation, how satisfied are each of the following groups with this process:	Very Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied	It does not affect them	Don't Know
a. Providers	4	3	2	1	8	9
b. Other staff	4	3	2	1	8	9
c. External customers	4	3	2	1	8	9
d. Patients	4	3	2	1	8	9

C. ORGANIZATIONAL CHANGES

C1. Were other goals added beyond the goal listed in Part A? Yes No

C2. IF YES, please write other goals here. _____

C3. How much time did you as the team leader allocate to work on this project?

- a. Meetings: _____ min per week
- b. Training Staff: _____ min per week
- c. Preparing materials/forms: _____ min per week
- d. Communicating by email: _____ min per week
- e. Working with information technology specialists: _____ min per week
- f. Other: (Please specify): _____ min per week

C4. How much time did other members of your team, on average, allocate to work on this project?

- a. Meetings: _____ min per week
- b. Training Staff: _____ min per week
- c. Preparing materials/forms: _____ min per week
- d. Communicating by email: _____ min per week
- e. Working with information technology specialists: _____ min per week
- f. Other: (Please specify): _____ min per week

C5. Why have you not previously implemented this new process/technology? (Check all that apply)

- a. We did not have the technology
- b. We did not have the time
- c. We needed a project like this to help us focus on making changes
- d. We hadn't thought about this idea before or identified it as a need
- e. Senior leaders were not supportive of making changes
- f. Staff were not supportive of making changes
- g. Other reasons (please specify) _____

C6. What other types of technology changes is your organization planning to implement in the future?

a. NEAR TERM: _____

b. LONG TERM: _____

C7. What were the biggest barriers to meeting your goals? _____

C8a. Which of these barriers were you able to overcome and how did you overcome them? _____

b. Which barriers were you not able to overcome and why not? _____

Please indicate how much you agree or disagree with the following statements about the potential impact of implementing the goal listed in Part A.
This project...

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	DK
C9. has enabled our organization to make changes that improve the process of care.	1	2	3	4	5	8
C10. has enabled our organization to make changes to other parts of our organization.	1	2	3	4	5	8
C11. has improved quality of care for patients with chronic illness.	1	2	3	4	5	8
C12. has improved feelings of accomplishment in our work.	1	2	3	4	5	8
C13. has improved patient satisfaction with their care.	1	2	3	4	5	8
C14. has improved patient clinical outcomes.	1	2	3	4	5	8

THANK YOU FOR YOUR PARTICIPATION

IX. APPENDIX C: DESCRIPTION OF CHANGES BY ORGANIZATION

AROOSTOOK COLLABORATIVE

Aroostook County Action Program: Transferring Information among Centers

Organization: Aroostook County Action Program's (ACAP) provides primary health and family planning services to people who cannot afford to pay for regular medical care.

Changes: Although ACAP initially was partnered with external organizations, it did not ultimately work with those organizations. Instead, ACAP implemented a **secure email** site within its three Aroostook County health center sites. Staff at each center received training to use the secure email site. The organization also obtained multiple **scanners** so that staff could scan information and share it externally using PDFs and the secure email website. Monthly statistical information can now be sent from center to center using the secure website.

Impact: The new process is reported to reduce staff burden because less time is required to transmit information. It also saves postage and delivers information in a more timely manner (prior to the project, it often took up to one week to transfer data from site to site). Finally, the new process is more secure than the mail or courier delivery had been.

Aroostook Family Practice: Secure Email and Physician Orders through EMR

Organization: Aroostook Family Practice (AFP), located in Presque Isle, provides healthcare services to families in Presque Isle and throughout central Aroostook County.

Changes: This practice initially intended to improve transfer of patient data for referral to visiting nurses using secure email. AFP put a **secure email** system in place as part of this project; however, nursing organizations still send faxes for patient care. Eventually, AFP focused on **sending physician orders** using the electronic medical record.

Impact: The team leader indicated that the changes implemented by AFP were not necessarily a result of the project and would have likely been accomplished even without the collaborative.

Aroostook Health Center: Secure Email and an Electronic Order System

Organization: The Aroostook Health Center (AHC) is an accredited 72 bed skilled nursing and long term care facility located in Mars Hill, Maine.

Changes: AHC had a secure email system in place before this project, but it had not been using the system. As part of the CCTP, AHC implemented **secure email** for use with two organizations (A.R. Gould Memorial Hospital and Presque Isle Rehab and Nursing). AHC also **revised its movement sheet** for internal use to facilitate collection of information needed for admissions, discharges and transfers. AHC did not have a scanner and, thus, could not send information electronically, but the practice was able to receive emails from Presque Isle Rehab and Nursing and reduce the turn around time for interactions with that organization tremendously. A system was also created to track

patient information (e.g., medical history, needs) and to **print standing orders** for the doctors.

Impact: Phone calls were reduced from three to four calls per day (90-120 per month) to one call per month. Because physicians can view the information at a single glance, the standing order system saves five minutes of physician time per patient.

Horizons Caribou Health Center: Electronic Referral Form and Scanning Capabilities

Organization: Horizons Caribou Health Center (HCHC) offers family practice, pediatric, orthopedic, obstetric and sports medicine services to citizens of Caribou and the surrounding communities.

Changes: HCHC developed an **electronic referral form** and installed a **scanner**. HC tried to work out electronic referrals with Horizons Surgical and Orthopedics (HSO) but became frustrated when a process for receiving information at HSO could not be finalized. Eventually, the Family Practice Unit also went fully to EMR with two lap tops and wireless remotes.

Impact: HCHC ended up reverting back to their old referral process because they could not overcome their barrier. The scanner, however, has resulted in improved security and accuracy, the ability to search data within the system, and the increased accessibility of information.

Horizons Madawaska Regional Health Center: E-Prescribing

Organization: The Horizons Madawaska Regional Health Center (HMRHC) provides quality care to patients in the St. John Valley. Services include prenatal care, office gynecology, family planning, well child care, school physicals, yearly immunizations and general medical care.

Changes: HMRHC originally was partnered with Fraser Paper's health clinic but when Fraser dropped out of the project the Center revised its goal. HMRC ended up attempting to implement a tool for tracking the number of prescription refills handled per day (**e-prescribing**). Dr. First was chosen as the e-prescribing vendor. A contract was signed with Dr. First after the collaborative ended but, as of the time of our interview with HM, the changes had not yet been implemented.

Impact: It was expected that, upon implementation, there would be time savings and improved patient safety due to e-prescribing. Unfortunately, due to the lack of an EMR in the exam rooms, the providers chose not to utilize e-prescribing as it took more time to do so. Another unfortunate event was the closure of the Health Center as of May 16th, 2008. TAMC is pursuing transfer of licenses to the Caribou Health Center and integration into Centricity.

Horizons Surgical Services: Improving Referral System

Horizons Orthopedic Services: Improving Referral System

Organization: Horizons Surgical Services (HSS) provides a wide range of surgical services in Presque Isle. Horizons Orthopedic & Sports Medicine Center (HO) provides orthopedic care to patients suffering from arthritis, spinal problems, joint pain, and various sports-related injuries in Presque Isle and Caribou.

Changes: HSS and HO were initially hoping to work with the Aroostook Band of MicMacs Health clinic. However, due to financial difficulties, the Aroostook Band of Micmacs was forced to close down. HSS and HO chose to work with Horizon's Caribou (HC) instead. They implemented **secure email** and created a **referral template** to be used by the referring office (HC) to make sure that needed information was sent to the specialist. By the last learning session, HS had obtained a **scanner**. HO later also obtained a scanner. The offices are using the scanners for office processes but have not started the referral process. They were going to use the surgical office as the first pilot site for referral but their office was split into two locations, making it impossible to continue.

Impact: The changes resulted in decreased numbers of phone calls and time on the phone for both the specialist office and primary care office or health center. Accuracy of information was improved because all of the needed information is now present in the referral form. Patient satisfaction was also improved because the information is available in a timely manner and the patient does not have to wait while it is retrieved. Finally, there is an increase in provider satisfaction due to improvements in office workflow.

Maine Veteran's Home Caribou: Various Technologies

Organization: Maine Veterans' Homes (MVH) is a public, not-for-profit organization with six facilities located throughout the state. The facility in Caribou is equipped with 40 nursing home beds and provides skilled nursing, rehabilitation and Alzheimer/Dementia care and a 30 bed residential care unit specifically designed for Alzheimer's/Dementia residents.

Changes: MVH's goal was to obtain scanning capacity so that medical records could be transferred electronically and to implement secure email. However, the organization was currently in a lease program for their photocopier and was unable to make changes until that lease expired in July 2007 and they could finally obtain a scanner. The organization also was also not able to implement secure email.

Impact: None.

Presque Isle Rehab and Nursing: Improving Referral System

Organization: Presque Isle Rehab and Nursing (PIRN) is a licensed long term care facility in Presque Isle, Maine.

Changes: PIRN purchased a copier/scanner/fax machine and now has **scanning and emailing capabilities**. PIRN also developed a **report template** that can be filled in electronically and emailed or faxed to other agencies. Most of PIRN's exchanges are with TAMC and because the hospital has been busy with the Together Project this year, much of what was planned was not possible. PIRN is able to send discharge information

by email; however, many agencies PIRN refers patients to cannot accept email referrals yet.

Impact: The amount of time it takes to give information to staff members and others inside and outside the operation has decreased significantly. At least an hour of time is saved each time a referral is made as a result of not having to copy many pages of information and not having to disseminate the information. In addition, the delivery is instant and can be retrieved when convenient. Other savings are costs associated with paper, toner, electricity, and disposal of paper records.

The Aroostook Medical Center: Following through on Power Chart Implementation

Organization: The Aroostook Medical Center (TAMC) is an affiliate of Eastern Maine Healthcare Systems and is the leading provider of healthcare services in northern Maine.

Changes: TAMC was particularly busy with the Together Project during the time of this collaborative, and this proved to be a significant barrier to accomplishing goals specific to this collaborative. Implementation of the Power Chart system was occurring at the same as the CCTP and, while the Power Chart system has facilitated the transfer of electronic health records among facilities, it was a significant undertaking that made it difficult to devote time to other projects. As part of the CCTP, however, refresher education was sent to staff on use of the existing secure email system. A high-speed **scanner** was also installed in the Health Information Services department to scan documents directly into PDF format. An **electronic template** is being created to be used for referrals to a facility. Once completed, this form would be securely e-mailed to the receiving facility.

Impact: None cited.

Visiting Nurses of Aroostook: Email and Internet Access

Organization: Visiting Nurses of Aroostook (VNA) provides a variety of home health services including Hospice, Acute Care, and Long-Term Care.

Changes: VNA was able to implement **secure email** so that clinicians could minimize non-emergency phone calls. VNA was able to make **wireless Internet** available in the office setting and to provide training for physicians on email utilization. This also enabled providers to go online to get patient treatment information. They also began to develop **email protocols** for clinicians and to develop a common inbox for email for physicians. The IT department also started working on obtaining a **scanner** to help make information sharing easier.

Impact: By increasing access to information, this project has improved the ability of clinical staff to make decisions for their patients.

BANGOR COLLABORATIVE

EMMC Hospitalists:

Organization: Eastern Maine Medical Center (EMMC) is located in Bangor, Maine and serves communities throughout central, eastern, and northern Maine. EMMC is a 411-bed

medical center that is open 24 hours a day. EMMC is also an American College of Surgeons verified Level II trauma center and host of Lifelight of Maine, a statewide medical helicopter service that transports seriously ill and injured patients.

Changes: Developed a **database** for logging and to aid in follow-up of issues raised during the IHI recommended Medication Safety Walk-Rounds (MSWR). MSWR were started in July 2007 and initially tracked on paper. The database was developed and paper results have been entered in retro-actively. Reports are being generated from the database. Each issue has an active/closed status linked to it, and the database can also assign who is responsible for the task/follow-up. This database is still being fine-tuned and is not yet on the intranet.

Impact: Moved from paper to database thus time and efficiency impacted

Lakewood Manor Nursing Home

Organization: Lakewood is a not-for-profit skilled nursing facility that includes rehabilitation services, social services, activity programming, dietary supervision, case management, and medical supervision.

Changes: Lakewood first completed an assessment of internal system capabilities (e.g., secure email, access to Cerner). Streamlined the admissions process using information technology and collaborated with referring hospitals to **improve access to their electronic medical records**. The organization began working on gaining **access to the EMR outside of the system** and gaining access to **print reports on Cerner**. The organization has access to **secure email** and is now corresponding with physicians this way rather than fax. They are also procuring a **scanner** to enhance the distribution of patient information internally and possibly to physicians and are exploring computerized templates to enhance the distribution of admission information internally in the future.

Impact: One hour of staff time is saved in processing each admission accepted from an EMHS hospital because of access to EMR (23 residents admitted per month). This new process also saves two to six hours of delay time for the patient during wait for faxes, phone calls, etc., which can cause the patient to be in the hospital an extra day. Transitions are generally smoother for the residents.

Ross Manor

Organization: Ross Manor is a for-profit nursing home facility in Bangor, ME that provides residential care, assisted living, and adult day services.

Changes: The organization initially met as a group with all key players including EMHS IT support to determine the best way to **improve physician access to patient records** using Powerchart and Logician. Three **laptops** were added to help maintain access for physicians throughout the building. In addition, the organization **improved virtual private network access to Powerchart/Logician**, eliminating the need for an onsite server. The need for tokens was also eliminated.

Impact: The number of people who have access to Powerchart/Logician was increased. Any physician having access at the hospital or in their own offices can now access it from Ross Manor. The time needed for each visit by physicians was decreased. The time

needed to receive information from the hospital was also decreased because providers are able to pull information up themselves and do not have to wait for a fax to come through.

Osteopathic Center for Family Medicine

Organization: The Osteopathic Center for Family Medicine in Hampden, Maine provides concentrated and individualized family medical care to patients of all ages incorporating the principles of Osteopathy and holistic health care. The Center provides general obstetrical, gynecologic, newborn, childhood, adolescent, adult and geriatric care.

Changes: The practice joined the Collaborative part-way through the year, but was still able to complete some important changes. The practice worked with Affiliated Pharmacy Services to implement **e-prescribing** using Dr. First. This required establishing a software agreement with Dr. First. By the end of the project, it had completed 90% implementation with Affiliated Pharmacy services and 50% implementation with other pharmacies. The practice expected to implement three point-of-care work stations in early July and an EMR with existing practice management software and had initiated talks with the EMR vendor.

Impact: This project has improved timeliness (time to prescription). There has also been a marked reduction in potential medication, dosing, or instruction errors. Patients have verbalized their satisfaction with the service and an increasing number have requested the service. Staff and providers are also satisfied with the changes. In addition, the practice anticipates that the changes have decreased costs associated with “man hours.” A variety of anticipated improvements are also expected with EMR implementation (e.g., improved patient safety through consistent and accurate problem and medication lists, enabling patient access to self-monitoring parameters of chronic disease conditions, and increasing patient centeredness through patient education and self management).

Affiliated Pharmacy Services, Inc.

Organization: Affiliated Pharmacy Services operates three full service apothecaries that provide practice-based pharmaceuticals and clinical consultation services to physician practices.

Changes: The organization worked internally with pharmacy staff at three sites (Riverside, Westgate, and Airline pharmacies) to help train them for changes as they are implemented. It also worked externally with medical providers throughout Maine and New England to remind them of different communication methods that are legally available. It also implemented **e-fax and email capability** directly from the pharmacy system using existing EMHS network and QS/1 software. In addition, the organization worked with Osteopathic Center for Family Medicine to test **e-prescribing** functions and how they connect with the pharmacy and joined the *e-Prescribing Controlled Substances Coalition* to help support e-prescribing legislation. By the end of the project, the function to receive e-scripts was functional, communication with area providers and retail customers had improved, customer wait times were reduced, and provider incoming and outgoing phone calls were reduced.

Impact: This project has decreased the prescription turn-around time by 25%, increased prescription accuracy by 10-20%, increased customer satisfaction by 10%, reduced error rate by 20-30%, reduced wait time on prescription refills by 10%, and increased available time with customers by 10-15%. (I don't think this was actually documented so I'd leave out the percentages)

Eastern Maine HomeCare

Organization: Eastern Maine HomeCare is one agency comprised of the four home care organizations already under the EMHS umbrella of services. Employees have home care and hospice experience.

Changes: The organization put **Tanberg conferencing equipment** in place, which is now used regularly. This was an important piece in helping to overcome geographic barriers since there are several sites across eastern and northern Maine. An electronic process was also implemented for **ordering patient supplies** from Affiliated Pharmacy Services. In addition, the organization implemented a **secure email system** for durable medical equipment orders. Finally, a virtual private network (VPN) is now available for EMHS clinicians.

Impact: For ordering supplies, the project has reduced the number of pieces of paper needed, though there is still some room for improvement. Supply orders are easier to track and read. The organization perceives that there has been a decrease in the time needed to order supplies, although this has not actually been measured. The secure email has enabled the vendor to receive the order sooner. It has also contributed to increased patient security, increased accuracy, and improved staff/provider satisfaction. The VPN implementation resulted in a much faster synch??? time with the server (which improves accuracy of information), a more secure connection, and an increase in staff satisfaction.

Center for Family Medicine

Organization: Center for Family Medicine is a primary care practice in Bangor, Maine.

Changes: The organization implemented **live answering of the phone system**, outgoing **faxing**, and incoming fax management.

Impact: The time for a nurse to deal with a prescription was decreased from 10 minutes to less than 30 seconds. Before and after patient satisfaction scores did not change.

Newport Family Practice

Organization: Newport Family Practice is a primary care practice in Newport, Maine.

Changes: The organization bought two new **fax/printer/copiers**. Six computers were programmed to LAN-fax. Four computers can now **access the EMHS system for medical reports**. Also, new **patient registries** were created for diabetes and cardiovascular disease which extract information from Logician. A **staff in-service** was conducted on customer service, including phone etiquette. In addition, an **electronic Prior Authorization form** was created which extracts information from Logician.

Impact: Significant time savings occurred as a result of these changes. LAN-faxing time decreased from 6 minutes to 2 minutes. Time to access the hospital system for medical reports decreased from 10 minutes to 3 minutes. Patient registry access time decreased

from 36 hours to 30 minutes. The time to complete the Prior Authorization form has been reduced from 10 minutes to 3 minutes. Before and after patient satisfaction scores did not change.

Husson Family Medicine

Organization: Husson Family Medicine offers primary care in pediatrics, adolescent and adult medicine, and geriatrics. It is a part of Eastern Maine Medical Center.

Changes: The organization improved the phone triage process by implementing a **Problem Knowledge Coupler (PKC)**. It determined how many licenses were needed, purchased licenses, a demonstration for all providers, designed and executed a training plan for all non-clinical staff,. PKC went “live” in May 2008.

Impact: Some of the measurable results included fewer phone notes to the medical assistant (by reducing follow-up calls), fewer phone calls for the provider to make, increased patient satisfaction by handling of the issue at the time of the call. Additionally, non-clinical staff are more “empowered” with PKC and patient safety is improved with more accurate and timely advice.

EMMC Orono Family Medicine

Organization: Orono Family Medicine is a primary care medical practice of Eastern Maine Medical Center.

Changes: The organization improved the phone triage process by implementing a **Problem Knowledge Coupler (PKC)**. It determined how many licenses were needed, purchased licenses, collaborated with Husson Family Medicine during the entire Collaborative, and trained staff on using PKC.

Impact: This project allows the organization to effectively triage patients effectively on a consistent basis and to increase patient’s sense of involvement in their care based on a patient satisfaction survey).