IMPROVING THE QUALITY OF QUALITY IMPROVEMENT IN HEALTH CARE: CASE STUDIES OF PROVIDER OFFICE PRACTICES IN THE USE OF ASSISTED OFFICE SYSTEMS ANALYSIS WITHIN A QUALITY IMPROVEMENT PROJECT

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ABSTRACT

CONSTANCE O. VAN EEGHEN: Improving the Quality of Quality Improvement In Health Care: Case Studies of Provider Office Practices In the Use of Assisted Office Systems Analysis within a Quality Improvement Project (Under the direction of Peggy Leatt, PhD)

Quality improvement (QI) is an important activity expected of the U.S. health care system. A method of performing QI that meets the needs of small health care organizations has not been well defined. Office practices have limited time to invest in QI. This multiple case study explored a method of QI based on workflow analysis, AA3, and measured its acceptance by staff and its effect both on office processes and clinical outcomes.

The study used a prospective, mixed methods approach to explore three Vermont primary care practices engaged in different QI projects: improving pediatric lead screen rates, integrating behavioral health services, and increasing the percentage of "After Visit Summaries" provided to patients. Data were collected from qualitative and quantitative sources. Each case was analyzed using non-equivalent dependent variable pattern matching over time along with observations about dependent and independent variables.

The results of cross case analysis revealed that median survey scores show higher than neutral responses for all sites regarding acceptance and clinical outcomes; two of three sites also produced high median scores for process outcomes. Team members rated AA3 method very highly as a method of QI. However, the time series studies, measuring changes in survey scores from pre- to post-periods, were not significant. Qualitative analysis revealed other insights: the importance of "organizational slack" to enable staff to

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engage in QI, the impact of the "big picture" in translating change to the work place, and the value of reinforcing changes that benefit the staff as well as the patient. All of these features are available via AA3, combining process and clinical outcomes improvement in a single QI method.

These findings are consistent with management theory regarding change. The results of this study indicated that AA3 may have a positive effect on the outcomes of QI and is worth further study. It provides support for grant-based research, both to improve the AA3 method and to explore how it may help translate policy into practice effectively. It can also provide the basis for future education of clinicians and health care leaders in the use of QI as part of clinical practice.

Dedicated to James R. Schmidt 1927 – 2011

A visionary health care leader, a coach and mentor to many, and "Dad" to a lucky few



"Systems awareness and systems design are important for health professionals but are not enough. They are enabling mechanisms only. It is the ethical dimension of individuals that is essential to a system's success. Ultimately, the secret of quality is love. You have to love your patient, you have to love your profession, you have to love your God. If you have love, you can then work backward to monitor and improve the system."

Avedis Donabedian (1919 - 2000) to Fitzhugh Mullan; Health Affairs 2001;20:140

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CHAPTER 1 INTRODUCTION

"Moreover, as health care evolves, the concept of a "shelf-life" of clinical interventions must be recognized. In other words, health services delivery innovations may be effective for a time and then no longer retain the same value as the entire health care system and reimbursement system change." Reuben, DB

Study Aim

The expectation that health care organizations engage in activities to improve the safety and increase the quality of the care provided to patients is ubiquitous. "Quality Improvement" permeates discussions about the national agenda for health care improvement, the functional systems and processes of health care, the organizations that deliver care, the individual providers that work within those organizations, and the theoretical models that analyze the processes and outcomes to improve health care (Batalden & Davidoff, 2007; D. M. Berwick, 1994; D. M. Berwick, 2005; D. M. Berwick, 2008; Boat, Chao, & O'Neill, 2008; Griffith & White, 2005; Kohn, Corrigan, Donaldson, & McKenzie, 2000; Nelson, Mohr, Batalden, & Plume, 1996; Tucker A., 2003). The continuing focus on the broad issue of quality improvement stems from a concern about the goodness of the care provided and its attendant costs, the survivability of our national and local systems of care, the supply and capabilities of providers of care, and the highly visible conversation about the value of the U.S. health care system when comparing our national population health outcomes to international indicators of population health. Undoubtedly, quality improvement (QI) is critically important to the future of health care as seen from many levels.

QI is a subject of discussion at many health care related forums and is widely accepted as an expectation, even an imperative, to correct and improve health care. QI is "an organized approach to planning and implementing continuous improvement in performance," (Alexander, Weiner, Shortell, Baker, & Becker, 2006) which is directed at "quality," defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (Institute of Medicine (U.S.) Committee on Quality of Health Care in America & ebrary, 2001). This study asked a specific question about the process of the QI effort in health care: can quality improvement itself be improved through office systems analysis, resulting in an easy and useful method that improves the work processes of health care providers and staff while improving the outcomes of care?

This study focused on QI projects performed in office practices, settings of direct patient care delivery that have few extra resources for the tasks of QI. The study used "office systems analysis" as a replicable methodology of QI. In the language of systems thinking, a "system" is "a collection of parts which interact with each other to function as a whole" (Kauffman, 1980). It applies to a broad set of functioning units, many of which must be coordinated in a clinical office practice, rather than a functionally specific system, such as "information system" or "human resource system." "Analysis," in this context, is the use of a structured approach to understand the components of such a system. The study assumed that "office systems analysis," which examines work processes focused tightly around a specific objective and can be conducted in a short training/implementation time frame, will improve the QI process and, therefore, will be performed more frequently and successfully. These assumptions were not tested in this study. The study explored

whether this methodology, also identified as "A3" from the implementation methods of the Toyota Production System (known as "Lean Management") (Jimmerson, Weber, & Sobek, 2005), when applied to QI projects in Vermont provider office practices, appears to be useful, easy, and effective in improving work processes that result in improved health care outcomes.

The Operational Impact of QI and Recent Meta-Studies of Innovation in Health Care

Providers and their office practice staff are keenly aware of their role in the need to make high quality patient care available and cost effective. They represent the first point of access for many and are guides in wellness, disease prevention, and the management of chronic conditions. Efforts to improve patient care processes at the practice site are in keeping with industry-wide efforts to engage in quality improvement, focusing directly on the operational delivery of care (as distinct from clinical improvements to patient care interventions).

Such efforts to improve health care operations have been evident since the formal advent of "total quality management" in 1985, if not before. Since then, they have been made manifest through multiple process improvement techniques (lean production, Japanese production management, team concept, cellular or modular manufacturing, reengineering, high-performance work organizations, and patient focused care), although not always with empirical evidence to support claims of higher quality care (Landsbergis, Cahill, & Schnall, 1999). Whether such methods are relevant and useful to health care organizations has become the subject of past and recent studies (D. M. Berwick, 1994; Jimmerson et al., 2005; Reuben, 2002; Schuster, McGlynn, & Brook, 1998; Shortell et al., 1995), and evidence is amassing in the affirmative. Researchers and health care leaders in

quality improvement are pressing for more academically acceptable studies, supported by rigorous research, to define the size and nature of this kind of QI that includes operational process improvement to increase value in health care (Boat et al., 2008).

Less often asked for, however, are studies showing how operational changes are affected by their health care settings, which can impede these changes due to a variety of barriers that diminish or resist the implementation of improvement techniques (Alexander et al., 2006; Borbas, Morris, McLaughlin, Asinger, & Gobel, 2000; Buchanon, 2003; Clemmer, Spuhler, Berwick, & Nolan, 1998; Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004; Ham, 2003; Rye & Kimberly, 2007). Defining "innovation" as "a novel set of behaviors, routines, and ways of working that are directed at improving health outcomes, administrative efficiency, cost effectiveness, or users' experience and that are implemented by planned and coordinated actions," Greenhalgh (2004) conducted a metaanalysis on the diffusion of innovation in health service organizations. The meta-analysis identified factors that affect the adoption and assimilation of innovations through constructs that describe features of the organization and its leadership. Rye (2007) structured her meta-analysis to look specifically at the factors that inhibit or facilitate diffusion, classifying them into a typology that also includes organizational and leadership characteristics around innovation adoption.

Greenhalgh, in particular, noted that reports that could be found on the process of implementing innovation were restricted to the "gray literature" and were "impoverished by lack of process information" (p. 620). One of her recommendations for future research was to discover what processes help implement and sustain innovations. Further, she suggested that such research be done in a form that is context sensitive, which speaks

against controlled, experimental studies that emphasize objectivity of results, stating in contrast that:

"Context and 'confounders' lie at the very heart of the diffusion, dissemination, and implementation of complex innovations. They are not extraneous to the object of study; they are an integral part of it. The multiple (and often unpredictable) interactions that arise in particular contexts and settings are precisely what determine the success or failure of a dissemination initiative" p. 615.

Rye agreed in her study that followed three years later, noting that the theory around adoption of innovation is weak and warning that the study of innovation characteristics, itself, is best formed through the "fluid and negotiable boundaries of innovations" (citing Denis et al. 2002, 69). She described those boundaries with guidance on how to traverse them:

"Many innovations seem to exhibit a hard core that is relatively fixed and a soft periphery that is related to how an organization might implement an innovation (which feeds into the adoption decision). Diffusion entails negotiation of meaning in the soft periphery, and this enables a variety of pathways to innovation adoption" p. 253.

Both studies call for further research on the implementation of innovation in health care, recommending, per Greenhalgh, a focus on the process itself as found in the wider setting in which the program takes place, engaging "on-the-ground" service practitioners as partners.

Determinants of Effective Implementation in Health Care Settings

Quality improvement that affects the delivery process of health care is one example of Greenhalgh's definition of innovation. QI represents a process by which health care practitioners can keep their practices current with expanding knowledge of and standards for high quality clinical care. However, every change in the clinical care process of a provider's office practice implies a corresponding change in the office system that supports that practice. Both anecdotal (gray literature) and published evidence indicate that the burden of supporting office practice systems has become costly and progressively difficult to manage. The literature surveys noted above predict this but do not suggest a remedy, other than to identify the characteristics of the organization and its leadership that will help implementation of such change take place. A model of how that process of change is made effective can be found in the work of Helfrich et al. 2007, which modified a conceptual framework of complex innovation implementation by Klein and Sorra (Klein & Sorra, 1996) to reflect the determinants of effective implementation in health care settings (Helfrich, Weiner, McKinney, & Minasian, 2007):





Figure 1 above illustrates the model adapted from the Klein and Sorra framework to healthcare, presenting six organizational components that affect the outcome of "Implementation Effectiveness," with "Organizational Climate" replacing the Helfrich determinant "Innovation Climate"¹. This study looked within the component

¹ Innovation Climate refers to the climate for a specific innovation; this study looks at the climate around <u>any</u> process improvement innovation and, therefore, logically depends on the climate of the organization, regardless of the specific change implemented.

"Implementation Policies and Practices"² to test whether a specific "QI Change Strategy" of office systems analysis, described below as the A3 methodology, improved the quality improvement process in health care in the small health care setting of a provider office practice. The six organizational components leading to implementation effectiveness in Figure 1 formed independent variables through which the context of QI implementation was assessed.

Measures of Effective Implementation in Health Care Settings

The effectiveness of the A3 method was measured against expected patterns of change in responses found in pre- and post-tests that compare A3-based QI to prior, non-A3-based QI. These responses measured staff perceptions about the acceptance of A3, the process effectiveness resulting from the QI project (for example, easier staff work flow), and both perceptual and objective data regarding the clinical effectiveness of the QI project. These three kinds of dependent variables together measured the effectiveness of the implementation of the QI project. Each variable played a different role in understanding how A3 affects QI work in the office practice setting.

Whereas Greenhalgh (2004) and Rye (2007) hypothesized factors that affect the adoption and assimilation of innovations through constructs that describe features of the organization and its leadership (i.e. the independent variables derived from Helfrich's adapted determinants of implementation effectiveness), other researchers have analyzed features related to specific innovations that result in successful adoption (F. D. Davis, 1989; Venkatesh & Davis, 2000). Davis hypothesized that two characteristics of an

² This model is applicable to studies of innovation in which leadership must give approval before employees can adopt an innovation and the innovation requires specialized training, resources, support, and coordination among multiple organizational members.

innovation, "perceived usefulness" and "perceived ease of use," are fundamental to user acceptance. Looking across five independent studies on innovation adoption, Davis concluded: "Users are driven to adopt an application primarily because of the functions it performs for them, and secondarily for how easy or hard it is to get the system to perform those functions." (p. 333). Usefulness had a higher correlation to user behavior than ease of use, but both positively affect adoption of innovation. Venkatesh extended this "Technology Acceptance Model" (TAM) through four longitudinal studies, all of which confirmed that: "TAM has become well-established as a robust, powerful, and parsimonious model for predicting user acceptance." (p. 187)

The remaining two kinds of dependent variables reflected other outcomes of QI projects: the effect of the changes made by the project on the work processes and the success of the expected outcomes of the QI project on, for example, the delivery of patient care by which the patient may be treated more effectively. The effectiveness of A3 was explored by studying each of the three variables in both pre- and post-project assessments made by practice staff, providers, and the researcher during and after the time in which the QI project took place.

A3 as a QI Change Strategy

In order to test whether the process of "quality improvement" can be improved by enhancing the work process of practice staff while accomplishing the outcomes of improved patient care through a QI process that is easy and useful, a methodology of implementing QI must be selected that fits the characteristics of a relatively small, contained organization with few extra resources for committee work. The toolkit of "Lean Management" provides such a methodology, taken from the Toyota Production System for

change management tools that are process oriented and have good track records for involving small staff groups in rapid cycle improvements. As documented by Jimmerson, (2005), the A3 problem-solving methodology is a process-based analysis with a tight focus on a specific process that can be conducted in a short training and implementation period. As with many Lean Management tools, A3 highlights two metrics that are salient in a service industry: the duration of service delivery (defined as either "value add" or "non value add" time) and the number of errors produced by the service delivery process. By measuring time and errors, issues of accessibility and cost can be addressed in terms that are directly manageable and measurable by front line staff.

The A3 methodology includes three tools of process analysis and improvement. These are frequently found in literature pertaining to the manufacturing industry, but the following description draws heavily from a health care application involving Intermountain Healthcare and Community Medical Center in Missoula, Montana (Jimmerson et al., 2005).

 <u>A3 Report:</u> The report is a cumulative outcome of the training/implementation process, including, on a single piece of 11" by 17" paper, the issue stated through the eyes of the customer: the patient and supporting family members. The single document frames, in graphic format, the current work procedures that underlie the patient care process, the specific problems that cost time and other resources and their root causes, countermeasures that are identified as moving the current process to more ideal, "target" work procedures, an implementation plan with assigned responsibilities for piloting change, and a follow-up plan that predicts expected improvements and methods for measuring

success, including cost. The report also provides space for later follow up of actual results to compare with expected.

- 2) <u>Value Stream Map:</u> Within the A3 report, graphic analysis identifies current and target work procedures as a series of process steps, depicted as a flow of information, people, and materials needed for patient care delivery. This tool separates work flow into "value add" (an activity the patient/family care about and are willing to take time or pay for) and "non-value add" (an activity created by the system but not a necessary part of the service that the patient/family care about). In Jimmerson's example, a provider interview regarding the patient's health status is value added work; waiting in the exam room for a provider to arrive is not.
- 3) <u>Coaching:</u> Dynamic adult learning environments, in which the process being studied is in active use in caring for patients, are complex classrooms. When the method of studying the process is unfamiliar, there is benefit from on-going coaching to support and ensure adherence to the problem solving process. Coaching includes guidance in the use of direct observation to collect data, reinforcement of the use of A3 and Value Stream Mapping tools, repetition around causal inferences in searching for root system reasons underlying identified problems, challenges to accepted assumptions about current work procedures, inclusive feedback from all parties affected by process change, cross checks to ensure that the target work processes are consistent with practice requirements, and consistent follow up.

The outcome of the A3 methodology is a problem-solving report that includes two

Value Stream Maps (for the current and target work processes) based on coaching

throughout the process. An example of the format for the problem-solving report appears

in Figure 2.





Application of the A3 methodology, using the three tools described above, makes it possible to identify office practice process problems regarding lack of time and work flowrelated errors that surround the focus of any QI project, such as raising screening rates for blood lead levels in children (see Case Study #1, Chapter 4), reducing time to first appointment for behavioral health referral (see Case Study #2, Chapter 4), or improving the delivery of After Visit Summaries before patient departure (see Case Study #3, Chapter 4).

Purpose of the Study

This study explored whether A3 was perceived by office staff and clinical providers as valuable in conducting a successful QI project. If valuable, A3 will provide a methodology to support QI projects in the future, demonstrate practical issues and discoveries in the process of using A3 to achieve the goals of a QI project, and support broader health care system and policy goals of increasing the quality of care and population health outcomes over time.

The study combined qualitative and quantitative methods to assess the pattern of responses office staff and providers generated regarding the study's dependent variables. It also determined if changes in the contextual, independent variables identified by Helfrich's adapted model, which affect the process of QI (management support, financial resource availability, implementation policies and practices, implementation values fit, champions, and organizational climate), played an additional role in the outcomes of each QI project. The QI projects were conducted with the researcher as facilitator to the QI teams, using the A3 methodology with staff on a problem-solving pathway which were documented by a structured, graphics based report and supported by on-going coaching. The outcomes of this study assessed the staff and providers' perceptions about whether the A3 method was easy to do and useful as well as whether it made their work processes easier (i.e. reduced process time, reduced rework, simplified work procedures, or supported positive staff attitudes regarding future QI projects). Secondary outcomes of this study assessed the success of the QI project itself (i.e. an increase in completed lead screening tests, integration of a behavioral health clinician in a primary care setting, and improved delivery of After Visit Summaries to departing patients).

Both primary and secondary outcomes had assessments based on quantitative data (staff/provider surveys and documentation from the QI projects) as well as qualitative data, rich in detail of the implementation climate and experience (initial key informant interviews, field journal entries made by the researcher/QI project facilitator, and

staff/provider surveys). This scheme of assessment sources is presented in Table 1. In addition, initial results of each case study were shared with participants in order to obtain feedback on their agreement and are documented at the conclusion of each case study.

Table 1: Outcomes Assessment Sources

	Primary Outcomes		Secondary Outcomes
Assessment	Ease of Use &	Improved Work	
Sources	Usefulness of A3	Processes from QI	QI Project Goal
	process		
Quantitative		Staff/Provider	Staff/Provider
Assessment	Staff/Provider surveys	surveys	surveys
			QI Project Data
Qualitative	Staff/Provider surveys	Interviews	Staff/Provider
Assessment	Interviews	Field journal	surveys
	Field journal		

The recruitment of potential participants in this study occurred through a variety of channels (state department of health grant based work, state health improvement initiatives to support improved chronic care, and direct recruitment) and therefore resulted in a convenience sample of three case studies. Each of the three case studies recruited to this research study was free to select a QI project with which to apply the A3 method, and all QI team work was organized around the team members and the schedule selected by the team leader from that office practice. This mixed methods, multiple case study holds out the possibility of conducting needed QI projects in office practice settings while improving work processes, reducing costs and errors, and improving the quality of care over time.

Research Questions

The primary purpose of this study was to answer the question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis assisted by a facilitator?" Because the context in which QI takes place, both in terms of the organizational setting and the leadership responsible for the

organization, has an impact on the effectiveness of QI implementation, the study describes that context, answering the question, "To what degree did management support, financial resources, implementation values fit, champions, organizational climate, and implementation policies and practices appear to affect the ability of these office practices to conduct these QI projects successfully?"

The study's primary outcome explored the acceptance of A3 as part of the QI project and the effect of the QI project on work processes, as measured by the pattern of rates used to score pre-and post-project surveys by staff and providers in the practice. The study also examined the contextual attributes of the environment to understand possible factors leading to the pattern of responses. The secondary outcome of this study, measured on the degree to which the stated goal of the QI project was achieved, was also measured quantitatively and qualitatively from post-project surveys and comments from staff and providers, as well as the objective outcomes of the QI project. An assumption of the study, not within its scope to test, was that a QI process that is perceived as useful and easy, makes work processes simpler, is supported by the office environment, and results in improved patient care is more likely to be adopted by staff for future use.

Study Participants

Each study participant received a recruitment letter explaining the nature and scope of the study, followed by a meeting to answer questions and explain the confidentiality and human rights protections provided by the study. Three office practices responded, representing a diversity of characteristics:

 Geographic diversity across the State of Vermont: practices volunteered from southern Vermont, northern Vermont, and northwestern Vermont

- Practice size: two practices were small (two and four providers each); one practice was twice as large as the combined forces of the two small practices (12 providers)
- Practice independence/affiliation with a larger organization (such as an integrated delivery system): one practice was affiliated with a small health system, one practice was affiliated with a large academic health system, and one was independent

• Specialty: two practices were Family Medicine and one was adult Internal Medicine All three practices were similar to each other in that each had previous experience with QI methods and teams. However, their selection of QI projects on which to work varied greatly:

- Lead screening rate improvement for one and two year olds, sponsored by the State of Vermont's Department of Health
- Integration of a behavioral health clinician into a primary care office for adults, affiliated with the patient centered medical home model of care for chronic conditions
- Improvement in the "meaningful use" (as defined by the Centers for Medicare and Medicaid Services) of the electronic health record by increasing delivery rate of After Visit Clinical Summaries to adult patients or family members before leaving the office

Inclusion criteria for the practices were based on their location in Vermont and their voluntary willingness to participate in a health care QI project.

CHAPTER 2 LITERATURE REVIEW

"Education is the ability to perceive the hidden connections between phenomena." Václav Havel

Background

This study has claimed that quality improvement in health care is universally considered important. It noted, however, that several observers of the QI process in health care (Boat, 2008; Greenhalgh, 2004; Rye, 2007) have remarked on an absence of studies that rigorously demonstrate the effectiveness of QI in this field. This absence is partly offset by studies that have identified limitations to QI effectiveness due to various organizational barriers.

As significant as organizational and environmental barriers may be in limiting the effectiveness of QI, it may be equally important to recognize limitations of effective QI seen as a direct result of its own processes. If the very process of QI is seen as a burden or an obstacle to the goal it intends to support, how will it affect the organization's ability to increase the quality of care for patients? Fischer et al. conducted a four year study starting in 1993 that asked how primary care clinics influence a QI process and how a QI process affects the clinic organizations (Fischer, Solberg, & Kottke, 1998). One finding of this case study research was that small clinics had more difficulty with the QI process due to limited resources and "lack of compatibility between the QI approach and their clinic organization" (p. 362). Smaller-sized offices (four clinicians or less) were more likely to be overwhelmed and to find a prescribed, formal QI process "inept and awkward" (p. 367).

Smaller-sized offices were also associated with more facile adaptation, but despite this advantage, "a QI process requires an investment in infrastructure, and to a large degree entails a fixed cost, irrespective of clinic size. Thus, the cost is likely to be especially burdensome for small clinics with little capital" (p. 368). As an example, the QI process undertaken in Fischer's research study employed a questionnaire (the "IMPROVE" form) that providers completed as they conducted the health status interview with the patient. The resulting increase in process time was material:

"We room six patients an hour. If a nurse adds additional questions and it takes one minute more, for 36 patients, that's an additional half hour. So that's a problem... There are days when scheduling is horrid and we just don't use the IMPROVE form" p. 369

The study concluded that QI initiatives are ultimately helpful in clinics' adaptation to changes in their environment and in supporting teamwork to address organizational problems and tasks. It cautioned, however, that QI processes should be flexible to accommodate varying organizational structures and cultures.

Six years later, the literature continued to reflect the burden of administrative requirements (including QI) on primary care providers. In an autobiographical description of 10 years of compliance with Medicare evaluation and management (E/M) requirements, Sinsky describes the complexities of adapting to "ballooning" clinical practice guidelines as a drill rather than a care process: conducting complete systems' review regardless of patient presentation, searching frantically for medical information, enumerating bullet points based on coding rules, and cajoling patients to reach targets irrelevant to them with no time or energy to "look them in the eye" and care for the concerns that brought them to their visit. She observed, "I felt at risk of becoming a guideline-following automaton – a

documentation drone" (p. 28) (Sinsky, 2006). As a result, her efforts to change her experience as a primary care provider led her to discover strategies to improve work processes in support of compliance within her practice, or, in other words, to improve her ability to adapt, and perhaps to improve the quality of patient care provided as well.

Such data stimulate new questions. What is currently known about how the process of QI in health care affects its own effectiveness and what role can process improvement play in improving this process? In particular, do we know whether process improvement methods like A3 that focus on greater efficiency (potentially making it easier to practice patient care) apply to health care settings, given their origins in the manufacturing industry? What effect does an improvement in efficiency have on patient care quality? How do process improvement methods that focus on efficiency affect the health care organizations in which they are implemented, especially regarding the variables adapted by Helfrich relating to innovation implementation?

The search for answers to these questions entailed a systematic review of the literature in December 2008 by querying MEDLINE® and Business Search Premier and scanning the related articles that met the search criteria for inclusion. Articles that matched the search criteria were entered into a spreadsheet to track sources and findings as well as into RefWorks to store citations and abstracts.

Definition of Terms

The questions stated above, and the models from which they are drawn, are based on commonly used terms; nonetheless, it is worthwhile to review how these terms are currently used in the literature related to health care.

Process improvement methods: Process improvement methods are a standard part of the industrial engineer's tool kit and have been employed in health care as well as other industry sectors. In a study on organizational technologies for transforming care in health care, Gamm identifies "administrative technology" as one of four that are necessary for the transformative change called for by the Institute of Medicine (IOM) report (Gamm, Kash, & Bolin, 2007). This includes structures and processes for innovation, including Six Sigma, Toyota Production Management (TPM), and Lean, all of which are focused on reducing waste through decreased errors and increased efficiency, using systems analysis tools. Process improvement methods, in this literature review, are those improvement methods that reduce errors and increase efficiency through systems analysis. Efficiency: Efficiency is directly referenced in the IOM report recommending transformational change in health care; it represents one of the six aims that health care systems should target for improvement (Institute of Medicine (U.S.) Committee on Quality of Health Care in America & ebrary, 2001). The IOM report refers to the aim of efficient patient care as "avoiding waste, including waste of equipment, supplies, ideas, and energy." It does not include time as one of the resources to conserve in order to achieve efficiency. The IOM instead identifies a separate aim of timely patient care as "reducing waits and sometimes harmful delays for both those who receive and those who give care." However, this literature review applies a broader definition of "efficiency" by relying on a customer/supplier-based definition created from TPM guidelines: "services supplied upon demand, delivered immediately, and produced without waste in an environment that is safe physically, emotionally, and professionally" (Spear & Bowen, 1999).

Implementation: Alexander's analysis of the role of organizational infrastructure in implementation of hospital quality improvement expresses "implementation" as "the integration of a new idea or practice into the operating system of the organization," fitting well with the use of this term in this literature review (Alexander et al., 2006).

In addition to the above terms, it is useful to refer to those that Helfrich defined in his adapted model of complex innovation for health care and that Davis defined in the Technology Acceptance Model. These variables, adapted to quality improvement implementation, are found in Appendix A.

Eligibility Criteria for Database Search and Title/Abstract Review

To conduct a broad search for related literature, search terms were selected to capture a diverse array of articles through electronic identification: "operations analysis," "six sigma," "lean management," or "Toyota," to represent systems analysis terms currently used for improving efficiency, and "practice management" to include noninstitutional provider settings. Exclusions eliminated articles more than ten years old and those not written in English. Results of electronic searches were then reviewed by examining titles and abstracts with more specific criteria based on concepts defined by this study: "process improvement methods," "efficiency," "quality improvement," and "organizational culture." The last of these terms, "organizational culture," is a more commonly used term than Klein and Sorra's variable of "innovation climate" but evokes the same sense of shared priorities and also includes the values, beliefs, and norms that shape an organization (Shortell et al., 1995)).

Articles matching these criteria were used as the source of a "related articles" search, the first 40 entries of which, for each matching article, were scanned using the same

criteria. As this selection process left few articles for review, the search was repeated using "hospitals" in place of "practice management" and, subsequently, "health systems" in place of "hospitals." A parallel search query regarding operations analysis, quality improvement, and performance improvement was constructed for Business Search Premier, without reference to health care organizations. As a final step, an author known for publication on "Lean" methods to improve efficiency and quality in provider office practices was searched and her one publication was added to the resulting 46 articles for review.

Article Review Criteria

The 46 articles were read to assess whether they addressed one or more of the following issues:

- The application of process improvement methods in a health care setting, preferably a provider office setting, and whether it improved efficiency
- The relationship of efficiency to quality improvement and whether improving the first had an impact on the second
- 3) The relationship of process improvement to organizational culture
- 4) The role of process improvement in QI

Results

The selection process of articles for this review is mapped in Figure 3. The initial electronic search on operations analysis terms and "practice management" netted 121 matches. Titles and abstracts were reviewed for terms related to process improvement methods, efficiency, quality improvement, or organizational culture, netting 5 matches. Upon reading the articles, one was discarded due to its focus on "revenue analysis" rather than a functional analysis of operations.




The query that resulted in this set of five articles was examined for common MeSH terms (the Medical Subject Heading terms by which MEDLINE® articles are categorized). Use of these terms in the original query netted 634 matches, two of which were immediately evident as consistent with the criteria for title/abstract review. In order to refine the search electronically, the query resulting in 634 matches was resubmitted to include articles that represented studies on quality improvement AND efficiency (rather than OR), reducing the total to nine articles. These nine articles were then researched through the "related article" function of MEDLINE®, resulting in 13 additional articles.

This query strategy was repeated three more times, replacing the "practice management" term with "hospitals" and then with "health systems," and ending with a parallel request without health care references to the Business Search Premier data base, resulting in a total of 18 additional articles. Due to the researcher's professional knowledge of process improvement activities taking place in provider offices in the United States, the name of a published consultant employing Lean Management methods in practices was queried, resulting in one additional article. The final number of articles produced for this review totaled 46.

Table 2 provides a summary of key article characteristics. All articles were published between 1998 and 2008 with approximately one quarter of them published in the last two years. Approximately one half used primary data as a source for studying their topics; one half either used secondary data or discussed the topic from a theoretical or opinion-based standpoint. All, with one exception, were directly related to the health care industry. After a thorough review of all 46 articles, three were discarded as not addressing the criteria in depth.

Key Characteristics	Number of Studies						
Publication Year							
1998 – 2003 (5 years)	20						
2004 – 2006 (3 years)	15						
2007	7						
2008 (query run 12/17/08)	4						
Institutional Setting							
Physician Practice	15						
Hospital	25						
Other	6						
Use of Primary vs. Secondary Data							
Primary	25						
Secondary or none	21						
Specific to Industry							
Health Care	45						
Non-Health Care	1						
Addressed Key Research Issues ³							
Process improvement in health care organizations	35						
Process improvement in relationship to quality improvement	15						
Process improvement in relationship to organizational culture	22						
Study of the role of process improvement in QI	1						
Discarded: review of article did not match criteria	3						

Table 2: Summary of Articles Reviewed

The remaining 43 articles were organized by key issue and, if addressing more than one issue, by the issue that received the greatest attention. Salient points related to each were identified and categorized in a literature review map (see Figure 4). For the first stated issue (process improvement increasing efficiency in health care settings), articles were separated depending on whether they addressed provider office settings or other, usually hospital, settings. Within those settings, articles were informally grouped into those that referred to process improvement methods directly related to Lean concepts (from which the A3 method was created) or other systems analysis concepts (such as Six Sigma, ISO 9000, and other established approaches).

³ Total studies exceed 46 as some studies address more than one criterion

Figure 4: Literature Map



Process improvement increasing efficiency in health care settings

Of the articles that analyzed the effect of process improvement methods on efficiency in a health care setting, 19 focused on hospital environments (Six sigma effort paying dividends for CT hospital.2002; New York hospital looks to six sigma for culture change.2003; Sustain the gain: Case history.2006; Ben-Tovim et al., 2007; Braaten & Bellhouse, 2007; Chu, 2002; Johnstone et al., 2003; Kamat, 1999; Laing & Baumgartner, 2005; Luck & Peabody, 2000; Nelson-Peterson & Leppa, 2007; Rae, Busby, & Millard, 2007; Serrano & Slunecka, 2006; Slunecka & Farris, 2008; Viau & Southern, 2007; Weber, 2006; Werner & Signorelli, 2006; Woods, 2001; Wright & Ferguson, 2001), 13 focused on provider office settings (Whole practice productivity applies 'big picture' solution to performance improvement.2003; Carlson, 2002; Endsley, Magill, & Godfrey, 2006; Fischer et al., 1998; Hill, 2001; McCarthy, 2002; Merkle, 2002; Sinsky, 2006; Solberg, Hroscikoski, Sperl-Hillen, O'Connor, & Crabtree, 2004; Solberg, Hroscikoski, Sperl-Hillen, Harper, & Crabtree, 2006; Taylor, Hepworth, Buerhaus, Dittus, & Speroff, 2007; Terry, 2000; Weinstock, 2008), and three referenced health care environments in general without further specification (D. Berwick, Kabcenell, & Nolan, 2005; Gamm et al., 2007; Towne, 2006). These 35 studies all identified process improvement techniques as a successful method to improve efficiency in health care. Additional characteristics highlighted by these studies, other than their institutional settings, were associated with success and included:

- Specific functional units (cardiac, endoscopy, telemetry, radiology, emergency departments, clinics, and office settings)
- Organizational types (private non-profit, private for profit, federal)

- Use of additional technologies (information technology, balanced scorecard reporting, crew resource management, change management programs, simulation modeling)
- Geographic diversity (rural and metropolitan; multiple regions in United States, Italy, Israel, Taiwan, and Australia)
- Key factors supporting success (managers as coaches, staff training and involvement, phased approach, physician involvement, leadership support, analytical methods, shared vision, among other associated relationships)

It is not within the scope of this study to debate the value of the characteristics identified above in implementing successful process improvement in a health care environment. What these studies collectively assert is that process improvement is effective in improving efficiency under a variety of health care situations and structures.

This first question, which asked if process improvement increases efficiency in health care, is, to some degree, true by definition: if process improvement is defined as a method of improving efficiency, then it would follow that studies of process improvement in health care will find increased efficiencies. Of course, not all implementation efforts result in successful outcomes; failures of implementation undoubtedly exist but are unlikely to be published. However, repeated evidence that such efforts do exist and have been successful implies that this methodology can be appropriately applied to health care organizations.

Improvement in efficiency related to quality improvement

If the first question is answered by empirical examples as well as by self-definition, the second is less intuitively obvious. As long ago as 1994, Berwick claimed efficiency (decreased waiting times, reduced inventories, streamlined documentation processes) as part of a longer list of clinical aims to make "fundamental" changes to the health system to

improve population health status and social justice (D. M. Berwick, 1994). But if "efficiency" is not part of our usual understanding of "quality," how does the literature currently view this relationship?

In fact, in the non-health care world, efficiency and quality are quite closely tied. The definition of efficiency is tied to a customer/supplier perspective of value; what is wasteful detracts from the product and increases its cost, whereas reducing variability increases reliability and reduces cost (E. Naveh, 2004; Spear & Bowen, 1999). Berwick has continued to include expectations about efficiency in his call to hospitals for "Pursuing Perfection" (D. Berwick et al., 2005), and seven of the hospital studies identified efficiency as intrinsically related to quality. For five of these hospital studies (Ben-Tovim et al., 2007; Braaten & Bellhouse, 2007; Johnstone et al., 2003; E. Naveh & Stem, 2005; Woods, 2001), process improvement applications to improve efficiency translated directly into safer care, more accessible care, fewer clinical errors, increased patient and staff satisfaction, lower than expected mortality, and other quality indicators.

For the remaining two hospital studies (Macinati, 2008; Silvey & Warrick, 2008), efficiency is part of a quality improvement framework, one of several QI strategies of health care organizations or a proposed national policy in order to achieve "the reinforcing effect of simultaneously pursuing quality and efficiency" (Macinati, p. 228). As previously noted, Gamm's framework defining four organization technologies to generate transformational change includes process improvement for any health care organization, not just the large institutions with the resources necessary to invest in this kind of administrative QI.

How is this same issue seen from the provider practice perspective? Of the six studies devoted to provider practices that referenced efficiency, two were examples of

practice-based process improvement that did not reference gains in efficiency as directly related to improvements in quality (Carlson, 2002; McCarthy, 2002; Sinsky, 2006; Taylor et al., 2007). Gains in efficiency through process improvement methods were recognized as valuable for improving office productivity but not connected to improving the quality of care.

The remaining four studies did find an efficiency/quality connection (Carlson, 2002; Endsley et al., 2006; Fischer et al., 1998). Carlson documented the use of a single process improvement solution, "advanced access," to create an appointment schedule that allows all patients to be seen in the same or next day of request (if desired by the patient). Outcomes directly related to this process improvement application included improved quality of care as well as higher patient and provider satisfaction. Fischer, on the other hand, did not document quality outcomes, but evaluated the successful deployment of QI teams that were trained in the use of process improvement methods. Using system analysis, these teams had as their goal the integration of prevention into routine clinic-based care, usually accomplished by systematically identifying the needs of scheduled patients and implementing automatic reminders regarding preventive services needed.

Accomplishing these process-based outcomes was directly related to increased expressions of faith in the QI process and indirectly related to better patient health, which was not tested. Endsley provided a step-by-step process for conducting process improvements in a provider office setting, using the Lean methodology of adding value and eliminating waste. He predicted that the outcomes of redesigning the clinical office practice by using Lean, which includes the A3 method, would result in improved scores that can be measured in a framework of patient-centered care created by the Picker Institute, including access to care, continuity of care, and coordination of care. Taylor reported on the effect of

Crew Resource Management (a work analysis method from the aviation industry focused on adherence to standards, work processes, and standardized clinical communication), resulting in improved clinical outcomes among medically indigent adults.

Although not all of the literature supported a connection between quality of care or QI and improved efficiency of health care operations, the theoretical hypotheses and predictions found in this review make this an issue worth evaluating in future studies focused on provider office practices. Based on the preceding studies grounded in hospital experiences, this relationship could produce benefits for beleaguered practice staff whose goals are to provide high quality of care, as long as the improvement process can adapt to meet the needs of the small provider offices, per Fischer 1998.

Process improvement and organizational culture

As identified by Helfrich's adapted model of complex innovation implementation, the variable of "organizational climate" lies at a key central point in Figure 1 (p. 6). It is the most influenced variable (being affected by implementation policies and practices, implementation values fit, and champions) and it is also the most influential, directly affecting implementation effectiveness. It may also have a reciprocal relationship with "policies and practices," for, although implementation methods may be set by leadership and limited by financial resource availability, their execution may be affected by the very organizational culture they help create.

As noted earlier, this study substitutes the term of "culture" for "climate," based on frequency of use in the literature and nearness of meaning. Despite its nebulous definition relating to values, beliefs and norms that shape an organization's behavior, "culture" appeared in 22 studies about process improvement, always with the finding that culture

drives implementation effectiveness (in correspondence with Helfrich's adapted model) and that the policies and procedures must fit the culture.

Of the 22 studies that address process improvement and culture, 13 were focused on the organizational culture of hospitals. In hospitals, clinical leaders (often physicians) are considered key in making meaningful, sustainable changes to healthcare systems but are seen as distrustful of organizational attempts to make changes promulgated by non-clinical hospital leaders. Yet, at the same time, these clinical leaders may themselves be distrusted by their peers (Weiner, Shortell, & Alexander, 1997). In addition, hospitals and other healthcare organizations have an inverted power structure, in which people at the bottom generally have greater influence over decision-making on a day-to-day basis than do those who are nominally in control at the top. In these disconnected hierarchies, organizational leaders have to negotiate, rather than impose, policies and procedures (Ham, 2003). Issues about organizational culture might be expected to arise in studies involving process change, even though that change leads to some kind of improvement.

All 13 studies unanimously agreed that the culture has a direct relationship to the effectiveness of process improvement implementation, much as Helfrich's adapted model specifies (New York hospital looks to six sigma for culture change.2003; Ben-Tovim et al., 2007; Braaten & Bellhouse, 2007; Chu, 2002; Johnstone et al., 2003; Jones, 2001; Luck & Peabody, 2000; Macinati, 2008; E. Naveh & Stem, 2005; Silvey & Warrick, 2008; Willcocks, 2003; Woods, 2001; Wright & Ferguson, 2001). Within this broad topic, six themes emerged:

 Leadership: Leaders of organizations with cultures that promote process improvement need to be facilitators rather than problem solvers.

- Staff: Active participation by staff who are directly engaged in the work, either as front line providers or as support staff, is associated with effective process improvement. In order to achieve the participation of clinicians, the cultural gap between clinical and administrative leaders and staff must be bridged.
- Style: Honesty in assessment, information sharing, and feedback should be reflected in the organization's policies and practices. A systems perspective is needed to broaden staff tendencies to see only the process step in front of them.
- Systems: Organizational systems, such as coverage systems for staff participating in QI and reward/ incentive systems, should support process improvement methods.
- Shared vision: Process improvement implies change; the culture of the organization should support the expectation that the organization's structure and processes will be affected.
- Role of process improvement: Consistency of process improvement activities over time produces better outcomes. Process improvement over time will also have an effect on organizational culture.

This last point supports the bi-directional relationship in Helfrich's adapted model: culture (or climate) has an effect on the implementation of process improvement and implementation has an effect on culture. Within the complexity of a hospital organization, culture appears to play a reciprocal role with process improvement in achieving changes in the quality of care.

The nine studies which focused on provider office settings and also addressed organizational culture were similarly unanimous in the expressing the significant role it plays in effective implementation (Whole practice productivity applies 'big picture' solution to performance improvement.2003; Carlson, 2002; Endsley et al., 2006; Fischer et al., 1998;

Hung, Rundall, Cohen, Tallia, & Crabtree, 2006; Marshall, Mannion, Nelson, & Davies, 2003; McCarthy, 2002; Solberg et al., 2004; Solberg et al., 2006). Here, too, echoed a repetition of some of the themes that emerged in hospital based studies:

- Leadership/Providers: Managers who have a range of skills and styles and are willing to work in partnership with other stakeholders, rather than solely in a directive style based on organizational hierarchy, are more successful in managing change.
 Physicians, in particular, must be willing to support a change in culture in order to improve performance. All leaders need to provide a committed and continuous level of support.
- Staff: Provider offices are social as well as task-oriented entities. Involving staff in practice decisions benefits both individual and organizational performance.
- Style: Physicians need to see the practice as a system of processes, knowing the value patients derive from those processes and eliminating steps or tasks that do not meet their needs.
- Shared vision: Change of processes or structures is more acceptable when consistent with the experience and values of a culture. Such changes are likely to decrease the individual physician autonomy in decisions about process improvements but increase the ability to make patient centeredness a system-level attribute.

The similarities between the two groups of studies provide support for the prominent role that culture plays in process improvement, either in helping or hindering its outcome or, in itself, being changed. As previously noted, Gamm (2007) calls for just such attention to the role of culture in achieving transformational change for any health care organization,

citing, in particular, Toyota Production Management/Lean management as an example of organization-wide, patient-centered cultural change in health care.

The role of process improvement in QI

The above-cited 43 studies lend support to a discussion around process improvement and its relationship to key aspects of QI (process efficiency, QI effectiveness, and organizational culture). The purpose of this literature review is to discover if process improvement has a role to play in improving QI and, if so, what factors are important in its ability to do so.

Of the 43 studies, only one examines the process of QI as a subject of study in provider office practices and identifies a key factor that makes it successful (Fischer et al., 1998). "Quality in Primary Care Clinics" was a four-year qualitative study of clinics participating in a randomized control trial to evaluate the effectiveness of Continuous Quality Improvement (CQI), an established process improvement methodology. The study documented that this methodology is applicable to health care and can help achieve QI goals, but must accommodate the structures and cultures of its host organizations. Small practices, in particular, had difficulty with CQI due to a relative lack of resources and the formal process of CQI, which they found "inept and awkward" (p. 367) for their smaller clinics (four or fewer clinicians). A key factor to improving the QI process was a methodology that could adapt to its environment, especially one in which staff time and other organizational resources are limited.

However, this study, now ten years old, does not reflect more recent adoption of process improvement methods from other industries such as TPM/Lean and Six Sigma. Current interest in emphasizing increased efficiency is no doubt due, to some degree, to the

rising cost of health care. The relevance of increased efficiency to health care leaders also comes from its cultural and QI characteristics. Endsley (2006), for example, promotes the use of Lean (process improvement methods that include A3) as a systematic approach for redesigning provider office practices. He does not address the relationship Lean might have with QI but does note its probable effect on the quality of patient care. Towne (2006) compares Lean to other process improvement approaches and notes its advantages in speed of application, conceptual accessibility to staff, and history as a proven, structured methodology. Despite many references supporting process improvement as a sustainable, effective approach to QI, no study directly addresses the potential role of Lean and what makes it successful.

Discussion

This literature review explored what is currently known about the role that process improvement plays in quality improvement activities in health care. It noted, in particular, its relevance to the health care industry, its relationship to QI, and its reciprocal effect on organizational culture, a driver for the effective implementation of QI. This search found studies, descriptions, and opinion pieces that addressed various aspects of this research topic, but none that addressed the issue of QI itself as a target for improvement and the potential for process improvement methods to provide a solution that could adapt to the environment of a small provider office setting. In addition, no study was found demonstrating how process improvement might be employed to accomplish the goal of improving QI in health care.

Summary of Findings

Of the publications reviewed, 35 were directly supportive of the applicability of process improvement methods to health care in a variety of organizational structures and

situations. The remaining eight studies spoke to QI or organizational culture issues associated with process improvement in or outside of health care.

Hospital related studies that addressed the connection between improvements in efficiency and quality, of which there were ten, all found a positive relationship. Two of the six provider office studies were silent on the topic of quality when addressing the benefits of increased efficiency; four found a positive relationship.

Organizational culture took a central role in process change for 14 hospital-related studies and eight provider office studies, resulting in common themes between the two groups that would help support successful process improvement. Only one study addressed the potential role of process improvement in QI, but this study was dated and not able to speak to current trends in the health care environment.

Rationale for this Study

This literature review left unanswered what role process improvement might play in improving the QI process, particularly in the setting of a provider office practice. It supported the need for a study to test a method that would be helpful to smaller organizations that have limitations on staff time and other resources, conduct QI projects that include process improvement, and determine the impact on the effectiveness of the QI process as well as the outcome of the QI project. The void in the literature to date suggested an exploratory study employing qualitative research to speak to contextual issues, as well as quantitative research to assess the impact this process has on perceptions about QI.

Limitations

Limitations in this literature review are found in the relatively small number of articles that met the central purpose of this search, although related issues were addressed

from a variety of perspectives in health care articles. The review looked for findings from both successful and unsuccessful implementations of process improvement in health care. The absence of unsuccessful findings led to the conclusion that failed projects rarely find their way into publication. The studies were not evaluated for quality or rigor; the low number of articles that met criteria was the basis for allowing all to be considered for input into the review. Future modifications to this review would expand searches into sources outside of MEDLINE® and further into Business Search Premier, as well as a more painstaking review of related articles found in bibliographies of past and future identified articles. Such searches would evaluate sources of the identified articles, as well as the articles themselves, if such studies have, in fact, been conducted.

CHAPTER 3 METHODS AND ANALYSIS

"Don't underestimate the power of your efforts, no matter what the size. Sure, we measure *everything* for a recordable outcome, but don't be surprised when the *un-measureable* turns out to be *immeasurable*." Susan Carr, NPSF's Patient Safety Congress and Community Engagement

The primary aim of this study tests the effectiveness of A3, a method of office systems analysis, on a QI process, as well as the work processes related to the QI project, in a provider office setting. The study also assesses the success of the QI project itself, the goal of which was determined by the QI project team. The study introduced A3 to three participating provider offices, which served as case studies, with the assistance of the researcher as QI team facilitator. Therefore, this study relabeled the QI method as the AA3 (Assisted A3) method to reflect the role played by the researcher as an assistant in the A3 process.

Each QI project, using the AA3 method, was preceded and followed by assessments that included practice document review, key informant interviews, field journal entries, surveys, data collection specific to the QI project, and participant feedback on the written and/or oral summary of the findings and conclusions. This study used a mixed methods approach, combining qualitative and quantitative methods to evaluate the impact of AA3 on the effectiveness of QI implementation following a "grounded theory" approach, which seeks the theory behind the experience after collecting the data (Creswell, 2003).

Framework of Innovation in Health Care

This study was based on a framework (Figure 1, pg. 6) in which one determinant of innovation is the organization's policies and practices of implementation. One example of

implementation policies and practices appears in the choice of QI methods, opening a line of inquiry to ask whether one specific method of office system analysis, AA3, can act as a QI method while also changing office procedures to simplify and improve work processes. If so, AA3 has the potential to improve QI by achieving expected clinical outcomes and increasing the frequency and success of QI projects in the field. The methodology to explore AA3 used multiple case studies with a mixed methods design.

Methodological Approach

Mixed methods research collects and analyzes quantitative and qualitative data in a single study. This research methodology is employed to explore the possibility of convergent findings from different quantitative and qualitative data sources in a single research project made up of multiple case studies. The mixed methods approach has gained attention and support in recently published texts, journal articles, diverse disciplines, and funded projects (Creswell, 2003). This approach relies on extensive data collection and is sometimes referred to as integrating, synthesis, and quantitative and qualitative methods, but recent writings use the term "mixed methods."

The study's multiple-case replication design used a concurrent nested strategy (Creswell, p. 218) that observed providers and staff engaged in the training and use of AA3 in three provider office practices in Vermont. This model of research used one data collection phase for each case study, during which both quantitative and qualitative data were collected simultaneously. The predominant method that guided this study was quantitative, based on the pre-project and post-project surveys that allowed pattern matching to an expected increase in the rating of questions related to the three non-equivalent dependent variables (perceptions of acceptance of AA3, perceptions of improvement in work processes due to QI, and perceptions

of the outcomes of QI) (Trochim, 2005). Each practice, through AA3, was able to select changes in office work flow that were unique to its own setting while working toward a selected goal for QI. Qualitative assessment of these non-equivalent dependent variables was possible through the use of comments and other narrative sources collected throughout the study. As a secondary point of interest, the study also included quantitative data from the QI project related to project outcome success.

Embedded in this primarily quantitative analysis of non-equivalent dependent variables was a qualitative analysis of the independent variables derived from Helfrich's adapted model. These data were drawn from document reviews, interviews, narrative comments on surveys, field journals, and post-analysis feedback from the study participants. The purpose of the qualitative portion of this mixed methods study was to understand the context of the case study, in which the "context" is *the relationship between causal mechanisms and their effects* (*which*) *is not fixed, but contingent*" (Pawson & Tilley, 1997). Understanding the context answers the question: "what are the social and cultural conditions necessary for change mechanisms to operate and how are they distributed within and between program contexts?" In this study, qualitative analysis assessed the independent variables proposed by Helfrich's adapted model relating to the context of QI in health care settings.

The Conceptual Model

The unit of analysis in this study was a QI project selected by and conducted within a Vermont provider office practice. Health care settings are well-documented as complex environments for implementing innovation in general. (Borbas et al., 2000; Clemmer et al., 1998; Denis, Lamothe, & Langley, 2001; Ham, 2003; Plsek, 2001; Reinertsen, 1998; Weiner et al., 1997). QI projects are found across a spectrum of industries and are prevalent in many

health care settings, linking together an improvement opportunity with a process for, and possibly education about, QI. The dependent variables of the study are threefold: the acceptance of the AA3 methodology, the effectiveness of the QI process in improving work process, and the results of the QI project, as measured by the stated goals of the QI project. As patient care expectations become more demanding, and new regulations and clinical standards are added to old, practices engaged in quality improvement projects may benefit from analysis of office systems to support changes in patient care. The study looked at the effect of a specific implementation practice, AA3, on the process of quality improvement, as illustrated in Figure 5.

Figure 5: Conceptual Model for Studying the Impact of Assisted Office Systems Analysis (AA3) on the Quality Improvement Process in Provider Office Practices



In the above model, the first dependent variable, acceptance of AA3 methodology, was assessed through the following measures:

- 1. Perceptions of Ease of Use: comparison of ratings before and after AA3 implementation
 - a. Survey responses reflecting the degree to which the respondent believed that the method of QI (previous methods prior to implementation and AA3 following) was free of effort
 - b. Interview comments reflecting usual QI methods (prior to implementation)
 - c. Field journal notes reflecting reactions to QI methods (during implementation)
- 2. Perceptions of Usefulness: comparison of ratings before and after AA3 implementation
 - a. Survey responses reflecting the degree to which the respondent believed that the method of QI (previous methods prior to implementation and AA3 following) enhanced his or her job performance
 - b. Interview comments reflecting usual QI effect on job performance (prior to implementation)
 - c. Field journal notes reflecting reactions to changes to job performance (during implementation)

The dependent variable, Effectiveness of QI Process, was assessed through the following measures:

 Perceptions of Ease of Office Work: comparison of measures before and after AA3 implementation

- a. Survey responses reflecting the degree to which the respondent believed that the consistency and quality of the processes required to perform the job take less effort than before; examples include easier work, shorter process time, less rework, and simpler work procedures as a result of the QI process
- b. Interview comments reflecting change in work processes prior to implementation
- c. Field journal notes reflecting reactions to changes in work processes
- 2. Team Member Evaluation of AA3 Method: measures after AA3 implementation
 - a. Post implementation survey responses from team members only, reflecting the degree to which the respondent believed that AA3 was helpful and that the time required to do AA3 was made up by time saved in work. Survey responses also elicited predictions from the responding team members about willingness to use AA3 again and to participate in a future QI project using AA3.
 - b. Field journal notes reflecting reactions to use of AA3.

The dependent variable, Clinical Effectiveness of QI Project, was assessed through separate measures:

- 1. Perceptions of outcomes: comparison of measures before and after AA3 implementation
 - a. Survey responses reflecting the degree to which the respondent believed that QI projects improve the quality of patient care
- 2. Outcomes data from the QI project (a secondary dependent variable)
 - a. Percentage of children ages 1 and 2 screened for lead (Case Study #1)

- Average number of weeks to first appointment for primary care patient receiving a mental health referral (Case Study #2)
- c. Percentage of patients receiving an After Visit Summary at the end of a visit (Case Study #3)

The study employed the above model through the participation of three provider office practices that volunteered to participate in a QI project to which they were committed. The study assumed that the effectiveness of AA3, as measured by the primary dependent variables listed above, was affected by the independent variables related to characteristics of the organization. These independent variables either supported the process of innovation or hindered it. This study evaluated the contextual variables in each practice that affected the specific quality improvement projects using the model in Figure 1 (see pg. 6) based on the following measures:

- 1. Perceptions of independent variables:
 - a. Interview responses showing themes and relationships
 - b. Survey responses before and after AA3 implementation regarding each independent variable
 - d. Documentation review results reflecting evidence of independent variables
 - c. Field journal notes reflecting evidence of independent variables

This study looked for evidence that perceived support from the organization for innovation (the independent variables) was associated with perceived ease, usefulness, and effectiveness of the AA3 method. The study assumed that positive outcomes of the kind listed above will result in adoption of AA3 and more frequent, and successful, QI projects in the affected provider office practices.

Study Design

The study question was formulated as exploratory research in order to ask how a quality improvement process, which virtually all health care organizations must select and use, can be made more effective. The study explored whether AA3 is supportive of the expected outcomes of the QI process as well as process improvements in the practice. It assessed whether any outcomes that confirm this relationship can be explained by chance or, as rival explanations, by the effects of the independent variables of the study.

Although examples of office practice QI projects that use office systems analysis to improve practice performance exist in the literature, little is documented about the effectiveness of systems analysis as part of the QI process. This study did not seek to control the quality improvement environment of office practices but rather to guide the use of the AA3 method during the QI process, accessing data about AA3 effectiveness through multiple sources. The study concludes with a cross-analysis of all three case studies to compare these findings among diverse practices using the same method to conduct QI.

Study Plan

For each of the three office practices, the study collected data from office practice documents regarding past support of QI, practice data regarding the baseline state of the QI project (e.g. the lead screening rate of one and two-year olds), key informant interviews to assess the independent variables of the study, a pre-project staff/provider survey to measure perceptions of independent and dependent variables, a field journal maintained by the researcher while providing AA3 training and implementation support, a post-project staff/provider survey to assess the impact of AA3, practice data to measure the results of the QI project, and feedback on the case study's findings and conclusions from office staff. Each

office practice cycle will conclude with a modification of the data collection process based on findings from the previous cycle. A visual model of the study design appears in Figure 6:

Figure 6: Research Design



The case studies chosen followed a literal replication, not sampling, logic. (R. K. Yin, 2003a) The cases were chosen because they followed the same QI methodology (AA3), not because they were representative of a larger universe (i.e. following a sampling logic). The study predicted that similarities in outcomes (dependent variables) would be explained in part by AA3. The study also considered rival explanations, found in the independent variables of Helfrich's adapted model. Similarities in AA3 case outcomes may be attributed to random chance or to other external factors that had a strong influence on the outcome of the QI projects. This study conducted a cross case analysis to consider this in a robust way.

Sources of Evidence and Data Collection Procedures

The multiple-case replication design of these case studies used multiple sources of evidence in data collection to answer the question of whether AA3 can improve a specific QI project from the perspective of clinical and office staff in a provider practice. Data collection followed a protocol prepared for obtaining evidence from each source. Three provider office practices agreed to participate in response to a recruitment letter (see Appendix B for sample recruitment letter). The contact person of each practice was provided with a description of the case study data collection activities of the study.

The data collection protocol provided detailed instructions regarding the method of accessing the contact person and the office site, the resources needed for data collection, a procedure for obtaining assistance and guidance when the data were not available or were difficult to interpret, a schedule for data collection, and follow up steps in the case of unanticipated events, such as barriers to data access. The sources of evidence identified in this design, the logical linkages to the study's research question, and key issues regarding data collection protocol are as follows:

- Office practice documents: were reviewed to identify the organization's mission, vision, values, business plans, strategic plans, and/or quality improvement plans. These secondary sources provided indications of the support present in each provider office practice in terms of the independent variables (pg. 6) in which quality improvement took place. Key points:
 - Statements of support of quality of care and QI were compared to evidence found in later stages of data collection.

- These documents were used to identify key operational characteristics of patient volume, staff support as measured in hours of work and FTEs, and hours of practice operation.
- Access to documents was based on a site visit to avoid any expectation that
 proprietary documents needed to be copied and sent to an external organization.
 Space was requested that allowed review of documents within the constraints of
 practice space, as determined by the participants.
- The researcher created an annotated data set of practice documents reflecting the independent variables identified in the study design.
- 2) Key informant interviews: Primary data were collected from at least three key informants for each practice (managing partner or medical director, nurse supervisor or lead nurse, and practice manager, or equivalent) to assess the influence of the independent variables affecting the quality improvement process (see Appendix C) for sample interview script):
 - Management support: Informant's assessment of support of QI plans and activities by leaders of the office practice
 - b. Financial resource availability: Informant's assessment of resources needed for staff time in QI efforts, staff education regarding the content of QI projects, and material support of changes in patient care delivery (e.g. changes to forms or work place)
 - c. Implementation policies and practices: Informant's explanation of the structure and expectations surrounding QI, especially regarding who is expected to participate in the projects, the role of practice leaders, the method of improvement (e.g. "plan, do,

study, act" or FOCUS-PDCA⁴), the schedule of time allocated to QI activities, and the physical environment of QI activities.

- d. Implementation values fit: Informant's perception of how QI projects overlap or connect to the organization's formal or informal values.
- e. Champions: Informant's identification of past and current formal or informal leaders whose support reduces resistance by other key actors in the process
- f. Organizational Climate: Informant's perception that the practice as a whole shares QI activities, including implementation, as an organizational priority that is promoted, supported, and rewarded by the organization.

The results of the three or more interviews within the office practice were compared to each other in a triangulated assessment of the context in which the organization conducts QI projects. Key points:

- Key informants were identified in the initial stages of the case study and selected based on the leadership role played in the practice.
- Key informants were scheduled according to their individual availability for a half hour interview, whether after-hours, at a meal, while in transit, or other time that conformed to participant schedules and provided a relatively quiet space.
- Positive and negative statements regarding support of quality of care and importance of QI were re-evaluated in other stages of data collection.
- Interviews were taped for later review, with the permission of the informant.

⁴ FOCUS-PDCA is a common QI model of the past representing the steps of Find, Organize, Clarify, Understand, and Select followed by Plan, Do, Check, Act. PDSA (Plan, Do, Study, Act) has largely replaced this model.

- Informants received a copy of the question guideline ahead of time for their preview, in order to anticipate study questions. The interviewer took limited notes of key points for follow-up questions regarding their interviews.
- 3) Pre-project group surveys: Prior to implementation of the QI project's changes to patient care and office systems, primary data were collected through a survey sent to all staff and providers involved to assess the dependent variables of the study (see Figure 1, pg. 6) and to validate independent variables identified from the key informant interviews (see Appendix D for sample pre-project survey). The survey queried respondents regarding perceptions about past QI projects and the respondents' experiences of the changes in work flow, successes in achieving the project goal, and attitudes regarding future QI projects. Key points:
 - The survey used 7-point Likert scales to agree/disagree with study outcomes.
 - Surveys were completed anonymously and returned by mail to the project director researcher. Response envelopes, with respondent names, were separated from responses and used for follow up in the effort to attain as close to 100% participation as possible.
 - Positive and negative findings relating to the independent variables of the study were used to compare results to post-project survey findings.
 - Survey results were organized in a tabular form and compared to results of other data sets from document reviews, interviews and field journal entries.
- 4) Researcher's field journal: The researcher collected primary data during contact points in the training of the AA3 technique and in post-implementation coaching of QI team members to act on their plan for change. The journal was structured to identify issues

related to the variables affecting the context of implementing innovation and evidence of use of AA3 training in the QI process (see Appendix E for sample field journal outline. Key points:

- The journal included copies of the physical artifacts of the AA3 technique, represented by a diagrammatic report of the QI plan known as the "AA3 Report."
- The researcher journaled all contact with the QI team for each practice, recording observed evidence of the independent variables associated with the study. The journal was updated for every contact and identified the individual(s) contacted, the date, key issue(s) related to the contact event, the independent variable(s) observed, and their perceived relationship to the QI study. This data set included key comments or phrases generated during the contact.
- Positive and negative findings relating to a supportive context and active use of AA3 were used to establish a connection with the dependent variables of the study.
- 5) *Post-project group surveys*: Following implementation of the QI project's changes to patient care and office systems, primary data were collected through a survey sent to all staff and providers involved to assess the dependent variables of the study and to validate independent variables identified from the key informant interviews and field journal entries related to the practice (see Appendix D for sample post-project survey). The surveys were adapted to the goals of the QI project in order to validate the findings of the key informant interviews and field journal entries regarding implementation issues. The surveys queried respondents regarding perceptions about those issues and the respondents' experiences of the changes in work flow, successes in achieving the project goal, and attitudes regarding future QI projects. Key points:

- The survey used 7-point Likert scales to agree/disagree with study outcomes.
- Surveys were completed anonymously and returned by mail to the project director researcher. Response envelopes, with respondent names, were separated from responses and used for follow up in the effort to attain as close to 100% participation as possible.
- Positive and negative findings relating to the independent variables of the study were used to compare with results from the pre-project surveys.
- Survey results were organized in a tabular form and compared to results of other data sets from document reviews, interviews and field journal entries.
- 6) *Participant review of case study findings*: Following the analysis of data collected and the identification of findings, the results of each case study were shared with the key informants and members of the QI team for additional validation. Furthermore, comments made in response to the review of these results were incorporated into the case study findings. The researcher followed up with these participants individually to ensure that they had access to their office's case study findings and to collect any comments made in response. Although comments could not be collected anonymously, these responses did not identify individuals.

The above listed sources were linked to the independent and dependent variables of the study, organized by phase within each case study (pre-implementation, implementation of AA3, and post-implementation). These logical relationships, and estimates of the impact on office staff and staff time, are presented in Table 3.

Comments that support or contradict the findings will be included in case study results.

Results from each source of evidence were sorted, coded, and summarized in a series of tables, graphs, and memos. The development of these analytical summaries was based on the study design, data protocols, and interview scripts, the latter two of which were pre-tested with project directors and other peers involved in the three case studies. The data collection and analysis components of this study took place over 28 months, including the completion of post-implementation data collection.

Variable Name	Measures	Sources	Study	Participants/Site		
			Phase ⁵	# Staff	Hours ⁶	
Acceptance of AA3 Methodology – Dependent Variables						
Easy to Use	Staff perceptions	Key Informant Interviews	Ι	3	1.5	
		Staff/provider surveys	I & III	8	1.5	
		Researcher's field journal	II			
Useful	Staff perceptions	Key Informant Interviews	II			
		Staff/provider surveys	II			
		Researcher's field journal	III			
Effectiveness of QI I	Effectiveness of QI Process – Dependent Variables					
Simplified office	Change in # office process steps	Researcher's field journal &	II			
process		A3 Reports by staff	II			
	Perceived ease of process	Staff/provider surveys	III			
Decreased process	Change in time to complete clinical	Researcher's field journal &	II			
time	process	A3 Reports by staff &	II			
		Staff/provider surveys	III			
Decreased errors	Change in errors in process	Researcher's field journal &	II			
		A3 Reports by staff &	II			
		Staff/provider surveys	III			
Patient wait time	Change in wait time	A3 Reports by staff	II			
		Staff/provider surveys	III			
Staff attitude about	Perceptions about future QI projects	Staff/provider surveys	III			
future QI projects	in the office setting					
Cost	Staff time spent on QI project	Researcher's field journal	II			
	compared to time saved	A3 Reports by staff	II			
		Staff/provider surveys	III			

Table 3: Variables (Dependent and Independent) and Sources of Evidence

⁵ Phase I: Pre-implementation; Phase II: Implementation of AA3; Phase III: Post-implementation

⁶ Estimated total number of hours needed by staff per practice; staff hours reported only once per data source; does not include QI Team Time

Variable Name	Measures	Sources	Study	Participants/Site				
			Phase ⁵	# Staff	Hours ⁶			
Outcomes of QI Project – Dependent Variables								
Achievement of	(varied by QI project)	(per office acquired data)	I & III	2	2			
project goal	Staff perceptions	Staff/Provider Surveys	I & III					
Independent Variables								
Management	Staff perceptions	Document Review	Ι	1	1			
Support		Key Informant Interviews	Ι					
		Researcher's field journal	II					
Financial Resources	Staff perceptions	Document Review	Ι					
Available		Key Informant Interviews	Ι					
		Researcher's field journal	II					
Implementation	Staff perceptions	Document Review	Ι					
Values Fit with QI		Key Informant Interviews	Ι					
Project		Researcher's field journal	II					
Project Champions	Staff perceptions	Key Informant Interviews	Ι					
		Researcher's field journal	II					
Organizational	Staff perceptions	Document Review	Ι					
Climate		Key Informant Interviews	Ι					
		Researcher's field journal	II					
Implementation	Staff perceptions	Key Informant Interviews	Ι					
Policies and		Researcher's field journal	II					
Practices								
Participant Review & Feedback on Summarized Findings/Conclusions for Office Site III			8	8				
Estimated total number of staff and staff hours involved per practice site:				8	14			

Data Management, Analysis, and Validity

All qualitative data were entered into separate data sets, each designed around its source of evidence (document reviews, interviews, field journals, surveys, and participant comments), and coordinated into a series of tables, graphs, and memos. Each case (i.e. office practice implementation of QI) was analyzed separately and independently of other cases, although adjustments to protocols were made in response to insights gained about the study design during the progression of the three case studies. Each data set was reviewed, coded, and sorted into themes to identify frequency of mention and relationships to independent and dependent variables.

The analytical framework compared the evidence for the study's research question (that AA3 office systems analysis can improve the QI process) with a rival explanation: that any resulting changes in QI project outcomes were due to chance. The values of the dependent variables were expected to increase from pre-project surveys to post-project surveys. This analysis is referred to as "nonequivalent dependent variables as a pattern in a time-series analysis" (R. K. Yin, 2003a) in which the three groups of variables, "Acceptance of AA3," "Effectiveness of the QI Process" and "Outcomes of the QI Project," were evaluated.

Following the analysis of the three separate case studies, in which each QI implementation was evaluated by measures of the independent and dependent variables, a cross-case analysis was conducted to develop themes that supported or contradicted the research question. Analysis steps included data coding, using the "Comment" function of MicroSoft Word to code study data and provide a document record of data interpretation. The Long Table Approach was used to find confirming and contradicting evidence of

findings. Survey outcomes were analyzed using simple descriptive statistics, with a sample size of 69 surveys (36 respondents completed pre-project surveys; 33 respondents completed post-project surveys) across all three office sites combined.

The construct validity of this multiple case-replication study is based on the use of multiple sources of evidence in data collection, a well established chain of evidence which cites the evidence used, and participant review of case study findings. The internal validity of this study is based on pattern-matching as part of the data analysis, periodic review of qualitative data summaries by principal investigators related to the case studies, project directors related to the case studies, and/or key participants, addressing rival explanation (the null hypothesis and the influence of changes in independent variables), and the use of a logic model to follow inferential connections. The external validity of this study depends on the use of replication in multiple case studies, repeating the same intervention of AA3 office systems analysis. This form of external validity is not based on statistical sampling (see pg. 46). Instead, case study research relies on analytical generalization, in which the results show a fit with a broader theory (R. K. Yin, 2003a). The reliability of this study centers on the use of case study protocol in data collection, peer review of the interpretation of qualitative data with an independent group of researchers, and the development of data sets into a series of interconnected summaries for the sources of evidence.

Despite the above efforts to ensure a valid, credible study, limitations to this approach must be recognized. Documentation sources are dependent on access through office practice management and may be selectively provided. Interviews may be subject to bias due to poorly constructed questions, inaccuracies due to poor recall, and/or

reflexivity—when the respondent offers comments based on what the interviewer appears to be looking for. Journal observations may be affected by selection bias on the part of the researcher; field contact may be affected by the presence of the researcher as an agent in the AA3 training and implementation process. In addition, the researcher's past history as a healthcare administrator for over 20 years may produce unintentional bias in recording observations. Survey questions may be poorly constructed and responses may be influenced by selection bias. Other limitations may be due to the office practice's own history with QI projects.

To protect against these limitations, qualitative data collection through interviews and journal entries were reviewed with peers to identify overlooked or misinterpreted evidence and confirmed with study participants throughout the study. Every effort was made to attend to all evidence discovered, addressing all significant rival interpretations of the data and working to identify the most significant aspect of each case study.

Study Deliverables

This study produced three products as a result of its work. The first was the creation of a series of educational articles published in a newsletter distributed widely throughout the state of Vermont. This series, under agreement with the Vermont Area Health Education Centers (AHEC) program, documents the tools, methods, and results of the study to raise awareness about the salient variables that determine successful QI projects. The intention of these articles is to focus on key findings from individual case studies as an example of health care clinician education and QI project support efforts. (See Appendix H for example of article accepted by Vermont AHEC.)
Because implementation of QI projects depends on clinical leadership support and a supportive organizational climate, a second deliverable was a case study written as a journal article for providers. This article presents Case Study 2 (integration of behavioral health services into primary care) as a test a method of QI based on workflow analysis and the resulting success of that project. (See Appendix I for abstract of article). The abstract has been reviewed by the editor of the Journal of General Internal Medicine and the researcher has been invited to submit the full article for full review. The article represents an example of one way to disseminate the value of process-based QI as an instrument of effective change and a focus for further research.

The third deliverable is an "R Series" grant application to the National Institutes of Health, requesting funding for the development of an implementation toolkit in response to the Request for Application for Dissemination and Implementation Research in Health (R03). This toolkit will build on Case Study 2, refining and trialing AA3 as a method of implementing the integrated behavioral health model in primary care sites. The application was submitted on February 13, 2012. A successful application will support documentation of the AA3 method consistent with the independent variables Helfrich's adapted model, identify further adjustments needed to the method based on the use of the toolkit in two pilot sites, and lay the groundwork for future multi-state and multi-studies to integrate behavioral health services in primary care based on AA3. (See Appendix J for the Project Summary.)

Concurrently with the production of these deliverables, the research results in total have been compiled in this dissertation, meeting the formatting guidelines specified

in *A Guide to Theses and Dissertations* published by the UNC Graduate School to meet program requirements of the Department of Health Management and Policy.

IRB and Confidentiality Issues

This study required direct interaction with human subjects who were the practice staff at the three case study office sites. As a result, the corresponding research protocol was approved by the UNC Office of Human Research Ethics – Institutional Review Board through a reliance agreement with the University of Vermont Committees on Human Research – Research Protection Office. Qualifying subjects were recruited by the protocols approved by the University of Vermont Committees on Human Research – Research Protection Office. All participants received a written description of the purpose of the case study prior to contact and were given opportunities to ask questions or raise concerns via multiple media, primarily phone or e-mail. Per the IRB, consent was waived for all subjects.

All contact was arranged in advance, with time available for participants to privately raise their questions or concerns. Recorded and written responses that can be attributed to individual participants were secured to protect confidentiality by locked storage at the researcher's UVM office. None of the deliverables listed above provided access to the name, specific location, or any other indicator that identified the individual provider office practice or its staff members.

CHAPTER 4 RESULTS

"Nothing endures but change, change is the only constant." Heraclitis of Ephesus Overview

The results of this exploratory multiple-case study come from three quality improvement (QI) projects conducted in provider office practices in Vermont between August 2009 and January 2012. Each case study was an empiric investigation of a current phenomenon occurring within the context of an actual practice setting in which what is studied (the QI project, which was different for each provider practice) intermingled with the context (the environment related to each specific provider office practice) (R. K. Yin, 2003b). As with the general experience of case studies, there were more interesting questions to study than can be responded to with a single set of data points. This analysis of results triangulated multiple sources of evidence (perceptions of the participants, perceptions of the researcher, and objective results of the QI project) to answer the study question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis?"

The answer to this question was informed by data collected before and after QI project implementation. Data reflect non-equivalent dependent variables and independent variables related to the QI project. The patterns created by the data taken from these different time periods are one example of the analytical process used to

explore whether AA3 was an effective tool in provider office settings. These patterns also explained AA3 is effective and why other factors contribute to the results found.

Each case study analysis within this prospective study resulted in discoveries about the research methodology that led to limited redesign for each subsequent case study, thus cross-case analysis was not based on perfectly comparable case studies. Each case study described below, however, included the following basic elements:

- A. The provider practice and the history and process of QI for that practice;
- B. Description of the QI project selected by the practice, the application of AA3 in that project, and the clinical effectiveness of that project;
- C. Outcomes from the study of the QI project using AA3 as a QI process, organized according to seven standard analytical steps outlined below;
- D. Threats to validity based on unique issues found in the context of the case study and examined for their effect on the dependent variables;
- E. Attachments: chronology and list of those interviewed found in the appendices, along with facsimiles of one or more AA3 hand drawn reports, found in Appendix F and Appendix G respectively.

As referenced in item C above, the analysis of results used to generate the outcomes for each case study follows the same analytic plan for each case study.

 Quantitative Analysis of outcomes: "What did team members and staff think about AA3?" The analysis looked at the post-project survey scores to describe the responses to the statements related to the three dependent variables. The analysis evaluated the relationships among these variables to explore possible associations.

- Quantitative Analysis of outcomes before and after the project: "How did responses change when compared to earlier perceptions of previous QI projects?" This analysis compared pre- and post-project survey scores to assess changes in perception of statements related to dependent variables over time.
- 3. Qualitative Analysis of context: "What is the context in which this QI project occurred?" This analysis combined all qualitative data from the documentation reviews, interviews, pre- and post-survey comments, and field journal entries to identify underlying themes that emerged about the provider practice environment.
- 4. Qualitative Analysis of outcomes: "What did survey respondents say qualitatively about the results of the QI project?" This analysis examined the post-survey comments and field journal entries to assess the three dependent variables.
- 5. Qualitative Analysis of predictors: "What can be inferred from the independent variables about the context of this QI project?" This analysis combined data from the documentation reviews, interviews, pre- and post-survey comments, and field journal entries to assess the six independent variables of the study.
- 6. Quantitative Analysis of predictors before and after the project: "Were there changes in the independent variables that could explain changes in the dependent variables?" This analysis compared pre- and post-project scores to assess changes in perception of the independent variables over time.
- 7. Case Study Results re: The Effect of Office Systems Analysis on QI. The analytical process summarized the findings of each case study to answer the study question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis?"

The presentation of the results of each case study is appended with a description of the feedback received from case study participants after the close of their QI project and their review of their case study results, highlighting participant agreement, disagreement, or supplemental statements about the results of the case study.

Each case study analysis was reviewed by an independent research team that examined primary qualitative data collected during the study, specifically from interviews and survey comments. Questions about interpretations made by the researcher, and additions to those interpretations, were invited in order to develop a robust analytical process in support of strong conclusion validity. Analysis across case studies appears in the Discussion Section (Chapter 5).

Regardless of the strategies used to reinforce the validity of this analysis, this multiple case study cannot be used to generalize to populations. These results can be generalized only to the theories being explored:

- That the QI team method has an effect on the outcomes of QI as measured by acceptance by staff, improved work processes and achievement of the QI goal;
- That organizational characteristics have an effect on the QI team method and its outcomes.

Case Study #1: Improving Lead Screening Rates in One- and Two-Year-Olds in a

Family Practice Office

"...the chronic problem we have here is that we are not seeing enough patients to make ends meet and nobody in this office could possibly work harder." OSA1 pre-project interview

1. The provider practice and the history and process of QI for that practice

Case Study #1 took place at an outpatient provider practice, here identified as Office Systems Analysis Case Study 1 (OSA1) in southern Vermont. The practice is owned by a corporate health care system in the same region. OSA1 lies near the Massachusetts border, mid-way between two moderately sized Vermont towns, each of which is home to a competing community hospital of which one is part of the OSA1 corporate system. Access to and from the community in which OSA1 is located,

however, requires travel through either a mountainous national forest to the west or an equally rocky state park to the east, both of which create traveling challenges during winter months. OSA1 is the only office practice in its community and serves both the local



community and a transient population attracted by local resorts throughout the year.

The provider group consists of three family medicine physicians (two of whom are allopathic, one osteopathic) and one allopathic internal medicine adult specialist. These providers offer a wide range of medical disciplines, providing care for adults and children with a practice site that, at the time of this study, was equipped to offer laboratory and radiological services. The expectation of these providers is that no one who asks for care will be turned away and, when possible, services will be provided on a same day basis, if specifically requested by patients at time of appointment scheduling. (*Anonymous.*)

Patient visits/year have increased over the last three years: 3% from 2007 to 2008 and another 10% to 2009. Less than 1 percent of this volume (0.73%) represented pediatric visits. Almost one third of all patient volume (30%) was paid by Medicaid. In addition to the four providers identified above, the practice employed 16 staff to keep the clinic open 45 hours/week. In the normal flow of patient visits, about 1 - 2 visits/week were one- and two-year-olds needing care. Improving the lead screening rate for oneand two-year-olds required studying a process that occurred infrequently for this practice.

OSA1 has a history of QI activity which predates its association with its corporate owner. Key members of the practice, including at least one physician and one nurse, have been trained in Clinical Microsystems, a 5 step, process-based approach that uses a systems perspective to improve care. After the conclusion of Case Study #1, OSA1 continued to be involved in QI activity, including a high profile state-wide collaborative QI project regarding its electronic medical record system.

2. <u>Description of the QI project selected by the practice, the application of AA3 in that</u> project, and the clinical effectiveness of that project

In January 2009, the Vermont Child Health Improvement Program (VCHIP), part of the Department of Pediatrics at University of Vermont College of Medicine, initiated a QI project to reduce pediatric blood lead levels as part of a Vermont Department of Health public health initiative. This initiative was developed in response to a recent

Vermont State public health law that mandates universal screening of children for elevated blood lead levels.

According to this statute, if pediatric primary care providers do not screen at least 85% of their one-year-old patients and 75% of their two-year-olds, the Secretary of the Agency of Human Services shall adopt rules requiring these providers to ensure that their patients are screened and tested according to these guidelines, beginning January 1, 2011 (Vermont Title 18, Chapter 38 - Universal Screening, 2008). These guidelines were updated effective July 1, 2008, based on recommendations of the U.S. Centers for Disease Control and the American Academy of Pediatrics, to include lead-screening blood tests for one- and two-year-olds, as well as education for parents and guardians of children six years or younger on the advisability of screening and testing their children for lead (Vermont Department of Health, 2009). Screening, under these guidelines, tests for prevalence of lead poisoning and must be conducted for all children. Such testing is not determined by selected screening based on risk factors, but rather universal screening of all children.

The above referenced legislation served as the genesis of the VCHIP QI project, focusing specifically on improving the rate of lead blood testing in one- and two-year-olds in the State of Vermont. Although screening results across Vermont were near the required level for one-year-olds in 2007 (85% required; 84.6% reported), results for two-year-olds' screenings fell short of this expectation (75% required; 46% reported in 2007) (Vermont Department of Health, 2009). At the time of the Vermont Department of Health 2009 report, an expectation was set that each under-performing practice would increase their lead screening rates by 15%.

In developing the "Test All Tots for Lead" QI project (TATL), VCHIP recruited from Family Medicine and Pediatric practices, with the former predicted to be more difficult to engage as children constitute a relatively small segment of the practices' patient populations (one- and two-year-olds). VCHIP successfully recruited one Family Medicine practice and one Pediatric practice for this QI project, contacting key members of the practice to initiate the study, conducting chart reviews before implementation, and monitoring the progress of the study. Of these two practices, one (OSA1) agreed additionally to participate in the "Office Systems Analysis" (AA3) project to receive free QI facilitated support for their QI team, with a start date of August 31, 2009 and an end to formal team meetings on November 9, 2009 after eight sessions. The QI team included three OSA1 staff (one physician, one registered nurse, and one front office assistant) in team meetings that totaled 10 hours of staff time for each team member.

Each session was organized around the AA3 method of office systems analysis; Appendix F lists the chronological events and staff interviewed for this study. Key actions completed by the team or VCHIP support staff included:

- August 2009 chart audit: conducted by VCHIP staff as a manual review of 62 charts, resulting in the one-year-old lead pre-project screening rate (25%) and the two-year-old pre-project lead screening rate (47%), both below the state targets of 85% and 75%, respectively
- Development of two complete "current state value stream maps," one for the current well child visit lead screening process and the other for the letter check out process, in which test results are sent to the patient's family

- Development of a single "target state value stream map," with two work process changes:
 - Shorter elapsed process time of letters mailed to patients/families from 20 hours per letter to less than 10 minutes per letter
 - Redesigned testing procedures to create a "same day" lead screening process in which lead tests are performed on the day of the well child visit, rather than scheduled for a return visit to draw labs, reducing the time needed to complete lead testing from one week to less than one hour
- Pilot tests and implementation plan of "target state" carried out over two months (See Appendix G for facsimiles of hand drawn diagrams of AA3 reports)
- September 2010 post-project chart audit by electronic medical record reporting and manual verification, resulting in one-year-old post-project lead screening rate (91%) and two-year-old post-project lead screening rate (86%), both above the state targets of 85% and 75%, respectively. This was based on an electronic review of six months of "well child visit" patient data from 18 patient charts (Table 4)

Clinical Effectiveness of Project	One-Year-Olds	Two-Year-Olds
VT Dept of Health Expectation:	85%	75%
VT 2007 State Wide Actual	84.6%	46%
OSA1 2009 Actual – 62 charts	25% (8/32)	47% (14/30)
OSA1 2010 Actual – 18 charts	91% (10/11)	86% (6/7)
Fisher's Exact 2-Tail <i>P</i> value <=	.0002	.0975

 Table 4: Clinical Effectiveness of Lead Screening QI Project OSA1

The Fisher's Exact test calculates the probability of obtaining a table as extreme or more extreme than the one observed⁷. It is specifically useful when cell size is small (five or less), as is true in the 2010 outcomes, during which the practice conducted well-child visits for only 11 one-year-olds and seven two-year-olds in the six month period studied. The use of the Fisher's Exact test is limited to data for which the following assumptions are true (Siegel, 1956):

a. The samples were representative of their populations, as, for example, by a random draw. In the 2009 chart review, the patient records for one- and two-year-olds were drawn randomly from those who had been seen for a "well child check" in the past year, which are the pediatric visit types during which the practice expects providers to order lead tests. In the 2010 chart review, all patient records for one- and two-year-olds were olds were included if they had been seen for a "well child check" after the close of the

⁷ The Fischer's Exact test was run on JMP, a SAS based program available for laptops.

project. The population of one- and two-year-olds in a family medicine practice is small relative to its entire patient base, so sample size equaled the available population for the time period used in 2010.

- b. The samples from the two time periods were independent of each other. The lead screening test rate for one- and two-year-olds sampled in 2009 did not affect the lead screening test rate of one- and two-year-olds found in 2010. Two-year olds in 2010, who were tested as one-year olds in 2009, were expected by the CDC guidelines to be re-tested regardless of their prior outcome.
- c. The tested results could fall into only one cell of the table. The results of the chart audit determining whether or not a child was tested for lead poisoning were mutually exclusive and appear in only one cell of the table.

The Fisher's Exact two tail test calculated the probability that any difference in the results in 2010, as compared to 2009, were due to chance: less than or equal to 2 in 10,000 for one-year-olds and less than or equal to 9.75 in 100 for two-year-olds (Table 4). One alternative to random chance as the cause of the increase in lead screening rates is the effect of the QI project that used AA3 as a method to change work processes. To further explore whether this was the case, this analysis examined the perceptions of the AA3-based project as found across multiple sources.

3. Outcomes from the QI project using AA3 as a QI process

Quantitative Analysis of outcomes. Using only the post-project scores, based on 11 returned surveys out of 19 distributed, a return rate of 58%, the analysis calculated the median values for each statement related to a dependent variable. Table 5 provides a list of all survey statements used to measure the three dependent variables, with

statements numbered 4 - 15 and 23 included on surveys for all staff and providers and

statements lettered from A – D included only on surveys for QI project team members.

 Table 5: Post-Project Survey Statements and Dependent Variables-OSA1

Post Survey Statements addressed to all staff	Dependent Variables
4. The QI study resulting in same day lead testing and	Clinical Effectiveness of
physician letter routing was successful in improving the	QI Outcomes
quality of patient care.	
5. The lead study made my job easier.	Process effectiveness of
	AA3
6. The lead study made us more efficient as a practice.	Process effectiveness of
	AA3
7. The lead study was easy to do.	Acceptance of QI
	Process
8. Lead screening for one-year-olds is done more often now	Clinical Effectiveness of
than at the beginning of the QI project.	QI Outcomes
9. Lead screening for two-year-olds is done more often now	Clinical Effectiveness of
than at the beginning of the QI project.	QI Outcomes
10. We do a better job screening for lead in pediatric patients	Clinical Effectiveness of
now than we did at the beginning of the QI project.	QI Outcomes
11. As a result of the QI study (same day lead testing and	Process effectiveness of
physician letter routing), it takes fewer steps to do a lead	AA3
screening test than it used to.	
12. As a result of this QI lead study, it is easier to do a lead	Process effectiveness of
screening test than it used to be.	AA3
13. As a result of this QI lead study, it takes less time to	Process effectiveness of
carry out a lead screening test than it used to.	AA3
14. As a result of this QI lead study, there are fewer mistakes	Process effectiveness of
in testing for lead than there used to be.	AA3
15. As a result of this QI lead study, the patients, once they	Process effectiveness of
are in the office, don't wait as long to complete their lead	AA3
screening tests as they used to.	
23. If I were asked to be part of a QI project in the future, I	Acceptance of QI
would accept.	Process
Post Survey Statements addressed to QI team members only	Dependent Variables
A. The A3 tool helped us make changes that were part of the	Acceptance of QI
QI lead study.	Process
B. I would be willing to use the A3 tool to make changes in	Process effectiveness of
other parts of the office.	AA3
C. I would be willing to participate in other QI projects that	Process effectiveness of
use the A3 tool to make changes.	AA3
D. The time I took to do the QI lead study using A3 was	Process effectiveness of
made up by time saved in the work I do in the practice.	AA3

Each statement was accompanied by a Likert scale from 1 (strongly disagree) to 7 (strongly agree), as well as a choice of 9 (don't know). The summary statistics for statements were calculated for all staff (#4-15 and 23 above) along with the five number summary⁸ (Figure 7). (Note: not all responders felt able to score all questions. The number of respondents for each statement is indicated in the x-axis labels.) Median values are identified by heavy horizontal bars for each statement.





<u>Responses from all staff (team members and non-team members)</u>: The above box and whisker plot⁹ indicates that all 13 statements related to the dependent variables had

⁸ The "five number summary" provides specific information about the frequency distribution of an ordered set of data: minimum data point, 1st quartile, median (or 2nd quartile), 3rd quartile, and maximum data point (or 4th quartile).

 $^{^{9}}$ A "box and whisker" plot provides a graphic display of the five number summary. When each value in the five number summary is different (as with "Easier n=6" above), the minimum and maximum (also

median scores equal to or greater than the midpoint score of 4 (the neutral response). The one statement for which the 1st quartile starts at "2,""Lead Screening patients wait less," was subject to two opposing interpretations by respondents, discussed below.

The graph has three sections: statements about the acceptance of the QI process (measuring the ease and willingness to participate in QI in the future) found to the left of the vertical dotted line; statements about Process Effectiveness (measuring whether staff work became more effective as a result of this QI project) found between the dotted and dashed lines; and statements about clinical effectiveness (measuring whether lead screening improved) found to the right of the dashed line.

In representing OSA1 staff opinions about "Acceptance," only five (of eleven) respondents evaluated the AA3 project on "easiness," most likely because the QI team relied on its own membership for much of the support needed. Responses on easiness were widely distributed above the median neutral score (4), including the highest possible score of 7, with no score lower than 3. Willingness to participate in future QI teams was evaluated by all 11 respondents, with the median well above the neutral score at 6 although the range covered the full spectrum of scores from 1 - 7. The median of 6 may be partly attributable to the long history of QI and staff involvement at OSA1 that helps

described as the 4th quartile) values are displayed at the lowest and highest endpoints of the lines (or "whiskers") that connect to the box. The lower edge of the box represents the 1st quartile and the upper edge of the box represents the 3rd quartile. The heavy blue line represents the median. This display, using quartiles in a graphic presentation, allows a comparison of multiple sets of ordinal data and their distributions. {{211 Moore,David S. 2001}}

Outlier definition: the difference between the first and third quartiles is known as the Interquartile Range (IQR). Outliers are values that lie more than 1.5 times the interquartile range above the third quartile or 1.5 times the IQR below the first quartile {{210 Renze, John}}. Outliers are represented graphically by a star.

Identical values of the five number summary: when the minimum or maximum values are equal to 1^{st} or 3^{rd} quartiles, the whiskers disappear. When 1^{st} or 3^{rd} quartiles are equal to the median, the median becomes the upper or lower edge of the box.

define its organizational climate, but the full range of scores indicates that there are staff who do not share that level of involvement.

Process effectiveness statements, of which there are seven, were answered by approximately half of all respondents and, based on median scores, indicated improvement in the work necessary to complete lead screenings on small children, particularly "lead screening takes fewer steps," "lead screening is easier," "lead screening takes less time," and "lead screening results in fewer errors." One statement was unintentionally worded ambiguously, stating that, once patients are in the office, they don't wait as long for their lead test as before. The QI team designed a "same day" screening solution, such that patients waited longer on the day of their visit to get "same day testing" but waited less in that they did not have to return on a different day for that test. This result may mask a benefit from the patient/family perspective (fewer trips to the office, saving more time overall), but the survey did not assess this. Respondents provided a mix of responses, strongly agreeing, strongly disagreeing, and neutral in response to this statement. The median score of 4.0 for this statement masks the ambiguity of this survey statement.

Clinical effectiveness was evaluated by four statements, ranging in median scores from 6 to 7. The lowest rated statement tested opinions about the success of the lead screening project, resulting in a median score of 6. This result is followed by statements about the outcomes for one-year-olds and two-year-olds and whether the practice now does a better job screening one-and two-year-olds, which all rated a median score of 7. Except for outliers, no response to these statements was lower than the neutral score of 4, indicating that the QI project was generally seen as clinically effective and, except for

one outlier for each of two questions, was never seen as less effective than previous efforts by the practice to screen for lead.

Responses from team members only: There was a marked difference in scores between members of the QI team on lead screening (2 respondents) when compared to scores from all other staff who responded (9 respondents). Both groups, as measured by median scores, rated all three dependent variables positively. QI team members, however, were typically more aware of the project, may have felt more confident in expressing strong opinions, and may also have been biased due to their responsibility for the project's outcomes. When statement scores are grouped together based on the three study variables noted above, the difference between median scores based on team membership is greatest for statements related to Process Effectiveness. (Figure 8)

Figure 8: Dependent Variable Box Plots of QI Team Members & All Others OSA1



One hypothesis to consider from this comparison is that AA3 requires team members to draw out and analyze the effect of work processes as a system, so that the

individual work processes are seen as affecting the outcome of the whole. Changes that the team put in place shifted work from some individual staff to others (e.g. letter printing was shifted from physicians to staff) and placed new stress on some staff (e.g. lab staff was asked to draw labs immediately after the physician visit rather than rescheduling a week or two later). QI team members were coached to see the advantage of these changes to the benefit of the patient and patient's family; non-QI members may have been more likely to see the changes only in light of how they affected the individual staff. Responses to individual statements about Process Effectiveness show that in all cases (excluding the statement regarding patient waiting), QI team members saw the QI project as improving the process to a greater degree than the non-team members (Figure 9). **Figure 9: Statements Made re: Dependent Variables about Process by QI Team**

Members and All Others – Box and Whisker Plots OSA1



QI Team members also provided a perspective on the AA3 methodology itself. In

this case study, two members of the team completed the post-project survey. Table 6

shows the responses to statements that represent the dependent variables.

 Table 6: QI Team Member Responses re: AA3 Methodology OSA1

	Team	Team
Dependent Variable Statements	Member 1	Member 2
T- The QI project was easy to do.	7	4
T- If I were asked to be part of a QI project in the future, I		
would accept.	7	7
P- The QI project made my job easier.	7	7
P- The QI project made us more efficient as a practice.	7	7
P- As a result of the QI study, the process takes fewer		
steps to do than it used to.	6	7
P- As a result of this QI study, the process is easier to do		
than it used to be.	7	7
P- As a result of this QI study, the process takes less time		
to carry out than it used to.	6	7
P- As a result of this QI study, there are fewer mistakes		
than there used to be.	n/a	7
P- As a result of this QI study, the patients, once they are		
in the office, don't wait as long as they used to.	2	n/a
C- The QI project was successful in improving the quality		
of patient care.	7	7
C- The process regarding one-year-olds is done more		
often now than at the beginning of the QI project.	7	7
C- The process regarding two-year-olds is done more		
often now than at the beginning of the QI project.	7	7
C- We do a better job with this process now than we did at		
the beginning of the QI project.	7	7
A- The A3 tool helped us make changes that were part of		
the QI study	6	7
A- I would be willing to use the A3 tool to make changes in		
other parts of the office.	5	7
A-I would be willing to participate in other QI projects that		
use the A3 tool to make changes.	5	7
A- The time I took to do the QI study using A3 was made		
up by time saved in the work I do in the practice.	4	6

T: Technology Acceptance statements C: Clinical Effectiveness Statements P: Process Effectiveness Statements A: QI Method Statements

The scores above indicate that 23 out of 34 statements (68%) had the strongest possible agreement (scores of 7) applied across the three categories of dependent variables and the separate assessment of AA3 as a method for conducting QI (which scored a median of 6).

Responses were generally positive with respect to "T" and "A" labeled statements made about the QI method (AA3), with 75% and 38% of these statements, respectively, rated as "7" by QI team members. Clinical Effectiveness of QI Outcome ("C" labeled statements) received the highest possible rankings possible (100% rated "7") and Process Effectiveness scores ("P" labeled statements) were rated "7" for 64% of the statements (this includes the ambiguously-worded statement). QI team members appear to be willing to attribute at least a portion of the success of the project to the AA3 methodology and to support participating in similar activities in the future.

The results described above, inclusive of all respondents, indicate that Clinical Effectiveness scored more highly than Acceptance or Process Effectiveness. (Figure 10). **Figure 10: Dependent Variable Box and Whisker Plot OSA1**



One assumption made by the study is that the dependent variables may have a relationship with each other. If so, there may be an underlying relationship between process and clinical variables despite differences in their median scores. Table 7 displays the relationship of paired scores for Process Effectiveness and Clinical Effectiveness as a fit to a monotonic relationship: whether ranked values of one set of values increase or decrease with the ranked values of another set, resulting in a Spearman rank order correlation coefficient (Spearman's rho) of 0.8102 and a *P* value of 0.0147^{10} .

Spearman's rho measures the degree to which two variables have a monotonic relationship with each other. It is the non-parametric equivalent of Pearson's correlation coefficient, based on the following assumptions (Siegel, 1956):

- a. The variables are related in a monotonic fashion. This assumption is not known to be true as there are no previous studies known to the researcher to demonstrate this. It may be true and the test statistics measures the degree to which it might be.
- b. Both variables are ordinal and can be compared with each other. The data were collected on staff perceptions that were ranked from 1 to 7 for each statement, making it possible to compare results to each other.

 Table 7: Relationships between Paired Variables: Spearman's rho & P values OSA1

Variable	Acceptance	Process	Clinical
Relationships		Effectiveness	Effectiveness
Acceptance	1.0		
Process	rho = .3080		
Effectiveness	p = .4200	1.0	
Clinical	rho = .5616	rho = .8102	
Effectiveness	p = .1156	p = .0147	1.0

¹⁰ The Spearman's rho test was run on STATA v11.2, copyright of StataCorp LP, 4905 Lakeway Drive, College Station, TX 77845, available through the Center for Clinical and Translational Science at the University of Vermont in Burlington, VT.

Table 7 estimates the strength and direction of a monotonic association between pairs of the dependent variables of the study, with positive values of rho indicating a positive relationship and a value of 0.5 considered a moderate positive relationship (AcaState Software, 2012). One possible explanation for the above relationship between Clinical and Process Effectiveness is that perceptions of Clinical Effectiveness may be affected by perceptions of Process Effectiveness, and vice versa. If AA3 is effective at improving processes, which is its stated goal, then it may also be effective in helping staff understand how to make work activities more clinically effective as well. Correlations between the other variables were not statistically significant.

Quantitative Analysis of outcomes before and after the project. All respondents to the pre-project survey were asked for their perceptions of Acceptance, Process Effectiveness, and Clinical Effectiveness of any previous QI team project that they could remember, regardless of whether they had been a team member, with a response rate of 58%. The post-project survey was administered five months after the pre-project survey and three months after the end of formal QI team meetings. The expected pattern of change from pre-project to post-project periods was an increase in values, particularly for Process Effectiveness statements (the focus of the AA3 method). The comparison of the median responses to statements made about the dependent variables, when aggregated by the three variables, shows a decrease in the median score of perception of Clinical Effectiveness. The median scores of the perception of technology Acceptance and Process Effectiveness did not change. (Figure 11).





For all three variables the distributions became wider in the post-project survey; for Process Effectiveness the minimum value and 1st quartile fell and the 3rd quartile rose, indicating a higher proportion of responses at the extreme ends of the scale. The impact of AA3 may be perceived very differently across staff, not changing the median values greatly but moving towards the extremes in rating those variables.

Changes in responses to the individual statements made in relation to these variables, however, did not consistently follow the above stable or declining patterns. The individual statements that both pre- and post-surveys had in common are found in Table 8:

Pre- and Post-Survey Statements addressed to all staff	Dependent Variables	
4. The QI study was successful in improving the quality of	Clinical Effectiveness of	
patient care.	QI Outcomes	
5. The QI study made my job easier.	Process effectiveness of	
	AA3	
6. The QI study made us more efficient as a practice.	Process effectiveness of	
	AA3	
7. The QI study was easy to do.	Acceptance of QI	
	Process	
23. If I were asked to be part of a QI project in the future, I	Acceptance of QI	
would accept.	Process	

 Table 8: Pre- and Post-Survey Statements Addressed to All Staff OSA1

Median responses to statements made about Process Effectiveness were not always identical: although the median value of one statement was the same (the QI study made my job easier), it declined for the other statement (the QI study made us more efficient as a practice) (Figure 12). For Acceptance, the medians of both statements (QI study was easy to do and willingness to participate in QI in the future) declined (Figure 12), although they appear the same as an aggregate (Figure 11). (Clinical Effectiveness, in this pre/post comparative analysis, is measured by only one statement and so did not change from Figure 11.) As with Figure 11, the distribution of the post-project scores was wider than the pre-project scores, with the exception of the first statement (QI easy). These differences in median and distribution (Figures 11 and 12), however, may represent little substantive change in the perception of these variables, as the Wilcoxon Rank Sum tests for significance indicate below¹¹.

¹¹ The Wilcoxon Rank Sum test was run on a publically available statistical software package located on the Internet at <u>http://elegans.swmed.edu/~leon/stats/utest.cgi</u>





One interpretation of this comparative analysis of the specific statements is that not only were post-survey responses generally more extreme (in all but the comparison of responses to "QI was easy to do") but they were also generally perceived more negatively than the remembered QI projects of the past (with the exception of "QI made my job easier"). AA3 represents a change from the past (as any new method of QI must be), and change, by itself, may not encourage acceptance. Additionally, it is also possible that the characteristics of the AA3 method itself may not encourage acceptance and may not be perceived as resulting in greater process efficiencies.

Using a two-tailed Wilcoxon Rank Sum test at a significance level of 0.05, the differences between values were not significant. The Wilcoxon Rank Sum test is a non-parametric test used to assess whether two independent samples have equally large

values. Since symmetry of the underlying distribution cannot be assumed, it tests medians. The use of Wilcoxon Rank Sum test is based on the following assumptions (Siegel, 1956):

- a. The samples representing the populations are measured independently. The response of each participant did not affect the responses of any of the other participants.
- b. The responses are ordinal and can be compared with each other. The data were collected on staff perceptions that were ranked from 1 to 7 for each statement, making it possible to compare results to each other.

The change in medians from pre- to post-survey responses (Figure 12), although not statistically significant, are nonetheless interesting in that the one statement score that produced higher 3rd and 4th quartile values in post-project responses was related to easier work processes. This is the intended goal of AA3: improving quality through improving work processes.

Qualitative Analysis of context. This analysis uses all qualitative data from the interviews and pre- and post-survey comments to identify underlying themes that emerge from respondents about the provider practice environment.

 <u>A well established history in QI:</u> As summarized in the introduction to this case study above, OSA1 is an office practice with a well-established history in conducting QI projects. QI projects take place through a formal approach (PDSA, Clinical Microsystems) and with an informal QI management style that appears to fit the culture and relationships of this practice. Comments in support of a naturally appearing, frequently repeated, and informal process of QI management predominate.

Ln 23: And it [the Diabetic Project] was based on the principle of (prompted) Plan, Do, Study, Act. We have a lot of informal things too, let's try doing this, and see how it works, some sort of informal feedback.

Ln 28: It wasn't formal. You always had the need to see there's a problem and how are we going to fix it, and you'd sit around and do brain storming, figure out possible ways of fixing it; then we would implement some of those changes, and then usually on a small scale, go back a week or two later, and see is this working. And, if it's working we would expand it and if it's not, then we would try something different. You know, it's just been... it's something that we've done many times but of course, it's been more formal over the past... (interruption). It's been more formal over the past couple of years as we've been working with the Blueprint for Health and been able to put some more clear language to we're doing.

Ln 217: How can I better do this? A lot of informal discussion about improving things. I would say on a daily basis.

2. <u>QI is part of the organizational climate:</u> In addition to the above references to

formal and informal QI activities, five other comments coupled QI policies and

procedures with statements about organization climate, with the result that QI

activities appear to be part of the climate. The process for conducting QI takes an

"ingrained" appearance, where it is the management style of the organization to

engage in participatory, staff-led QI.

Ln 25: And it was based on the principle of (prompted) Plan, Do, Study, Act. We have a lot of informal things too, let's try doing this, and see how it works, some sort of informal feedback.

Ln 75: But many times, you know, a problem would apply only, say, the front desk, or the interaction between the receptionist at the front desk and a nurse who is doing triage. And so it may be something as simple as me saying, "Do a PDSA. Find out, try to solve that problem and let me know what kind of solutions we need to come up with," and so that it's only suggestions or the active support without me doing the work.

Ln 107: I think that Plan, Do, Study, Act comes naturally, you know, one makes a plan, alright, how we going to do it, let's find out what our information is, let's find out what our options are, then there's the study, and there's the do, Ok let's give it a go. And then make a decision based

on that. I think often that's often the way people attack a project anyway and I think that it's been formalized well.

3. <u>Sometimes hierarchically imposed:</u> QI projects are not always internally or self-

driven and are not necessarily seen positively. Sometimes they are imposed by the

corporation or state agencies.

Ln 9: Whenever the hospital gives us one, we have to kind of do whatever they ask us to do.

Ln 249: I sometimes think, "Oh yes, we'll get over it, it's just another one, we'll move on." I think there's a little bit of that but I think that has a lot to do with the lack of time and the financial constraints we are constantly being reminded about... So you know sometimes quality assurance stuff that comes from the hospital, or the state, it might bring up a feeling of "oh no, not another one"

4. <u>Selective participation:</u> The hierarchy within healthcare may sometimes impose

QI expectations top-down, but participation in QI is a staff decision and not all

staff have identical priorities regarding QI projects. As a result, staff appear to

choose how and whether they participate in individual QI projects.

Field journal, Sep 21, 09: Nurses appear to have their own assignments and priorities; the QI work of other staff who are on vacation does not become a priority. The practice leaders do not dictate to the staff; they need to find ways to incorporate valued work into the mindset of the staff to make it perceived as valuable. If the task is not seen as important, particularly as part of the patient care process, then it won't get done. (Field journal)

Field journal, Sep 21, 09: Staff are trained to work independently and, in some cases, autonomously. If asked to change, staff are able to resist, but they won't resist if they see the value in terms of the patient visit. QI team members are sensitive to work that needs to be done but don't have the ability to address resistance from staff. This has become expected and accepted. The organizational climate is about QI, but also about the way people behave autonomously, in their own separate parts, taking responsibility for what they do individually but not always able to see beyond their roles.

Field journal, Oct 26, 09: "If it's not broke, don't fix it" (stated by a QI team member about the attitudes of other members on staff not on the team)

5. <u>QI as an organizational norm:</u> Although staff may participate to different degrees and levels of commitment, there was a consensus among all respondents that QI activities, even without full participation, are a norm and not an exception to usual practice.

Ln 8: Seems like we're always doing them.

Ln 25: We're constantly changing around here; we're always into something new. I think informally, certainly (a lot or QI projects done). Definitely.

During the course of the Lead Screening QI project, all of the QI team members expressed, without being prompted by questions, their expectation that QI is part of their work.

Field journal, Aug 31, 09: "I can't keep doing the same thing that doesn't work without going crazy; I have to do something to make it better" (with team members nodding in agreement)

6. Shared understanding and adaptive use of QI: As might be expected with a long organizational history of QI, the development of an informal approach, and an ingrained "QI" management style and organizational norm, staff share a common understanding of the formal steps to do QI and adapt those steps to their immediate needs. The staff see short or small projects as more effective than those that are large or long. Flexibility in trialing changes and adopting selected outcomes must also happen in a short time frame to be successful.

Ln 37: One of the biggest umbrella projects which has many little ones in it was that we wanted to improve the and standardize the way we take care of diabetics. (sic)

Ln 120: So then we the group will brainstorm, find possible solutions, and come up with a manageable intervention that may be able to have a benefit to solve the problem. And after we plan that, then we implement it, we do it. We try to do it within a short time span. Anything that takes, you know, more than a couple of weeks to do, won't get done. So that after we do it, we have to rapidly go back and assess it and say "did this make a difference" and if it makes a difference, then we may have to incorporate that into a larger policy, so that we do this on a regular basis. If it makes part of a difference, we may have to use it but change it a little bit, and if it didn't make very much difference, or it made things worse, recognize that and try to find another solution. Then do the circle again.

7. Ease of QI defined in terms of staff work: QI projects are generally spoken of in

positive terms and staff involvement in QI is referred to as "easy" when it is

organized not to interfere with regular work.

Ln 133: With that one it was easy, because we were dealing with patients; the only thing we had to do was hand it out at the beginning and collect it at the end. If it's something, I don't know, in regards to we're so short staffed right now, that involved taking a person away from their particular job, that's going to be a little bit difficult because some of us are doing four people's job at the moment because we're so short staffed.

8. <u>Difficulty of QI defined in terms of change to staff work:</u> In contrast, staff

involvement in QI is referred to as "hard" when it requires significant change to work processes. Even in such cases, the outcome is often seen as worth the difficulty of making that change, especially if the project includes an opportunity to make that work easier. Sometimes QI is not worth the challenge that the project creates. Some of what is "hard" is just the speed of change in health care, regardless of QI as a source of change.

Ln 158: Like when we first started the electronic medical record, I am one of the most computer illiterate people in the office – I'm fine, I do it – but I was the most computer illiterate. So in the beginning, I was really worried about it. I went to the teaching sessions and I'm fine with it now. I frequently ask questions of my younger computer buddies, but, so I think, for example, people having to do something they're not familiar

with, like anyone, if it's something that's unfamiliar, something that makes a change, and given the nature of and the climate of health care these days, we are all constantly under the stress of having to keep up with stuff, and the financial stresses of health care right now experiencing and, in the middle of it, one is asked to make a change, and one's comfort zone is constantly threatened in this job, constantly.

Ln 234: ... we all roll our eyes from time to time but we basically agree with the quality improvement notion.

Ln 237: ...they [the staff] think of it as an excellent tool. That it is also a burden. It often requires extra work. But, you know, by doing the extra work we hopefully get improved quality, quality improvement, but also better solutions to our day-to-day activities so that whether it is a value in itself, some of us obsessive/compulsive types think that it is, but everybody sees it as a useful tool.

9. <u>QI can be work process focused:</u> Although these projects have been focused on patients, who are central to the stated values found in many organizational documents, staff comfortably associate QI with improving their work processes related to patient care. References found above connect the value of engaging in work processes with statements about organizational climate as well, demonstrating that the needs of the staff are considered as highly, or almost as highly, as those of the patients. The organizational climate supports QI projects that have an application to work processes directly affecting the work of the staff. QI projects don't necessarily have to be limited to improving a clinical issue alone. Changes to work processes that make work easier for staff are considered valuable QI activities.
Ln 231: In our motto, it's "patients come first," so it's really to make things better for the patients.

Ln 12: [As an example of a QI project,] Workflow in general with the patients' time; getting them in the office and then getting them out.

Ln 42: ...all of those things we wanted to improve, so we put them in one package and every time we see a diabetic, we make sure every one of those things is in order and then review it, see what our success rate is, and then sometimes only by trying to remember something more clearly or often by some other technique make sure that it doesn't fall through the cracks. One of the techniques that was used was that quicktext, that when a patient was brought in, a nurse would type in a quicktext, which would then make a list of questions, so she'd have to ask those questions which would make sure that none of those problems fell through the cracks.

Ln 169: I would think quality improvement would make us more efficient.

Field Journal, Oct 5, 09: "The changes would affect (a specific physician's) process. Then all of us would have less work."

Field Journal, Oct 19, 09: "At least if all of us do the same thing it makes it easier."

10. <u>Despite a supportive organizational climate, QI has challenges:</u> Organizational history indicates that QI is a past and current activity in the practice. Sometimes,

patient care priorities can override QI activities, and the practice must struggle to

make them happen. While staff believe that QI improves the practice of

medicine, they also recognize that there are limited resources with which to do so

(funding and staffing). The success of QI projects is strongly related to the

availability of staff and the impact of projects on staff time, an often-stated scarce

resource.

Ln 144: So that, it's not like we can cut back what we are doing in order to accomplish something (we have open access, we never turn anybody away, we make sure that everybody who calls here gets seen in 24 hours. If more people call, we see more people.) It is limited in that there is only a limited population here, but yes, we don't have unlimited funds, people to do it, and we can't cut back on other things we are doing in order to accomplish quality improvement.

Ln 252: And that the chronic problem we have here is that we are not seeing enough patients to make ends meet and nobody in this office could possibly work harder. So there's a little bit of that.

11. <u>QI expertise and support needed outside QI Team</u>. Despite its long standing and generally successful history within the practice, QI requires support of various

kinds – it doesn't happen automatically.

Ln 93: ...then the manager kind of follows up to make sure it's being done, because usually those papers have to go somewhere and it's usually to the manager to make sure that stuff is getting done.

Ln 207: That would be practice manager, CS. And she's usually the one when we have to do some of these projects that they get from the hospital, and they usually go to her to start off.

12. <u>Insufficient assessment of the outcomes of QI</u>. Assessing the value of QI

outcomes is an expected part of the process by the practice but not always self-

evident nor easy to do. As a result, staff may participate in QI because they

believe the long term outcome should be beneficial to patients. They do not

necessarily know whether a specific project has improved a process or an

outcome.

Ln 120: So that after we do it we have to rapidly go back and assess it and say "did this make a difference" and if it makes a difference, then we may have to incorporate that into a larger policy, so that we do this on a regular basis. If it makes part of a difference, we may have to use it but change it a little bit and if it didn't make very much difference, or it made things worse, recognize that and try to find another solution. Then do the circle again.

Ln 255: It has to do with time, support, and some kind of real clarity about outcome. I think the outcome piece is something that, you know, doesn't always seem worth it. What did we do? What was that? I've forgotten already, there's another one coming along.

Ln 260: The biggest problem with quality improvement practices is that we get started and that rarely do they come to a formal conclusion. That is, we may go around the PDSA circle once, or twice, maybe three times and the solution either we've changed our behavior so that problem is not that prominent any more or we burn out on it or it's, um, or the first change was obvious and made the difference but we rarely do that final step of saying here was a problem, here is the best of solution we came up with, and we've proven an improvement, and the book is closed and we put it on the shelf, that final assessment is something that would help I think in both obtaining the closure and making people think that they've accomplished something, and we hardly ever do that.

Across these findings, this contextual picture presents a provider office practice that is well versed in QI methods with a solid history of conducting QI projects successfully and a firmly established expectation that it will continue to do so. "QI" in this practice can be improved and, in fact, is regularly adjusted for patient care and the needs of staff to get work done. The style of QI is highly participative but does need a degree of formal support from leaders and/or champions, including support of an assessment process to close its QI work. The practice faces challenges due to limited resources in the face of its own patient care goals in serving its community members, particularly in supporting staff time to participate in QI projects.

Qualitative Analysis of outcomes. This analysis uses the post-survey comments by QI team members to assess the three dependent variables of the study.

As noted above, QI projects of the past are seen by OSA1 practice members as producing better clinical outcomes for patients and, regarding at least some projects, better work processes for staff. Several responses either directly or by inference indicate that more successful projects reduce the burden of work on staff as well as improve care for patients. This supports the study's assumptions that a QI methodology that includes improving work processes for staff will be associated with more successful outcomes for the patient and may engage staff support for more QI projects in the future.

The above observation reinforces the previous observations of a supportive climate for QI at OSA1, regarding both improving patient care and meeting staff needs.

Perceptions of study outcomes related to work process changes and of AA3 as a method for QI are likely to be influenced by the organizational climate of the practice as well as by the AA3 methodology itself. With the context and likely influence of organizational climate on outcome perceptions framing these findings, specific perceptions attributed to OSA1 staff about each dependent variable follow.

 <u>QI Perceived as Easy to Use:</u> The AA3 method of QI was not identified as hard to use; this is consistent with pre-project comments about QI, which focused on human factors as barriers to QI (for example "No, the biggest barrier is always inertia" from line 171). Comments regarding AA3 as a QI method, however, may reflect the facilitator assistance provided as well as the AA3 methodology.

Ln 313: (Post-project survey) Can't think of any - it (AA3) was made as "user friendly" as it could have been. (No specific changes suggested to improve the project in the future.)

Field journal, Feb 10, 10: A post-project survey comment by a QI team member indicated that AA3 was organized to be easy: "We didn't have to do anything extra.; this has made it easy to do. Not extra work, like other projects."

2. <u>QI Perceived as Useful:</u> QI is accepted as producing useful outcomes but the QI process itself is not specifically noted as useful in making job performance easier. Instead, QI is generally associated with more work according to pre-project interviews ("Often (QI) results require more work on input end" from Line 283). AA3 required more work in one respect (drawing diagrams) but less "extra work" as noted in the comment above. AA3 was also seen as "helpful" and one team member spoke highly of both the AA3 process and its outcome.

Ln 296: (Post-project survey comment on what worked well) The initial meetings to lay out the process and find where the problems are/were.
The concept of the A3 tool (AA3) is good but having us all write our own is probably overkill and slows us down.

Ln 301: (Post-project survey comment on what worked well) I loved the process of reviewing workflows (AA3). Good exercise in working as a team/microsystem.

Field journal, Dec 18, 09: (Post-project) "I will stand by this process (AA3): it took care of the print problem"

Field journal, Feb 10, 10: (Post-project) "We know this process (AA3) has been helpful."

3. <u>QI Project Perceived as Improving Work Processes:</u> In pre-project interviews,

QI has been associated with improving work processes in the past ("we make sure

every one of those things is in order and then review it, see what our success rate

is" from Line 42), as well as better patient outcomes. AA3 is seen as directly

improving work processes.

Field journal, Dec 14, 09: (Post-project) "We don't have to make it more difficult (with AA3)"

Field journal, Nov 30, 2009 – Feb 10, 2010: (Post-project) "If nothing else, this process (AA3) really fixed the problem with the letters"... "I can't stop thinking about the letters."... "I will stand by this process: it took care of the print problem"... "I'm still celebrating the letters"

4. <u>QI Project Perceived as Affecting QI Outcomes:</u> QI projects are closely

associated with clinical care outcomes in pre-project interviews ("Usually most of

them end up going good. We usually get good outcome from them" from line

246) and the AA3 process was seen as connected to clinical care outcomes from

early in the project.

Field journal, Oct 26, 09: (Mid-project) "We're going to do this (improve lead screening) for the patient"

In summary, the above findings indicate that staff do not consider past QI methods hard to use and the AA3 method was similarly seen as not hard. AA3 did not add to the work of the staff and was able to address work and clinical issues that the staff cared about. However, after the study was finished, the researcher noted that practice staff had become more engaged in the AA3 process after they used it to improve an office process that was very dissatisfying (printing follow up letters for patients), a process that chronologically falls after the well child visit is over and might not be thought of as affecting the lead screening process. After the team addressed this issue, it went on to improve the lead screening process successfully. The benefit gained by using AA3 first to address an issue that staff chose (rather than a project mandated by the state government or authorized by practice leaders) may be an important element of creating a successful QI process in a health care setting with limited resources and an environment of ongoing change.

Qualitative Analysis of predictors. This analysis uses the interviews and preand post-survey comments to assess the six independent variables of the study.

The data collected from respondents show the presence of all the elements of the Helfrich adapted model of implementation effectiveness (Figure 1, pg. 6), either directly or by inference. The success of past QI projects can be attributed at least in part to the presence of organizational support for QI as seen by:

 <u>Champions:</u> multiple champions were noted and consistently identified across reporting staff, who recognized different competencies or abilities possessed by certain staff to contribute to QI. At least one champion is trained in QI methods and is passionately involved in making improvement happen. Ln 213: It depends on the quality improvement project. You know, yeah, it depends. There are certain things that I might go to J for, she's our informal nurse manager. No, she's a formal nurse manager, I would say. I would talk to her about certain things – she's a diabetic educator, so... and K's been remarkable on the electronic medical record and I check in with her about that: how am I supposed to do this, what's this. So yes, there are various people again...

Ln 220: ... there are many of us.

Field journal, Aug 31, 09: (Two staff identified by name), for example, have taken Microsystems and are familiar with the tools.

Field journal statement made by a previously identified champion, Oct 19, 09: "I like getting my head around these things so we can make it a system..."

2. <u>Fit with the practice's values:</u> statements about the action of the practice as a whole

indicate a patient centered perspective, consistent with the QI projects used as

examples. Staff care about patients needs, which is a stated organizational priority

found in corporate documents as well as staff comments. The organization is also

committed to improving work processes for the staff.

Ln 143: We are the only practice for twenty miles in any direction. So that, it's not like we can cut back what we are doing in order to accomplish something. We have open access, we never turn anybody away, we make sure that everybody who calls here gets seen in 24 hours. If more people call, we see more people.

Ln 168: Finance is NOT a reason not to do quality improvement

Ln 231: In our motto, it's "patients come first," so it's really to make things better for the patients so, yes, usually, yes.

Corporate Policy - Organizational Philosophy: Our commitment to quality and improving on our quality will be the priority in everything we do

State of the Hospital August 2009 Update, Interim CEO: We must rely on data, our performance improvement culture, and the tools of waste reduction to support us through this change in management philosophy. We are currently working on process improvement and waste reduction...

3. Existing policies and practices around QI: staff were able to identify or recognize the

same method (Plan Do Study Act) for their formal QI process and indicated that this

process had infiltrated to their informal QI activities. QI methods are well

understood.

Ln 23: And it was based on the principle of (prompted) Plan, Do, Study, Act.

Ln 78: it may be something as simple as me saying, "Do a PDSA. Find out, try to solve that problem and let me know what kind of solutions we need to do come up with..."

Ln 107: I think that Plan, Do, Study, Act comes naturally, you know, one makes a plan, alright, how we going to do it, let's find out what our information is, let's find out what our options are, then there's the study, and there's the do, Ok let's give it a go. And then make a decision based on that. I think often that's often the way people attack a project anyway and I think that it's been formalized well

Ln 154: we call it PDSA

4. <u>Management support for QI:</u> managers (local leaders within the practice) are highly

regarded in support of or leading QI efforts. Leaders are seen as actively supporting

QI through direct involvement as well as by providing indirect support. This is

reinforced in organizational documentation regarding the corporation.

Ln 61: They (the leaders) definitely want our input on it too.

Ln 65: We've had involvement of all kinds of people on the staff, not necessarily clinical staff members have been involved.

Ln 93: ...then the manager kind of follows up to make sure it's being done, because usually those papers have to go somewhere and it's usually to the manager to make sure that stuff is getting done.

Corporate Policy - Organizational Philosophy: The role of management is to facilitate the success of our employees, stimulate and capitalize on their creativity and provide leadership to enable each employee to achieve best possible clinical outcomes and meet the expectations of their respective department consumers.

5. Organizational climate in support of QI: although the tone and behavior of the staff

reflected that QI sometimes requires extra work, QI was appreciated and regarded

highly across the practice. This is very likely helpful in an organization that conducts

QI work on an voluntary basis with participative, staff led QI, which may be the result of the small size of the setting, the close relationships among the staff, the fast pace of daily operations, and/or the high level of demand placed on both providers and staff. Overall, the climate supports participative, staff led QI. The work

environment is collegial, collaborative, and mutually respectful.

Ln 8: Seems like we're always doing them

Ln 25: We're constantly changing around here; we're always into something new.

Ln 32: You know, it's just been... it's something that we've done many times

Ln 65: We've had involvement of all kinds of people on the staff, not necessarily clinical staff members have been involved. We have had meetings specifically around the Blueprint. It's been an important part of the practice.

Ln 179: Definitely. More so, I think, than anywhere I've ever worked (re: whether the practice values QI)

Ln 181: Absolutely. (re: whether the practice values QI)

Ln 183: Absolutely. (re: whether the practice values QI)

Ln 183: It's automatic. It also makes it much more interesting to do your work rather than keep doing the same things.

Field journal, Aug 31, 09: There's a small group of staff that's usually part of new ideas and QI activities. (Names of two staff), for example, have taken Microsystems and are familiar with the tools. The rest of the staff aren't opposed to QI, but just let someone else do it.

Field journal from Nov 6 - 9, 2009: Staff are trained to work independently and, in the case of Lab, autonomously. If asked to change, staff are able to resist, but won't if they see the value in terms of the patient visit... (Staff name) is willing to take a look at the process for doing same day sticks for H/H and lead tests... Quotes from QI team members: "(Staff name) felt pretty good about this; it was clearly OK with her. It's about the patient"... She said, "No problem doing finger sticks; I can try it!"

- 6. <u>Resource availability for QI:</u> although time for QI is sometimes carved out more by the dedication of the staff to QI than by leaders allocating sufficient time in the staff schedule for QI project work, the evidence of many QI projects indicates that leaders provide at least the minimum resource support needed to work on QI. The QI Team for lead screening showed evidence of similarly strained resources. Four themes related to resource availability:
 - a. Resources are made available to conduct QI activities; this is reinforced

by corporate documents.

Ln 95: That's usually our general manager, CS, who will do some kind of spreadsheet. She does quite a lot of spreadsheets that we discuss at a lot of our meetings, basically how many patients are we seeing this year, what was the timeframe on that particular survey or whatever, what's the general timeframe that patients are here, was there a big emergency one day when it looked bad or something (laughs), and she kind of checks up on all that stuff

Ln 115: Usually, first somebody recognizes a problem. And then, the people who are involved in the process, that all of the people involved in that process, involved in that problem, have to be in one place and they have to say what are the possible solutions.

Corporate Policy - Organizational Philosophy: Education and staff development are critical to quality and will be supported and encouraged. Remaining on the cutting edge of one's profession is an expectation and a responsibility of all health care professionals.

b. Staff availability for QI activities is a continual challenge; it is difficult to

find time to do the work.

Ln 137: We'd definitely try and do it, the best that we can, but we don't want anything to fall behind as well

Ln 140: You saw what happened today, trying to get 15 minutes with you. And this is constant, very hard.

Ln 143: Not only are we greatly understaffed, but we are the only practice for twenty miles in any direction...

Ln 250: I think that has a lot to do with the lack of time and the financial constraints we are constantly being reminded about. And that the chronic problem we have here is that we are not seeing enough patients to make ends meet and nobody in this office could possibly work harder.

Field journal, Aug 31, 09: Busy time; reduced staff; not enough time to do the things we used to do; just moving around all the piles that are waiting to be dealt with. In the process of "moving" (rearranging the current office space; not leaving it). (Staff name) used to take a flu kit to the community elementary schools and vaccinate school kids in partnership with school nurses and parents. Can't take the time to do this anymore; she is trying to arrange for the kits to go to the school nurses for their use in vaccinating.

Field journal, Aug 31, 09: Stressful time; can't spend too much time away from workstation. Front line staff must leave QI meetings promptly at the end of the meeting and sometimes a little earlier.

c. Financial constraints are not necessarily an obstacle and are not seen as

the biggest obstacle

Ln 171: No, the biggest barrier is always inertia

Ln 168: Finance is NOT a reason not to do quality improvement.

Field journal, Sep 21, 09: Finance doesn't get raised as a barrier or an issue. Often, there is not the time for everything that is important. There is no barrier around making changes, but changes are usually discussed in the context of IT, and therefore not always in the control of the practice.

d. But finances are sometimes seen as an obstacle and leaders should

address them for long term success. This is seen both by practice

members and addressed by the corporate organization as a whole.

Ln 146: there is only a limited population here, but yes, we don't have unlimited funds, people to do it, and we can't cut back on other things we are doing in order to accomplish quality improvement.

Ln 277: Need training support - both time + finance in order to implement changes + see them carried out

Ln 279: Hard to carve out time for planning, implementing very busy, financial stressors

Ln 288: They (QI projects) are vital to do but not valued by our national health care system. No value for time spent monetarily which limits office's ability to continue. Would be nice to have a reimbursement system that values improvement and not just procedures

Ln 310: Financial support (is needed) from employer to have team for meetings and not relying on volunteers. Worked for this but won't be sufficient to repeat other QI projects.

State of the Hospital August 2009 Update, Interim CEO: No organization can be successful without investing in education and effectively recognizing its own staff for their outstanding performance. We must find additional savings or new revenue to allow us to support a learning organization.

All sources of information regarding the independent variables in this case study indicate that this practice should be as effective, if not more so, as any in conducting and implementing QI projects. Although the outcome of QI projects cannot be guaranteed, the likelihood of success is high with consistent support from champions, management, resources, organizational climate, fit with internal values, and consistent QI policies and practices. Staff expressed concern about whether leadership will address limited resources and the researcher noted that not all staff were involved equally due to the volunteer nature of their participation. Nonetheless, the evidence presents a strong case for implementation effectiveness. If there is a setting in which AA3 could be accepted, OSA1 would be a logical place for effective application.

Quantitative Analysis of predictors before and after the project. This analysis used pre- and post-project scores to assess changes in perception of the independent variables over time. The conceptual model identified in Chapter 3 proposed that six independent variables collectively affect the willingness of provider office staff to change via a QI project and may also affect the QI project itself and its outcomes. The model assumes that the independent variables were relatively unchanged during the course of the QI project up to the time that the results were evaluated again by the second, post-project, staff survey. This survey repeated questions that related to five of those variables (management support, financial resource availability, the presence of champions, implementation policies & practices, and organizational climate) to support identification of noticeable changes¹². Table 9 provides a list of all survey statements used to measure the five independent variables, with statements numbered 16 - 22 and 24 included on surveys for all staff.

Post Survey Statements addressed to all staff	Independent Variables
16. Our practice leaders (providers or managers) support QI	Management Support
projects.	
17. Our practice provides enough time to complete QI	Financial Resource
projects.	Availability
18. When we do a QI project, our practice provides the	Financial Resource
financial resources to implement it.	Availability
19. When we do a QI project, we understand how to get it	Implementation Policies
done.	and Practices
20. Our office practice cares about QI projects	Organizational Climate
21. Our practice has someone we can go to for help when	Champions
doing a QI project.	
22. QI is important to me	Organizational Climate
24. I think that QI projects are NOT valued in our practice.	Organizational Climate

 Table 9: Post-Project Survey Statements and Independent Variables OSA1

Changes in median scores for independent variables were mixed, with two variables unchanged and three increasing. The two variables that did not change were not able to

¹² The sixth independent variable, implementation values fit, was not included in the initial design of the staff surveys used with OSA1 staff, although the variable was included in later case studies.

increase, as the pre-project medians were at the top of the range. Scores above the neutral point of 4.0 are considered high. No median scores appeared below the neutral point. (Figure 13).





Of the three variables that saw an increase in median, "Champions" increased the most by a full fourth of the rating scale.

When looking at score changes for individual statements rated by all respondents, three of the statements increased in score and four stayed the same. No scores changed by more than one fourth of the range. (Figure 14).

Figure 14: Indep. Var Statement Pre/Post Patterns-Box & Whisker Plot OSA1



Changes between values from pre- to post- period surveys regarding the statements reflecting independent variables were analyzed using a two tailed Wilcoxon Rank Sum test at a significance level of 0.05; these differences were not significant. It is not possible to tell, using the survey instruments, whether these changes were due to systemic issues or to random chance. No systemic issues presented themselves overtly during the course of the project and no medians changed by more than a fourth of the range, which is the threshold at which statistical significance could be detected. Those statements whose medians displayed a change (sufficient time, the support of a champion, and understanding how to conduct the project) may bear interesting findings in future studies. In addition, it must be considered as a possibility that the positive outcomes of the AA3

based QI project were affected in part by the supportive environment, of which three median ratings showed a nominal increase.

Case Study 1 Results re: The Effect of Office Systems Analysis on QI

This study asked the question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis?" This particular practice, OSA1, was already very capable with regard to conducting QI projects prior to the start of the lead screening project. All predictors of implementation success (independent variables) were aligned to support successful outcomes both before and after the QI project on lead screening.

After one AA3 project, the staff found the AA3 methodology effective in improving a desired clinical outcome (increasing lead screening rates), a perception supported by electronic chart review conducted after collecting staff survey data. The project made two changes to work processes (same-day lead testing and streamlined patient letter printing) and staff surveys rated these changes as positive (positive median values for four of the seven process statements: the lead screening process had fewer steps, was easier, took less time, and resulted in fewer errors). However, these four statements received a wide range of ratings (scores ranging from 2 - 7), except for "lead screening is easier" which received scores ranging from 4 - 7. The wide range of ratings can be interpreted as a logical result from work redesign that redistributed tasks, giving some staff more work and some less in order to meet the QI team goal. The ratings also indicate that the QI process, AA3, has characteristics that may be linked to some degree of staff acceptance of this methodology: a median of 4 for the statement that the QI process was easy and 6 for willingness to participate in future QI projects.

These perceptions were more strongly expressed in responses from the QI team. Two team members rated the clinical outcome as improved, the process changes as effective, and the AA3 methodology as helpful with 72% of the total number of responses given the highest possible ratings. Across all respondents, scores for Process Effectiveness were positively correlated with scores for Clinical Effectiveness. This case study indicates that there may be a logical and measurable relationship between process improvement and the improvement of patient care, and that this approach can be useful in a small health care organization with limited resources.

Furthermore, AA3 may have been particularly well suited to this QI environment. QI projects are typically an accepted part of OSA1's organizational work. The value of staff participation and QI projects that improve staff work are indicative of an organizational climate that supports a QI method based on AA3. The projects are conducted by staff volunteers who perceive value in improving both work processes and patient care. Staff do understand the QI process but identify their greatest challenges in terms of staff availability and the need to maintain work processes while conducting QI. The staff value short or small QI projects for this reason, which helps explain why AA3 was rated positively by QI team members. The project required 10 hours of meeting time for three staff over lunches with one evening meeting, all of which were organized around staff availability. Furthermore, the AA3 method allowed speed and flexibility, two characteristics that were cited as being important for successful QI projects in this practice.

Although AA3 appeared to work effectively in this one QI project as rated by team members, it is not certain, in its first trial, that it is easy to use, or easier than its

established QI process of PDSA and Clinical Microsystems. Changes from pre- to postproject surveys did not increase for any of the median values of the dependent variables. Although one team member noted that AA3 was made as easy "as it could have been," the methodology uses new and different steps (e.g. the AA3 Report), which require instruction and practice. A more complete evaluation of "ease of use" would require additional trials of the AA3 methodology.

Nonetheless, AA3 may have potential to assist in this and similar offices. Many references were made regarding the limitations in resources to conduct the core work of the practice (patient care) as well as additional QI projects. Ln 249: "And that the chronic problem we have here is that we are not seeing enough patients to make ends meet and nobody in this office could possibly work harder." If AA3 can continue to be used to remove waste from office processes while making progress in QI projects that staff value, both the ease of use and usefulness of AA3 will increase over time to engage more staff in more QI teams with lower costs. Furthermore, AA3 participants appeared more able to see the effect of process changes and their impact on clinical outcomes. With additional experience in AA3, more staff may benefit from this perspective as well.

Following the formal close of this case study, the practice continued to collect data on its success in screening children for lead and engaged in other QI projects, such as a state-wide demonstration of its electronic medical record for "meaningful use" as defined by the Centers for Medicare and Medicaid. As QI projects continue, it is likely that the practice will need to address how to support staff participation and the other resources needed to conduct and assess improvements in patient care. The AA3 lead screening project has provided an example of how this can be done.

Participant Review of Case Study Findings: As described in the Chapter 3 (see pg. 52), the participants had the opportunity to review the results of the case study during a scheduled staff meeting on May 13, 2011, more than a year after the formal conclusion of the QI project. This meeting was attended by 14 OSA1 practice staff and by the Chief Medical Officer of the corporation of which this practice is a member. The presentation provided an overview of the study aims and a summary of the results, which included more recent data demonstrating that the practice had sustained the improvements in lead screening rates for over a year, with a 16 month screening rate of 89% for one-year-olds and 88% for two-year-olds.

After viewing results about both clinical outcomes and staff perceptions about the AA3 process, the participants responded freely to the question: "Did this experience with Office Systems Analysis make Quality Improvement more likely to be successful in this practice?" In addition, the presentation handout provided comment sections for every slide and a separate page for open-ended responses regarding the QI project and the QI process. Five participants provided written comments and the researcher took notes on the group discussion that reflected the opinions and experiences of the providers and staff present.

None of the feedback received in response to this presentation contradicted or questioned the results presented above. Responses to the question of whether AA3 made QI more like to be successful in OSA1 were unanimously positive. In addition, the following comments provided additional insight on staff perceptions of AA3:

Comparing this process to Clinical Microsystems, it [Office Systems
 Analysis] used the same information, with a similar process, but it had a very

specific focus on how much time it takes to do every step. It required us to measure and quantify something we don't usually think about.

- This was like Clinical Microsystems with a magnifying glass. It was helpful,
 it set the stage to study the problem.
- When you put in the time frames for each step, you can really streamline the process.
- This (Office Systems Analysis) is good for more specific problems.
- Our office was VERY pleased with how this project was conducted, the impact it had (and continued impact) it has had on our work flows and approach to quality improvement. This project will actually be rolled out to our pediatric office as well as our other primary care office as a system quality improvement initiative with the hopes of the same success that we saw at (OSA1).
- We need to do this again we're going to work on immunizations next.
- Could you (the researcher) be available "on call" for us when we do another project? (The answer given was: "Yes!")

4. <u>Threats to validity</u>

The results found in OSA1 case study on lead screening may have been affected by unique issues found in the context of the case study. These threats to validity may have affected the findings related to the dependent variables of the study.

History: No known changes affecting the practice and staff with regard to lead screening or QI projects in general occurred during this study. However, the overall positive climate in support of QI projects, plus the state mandate to increase lead

screening rates, may have heightened positive staff perceptions of AA3 and the QI project outcomes. As far as could be measured by pre- and post-project ratings of the independent variables from the Helfrich adapted model on implementation effectiveness, the QI climate did not change significantly between surveys conducted before and after the project so that such effect, if it existed, was equal to that of past QI projects.

Problem-solving Solution Pull: The practice was confronted by a known public health problem: lead screening rates in its region were lower than state averages and far lower than new clinical standards. The practice is also the sole provider in its particular community and the health care providers have a stated purpose of providing care that meets or exceeds quality standards, with a history of conducting quality improvement projects. Furthermore, the researcher has observed anecdotally that health care providers in rural communities are often motivated by their setting, in which they provide care directly to family and neighbors. It is possible that the need to solve the problem (low screening rates) was motivation enough to create a workable solution regardless of the QI process used. It is impossible to tell if using OSA1's existing QI methodology would have resulted in the same outcomes as with AA3, other than by asking participants for their opinions through the survey conducted following the completion of the QI project.

Investigator Relationship: The process of conducting a QI project required time on the part of the investigator who acted as QI facilitator to set up, explain, teach, coach, and advise QI team participants. It is inevitable that human relationships form over time, resulting in interpersonal attachments. The QI team members appeared, throughout the investigator's field journal, to have provided honest and thoughtful comments and responses to the QI project. It is possible, however, that those responses were affected by

a desire to please the investigator or to meet the investigator's expectations of desired answers. The data collected from different sources (interviews, document reviews, two surveys, field journals, and chart audits) converged on the results identified above, providing different opportunities to collect valid data. With the exception of the chart audits and document reviews, all of these could have been affected by the relationship that developed over six months.

Maturation of the Investigator: The investigator involved in this case study conducted the QI project according to the IRB approved protocol described in the methods section above. However, this was the first such application of that protocol in the investigator's experience, and as the case study proceeded over the course of three months, the investigator became more aware of and capable of responding to the QI team's needs for proceeding through the QI project. The investigator has extensive experience in conducting QI projects (over 25 years), so that any self-adjustment to the context of the case study was likely made early in the introductory process. Nonetheless, the interviews were conducted prior to the start of the project and the field journal was recorded throughout the process. Observations may have been affected as a result of the investigator's own growth and maturity in understanding the QI process and context in this particular practice.

Investigator Bias: The investigator who facilitated the QI team is the same person as the researcher who designed and oversaw this case study. It is possible that the data collected could be interpreted from a biased perspective in favor of hoped-for study outcomes. In anticipation of this threat, all qualitative data and resulting analyses for this case study were reviewed by an independent research team at the University of Vermont,

who confirmed the associations made with the raw data and identification of major themes. Quantitative analysis was guided by a statistical expert on faculty at the same organization. The researcher was mindful of this threat and worked to identify and eliminate such threats through presentations and review of the case study findings.

5. <u>Attachments</u>: chronology and list of those interviewed found in Appendix F

Case Study #2: Integration of Behavioral Health Services in Primary Care Office -

Adult Internal Medicine

"You know I think it's the same problem. That there just seems to be not enough time to do the project correctly, to study it correctly. To get back to build on it. You know sometimes it's kind of like the finger in the dike thing. At least that's what it sometimes feels like to me. And maybe that's just – I'm always feeling aggravated about it." OSA2 pre-project interview

1. The provider practice and the history and process of QI for that practice

Case Study #2 took place at an outpatient provider practice here identified as Office Systems Analysis Case Study 2 (OSA2) in northwestern Vermont. The practice is one of many operated within an academic medical center in the same region. OSA2 is located in the largest city in Vermont and serves a diverse socio-economic and ethnic

population. The practice includes the primary care internal medicine residency program of the academic medical center. The practice is physically divided between two wings in a single facility, one of which



houses the clinic in which residents see their patients. However, providers (physicians and nurse practitioners) see patients on both wings and the quality improvement project was conducted to include the entire practice. Within the same facility, a variety of other medical services are available, including specialty care office practices, laboratory services, and a retail pharmacy.

The provider group consists of nine physicians who are regularly scheduled to care for patients in this setting, as well as three nurse practitioners. Including all residents and covering physicians from other practice offices within the academic medical center, 72 other providers also saw patients in this location over the course of 18 months. The practice serves primarily adult patients (1.15% of patients were less than age 18) and most of its patients (79.72%) are between the ages of 19 - 64 years of age. The practice offers same day appointments for acute needs and accepts new patients into its schedule.

In addition to the providers identified above, the practice employed 30 staff at the time of project start-up to keep the practice open 47 hours/week. Patient visit volume fell from 2008 to 2009 by 11%, most likely due to the departure of a physician who was not replaced and due to reduced scheduling for all providers during the implementation of an electronic health record (EHR) system in 2009. Practice payer mix for this time period is presented in Table 10:

Payer Category	Percent of Total
	Charges
Commercial	59%
Medicare	20%
Medicaid	17%
Self Pay	2%
Other Government	1%
All Other	1%

Table 10: Payer Mix Percentage of Total Charges OSA2

Among the top 10 diagnoses or conditions related to patient visits, two were directly related to mental health needs: depression (#6 in visit volume) and anxiety (#8). Integrating a new position, a behavioral health clinician, into the practice to assist with mental health needs involved a process that occurs regularly for this practice, with a referral volume to mental health specialists of approximately six referrals per week prior to the start of the project. OSA2 has a history of conducting QI projects that predates the recollections of the three employees who were interviewed, including one with 15 years at the practice. Practice physicians in leadership roles are known, and remembered from the past, for initiating QI projects. The practice plans its QI work in conjunction with the larger academic medical center of which it is a part. Case Study #2 was one such QI project conducted during the academic year 2010-2011. After the conclusion of the "Integration Project," as it came to be known, the leadership within the academic medical center decided to integrate behavioral health clinicians into all affiliated primary care sites.

2. <u>Description of the QI project selected by the practice, the application of AA3 in that</u> project, and the clinical effectiveness of that project

The Governor of Vermont launched the Vermont Blueprint for Health in 2003 with the goal of simultaneously improving the management of diabetic conditions and reducing resource utilization by diabetic patients. Over the past eight years, the State Legislative and Executive branches have supported and transformed this program into a health reform plan, passing into law Act 191 in 2006 to endorse the Blueprint formally and to provide a health insurance program for uninsured Vermonters (Vermont Blueprint for Health, January 2011). A 2007 legislative update incorporated the Patient Centered Medical Home (PCMH) model into the Blueprint, an approach that provides comprehensive primary care with the goal of broadening access to primary care and enhancing care coordination (Patient Centered Primary Care Collaborative,). The Blueprint subsequently piloted three PCMH communities in Vermont, one of which included OSA2 in 2008.

The 2010 annual update to the law, Act 128, mandated expansion of the program state-wide, "integrating a system of health care for patients... by promoting health maintenance, prevention, and care coordination and management." To support this expansion, the Blueprint developed tools and programs to assist primary care practices and other community providers with the implementation of the PCMH model. One such form of assistance was the establishment of the Expansion and Quality Improvement Program (EquIP), through which facilitators and coaches worked with primary care practices throughout the state. This QI method is described in the "Blueprint for Health Implementation Manual" as the use of "rapid process improvement cycles utilizing the PDSA (plan, do, study, act) model," which "may be as simple as mapping and documenting an 'everybody knows it' policy, or may be more difficult, such as changing clinical flow and job roles." (Department of Vermont Health Access, Vermont Health Care Reform, November 2010)

In 2009, researchers from the academic health center and the affiliated university college of medicine noted the need for integrating psychological services into the primary care setting, specifically referencing the PCMH model (R. Kessler, Stafford, & Messier, 2009). The academic medical center had previously experimented with a behavioral health psychologist specializing in primary care as a part of a provider office practice in 2000 and again in 2009, efforts marked by both successes and failures. The model of behavioral health services integrated into primary care practices grew from these two single-site experiments into a formal business case. OSA2, the practice setting of a third behavioral health integration experiment conducted as a QI project, was a deliberate test of this business case prior to full adoption of integrated behavioral care.

The business case for integration of behavioral care is based on multiple findings indicating that patients with behavioral health needs are more likely to receive related services in primary care settings than in the specialty mental health system (R. Kessler & Stafford, 2008). This review of the literature also found that, in primary care settings, the presentation of behavioral health problems often goes undetected. Treatment of such problems in primary care settings does not meet standards of care and the costs associated with inadequately treated behavioral problems are high, whether measured by the utilization of services (emergency room visits and hospitalizations), medical costs, or mortality.

Data collection for this QI project did not include measuring the degree to which patients' behavioral health needs were met in primary care settings. Such data collection was outside the capabilities of the QI team. However, Kessler and Stafford also found another measure of unmet need in the literature: the low rate of appointments made by primary care patients whose needs are recognized by their primary care providers and who receive referrals to mental health specialists. These studies show that 50% - 90% of primary care referrals made to out-of-office mental health practitioners did not result in a follow up appointment.

When the QI team reviewed its own history of scheduling appointments for referrals, it found that over the course of 10 months prior to the start of the team's work 26% of mental health referrals were incomplete, refused by patient, refused by the mental health specialist, or lost; 40% were the responsibility of the patient to schedule; and 34% were scheduled by the office practice staff. Those that were scheduled by the office staff resulted in an average time from referral to date of first appointment of four weeks,

ranging from two weeks to twelve. This delay was considered unacceptable by provider members of the team. The team developed three specific measures to evaluate the impact of its work: the ratio between mental health referrals ordered relative to primary care visits at the practice, the number of mental health services scheduled at the academic medical center relative to the number of referrals ordered, and the average time from referral to first appointment for mental health services at the academic medical center.

Practice leaders of OSA2 agreed to integrate a behavioral health clinician into their practice in 2010. A project leader from the Center for Clinical and Translational Science within the university, interested in the relationship of innovation implementation and organizational context, volunteered the project for inclusion in the OSA study, with a start date of August 11, 2010 and an end to formal team meetings on November 17, 2010, after eight sessions. The QI team included three OSA2 providers (two physicians and one nurse practitioner), four OSA2 staff (a triage nurse, a lead scheduler, a medical office assistant, and the practice manager), and two project leaders (one from the academic medical center and the Principal Investigator from the Center for Clinical and Translational Science). Formal QI team meetings totaled eight hours of staff time per team member, excepting two team members who experienced scheduling conflicts after the first session. These team members either participated in additional meetings at separate times or provided informal feedback to team members as the work progressed.

Each session was organized around the AA3 method of office systems analysis; Appendix F lists the chronological events and staff interviewed for this study. Key actions completed by the team included:

- Initial assessment of measures of success by team members, estimating that 70-80% of patients may be found to have behavioral health needs, that approximately 6-10 referrals for mental health services were issued weekly, that many of these were not scheduled by the practice, and that no feedback loop existed to confirm whether the patient went on to receive care.
- Development of two complete "current state value stream maps," one for the behavioral health referral process and another for the referral scheduling process with a mental health specialist outside the practice.
- Development of a single "target state value stream map," with seven work process changes:
 - Direct scheduling for an appointment with the behavioral health clinician based on triage nurse screening (i.e. no primary care provider visit needed in order to generate a behavioral health referral)
 - Face-to-face introduction of the behavioral health clinician at the time that a primary care provider generates a mental health referral during a patient visit
 - Immediate scheduling of an appointment with the behavioral health clinician on the day that the referral is made
 - Pre-authorization for insurance coverage by schedulers for initial behavioral health clinician visit
 - Behavioral health services provided by the behavioral health clinician until an external mental health specialist is found
 - o Scheduling of external mental health visits by the behavioral health clinician

- Follow up communication by the behavioral health clinician with external mental health specialists for patients with scheduled appointments
- Pilot tests and implementation plan of "target state" carried out over two months (See Appendix G for facsimiles of hand drawn diagrams of AA3 reports)
- October 2011 post-project data collection by electronic medical record reporting for pre-project (February 2010 January 2011¹³) and post-project periods (February 2011 June 2011), resulting in:
 - An increase in the ratio of mental health referrals ordered by primary care providers to primary care visits at the practice from 25.25 referrals per 1000 primary care visits to 43.95 referrals per 1000.
 - A decrease in the mean number of days from date of referral to first mental health appointment in the academic medical center from 33.1 days to 20.6 days.
 - An increase in the number of mental health services scheduled at the academic medical center relative to the number of mental health referrals ordered from 59% of mental health referrals to 71% of mental health referrals.

Table 11 presents these data in more detail with appropriate statistical tests to determine significance. In addition to identifying the relationship between primary care provider (PCP) visits and referrals for all mental health services, the analysis highlights a subset of mental health services, Ambulatory Consult Behavioral Health, which represents the type of referrals associated with the services provided by the behavioral health clinician. Referrals for these services increased more than total referrals or referrals for non-

¹³ Data from January 2010, representing the start-up period of the EHR, were excluded from the pre-project data set as post data collection review showed them to be markedly different from the remainder of the data

Ambulatory Consult Behavioral Health services, which decreased relative to visits. All

associations between pre-project and post-project measures were statistically significant.

Clinical Effectiveness of Project	Pre-Project 12 Months 2/2010-1/2011	Post-Project 5 Months 2/2011-6/2011	Test for Significance	2-Tailed p value
Primary Care Referrals for All Mental Health Services	25.25/1000 PCP visits n=22,808	43.95/1000 PCP visits n=9,419	Chi-square with Yates correction ¹⁴	< 0.0001
Primary Care Referrals for Ambulatory Consult Mental Health Services	0.92/1000 PCP visits n=22,808	23.89/1000 PCP visits n=9,419	Chi-square with Yates correction	< 0.0001
Primary Care Referrals for Non- Ambulatory Consult Mental Health Services	24.33/1000 PCP visits n=22,808	20.07/1000 PCP visits n=9,419	Chi-square with Yates correction	= 0.0226
Average # Days from Referral Date to 1 st MH appointment at AMC	33.10 days n=341 sd=30.0844	20.60 days n=292 sd=28.6469	Unpaired <i>t</i> test ¹⁵	< 0.0001
% MH Referrls resulting in a Scheduled MH Appointment	59% (341/576)	71% (292/414)	Fisher's exact test ¹⁶	= 0.0003

 Table 11: Clinical Effectiveness of Behavioral Integration Project OSA2

¹⁴ The chi-square test with Yates' correction was run on a publically available statistical package found on the Internet at <u>http://www.graphpad.com/quickcalcs/CatMenu.cfm</u>

¹⁵ The unpaired *t* test was run on a publically available statistical package found on the Internet at <u>http://www.graphpad.com/quickcalcs/ttest1.cfm?Format=SD</u>

¹⁶ The Fisher's exact test was run on a publically available statistical package found on the Internet at http://www.graphpad.com/quickcalcs/CatMenu.cfm

In addition to the above data collection process using electronic health records, observations of the results associated with the presence of a behavioral health clinician stem from two other sources: post-project conversations with the behavioral health clinician and review of her manual log of all referrals received for behavioral health consults. Results from these sources indicated that:

- All referrals (100%) from the PCP for a mental health service that came to the behavioral health clinician (BHC) resulted in a meeting, an appointment, or other form of contact with the clinician to set up a mental health or social service appointment. This is in contrast to the 34% of mental health referrals scheduled by practice staff in the past. However, not all mental health referrals were directed to the BHC for services or coordination. Occasionally, physicians referred to mental health providers based on patient or physician preferences.
- The time from date of referral by the BHC to date of first mental health appointment with an outside specialist was 12 days on average, with a minimum of zero (same day appointment as referral date) and a maximum of 35 days, or five weeks. The median number of days was 14 for 37 referrals in the time frame provided by the log (June 2011 to August 2011).
- For patients that the BHC referred on to mental health specialists outside the practice (either in the academic medical center or in the community), 68% of patients were documented as keeping the first appointment made with their specialists. No corresponding data exist that the QI team was able to collect prior to project start up. Regardless of comparative measures, the mere presence of this

information, which is referred back to the PCP for further follow up with the

patient, was considered an improvement in the quality of the service provided. The numbers related to elapsed time, in particular, compared favorably to the manual review of referrals and scheduled appointments conducted by the QI team, for which the average time was four weeks, with a minimum of two weeks and a maximum of 12 weeks for the 90 referrals that could be tracked (January 2010 to November 2010). These numbers are only generally descriptive of the change that took place; the sources of data for the two time periods were completely different and the degree of accuracy related to the sources and methods used are also likely to be very different. Nonetheless, those differences are dramatic, although not appropriate for statistical testing for significance, as seen in Table 12:

Clinical Effectiveness of Project - Descriptive	Pre-Project 10 Months 1/2010-11/2010	Post-Project 3 Months 6/2011-8/2011
% of Referrals scheduled by practice staff	34%	~100% (for referrals managed by BHC)
# Days from Referral Date to 1 st MH specialty appointment at AMC (and in community post-project)	Average: 28 days Minimum: 14 Maximum: 84 N: 90	Average: 12 days Minimum: 0 Maximum: 35 N: 37
% Patients Arrived at 1 st MH specialty appointment	n/a	68%

 Table 12: Clinical Effectiveness of Behavioral Integration Project-Descriptive OSA2

As part of the data analysis provided in Table 11, the Chi-square test with Yates correction compares frequencies of two groups. It is used for dichotomous data (a visit

either did, or did not, result in a mental health referral). Use of this enumeration statistic is based on the following assumptions (Dixon & Massey, 1957):

- a. Samples are randomly drawn from a normally distributed population. The population of primary care visits is assumed to be normally distributed; the sample included all visits within the time periods (February 2010 through January 2011 and February 2011 through June 2011), which is also assumed to be representative of the entire population of primary care visits in this practice.
- b. Cell sizes (the number counted within each dichotomous group) are 5 or higher. All cell sizes in this calculation were larger than 5 visits. The smallest cell size was the number of pre-project referrals for Ambulatory Consult behavioral health services, of which there were 21.

The two-tail Chi-square tests used in Table 11 calculate the probability that any differences between the pre-project and post-project results for referring primary care patients to mental health services were due to chance. The results show that the probability that all mental health referrals increased, and that Ambulatory Consult behavioral health referrals increased, solely by random chance is less than 1 in 10,000 for each measure. The probability that non-Ambulatory Consult behavioral health referrals decreased solely due to chance is slightly more than 2 in 100.

The unpaired *t* test calculates the probability that the means from two independent groups are different. In this case study, it is used to compare the pre-project average number of days from the referral date on which a primary care provider made a mental health referral to the date of the first mental health appointment related to that patient within the academic medical center (AMC) to that of the post-project period. (The

electronic health record data source did not include appointments scheduled for other community mental health providers.) The use of the unpaired t test is based on the following assumptions (Dawson & Trapp, c1994):

- a. Samples are randomly drawn from a normal population. The number of days that elapse from referral to scheduled appointment for mental health visits is assumed to be normally distributed. The sample included all mental health referrals resulting in an AMC scheduled visit within the time periods (February 2010 through January 2011 and February 2011 through June 2011), which is also assumed to be representative of the entire population of primary care AMC mental health referrals in this practice.
- b. Given that sample sizes are unequal (a total of 341 pre-project referrals resulting in a scheduled AMC mental health visit versus a total of 292 post-project referrals), variances are equal. There is no reason to believe that the variance of this statistic would have changed between the two time periods.
- c. Observations are independent of each other. The elapsed time between referral and appointment dates in the pre-project period did not affect the elapsed time in the post-project period.

The two-tailed *t* test used in Table 11 calculated the probability that the decrease in the number of days that elapsed from referral to the scheduled AMC mental health appointment between the pre-project and post-project periods was due to chance is less than 1 in 10,000.

A description of the function and the assumptions related to the Fisher's Exact Test are found in Case Study #1 and are not repeated here. The samples used to analyze

the percent of mental health referrals resulting in scheduled mental health appointments were representative of their populations, as the samples include all referrals and appointments generated during these time periods and entered into the electronic health record system. The samples from the two time periods were independent of each other. The results that are tested above are mutually exclusive, representing either scheduled or non-scheduled visits. The two-tailed test in Table 11 calculated the probability that the increase in scheduled mental health appointments from the pre-project to the post-project period was due to chance is 3 in 10,000.

There is an alternative to the conclusion that random chance was the cause of the above five outcomes of project clinical effectiveness (Table 11), or the three descriptive outcomes of project clinical effectiveness not tested for statistical significance (Table 12). The cause of these results may be the effect of the QI project that used the AA3 method to integrate a behavioral health clinician to provide immediate, short term access to such services and to facilitate further referrals to longer-term mental health services. To further explore whether this might actually be the case, this analysis examined the perceptions of the AA3-based project as presented in staff surveys, compared those perceptions to similar perceptions prior to the QI project, and examined narrative descriptions of the context, the outcomes, and the predictors related to the outcomes of the behavioral integration study.

3. Outcomes from the QI project using AA3 as a QI process

Quantitative Analysis of outcomes. Using only the post-project survey scores, from 14 returned surveys out of 35 distributed (a return rate of 40%) the analysis calculated the median values for each statement related to a dependent variable. Table 13

lists all survey statements used to measure the three dependent variables, with statements

numbered 4 - 16 and 25 included on surveys for all staff and providers and statements

lettered from A – F included on surveys for QI project team members only.

Table 13: Post-Project Survey Statements and Dependent Variables-OSA2

Post Survey Statements addressed to all staff	Dependent Variables
4. The behavioral health project was successful in improving the	Clinical Effectiveness
quality of patient care.	of QI Outcomes
5. The behavioral health project made my job easier.	Process effectiveness
	of AA3
6. The behavioral health project made us more efficient as a practice.	Process effectiveness
	of AA3
7. The behavioral health project was easy to do.	Acceptance of QI
	Process
8. The behavioral health project improved how well I can do my	Acceptance of QI
job.	Process
9. Behavioral health referrals from primary care providers are	Clinical Effectiveness
managed more quickly now than before the QI project.	of QI Outcomes
10. Behavioral health referrals to mental health specialists outside the	Clinical Effectiveness
practice are managed more quickly now than before the QI project.	of QI Outcomes
11. We do a better job managing referrals for behavioral health now	Clinical Effectiveness
than we did before the QI project.	of QI Outcomes
12. As a result of the behavioral health project, it takes fewer steps to	Process effectiveness
manage a referral than it used to.	of AA3
13. As a result of this behavioral health project, it is easier to manage a	Process effectiveness
referral than it used to be.	of AA3
14. As a result of this behavioral health project, it takes less time to	Process effectiveness
manage a referral than it used to.	of AA3
15. As a result of this behavioral health project, there are fewer	Process effectiveness
mistakes in handling a referral there used to be.	of AA3
16. As a result of this behavioral health project, the patients don't wait	Process effectiveness
as long for a behavioral health visit as they used to.	of AA3
25. If I were asked to be part of a QI project in the future, I	Acceptance of QI
would accept.	Process
Post Survey Statements addressed to QI team members only	Dependent Variables
A. The A3 tool helped us make changes that were part of the	Acceptance of QI
behavioral health project.	Process
B. I would be willing to use the A3 tool to make changes in	Process effectiveness
other parts of the office.	of AA3
C. I would be willing to participate in other QI projects that use	Process effectiveness
the A3 tool to make changes.	of AA3
D. The time I took to do the behavioral health project using A3	Process effectiveness
was made up by time saved in the work I do in the practice.	of AA3

Post Survey Statements addressed to all staff	Dependent Variables
E. The A3 process was easy to do	Acceptance of QI
	Process
F. The A3 process made my job performance better.	Acceptance of QI
	Process

Each statement was accompanied by a Likert scale from 1 (strongly disagree) to 7 (strongly agree), as well as a choice of 9 (don't know). The summary statistics for statements were calculated for all staff (#4-16 and 25 above) as well as the five number summary (Figure 15). (Note: not all responders felt able to score all questions. The number of respondents is indicated in the x-axis labels.)





<u>Responses from all staff (team members and non-team members)</u>: The above box and whisker plot¹⁷ indicates that all 14 statements related to the dependent variables had median scores greater than the midpoint score of 4 (the neutral response).

The graph has three sections: statements about the acceptance of the QI process (measuring the ease of the QI project, improvement of job performance, and willingness to participate in future QI projects) found to the left of the vertical dotted line; statements about Process Effectiveness (measuring whether staff work became more effective as a result of this QI project) found between the dotted and dashed lines; and statements about Clinical Effectiveness (measuring whether the process of making behavioral health referrals improved) found to the right of the dashed line.

In representing OSA2 staff opinions about "Acceptance," all three statements in this category yielded a median score of 6, well above the neutral score of 4 and one point short of the maximum possible score. All three statements also yielded maximum scores of 7, the highest rating possible. Of the 14 respondents, 10 evaluated the AA3-based project on "easiness," which included a minimum score of 2. Improvement on job performance was evaluated by 12 of 14 respondents, with the minimum response rating slightly higher at 3. All 14 respondents scored their willingness to participate in future QI projects, which had the most concentrated and positive responses with a minimum score of 5, excluding outliers. This concentration of high scores may be partly attributable to the long history of and reputation for QI in OSA2, which is considered a reason that new personnel apply for employment in the organization. However, two outliers rated this statement a "1" and a "2," indicating that this perception is not uniform across respondents.

¹⁷ See pg 72, Figure 7 footnote, for a detailed explanation of a "box and whisker plot."
Process effectiveness statements, of which there are seven, were answered by no less than 8 and sometimes as many as 13 out of 14 respondents. All of these statements, based on their median scores, indicated improvement (medians > 4) in the work necessary to complete behavioral health referrals. All statements except two had first quartile responses above the neutral score of 4 as well, indicating that three quarters of the respondents saw improvements in these five statements. The exceptions, "fewer steps to manage a referral" and "takes less time to manage a referral," had first quartile scores of 4 or just under 4. Low scoring outliers were identified for two statements: "easier to manage a referral" and "patients don't wait as long" but these statements were otherwise considered to have improved by most respondents.

Clinical Effectiveness was evaluated by four statements, with a minimum of 11 respondents out of 14 ranging in median scores from 5.5 to 7 and with all statements reaching the maximum of 7 for highest scores. The lowest rated statement tests opinions about the speed of managing referrals from the primary care provider (PCP), resulting in a median score of 5.5. The two statements regarding success in improving the quality of patient care and the speed at which referrals are made to outside mental health specialists yielded median scores of 6. The summary statement of success for the project, "We do a better job managing referrals for behavioral health now than we did before the QI project" resulted in a median of 7, indicating that half of the 13 respondents gave this statement the highest positive score possible. There were no outliers; however, the minimum scores given for all four statements was a "3," or less than neutral score. In general, the QI project was seen as clinically effective with the majority of all ratings (first quartile and above) rating 5 or higher.

<u>Responses from team members only:</u> There is a discernable difference in scores between members of the QI team (4 respondents) when compared to scores from all other staff who

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responded (10 respondents). Both groups, on average, rated all three dependent variables positively. QI team members, however, due to their close association with the project, may have been more likely to display a positive bias in their scores. When statement scores are grouped together based on the three study variables noted above, differences among median scores based on team membership are seen for statements related to Process Effectiveness and Clinical Effectiveness. (Figure 16).



Figure 16: Dependent Variable Box Plots of QI Team Members & All Others OSA2

Difference found in Clinical Effectiveness may be attributed to a "pride of ownership" response resulting from participation in a project team. The difference found in Process Effectiveness scores may be explained by the AA3 method, which requires specific attention to the process steps involved in behavioral health referrals and their impact on the office system as a whole. The team's actions caused work to shift from some staff (Practice Support Specialist referral activities) to the new staff position (Behavioral Health Clinician), as well as creating new work (behavioral health visit authorizations to be arranged by Practice Support Specialists). QI team members could see these changes across positions and were coached to see the advantages that would benefit referred patients. Non-QI members may have seen changes based on how they affected individual staff. Responses to individual statements about Process Effectiveness show that for all statements except two, QI team members saw the QI project as improving the process to a greater degree than the non-team members. For the two exceptions, the median scores about "efficiency" were the same between the two groups; the non-member median for "fewer steps" was higher than for the QI team member median but also had a wider range of scores (Figure 17).

Figure 17: Statements Made re: Dependent Variables about Process by QI Team Members and All Others – Box and Whisker Plots OSA2



QI Team members also provided a perspective on the AA3 methodology itself. In

this case study, four members of the team completed the post-project survey. Table 14

shows the responses to statements that represent the dependent variables.

 Table 14: QI Team Member Responses re: AA3 Methodology OSA2

Dependent Variable Statements	Team Mmbr 1	Team Mmbr 2	Team Mmbr 3	Team Mmbr 4
T- The behavioral health project was easy to do.	2	6	7	7
T - The behavioral health project improved how well I can do my job.	4	6	7	7
T- If I were asked to be part of a QI project in the future, I would accept.	6	7	6	6
P- The behavioral health project made my job easier.	4	7	7	7
P- The behavioral health project made us more efficient as a practice.	5	4	7	7
P- As a result of the behavioral health project, it takes fewer steps to manage a referral than it used to.	4	4	7	5
P- As a result of this behavioral health project, it is easier to manage a referral than it used to be.	7	6	7	7
P- As a result of this behavioral health project, it takes less time to manage a referral than it used to.	7	4	7	7
P- As a result of this behavioral health project, there are fewer mistakes in handling a referral there used to be.	7	n/a	7	1
P- As a result of this behavioral health project, the patients don't wait as long for a behavioral health visit as they used to.	4	n/a	7	7
C- The behavioral health project was successful in improving the quality of patient care.	5	6	7	7
C- Behavioral health referrals from primary care providers are managed more quickly now than before the QI project.	5	5	7	7
C- Behavioral health referrals to mental health specialists outside the practice are managed more quickly now than before the QI project.	7	5	7	5
C- We do a better job managing referrals for behavioral health now than we did before the QI project.	7	5	7	7
A- The A3 tool helped us make changes that were part of the behavioral health project.	3	6	6	n/a

Dependent Variable Statements	Team Mmbr 1	Team Mmbr 2	Team Mmbr 3	Team Mmbr 4
A- I would be willing to use the A3 tool to make changes in other parts of the office.	3	6	6	n/a
A- I would be willing to participate in other QI projects that use the A3 tool to make changes.	3	7	6	n/a
A- The time I took to do the behavioral health project using A3 was made up by time saved in the work I do in the practice.	4	n/a	6	n/a
A- The A3 process was easy to do.	3	6	6	n/a
A- The A3 process made my job performance better.	4	4	6	n/a

T: Technology Acceptance statements C: Clinical Effectiveness Statements P: Process Effectiveness Statements A: QI Method Statement

The scores above indicate that 31 out of 80 statements (39%) had the strongest possible agreement (scores of 7) applied across the three categories of dependent variables and the separate assessment of AA3 (which scored a median of 6). Responses were generally positive with respect to "P" and "C" labeled statements made about the effectiveness of the project, with 57% and 56% of these statements, respectively, rated as "7" by QI team members. Strongly positive rating of "T" labeled statements was 42%, by comparison, and only 4% for "A" rated statements. QI team members were not inclined to use the highest possible ratings in support of the use of AA3 in their QI team process, although the team's process was sometimes strongly associated with ease of use and usefulness (the characteristics of Acceptance) and even more often with strongly positive Clinical and Process Effectiveness.

The results described above, inclusive of all respondents, indicate that scores were very similar across the three variables, with a narrower distribution of responses provided for Clinical Effectiveness than for Acceptance or Process Effectiveness (Figure 18).



Figure 18: Dependent Variable Box and Whisker Plot OSA2

One assumption made by the study is that the dependent variables may have a relationship with each other. Table 15 displays the relationship of paired scores among the three variables (Acceptance, Process Effectiveness, and Clinical Effectiveness) as a fit to a monotonic relationship: whether ranked values of one set of values increase or decrease with the ranked values of another set, resulting in the Spearman rank order correlation coefficients (Spearman's rho¹⁸) and indicating statistically significant relationships.

A description of the function and the assumptions related to the Spearman's rho are found on pg. 80. It is the non-parametric equivalent of Pearson's correlation coefficient and assumes that the variables are related in a monotonic fashion.

¹⁸ The Spearman's rho test was run on a publically available statistical package found on the Internet at <u>http://faculty.vassar.edu/lowry/corr_rank.html</u>

Variable	Acceptance	Process	Clinical
Relationships		Effectiveness	Effectiveness
Acceptance	1.0		
Process	rho = .5085		
Effectiveness	p = .0629	1.0	
Clinical	rho = .7368	rho = .6693	
Effectiveness	p = .0026	p = .0089	1.0

 Table 15: Relationship between Paired Variables: Spearman's rho & P values OSA2

One possible explanation for the strong relationship between Acceptance and Clinical Effectiveness may lie in the definition of "acceptance," which is based on the ease of implementation of the new solution (the behavioral health specialist as an integrated member of the practice) and the usefulness of that intervention. This QI project did not only re-organize work place resources, it added to them, making some job functions both easier and more effective. Under these circumstances, it is likely that improved Clinical Effectiveness (faster mental health referrals and appointments) would be strongly related to a new staff function that removed the inherent difficulties and frustrations of referral processing and appointment scheduling from other staff members. The relationship between Clinical and Process Effectiveness for the purpose of improving Clinical Effectiveness. The correlation between Acceptance and Process Effectiveness was not strong enough to be considered statistically significant.

Quantitative Analysis of outcomes before and after the project. All respondents to the pre-project survey were asked for their perceptions of Acceptance, Process Effectiveness, and Clinical Effectiveness of any previous QI team project that they could remember, regardless of whether they had been a team member, with a response rate of 40%. The post-project survey was administered eight months after the pre-project survey and five months after the end of formal QI team meetings on this project. The expected pattern of change from pre- to post-project periods was an increase in values, particularly for Process Effectiveness statements (the focus of the AA3 methodology). The comparison of median responses to statements made about the dependent variables, when aggregated by the three variables, shows an increase in the median score of perception of all three variables (Figure 19).

Figure 19: Dependent Variable Pre/Post Patterns – Box and Whisker Plot OSA2



For one variable, Process Effectiveness, the distribution of answers became narrower in the post-project survey; the distribution was the same for Acceptance and grew wider for Clinical Effectiveness. For Process Effectiveness, not only did the median increase and scores narrow in range, but the scores also became concentrated at the high end of the scale, as indicated by the disappearance of the top "whisker" which demonstrates that the

3rd and 4th quartiles are the same, at the highest possible score. The impact of AA3 may

have resulted in more awareness of process ease and efficiency, a key focus of this

method.

Changes in responses to the individual statements made in relation to these variables closely matched those described above. The individual statements that both pre- and post-project surveys had in common are found in Table 16:

 Table 16: Pre- and Post-Survey statements Addressed to All Staff OSA2

Pre- and Post-Survey Statements addressed to all staff	Dependent Variables
4. The QI study was successful in improving the quality	Clinical Effectiveness of
of patient care.	QI Outcomes
5. The QI study made my job easier.	Process effectiveness of
	AA3
6. The QI study made us more efficient as a practice.	Process effectiveness of
	AA3
7. The QI study was easy to do.	Acceptance of QI
	Process
25. If I were asked to be part of a QI project in the future,	Acceptance of QI
I would accept.	Process

Median responses to the two statements made about Process Effectiveness both rose (Figure 20). For Acceptance, the median of one statement rose (the QI study was easy) and the median of the other (willingness to participate in QI in the future) stayed the same but became more concentrated in higher ratings of response. Clinical Effectiveness, in this pre/post comparative analysis, is measured by only one statement and so did not change from previous measures (Figure 19). These differences in median and distribution in Figures 19 and 20, however, may represent little substantive change in the perception of these variables, as the Wilcoxon Rank Sum tests for significance indicate below.





One conclusion of this comparative analysis of the specific statements is that post-survey responses were more positive than those in the pre-survey for four out of five statements and, for three of the five statements, more widely distributed across the range of possible ratings. It is not possible to determine from these figures if AA3 was a reason for increased scores but the repeated increases in median for Process Effectiveness statements does coincide with the specific characteristics of AA3.

Using a two-tailed Wilcoxon Rank Sum test at a significance level of 0.05, the differences between values were not significant. A description of the function and the assumptions related to the Wilcoxon Rank Sum test are found pg. 85. The samples representing the populations were measured independently, the responses are ordinal, and can be compared with each other. The results of Figure 20, although not statistically

significant, are nonetheless interesting in that median scores increased and, for one statement, scores became more concentrated at the high end of the scale. This is the intended goal of AA3: improving quality through improving work processes.

Qualitative Analysis of context. This analysis uses all qualitative data from the interviews, pre- and post-survey comments, and field journal entries to identify underlying themes that emerge from respondents about the practice environment.

1. <u>A well established history in QI:</u> OSA2 has conducted provider-led and staff-

involved QI projects for over 15 years. Its method of performing QI has changed over the course of the past four years based on a model described by practice members as "the Blueprint Methodology." Minutes of Blueprint team meetings at this practice date back to March 2007 and some members of the case study team have been meeting semi-monthly for over three years.

Ln 9: There have been a lot of them. There have been many that I haven't been a part of. I would say at least one a year. And often there have been two going on... the first year I was in practice here there was one quality improvement project on hypertension. (Speaker has over 15 years history with the practice.)

Ln 22: In the three and a half years I've been here we have (done QI projects). Prior to that I'm not sure how formally they did. I would say formally they started working on it with the Blueprint concept. What they did before that may have been site-based, less formal... (Around the time I started,) the team had come together. But they were still learning aspects of doing a quality improvement project. They were learning the Blueprint Methodology

2. <u>QI involves a formal, structured method:</u> The QI method used by the Blueprint team follows the same approach as that used by the practice in the past: QI is associated with facilitator support using a somewhat formal process of analytical problem solving, short trials of success, and post-project assessment. This way of approaching QI is considered ideal by practice members and is supported with

many examples, but is not always achieved.

Ln 214: They (QI projects) are time limited and the person who started the project is responsible for collecting all the data.

Ln 216: At some point, once it all goes to the – someone collates all that data. The physicians use some of the professionals to help them with all of that.

Ln 57: First we logged – how many errors are we getting from each side? What kinds of errors are they? Is it the same consistent error or a multitude of errors? ... We looked at how many errors we had before and we made a change. We tried it out only on the west side, to see if it would work. We changed our process. It – with some tweaking, it actually did work. We got the number of errors down to like zero in a month.

Ln 245: We'll meet again and plan to move ahead. And we will try and do a trial to see if it's... successful. I think sometimes again, because we're a large practice and it – and maybe that's been my fault, but I don't think we've done a sort of – the ideal of wanting to do a quick trial of one to two days to see how it would work and – so we've sometimes done trials on West or on East and see if it's worked and then spread it out. But I don't think we've been so great on doing just really very short trials.

Ln 226: Often, you know part of the proposal is usually three to six months later going back and re-looking at it. At how did we institute any change? And what did we do with that?

3. QI is defined by formal and informal examples of changes to both clinical

practice and office processes: Some practice members see QI as a formal activity

but others provided informal project examples as well. Informal approaches, such

as collaborative, staff-led teams, are not considered the norm, although there is

some evidence that they are more prevalent than formal QI.

Ln 12: The first year I was in practice here there was one quality improvement project on hypertension. That was done by one of the physicians. (Spoken by a respondent with a 15 year history in the practice.)

Ln 85: We've been doing the Blueprint team for a couple of years. I think anything else that I can think of off hand has been more informal and I wouldn't really consider it a project.

Ln 35: You know that concept of what a project is, in terms of quality improvement initiatives. Some might have been as small as changing a form, and was something that we were able to do in house without having to get lots of permissions.

Ln 304: We worked for a long time on a release of information form and we worked with another site, another PCIM (primary care internal medicine) site.

Ln 33: We've been doing ongoing projects, some small, some large. Gosh, it's hard. You know, some may have been small projects that didn't take a lot of time. Overall, I'd say we've probably worked on 15-20 things. (Speaker has a three year history with practice.)

4. <u>Formal QI usually requires approval:</u> Larger, more formal QI projects involve

approval by health care organization leadership within and administratively

outside the practice.

Ln 232: Because there's just too much going on to initiate new changes, and so we're coming up to September and trying to figure out, Okay. What are we going to work on as a practice? And so there were some emails going around this week, sort of putting some things on the table. And then as a group, we'll decide. We'll have a discussion and we'll decide which of those things we want to pursue.

Ln 190: It usually takes some chatting around with different providers and things to come up with the proposal that will go if they need funding to the (practice name) Funding Committee. And/ or to Administrators like (the Department Chair) to see if salary support can be provided.

5. <u>Practice leaders are seen as highly supportive</u>: OSA2 practice leaders (clinical

and administrative) support QI directly and strongly. Key functions they provide

are advocating for resources related to QI, communicating about change

throughout the practice, and operationalizing the changes needed, although the

communication process is not always effective. A key element to

operationalizing change is helping staff change their behavior.

Ln 101: They've (practice leaders have) advocated with the administrators for salary support and provided some protected time. Both for doing the projects and for disseminating it.

Ln 104: Some of it's putting it into action, but most of it is to make sure that everybody in the larger practice gets the information. (About practice leaders)

Ln 282: (Practice leaders help by) keeping them going as the drop off in terms of having to pay attention to breaking habits. And people kind of get in their patterns so it will drop off.

Ln 464: I participated in 1 multiclinic project. The project was not implemented and we were not informed as to why. No follow up. (Written comment in response to open ended question about QI projects in the practice.)

Ln 317: One of our process improvements was around standardization. We have three circulating areas, two front desks. Three teams of PSS's. And they have to cover each other. So the more you can standardize from place to place to place....(example) I am in this MA circulating area and I know that I don't know that tongue depressors are always kept *here*. And have a list of the same supplies that we order on each side. Initially even staff was resistant to that kind of standardization. It's: "MY doctor wants it this way or this way". But they've come to recognize in part because they're the ones that have to change seats that there IS value to standardizing it. (By a practice leader)

6. <u>Administrative leaders provide limited support regarding staff time:</u>

Administrative leadership and support are external to the practice. There is a

consistent perception that administration does not support, or does not know how

to support, QI with respect to the allocation of staff time for this activity.

However, the Blueprint team has been meeting consistently for over three years,

so administrative support has been present to some degree.

Ln 117: Outside the practice, I do not see support. And when I say that, I see the desire for process improvement, to come from the site. I do not see an understanding that it requires built in time to have those meetings. And I don't see a desire really..., but I don't see it built into organizational structure to support staff development to allow them to do so.

Ln 126: The only time to have a meeting is either before work, after work or lunchtime and the supervisors are held to pretty strict standards of overtime, not to exceed your budget. So, to have a regular meeting, monthly, ONE staff meeting is challenging. So if you want to add even one Blueprint meeting, the staffing is such that it's tight. You don't have extra staff to put on the floor for an hour while you pull someone off. Ln 472: Salary Support is provided for some projects but time pressure for productivity can preclude getting out. (Written in response to open ended question about experience and observations about QI in OSA2.)

7. <u>Relationships with physicians affects QI:</u> Organizational relationships, both

within the practice and outside the practice within the system, are key to

successful change. A key set of organizational relationships lies between practice

leaders and physicians. There are staff that see physicians as resistant to change.

However, physician involvement is also seen as very important for success, along

with involvement of the entire practice. The practice employs a physician as a

clinical site leader whose job is, in part, to facilitate physician involvement in QI,

representing the medical staff on QI issues and communicating about QI with the

medical staff. As a result, QI team leaders do not always include physicians in

the QI process due to perceptions of differences in priorities or attitudes about QI.

Ln 326: I think that the providers are the biggest barrier. I mean the staff – my experience at this site is that the staff has been very open and excited to try things. And um... it varies with the providers. And one difficulty has been that everybody has a way that they like to do something. And they probably buy in the least to, you know, not all, but a lot. Because some of it is that I think they don't realize how their – how everyone doing things differently impacts the staff and makes the staff's job hard. And they often don't see the big picture. And so we've definitely had providers who say, Fine. I'm just doing it my way and too bad. So, yes and it's hard particularly with the providers to say too bad, this is what we're doing. And so, that has I think that has been one of the biggest barriers. It's been hard to get consistency on things and how we do things.

Ln 314: There are attitudes of the people on site is definitely. Our providers here are like herding cats. And this site was known for that. I didn't realize it when I came into it, but our providers are pretty independent. And there's a wide variety of responses to situations. That's definitely a challenge.

Ln 68: And it was going to result in better results. And that took some communication, took some...we actually had to trial it there with them (the physicians). So that they could see too, that Oh! Okay, I guess it's okay if we change what we do.

Ln 109: (Clinical site leader) has been very involved. And that is important from two standpoints. One – she is a provider and we need that perspective. And Two. She is our lead provider. The lead for the site, the clinical lead for the site. So she was the right person, both sort of formally, but also sort of informally. Her own style is very supportive. She wants to include the opinions of staff. She well, she's the right personality.

Ln 388: (Involving) the providers is trickier. In this practice - being as large as it is, I have not engaged providers myself. There is still some division I think. I've had staff meetings. I've invited providers. They generally have their own schedules and priorities interfere and they don't make it. And because they have such widely varying views themselves, I will admit I have left them out of the process improvement to some extent. I know I can get some cohesive direction in my staff. I'm not confident I could do that with the providers. And that's one of those also, I am *practice* manager. I don't manage the providers. So I tread fairly delicately there and I leave that piece to (clinical site leader).

Ln 401: I think they (physicians) would love to see all kind of quality improvement going on, but just get that done over there and don't bother me with it. I'm busy enough.

8. <u>Staff are seen as committed but need support to be effective:</u> Staff support and

commitment are recognized as important to the success of QI projects. Their

input is explicitly sought. However, staff need not only time to participate but

training in order to participate effectively and this takes more time.

Ln 79: They have a point person here through (staff name), which was perfect. Because it wasn't me, I wouldn't have had the time to follow up on every single lab error. And (staff name) has tons of energy and had the initiative and the desire to do that.

Ln 215: And you know, we all help. Sometimes that's one of our noontime meetings. Do chart readings.

Ln 243: The PSS staff will run it by their fellow PSS staff members. And the MA's may run it by their MA's, and then if people give feedback, and then we'll meet again and plan to move ahead.

Ln 326: My experience at this site is that the staff has been very open and excited to try things.

Ln 492: Great participation by wide range of staff (Written in response to question about what worked well in the project)

Ln 139: When we started having meetings I had people who would talk over other people. That had to be addressed and those staff members had to be supported while they were addressing some ways in which they were inappropriate. And it was a personal thing, but it was also very public in a meeting when that's going on. So the assumption that you can bring together a working group and they're going to... (makes clapping sound) you know slap out changes isn't the reality. You have to...people have to understand how to be in a meeting... It takes time for that to gel, for people to understand that, to learn those things.

9. <u>Financial support is limited:</u> Although the practice has a strong record of QI

processes and projects, multiple references were made to the limitation of QI due

to lack of funds. The most critical resource needed was funding for provider and

staff time allowing them direct involvement in the QI process, funding that

requires the support of the administrative leadership.

Ln 283: Finding the time and if it needs funding it's always a big issue. For instance, we were trying to do the education for the medical assistants in the larger medical group. So for all of the outpatient settings. And you know, we've worked really hard at trying to make sure that vital sign management, that they are really trained in how to take blood pressure and how to do an EKG appropriately. And one of the – it took forever to get an automated blood pressure cuff; because one of the Medical assistants has a hearing problem. And it wasn't until one of the physicians got so fed up that there was some major discussion about it. That it happened.

Ln 160: For the Blueprint, at least for the first year, which we had funding, so that the staff, the group that was made part of the Blueprint team um...could do this over their lunch hour and then get paid for it, as opposed to take them out of their regular job. And there was actually some funding for my time as well. That went away... It's my understanding that was gone after the first year. So, that was helpful, because actually that was the first time anything's really been funded.

Ln 168: That's really been a big issue with um... trying to do change, particularly with the providers, because it's really been all trying to squeeze it in between seeing patients. It's on our own time, meeting over lunch, coming in early, staying late. Meeting as a group, which is difficult in a big practice anyway.

Ln 177: There's very little time that providers can meet with the rest of the staff and work on some of these projects.

Ln 242: I (clinical site leader) will run it by the providers, and often that's by email, because again, it's just too hard for us to meet

Ln 153: In a lot of ways the support has to come from above us. And we have very little control...no control really over say... can we take staff away from their regular jobs and support them to work on this project. ...But in terms of um, you know funding, you know, that's beyond my control. That has to come up from somebody higher than me.

10. <u>QI needs to be easy, quick, and adaptable:</u> The ease of the QI process matters to

practice members. Informal projects are quick and quick is good. OSA2 has

adapted the Blueprint Methodology to better suit the practice, which has been

helpful.

Ln 198: Often in the past there were paper forms that we would document on that were then available to the researchers... and it made the data easily retrievable.

Ln 36: Some (projects) might have been as small as changing a form, and was something that we were able to do in house without having to get lots of permissions. And it was quick. And others were more formal.

Ln 469: It's important to have a set goal but not "set" steps to reach that goal. It's necessary to be flexible in creating the steps to achieve it. (Written in response to question about experience or observations about QI in OSA2.)

Ln 60: We made some changes in using the Blueprint method... We changed our process. It – with some tweaking, it actually did work.

11. <u>QI is seen as valued by the organization, with limitations:</u> QI in OSA2 is based on

a historical commitment and the hard work of a subset of individuals. Perceptions

about its value are mixed. Despite this, staff see QI as a norm and projects

continued to move forward during six months in which the practice supervisor

position was vacant, about three years ago.

Ln 385: It's mixed at best. Frequently the comments are that it's more work than... (trails off). (In response to question about whether practice providers and staff think of quality improvement projects as a priority to be supported and rewarded by the practice.)

Ln 388: That's a mixed bag. I think most of the staff does. But some really aren't too involved.

Ln 353: I think it's (the presence of QI champions) at least one of the reasons that at least, you know twenty years ago, because this practice well known for being founded on quality issues. That it attracted people who were really interested.

Ln 467: We are in constant qi process of varying degrees. (Written in response to question about experiences and observations about QI in OSA2.)

Ln 41: They had some that they were working on as I got there. (By practice leader entering a position vacant for six months)

The image provided by the above findings presents a practice with a wellestablished history in conducting QI projects. The perceptions about the commitment made to QI are divided: practice leadership and staff commitment to QI appear alongside challenges to obtaining financial support to fund QI projects including staff and provider time. There is wide-spread agreement that provider and staff involvement, as well as commitment, are key ingredients to successful projects but the process to access these ingredients is not seen as easy to initiate or maintain.

This does not mean that the practice does not invest considerable resources in QI. It has adopted and adapted the Blueprint QI methodology, which provides a structured approach similar to what the practice used in the past. This methodology appears to have leant itself to alterations that make it easy, quick, and adaptable. Small projects are better suited because they are quick (and possibly easier to manage with staff time) but these are not seen by all practice members as QI projects, which for some had a formal and a clinical focus (diabetes, hypertension).

However, the value attributed to QI and placed on its importance to the practice is not uniform across the practice or the supporting administrative organization above the

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practice. It is not easy to access the resources to support the work of QI teams and it is not easy to maintain the process changes and the results of the work they do. Despite this, the practice and its administrative leadership support a number of key leaders that are committed to QI activity and fund Blueprint team meetings that have met semimonthly for over three years.

Qualitative Analysis of outcomes. This analysis used the post-survey comments by QI team members and the field journal of the researcher to assess the three dependent variables of the study.

In the contextual picture described above, QI projects could be seen as formal or informal activities, with a clinical or an office work process focus. (See finding #3 above, pg. 142). This, along with the relationship between paired variables for process effectiveness and clinical effectiveness (see Table 15, pg. 137) that were confirmed by a Spearman's rho statistic of .6693 with a *P* value of .009, supports the study's assumptions that a QI methodology that makes work processes better will be associated with more successful patients outcomes, both of which may result in more staff support for QI projects in the future.

The above observation fits with previous observations of a supportive climate for QI at OSA2. The practice places high value on meeting patient needs and values staff input and participation in improving how those needs are met. The study question regarding AA3 effectiveness is likely to be influenced by this climate, in addition to the AA3 method itself. Given the influence of context and climate, specific perceptions attributed to OSA2 staff about each dependent variable follow:

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 <u>QI perceived as Easy to Use:</u> Feedback about the AA3 process itself (as opposed to the Integration QI project) was indirectly gathered, as there were scant comments from team members regarding the QI method. This may be due to the decision to provide no formal presentation of AA3 to the QI team at the request of the team leader, who preferred that the project be made part of the Blueprint team regular meeting schedule and process. Respondents generally liked informal projects as being easier than formal projects, possibly due to also being smaller and quicker.

Ease of conducting a QI project was also valued.

Ln 33: You know, some may have been small projects that didn't take a lot of time... Some might have been as small as changing a form, and was something that we were able to do in house without having to get lots of permissions. And it was quick. And others were more formal.

Field journal, August 25, 2010: Medical Director (and team member) during second team meeting after receiving the A3 sheets of paper, wooden pencils, and erasers: "You have no idea how refreshing it is to work with tools that aren't computers." Staff around the table expressed their agreement.

Field journal, September 8, 2010: All participants brought their A3 diagrams or, if new, were willing to start one.

2. <u>QI perceived as Useful:</u> By adapting the Blueprint method, the QI project produced a

useful effect. Useful includes improving a work process; this was perceived as highly

positive. The process of conducting the Integration project was seen as useful.

Ln 50: Yes! (In response to a remembered QI project in the past.) It's one that I felt very excited about. We have in the building a phlebotomy lab that we send out patients to... And the number of problems we had was substantial... We made some changes in using the Blueprint method. We looked at how many errors we had before and we made a change. We tried it out only on the west side, to see if it would work. We changed our process. It – with some tweaking, it actually did work. We got the number of errors down to like zero in a month.

Field journal, April 13, 2011: Email from practice manager stated: "We think it is going very well. (The new behavioral health clinician) has been called into exam rooms to briefly meet patients. She is keeping track of the referrals she is making

out into the community, and whether patients make it to those first appointments. I'm very pleased and do think that our pre-work helped integrate her position more quickly than would have been otherwise. She had just over 30 referrals in February and just over 30 in March. All the attendings here have referred someone to her, and many of the residents have."

3. <u>QI Project Perceived as Improving Work Processes:</u> Past QI projects have focused on

work processes, such as ensuring that a lab order arrives at the lab correctly. The

Integration Project improved the work process as perceived by a subset of staff, not

necessarily by reducing the amount of work but by helping it flow more smoothly.

Ln 50: We have in the building a phlebotomy lab that we send out patients to. And of course it requires a provider's order. For some reason, patients would show up at that lab and either: A) The order would not be there; B) There would be duplicate orders there asking for different things; or C) It would be a wrong order. They would pull something wrong. And the number of problems we had was substantial. And we also have two sides of the clinic. So we started a project.

Field journal, September 8, 2010: Team members express keen interest in making this process better for both the patient and the staff – it is perceived as complex and difficult for all involved.

Ln 481: (Name of new behavioral health clinician) is a wonderful addition to our practice. She has made the process easy and patients love her. (Written comment in response to open-ended question about QI projects in the practice.)

Ln 488: Workload shifted to another person but did NOT diminish (Not a goal of the project) Process feels more efficient, but less visible (name of new behavioral health clinician) does the work - have no idea how many calls it takes). (Written comment in response to open-ended question about QI projects in the practice.)

4. <u>QI Project Perceived as Affecting QI Outcomes:</u> QI projects have historically and

recently included clinical outcomes.

Ln 12: The first year I was in practice here there was one quality improvement project on hypertension... I've done one on hypertension. One on, or participated in, one on diabetes care.

Ln 93: Part of the Blueprint, which was initially started for diabetics, improvement of diabetic chronic care, one thing we worked on was to try and get most of the diabetic patients to come into the office for planned visits having had their blood work done ahead of time. In summary, the above findings indicate that staff do not consider QI methods a barrier and both past and current methods have helped them produce effective results. The AA3 method was not identified as a barrier and, from the researcher's observations, addressed the work and clinical issues the staff cared about. (See comments under Finding #3, pg. 152.) The researcher noted that the "Integration" project was relatively broad in scope for analysis using an AA3 report in a period of eight hours. Much of the work was conducted outside team meetings to operationalize and implement the plans made during the AA3 sessions. As a result, OSA2 did not delve deeply into other issues that it might have improved to the benefit of work process and staff time. This might be managed more efficiently in further iterations of the same project topic while using AA3 as the team method.

Qualitative Analysis of predictors. This analysis uses the interviews, pre- and post-survey comments, and the researcher's field journal to assess the six independent variables of the study.

The data collected from the practice show the presence of all the elements of the Helfrich adapted model of implementation effectiveness (see pg. 6), either directly or by inference. The success of past QI projects can be attributed at least in part to the presence of organizational support for QI as seen by:

 <u>Champions:</u> Respondents easily identified multiple champions, including front line staff, providers, and other staff, including practice leaders. They were commonly characterized by their energy, commitment, and competence. However, references to a champion that can also be an effective change agent typically implied a specific role: a physician.

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Ln 79: They (external department involved in QI project) have a point person here through (staff name 1), which was perfect... And she has tons of energy and had the initiative and the desire to do that.

Ln 349: In this office, it's probably (staff person name 2) or (staff person name 3) and (staff person name 4). Those are the three that jump into my mind. And in the wider PCIM department. And I know that I'm completely blanking (Pauses) – (staff person name 5) has done a lot of quality stuff over the years.

Ln 357: I'd say there's more than one. I think we have different champions for the different job functions... So (staff person name 1) was definitely the mover and shaker for the medical assistants. (Staff person name 6), interestingly enough had not joined the Blueprint committee. But because of who she is and her basis of knowledge, she would be an informal source. She is also one (a champion).

Ln 288: It took forever to get an automated blood pressure cuff; because one of the Medical assistants has a hearing problem. And it wasn't until one of the physicians got so fed up that there was some major discussion about it. That it happened... I mean we had identified that three years previously, so that was always a...(trails off) inherently an expense.

2. <u>Fit with the practice's values:</u> Shared values among organizational members that

are reflected in the goal of the QI projects help move the QI process forward.

This is evident in both past QI projects focused on patient care and the current

project on Integrated Care. Shared values also include maintaining important

relationships and this is part of the QI process.

Ln 16: I've done one (QI team) on hypertension. One on...or participated in, one on diabetes care.

Field journal, January 24, 2011: Email from practice manager during implementation of QI project plan stated: "One thing I noted and was excited to see: the providers were having a "virtual" conversation via e-mail exchange about the site's policies regarding prescribing of benzodiazepines. Someone mentioned the possibility of bringing the BHC into the discussion once she got oriented to the site. So it was nice to see they were already thinking of ways to engage her."

Ln 72: Now we're back to having lab issues and we're going to have to start all over there. (Laughs)... AND we have the relationship with them. With the lab. It IS important, because they see that we care.

3. <u>Existing policies and practices around QI:</u> There is a formal process for starting and conducting QI projects. The current QI process is based on Blueprint methods. There is an ideal process that the practice strives for but is not always achieved.

Ln 208: Then there is usually a presentation to the group about any - all along people know what's going on. But then there's a formal presentation asking for people who are interested in participating, or should it be practice wide?

Ln 214: Usually, (there is a formal process for QI projects and) they are time limited and the person who started the project is responsible for collecting all the data.

Ln 44: They were learning the Blueprint Methodology.

Ln 245: And we will try and do a trial to see if it's – and that's the ideal to do, and see if it's um... successful. I think sometimes again, because we're a large practice and it – and maybe that's been my fault, but I don't think we've done a sort of – the ideal of wanting to do a quick trial of one to two days to see how it would works and – so we've sometimes done trials on West or on East and see if it's worked and then spread it out. But I don't think we've been so great on doing just really very short trials.

From other comments, however, it emerged that there are two aspects of QI

policies and practices that are missing and are perceived as important. The first is the need for individuals to be able to see the entire system to help them grasp why possibly inconvenient changes to themselves help produce a desired change that will more greatly benefit the system as a whole. The second is the need to reinforce changes to past, accepted and working solutions (whether clinical practice or office systems), replacing them with new, untried solutions. This is part of a cycle of change in health care, as the "best" practices and systems of the past will inevitably be replaced by new ones.

Ln 330: I think they don't realize how their – how everyone doing things differently impacts the staff and makes the staff's job hard. And they often don't see the big picture. And so we've definitely had providers who say, Fine. I'm just doing it my way and too bad.

Ln 317: ...one of our process improvements was around standardization. We have three circulating areas, two front desks. Three teams of PSS's. And they have to cover each other. So the more you can standardize from place to place to place....(example) I am in this MA circulating area and I know that I don't know that tongue depressors are always kept *here*. And have a list of the same supplies that we order on each side. Initially even staff was resistant to that kind of standardization. It's: "MY doctor wants it this way or this way". But they've come to recognize in part because they're the ones that have to change seats that there IS value to standardizing it.

Ln 417: Every provider has their belief about what's evidence based and what's good practice. And sometimes it's really hard to find consensus and keep it there.

4. <u>Management support for QI:</u> The lead clinical provider within the practice

provides support and a style of inclusiveness. The practice manager organizes

staff time to support QI activity, which is not considered part of their "regular

jobs." Support from the administrative leadership, however, is difficult to obtain.

QI is a stated value of the organization but provider and staff perceptions indicate

that QI is not always supported with funding. Semi-monthly meetings of the

Blueprint team have been supported for over three years but attendance at those

meetings takes additional effort and is not always successful.

Ln 109: Within the practice, (medical director) has been very involved.

Ln 110: She is our lead provider. The lead for the site, the clinical lead for the site. So she was the right person, both sort of formally, but also sort of informally. Her own style is very supportive. She wants to include the opinions of staff. She well, she's the right personality.

Ln 159: (The practice manager) can work, for example on taking staff and saying - You can come here for this hour and work on this project. And someone else will cross cover.

Ln 117: I see the desire for process improvement, to come from the site... I do not see an understanding that it requires built in time to have those meetings. And I don't see a desire really to... I don't see it built into organizational structure to support staff development to allow them to do so.

Ln 117: Outside the practice, I do not see support.

Ln 132: If you listen to the language, they (administrative leaders) want this to be happening, but on an organizational, just, what's the word I want, organizationally... Operationally, it hasn't been recognized that there's a need to give time to it.

Ln 160: For the Blueprint, at least for the first year, which we had funding, so that the staff, the group that was made part of the Blueprint team um...could do this over their lunch hour and then get paid for it, as opposed to take them out of their regular job. And there was actually some funding for my time as well. That went away... It's my understanding that was gone after the first year. So, that was helpful, because actually that was the first time anything's really been funded.

Ln 472: Salary Support is provided for some projects but time pressure for productivity can preclude getting out. (Written in response to open ended question about experience and observations about QI in OSA2.)

Ln 496: Time to participate (Personal and work factors) (Written in response to what about the project did not work well for the team member.)

Field journal, September 8, 2010: Limited attendance at "Integration" team meetings is a norm – many competing priorities for staff (this team meets at most twice/month for an hour/meeting).

5. <u>Organizational climate in support of QI:</u> The practice has an extensive history

with QI. While change is not easy, its continual nature is accepted. The climate is

strongly influenced by supportive practice leaders. In addition, the climate also

supported the development of a QI team in the six-month absence of a key leader.

Ln 353: It's at least one of the reasons that at least, you know twenty years ago, because this practice well known for being founded on quality issues. That it attracted people who were really interested.

Ln 100: (Practice leaders affect the QI process by) having a willing attitude and encouraging people to come up with ideas to look for some funding.

Ln 67: We had to step back and take some time to convince our attendings on the other side of the clinic, the East side of the clinic that this was a worthwhile change. And it was going to result in better results. And that took some communication, took some...we actually had to trial it there with them. So that they could see too, that Oh! Okay, I guess it's okay if we change what we do. And got the number of errors down on that side. This was all prior to (implementation

of new electronic health record system). Now we're back to having lab issues and we're going to have to start all over there. (Laughs)

Ln 41: They had some (QI projects) that they were working on as I got there... I guess I would also say in the time frame I came in, the team had come together. But they were still learning aspects of doing a quality improvement project. They were learning the Blueprint Methodology. (Stated by practice manager, who started the position after a six month vacancy.)

Wide-spread staff and provider participation is expected and supported by a two way

communication process; staff participation is repeatedly noted. Making changes depends

on resolving conflict effectively; this is sometimes hard to do. A barrier that was

repeatedly noted to inhibit change is attitudinal – there are many opinions in the face of

proposed changes. This observation supports the emerging discovery that inability to see

the entire system and resistance to altering currently working systems inhibits QI.

Ln 241: And we met and tried to come up with ways to get this happening. And then typically, we will brainstorm, come up with a plan. I will run it by the providers, and often that's by email, because again, it's just too hard for us to meet. The PSS staff will run it by their fellow PSS staff members. And the MA's may run it by their MA's, and then if people give feedback, and then we'll meet again and plan to move ahead.

Ln 262: I mean, we might do something for a couple of weeks and then meet again in the same group and say – How is it going? What have been the problems? What kind of pushback are you getting?

Ln 296: I also think people were uncomfortable with confronting in a positive way. But confronting the medical assistant... And wanting to accommodate it for her.

Ln 314: There are attitudes of the people on site is definitely. Our providers here are like herding cats. And this site was known for that. I didn't realize it when I came into it, but our providers are pretty independent. And there's a wide variety of responses to situations. That's definitely a challenge.

The climate reinforces the high level of priority placed on the community and its health

needs above other practice priorities but it is also very sensitive to strict budget

constraints. Corporately, the climate is influenced by a top-down administrative style

rather than through staff involvement, the latter of which is considered desirable but costly. The process of change is stressful but QI is seen as a way to meet the mission of patient care and community health. At the same time, there is an expressed desire to do it better. From this emerges another theme, identifying the absence of organizational slack, such as the time and opportunity to work on and improve QI, as a critical gap in a

functional QI process.

Ln 124: We are a public facing entity. And from 8 in the morning till 5 at night, except for the one hour at lunchtime, we see patients. And we have to be in front of our patients. So the only time to have a meeting is either before work, after work or lunchtime and the supervisors are held to pretty strict standards of overtime, not to exceed your budget.

Ln 427: This is the only job I've ever had in health care... But it did feel, it was -I guess surprising to me that quality process improvement didn't feel..(pauses). It's important to the organization, but it's very driven from top down. And not having been in this industry, I was used to working in industries where it was much more of a collaborative effort. It does feel that the idea of engaging your staff in this process seems unheard of here, revolutionary. But it's natural to me from my experiences elsewhere.

Ln 501: Involve every level of staff in project. (Written comment to open-ended question about what would make future QI projects better.)

Ln 147: And that takes time. You know, it takes time for that to gel, for people to understand that, to learn those things... because you're bringing in people from all levels from beginning, entry-level jobs and it is part of professional development.

Ln 415: I think that it can be really difficult to get them implemented; to get any change implemented for a lot of barriers, both institutional and you know, individual. Institutional change, you know we all - every provider has their belief about what's evidence based and what's good practice. And sometimes it's really hard to find consensus and keep it there. You know, the hypertension care and diabetes care are probably two of the most frequent things that – mostly because they are easy to measure, or easier to measure... They are the things that come up the most to be looked at. And how can we improve it. And I think in part because that's the national trend to do. But also because they are –(Pauses) you can get good gains on it, if you can....But I think implementing things can be challenging. (Began as a voluntary comment about barriers to QI.

Ln 447: You know I think it's the same problem. That there just seems to be not enough time to do the project correctly, to study it correctly. To get back to build on it. You know sometimes it's kind of like the finger in the dike thing. At least that's what it sometimes feels like to me. And maybe that's just – I'm always feeling aggravated about it.

6. <u>Resource availability for QI</u>: A formal process exists to obtain funds for QI

projects. However, financial resources are broadly seen as limited and difficult to

obtain. The practice leaders find these resources as needed and as they can, as

demonstrated by more than three years of consistent Blueprint team meetings.

The practice members, when organized to conduct QI, are seen as excellent.

However, staff involvement takes time and was seen as both a strength and a

weakness of the "Integration" project.

Ln 190: It usually takes some chatting around with different providers and things to come up with the proposal that will go if they need funding to the (practice name) Funding Committee. And/ or to Administrators like (Department Chair) to see if salary support can be provided.

Ln 128: To have a regular meeting, monthly, ONE staff meeting is challenging. So if you want to add even one Blueprint meeting, the staffing is such that it's tight. You don't have extra staff to put on the floor for an hour while you pull someone off.

Ln 342: I think for some of the private providers there may be some cynicism, like we don't get support to do this, there's no time to do this, it's just being...how is my life going to improve by this.

Ln 284: And finding the time and if it needs funding it's always a big issue.

Ln 159: (The practice manager) can work, for example on taking staff and saying - You can come here for this hour and work on this project. And someone else will cross cover.

Ln 276: That (obtaining funding to support staff time for QI) is my biggest challenge. (Stated by practice manager.)

Ln 450: I think that we have a really good group with the Blue Print and some of the people that (name of practice leader) got involved. I think she's done a great job of pulling people from different positions in the practice to work on quality

improvement. I mean I think now we have the Blue Print team and its offshoots to make it happen, which we haven't always had.

Ln 472: Great support + enthusiasm for many projects + implementation. (Written comment in response to open-ended question about QI projects in the practice.)

Ln 472: Salary Support is provided for some projects but time pressure for productivity can preclude getting out. (Written comment in response to open-ended question about QI projects in the practice.)

Ln 493: Great participation by wide range of staff. (Written comment in response to open-ended question about what worked well in the Integration Project.)

Ln 497: Time to participate (Personal and work factors). (Written comment in response to open-ended question about what did not work well in the Integration Project.)

The comments above that reflect on ways that the QI processes could be more

effective (the difficulty in coordinating QI among all those who should be involved and

the repeated refrain that there is "not enough time") all converge around a single idea:

that limited organizational resources, or organizational "slack," are a prerequisite to QI.

Samples of these comments:

Ln 128: To have a regular meeting, monthly, ONE staff meeting is challenging. So if you want to add even one Blueprint meeting, the staffing is such that it's tight. You don't have extra staff to put on the floor for an hour while you pull someone off.

Ln 168: That's really been a big issue with um... trying to do change, particularly with the providers, because it's really been all trying to squeeze it in between seeing patients. It's on our own time, meeting over lunch, coming in early, staying late. Meeting as a group, which is difficult in a big practice anyway.

Ln 242: I (clinical site leader) will run it by the providers, and often that's by email, because again, it's just too hard for us to meet.

Ln 447: That there just seems to be not enough time to do the project correctly, to study it correctly. To get back to build on it. You know sometimes it's kind of like the finger in the dike thing. At least that's what it sometimes feels like to me. And maybe that's just – I'm always feeling aggravated about it.

Although the comments above identify salient issues that challenge the effectiveness of QI, they also indicate that the practice creates a context in which QI is demonstrably carried out, as defined by the six independent variables. The evidence presents a strong case for the preconditions of implementation effectiveness according to Helfrich.

Quantitative Analysis of predictors before and after the project. This analysis uses the pre- and post-project scores to assess changes in perception of statements related to independent variables over time.

As described in the previous chapter and case study, the six independent variables drawn from the conceptual model described in Chapter 3 (see pg. 41) affect the ability of the provider office staff to conduct QI activities and may also affect the QI project itself and its outcomes. The model assumes that the independent variables are relatively unchanged during the course of the QI project up to the time that the results were evaluated by a second, post-project, staff survey. This survey repeated the questions related to five of the six variables (management support, financial resource availability, the presence of champions, implementation policies & practices, and organizational climate) to support identification of noticeable changes. Table 17 provides a list of all survey statements used to measure the five independent variables, with statements numbered 17 - 22 and 24 included on surveys for all staff.

 Table 17: Post-Project Survey Statements and Independent Variables OSA2

Post Survey Statements addressed to all staff	Independent Variables	
17. Our practice leaders (providers or managers) support QI	Management Support	
projects.		
18. Our practice provides enough time to complete QI	Financial Resource	
projects.	Availability	
19. When we do a QI project, our practice provides the	Financial Resource	
financial resources to implement it.	Availability	

Post Survey Statements addressed to all staff	Independent Variables	
20. When we do a QI project, we understand how to get it	Implementation Policies	
done.	and Practices	
21. Our office practice cares about QI projects	Organizational Climate	
22. Our practice has someone we can go to for help when	Champions	
doing a QI project.		
24. QI is important to me	Organizational Climate	

Changes in median scores for independent variables were mixed, with three variables increasing, one decreasing, and one unchanged. All medians were at the neutral point (a score of 4) or above, with the exception of pre-project "Financial Resources" that rose from 3 to a score of 4 in the post-project survey. The median for "organizational climate" was unchanged and "implementation policies and procedures" declined from a score of 5 to 4. The largest change in median was in "champion," which rose from 5 to 6.5 (Figure 21).

Figure 21: Independent Variable Pre/Post Patterns – Box and Whisker Plot OSA2



When looking at score changes for individual statements rated by all respondents, four of the statements increased in score, two declined, and one stayed the same. No scores changed by more than one fourth of the range (Figure 22).

Figure 22: Independent Variable Statement Pre/Post Patterns – Box & Whisker Plot OSA2



Changes between values from pre- to post-period surveys regarding the statements reflecting independent variables were analyzed using a two-tailed Wilcoxon Rank Sum test at a significance level of 0.05; these differences were not significant. It is not possible to tell, using the survey instruments, whether these changes were due to systemic issues or to random chance. No systemic issues presented themselves overtly during the course of the project and no medians changed by more than a fourth of the range, which is the threshold at which statistical significance could be detected. Those statements

whose medians displayed a change (all except "my practice cares about quality") may bear interesting findings in future studies. In addition, it must be considered as a possibility that the positive outcomes of the AA3 based QI project were affected in part by the supportive environment, of which four median ratings showed a nominal increase.

Case Study 2 Results re: The Effect of Office Systems Analysis on QI

This study asked the question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis?" OSA2, with its long history of QI and recent history of QI adaptation coupled with internal practice support, fit with values, champions at all levels of staff, and a positive organizational climate, was already very capable of conducting QI projects prior to the start of the behavioral health integration project. With the exception of financial resources (which had median ratings of neutral to negative), the predictors of successful implementation (the independent variables) were suggestive of successful outcomes both before and after the "Integration" project.

After the AA3 project, the staff found that their QI work had produced the desired clinical outcome (an increase in mental health referrals, an increase in the percentage of mental health referrals resulting in a scheduled appointment, and a decrease in the length of time from date of referral to date of appointment), a perception supported by reports generated from the electronic health record conducted after collecting survey data. The project made three major changes to work processes (integration of a new role-behavioral health clinician (BHC), scheduling of primary care provider referrals with the BHC, and follow up appointments with external mental health specialists scheduled by the BHC).

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for all seven of the seven process statements: the project made job easier, made the practice more efficient, the process took fewer steps, referrals were easier to manage, took less time, caused fewer mistakes, and reduced patient wait time). However, these statements received a wide range of ratings (scores ranging from 1 - 7 for two questions and at least 3 - 7 for all seven process questions). The wide range of ratings is consistent with an activity that redistributes work tasks, given that there were staff who worked increased assignments and others who worked less in order to meet the QI team goal. The ratings also indicate that the QI process, AA3, has characteristics that may be linked to a degree of staff acceptance of this method: a median of 6 for all three questions (the QI process was easy, improved job performance, and willingness to participate in future QI projects).

These perceptions were voiced more strongly in responses from the QI team. All four responding team members rated the clinical outcome as improved, the process changes as effective, and the AA3 method as helpful, with 39% of the total number of responses given the highest possible ratings. For all respondents, scores for process effectiveness were positively correlated with scores for clinical effectiveness, with the latter also positively correlated with acceptance. This case study indicates that there may be a logical and measurable relationship between process improvement and the improvement of patient care. Furthermore, QI measures of acceptance (is easy to use and improves job performance) may have a relationship with measures of the improvement of patient care. The unprompted description of both past projects and the very recent Integration Project in terms of work processes ("done ahead of time," "easy," and

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"efficient") imply that work processes are relevant components of clinical QI work. If so, the AA3 approach helps small health care organizations with limited resources.

The AA3 method was to a degree suited to this QI environment. QI projects are typically an accepted part of OSA2's organizational work. Within the practice, staff participation is valued and projects that improve staff work are generally accepted, an indication of an organizational climate that supports AA3. Team members perceived value in improving both work processes and patient care. Their biggest challenges lay in staff availability, the ability to see the "big picture," and support for changing past practices. AA3 addressed all of these issues with 8 hours of meetings in eight separate sessions for ease of access, value stream mapping to provide a patient care system perspective, and reinforcement of accepting changes in established patterns by work processes for at least a subset of staff. Furthermore, the AA3 method allowed flexibility, with variations in team attendance, identification of new issues, and limitations in piloting new solutions accommodated throughout the team's progress.

Although AA3 appeared to work effectively in this QI project, it was not rated highly by team members. Post-project survey comments were limited as the four team members who returned surveys did not comment on the AA3 method itself. However, field journal references indicated positive responses to the style and content of the AA3 process. Inferences can be made about the impact on work processes. As a key focus of the AA3 method, team members perceived it positively. The absence of comments is consistent with the generally neutral responses in post-project staff survey questions for team members specifically about AA3, which consistently averaged a score of "5" out of a rating scale with a maximum score of 7 across six questions (where "4" is the neutral

response). Although AA3 did not make a measurable impact, all changes in median scores from pre- to post-project surveys were positive. Process effectiveness questions resulted in a smaller distribution of ratings (i.e. fewer low ratings) than acceptance or clinical effectiveness questions, a possible result of the AA3 method. Although one team member stated in email correspondence that "our pre-work helped integrate her (the behavioral health clinician's) position more quickly than would have been otherwise," there are many other variables that supported this outcome. A more complete evaluation of AA3 would require additional trials.

A particular compelling set of findings that emerged from this case study identified important challenges to QI in health care settings which AA3 may be especially suited to address. Three key issues were repeated throughout the comments taken from interviews, surveys, and field journal notes: the absence of "organizational slack" to conduct QI easily and well, staff/provider ability to view the needs of the entire system in order to justify the need to change subsystems, and the need to reinforce new solutions that required changes in behavior. These new themes should be considered as possibly constants across all practices and the challenges they face in conducting QI projects.

a. <u>Absence of organizational slack</u>, which allows staff and providers the time and knowledge necessary to make QI related process changes, directly affects participation and efficiency of QI teams. Attendance at teams meetings was perceived as an issue in multiple references and was noted as a concern for the Integration project.

- Inability to see benefits of change to the larger system, despite the cost of change born by individuals (e.g. based on old, previously successful patterns or processes of work), results in resistance to change within subsystems.
- c. <u>Inability to reinforce process changes</u> with staff results in reversion back to old, formerly successful patterns of work after implementing new solutions.

Regarding the first issue of organizational slack, a statement made by the clinical director spoke to this clearly (Ln 447): "That there just seems to be not enough time to do the project correctly, to study it correctly. To get back to build on it. You know sometimes it's kind of like the finger in the dike thing. At least that's what it sometimes feels like to me. And maybe that's just – I'm always feeling aggravated about it." The message is clear: organizational slack is essential. If AA3 can continue to be used to remove wasted time and materials from the office process, then perhaps the time can be justified to include staff and providers in future QI teams to improve quality while reducing cost. In addition, the AA3 process provides the tools for "big picture" understanding and reinforcement for change. With additional experience in AA3, the practice may be able to realize this benefit.

Following the formal close of this case study, the practice implemented its plan to operationalize the BHC position and re-organize office functions (scheduling, referrals, and pre-authorization) to support the new role. The academic medical center made a formal decision to implement a BHC role in each of its primary care offices (both internal medicine and family medicine practices) over the course of the next year. Furthermore, it contracted with the researcher to use the AA3 method for implementation in this process.

Participant Review of Case Study Findings: As previously described in the methods section, the case study participants had the opportunity to review the results of the case study during a meeting scheduled for team members on December 6, 2011, more than a year after the formal conclusion of the QI project. The meeting was attended by four members of the team, two members of administration responsible for all primary care practices in the academic medical center, and the principal investigator for the behavioral health integration project. The presentation provided an overview of the study aims and a summary of the results, which included the clinical outcomes reported in this case study.

After reviewing results about both clinical outcomes and staff perceptions about the AA3 process, the participants responded freely to the question: "Did this experience with Office Systems Analysis make Quality Improvement more likely to be successful in this practice?" In addition, the presentation handout provided comment sections for every slide and a separate page for open-ended responses regarding the QI project and the QI process. Five participants provided written comments and the researcher took notes on the group discussion that reflected the opinions and experiences of the providers and staff present.

None of the feedback received in response to this presentation contradicted or questioned the results presented above. Responses to the question of whether AA3 made QI more likely to be successful in OSA2 were unanimously positive. In addition, the following comments provided additional insight on staff perceptions of AA3:

• It was the "mapping" process that worked so well. The "fishbones" too to understand why things go wrong. If you can see it, you can understand it.

- It broke the process down.
- You don't see what's happening to each other when you're working we're so wrapped up in our own work. We could see this.
- It made sense out of chaos.
- It was hard to get away to do this, but it was worth it. To know how to change.
- They were so excited by the process, when they came out of meetings. (Spoken by a team member unable to make team meetings.)
- It gave the ability to participate to those who are not usually appreciated in the process or who are overwhelmed by it.
- I can tell this is happening, that it's working, just by the calls I get now. Patients are getting the care they need. (Spoken by the triage nurse, a.k.a. "phone nurse.")
- It was great how nurses and staff were really engaged in the process.
- PDSA is great.
- Keep the staff involved.
- Although I was not part of this project, I was impressed with the data and the presentation of this QI project. We will be sharing this information with the other primary care and family practice sites. Team enthusiasm was great to see!
- I think this was a very successful project though I do feel that the project goals & planning should have been communicated a little more thoroughly to staff.
- This was a successful project and well received. I found it most useful because it incorporated all members of the team (or a person from each part of the team). I think many of the other members were made aware of workflow issues in a way they might not have if we didn't approach the integration in this manner.

4. Threats to validity

The results found in OSA2 case study on behavioral health integration may have been affected by unique issues found in the context of the case study. These threats to validity may have affected the findings related to the dependent variables of the study.

History: No known changes affecting the practice and staff with regard to integration of behavioral health or QI projects in general occurred during this study. However, the overall positive climate in support of the QI project, coupled with the academic medical center's decision to add a new role to the practice, may have heightened positive staff perceptions of the QI process and the project outcomes. As far as could be measured by pre- and post-project ratings of the independent variables from the Helfrich adapted model on implementation effectiveness, the QI climate did not change significantly between surveys conducted before and after the project so that such effect, if it existed, was equal to that of past QI projects.

Knowledge-driven Push: The practice was instructed to implement a specific solution to a known problem – that medical patients with mental health needs are typically underserved in our health care system. The solution, an additional "full time equivalent" (40 hour staff role) added to the practice, was not a request made by the practice but a decision made by the corporation. The QI project was not a quest for a solution, it was the design and implementation of a practice system around a new resource. In a field in which new staff resources are rare and difficult to obtain, it is quite likely that a workable system design would have been achieved regardless of the QI method used. It is impossible to tell if using OSA2's Blueprint methodology would have

resulted in the same outcomes as with AA3 other than by asking for such opinions directly from the participants after the completion of the QI project.

Investigator Relationship: The academic medical center in which OSA2 operates was reorganized in 1994 as an "integrated health care system" that included the university's college of medicine, its faculty practice plan (the physician office practices of the faculty), and two hospitals. At the time, the researcher was an employee of the faculty practice plan and knew many of its physicians and staff. At the time of reorganization, the researcher was promoted into a leadership position in the new entity's administration and worked as the Director of Quality and Systems Improvement for two years before leaving the organization in 1996. Few of OSA2's team members were part of the practice at that time and none had a previously established relationship with the researcher. Other members of the practice not part of the QI project were still present and remembered the researcher in her previous role. In addition, the researcher is an active patient of OSA2 and has a two-year patient-physician relationship with a primary care provider there, who was not involved in the QI project. None of these relationships appeared to affect the recruitment, initiation, study, or analysis of this case study.

The researcher worked closely with the QI team members for a period of three months, during which interpersonal relationships developed naturally over the course of time. The QI team members appeared, throughout the researcher's field journal, to have provided honest and thoughtful comments about the QI project. These responses may have been affected by a desire to please the researcher or meet the researcher's expectations of desired answers. The data collected from different sources (interviews, document reviews, two surveys, field journal entries, and electronic health record reports)

converged on the results identified above, providing different opportunities to collect valid data.

Investigator Bias: The researcher who facilitated the QI team is the same person as the researcher who designed and oversaw this case study. It is possible that the data collected could be interpreted from a biased perspective in favor of hoped-for study outcomes. In anticipation of this threat to validity, all qualitative data and resulting analysis for this case study were reviewed by an independent research team at the University of Vermont, who confirmed the associations made with the raw data and the identification of major themes. Quantitative analysis was guided by a statistical expert on faculty at the same organization. The researcher was mindful of this threat and worked to identify and eliminate such threats through presentations and review of the case study findings.

5. Attachments: chronology and list of those interviewed found in Appendix F

Case Study #3: Increasing the "Meaningful Use" of the After Visit Summary in a

Family Medicine Practice

"The barrier is still time, because every time we add something, there is more time that we have to find and the nature of primary care is that it's hard to find that time." OSA3 pre-project interview

1. The provider practice and the history and process of QI for that practice

Case Study #3 took place at an outpatient provider practice here identified as Office Systems Analysis Case Study 3 (OSA3) in northern Vermont. The practice is an independent, free standing office less than 10 miles from the Canadian border. OSA3 is located in rural Vermont and serves a community known for dairy farming and attracting

seasonal tourists interested in a quiet, beautiful countryside. The practice includes a family medicine physician and a nurse practitioner. The building in which the practice is located is shared with a dental practice. The closest acute care



medical facility is about 19 miles away and collaborates with the practice on quality improvement (QI) projects.

The practice serves community members of all ages, with 5% of patient visits for patients under the age of 18, 78% from 18 to 64, and 17% aged 65 and older. The practice offers same day appointments and accepts new patients into its schedule. In addition to the two providers identified above, employed at 1.75 full time equivalents (FTE) for a total of 70 hours/week, the practice also employs 6 staff (5.35 FTE) to keep the practice open 50 hours/week. Patient volume is relatively stable, having grown 1% in

two years but with a slight drop off of patients in the last full year of reporting, likely due to economic conditions of the region.

Patients seen at OSA2 are likely to have chronic diseases, as eight of the top 10 diagnoses or conditions related to patient visits were hypertension, diabetes mellitus, backache, hyperlipidemia, depression, sleep apnea, drug dependence, and joint pain. Such patients are likely to make meaningful use of self-management tools and information such as a printed After Visit Summary, the focus of the team's QI project.

OSA3 has a history of conducting QI projects dating back eight years, involving all employees of the practice in these activities. Both practice leaders, the medical director and the practice manager, are familiar with QI concepts and tools and use them in QI projects. The practice is a "patient centered medical home" certified by the National Committee for Quality Assurance (NCQA) which recognized the practice with an award (2011-2014) for its achievements with respect to NCQA standards. One of the practice's current goals related to QI is based on a requirement to demonstrate "meaningful use" of its electronic health record (EHR) system.

 Description of the QI project selected by the practice, the application of AA3 in that project, and the clinical effectiveness of that project

The Health Information Technology for Economic and Clinical Health Act of 2009 provides federal incentive payments to physician office practices and hospitals for the adoption of EHRs using specific criteria to demonstrate "meaningful use" of those systems to improve quality, safety, and effectiveness of care (Centers for Medicare and Medicaid Services, 2010). An office practice's meaningful use of its EHR is specified by Medicare in terms of the automated functions that the practice must implement, achieving a targeted success rate in order to qualify for the incentive payments.

Of the 24 "stage one" objectives that a practice office can choose from to demonstrate meaningful use, one is the expectation that the practice provide every patient with a clinical summary at the close of each eligible office visit (also known as an "After Visit Summary" or AVS) (Department of Health and Human Services, Centers for Medicare and Medicaid Services, 2010). Eligibility is determined by type of encounter; certain encounters (such as providing a lab sample) may be excluded from generating an AVS. The threshold for acceptable performance is a distribution rate of 50% or more.

The Office of the National Coordinator for Health Information Technology, under the direction of the Department of Health and Human Services, issued a rule identifying standards and certification criteria of EHR technology. The EHR implemented by OSA3 is certified as meeting these standards and has been the medical record system of the practice for approximately the past five years. At the time of the start of this project, the practice already had established a process of printing out and handing the AVS to departing patients, but had not set up a measurement system to study its performance. The practice members felt confident that they were exceeding the 50% threshold but agreed upon a goal of raising their performance to 100%. After the project started, measurement of this activity proved to be more complex than expected but the team leader set up a reliable measurement system through the EHR by the time the team had completed its work.

The practice was recruited into the study by a letter of invitation which was accepted by the practice manager, who also became the project team leader. The project

team started on May 5, 2011 and included, beside the practice manager, a provider, a certified medical assistant, and a front office staff person. The team met for three sessions of two to three hours each, meeting for a total of 7 hours and 40 minutes for each of the four team members.

Each session was organized around the AA3 method of office systems analysis; Appendix F lists the chronological events and staff interviewed for this study. Key actions completed by the team included:

- Development of a reliable measure of success by using the EHR to identify discharged patients every Monday and the number of those patients whose records indicated that the AVSs were printed.
- Development of a complete "current state value stream map" for a patient care process resulting in an AVS using a "diabetic acute visit" as an example.
- Development of a "target state value stream map" with two work process changes:
 - o Elimination of "Provider verification" as a separate step
 - Provider completes all documentation while a Medical Assistant follows up with patient, resulting in a completed record from which to generate an AVS.
- Identification of other changes to smooth work flow process: room set up, research on the use of selected EHR templates, shared EHR quick tips, suggestions for brief patient care management within an acute visit time frame, small clocks posted in exam rooms, updated front desk scripts for phone conversations with patients to prepare them for their visit, and additional research on Care Manager and other features of the EHR.

- Development and completion of a patient focus group exercise to gather feedback on how to make the AVS more meaningful to the patient.
- Pilot tests and implementation plan of "target state" carried out over three months (See Appendix G for facsimiles of hand drawn diagram of AA3 report)
- November 2011 post-project EHR data collection for both the pre-project (May 2 to 23, 2011) and post-project period (September 6 to November 7, 2011), resulting in an increase in the percentage of patients who received an AVS before leaving the office.
 Table 18 presents these data in more detail. The increase from 64% to 74% of printed AVSs for all eligible patients was statistically significant.

Table 18: Clinical Effectiveness of After Visit Summary QI Project OSA
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Clinical Effectiveness of Project	Pre-Project 5/2/11-5/23/11	Post-Project 9/6/11-11/7/11
Percent received AVS	64% (109/170)	74% (319/429)
Fisher's Exact 2-Tail <i>P</i> value =	0.0158	

The Fisher's Exact test calculates the probability of obtaining a table as extreme or more extreme than the one observed¹⁹. A description of the function of the test and its assumptions are found in Case Study #1 (see pg. 70). The samples used to analyze the percent of primary care visits resulting in a printed AVS included all visits on Mondays, the highest volume day of the week, as extracted from the EHR system and may not be representative of their populations for this reason. The samples from the two time

¹⁹ The Fisher's Exact test was run on a publically available statistical package found on the Internet at <u>http://www.graphpad.com/quickcalcs/CatMenu.cfm</u>

periods were independent of each other. The results that are tested above are mutually exclusive, representing either visits with printed AVS records or visits without these printed records. The two-tailed test in Table 18 calculates the probability that the increase in the printing of AVS records from the pre- to the post-project period was due to chance is 2 in 100.

Although this statistical test indicates that random chance was probably not the cause of the above outcome of clinical effectiveness, the practice members noted to the researcher their disappointment around the lack of improvement in AVS distribution. They attributed the perceived lack of clinical effectiveness to several different causes. A few members of the practice noted that it continued to be a challenge for one provider to conclude certain acute care visits with enough time to complete the electronic documentation to allow printing of the AVS. Another member of the practice commented that over the course of the implementation period (summer 2011), the EMR system degraded to the point that providers could not use it easily as part of the patient care process. Furthermore, the subsequent system upgrade was perceived as laborious and slow. Another member wondered if the front office process could be better streamlined to print each AVS more smoothly. The effect the AA3 method did have on the variables being studied can be more deeply explored in other qualitative forms of feedback provided by practice members. This analysis examines the perceptions of the AA3-based project as presented in staff surveys, compares those perceptions to similar perceptions prior to the QI project, and examines narrative descriptions of the context, the outcomes, and the predictors related to the outcomes of the AVS study.

3. Outcomes from the QI project using AA3 as a QI process

Quantitative Analysis of outcomes. Using only the post-project scores, based on eight returned surveys out of eight distributed (100% returned), the analysis calculated the median values for each statement related to a dependent variable. Table 19 provides a list of all survey statements used to measure the three dependent variables, with statements numbered 4 - 16 and 25 included on surveys for all staff and providers, and statements lettered from A – F included on surveys for QI project team members only.

Post Survey Statements addressed to all staff	Dependent Variables
4. The After Visit Summary project was successful in improving the	Clinical Effectiveness
quality of patient care.	of QI Outcomes
5. The After Visit Summary project made my job easier.	Process effectiveness
	of AA3
6. The After Visit Summary project made us more efficient as a	Process effectiveness
practice.	of AA3
7. The After Visit Summary project was easy to do.	Acceptance of QI
	Process
8. The After Visit Summary project improved how well I can	Acceptance of QI
do my job.	Process
9. After Visit Summaries are printed out more frequently now than	Clinical Effectiveness
before the QI project	of QI Outcomes
10. After Visit Summaries are printed out more promptly now than	Clinical Effectiveness
before the QI project	of QI Outcomes
11. We do a better job giving After Visit Summaries to patients now	Clinical Effectiveness
than we did before the QI project.	of QI Outcomes
12. As a result of the After Visit Summary project, it takes fewer	Process effectiveness
steps to conduct a patient visit than before.	of AA3
13. As a result of this After Visit Summary project, it is easier to	Process effectiveness
conduct a patient visit than before.	of AA3
14. As a result of this After Visit Summary project, it takes less time	Process effectiveness
to conduct a patient visit than before.	of AA3
15. As a result of this After Visit Summary project, there are fewer	Process effectiveness
mistakes than there used to be.	of AA3
16. As a result of this After Visit Summary project, the patients	Process effectiveness
don't wait as long during their visits as they used to.	of AA3
25. If I were asked to be part of a QI project in the future, I	Acceptance of QI
would accept.	Process

Post Survey Statements addressed to all staff	Dependent Variables
Post Survey Statements to QI team members only	Dependent Variables
A. The A3 tool helped us make changes that were part of the	Acceptance of QI
After Visit Summary project.	Process
B. I would be willing to use the A3 tool to make changes in	Process effectiveness
other parts of the office.	of AA3
C. I would be willing to participate in other QI projects that	Process effectiveness
use the A3 tool to make changes.	of AA3
D. The time I took to do the After Visit Summary project using	Process effectiveness
A3 was made up by time saved in the work I do in the practice.	of AA3
E. The A3 process was easy to do	Acceptance of QI
	Process
F. The A3 process made my job performance better.	Acceptance of QI
	Process

Each statement was accompanied by a Likert scale from 1 (strongly disagree) to 7 (strongly agree), as well as a choice of 9 (don't know). The summary statistics for statements were calculated for all staff (#4-16 and 25 above) as well as the five number summary (Figure 23). (Note: not all responders felt able to score all questions. The number of respondents is indicated in the x-axis labels.)





<u>Responses from all staff (team members and non-team members)</u>: The above box and whisker plot²⁰ indicates that 12 of the 14 statements related to the dependent variables had median scores greater than or equal to the midpoint score of 4 (the neutral response).

The graph has three sections: statements about the acceptance of the QI process (measuring the ease of the QI project, improvement of job performance, and willingness to participate in future QI projects) found to the left of the vertical dotted line; statements about Process Effectiveness (measuring whether staff work became more effective as a result of this QI project) found between the dotted and dashed lines; and statements about Clinical Effectiveness (measuring whether the process of making behavioral health referrals improved) found to the right of the dashed line.

In representing OSA3 staff opinions about "Acceptance," at least six out of eight respondents scored each statement. The two statements associated with the Technology Acceptance Model (F. D. Davis, 1989) – the QI project perceived as easy and as improving job performance – produced positive median scores slightly above neutral: 5.5 and 5.0, respectively. The scores that contributed to these results had wide ranges including 3.0 and 1.0 as minimums. The statement associated with willingness to participate in QI in the future, however, resulted in very high scores with a narrow distribution: almost all scores scored 6.0 or 7.0, with a median of 7.0. This concentration of high scores may be partly attributable to the long history of and strong leadership commitment to QI in OSA3. However, one outlier response resulted in a score of 4 (neutral) to this statement, indicating that this strong response to future QI is not uniform across members of the practice.

²⁰ See Case Study 1,pg. 73 footnote, for a detailed explanation of a "box and whisker plot."

Process effectiveness statements, of which there are seven, were answered by as few as four respondents (50%) and as many as eight (100%). Only two had a median score greater than the midpoint (the project improved efficiency and reduced mistakes), three statements had median scores equal to the midpoint (the project made the respondents job easier, made it easier to conduct a patient visit, and reduced patient waiting time) and two statements had medians below the midpoint (the project reduced the number of process steps and saved time). The distribution of responses for six out of seven statements covered more than 70% of the total range (at least 5 points out of 7), indicating that agreement was not high among respondents except for "reduced patient waiting," which received scores of either 4 or 5. The wide array of responses, and lack of positive change in process effectiveness for five out of seven statements, indicates that the primary objective of AA3 (a process improvement QI method) may not have been accomplished.

Clinical Effectiveness was evaluated by four statements, with a minimum of seven respondents out of eight ranging in median scores from 5 to 7 and with all statements reaching the maximum of 7 for highest scores. Of these four statements, the overall success of the project yielded the lowest median score of 5. The two statements regarding outcomes attributed to the process of producing the AVS yielded median scores of 6 (AVS is printed more frequently; AVS is more prompt). The summary statement of success for the project (better job giving out AVS) resulted in a median of 7, indicating that more than half of the 7 respondents gave this the highest positive score possible. This statement, however, also had the lowest score among the four, with a minimum score of 2 (compared to a minimum score of 3 for the other three statements). For all four statements, the first quartile

score was a 4 or higher, indicating that the majority of responses scored Clinical Effectiveness positively.

<u>Responses from team members only:</u> There is a discernable difference in scores between members of the QI team (4 respondents) when compared to scores from all other staff responding (4 respondents). Both groups, on average, rated Acceptance and Clinical Effectiveness variables positively. QI team members, however, rated all three variables positively and had higher median scores for all variables than the non-team members (Figure 24). This may be a result of QI team members close association to the project, resulting in a positive bias in scores.

Figure 24: Dependent Variable Box Plots of QI Team Members & All Others OSA3



Difference found in Clinical Effectiveness may be attributed to "pride of ownership" that comes from participating in a project team. The difference found in Process Effectiveness scores may be explained by the AA3 method, during which the separate process steps of the patient visit are analyzed in light of their impact on producing an AVS before any patient leaves a practice. The team's work highlighted many job functions that affect this outcome: front office staff appointment reminders, the precise use of the EHR, the organization of the exam rooms, and the provider's ability to manage the patient's care needs within a defined window of time (e.g. 15 minutes for an acute care visit). QI team members could see these changes across positions, all intended to benefit the production of the AVS. Non-QI team members may have seen changes based on how they affected individual staff. Nonetheless, three statements scored by team members were negative, indicating either that AA3 did not produce uniform improvements in process effectiveness or that other obstacles made the patient visit process more difficult.

Responses to individual statements about Process Effectiveness show that for all statements, QI team members saw the QI project as improving the process to a greater degree than the non-team members. One statement received a negative median score from both team members and non-team members: the time needed to complete the process compared to before the project. This statement also had a wide distribution of responses from team members; team members did not agree on this statement or on the statement evaluating the number of steps needed to complete the process (Figure 25).

Figure 25: Statements Made re: Dependent Variables about Process by QI Team Members and All Others – Box and Whisker Plots OSA3



QI team members also provided a perspective on the AA3 methodology itself. In this case study, all four members of the team completed the post-project survey. Table 20 shows the responses to statement that represent the dependent variables.

Table 20: QI Team Member Responses re: AA3 Methodology OSA3

Dependent Variable Statements	Team Member 1	Team Member 2	Team Member 3	Team Member 4
T- The behavioral health project was easy to do.	5	4	6	6
T - The behavioral health project improved how well I can do my job.	6	6	6	4
T- If I were asked to be part of a QI project in the future, I would accept.	7	6	7	7
P- The behavioral health project made my job easier.	6	n/a	4	4
P- The behavioral health project made us more efficient as a practice.	5	7	6	4

	Team	Team	Team	Team
Dependent Variable Statements	1	2	3	4
P- As a result of the behavioral health	-	_	-	
project, it takes fewer steps to manage a	1	5	4	5
referral than it used to.				
P- As a result of this behavioral health				
project, it is easier to manage a referral	4	n/a	5	5
than it used to be.				
P- As a result of this behavioral health				
project, it takes less time to manage a	1	2	5	5
referral than it used to.				
P- As a result of this behavioral health				
project, there are fewer mistakes in	n/a	7	5	5
handling a referral there used to be.				
P- As a result of this behavioral health				
project, the patients don't wait as long for	n/a	4	5	5
a behavioral health visit as they used to.				
C- The behavioral health project was				
successful in improving the quality of	7	5	6	4
patient care.				
C- Behavioral health referrals from				
primary care providers are managed	3	7	6	7
more quickly now than before the QI	0	,	Ũ	,
project.				
C- Behavioral health referrals to mental				
health specialists outside the practice are	3	6	6	7
managed more quickly now than before	Ũ	Ũ	Ũ	
the QI project.				
C- We do a better job managing referrals		_		_
for behavioral health now than we did	3	7	6	7
before the QI project.				
A- The A3 tool helped us make changes				
that were part of the behavioral health	7	7	6	7
project.				
A- I would be willing to use the A3 tool to	7	7	7	7
make changes in other parts of the office.	-	-	-	-
A- I would be willing to participate in other	_	,	_	_
QI projects that use the A3 tool to make	7	n/a	7	7
changes.				
A- The time I took to do the behavioral				
health project using A3 was made up by	7	5	4	3
time saved in the work I do in the				
A- The A3 process was easy to do.	7	6	7	3
A- The A3 process made my job	7	7	7	3
penormance better.	1	1	1	1

T: Technology Acceptance statements C: Clinical Effectiveness Statements

P: Process Effectiveness Statements A: QI Method Statement

The scores above indicate that 27 out of 80 statements (34%) had the strongest possible agreement (scores of 7) applied across the three categories of dependent variables and the separate assessment of AA3 (which scored a median of 7). "P" labeled statements (process effectiveness) received the lowest percentage of statements rated 7, with only 7% of the statements rated highly positive. "T" labeled statements (acceptance) and "C" labeled statements were rated 7 for 25% and 38% of the statements, respectively. QI Team members were very positive about the AA3 method with 67% of the "A" labeled statements rated at 7, even though scores related to process effectiveness had a median score of 5 for team members (Figure 24). In this case study, although the AA3 method did not have the expected effect of positive process effectiveness scores, the method was highly regarded by the team relative to their perceptions of all other dependent variables.

The results described above, inclusive of all respondents, indicate that scores were very similar for dependent variables reflecting "Acceptance" and "Clinical Effectiveness" (both with median scores of 6), whereas as the median score for "Process Effectiveness" was noticeably lower, at 4, the neutral value (Figure 26).



Figure 26: Dependent Variable Box and Whisker Plot OSA3

One assumption made by the study is that the dependent variables may have a relationship with each other. Table 21 displays the relationship of paired scores among the three variables (Acceptance, Process Effectiveness, and Clinical Effectiveness) as a fit to a monotonic relationship: whether ranked values of one set of values increase or decrease with the ranked values of another set, resulting in the Spearman rank order correlation coefficients (Spearman's rho²¹) and indicating statistical significance. (Wessa, 2009, Office for Research Development and Education)

A description of the function and the assumptions related to the Spearman's rho are found in Case Study #1 (see pg. 80). It is the non-parametric equivalent of Pearson's correlation coefficient and assumes that the variables are related in a monotonic fashion, are ordinal, and can be compared with each other.

Variable Relationships	Acceptance	Process Effectiveness	Clinical Effectiveness
Acceptance	1.0		
Process	rho = .491		
Effectiveness	p = .2166	1.0	
Clinical	rho = .3697	rho = .9157	
Effectiveness	p = .3674	p = .0014	1.0

 Table 21: Relationship between Paired Variables: Spearman's rho & P values OSA3

One possible explanation for the strong relationship between Clinical and Process Effectiveness may be the result of the AA3 method, which focuses on Process Effectiveness for the purpose of improving Clinical Effectiveness. Although respondents did not rate Process Effectiveness highly in terms of absolute scores, the relationship between the scores given this variable and those given Clinical Effectiveness resulted in

²¹ The Spearman's rho test was run on a publically available statistical package found on the Internet at <u>http://www.wessa.net/rwasp_spearman.wasp</u>

similar relative rankings. This study indicates that even when Processes Effectiveness does not improve, its relationship to clinical effectiveness is still perceived by respondents. The correlations between Acceptance and Process Effectiveness, and between Acceptance and Clinical Effectiveness, were not statistically significant.

Quantitative Analysis of outcomes before and after the project. All respondents to the pre-project survey were asked for their perceptions of Acceptance, Process Effectiveness, and Clinical Effectiveness of any previous QI team project that they could remember, regardless of whether they had been a team member, with a response rate of 100%. The post-project survey was administered six months after the end of the project. The expected pattern of change from pre-project to post-project periods was an increase in values, particularly for Process Effectiveness statements (the focus of the AA3 methodology). The comparison of median responses to statements made about the dependent variables, when aggregated by the three variables, shows a decrease in the median score of perception of all three variables (Figure 27).





For all three variables, the distribution of answers became wider in the post-project survey. In addition, the minimum scores dropped from pre-project to post-project periods, as did the first quartile scores. Third quartile scores dropped for two of the three variables; fourth quartile scores (maximum scores) dropped for one of the three variables. Overall, the effect of AA3 on the AVS project appears to have reduced the perceptions of acceptance, process effectiveness, and clinical effectiveness.

Changes in responses to the individual statements made in relation to these variables closely matched the observations for Process Effectiveness and Clinical Effectiveness described above. The statements representing Acceptance identified new patterns. The individual statement that both pre- and post-surveys had in common are found in Table 22:

Pre- and Post-Survey Statements addressed to all staff	Dependent Variables
4. The QI study was successful in improving the quality	Clinical Effectiveness of
of patient care.	QI Outcomes
5. The QI study made my job easier.	Process effectiveness of
	AA3
6. The QI study made us more efficient as a practice.	Process effectiveness of
	AA3
7. The QI study was easy to do.	Acceptance of QI
	Process
8. The QI study improved how well I can do my job.	Acceptance of QI
	Process
25. If I were asked to be part of a QI project in the future,	Acceptance of QI
I would accept.	Process

 Table 22: Pre- and Post-Survey statements Addressed to All Staff OSA3

Median responses to two of the three statements made about Acceptance both increased: the QI study made the respondent's job easier and the respondent would be willing to participate in a QI project in the future (Figure 28). Distribution of responses became more narrow for "easier" and wider for "future QI." In opposition to the intended effect of the AA3 methodology, ratings for all other statements dropped from pre- to postproject periods: ability to do job well, ease of process, efficiency, and success of the project. These distributions usually became wider (three out of four statements), indicating less agreement among practice members over time. These differences (Figures 27 and 28), however, may have been caused by random fluctuation, as the Wilcoxon Rank Sum tests for significance indicate below.





In summary, the post-survey responses were more negative than those in the pre-survey for four out of six statements and, for four out of six statements, more widely distributed across the range of possible ratings. It is not possible to determine from these figures if AA3 was the cause for the general decline in scores; more insight around this issue was found through qualitative data of interview and survey data.

Using a two-tailed Wilcoxon Rank Sum test at a significance level of 0.05, the differences between values were not significant. A description of the function and the assumptions related to the Wilcoxon Rank Sum test are found in Case Study #1 (see pg. 84). The samples representing the populations were measured independently, the responses are ordinal, and they can be compared with each other. The results of Figure 28, although not significant, are interesting. The AA3 method was relatively easy for the practice members, and after the project was completed, there was a generally greater willingness to engage in QI in the future. Nonetheless, all measures related to work processes and clinical outcomes were negative. The data suggest that there is another story to tell behind these charts, accessible through more qualitative methods.

Qualitative Analysis of context. This analysis uses all qualitative data from the document review, interviews and pre- and post-survey comments to identify underlying themes that emerge from respondents about the provider practice environment.

 <u>A well established culture of QI:</u> OSA3 demonstrates the value it places on QI through the actions of leadership and staff. The practice has invested time in the Vermont Blueprint for Health process of QI. Leaders and staff exhibit a foundation of QI concepts and practices. QI is an ongoing expectation of staff and providers.

Ln 110: The leadership here in (OSA3) Practice was to free up time in the schedule for the entire staff to attend these collaborative meetings. And we set up; we carved out times to have regular meetings to work on our QI projects because we just do not think that you can do QI without carving out time to do that. You can't do that on the fly while you are doing your regular duties.

Ln 30: We got together with other practices in this area of Vermont and decided and talked about and planned things that needed to be done better for diabetics. And they were implemented in the practice and have really helped a lot. Ln 131: Clinical Microsystems (a method of QI). We never bought into that. Because that just involved measuring your practice and it didn't, in our view, give us any specific tools to use beyond measuring how you're doing and measuring the current state. And we ended up getting a lot more out of um, value stream mapping. More other ways to measure your practice that then make solutions more – or at least they make other questions or solutions more obvious. As opposed to clinical Microsystems, which we found was very nebulous and basic. (Pre-project interview statement by practice manager)

Ln 468: QI projects are on-going & an expectation in patient care. (Post-project survey comment)

2. <u>Systems perspective is valued:</u> Members of OSA3 associate QI with the need for

making the processes within their system of work flow together, which includes

making those processes more alike. The QI method is expected to include seeing

how the pieces of the process fit together to support the system as a whole and to

increase shared understanding of the system. The AA3 method helped understand

this larger picture.

Ln 57: Two separate persons to see the difference in the flow for the RN's and the MA so that we could better bring the process together. So that the two became more alike in the process.

Ln 86: Um, we've done a lot of role playing, we start at the front desk and someone would be the patient. We would go through all so we all understood what everyone did.

Ln 482: While using the "A3" tool, I became aware of all the "steps" involved in an office visit - from check in to check out. (Post-project survey comment)

3. <u>Openness to external solutions:</u> The practice welcomes assistance from outside,

whether in person from facilitators or as concepts and new methods. There are

few apparent barriers to adopting new ideas from foreign sources.

Ln 106: What we started by doing was by getting help from the outside. And we received a lot of help from the Vermont Program for Quality in Health Care. And we participated in their – we initially started working with their diabetes collaboratives in 2003. Um, because we didn't really know what to do, and they

seemed to have a nice little IHI program that they were willing to share for free. (laughs) And they provided a lot of support.

Ln 117: I should say that initially we started with the diabetes collaborative and went there with a tell us what to do attitude. And then we diligently followed their recommendations.

Ln 291: It's always a breath of fresh air when we have someone come in from the outside like you. Because you're bringing us through a different process that we've never been through. And I think that people really need – they stand up and pay attention.

4. <u>Practice works to function as one group:</u> The management style of the practice is

participatory and inclusive, treating all members as important elements of a single

group. The practice is small, has few organizational barriers, and values the needs

of staff and their opinions. Time is scheduled to ensure staff involvement. Staff

realize their interdependence, their responsibility for QI, and their need for a

group approach to create system-based solutions. The leaders recognize that there

are differences among practice members in attitudes and opinions about QI and

that this is normal. Differences may appear as "lack of commitment" to outside

observers but the practice makes decisions and acts on them as a whole.

Ln 88: And you know, they've really been good about how everyone's job is important. You know, they made it clear that every piece was important.

Ln 251: We agree we are going to do it. I've carved time out of the schedule. Done.

Ln 208: It usually requires that we all sit down together. Because there's no part of this job that is separate from any other part of this job. I mean in all honesty. So, you can't have just one person doing something. You have to look at how this system enjoins this person or enmeshes that person within the job that's done by all.

Ln 285: I'm the manager, so I think everyone should just have the most positive attitude toward the change and just do it, but of course, I'm not the one making the change. I'm usually the one suggesting the change. Um, but I wouldn't say

that's resistance, I never consider initial resistance to be a barrier, because I think that's just part of the normal process. (Stated by the practice manager)

Ln 470: A lot of the staff thought that it made more work for them. These projects only work if everyone is committed. (Post-project survey comment)

Ln 211: So once the decision is made to do the process, to do the QI piece, then we all agree at the end the changes that are going to be made.

5. <u>Patient involvement:</u> The practice's approach to QI includes involving patients to

understand the process from the patient's point of view.

Ln 75: It was actually our medical assistant and our nurse that took that on first. And they worked with patients to try to figure out our systems.

Ln 160: Initially all together as a group, then we take it out and we play with it with patients and then once – we tweak it all along – and then once we feel like it's ready for prime time we start rolling it.

Ln 231: We try to play with it, then we roll it out, like I was saying, we test it on about three to five patients.

6. <u>Implementing change is seen as challenging:</u> Members of the practice differ in

their opinions about QI and not all staff choose to be involved. Sometimes staff

needs are not met. As a result, not everyone agrees on the value of the time it

takes and the effort around implementation that causes extra work. These

differences are accepted as reality by the practice leaders.

Ln 214: We don't always agree. Because in many cases it means that there's another burden on you to do something.

Ln 419: I don't think that sometimes we have the support of all of the staff... I think that some of the staff just feels burdened and overworked and um, so they're just negative about trying to do anything that is different.

Ln 408: It's only a human nature to just some people their job is something that you come and do and hopefully it's as easy as possible. And then some people have a sense that they want to be excellent. And I'm not saying that people that want to have it be smooth all the time don't want to be excellent, but I think that most people. I think some people – yeah I mean I think that for the most part, people are wanting to go along with it. But like I said, there are some people that

don't initiate things and I think that it would be okay with them if we never initiated anything. But not because they don't want to participate. I just don't think it's in their nature to bring up changes. (Stated by the practice manager)

7. <u>Reinforcement of changes needed:</u> QI brings change and change is stressful,

especially in large amounts. Management understands that it needs to support

change but recognizes that it can't be forced and must be balanced over time to be

effective. Change is seen as inevitable and uptake is faster for those who

participate in the QI team.

Ln 458: Change is sometimes difficult. We always get thru it. (Pre-project survey comment)

Ln 263: Some of the staff feels overworked. No time to do that. You know, they're stressed about change.

Ln 294: I think everyone's attitudes are always really good, because you know – we went through a big stressful change that had a huge impact, that's when we added the E.H.R. And it really – I mean it took 18 months for everyone to feel comfortable, basically doing what they were already doing on a paper chart. So it took us 18 months to get back to where we were. And then, once I felt like everyone was all comfortable, I kept saying to people, Hey! Want to – should we experiment? And do new things? And I could just tell by everyone's looks, that they were just like "You need to leave us alone for a while!" And so we did. We stepped back for 6 months and tried to let everyone go. And then we started doing little things. Little tweaks here and there. And then over time, people have become accepting that there's always going to be changes here and there. You know they – basically I traumatized them and so now, these little ones don't seem as difficult. (Stated by practice manager)

Ln 453: PDSAs are usually team-based, so spread to the other team slows "spread" at times. (Pre-project survey comment)

The above findings provide a picture of OSA3 as a practice with not only a

history but a culture of QI. It places a high priority on QI activities, demonstrated by the

time dedicated to educating staff and providers about QI and, in addition, the time

blocked off for practice members to participate directly in QI. From the document

review, it is apparent that their work resulted in successful external (NCQA) audits.

OSA3 is furthermore remarkable not only for its commitment to the time needed for QI, but also for a sophisticated understanding of what makes QI effective. Practice members understand the value of seeing more than their own perspective of a process. Understanding the system as a whole is perceived as a valuable exercise and an expected outcome in the process of QI.

Another example of their culture of QI is the evidence that staff and providers see their practice as a single system, in which all the parts must fit together. Their history of working together in teams does not imply that all practice members agree with each other or have the same opinions about QI. Practice members nonetheless actively work to involve everyone, although not all at the same time. Their success in this regard is probably due in part to the small size of their practice.

Their success is likely also due to a management style that welcomes new approaches and QI resources, its inclusion of patients in part of the QI process, and a strong preference for staff participation. Engagement in QI is a practice norm; it is an ongoing expectation that applies to everyone.

In its success, the practice appears to have learned that, whatever the approach to QI, the result of QI is change and change needs reinforcement because it is hard to do, even as a cohesive practice. QI, and therefore change, are understood to be ongoing but the burden of change needs to be well supported in terms of timing, amount, and the acceptance of each individual. The practice manager, particularly well versed in QI concepts and methods from the researcher's perspective, drew on a variety of well known resources and references for QI. She placed a high value on QI methods that promote

staff based solutions, citing a Lean management tool used in the AA3 method as an example ("value stream mapping").

Qualitative Analysis of outcomes. This analysis uses the post-survey comments by QI team members to assess the three dependent variables of the study.

OSA3, as described above, places a high value on staff involvement and system solutions as a part of QI. From the start of the project, the members of the QI team were interested in work process analysis and, at the end of the project, their post-project survey results demonstrated a monotonic relationship between perceptions of QI as effective for work processes and perceptions of QI as clinically effective (see Table 21, pg. 190), with a Spearman's rho statistic of 0.92 and a *P* value of .001.

Given the above observations about organizational culture, management style, and interest in work process effectiveness, the study question about the effectiveness of AA3 is likely to be affected by these factors in the practice environment. With this understanding, findings from OSA3 practice members statements about each dependent variable follow:

 <u>QI is perceived as Easy to Use:</u> The practice prefers QI methods that make solutions more obvious. QI is easier for staff to manage if it comes in small amounts spread out over time. Although no comments were received as to whether AA3 was easy or hard, the value placed on the facilitator may be an indicator that assistance was needed for the initial project.

Ln 131: We ended up getting a lot more out of um, value stream mapping. More other ways to measure your practice that then make solutions more – or at least they make other questions or solutions more obvious.

Ln 294: We stepped back for 6 months and tried to let everyone go. And then we started doing little things. Little tweaks here and there. And then over time, people have become accepting that there's always going to be changes here and there.

Ln 477: I think having Connie as the facilitator definitely improved our project (Post-project survey comment)

2. <u>QI perceived as useful:</u> The practice's usual approach to QI has been useful. The

practice members expect that changes will ease the work process. AA3 was

useful in looking at how time was spent in the flow of the work process and the

steps in that process.

Ln 92: We have done things like PDSAs where we plan and figure out what needs to be done on things. Even though they were very simple, just to get us thinking about how to – you know – take care of you know a problem we're having. And that worked good.

Ln 445: The goal is that the new way of doing things is easier than the old way.

Ln 482: While using the "A3" tool, I became aware of all the "steps" involved in an office visit - from check in to check out. (Post-project survey comment)

Ln 477: The A3 provides a tool for focusing efforts in PI or QI.

3. <u>QI Project Perceived as Improving Work Processes:</u> QI projects are routinely

associated with the need to improve work processes. This AA3 project created

more of a work burden for some staff but did address work process issues.

Ln 52: We worked on trying to improve the process of patient flow. And we've done that with at least with two different people. And the other one was improving documentation. So those are two of them (past QI projects).

Ln 189: Then we were asked how we were going to get into our short time that we are with the patient to get things accomplished. And therefore documenting it into the EMR.

Ln 470: A lot of the staff thought that it made more work for them. (Post-project survey comment about the AA3 project)

Ln 480: Improved time structure. (Post-project survey comment about the AA3 project)

4. <u>QI Project Perceived as Affecting QI Outcomes:</u> QI projects are commonly

associated with the need to improve clinical outcomes.

Ln 26: We did a diabetic collaborative – oh that was, probably five or six years ago.

Ln 323: Colonoscopies and mammograms was another one of the QI projects we did. And (the practice manager) printed out the information and handed it to us and we all went. Oh! That's where we're starting? This isn't very good.... and then it gets noted and then we go back and say something to the patient. And the patient either accepts or declines. And so again, this gets verified by running this report.

Ln 427: Yes, they (QI projects) are a good thing for our being more complete. Definitely good for the patient which is very important. That's what we are here for.

Ln 456: This (past) QI looked @ workload as well as outcomes in a very comprehensive manner. (Pre-project survey comment about a previous QI project)

OSA3 has expectations that QI methods should be easy to do and easy to manage.

AA3 was not noted as exceptionally easy or hard during this project. There is also a clear

expectation that QI projects should be useful in the sense of making work easier. Practice

members commonly combine both work process and clinical care outcomes as targets in

discussions about the goals of QI.

Qualitative Analysis of predictors. This analysis uses the interviews, pre- and

post-survey comments, and the researcher's field journal to assess the six independent variables of the study.

The data collected from the practice members show the presence of all the

elements of the Helfrich adapted model regarding implementation effectiveness. The success of past QI projects can be attributed at least in part to the presence of

organizational support for QI as seen by the following findings.
1. <u>Champions:</u> The practice manager is universally seen as a champion, but others

are recognized as champions as well.

Ln 373: That would be (the practice manager). Repeated by all four respondents.

Ln 377: (The medical director) does the geek stuff, (the practice manager) does processing and people.

Ln 382: I would say it's either (the medical director) or me (the practice manager). Depending on what the issue is. But then I hear that (staff person 1) goes to (staff person 2) a lot for things, so she obviously feels like (staff person 2) is her closest peer and...so I'd say (staff person 2) is one too. And I know the women up front – they try to solve things on their own. So I think that each individual probably has their own idea of who the champion is.

2. <u>Fit with practice's values:</u> The practice chooses QI projects that fit with its values

about patient care and community health. Practice staff sometimes selectively

inhibit the implementation of QI projects based on workload.

Ln 202: That very often dovetails with things that are going on in the community

Ln 354: We're supposed to be practicing according to the American Association of Family Practitioners. And that is one of the stated goals. That patients – that and USPTF which is the US – United States prevention task force – USPTF. And that's part of the value, that we will follow these national guidelines. So each of the projects that we have done, I feel it's in keeping with the stated value of improving patient care, improving communications and improving documentation and following the guidelines. So I can't see where anything we've done is not in keeping with that.

Ln 404: Some think of it as one more damn thing I have to do - I'm not going to do it on Fridays. And everybody is kind of in this "informal" acceptance of things don't get done on Friday that normally get done on the other days of the week.

3. <u>Existing policies and practices around QI:</u> PDSA is a commonly understood and applied approach to implementing QI. The process is described consistently as a series of distinct steps including data collection, problem analysis, plans for improvement, trials of success, and assessment of performance. Everyone

participates. Implementation decision making is efficient due to a flat

organizational structure.

Ln 138: VPQ definitely gave us the basic PDSA/IHI process improvement framework

Ln 221: Our usual M.O would be to introduce it to the group, decide if everyone thinks that is an important issue, then we'll carve out time, then we'll do a kick off to make sure everyone understands the problem and then how we are going to try to resolve the problem. Whether it's using an IHI process improvement or like I explained our big list items and just hack away. Who is going to be responsible? And then once we feel like we are in a position where we can start you know playing with it, we will prototype it within the group, the group will role play, and you know if it's a new exam room process we'll actually go to the exam room and a provider and a nurse and someone will pretend to be a patient. And we'll actually prototype the new service. And then everyone asks questions, makes comments, there's a lot of brainstorming around it, and then depending on how long it takes to fix an aspect of the change, it will be done right then and there, or we'll come back and do it again.

Ln 253: You know, we just do it. (Stated by practice manager)

The accepted process for QI highlights education and staff time made available for QI.

Staff are able to independently initiate QI changes. The QI process must be adaptable to

the practice's needs, such as adjusting to the size of the QI project.

Ln 114: We've found that those two things alone (QI education and available staff time for QI) have made us quite successful.

Ln 119: As we became comfortable with the process, we started coming up with our own ideas.

Ln 149: We have kind of created a process. We have what's called a big list and a little list. And what it means is like, the big list are big items. Things that you can't just do a quick and easy change. Um, they're sort of ongoing projects and our method for that basically is to chip away at it

4. <u>Management support for QI:</u> Managers invest in staff time both for education and

for time to work on QI activities. They initiate QI projects based on need in the

practice or the community, creating organizational "slack" in order to give staff

time for QI involvement. The practice manager acts as a resource to take on the

work that can be delegated. Managers are committed to an organizational

transformation, showing an understanding that although they support QI, they

cannot make practice members adopt change.

Ln 91: Our practice manager (name) has set up different people coming in to talk to us about different ailments, illnesses to give – to have us be better informed.

Ln 96: It went on for three years where we had to go down actually – twice the whole practice went down and talked about different things in regards to the diabetes and that was really informative.

Ln 86: They have given us time out of the schedule to work on them (QI projects).

Ln 152: If a provider has to get involved, then we do carve out time, for them just to keep, you know, - it's – often it's a lot of E.H.R drudgery, just you know, typing and setting things up properly and if it's something that they can figure out how they want it set up in the E.H.R. and then feed me the information and show me how to set it up, then I can start doing the drudgery. (Stated by the practice manager.)

Ln 163: When I first started doing process improvement; I would measure people's usage of the new process right from the get-go. Because I felt like people needed a little "stick" to you know, to keep after them with. But I've found... people really need time to get used to it. And so I've kind of – I've dropped the whole measuring thing. And I find that things either get adopted or they don't. And not everything does.

5. <u>Organizational climate in support of QI</u>: Management assumes that quality

problems are system problems, not issues about individual performance. The

practice values all the roles of its members, regardless of position. Staff

involvement includes team and practice meetings on a regular basis, with strong

support both in terms of time commitment and confidence in its members.

Field journal, May 3, 2011, stated by practice manager and team leader at time of QI team start of problem solving why the AVS doesn't get handed out: "No one is at fault; it's the system."

Ln 174: Any of the suggestions or ideas that we felt were good to implement, we would implement those ideas. And just go from there.

Ln 221: We'll do a kick off to make sure everyone understands the problem and then how we are going to try to resolve the problem... Who is going to be responsible? ...And then everyone asks questions, makes comments, there's a lot of brainstorming around it, and then depending on how long it takes to fix an aspect of the change, it will be done right then and there, or we'll come back and do it again.

Field journal, May 26, 2011, stated by the practice manager: "This is a great group – we are all committed to changing for the better."

6. <u>Resource availability for QI:</u> The practice provides support to make staff available

for education and QI projects. This includes blocking out time, providing

education, and bringing members of the practice together to work on QI. There

are staff that see this resource as sufficient; others do not. When time is "carved

out" for providers and front office staff, the work doesn't "pile up." When it's

"carved out" for nurses and medical assistants, the work (paperwork, EHR

documentation, phone call messages) does pile up. Indications of stress due to

lack of resources are evident. Lack of resources to improve the EHR system also

resulted in QI deficits, for example, inability to use the system for easy outcome

measures or delaying an upgrade to the system for better functionality.

Ln 103: Time gets carved out of your schedule, you don't have patients. You sit down. There is computer support. Everybody does it together. I mean it's very um... it's very affirming.

Ln 182: We have staff meetings every Thursday at noon. We meet together, so you know, we do a lot of working on things during that time.

Ln 248: (Practice manager) just carves the time out of your schedule. She hands it to you. This got handed to us today. (Stated by provider)

Ln 243: There's not a lot of time left. And it's – time right now is a problem... Right now there's a lot of messages on my desk. I do not have time to do. Paperwork. Yeah! It's a problem. (Stated by nurse) Ln 263: Some of the staff feels overworked. No time to do that. You know, they're stressed about change.

Ln 280: The barrier is still time, because every time we add something, there is more time that we have to find and the nature of primary care is that it's hard to find that time.

Ln 421: I think that some of the staff just feels burdened and overworked and um, so they're just negative about trying to do anything that is different

Ln 336: And you know – the kinds of things I would like to measure are not always available without a big yank going and looking for the information. So I won't set aside the time for it

Ln 473: This particular QI project (the AA3 project on AVS) was limited by our EMR system.

Although OSA3 strongly commits to resources to provide staff time for QI

projects, the availability of resources continues to be a theme related to successful outcomes. The AA3 process itself highlighted this: as the analysis of work process flow was reviewed by the team over many meetings, the need for both providers to keep up with the patient schedule in order to produce the printed AVS by the time the patient left surfaced repeatedly. A brief root cause analysis identified that a portion of the practice's patients are in need of behavioral health services, for which there is not an adequate amount of providers available in the community. As a result, providers had to balance meeting the immediate needs of these patients, which requires more than the 15 minute acute visit allowance, with meeting the needs of patients waiting to be cared for. The result, in some cases, was an EHR record still incomplete at the time of the patient's departure, as the provider moved on to the next patient on the schedule. AA3 as a method could identify this issue, and the team proposed countermeasures to address it.

"Organizational slack" appeared to be abundantly provided for in the context of QI education and projects. Staff repeated commented positively on the "carve out" of paid time to work on such projects. However, balancing these resources to support the work left undone by all staff is a topic that the practice has not yet addressed, adding support to the relevance of this theme in health care QI.

Two challenges were identified in OSA3's ability to conduct QI effectively that AA3 was not able to address: patient care management and IT functionality. Nonetheless, the above comments indicate that the practice has a culture of QI that strongly supports this work, including all six independent variables. Evidence was found to indicate the presence of champions, management, resources, climate, fit with internal values, and functional QI policies and practices, in keeping with the preconditions provided by the model Helfrich adapted for health care.

Quantitative Analysis of predictors before and after the project. This analysis uses the pre- and post-project scores to assess changes in perception of statements related to independent variables over time.

As described previously, the six independent variables drawn from the conceptual model in Chapter 3 (see pg. 41) affect the ability of the provider office staff to conduct QI activities and may also affect the QI project itself and its outcomes. The model assumes that the independent variables are relatively unchanged during the course of the QI project up to the time that the results were evaluated by a second, post-project, staff survey. This survey repeated the questions related to the six variables to support identification of noticeable changes. Table 23 provides a list of all survey statements used to measure the six independent variables for all staff.

Post Survey Statements addressed to all staff	Independent Variables
17. Our practice leaders (providers or managers) support QI	Management Support
projects.	
18. Our practice provides enough time to complete QI	Financial Resource
projects.	Availability
19. When we do a QI project, our practice provides the	Financial Resource
financial resources to implement it.	Availability
20. When we do a QI project, we understand how to get it	Implementation Policies
done.	and Practices
21. Our office practice cares about QI projects	Organizational Climate
22. Our practice has someone we can go to for help when	Champions
doing a QI project.	
23. Our QI projects reflect the values of our practice.	Values Fit
24. QI is important to me	Organizational Climate

Median scores for independent variables were unchanged. With one exception, all

median scores were the highest possible value on the scale (7), the variable

"Implementation Policies and Procedures" being unchanged at 6 (Figure 29).





When looking at score changes for individual statements rated by all respondents, one statement increased in median score, one decreased, and the remainder stayed the same. The median score that increased (practice provides enough time) moved up by one third of the range (from 5 to 7) whereas the median score that decreased (QI is important to me), decreased by approximate 8% of the range (from 7 to 6.5).

Figure 30: Independent Variable Statement Pre/Post Patterns – Box & Whisker Plot OSA3



Changes between values from pre- to post-period surveys regarding the statements reflecting independent variables were analyzed using a two-tailed Wilcoxon Rank Sum test at a significance level of 0.05; these differences were not significant. It is not possible to tell, using the survey instruments, whether these changes were due to systemic issues or to random chance. No systemic issues presented themselves overtly during the course of the project and only one variable's median changed by more than a fourth of the range, the threshold at which statistical significance could be detected. The overall consistent score of the medians suggest that the practice was, for this period of time, stable, with no indication that a change in the organizational context caused changes in the QI project or process.

Case Study 3 Results re: The Effect of Office Systems Analysis on QI

This study asked the question: "Can the process of quality improvement (QI) in small health care settings be improved by the use of office systems analysis?" OSA3, with a culture committed to QI and a history of successful QI work supported by management support, financial resources, fit with values, champions found among at least 50% of its members, and a positive organizational climate, had an established QI track record before embarking on the AVS project.

Based on the results of staff surveys as well as staff comments, the QI project improved clinical effectiveness to a degree (distribution of the AVS) but at the cost of adding steps to the process and taking more time to complete it. This finding was supported by the EHR with respect to the percentage of visits that finished with a printed AVS. The project made multiple changes to work processes (combining two steps for the Provider into one, standard room set up, "short cuts" to using the EHR, among others). The QI project itself was rated as "easy" with improved job performance by most practice members, however the distribution of scores was wide, indicating lack of agreement. The most consistently agreed upon perceptions were willingness to work on QI projects in the future and no change found in patient waiting time for an AVS. QI Team members showed greater agreement (smaller distributions) and higher scores for all statements measuring the outcomes of the project. All four responding team members rated the clinical outcome as improved, the process changes as effective, and the AA3 methodology as helpful, with 34% of the total number of responses given the highest possible ratings. Across all respondents, scores for process effectiveness were positively correlated with scores for clinical effectiveness, reflecting that there may be a consistent relationship between the perceptions of process and clinical effectiveness. The language of the practice members throughout the QI project, moreover, indicates that work processes were already relevant components to the practice at the start of this work. The response of team members to the AA3 method was uniformly positive, indicating an enduring interest in the analysis of work processes to improve quality of care.

The combined findings of relatively low effectiveness of "work process effectiveness" scores and high interest in AA3 are likely to be less an outcome of the QI project than an outcome of the culture of the practice. QI projects are the norm; practice members are expected to participate although they are not expected to agree with QI changes. As a result, the lack of work process improvement did not diminish the practice members' interest in work process analysis and solution development. The challenges facing this team lay outside the scope of their work, touching on patient care management issues for providers and EHR performance for all. The AA3 method did not address these issues, although it did develop solutions for further implementation to follow installation of a new IT server. It also provided a flexible QI process that adapted to the team's schedule, permitted postponement of certain activities, and produced an ongoing list of projects that will feed future QI work when the practice is ready. In particular,

AA3 was highly regarded by team members for focusing the team's efforts, analyzing the impact of time on the team's focus for improvement, creating an awareness of the system perspective and all the processes within it, and having a competent facilitator. AA3 had a positive effect, but it may have as much or more to do with the unique strengths of the practice as opposed to the unique strengths of the method.

Key themes from previous case studies were easily identifiable in the comments of practice members, very likely due to their experience with QI and QI-oriented leadership. Their statements indicated that:

- a. <u>The presence of organizational slack</u>, which allows staff and providers the time and knowledge necessary to make QI-related process changes, directly affects the effectiveness of QI. Although the method of allocating protected time for education and time did not help all staff equally, it was a key asset in the practice's approach to QI.
- <u>The ability of practice members to see changes</u> that affect them personally in light of the benefits to the larger system made it easier to pursue effective solutions and trial proposed changes.
- c. <u>The acknowledgement that individuals need to accept change themselves</u>, i.e. they cannot be mandated to do so by management, leads to a workplace environment which supports differences in opinions but promotes unified change. Although reinforcing change is sometimes difficult, the management philosophy that QI should result in easier work for staff is likely to result in greater self-reinforcement of changes that are easy and useful. The AA3 project regarding AVS did not make work easier although, according to EHR

reports and staff surveys, its outcomes were useful (more frequently delivered AVSs). Its effectiveness might have been greater if it had performed better in improving work processes.

The recurrence of these themes makes them candidates for promoting effective QI implementation across all practices in facing the challenges involved in QI.

Although the formal team meetings for this project ended in May 2011, interest in finding ways to make the AVS available and "meaningful" to patients continued. In August 2011, the practice conducted a focus group of patients selected for past interest in helping the practice improve the quality of its care. The outcome of this event resulted in confirmation of the value of an AVS, additional features to make it more useful, and the identification of the patients' future willingness to help in this regard. As technical issues with the EHR continued to make it difficult to for providers to document care, a new server was purchased and installed in November 2011. Practice members continued to express their interest in continued improvement around this process.

<u>Participant Review of Case Study Findings:</u> Case study participants had the opportunity to review the results of the case study during a meeting scheduled for the entire practice on January 26, 2012, more than four months after the formal conclusion of the QI project. The meeting was attended by all but one of the practice members. The presentation provided an overview of the study aims and a summary of the results, which included the clinical outcomes reported in this case study.

After reviewing results about both clinical outcomes and staff perceptions about the AA3 process, the participants responded freely to the question: "Did this experience with Office Systems Analysis make Quality Improvement more likely to be successful in

this practice?" In addition, the presentation handout provided comment sections for every slide and a separate page for open-ended responses regarding the QI project and the QI process. One participant provided written comments and the researcher took notes on the group discussion that reflected the opinions and experiences of the providers and staff present.

None of the feedback received in response to this presentation contradicted or questioned the results presented above. Responses to the question of whether AA3 made QI more likely to be successful in OSA3 were unanimously positive. In addition, the following comments provided additional insight on staff perceptions of AA3:

- That was a year of calamities, with the server going down, re-installed with bad service, and losing a provider for six weeks. But the project still worked.
- The A3 report was new and it was simple, so it kept us engaged.
- I never thought of looking at work flow as a way to improve quality it added to patient outcomes.
- Patients are bringing them (AVS printouts from previous visits) back! They look at them and use them!
- Doing the focus group put the wind in the sails of this project we found out that the AVS really is "meaningful."
- The patients are bringing those bags of pills in it's made a difference.
- I get the AVSes back on my desk with corrections!
- Some people still refuse to take them but that is rare.
- Rarely do I not give them (AVS) out.
- The process made us focus on where the problems are.

• We'll be working on more QI projects (asthma, narcotic use, integrating pharmacy services) – they will all affect our AVS documentation in the future.

4. <u>Threats to validity</u>

The results found in OSA3 case study on the distribution of After Visit Summaries to patients may have been affected by unique issues found in the context of the case study. These threats to validity may have affected the findings related to the dependent variables of the study.

History: No known changes affecting the practice and staff with regard to the AVS project or QI projects in general occurred during this study. However, the overall positive climate in support of the QI project may have heightened positive staff perceptions of the QI process. As far as could be measured by pre- and post-project ratings of the independent variables Helfrich's adapted model on implementation effectiveness, the QI climate did not change significantly between surveys conducted before and after the project so that such effect, if it existed, was equal to that of past QI projects.

Social-interaction theory: One half of the eight members of the practice were QI team members; two of the members of this team (the provider and the medical office assistant) work together regularly as a clinical team. Analysis of work process is presented in an objective format, using QI team-based discussion of a "value stream map." However, the problems related to the smooth functioning of the work process required team members to discuss the effectiveness of the provider's patient care management process when encountering a patient with behavioral health needs. It is possible that the social behavior of the team members, which includes not only the work

task but the perception of the relationship among two or more of the participants, may have affected their work on the QI team and the later perception of that work. Although team members could be asked about the effect of these relationships directly, it is not certain that they are aware of or would be willing to share any obstacles this presented to their work.

Investigator Relationship: A few of the practice members were previously known to the researcher. The practice manager had previously participated in a "Lean" training program about two years prior to this project, conducted by a consultant who was also the former business partner of the researcher. As a result of her interest in Lean, the practice manager and the researcher had met once before to discuss how to learn more about value stream mapping (VSM). When she was contacted for recruitment into this study, the practice manager was reminded of the past meeting and was informed that the two activities (the consultant's training program and research study participation) were completely separate activities. She stated she understood and was interested in more work on VSM.

Separately, the provider assigned to the QI team had worked at a rural critical access hospital at which the researcher had previously functioned as the chief administrative officer. As employees, the two had worked together in a collegial relationship and had developed a work-based friendship. At the close of the project in May 2011, the researcher asked the provider and the practice manager privately for their opinions about whether this past relationship had affected the provider's engagement and attitude about the QI project. Both respondents reported negatively with the following specific comments:

Provider: Our relationship in the past affected my expectations that the project would be run well. These expectations were met. Had you been 'Zoro Schultz,' I would have participated in the same way with the same results.

Practice Manager: Your relationship with (the provider) meant you didn't have to earn her trust first – you already had it. But you had to earn everyone else's trust – and you did.

The researcher worked closely with all QI team members for a one month period, during which interpersonal relationships developed naturally over time. The QI team members appeared, throughout the researcher's field journal, to have provided honest and thoughtful comments about the QI project. These responses may have been affected by a desire to please the researcher or meet the researcher's expectations of desired answers. The data collected from different sources (interviews, document reviews, two surveys, field journal entries, and electronic health record reports) converged on the results identified above, providing different opportunities to collect valid data.

Investigator Bias: The researcher who facilitated the QI team is the same person as the researcher who designed and oversaw this case study. It is possible that the data collected could be interpreted from a biased perspective in favor of hoped-for study outcomes. In anticipation of this threat to validity, all qualitative data and resulting analysis for this case study were reviewed by an independent research team at the University of Vermont, who confirmed the associations made with the raw data and the identification of major themes. Quantitative analysis was guided by a statistical expert on faculty at the same organization. The researcher was mindful of this threat and worked to identify and eliminate such threats through presentations and review of the case study findings with the practice members.

5. Attachments: chronology and list of those interviewed found in Appendix F

CHAPTER 5 DISCUSSION

"The real voyage of discovery consists not in seeking new landscapes, but in having new eyes" Marcel Proust

This multiple-case, mixed methods exploratory research study used three unrelated provider office practices and QI projects to explore whether the process of quality improvement (QI) in small health care settings could be improved by the use of office systems analysis (AA3) assisted by a facilitator. Its primary aim was to test the effectiveness of AA3 by conducting a QI project that focused on the work processes related to that project in the provider's office setting. The study explored whether office practice members would respond similarly to the use of AA3 to conduct those projects – a "literal replication" multiple case study as previously explained (see pg. 46). The study explored the context of the office practice in which AA3 was used and the impact of rival explanations found in the independent variables of the Klein and Sorra model adapted by Helfrich (Helfrich et al., 2007) for implementation effectiveness in health care.

All the selected case studies reflected Vermont provider office practices that volunteered to do self-selected QI projects using AA3, but otherwise they varied by geography, practice size, affiliation with other health care organizations, specialty, and choice of QI project. The research study followed a prospective design, using consistent sources for assessment across all three cases (see pg. 47), combining perceptual data about the independent and dependent variables, the AA3 methodology, and objective results of each QI project.

Analysis across case studies drew from the individual case study results found in Chapter 4. This cross-case analysis assesses how the practices were different from each other and how their outcomes varied across the dependent variables. These differences are compared to pre-project ratings of previous QI projects within each practice, leading to an assessment based on changes found in these non-equivalent dependent variables. Analysis includes evaluations of the AA3 method for QI by QI project team members and an assessment of whether the predictors related to implementation effectiveness played a role in explaining those outcomes. The result of this analysis highlights key findings that emerged as a result of this multiple case study, with apparent advantages to the use of AA3 in conducting QI, limitations and drawbacks to its use, and a comparison of its advantages to its disadvantages, including potential for future dissemination.

Case Study Site General Characteristics

Table 24 identifies each office practice (OSA1, OSA2, OSA3) by its QI project and presents a side-by-side comparison of their general description, and practice size.

	0011	0010	0010
Site Characteristics	OSA1	USA2	OSA3
	Lead	Behavioral	After Visit
Sile Characteristics	Screening	Health	Summary
	Rate	Integration	Delivery
Ge	neral Description	n	
Type of Community and	Tourism	Urban	Agricultural
Geographic Region in Vermont	Rural South	Northwest	Rural North
Medical Specialty	Family	Adult Internal	Family
	Medicine	Medicine	Medicine
Organizational Affiliation	Health Care	Academic	Nono
Organizational Anniation	System	Medical Ctr	None
Practice Size			
Annual patient visits	11,483	23,319	9,601

 Table 24: Site Characteristics by Office Practice QI Project

Site Characteristics	OSA1 Lead Screening Rate	OSA2 Behavioral Health Integration	OSA3 After Visit Summary Delivery
Practice FTEs (total)	15.3	32.8	7.1
Practice FTEs – Providers	3.8	6.0	1.8
Practice FTEs – Non-providers	11.5	26.8	5.3
Weekly Hours of Operation	45	47	50
% Medicaid Revenues	30%	17%	30%

As reflected by their general descriptions in Table 24, the three practices are all Vermont primary care offices but differ in their geographic location and type of community, as

well as their relationships with corporate entities. OSA2 (on the west side of the state, bordering the lake) has been part of an academic, integrated health system from inception, OSA1 (south, in red) was incorporated into a small, regional health system approximately 10 years ago, and OSA3 (most northern) operates independently of any corporate system. OSA2 is twice the size of the two other practices in terms of patient visits and OSA3 appears to be



almost twice as productive, although there are many reasons that could explain this apparent difference (for example, varying definitions of provider "Full Time Equivalent", use of a local hospitalist program to delegate care for patients admitted to hospitals, and type of visits included in volume (e.g. lab draws, vaccinations, etc.)) (Izor, 2011). The two smallest practices depend on Medicaid funding for 30% of their patients, a payer source documented by the Vermont State Department of Banking, Insurance, and Health Care Administration to be responsible for approximately 43% of the state-wide cost shift to commercial insurance carriers in 2009, due to a payment structure that reimburses less than the cost of providing care (M. Davis, 2009). These differences do not, themselves, suggest differences in quality improvement methods and outcomes but they contribute to the context in which the practices are found and, thereby, to the study variables.

Case Study Site Contextual Themes and Status in terms of Independent Variables

Table 25 identifies contextual themes found to be present (or absent) in the three case studies, based on qualitative data drawn from interviews and survey comments. Table 25 provides a summary of the qualitative assessment of independent variables in supporting the QI project as drawn from the Klein and Sorra model adapted by Helfrich.

Site Characteristics	OSA1 Lead	OSA2 Behavioral	OSA3 After Visit
Sile Characteristics	Screening Rate	Health Integration	Summary Delivery
Contextual Themes Presen	t across Each S	ite (Low, Modera	ate, High)
History with QI	High	High	High
QI Part of Org Climate	High	High	High
Staff Selectively Participate	High	High	High
QI as Org Norm	High	High	High
QI Support Needed	Moderate	Moderate	Moderate
QI Imposed Hierarchically	Moderate	High	Low
QI Shared and Adapted – Prefer Short, Flexible QI	High	Moderate	High
QI Includes Improving Staff Work	Moderate	Moderate	High
Resources for QI Limited	High	High	Moderate

 Table 25: Contextual Themes and Independent Variables by Office Practice QI

 Project

Site Characteristics	OSA1	OSA2	OSA3
	Lead	Behavioral	After Visit
Sile Characteristics	Screening	Health	Summary
	Rate	Integration	Delivery
Assessment of Independent Variables across Each Site (Low, Mod, High)			
Champions	High	High	High
Implementation Values Fit re:	High	High	High
Implementation Policios 8			
Procedures	High	High	High
Management Support	High	High	High
Organizational Climate	High	High	High
Financial Resource Availability	Moderate	Moderate	Mod – High

The contextual themes show important similarities across all three practices. All three sites had a well-established history of conducting QI projects within the practice, to the point that QI was a discernable part of the organizational climate. In all practices, staff selectively participated in QI, allowing those who were most interested and committed to be involved. QI was seen in all practices as an organizational norm, or an expected part of organizational life. And, in all practices, QI support (e.g. facilitation and leadership) was seen as a necessary part of successful QI outcomes.

With the above similarities noted, interesting differences appeared. All three practices were different from each other in the hierarchical imposition of QI projects on the practice. This was highest for OSA2, as one of many practices in an academic medical center; lower for OSA1, as a more recent member of a smaller, regional health system; and lowest for OSA3, an independent practice. There were also interesting pairings within the group of three. OSA1 and OSA3, the two smallest practices, appeared to value the ability to easily share and adjust their QI methods, adapting those

methods to work flexibly for short projects, as compared to OSA2. OSA3, with a high level of staff investment in QI resources and education, perceived value in the improvement of staff work processes as part of QI projects more positively relative to OSA1 and OSA2. The same pair of practices, OSA1 and OSA2, also shared similarities in reporting more limited resources for QI than OSA3, which carried at least as equivalent a percentage of Medicaid funding as the other two practices.

These differences, which were elicited from qualitative analyses, are subtle. The ratings given to the independent variables, as defined by Helfrich's adapted model for health care organizations, demonstrate that the theory-based components of successful QI implementation were all well represented by the three practices. Each indicated active engagement by QI champions, QI projects that fit with practice values, well-established QI policies and procedures, a supportive management structure at the practice level, an organizational climate conducive to QI, and the availability of at least a minimum of financial resources, although OSA3 had greater ability to arrange those resources in support of staff time for education and QI participation. These variables did not change significantly over the course of the QI project for any practice.

Case Study Site Evaluation of Dependent Variables

Table 26 presents the results of conducting the QI projects using the AA3 method as determined by all respondents from each practice. These results present, side-by-side, the dependent variables in terms of post-project survey median scores, where a score of "1" indicates the most negative rating of the QI project outcome and a score of "7" indicates the most positive rating of the QI project outcome. In these terms, any score above 4.0 represents a positive rating; any score below 4.0 represents a negative rating.

Following each score is the highest number of respondents who rated the statements

associated with each dependent variable.

Table 26: Dependent Variables by Sites – Median Post-Project Survey Results with ratings ranging from 1 (most negative QI project outcome) to 7 (most positive QI outcome) (n represents the maximum number of respondents responding to each variable)

Dependent Variables	Lead Screening Rate	Behavioral Health Integration	After Visit Summary Delivery
All Staff Rating	gs and Number c	of Respondents	
AA3 Acceptance	6	6	6
	(n=11)	(n=14)	(n=8)
OI Effect on Work Processes	5	6	4
QI EIIECI OII WOIK FIOCESSES	(n=9)	(n=13)	(n=8)
OLEffect on Clinical Outcome	7	6	6
	(n=9)	(n=13)	(n=8)

Notable in these results are the similarities across practices. The median score for "AA3 Acceptance" for all three practices was 6, a moderately positive rating of statements about the usefulness of QI, the ease of QI, and staff willingness to participate in QI in the future. The QI project's effect on work processes showed the greatest difference of the three dependent variables across practices. The Behavioral Health Integration (BH Integration) QI project's moderately high score may be affected by the decision of the practice to add a full time staff resource to respond to the need for behavioral health services, resulting in a reduction of workload for other staff. The After Visit Summary (AVS) project identified the need to change one provider's "care management" work process to fit the time allocated for that provider to see each patient. The project did not accomplish this need for a more effective work process, which may be responsible for the resulting neutral score. The Lead project did change work processes for a subset of staff and the resulting score is a "low positive," falling between the other two mentioned

project scores. The effect of QI on the clinical outcome was positive for all three practices but highest for the project in which work process changes were the team's focus, as seen in OSA1's streamlined lab draws and letter printing. Clinical outcome medians were moderately high for the team whose focus was the addition of new resources (OSA2) and the difficult challenges in provider patient care management and its IT system (OSA3). These results, overall, indicate that AA3 was perceived as positive from the perspective of survey rankings, although differences exist due to the unique opportunities or limitations that accompanied each project.

Case Study Site Evaluation of QI Project by Team Members

A closer view of the evaluation of AA3 is provided by the ratings assigned by QI team members, who had the opportunity to learn about and practice the AA3 method directly. The median scores are supplemented by the percentage of ratings that equaled "7," the highest rating that could be given. Where medians are equal, these percentages provide more insight into the relative strengths of those ratings (Table 27).

Table 27: Dependent Variables by Sites – Team Member Median Post-Project
Survey Results with Ratings ranging from 1 (most negative QI project outcome) to 7
(most positive QI outcome) / Percent of "7" Ratings

Dependent Variables	Lead Screening Rate	Behavioral Health Integration	After Visit Summary Delivery
	(n=z)	(1=4)	(n=4)
Team Member Ra	tings and Percer	ntage of "7" Ratin	igs
AA3 Acceptance	7 / 75%	6 / 42%	6 / 25%
QI Effect on Work Processes	7 / 64%	7 / 57%	5 / 7%
QI Effect on Clinical Outcome	7 / 100%	7 / 56%	6 / 38%
AA3 Method for QI	6 / 38%	6 / 4%	7 / 67%

As noted in Chapter 4, team members are likely to be biased in favor of the outcomes of projects to which they are associated and this helps explain medians that are consistently higher than those seen in Table 26. With the addition of "percentage of 7" measures, there are again interesting differences worth noting.

Focusing on the dependent variables (the first three rows in Table 27), all the responses for the Lead project are higher than those of the other two projects, based on either median scores or %7's. This project made a change to a subprocess (letter printing) as well as to the method of collecting blood samples from one- and two-year olds, directly affecting clinical outcomes and work processes, factors which are likely to have affected the high score associated with A3 acceptance. In turn, the responses for the BH Integration project shows scores that are all higher than those for the AVS project, again based on either median scores or %7's. This project added a new resource (a provider position in a new behavioral health role) which redistributed work with a clinical component from non-clinical workers to a clinical worker. The AVS project, with its relatively lower scores, used the AA3 method to improve work process and discovered that its "root causes" were attributed in part to the patient care management practices of an individual provider and the challenges of an IT system needing an upgrade. AA3 did not provide a solution to the issues concerning individual performance or technological breakdowns, so low relative scores are consistent with the issues found for the practice's QI project.

Because team members had the advantage of being trained in the AA3 method, these practice members received an additional survey questionnaire specifically rating AA3 as a method of QI. Here the responses break the pattern: the highest median and

%7's was returned by the AVS team members, who appear to have a high degree of QI education and interest in QI methods. Lead screening was second highest, with members trained in QI and benefiting from a practical example of work flow improvement. The BH Integration team members gave AA3 its lowest score, having benefitted most from the addition of a new staff resource. Despite all these differences, however, the most easily identifiable conclusion from this comparison is that all team members, regardless of project, returned positive median scores for all variables and AA3 evaluations.

Case Study Site Evaluation of AA3 by Team Members

The evaluation of AA3 can be examined more closely by looking at team member responses to individual post-project statements specifically rating this QI method. Based on a total of nine returned team member surveys, out of 14 team members who participated (a cross-case return rate of 64%), this analysis calculated a median value for each statement rated. Table 28 provides a list of the statements used to measure team member evaluations of AA3, included in post-project surveys only.

Table 28: Post-Project Statements Evaluating AA3 by Team Member	s – All Cases
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Post Survey Statements addressed to QI team members only	Dependent Variables
A. The A3 tool helped us make changes that were part of the	Acceptance of QI
behavioral health project.	Process
B. I would be willing to use the A3 tool to make changes in	Process effectiveness of
other parts of the office.	AA3
C. I would be willing to participate in other QI projects that	Process effectiveness of
use the A3 tool to make changes.	AA3
D. The time I took to do the behavioral health project using	Process effectiveness of
A3 was made up by time saved in the work I do in the	AA3
practice.	
E. The A3 process was easy to do	Acceptance of QI
	Process
F. The A3 process made my job performance better.	Acceptance of QI
	Process

Each statement was rated on a Likert scare from 1 (strongly disagree) to 7 (strongly agree), as well as a choice of 9 (don't know). The summary statistics for statements were calculated across all team members from the three sites as well as the five number summary (Figure 31). (Note that not all responders felt able to score all questions. The number of respondents for each statement is indicated in the x-axis labels.)



Figure 31: Statements Made re: AA3 Effectiveness - Box & Whisker Plot All Sites

The above box and whisker plot²² indicates that the six statements related to the evaluation of AA3 had median scores greater than the midpoint score of 4 (the neutral response).

The graph has two sections: statements about the acceptance of the AA3 method (AA3 helped, was easy, and was useful) found to the left of the vertical dashed line and

²² See Chapter 4, pg. 73, Figure 7 footnote for a detailed explanation of a "box and whisker" plot

statements about process effectiveness of AA3 (willingness to use a work process method in the office, willingness to use a work process method in QI, and whether the time spent using the method was made up by work time saved) found to the right of the dashed line.

In representing team member opinions about acceptance, all three statements in this category yielded a median score of 6, above the neutral score of 4. There was a high degree of agreement in response to whether AA3 was helpful. Except for one outlier, all scores reflected either a median of 6 or the maximum possible of 7. The other two statements regarding ease of use and usefulness covered a broader range of scores from 3 to 7.

Team member opinions about process effectiveness of AA3, representing their willingness to use AA3 for office and QI projects, resulted in median scores of 7 for both statements, the highest rating possible, and both resulted in minimum scores of 5 (moderately positive) with the exception of one outlier for each statement. The remaining process statement reflecting the cost of doing AA3 in terms of time needed for the project relative to time saved at work resulted in a median score close to neutral, but positive at 4.5. Although this score appears relatively low compared to the others in this analysis, in the financially limited and time constrained environments of all three practice sites, any score above a 4 is a sign of success. Each team member invested a minimum of eight hours of work time in her/his particular project. This result indicates that for at least half of the team members, that time had been recouped at the point that the survey was administered after project close.

Qualitative Evaluation of QI Project by Practice Members

The supportive ratings of QI team members notwithstanding, the value of a QI project and the way it was achieved encompasses the value perceived by all members of each practice. In confirmation of the median values calculated from practice-wide surveys in Table 26, Table 29 provides a qualitative evaluation of the dependent variables collected from survey comments, field journals, and post-project feedback.

Dependent Variables	Lead Screening	Behavioral Health	After Visit Summary
	Rate	Integration	Delivery
Process Out	comes (Low, Mo	derate, High)	
AA3 Usefulness	High	High	High
AA3 Ease of Use	Moderate	Moderate	Moderate
QI Positive Effect on Work Processes	High	High	Moderate
Post-project Assessment of Positive Effect on Practice	High	High	High
Clinical Outcomes (Improved/No Change/Worsened)			
QI Effect on Clinical Outcomes	Improved	Improved	Improved

 Table 29: Dependent Variables by Sites – Qualitative Assessment

The qualitative methods used in this study did not directly ask participants to evaluate the dependent variables at the close of the project. However, participants volunteered comments either in written form on the post-project survey or orally to the facilitator throughout the study, and these reflected consistent feedback about the primary and secondary outcomes of the study. Across all three sites, participants described the AA3 method as useful but did not describe it as easy to use, except in terms of the facilitator's ability to make it so. All comments reflected the positive impact of each QI project on

aspects of work processes. All post-project assessments confirmed a continued positive impact of the QI project on both work processes and clinical outcomes. OSA1 and OSA2 participants also commented positively on the clinical outcomes of their projects (increased lead screening rates and increased behavioral health services for patients). OSA3 participants reflected disappointment that their QI project had not yet yielded the expected results (distribution of the AVS to 100% of departing patients) but the majority of their qualitative feedback was focused on the QI process, not its intended outcome. In this sense, OSA3 is again different from the other two sites: the "how to" aspect of QI held these participants' attention and received their comments much more than the "so what" aspect of QI, which is commonly the focus of interest of those involved in QI.

Pre-Project vs. Post-Project Evaluation of AA3 by Practice Members

The above post-project findings (Tables 26 – 28 and Figure 31) all support the conclusion that work process-based QI may be an effective way to improve quality improvement. The study question, however, does not simply ask whether AA3 is easy, useful, and effective in improving work processes and clinical outcomes. It asks if AA3 can improve QI in small health care settings. To answer this question, the study posed survey statements for practice members to rate before and after the QI project. The medians for each non-equivalent dependent variable were calculated, previously reported case by case, and are summarized in Table 30.

Table 30 shows the net change between the medians of matching questions on the pre- and post-project staff surveys. These questions reflect perceptions about the dependent variables; they do not represent a comparison of specific QI projects. The preproject survey questions were focused on subjects' memories of characteristics of

previous QI projects; the post-project survey questions were focused on the recent experience of the particular QI project conducted using AA3. The table helps explore the question of what characteristics of QI projects might be seen by staff in a different light due to use of AA3 in the recent QI project.

 Table 30: Dependent Variables Median Score Changes from Pre-Project to Post-Project Surveys across Sites (+ indicates median increased; - indicates median decreased; 0 indicates no change in score)

Dependent Variables (pre/post median scores)	Lead Screening Rate	Behavioral Health Integration	After Visit Summary Delivery	
Dependent Variable Responses				
AA3 Acceptance	0	+ 1	- 1	
QI Effect on Work Processes	0	+ 1	- 1	
QI Effect on Clinical Outcome	- 1	+ 0.5	- 1	

The change in median score, in terms of direction and degree, appears different for each case study. The Lead case study, which implemented changes in two work flow processes and accomplished a successful QI outcome, recorded no change in perception of the ease or usefulness of AA3 (acceptance) or effect on work processes (process effectiveness). And, although the project was considered a success, the median evaluation of clinical outcome was a full point less than that of QI projects remembered from the past. Although team members appreciated the AA3 process and the practice members thought highly of the project, they thought equally or more highly of past projects.

The BH Integration case study, in which work flow was changed in order to incorporate a new provider into the practice, recorded positive changes in perception for

all three dependent variables. Acceptance and process effectiveness increased by one full point from pre- to post-project periods. Clinical effectiveness increased by one half point. Although the practice members did not rate AA3 highly in their survey results, they rated the QI project and its methods more highly than they did past projects.

The AVS case study produced the opposite results. Work flow changes were planned but not carried out due to barriers related to individuals or technology. Although practice members rated AA3 highly in their post-survey results, they rated the QI project and its methods lower than they did past projects.

Based on this analysis, AA3 appears to have had an impact only in the case study in which there was also a large addition of a new resource: a new clinician was added to the practice engaged in the BH Integration project to help manage the services of patients with mental health needs. With these results, there is little to support the expected outcome of higher scores due to the addition of AA3 as a method of QI alone. Many other factors are also at play, including the above mentioned characteristics of past practices' histories with QI projects, whether QI is perceived to include work processes, the varying sophistication of practice members regarding QI concepts and methods, and unique project related issues such as the allocation of resources for new clinicians, difficult challenges with patient care management, and technology breakdowns. With many factors to study, an appropriate analysis of the effect of AA3 relative to other QI methods requires more than three case studies.

New Insights from AA3 QI Projects

This study was driven by an interest in exploring what might make QI in small health care settings more effective. Although AA3 might play a role in QI effectiveness,

the study identified three unexpected findings that add new and possibly significant factors to the effectiveness of QI. These factors are not explicitly addressed by the Klein and Sorra model, or the adaptation made by Helfrich, and may add depth to what is understood to affect implementation effectiveness. In addition, these factors may be influenced by the use of AA3, thereby giving the practice leverage over its challenges through its QI method to make its QI projects more successful.

Identification of these three factors came to light through re-analysis of the qualitative data provided by interviews, survey comments, and field journals using a Grounded Theory approach. Grounded Theory conceptualizes emergent social patterns present in research data that are separate from time, place, and individuals (Glaser, 2002). According to Glaser, the concepts so generated must have an "enduring grab," which in the course of this analysis echoed other references found in the review of literature after the completion of Chapter 2 (see pg. 16). These factors surfaced during the analysis phase of Case Study #2, which resulted in a return to Case Study #1 data to confirm similar findings. Case Study #3 analysis took advantage of the possible relevance of these factors and highlighted them explicitly. All findings confirmed the possibility of a degree of commonality in their application to QI in small health care settings.

Provide Organizational Slack: Without the time and QI support for health care
workers to think about and act on the system that produces its current outcomes,
effective changes to the system will be elusive. Everett Rogers highlights this issue
in Bate's text on <u>Organizing for Quality</u> within a case study of Luther Midlefort
Mayo Health System, a hospital committed to providing "organizational slack" to its
staff. When he was asked "the one thing he would do 'to get innovation going,'

Rogers' reply was 'quite simply to create slack."" (Bate, Mendel, & Robert, 2008) p.

107. Recognition of this need for slack emerged repeatedly from all three case

studies, with representative examples:

- a. OSA1 on Ln 158: Given the nature of and the climate of health care these days, we are all constantly under the stress of having to keep up with stuff, and the financial stresses of health care right now experiencing and, in the middle of it, one is asked to make a change, and one's comfort zone is constantly threatened in this job, constantly.
- b. OSA2 on Ln 128: To have a regular meeting, monthly, ONE staff meeting is challenging. So if you want to add even one Blueprint meeting, the staffing is such that it's tight. You don't have extra staff to put on the floor for an hour while you pull someone off.
- c. OSA3 on Ln 110: We carved out times to have regular meetings to work on our QI projects because we just do not think that you can do QI without carving out time to do that. You can't do that on the fly while you are doing your regular duties.
- 2. <u>Share the Big Picture:</u> Staff involved in QI must be able to see the "big picture" that

encompasses the entire systemic structure in which they operate. The systemic

structure represents the behavior of the organization as a system, by which

"relationships among system variables ... cause the events and patterns to occur"

(Kelly, 2011) p. 32. Without this picture, the only change that makes sense to health

care workers relates to the immediate subsystems in which they work.

- a. OSA1 in Field journal, Sep 21, 09: Staff are trained to work independently and, in some cases, autonomously. If asked to change, staff are able to resist, but they won't resist if they see the value in terms of the patient visit. The organizational climate is about QI, but also about the way people behave autonomously, in their own separate parts, taking responsibility for what they do individually but not always able to see beyond their roles.
- b. OSA2 on Ln 330: I think they don't realize how their how everyone doing things differently impacts the staff and makes the staff's job hard. And they often don't see the big picture. And so we've definitely had providers who say, Fine. I'm just doing it my way and too bad.

- c. OSA3 on Ln 208: Because there's no part of this job that is separate from any other part of this job. I mean in all honesty. So, you can't have just one person doing something. You have to look at how this system enjoins this person or enmeshes that person within the job that's done by all.
- 3. <u>Deconstruct Past Solutions:</u> In order to make changes, it must be organizationally

acceptable to change old solutions - to deconstruct the right answers of the past. Past

solutions have many advantages; from the point of view of a health care worker, past

solutions are a source of competence, a comfort zone, and a source of efficiency as

they require less thought and effort. Health care systems, in particular, have "history

dependence," in which the past has a strong influence on the present (Kelly, 2011) p.

26. The strength of past solutions directly affects the ability to change – especially in

a field where change invites errors and errors herald disasters.

- a. OSA1 in Field journal from Nov 6 9, 2009: Staff are trained to work independently and, in the case of Lab, autonomously. If asked to change, staff are able to resist, but won't if they see the value in terms of the patient visit... (Staff name) is willing to take a look at the process for doing same day sticks for H/H and lead tests... Quotes from QI team members: "(Staff name) felt pretty good about this; it was clearly OK with her. It's about the patient... She said, 'No problem doing finger sticks; I can try it!'"
- b. OSA 2 on Ln 317: ...one of our process improvements was around standardization. We have three circulating areas, two front desks. Three teams of PSS's. And they have to cover each other. So the more you can standardize from place to place to place....(example) I am in this MA circulating area and I know that I don't know that tongue depressors are always kept *here*. And have a list of the same supplies that we order on each side. Initially even staff was resistant to that kind of standardization. It's: "MY doctor wants it this way or this way". But they've come to recognize in part because they're the ones that have to change seats that there IS value to standardizing it.
- c. OSA3 on Ln 445: The goal is that the new way of doing things is easier than the old way.

One way to analyze the relationships between the dependent variables of the study

and the findings related to successful QI is to evaluate how they measure up, qualitatively

and quantitatively, across the three cases. Table 31 presents those data that identify common patterns among these six measurable characteristics related to QI. Quantitative data were drawn from team member surveys, which provided a larger number of survey statement responses; qualitative data were drawn from all practice member responses, which provided rich, contextual data from multiple perspectives.

Table 31: Relationship between Dependent Variables and Characteristics of				
Successful QI - Practice-Wide Qualitative Ratings, Team Member Median Ratings				
ranging from 1 to 7, and Team Member Percent of "7" Ratings				

Dependent Variables and	Lead	Behavioral	After Visit
	Screening	Health	Summary
	Rate	Integration	Delivery
	Mod High	Moderate	High
AAS Method was Acceptable	6/38%	6/4%	7/67%
AA3 Project had an Effect	High	High	Moderate
on Work Processes	7/64%	7/57%	5/7%
QI had an Effect on Clinical	Very High	High	Mod High
Outcome	7/100%	7/56%	6/38%
Organizational slack was	Some	Less	More
available	"very hard"	"challenging"	"we just do it"
Pig picture was abarad	Yes	Some	Yes
Big picture was shared	Staff aware	Team aware	All aware
Past solutions were	Yes	Yes	No
deconstructed	Lab changed	FTE changed	Obstacles

Three shaded rows in Table 31 highlight a single, common pattern among the characteristics related to "AA3 Acceptable," "Organizational slack available," and "Big picture shared." Where acceptance of AA3 was highest (evidenced by understanding of the process and familiarity with the tools), organizational slack was most available, and a common understanding of the system picture of the change was shared practice-wide – the AVS project. All three characteristics of QI were moderately present for the Lead Screening project, as interest in AA3 grew over the project period, continued after the end of the project, and team members worked to share their "maps" with selected
members of the staff in the practice. All three of these characteristics were in shortest supply for the Integration project. AA3 was not of particular interest, although it received support during the post-project presentation, and, in this larger practice, the "big picture" appeared to be shared with relatively few. There is face validity to these relationships: having the available time to address a QI project goes hand-in-hand with accepting its outcomes, which are easier to understand when the "big picture" has been shared and explained.

There is a similarly close relationship between two other rows: "QI Effect on Work Process" and "Past solutions deconstructed," bolded in Table 31. If work is going to be successfully changed as a result of a QI project, then the old work processes need to be "deconstructed" and replaced with more effective new work processes. The Lead Screening project saw work process changes in two ways (same day lab draw and streamlined letter printing) and experienced the most positive results. The Integrated project experienced work process changes around the arrival of a new employee (Behavioral Health Clinician) and also experienced positive results. The AVS project ran into obstacles with respect to process changes and experienced only moderate results. A successful QI project that addresses work process, therefore, also addresses how changes affect past work processes to ensure that they become easier and more useful for those involved. The remaining row, "QI Effect on Clinical Outcome," did not match the pattern associated with the new factors of effective QI, although these results were similar to another dependent variable, "QI Effect of Work Process."

These three characteristics are likely to be associated with effective QI projects. Because the AA3 method is designed to support the development of all three

characteristics as part of QI teamwork and outcomes, described in more detail below, this study suggests that AA3 has a valid and useful role to play in health care QI. These characteristics can be thought of as features of an effective QI process. None of these features will necessarily cause a successful outcome, but creating QI projects by considering how to incorporate such features, through a checklist or a toolbox for QI, may be helpful for future QI work.

Advantages, Limitations, and Drawbacks of AA3

The three features of successful QI noted above (the need for organizational slack, a shared "big picture," and redesigned work processes that deconstruct old solutions) are represented as actions for health care organizations to consider in support of their QI efforts. They are also natural outcomes of AA3 project work, adding support to the cross-case analysis of the impact that could be made by AA3 on QI effectiveness. The primary tool of AA3 is "value stream mapping," an exercise that identifies the process steps in a system of care, the time needed to complete that care, and the errors that must be corrected by staff in order to complete that care accurately. The value stream map creates a literal picture. AA3 requires all team members to draw that picture themselves, identifying their roles and that of their colleagues to ensure a full understanding of the system of care. One comment volunteered by a case study team member after the close of the project stated: "While using the 'A3' tool, I became aware of all the 'steps' involved in an office visit - from check in to check out." (OSA3, Ln 482).

In addition, the expectation of work process analysis is that work processes will be redesigned for the direct benefit of the staff, thereby making it worthwhile to deconstruct the work processes of the past. The result of AA3 is an easier day of work, in

one or more ways, for practice members, while still accomplishing the goal of improved clinical care for the patient. While AA3-based QI work cannot guarantee an easier work day for everyone, repeated applications of this approach will remove the "waste" of unneeded effort and avoidable errors from everyday work. When this result is achieved, it is memorable: "If nothing else, this process (AA3) really fixed the problem with the letters"... "I can't stop thinking about the letters."... "I will stand by this process: it took care of the print problem"... "I'm still celebrating the letters" (OSA1 Field journal, Nov 30, 2009 – Feb 10, 2010).

The need for organizational slack challenges almost every health care organization in operation today. There are many reasons underlying this dilemma and, therefore, many solutions that may involve a range of changes that address health care policy, financial reimbursement systems, organizational strategic goals, operating plans and budgets, and the management philosophies of individual health care leaders. No one solution will address all of these sources that cause the "lack of slack" in health care today. However, the recognition that "waste," in the form of poorly spent time and the correction of errors, is a potential resource that could be reclaimed has been present in the literature for over two decades.

We know that flaws in the processes through which we produce care are everywhere – waste, duplication of effort, unnecessary complexity, and unpredictability. What portion of the health care dollar is today being spent on 'real work,' that is, care that actually helps somebody, and what portion is 'nonreal work?' Few who know health care from the inside would claim that 'real work' is as much as 80% or even 70% of what we do. (D. M. Berwick, 1990)

Four years later, Berwick defined solutions based on specific aims of health care reform that could reduce specific forms of work process waste in health care: decrease waiting times, reduce inventory levels, and eliminate duplicate data collection (D. M. Berwick, 1994). These aims are the focus of AA3 projects: the reduction of wasted time and effort that could be a source for "organizational slack." While not the answer to all resource shortages in health care, AA3 and related performance improvement tools can provide meaningful assistance. As voiced by a QI team member from OSA3: "I can see where a majority (of QI projects) that we have done have added one more piece to improving patient care. I think if we all did it right, we would have time (for QI) every day." (Ln 434).

The use of AA3 in conducting QI in small health care organizations brings with it a measure of support for the three features regarding effective QI that emerged from this cross-case analysis. However, AA3 QI projects are more likely to generate such support if engaged in frequently and consistently. Other advantages that are likely to accrue to organizations making such an investment in staff education and time include:

- Mutual understanding of colleagues' work processes and work loads, resulting in a higher level of office teamwork and communication.
- Staff development in analytical skills that are based on a patient-centered approach that can improve productivity and job satisfaction.
- Development of a QI organizational climate that includes incorporation of the responsibility for QI as a part of every job function.
- Greater value for the patient and the provider through improved quality and reduced cost.

Limitations to the AA3 method are evident as well:

• AA3 must be used consistently and frequently or the value of the educational component fades quickly.

- The cost of "organizational slack" to a practice is not easily calculable. The practice manager of OSA3 stated it as an expectation of the practice that "the leadership here in OSA3 was to free up time in the schedule for the entire staff to attend these collaborative meetings" (line 110), but this expectation is not universal and is unlikely to be easily affordable. Eight hours per team member per QI project represents the cost of the team meetings, but ongoing education and support of staff to participate in QI cannot be considered an ad hoc expense. Double scheduling for staff absences, overtime expenses for staff that cannot be replaced, and the loss of patient volume are significant expenses and must be planned for and budgeted accordingly, along with external facilitation support if needed.
- AA3, while a simplified version of Lean Management concepts and tools derived from the Toyota Production System (Jimmerson et al., 2005), requires education and practice. Until one or two practice members have conducted three or more AA3 projects each, the need for ongoing external facilitation support is likely.
- The investment in AA3, both in terms of staff time and facilitation support, requires acceptance and funding from the corporate hierarchy, if one exists.

AA3 is generally similar to other QI methods based on the "Plan-Do-Study-Act" framework of the classic Shewhart cycle (Walton, 1986). This represents an advantage, as the method may be familiar to classically trained QI facilitators, but it also represents a drawback, as the distinction between, for example, a "process flow diagram" and a "value stream map" may take additional time to understand in order to use it effectively. The requirement for all team members to "draw your own" value stream map will seem

inefficient to untrained observers, yet this convention is accepted by Lean practitioners as a way to "level the playing field" across all roles and to tap multiple intelligences and sources in the development of new solutions to work process problems. In the field of health care, this method flies in the face of strict boundaries among clinical and nonclinical roles and traditional methods of problem solving. If the components of the Klein and Sorra model of innovation implementation, as adapted by Helfrich, are not largely supportive of this staff-based, analytical, boundary crossing problem solving method through appropriate management support, resources, organizational climate, implementation policies and procedures, organizational values fit, and the presence of at least one respected QI champion, AA3 may create more problems than it will solve.

While AA3 has advantages, limitations, and even drawbacks for health care organizations to consider, studying the effects of AA3 is less straightforward. The analytical tools used to examine AA3 in the context of provider office practices (organizational documents, key informant interviews, surveys, field journals, chart reviews, ERH reports, and feedback from participants post-project) provided many kinds and points of data to cross reference and explore. These tools were limited, however, in supporting a causal understanding of the determinants of effective QI. The variables studied cannot be ranked in order of importance in their ability to explain concepts related to QI and there were few tools to examine the potential interactions between variables. A prerequisite to continued study of AA3 in health care settings is additional work to refine the use of those tools.

Another question to consider in the future is whether the variables "process effectiveness" and "clinical effectiveness" are measures of two different constructs or are

different perspectives of the same construct. This study has examined "process effectiveness" as a characteristic of office work flow, separate from "clinical effectiveness," which has been described as a characteristic of the quality of patient care, defined by the IOM previously (see pg. 2). The study asked if QI can be improved through work process analysis, having defined QI as "an organized approach to planning and implementing continuous improvement in performance" per Alexander, 2006. The analyses explored in Tables 7, 15, and 21 all reflect significant correlations between survey respondent perceptions of process effectiveness and clinical effectiveness, summarized in Table 32.

 Table 32: Relationship between Rating for Two Dependent Variables

Relationships between	Lead	Behavioral	After Visit
Ratings of Process & Clinical	Screening	Health	Summary
Effectiveness	Rate	Integration	Delivery
Response size (n)	8	14	8
Spearman's rho	0.81	0.67	0.92
<i>P</i> value	.015	.009	.001

Is it possible that the "continuous improvement in performance" of the quality of patient care necessarily includes the work processes that produce that care?

From a patient perspective, there is evidence to support a positive answer. The parent of a one-year-old at OSA1 might see the opportunity to submit the lab sample as part of the well child visit as an improvement in the quality of care, along with the completion of yet another required pediatric test out of many. The OSA2 primary care patient in need of someone to talk to about depression or anxiety may consider the immediate "warm hand off" to a behavioral health clinician to be an improvement in the quality of care, just as is the eventual referral to and care by a specialist. OSA3 patients

completed a focus group conducted by practice members that confirmed the value of the After Visit Summary received immediately at the end of the visit. Is this not part of their understanding of "quality of care?" If clinical <u>and</u> process outcomes are characteristics of the quality of care, then quality improvement is more likely to be achieved with concepts and tools that address both.

Summary of Cross-Case Analysis

Although this final point is simple conjecture, the findings related to a set of features that define effective QI processes reinforces the value of continued research into and application of work process-based systems analysis, such as AA3, as an important part of QI along with clinical care-based improvement. This chapter has revealed that the three case study sites, although different from each other in terms of geography, community, and operational features, were very similar to each other in terms of the independent variables of the study. They differed contextually in terms of the influence of corporate hierarchies, preferences regarding QI work, perspectives on work processes as part of QI, and the resources made available to conduct QI. The three practices rated the AA3 project positively in terms of acceptance and clinical outcome; two of the practices also rated the AA3 project positively in terms of its effect on work processes. QI team members across all three sites rated these variables positively and rated the AA3 method, in particular, positively as well. These ratings persisted when each statement was rated by team members individually.

When providing feedback qualitatively, practice members reported that the AA3 project as useful but not easy. In discussions during and after the project, practice members reported positively on its effect on work processes and on the practice. Two

practices also reported positively on its effect on clinical outcomes. However, when preproject ratings of the study variables were compared to post-project ratings, no consistent pattern emerged. Based on these comparative measures, AA3 did not appear to improve the QI process notably. Grounded Theory analysis highlighted the need for organizational slack with which to carry out QI, an understanding of the system's "big picture" that could be communicated and shared, and redesigned work process changes to deconstruct old work processes required of all those involved. These features of successful QI match case study patterns, associating AA3 acceptance with organizational slack and shared big pictures as well as associating an effect on work processes with deconstructing past work processes. AA3 provides these features as a QI method.

In addition to noting how AA3 offers opportunities to support all three of these needs, this discussion also lists other advantages related to the development of teamwork, staff skills, organizational climate, and greater value for patients and providers. Limitations include the need for frequent use, significant cost, facilitation support, and administrative/leadership understanding and support. AA3 will not fit the cultural expectations of all health care organizations and may take time to be understood and appreciated. However, the use of AA3 may result in a greater understanding of the impact of work processes on the quality of care, and how the first may be an inherent component of the second. The exploration of this method suggests a strategy for the development of more effective QI efforts, an advantage that may be sufficient to overcome the limitations associated with the method. Dissemination of these results, and a plan for moving AA3 into the field along with continued research, is supported by these findings and presented in Chapter 6.

CHAPTER 6

IMPLEMENTATION PLAN AND DIRECTIONS FOR FUTURE RESEARCH

"Research is less about getting at the truth than it is about reaching meaningful conclusions, deeper understanding, and useful results." Trochim

The OSA study determined that an office systems analysis-based QI method, AA3, added value in supporting the work of three case study projects, although not all projects were deemed a success by study participants. The use of AA3 in three QI projects suggested a connection between process effectiveness and clinical effectiveness by using a problem-solving technique focused on both work flow and patient care delivery, a method of managing change adopted from Lean. AA3 appeared to be useful in helping clinicians and leaders take advantage of this connection and make changes to produce improvements in both types of outcome.

In addition, the use of AA3 revealed that successful implementation of change in health care is associated with the presence of organizational slack, a shared system perspective, and reinforcement for change by improving work processes in ways that benefit health care workers. One conclusion of this study was that the continued use of AA3 could support the development of all three of these resources and strategies. The study provided support for the theory that an implementation policy or practice such as AA3 depends on organizational characteristics for success, such as management support, resource availability, fit with users' values, organizational climate, the presence of a champion for change, and the support of other organizational implementation policies and practices. These organizational characteristics can help members of the practice

respond to challenges that arise outside or as a result of the QI project, such as a failure of technology or challenges experienced by providers in patient care management, as was discovered in the third case study.

Relevance of AA3 in the Wider Context of Health Care Innovation and Reform

The use of AA3 as a method for managing change falls within a theoretical typology of leverage points that represents change management strategies positioned on a scale of effectiveness (Meadows, 1999). A leverage point is a "small shift that makes a big difference in a complex system." Meadows described twelve types of leverage points, arranged in order of their breadth and depth of effectiveness. The fourth entry in this typology (i.e. the fourth most effective leverage point) is "The power to add, change, evolve, or self-organize system structure." Meadows' examples include "evolution, revolution, technological breakthrough, and self-organization." AA3, when used in a staff-based QI project, contributes to self-organization by putting the locus of control over change in the hands of the process-worker, i.e. the person who delivers health care. AA3 is shown in these case studies to be an effective means of change in the context of an organization that supports innovation.

This method of solving problems by workers who understand the underlying work process emerged from the Total Quality Management practices of the 1980's. It is successful when staff are given responsibility for QI, when the problem-solving algorithm is iterative to allow staff to improve these skills, and leadership supports their outcomes and allows them to improve their effectiveness over time (Young et al., 2004). AA3 also allows participants within a system to understand the broad view by mapping the flow of value-added and wasteful process steps, resulting in customer services or

products of measurable quality in terms of those process outcomes. This tool, along with external coaching, provides a means to access higher orders of leverage in Meadows' typology, which involve understanding and changing the goals of the system (leverage point 3) and exploring the paradigm from which the system was created (leverage point 2). AA3, as described in this study, may provide a small "leverage point" to support change in a field that is destined to change continually in the foreseeable future.

The health care system, including federal and state policy-making as well as the providers throughout the U.S., is fully engaged in reform. The motivation for reform stems from ongoing dissatisfaction with a system that harbors waste and inefficiencies (Altman, 2003). As health service research studies the impact of policy on patient care and its costs (Rosenthal, Landon, Howitt, Song, & Epstein, 2007), expectations have been set that new policies will improve care and reduce cost (Wennberg, Fisher, Skinner, & Bronner, 2007). While policy-making provides one means of quality and cost-effective change, the method of implementation of policy may provide another.

Application of Change Management Theory

Implementing change is a recognized challenge and is made more difficult by unique characteristics of the health care industry. Studying the dynamics of innovation implementation, Repenning reviewed past failures of change management models, such as job enrichment, TQM, business process re-engineering, and others similar to Lean (Repenning, 2002). Repenning's findings highlighted the need for feedback processes for effective change, one example of which is reinforcement, or the direct experience of sustaining success over time. Repenning focused on leadership responsibility to provide

repetitive feedback and reinforcement of innovation; AA3 recognizes that reinforcement can be built into the work processes of providers and staff to help accomplish this goal.

Managing change, however, involves more than building in rewards for adopting innovation. Herzberg theorized that the root of managing change is managing the challenge of changing the behavior of employees expected to change (Herzberg, 2003). Motivating such changes depends on increasing individual control over work environment in alignment with organizational goals. AA3 allows workers to design effective work processes that accomplish the goals of the "big picture" – the value stream map that they have helped create with the support of their leader/facilitator.

In the U.S. health care system, leaders who support on-going change are additionally challenged by the behavioral patterns of the industry (Tucker A., 2003). Tucker focused on hospitals, which emphasize individual problem solving, "lean" staffing to minimize variable costs, and removal of managers from daily work activities. These characteristics feed a list of reasons explaining why hospitals fail to change. AA3 challenges all three of these cultural assumptions in hospitals, as it builds team problem solving, requires organizational slack for innovation, and engages the leader not as isolated problem-solver but as team facilitator.

Dissemination Plan and Continued Research

The use of AA3 to implement change is relevant to the health care and conforms to management theory regarding change management and leadership. These theories recognize that "Every organization is perfectly designed to get the results that it gets" (Hanna 1988, quoted by Kelly (Kelly, 2011)), with the result that, if dissemination is to be effective, it must be approached from an implementation perspective.

<u>Recommendation 1:</u> Work within the provider environment to refine tools that implement policy changes by analyzing and improving work processes for the benefit of patients and health care workers.

This exploratory study has identified possible advantages to a process-based QI method but has only begun to explore a method to study its use to implement policy changes within organizations. Current interest in the dissemination and implementation of health research has led the National Institutes of Health to call for grant applications that will develop and refine effective methods to move research-tested health behavior change interventions into clinical practice settings (Program Announcement Number PAR-10-039). This NIH small research grant (R03) award is an example of a research-based opportunity to implement a change in the standard of care while using AA3 as an implementation method to study.

As a result of the outcomes of Case Study #2 (Integration of Behavioral Health services in Primary Care), the Director of Primary Care Behavioral Health at the academic medical center in which it took place is collaborating with the case study researcher/facilitator to prepare a grant application in response to the above PAR. (See Appendix J for the Project Summary.) This application describes the significance and innovation of Primary Care Behavioral Health services and proposes the development of a "toolkit" to guide implementation through the use of AA3 methods. This two-year grant will allow the researchers to study the use of AA3 in provider office practices to implement a specific change, develop tools to describe its effectiveness and measure its results, and create a guide that will allow other practices to replicate this work. The design of this dissemination and implementation study regarding behavioral health

innovation will be a mixed methods study for which evaluation will be focused on both outcomes (process and clinical effectiveness) and the social change within the organization necessary for innovation to take place (D. M. Berwick, 2008).

Looking beyond the use of QI methods as tools for innovation implementation in individual practices, AA3, or tools developed based on AA3, may have a role in implementing policy changes across a system of care. Health policies are sometimes created as experiments, such as "Pay for Performance," and are not necessarily designed to improve the efficient delivery of care in organizations (Galvin, 2005). If effective public policy is not one act but many small acts, repeated again and again (Oliver, 2007), then effective implementation will depend on operationalizing those policies through effective, repeatable change mechanisms. One such policy example is found in the advent of "accountable care organizations," which are intended to align performance measurement, payment, and local decisions by hospitals and physicians regarding the management of patient care (Fisher, 2007).

<u>Recommendation 2:</u> Conduct research to apply work process tools in micro-systems (such as primary care practices) to implement health policies that benefit the macro-system (accountable care organizations).

With an understanding of implementation methods grounded in the work of Recommendation 1, researchers can further study the implementation of broader policy changes that affect provider office practices in integrated systems of care that are adopting accountable care organizational models. While the focus of Recommendation 1 lies in the work of implementation in a practice site, this recommendation focuses on the replication of implementation across a system of care. Work process tools may be of

assistance in carrying out the intent of policy to meet the capabilities and needs of many different micro-systems.

Currently, grant-based research is available to apply a base of knowledge regarding implementation to a multiple-site study across more than one state. Outcomes will describe the organizational policies and practices related to implementation and propose teaching programs for replication to other sites. Evaluation of this study will again include quantitative and qualitative results, but are likely to reflect the pragmatic needs of the stakeholders rather than just the theoretical interests of the researchers. The assessment of the validity of this work may continue through many future inquiries. The evaluation of AA3 application to support policy implementation will focus on accuracy, feasibility, utility, and ethical considerations (Fitzpatrick, c2004). The expected outcome of this work is the material for educational program development relevant to health care clinicians and leaders.

Applying the results of this work to the field will require ongoing dissemination and education. Health care workers and leaders have limitations in the implementation of innovation. Board members, executives, and health care leaders need to be educated to examine the core performance of their organizations, to develop a shared aim of improvement, and to use effective tools to implement change (Galvin, 2005). <u>Recommendation 3:</u> Educate clinicians and health care leaders in the effective management of change.

Using the results of effective implementation tools in micro-systems to align with the policies of macro-systems, researchers will collaborate with health care-related institutions and professional associations to provide concepts and tools of innovation

implementation (AA3 along with other tools) as a means of organizing change within the context of health care organizations. Outcomes of this work may include educational guides to health care organization management at multiple levels of application (e.g. personal, team, organizational, and health system). The goals of this work will be developed with end-users as collaborators, who will help develop the model, the method, and the use of these outcomes.

Applying the products of research to the settings of health care systems requires situational responsiveness based on joined commitment of the stakeholders (Patton, c1997). It is likely that the evaluation of this work will call for mixed methods to observe these activities from different perspectives resulting in case studies and small group studies that explain "how" and "what," rather than generalizing across populations. If these studies can "place the best brains available into the thick of what is going on" (Fitzpatrick, quoting Stake, p. 309) (Fitzpatrick, c2004), the outcome may be effective translation of public health policy into the operating field of the health care system.

Advantages and Limitations

The above recommendations to move AA3 into the field for further testing, development, and application is based on theories and evidence supporting the effective management of change in health care. AA3 brings with it characteristics of managing change that provide strategic advantages and important limitations. Just as effective public health policy changes social structures so that healthy behavior becomes the natural course of action (rather than due to rules and punishment) (Goodman, 2007), so does effective implementation, by work process redesign, make what is "right" from an organizational perspective the same as "what is easy" for the health care worker.

AA3 complements other theories of effective change as well. Mintzberg emphasized the value of map making, both for its aid in visualizing change and its support for synthesizing complex data (Mintzberg, 1998), a feature that AA3 also emphasizes. AA3 map making is drawn from the participation of front line workers, a tactic of implementation that Nutt found successful but low in frequency of use, due to the high demand it places on leadership resources (Nutt, 1986). And, AA3 incorporates process-based measures of cost effectiveness, responding to on-going need to demonstrate the results of policy implementation (Greene, 2007).

Despite these advantages, the proposal to study and measure the relationship between process-based implementation in micro-systems and policy adoption in macrosystems is at risk for being overly broad and difficult to manage, as is the recommendation to change leadership education. Meadows points out that using systems analysis as leverage for change is hard to predict and control (Meadows, 2001). The study of effective change using self-organizing, non-linear tools is not likely to result in tight couplings of determinants and outcomes. The "wisdom of systems" is more likely to be revealed through surprises, relaxed attention to what the current system produces, and openness to possibilities rather than points of data that reflect possibly limited perspectives of the past.

In addition to the resistance to orthodox scientific study that this topic is likely to display, researchers are likely to encounter an ongoing difficulty in separating the facilitator and the team from the AA3 process. The role of "coach" is likely to be indistinguishable from "facilitator," and both dramatically affect the work of the team as well as the outcome of the AA3 process. In this sense, research in this area may need to

follow the "realist" design proposed by Pawson and Tilley, in which attention is paid to local details of how the intervention works and in what contexts (Pawson & Tilley, 1997). If research on AA3 becomes necessarily imbedded in the work of AA3, the result may be a process "to equip the workforce to study the effects of their efforts, actively and objectively, as part of daily work" (D. M. Berwick, 2008). In fact, this is exactly the goal that Lean management tools try to achieve.

Conclusion

The three recommendations above call for studying AA3 as an implementation tool within micro-systems, as a method to implement policies of macro-systems, and as an educational resource to support health care leaders in their work of implementing innovation. These recommendations correspond with the call for action from the Institute of Medicine in 2003 (The future of the public's health in the 21st century 2003), a report that documented progress in the science of improving health and innovation in public/private partnerships in communities. The purpose of the IOM report was to bring together key agents of change, including government agencies, health care organizations, and academia, among others. It highlighted the need for access to services that will better manage chronic disease, provide neglected health care services (such as mental health), and increase the service capacity and quality of health care services. The need for better access calls for innovation that must be implemented effectively with respect to both work processes and clinical outcomes. The work to research and move AA3 forward supports these goals and, furthermore, helps move the focus of research to public health practice and improvement.

APPENDIX A

Glossary of Terms

Analysis: the use of a structured approach to understand the components of a set of functioning units, many of which must be coordinated in a clinical office practice, representing a system

Champion: a charismatic individual who throws his/her weight behind quality improvement, thus overcoming the indifference or resistance that a new idea often provokes in an organization (Helfrich 2007)

Clinical effectiveness: the degree to which a QI project or QI team activity achieves higher quality of care for patients whether measured via perceptual or objective data *Culture*: values, beliefs, and norms of an organization that shape its behavior (Shortell 1995)

Easy to Use (related to the A3 process): From the Technology Acceptance Model, "freedom from difficulty or great effort;" when measured as a perception: "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989)

Fit with users' values: the extent to which targeted users perceive that use of quality improvement will foster (or conversely, inhibit) the fulfillment of their values, where values are 'generalized, enduring beliefs about the personal and social desirability of modes of conduct or 'end-states' of existence' (Helfrich 2007)

Implementation effectiveness: the consistency and quality of collective use of quality improvement (Helfrich 2007)

Implementation policies and practices: the formal strategies (i.e. the policies) the organization uses to put quality improvement into use and the actions that follow from those strategies (i.e. the practices)... [e.g. employee training, technical assistance, praise from supervisors, employee promotions, regular and accurate communication from supervisors about the innovation, and extra time in the workday to experiment with quality improvement changes and become comfortable with them]. (Helfrich 2007) *Management support:* managers' commitment to conduct transformation of the organization and to invest in quality implementation policies and procedures to implement improvement (Helfrich 2007)

Organizational climate: "a shared perception of the relative priority of a specific set of roles or tasks within the organization," including such organizational priorities as customer service, occupational safety, or implementation of a new technology. In this review, "organizational climate" is a shared perception among targeted organizational members that quality improvement is a major organizational priority—promoted, supported, and rewarded by the organization. (Helfrich 2007)

Process effectiveness: the degree to which a QI project or QI team activity achieves improved work flow (for example, shorter processing time, fewer steps, fewer errors, less waiting, less duplication of effort, fewer wasted steps or time) whether measured via perceptual or objective data

Resource availability: a cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment' (Helfrich 2007)

Quality: "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." (Institute of Medicine, 2001)

Quality improvement: "an organized approach to planning and implementing continuous improvement in performance." (Alexander, 2006)

System: "a collection of parts which interact with each other to function as a whole" (Kauffman, 1980)

Useful (related to the A3 process): from the Technology Acceptance Model "capable of being used advantageously;" when measured as a perception: "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989)

APPENDIX B

Sample Recruitment Letter

Dear xxx,

I am conducting a short research project to support quality improvement projects in Vermont provider office practices. My role is to test a method of quality improvement called "office systems analysis," which is intended to help office staff plan their work around patient care, making improvements to patient care easy and successful. This work is part of my faculty work at the College of Nursing and Health Sciences as well as a requirement of my doctoral studies in public health at the University of North Carolina in Chapel Hill.

I would like to volunteer my time to work with a few of your office staff around an office systems project they would like to improve. Examples from previous work as part of this study include: electronic medical record utilization, tracking of patient paperwork, and coordinating child wellness visits with lab visits.

I would be glad to meet with you to review the office analysis study in more detail, if helpful to you. As a research study, it comes with requirements to get willing and informed consent from participants, to participate in discussions or surveys about the study before and afterwards, and to engage staff participation in this QI process either weekly or biweekly. I will follow up this letter with a phone call, or you can contact me at 802-373-6286 and through my UVM office at cvaneegh@uvm.edu. Of course, this project is completely voluntary for you and your practice. I look forward to talking with you soon.

Sincerely,

Connie van Eeghen Project Faculty

APPENDIX C

Sample Interview Script

Introduction

Hi there. My name is Connie van Eeghen. Thank you for taking the time to talk with me. I am a faculty member at the UVM College of Nursing and Health Sciences. I am also a student in the Executive Doctoral Program in Health Leadership at the University of North Carolina at Chapel Hill School of Public Health.

You may already know that your practice is participating in a UVM study to make quality improvement projects easy and successful. The goal of the study is to create easy and effective methods to conduct quality improvement projects in the future. This meeting is an interview to find out how your practice has done quality improvement projects in the past.

As you can see, I am using a script that helps me make sure I am asking you everything I should. Are you comfortable if I continue to read from it?

Any questions about this study so far?

(Pause to check for questions about this study at this time. If more information is needed now, respond to questions as concisely as possible and follow up later if needed.)

In preparing for this interview, we sent you an information sheet (OSA Key Informant Information Sheet) reviewing this goal, outlining possible benefits and risks related to the study, and explaining how we will work to protect your confidentiality both during and after the study. Do you have any questions about this study so far? Do you have the information sheet with you or would you like a new one now?

(Provide a new copy of OSA Key Informant Information Sheet, if requested, and answer any questions offered by the Key Informant)

One of our requests is to ask for your permission to record this session, so that we can make sure that the notes I take really reflect your thoughts and opinions.

Do I have your permission to record this session? (If yes, start audio

recorder(s). If no, proceed.)

OK, let's get started.

(Note: questions that start with "Prompt:" are not used unless the respondent appears to need help understanding the original question.)

Scripted Questions

- 1. Please tell me your name, birth date, and your title or role. How long have you been working in this role at (practice name)? Is this a full time role?
- 2. Has (practice name) worked on quality improvement projects in the past? If so, about how many? When did the first project get started? Could you describe a quality improvement project you were part of?
- Tell me what the leaders (providers, managers) of the practice have done to support quality improvement projects in the past? (Prompt: Staff meetings, incentives, posters, displays, their own involvement, leading the process, staff education, material support?)

- 4. How does a quality improvement project usually proceed? (Prompt: Is there a certain method or plan for doing quality improvement projects? Is there a formal process for getting it done? Who involved? Schedule of project? Location/space?)
- 5. Are there any issues around getting staff time to do a quality improvement project?
- 6. When a quality improvement project produces recommended changes, are there any barriers to making those changes happen or keeping them going? (Funds? Staff attitudes? Leadership?)
- Does this practice value QI projects? (Prompt: What are people's attitudes about them?)
- How does this practice assess the outcomes of QI projects? (How do you know they worked?)
- 9. Do the QI projects that this practice does reflect its stated values? How so?
- 10. Is there a "quality improvement" champion in the practice someone that people go to to help resolve issues or problems that arise? (Someone who takes responsibility for making sure projects keep moving forward?)
- 11. Do the practice staff (providers and office staff), as a whole, think of quality improvement projects as a priority to be supported and rewarded by the practice?
- 12. What else would you like to tell me about quality improvement projects in your practice?

<u>Closing</u>

Thank you again for your time. Your input and insights will be very helpful to this study. I'll be sending you a draft report summarizing the findings of the study related to this practice for your review and comment. A copy of the final study will be available to you at your request, expected in December 2011.

After Interview

- 1. Turn off audio recording(s)
- 2. Document recording folder and file number, and place in kit with notes.
- Update Informed Consent spreadsheet, noting that informant consented verbally and completed the interview process.
- After returning to UVM, secure kit with recorder, forms, and notes in locked file.

APPENDIX D

Sample Pre- and Post-Project Surveys

To: <<staff name>>

From: Connie van Eeghen, Researcher with the College of Nursing and Health Sciences, University of Vermont and Doctoral Student in Public Health at the University of North Carolina – Chapel Hill

Date: April 4, 2012

Re: Staff Survey regarding Quality Improvement Projects

You are invited to take part in a research study. You are being asked to complete a survey to evaluate a quality improvement project to <NAME OF PRACTICE QUALITY IMPROVEMENT PROJECT>. The survey should take about 5 minutes to complete. If you fill out the form, your name will not be linked to what you write down. The envelope with your name on it will be separated from the survey you filled out before it is looked at. Our goal is to create easy and effective quality improvement project methods. We will use the results of this survey to find out how all staff view quality improvement projects in your practice.

Taking part in this survey is voluntary. You may refuse to answer without penalty to you or your practice. If you do not want to be asked again, please call me at 802-373-6286 or at <u>cvaneegh@uvm.edu</u>. Your practice will take part in this quality improvement study even if you don't want to fill out this survey. Please return your completed survey to the marked folder or envelope held by <PRACTICE MANAGER>.

At the end of the project, the envelope with your name on it will be shredded. No results from this study will include your name.

Thank you for your time; your answers will help us with new quality improvement projects. If you have any questions please contact me at 802-373-6286 or at <u>cvaneegh@uvm.edu</u>. If you have any questions about your rights as a participant in a quality improvement research project you should contact Nancy Stalnaker, the Director of the Research Protections Office, at the University of Vermont at 802-656-5040.

Thank you,

Evaluation of Quality Improvement Project Pre-Project Staff Survey

The first questions ask you about your knowledge of and involvement in the Quality Improvement (QI) project referred to on the previous page.

1. Were you already aware of the upcoming quality improvement (QI) study (NAME OF PRACTICE QUALITY IMPROVEMENT PROJECT) in your office?

- 🗆 No
- □ Yes
- \Box Don't know
- 2. Will you be a member of the QI team that works on this project?
 - 🗆 No
 - \Box Yes
 - \Box Don't know

The next questions are about your views on a QI project you can remember <u>in your practice</u>. For each question, please check or circle the one answer that comes <u>closest</u> to your viewpoint on the outcome of that QI project. Answer even if you were not part of the QI project yourself.

3. Can you remember a QI project that happened in your practice that is now finished?

- $\hfill\square$ No..... If No, go to question 12, next page
- \Box Yes..... If Yes, go to question 4, directly below
- \Box Don't know.....
- If unsure, go to question 12, next page

	Strongly Disagree						Strongly Agree	Don't Know
4. The QI project was successful in improving the quality of patient care.	1	2	3	4	5	6	7	9
5. The QI project made my job easier.	1	2	3	4	5	6	7	9
6. The QI project made us more efficient as a practice.	1	2	3	4	5	6	7	9
7. The QI project was easy to do.	1	2	3	4	5	6	7	9

The next questions are about your personal experiences participating in a QI project <u>in your practice</u>. Please check or circle only one answer for each question.

8. Have you ever participated directly in a QI project in your practice that is now finished?

- \Box No..... If No, go to question 12, below
- \Box Yes..... If Yes, go to question 9, directly below
- \Box Don't know..... If unsure, go to question 12, below

	Strongly Disagree						Strongly Agree	Don't Know
9. I had enough time to								
participate in the QI project.	1	2	3	4	5	6	7	9
10. We had the financial								
resources necessary to	1	2	3	4	5	6	7	9
complete the QI project.								
11. We understood how to								
get the QI project done.	1	2	3	4	5	6	7	9

The next questions are about your views about how QI projects work in your office practice in general. Please circle only one number for each question.

	Strongly Disagree						Strongly Agree	Don't Know
12. Our practice leaders (providers or managers) support QI projects.	1	2	3	4	5	6	7	9
13.Our practice provides enough time to complete QI projects.	1	2	3	4	5	6	7	9
14. When we do a QI project, our practice provides the financial resources to implement it.	1	2	3	4	5	6	7	9
15. When we do a QI project, we understand how to get it done.	1	2	3	4	5	6	7	9
16. Our office practice cares about QI projects	1	2	3	4	5	6	7	9
17. Our practice has someone we can go to for help when doing a QI project.	1	2	3	4	5	6	7	9

The next questions are about your own personal views about QI projects. Please circle only one number for each question.

	Strongly Disagree						Strongly Agree
18. QI is important to me	1	2	3	4	5	6	7
19. If I were asked to be part of a QI project in the future, I would accept.	1	2	3	4	5	6	7
20. I think that QI projects are NOT valued in our practice.	1	2	3	4	5	6	7

Question 21. What else would like to tell us about your experience in or observations about QI projects at your practice? Please share your thoughts below or use an additional sheet if needed.

Please tell us some basic information about you.

- 22. Your primary role in the practice is:
 - □ Provider (MD, DO, NP, PA or any other licensed independent practitioner)
 - \Box Nursing Staff
 - \Box Medical Assistant
 - □ Front Office Staff
 - □ Billing/Medical Records
 - □ Other (Specify)
- 23. Your age: _____
- 24. Sex: \Box Male \Box Female
- 25. What year did you did you start working at the practice? (If you left the practice and came back, indicate the first year you started working at the practice.)

Thank you for your time and input into this survey. Your answers will help us improve our support of quality improvement projects in the future. Please place this completed survey in the accompanying envelop with your name on it, seal it, and leave in the manila folder at the front desk marked "Quality Improvement Study Survey." Again, thank you.

Providers and Staff of the <NAME OF HEALTH CARE ORGANIZATION>

From: Connie van Eeghen, Researcher with the College of Nursing and Health Sciences, University of Vermont and Doctoral Student in Public Health at the University of North Carolina – Chapel Hill

Date: April 4, 2012

Re: Follow up Staff Survey regarding Quality Improvement Projects

This survey is a follow-up survey to a recent research study to evaluate a quality improvement project to <PURPOSE OF PRACTICE QUALITY IMPROVEMENT PROJECT>. This particular project made <SELECT NUMBER> changes in your practice:

) <GOAL ONE OF PRACTICE QUALITY IMPROVEMENT PROJECT>

2) <GOAL TWO OF PRACTICE QUALITY IMPROVEMENT PROJECT>

The survey should take about 5 minutes to complete. If you fill out the form, your name will not be linked to what you write down. The envelope with your name on it will be separated from the survey you filled out before it is looked at. Our goal is to create easy and effective quality improvement project methods. We will use the results of this survey to find out how you and others viewed this quality improvement project in your practice.

Taking part in this survey is voluntary. You may refuse to answer without penalty to you or your practice. Your practice has already taken part in the above mentioned quality improvement study. Your response, even if you have filled out a similar survey before, will be very helpful. Some questions on this survey are the same as those on a previous survey sent to you. To support this research study, please answer them again even if you did so before. Please return your completed survey to the marked folder or envelope held by <PRACTICE MANAGER>.

At the end of the project, the envelope with your name on it will be shredded. No results from this study will include your name.

Thank you for your time. Your answers will help us improve future quality improvement projects. If you have any questions please contact me at 802-373-6286 or at <u>cvaneegh@uvm.edu</u>. If you have any questions about your rights as a participant in a quality improvement research project you should contact Nancy Stalnaker, the Director of the Research Protections Office, at the University of Vermont at 802-656-5040.

Thank you,

Evalu	Evaluation of Quality Improvement Project Post-Project Staff Survey											
The first questions ask you abo Improvement (QI) project refe	out your l erred to o	nowledgen the pre	ge of and evious pa	involver lge.	nent in tl	ne Qual	ity					
1. Before today, did you know th PRACTICE QUALITY IMPRO	nat there w	vas a qua Г PROJE	lity impro CT> in y	ovement (our office	(QI) <na ?</na 	ME OF						
□ No	E	□ Yes				Oon't kno	ow					
2. Were you a member of the QI team that worked on this project?												
\Box No \Box Yes \Box Don't know												
3. Did you attend any meetings related to the results of this quality improvement project? □ No □ Yes □ Don't know												
The next questions are about your views on the success of the QI study. For each question, please check or circle the one number that comes <u>closest</u> to your viewpoint on the outcome of this project. Answer even if you were not part of the QI project yourself.												
	Strongly Disagree						Strongly Agree	Don't Know				
4. The QI study resulting in <purpose of="" study=""> was successful in improving the quality of patient care.</purpose>	1	2	3	4	5	6	7	9				
5. The <name of="" study=""> study made my job easier.</name>	1	2	3	4	5	6	7	9				
6. The <name of="" study=""> study made us more efficient as a practice.</name>	1	2	3	4	5	6	7	9				
7. The <name of="" study=""> study was easy to do.</name>	1	2	3	4	5	6	7	9				
8. The <name of="" study=""> study improved how well I can do my job</name>	1	2	3	4	5	6	7	9				
9. <first of<br="" purpose="">STUDY> is done more often now than at the beginning of the QI project.</first>	1	2	3	4	5	6	7	9				
10. <second of<br="" purpose="">STUDY> is done more often now than at the beginning of the QI project.</second>	1	2	3	4	5	6	7	9				
11. We do a better job <purpose of="" study=""> now than we did at the beginning of the OI project.</purpose>	1	2	3	4	5	6	7	9				

The next section asks for your views about the effect the QI project had on getting <PURPOSE OF STUDY> done in your practice. For each question, please select the one number that comes <u>closest</u> to your viewpoint on how the project affected patient care.

	Strongly Disagree						Strongly Agree	Don't Know
12. As a result of the QI study <name of<br="">STUDY>, it takes fewer steps to do a <purpose> than it used to.</purpose></name>	1	2	3	4	5	6	7	9
13. As a result of this QI study <name OF STUDY>, it is easier to do a <purpose> than it used to be.</purpose></name 	1	2	3	4	5	6	7	9
14. As a result of this QI study, it takes less time to carry out a <purpose> than it used to.</purpose>	1	2	3	4	5	6	7	9
15. As a result of this QI study, there are fewer mistakes in <purpose> than there used to be.</purpose>	1	2	3	4	5	6	7	9
16. As a result of this QI study, the patients, once they are in the office, don't wait for <purpose> as long as they used to.</purpose>	1	2	3	4	5	6	7	9

The next questions ask for your views about how QI projects work in your office practice in general. Please circle only one number for each question.

	Strongly Disagree						Strongly Agree	Don't Know
17. Our practice leaders (providers or managers) support QI projects.	1	2	3	4	5	6	7	9
18.Our practice provides enough time to complete QI projects.	1	2	3	4	5	6	7	9
19. When we do a QI project, our practice provides the financial resources to implement it.	1	2	3	4	5	6	7	9
20. When we do a QI project, we understand how to get it done.	1	2	3	4	5	6	7	9
21. Our office practice cares about QI projects	1	2	3	4	5	6	7	9
22. Our practice has someone we can go to for help when doing a QI project.	1	2	3	4	5	6	7	9
23. Our QI projects reflect the values of our practice.	1	2	3	4	5	6	7	9

The next questions are about your own personal views about QI projects. Please circle only one number for each question.

	Strongly Disagree						Strongly Agree
24. QI is important to me	1	2	3	4	5	6	7
25. If I were asked to be part of a QI project in the future, I would accept.	1	2	3	4	5	6	7
26. I think that QI projects are NOT valued in our practice.	1	2	3	4	5	6	7

Question 27. What else would like to tell us about your experience in or observations about QI projects at your practice? Please share your thoughts below or use an additional sheet if needed.

Please tell us some basic information about you.

28. Your primary role in the practice is:

- □ Provider (MD, DO, NP, PA or any other licensed independent practitioner)
- \Box Nursing Staff
- $\hfill\square$ Medical Assistant
- □ Front Office Staff
- □ Billing/Medical Records
- \Box Other (Specify)
- 29. Your age: _____
- 30. Sex: \Box Male \Box Female
- 31. What year did you did you start working at the practice? (If you left the practice and came back, indicate the first year you started working at the practice.)

Thank you for your time. Your responses will help us improve future quality improvement projects. Please place this completed survey back in the envelop it came in, seal it, and leave in the manila folder in the Practice Manager's office marked "Quality Improvement Study Survey." Again, thank you.

QI Team Members Evaluation of Quality Improvement Project Post-Project Survey Insert

The questions below ask about the "A3" tool used to make process changes to <PURPOSE OF STUDY> in your practice (the 11" x 17" paper used to document your work). For each question, please give the one number that comes <u>closest</u> to your viewpoint on how well the A3 tool worked for you and your team.

	Strongly Disagree						Strongly Agree	Don't Know
A. The A3 tool helped us make changes that were part of the QI study.	1	2	3	4	5	6	7	9
B. I would be willing to use the A3 tool to make changes in other parts of the office.	1	2	3	4	5	6	7	9
C. I would be willing to participate in other QI projects that use the A3 tool to make changes.	1	2	3	4	5	6	7	9
D. The time I took to do the QI study using A3 was made up by time saved in the work I do in the practice.	1	2	3	4	5	6	7	9
E. The A3 process was easy to do	1	2	3	4	5	6	7	9
F. The A3 process made my job performance better.	1	2	3	4	5	6	7	9

The next questions are about your personal experiences participating in the <NAME OF STUDY> QI project. Please check or circle only one number for each question.

	Strongly Disagree						Strongly Agree	Don't Know
G. I had enough time to participate in the QI project.	1	2	3	4	5	6	7	9
H. We had the financial resources necessary to complete the QI project.	1	2	3	4	5	6	7	9
I. We understood how to get the QI project done.	1	2	3	4	5	6	7	9
The final questions ask for feedback about how to make this research project more effective for future participating provider office practices. Please give your full and candid response.

Please take a moment to think about this project, starting from the beginning when you were first brought together as a QI team to the last meeting you had together.

J. What do you remember about this project that worked well for you?

K. What do you remember about this project that did NOT work well for you?

L. What specific changes would help make this project or one like it better in the future?

Please enclose this page into the envelop with the larger survey form. Your responses will give us key insights into the way we can make QI projects work better for office practices in the future. Thank you for the time and effort you put into this project, both to improve patient care and to help us examine your QI process. Your work and efforts are greatly appreciated.

Evidence of A3 Effect iveness Organizational Climate QI Champions Organizati ond Values Office Practice Field Journal cpractice name> Project Start Date: <date> Of Processes Existing Financial Resources Management Support First Name Date

APPENDIX E

Sample Researcher's Field Journal Outline

APPENDIX F-Case Study 1

Case Study #1 Chronology (2009-2010) and List of Interviewees

- August 2009 chart audit: conducted by VCHIP as a manual review of charts, resulting in one-year-old lead screening rate (25%) and two-year-old lead screening rate (47%), both below the state targets of 85% and 75% respectively.
- August 31: Introduction, background, and issue identification; document review of practice documents
- 3. September 16: Pre-project survey administered; with 11 of 19 responding (58%)
- 4. September 21: Current state and process analysis (start); problem analysis (start); identification of work process to change ("letter checkout process") [included a lunch hour meeting followed by an evening dinner meeting]; interviews of 3 staff:
 - o RT, Medical Practice Manager
 - o JH, RN
 - o CA, Patient Coordinator and Medical Assistant
- 5. October 5: Process analysis (continued); problem analysis (completed)
- 6. October 12: Current state and process analysis (completed); target state (start)
- October 19: Target state (continued); cost/benefit analysis; implementation plan (start)
- 8. October 26: Target state (completed); implementation plan (continued)
- 9. November 9: Implementation plan (completed)
- 10. November 2009 January 2010: Pilot test and implementation of target state
- 11. February 26: Post-project survey administered with 11 of 19 responding (58%)
- 12. September 2010: Electronic chart audit of well child visits from Jan June 2010

APPENDIX F-Case Study 2

Case Study #2 Chronology (2010-2011) and List of Interviewees

- 1. August 11: Introduction, background, and issue identification
- 2. August 3 October 13: Interviews of 1 provider and 2 staff:
 - CB: Clinical Site Leader
 - o JE: Practice Supervisor
 - o GM: Nurse Practitioner
- 3. August 25: Current state and process analysis (start); problem analysis (start)
- 4. August 27: Pre-project survey administered with 17 of 42 responding (40%)
- 5. September 4: Document review of practice documents
- 6. September 8: Review of best practices by local Behavioral Health Clinician; current state, process analysis, problem analysis completed; target state (start)
- October 6: Identification of work process to change ("external referral process") and measures of success
- 8. October 20: Target state (continued); Implementation plan (started)
- 9. November 3: Target state and Implementation plan (continued)
- 10. November 17: Target state and Implementation Plan completed, including cost/benefit analysis, pilot test, and follow-up plan
- 11. November 2010 February 2011: Pilot test of target state
- 12. February 2011: Implementation of target state
- 13. April 13: Post-project survey administered with 14 of 35 responding (40%)
- 14. October 2011 pre- and post-project data collection by electronic medical record reporting from Feb 2010 Jan 2011 and from February 2011 June 2011

APPENDIX F-Case Study 3

Case Study #3 Chronology (2011) and List of Interviewees

- May 5: Introduction, background, issue identification, current state, measures, process analysis and problem analysis (start)
- 2. May 5 May 19: Interviews of 1 provider and 3 staff:
 - o LM: Provider
 - CC: Practice Supervisor
 - o SA: Medical Office Assistant
 - AR: Front Office Staff
- 3. May 19: Current state, process analysis, and problem analysis (complete); target condition, measures, countermeasures, and implementation plan (start)
- 4. May 19: Pre-project survey administered with 8 of 8 responding (100%)
- 5. May 26: Implementation plan and measures (completed)
- 6. June September: Pilot test of target state
- 7. August: Patient focus group on meaningful use.
- 8. September 8: Document review of practice documents
- 9. September 8: Review of pilot; adjustments to plan
- 10. November 14: Post-project survey administered with 8 of 8 responding (100%)
- 11. November14: pre- and post-project data collection by electronic medical record reporting from May 2, 2011 May 23, 2011 and from September 6, 2011 November 7, 2011

APPENDIX G - Facsimiles of Hand Drawn Diagrams of AA3 Reports of Well Child Visit Lead Screening Process-Case Study 1





APPENDIX G - Facsimiles of Hand Drawn Diagrams of AA3 Reports of Letter Check Out Process - Case Study 1

APPENDIX G - Facsimiles of Hand Drawn Diagrams of AA3 Integration of Behavioral Health Clinician – Case Study 2





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APPENDIX G - Facsimiles of Hand Drawn Diagrams of AA3 Referral to External Specialist – Case Study 2

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APPENDIX G - Facsimiles of Hand Drawn Diagrams of AA3 After Visit Summary to Patient – Case Study 3

APPENDIX H- Example of Educational Article on QI Methods based on Case Study #1 Accepted for publication by AHEC, July 2011

One of the best things about a quality improvement project is finding out that the work to improve patient care can also improve staff work life too. Three members of the (name of site) accomplished this when they decided to respond to a call from the Vermont Child Health Improvement Project (VCHIP) to improve lead screening rates in their region for one- and two-year old kids. Their aim was simple: hit the Vermont Department of Health target of screening rates for children in their Family Medicine practice (Vermont Department of Health, 2009).

The practice knew, from a previous chart audit, that it was screening only 25% of its one-year olds and 47% of its two-year olds, both below the state targets (85% and 75% respectively). The practice, which includes 4 providers and 15 staff, sees only a few children of those ages each week, so developing a fail-safe system to screen every single one of them (except for those whose parents declined) was essential to improving this baseline.

What Quality Improvement Method to Choose?

The practice gathered a small team of three: (team member names), knowing that the work of each position in the practice could affect the outcome of testing for lead. The team knew that their quality improvement project was tightly focused on one outcome (their lead screening rate) but that they needed to look across the workflow of the entire practice to find where these children were falling through the cracks. They used a Plan-Do-Study-Act framework to organize their work and added Office Systems Analysis as a method to examine their workflow for delays and errors.

Developing the "Plan"

The team studied the flow of work created when a patient comes through the door for a "well child visit" that is supposed to include an order for a lead screening test. By creating a "map" of every step in the process (insert photo around here), they found where work was delayed or when it was repeated due to errors. They found that all their lead tests took place a week or more after the well child visit, due to the need to schedule a separate lab encounter within the practice once the order was written. They also found that a staff intensive process to print patient letters with lab results took time away from patient care for providers and staff. The team created a report that included their map and the development of their plan of action.

"Doing" the Plan

The team developed two specific changes to their office systems:

- 1) "Same day" lead screening, in which lead tests are performed on the day of the well child visit, rather than scheduled for a return visit to draw labs. This plan was piloted with the lab technician using sample kits for capillary draws (finger sticks).
- 2) "Routing" the lab test result letters electronically to the printer after confirmation by the provider using the practice's electronic medical record (EMR). This plan was tested with two providers who routed letters to staff for signature stamps and mailing.

"Studying" What the Plan Accomplished

After they brought their co-workers up to speed on their plan and carried it out for several weeks, the team completed some rapid cycle learning steps, studying the results of their work in order to adjust their plan as they went. They learned some key results from both patient screening and staff feedback:

- 1) Venous draws were less complicated and required less work than the capillary draws. The system of processing capillary draws required a separate lab reporting system, not compatible with their EMR.
- 2) Same day scheduling reduced patient waiting for a lab test from about 1 week to less than 1 hour. Staff identified pediatric pain management as a problem for parents (as well as for patients, who can be quite vocal!). The team discovered that applying EMLA cream (Lidocaine & Prilocaine) at the start of the visit reduced these concerns.
- 3) Routing letters electronically through the EMR was declared an immediate success, reducing the delay in mailing results from about 20 hours to less than 10 minutes per letter.

"Acting" on Success

Taking the lessons learned from its analysis of office systems and feedback from its piloted changes, the team implemented its redesigned process steps with the whole office. Change isn't always easy. New work habits need reinforcement and support so that the new process of scheduling both the well child visit and the lab visit on the same day could become automatic. As time passed, other suggestions were offered by staff and added to the process, such as educating parents about lead screening at the nine month visit using Bright Futures, AAP as a guide (*Recommendations for preventive pediatric health care*.2008) and sending appointment reminders that include information about lead screening and the use of EMLA cream.

The Prize

The team knew that regular feedback to providers and staff would help everyone keep track of how well the practice was screening children for lead and whether they needed to do more to make it better. They used their EMR to report on well child visits with and without lead screening tests every six months, finding immediate success after their first feedback report in reaching the Vermont Department of Health goals (91% for one-year olds and 86% for two year olds 6 months after base line). Updated reviews continued to show high levels of screening to April 2011, with most recent scores for one-year olds at 100% - meeting their ideal goal for these children. (This reporting period had no well child visits for two-year olds, so no data were available for this age group.) Although there have been some dips in their progress (insert chart around here), the practice has maintained the state standards ever since completing its quality improvement project.

Lessons Learned:

Practice staff came together for a review meeting of their lead screening project this past Spring 2011, and agreed on three key reasons that helped make the project a success:

- 1. Everyone cared about the relatively low rate of lead screening in their region and practice patients. Caring counts staff need to feel committed to the project in order to make it better.
- 2. The leaders and other providers in the practice gave staff the time to do the project. Without the time (about 10 hours, over four months), a team can't analyze and solve the "cracks" in its office system.
- 3. The team looked at both clinical methods of testing and work flow steps at the same time. Making the work flow better helps make the clinical outcome better too.

In summary, the Lead Screening Project was a success both in terms of improving lead screening rates for pediatric patients and making office work a little easier for staff. If you have a quality improvement project you'd like to share, or tips on making projects easy and useful, please contact Connie van Eeghen at cvaneegh@uvm.edu or call at 802-373-6286.



Map of the Well Child Visit

Latest Results of Lead Screen Rates (Spring 2011):



APPENDIX I - Abstract of Article "Integrating Behavioral Health in Primary Care using Workflow Analysis in Quality Improvement – Case Study"

Background: Primary care offices are integrating behavioral health clinicians into their practices to help meet the mental health needs of many of their patients. Implementing a practice change that affects providers, staff, and office systems is complex. Office practices have limited time to invest in complex change, which represents a challenge to such quality improvement (QI) projects.

Objective: To test a method of QI based on workflow analysis in a practice integrating a behavioral health clinician into primary care.

Design: Prospective, mixed methods case study of one primary care internal medicine practice conducting a QI project to improve care.

Participants: Nine physicians, three mid-level providers, and 30 staff members of an internal medicine primary care practice.

Measurements: The QI Team measured success by referral management and appointment scheduling for its patients with mental health needs, extracted from an electronic health record system. The use of workflow analysis for QI was evaluated by a novel survey instrument administered to all practice members, along with narrative feedback.

Mixed Methods Results: Quantitative results showed that referrals for mental health services increased from 25.3/1000 visits to 44.0/1000 (P<0.0001). Average number of days from referral date to appointment date decreased from 33.1 to 20.6 (P<0.0001). Percentage of referrals resulting in a scheduled appointment increased from 59% to 71% (P=0.0003). Qualitative results indicated high post-project survey scores (medians = 6 in a range from 1 to 7), reflecting opinions about clinical effectiveness, work flow effectiveness, and acceptance of changes made. Post-project comments supported workflow analysis to make changes.

Conclusions: The management of behavioral health services showed significant improvements in referral management, appointment scheduling, and arrival rates for referred appointments. The workflow methodology of conducting QI had strengths in its brevity, adaptability, focus on improving work processes, system perspective, and success in achieving the team's objective.

APPENDIX J - Project Summary of R03 Grant Application Implementation Toolkit to Integrate Behavioral Health Services into Primary Care

Primary care does not meet the needs of patients with psychological, substance abuse, or health behavior problems, 43-60% of whom are treated solely by their primary care providers (R. Kessler & Stafford, 2008). Furthermore, between 50% - 90% of primary care referrals made to out-of-office mental health practitioners fail to result in a follow up appointment (R. Kessler & Stafford, 2008). Over the past 20 years, primary care sites have explored integrating mental health services into their patient care processes without systematically addressing core clinical, operational, and financial issues. These services have not addressed the broad range of psychological needs (mental health, substance abuse, and health behavior issues) presented in primary care settings.

The objective of this study is to present an innovative, evidence-supported model for integrating primary care behavioral health services supported by a novel implementation toolkit. The Toolkit systematically implements integrated care services and simultaneously addresses the culture of the organization. The Toolkit is based on "Lean Management," a method of structured, analytically based problem solving focused on work processes. The broad goal of this work is to improve delivery of psychological services to patients who present in primary care settings. Specific aims of this project are:

Aim 1: Refine an early version of the Toolkit and pilot it in two primary care practice sites. The study will investigate the effectiveness of implementation through a concurrent, triangulated mixed methods study. Qualitative assessment of focus group feedback before and after each implementation, along with researcher observations, will highlight Toolkit elements for fine-tuning. Quantitative assessment of staff perceptions through surveys, administered before and after each pilot, will identify cultural issues within each site to address using the Toolkit.

Aim 2: Evaluate the reach and effectiveness of implementation for patients referred to primary care behavioral health services as well as to more intensive specialty MH/SA/HB services. The study will measure PCP referrals for psychological services provided within primary care practices and in specialty MH and SA practices. The study will track elapsed time to first scheduled appointments with these providers and the percentage of appointments kept. The two pilot sites will provide patient data through an existing EPIC based electronic health record (EHR) to report on outcomes at both sites at 6 and 9 months after the implementation.

This work will lead to a multi-site and multi-state study for underserved primary care populations using the investigators' access to two patient based research networks, one specifically focused on integrated practices.

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