Associations between organizational characteristics and intervention choices in quality improvement collaboratives

Sarang Deo, PhD

D. Keith McInnes, ScD, MSc

Charles J. Corbett, PhD

Bruce E. Landon, MD, MBA

Martin F. Shapiro, MD, PhD

Ira B. Wilson, MD

Paul D. Cleary, PhD

From Kellogg School of Management, Northwestern University (S.D.); Center for Health Quality Outcomes and Economic Research at ENRM Veterans Hospital (D.K.M.); UCLA Anderson School of Management (C.J.C.); Division of General Medicine, Beth Israel Deaconess Medical Center and the Department of Health Care Policy (B.E.L.); Department of Health Services, UCLA School of Public Health and Division of General Internal Medicine, David Geffen School of Medicine at UCLA (M.F.S.); Institute for Clinical Research and Health Policy Studies and the Department of Medicine, Tufts-New England Medical Center (I.B.W.); and the Yale School of Public Health, New Haven, CT (P.D.C.)

September 4, 2008

Word count: 3,375

Corresponding Author:
Sarang Deo, Kellogg School of Management, 2001 Sheridan Road, Evanston IL 60208
Email: s-deo@kellogg.northwestern.edu
Phone: (847) 491-3551
Fax: (847) 467-1220

Running title:
Intervention choices in collaboratives

Author information page

Sarang Deo, PhD
Kellogg School of Management
2001 Sheridan Road, Evanston IL 60208
Email: s-deo@kellogg.northwestern.edu
Tel: 847-491-3551
Fax: 847-467-1220

Keith McInnes, ScD, MSc
Center for Health Quality Outcomes and Economic Research
ENRM Veterans Hospital
200 Springs Road (152), Bedford MA 01730
E-mail: keith.mcinnes@va.gov
Tel: 781-687-3507
Fax: 781-687-3106

Charles J. Corbett, PhD
UCLA Anderson School of Management
110 Westwood Plaza, Box 951481, Los Angeles, CA 90095-1481
Tel: 310-825-1651
Fax: 310-206-3337
Email: charles.corbett@anderson.ucla.edu

Bruce E. Landon, MD, MBA, MSc
Harvard Medical School, Department of Health Care Policy
180 Longwood Avenue, Boston MA 02115-5899
Email: landon@hcp.med.harvard.edu
Tel: 617-432-3456
Fax: 617-432-0173

 Martin F. Shapiro
UCLA School of Public Health
Box 951736, 911 Broxton Plaza, Los Angeles CA 90095-1736
Email: mfshapiro@mednet.ucla.edu
Tel: 310-794-2284
Fax: 310-394-3288

Ira B. Wilson, MD, MSc
Tufts Medical Center
800 Washington St, #345, Boston MA 02111
Email: iwilson@tuftsmedicalcenter.org
Tel: 617-636-8672
Fax: 617-636-8351

Paul D. Cleary, Ph.D.
Yale School of Public Health
60 College St., P.O. Box 208034, New haven CT 06520-8034
Tel: 203-785-2867
Fax: 203-785-6103
Email: Paul.Cleary@Yale.edu

ABSTRACT:

Background: Few studies have rigorously evaluated the associations between organizational characteristics and intervention choices made by health care organizations participating in quality improvement collaboratives (QICs).

Objective: To examine the relationship between clinic characteristics and intervention choices made by primary care clinics that provide HIV care and that participated in a QIC.

Design: Cross-sectional study of Ryan White CARE Act (now called Ryan White HIV/AIDS Treatment Modernization Act) funded clinics that participated in a QIC. Data were collected using surveys of clinicians and administrators in participating clinics and monthly reports of clinic improvement activities.

Measures: Number of interventions attempted, percent of interventions repeated, percent of interventions evaluated, ratings of intervention importance, and organizational characteristics.

Results: Clinics varied significantly in their intervention choices. Organizations with a more open culture and a greater emphasis on quality improvement attempted more interventions ($p<0.01$, $p<0.05$) and interventions that were more comprehensive ($p<0.01$, $p<0.10$). Presence of multi-disciplinary teams and measurement of progress toward quantifiable goals also were associated with comprehensiveness of interventions ($p<0.01$, $p<0.05$).

Conclusion: Organizational characteristics of clinics seem to predict intervention choices during the QIC. Further research is needed on how these organizational characteristics impact quality of care through intervention choices.

Key Words: organizational structure, quality improvement collaborative, chronic disease

INTRODUCTION

The growing consensus that there are serious problems with the quality of health care for chronic medical conditions in the U.S. (Chassin, 1996; Chassin and Galvin, 1998; IOM, 2001, McGlynn 2003) has stimulated interest in quality improvement methods (Berwick, 2002; Leape and Berwick, 2005). One widely used method is the quality improvement collaborative (QIC) (Wilson et al., 2003). A QIC typically convenes representatives from a group of health care organizations that are committed to improving care for a specific condition (e.g. HIV) or improving a specific care process (e.g. appointment scheduling). A fundamental premise of the collaborative approach is that most quality problems are due to shortcomings in the organization and management of health care delivery systems rather than shortcomings of individuals (Blumenthal, 1996; Chassin and Galvin, 1998; Shortell et al., 1998; Ferlie and Shortell, 2001; IOM, 2001; Deming, 1986; Berwick, 1989).

During a QIC, teams from participating organizations meet periodically (e.g. every three months) to learn about best practices, receive training in continuous quality improvement techniques, systems theory, and industrial quality control methods (Mittman, 2004), and share their own findings and experiences with each other. Collaboratives that focus on chronic conditions often use the Chronic Care Model (CCM) (Wagner et al., 2003) as a framework to guide quality improvement interventions in the participating organizations. The CCM describes six aspects of care systems that have been linked to improved chronic care processes and outcomes: the delivery system, patient self-management, decision support, information systems, community linkages, and health system support. Between meetings, each organization's quality improvement

team implements multiple small scale interventions, measures their effectiveness, and refines them based on the data collected.

Despite the popularity of QICs, the evidence regarding their impact on the quality of care is mixed (Chin et al., 2004; Landon et al., 2004; Landon et al. 2007; Homer et al., 2005; Schonlau et al., 2005; Asch et al., 2007; Grossman et al., 2007). In an evaluation of a national QIC focused on HIV care among Ryan White clinics, researchers found no significant differences in improvements in the measured care processes (Landon et al., 2004). It is not well understood, however, why the QIC was not successful. In this paper we examine in greater depth the interventions adopted and the characteristics of the participating organizations, such as organizational culture and leadership commitment to quality improvement, to help answer this question (Mittman, 2004).

Research on quality improvement suggests that organizational attributes are related to the improvement processes adopted (Boerstler et al. 1996; Plsek 1997; Zammuto and Krakower 1999; Shortell et al. 2000; Shortell et al. 2001). These improvement processes can in turn affect variations in the processes of care and patient outcomes (Pearson et al., 2004; Shortell et al., 1995; Ovretveit et al., 2002; Shortell et al., 2004). In this paper, we use evaluation data from the HIV QIC to assess the extent to which specific organizational characteristics, such as quality improvement focus and openness of organizational culture, are associated with the number and comprehensiveness of interventions adopted by the clinics participating in the QIC.

METHODS

Overview

The data for this study were collected as a part of the Evaluation of Quality Improvement for HIV Care (EQHIV) project (Landon et al., 2004), a national evaluation of a quality improvement collaborative involving 62 HIV clinics that received funding under Title III of the Ryan White Comprehensive AIDS Resources Emergency (CARE) Act. The collaborative was conducted for 16 months between 2000 and 2001 by the Institute of Healthcare Improvement.

As part of the study, we collected data from monthly reports about the interventions attempted by participating clinics during the collaborative. Surveys of clinicians and administrators were conducted before (baseline) and after (follow-up) the QIC in 2000 and 2001, respectively. This study uses data from the baseline survey only since we wanted to assess the characteristics of the clinics before the intervention.

Clinics

The EQHIV study recruited sites that were receiving CARE Act funding and provided care for at least 100 patients with HIV infection during 1999. Of the 62 clinics participating in the collaborative (intervention clinics), 54 agreed to participate in the EQHIV study. Of these 54 clinics, we studied 41 clinics for which we had the intervention data as well as responses to clinician and administrator surveys. The EQHIV study also included 37 control clinics that did not participate in the collaborative. They were excluded from the current study because the analyses presented herein focus on intervention choices.

Respondents

For the clinician surveys, all clinicians providing care to HIV-infected patients at the selected sites were eligible. A study facilitator at each of the clinics identified all relevant clinicians (including physicians, nurse practitioners, and physician assistants) with primary responsibility for caring for HIV patients and we randomly selected up to 5 clinicians per clinic for the survey. The overall response rate to the survey was 89%. We considered responses from 119 clinicians from the 41 selected intervention clinics with an average of 2.8 responses per clinic. In addition, for the administrator surveys, we considered responses to a baseline survey from HIV program administrators of the 41 selected intervention clinics.

Data

Screening questionnaires

All of the clinics completed screening questionnaires that asked about geographic location (Midwest, Northeast, South, and West), organization type (community health centers, community based organizations, health departments, hospital outpatient clinics, and university medical centers) and number of HIV infected patients.

Monthly activity reports

As part of the collaborative, each clinic submitted a monthly activity report describing the quality improvement interventions attempted. Data corresponding to each unique intervention reported in every monthly report were coded on a separate data entry form. Each intervention was classified according to whether it addressed one or more of the six chronic care management categories. For each intervention, we also coded the

types of clinical processes that were the foci of the intervention (e.g. preventive

screening, immunization, women's health, antiretroviral therapy) and/or organizational

change promoted (e.g. team building, chart initiatives, staffing policies).

Clinician surveys

The clinician survey included questions about practices related to patient self

management (e.g. educating patients and their families about HIV); decision support

(attending HIV conferences, access to HIV expertise, emphasis on guidelines); clinical

information systems (e.g. use of computers, patients emailing clinicians), community

outreach for HIV prevention (e.g. organizing a community screening day), health system

organization (e.g. leadership vision for, and ability to implement, quality improvement);

and delivery system redesign (e.g. clinician involvement in clinical policy decisions,

clinician receptiveness to quality improvement).

Administrator surveys

The administrator survey elicited information about the characteristics of the

clinics such as the nature of the practice (specialty HIV clinic vs. general medicine with

some HIV care), size of the staff (number of full-time equivalent physicians, nurses,

residents, fellows and case managers working in the clinics), and organization of the staff

(whether the clinic had multidisciplinary teams).

Measures

Number of attempted interventions

Previous studies have used the number of attempted interventions as a measure of

the intensity of implementation or overall activity level during the QIC (Grossman et al.,

2008; Pearson et al., 2005; Schonlau et al., 2005). Thus, in this study we used data from the monthly reports to calculate the number of interventions attempted.

Comprehensiveness of attempted interventions

Wagner and colleagues have argued that chronic care improvement requires attention to all six components of the CCM (Wagner et al., 2001). Hence, earlier studies have attempted to measure comprehensiveness using the distribution of improvement interventions across the different CCM components. For example, Pearson et al. (2005) measured *fidelity* to the CCM framework as simply the number of CCM components or subcomponents represented by the attempted interventions in their evaluation of three chronic care collaboratives conducted between 1999 and 2002. Grossman et al. (2008) measured the number and percentage of interventions attempted in each CCM component in their evaluation of the Health Disparities Collaborative for asthma, cardiovascular disease and diabetes between 2000 and 2002. In contrast to these studies, the measure we developed for this study reflects the comprehensiveness of the entire intervention portfolio in a single aggregate measure. In this study we created a single index of comprehensiveness that measures breadth (whether the clinics attempted interventions in a narrow subset or over a broader subset of the CCM areas) and depth (whether the clinics attempted many interventions or only a few interventions in each CCM category on average).

Because there are no standard methods to measure intervention breadth in collaboratives; we developed a breadth index (B) similar to the Hirschman – Herfindahl index used to assess market concentration (Scherer, 1970; Baumgardner and Marder,

1991; Franks et al., 2000, LescoeLong et al., 1996): $B = \dfrac{1 - \sum\limits_{i=1}^{N}(s_i)^2}{1 - \dfrac{1}{N}}$ where s_i is the

fraction of interventions addressing CCM component i and N (6) is the total number of

CCM components. The theoretical range for this index is between 0 and 1 where a value

of 0 indicates that the clinic focused only on one CCM component and a value of 1

implies that the clinic focused on all components equally.

The depth index (D) was calculated as the mean fraction of the interventions

attempted that address each CCM component: $D = \dfrac{\sum\limits_{i=1}^{N} s_i}{N}$ where N (6) is the total number

of CCM components and s_i is the fraction of interventions attempted in each component.

The theoretical range of this measure is between 1/N and 1 where a value of 1/N indicates

that none of the interventions spanned more than one CCM component and a value of 1

indicates that all the interventions spanned all the CCM components. We constructed a

combined comprehensiveness measure (C) that was a weighted average of the breadth

and the depth measures: $C = w_B B + w_D D$ where w_B and w_D are the respective weights.

We report results using the values of $w_B = w_D = 0.5$ for here but changing these did not

materially change the results.

Other measures of intervention choices

In addition, we coded whether the intervention was evaluated (yes/no) and the

phase of implementation of the intervention (development, small scale implementation,

broad implementation, refinement, institutionalized, discontinued or one-time special

event).

Organizational culture

Previous articles in both the organizational and health services literatures suggest that leadership commitment to quality improvement (Shortell et al., 1995; Shortell et al., 2000) and a supportive organizational and interpersonal climate that encourages employees to engage in experimentation (Edmondson et al., 2001; Sarin and McDermott, 2003; Edmondson, 1999) are important organizational characteristics associated with success in quality improvement efforts.

To measure these aspects of organizational culture, we used responses to nine questions in the clinician surveys about the leadership and staff attitudes towards implementing quality improvement initiatives: (i) clinical leadership's possesses a vision for improving quality of care, (ii) responsiveness of leadership to ideas for quality improvement, (iii) leadership's ability to implement new ideas, (iv) leadership's support for the collaborative, (v) clinician participation in adoption of new guidelines, (vi) staff initiative in developing new ideas for quality improvement, (vii) staff training in quality improvement techniques, (viii) cooperation among staff to implement ideas for quality improvement, and (ix) receptiveness of staff to new ideas for quality improvement.

We aggregated the responses of clinicians to the above nine questions within each clinic and then conducted exploratory factor analyses on the aggregated responses. Extraction of factors with eigenvalue greater than 1 followed by varimax rotation suggested two substantively meaningful and consistent scales. We labeled the first scale "organization QI focus". It included questions about leadership's clarity in stating its QI vision, leadership's ability to implement new QI programs, staff initiative in developing new ideas, staff cooperation to improve HIV care, staff training in QI, and patient

involvement in QI activities. We labeled the second scale "openness of organization culture". It included questions about receptiveness of staff to new ideas, extent of respondent's involvement in adoption of new guidelines and leadership's responsiveness to ideas of quality improvement. Cronbach's alpha (Nunnally, 1967) for the two scales was 0.87 and 0.70 respectively indicating satisfactory reliability.

Other organizational characteristics

We used responses (yes/no) from administrator and clinician surveys to construct dichotomous variables for two organizational characteristics considered important in quality improvement: the presence of multidisciplinary teams (Argote et al., 2001; Horbar et al., 2001; Wagner et al., 1996; Shortell et al., 2004) and regular measurement of progress toward quantifiable goals (Ovretveit et al., 2002). Other organizational characteristics included type of the clinic (community-based organization, community health center, university medical center, public health clinic or part of a larger multispecialty hospital), whether the clinic was a specialty clinic focusing on HIV or a general practice, number of HIV patients, and region (South, West, Northeast and Midwest).

Analyses

We estimated a count regression model to identify the significant predictors of the number of interventions attempted at the clinics. Preliminary descriptive analyses indicated overdispersion of the dependent variable, so we used a negative binomial model (Cameron and Trivedi, 1998). We estimated linear regression models to identify the predictors of the breadth, the depth and the comprehensiveness of the interventions, which have been defined above. The independent variables used in these models were QI

focus, openness in organizational culture, measurement of quantifiable goals and presence of multidisciplinary teams. In these models we controlled for the size of clinics, specialty, organization type and region. Independent variables with a p-value of less than or equal to 0.05 were deemed to be statistically significant.

RESULTS

The study sites were similar to all CARE Act sites with two exceptions (Table 1). First, our study sample includes more sites from the South and fewer sites from the Northeast and the West. Second, the study sample contained fewer community health centers than the population of all CARE Act sites (Landon, 2004).

A total of 466 monthly activity reports were completed by the 41 study clinics over the 16 month study period (mean 11.1 reports per clinic). Most (76.2%) of the sites submitted monthly activity reports for at least 8 out of the 16 months of the collaborative. On average, clinics attempted 34.7 unique interventions (median 34.5, range 1 – 77) (Table 2). The mean breadth index was 0.87 suggesting that many clinics attempted interventions for multiple CCM components. The mean depth index was 0.25 indicating that few interventions across clinics spanned all the CCM components. Clinics evaluated only 16.7% of the attempted interventions on average (std. dev. 12.5%, range 0 – 58.3%). Many interventions were special onetime events such as an HIV testing day or seminar on chronic diseases at a community meeting; on average clinics repeated only 24.8% of the interventions (std. dev. 12.8%, range 0 – 54.2%) at least more than once.

Predictors of Number of Interventions

As hypothesized, the number of interventions attempted by a clinic was significantly associated with openness in the organizational culture ($p \leq 0.01$) and QI focus ($p \leq 0.05$) (Table 3). Community based organizations, community health centers and hospitals attempted fewer interventions than university medical centers ($p \leq 0.05$, $p \leq 0.01$, $p \leq 0.05$ respectively). However, the differences were small. On average these organizations attempted 0.5 fewer interventions compared to university medical centers. The number of interventions was not significantly associated with the presence of multidisciplinary teams, regular measurement of quantifiable goals, or the number of active HIV patients in the clinic.

Predictors of Comprehensiveness of Interventions

Clinics with a more open organizational culture ($p \leq 0.01$), clinics with multidisciplinary teams ($p \leq 0.01$), and clinics that measured quantifiable goals more regularly ($p \leq 0.05$) were more likely to implement more comprehensive interventions than other clinics (Table 4). We obtained similar results when we used different weights for the breadth and depth indices (data not shown) and in models predicting only the breadth and the depth index separately (Table 4).

DISCUSSION

In this study, we analyzed the intervention choices made by clinics that participated in a QIC and assessed whether selected clinic characteristics were associated with the number of unique interventions and comprehensiveness of interventions.

Our findings indicate that a clinic's focus on QI and openness in the clinic's culture were related to the number and comprehensiveness of the interventions attempted

and that the presence of multidisciplinary teams and clinic's measuring progress toward quality improvement goals were associated with more comprehensive interventions. These results are consistent with other studies showing that there is heterogeneity in how organizations participate in quality improvement collaboratives (Pearson et al., 2004; Landon et al., 2004; Grossman et al., 2008; Schonlau et al., 2005).

Multidisciplinary teams have been found to be effective for improving quality of chronic care (Wagner, 2000; Shortell et al., 2004), but our study suggests that the presence of teams alone is not sufficient to increase the number of interventions attempted. The number of attempted interventions might depend primarily on team effectiveness which in turn might depend on team composition, team leadership and team culture (Shortell et al., 2004). Unfortunately we did not have data on the composition and the leadership of the teams in our study.

Research on team learning suggests that a supportive organizational and interpersonal climate facilitates collaborative problem-solving and increases the willingness of employees to engage in trial and error experimentation (Sarin and McDermott, 2003; Edmondson et al., 2001; Edmondson, 1999; Shortell et al., 1995). Aspects of such a climate include facilitative leadership, psychological safety, and a culture of openness in the organization. Our finding that clinics with more open culture attempted more interventions is consistent with the research on team learning. That research also suggests that organizations with more open cultures should evaluate a higher proportion of the interventions, but our analysis (not shown) did not find that.

The literature on quality improvement stresses the importance of clearly stating quantifiable improvement goals and then measuring progress towards them (Ovretveit et

al., 2002). We find that measurement of progress towards quantifiable goals is associated with the comprehensiveness of the interventions but not with the number of interventions attempted. This could be because implementing more comprehensive interventions requires communication across multiple departments, which might be facilitated by quantification and measurement. On the other hand, merely attempting multiple interventions do not necessarily require quantifiable goals and measurement of progress towards them.

Comprehensiveness of the attempted interventions was significantly associated with the presence of multidisciplinary teams, an open organizational culture and measurement of progress toward quantifiable goals. This could be because such an organizational culture provides the multidisciplinary teams with an effective platform to discuss issues that span multiple areas and require inputs from different stakeholders. This finding also suggests a likely mechanism through which multidisciplinary teams might affect quality of care: they might focus on interventions that are more comprehensive rather than just increasing the number of interventions attempted. If confirmed by other studies, this would provide an important pointer on how to ensure that QICs have more positive effect on quality of care.

There are several limitations of our study. We measured only certain aspects of the clinics' culture. It is likely that characteristics of the teams such as composition (beyond just being multidisciplinary), attitudes of its members and their influence within the clinic could have significantly affected intervention choices (Shortell et al., 2004). Also, the modest clinic level reliability of our measures may have limited our ability to identify important associations (Marsden et al., 2006). Ideally, the comprehensiveness

would be calculated by measuring the number of CCM components targeted by each intervention. However, we did not have that level of detail in our reports. There were only 41 clinics that had matching data on interventions and clinician and administrator surveys. It is possible that some of the non-significant relationships in our study might have been significant with a larger sample size. The data for the study were obtained from HIV clinics. It is possible that these findings might not generalize to improvement efforts focused on other conditions.

Demonstrating that organizational factors influence how clinics participate in quality improvement collaboratives is only a first step in understanding the heterogeneity in performance of clinics in collaboratives (Landon et al., 2004; Shortell et al., 2001; Shortell et al., 2000; Plsek et al., 1997). For example, we do not know whether these intervention choices affect the performance of the clinics. Recently, Grossman et al. (2007) in their study of the Health Disparities Collaborative did not find any relationship between improvement in quality and intervention choices measured by number and percentage of interventions in each CCM category. In future, it would be important to investigate whether the measures of intervention choices developed here along with other structural variables can explain the heterogeneity in the final outcomes.

Table 1: Characteristics all CARE Act clinics and study clinics

Variable	All CARE Act Clinics	Study Clinics
Region, %		
Northeast	39.8	21.4
South	27.7	35.7
Midwest	15.0	16.7
West	17.5	7.1
Organization Type, %		
Community Health Center	38.9	30.9
Hospital	11.1	11.9
Others	50.0	57.2
Number of HIV infected patients (SD)	623 (733)	682 (758)
Clinic size		
Large (> 400 patients), %	51.0	50.0
HIV Specialty Clinic		
Yes, %	74.3	64.3

Table 2: Descriptive statistics for intervention choices

Variable	Mean	Std. Dev.
Number of unique interventions	34.7	18.6
Percent of repeated interventions	24.8%	13%
Percent of evaluated interventions	16.7%	12.5%
Breadth index across CCM components	0.87	0.15
Depth index across CCM components	0.25	0.02
Comprehensiveness index across CCM components	0.56	0.08

Table 3: Predictors of number of interventions

Dependent variable	Number of interventions[@]
Intercept	4.15[***]
Predictor Variables	
QI focus	0.29[*]
Openness in organizational culture	0.37[***]
Measuring quantifiable goals	0.26
Multidisciplinary team	0.16
Control Variables	
Large clinics (>400 patients)	-0.03
Specialty site	-0.02
Organization type: University medical center	0.00
Organization type: Community based organization	-0.51[*]
Organization type: Community health center	-0.69[**]
Organization type: Public health clinic	0.04
Organization type: Hospital	-0.61[*]
Region: West	0.00
Region: Northeast	-0.68
Region: South	-0.67
Region: Midwest	-0.56

[@] Negative Binomial Model, N = 41, Log Likelihood = 3960, Dispersion = 0.18
[*] $p <= 0.05$
[**] $p <= 0.01$
[***] $p <= 0.001$

Table 4: Predictors of intervention choices (B)

Dependent variable	Breadth of interventions[†]	Depth of interventions[‡]	Comprehensiveness of interventions[$]
Intercept	0.52***	1.29***	0.91***
Predictor Variables			
QI focus	0.07	0.04	0.05
Openness in organizational culture	0.07*	0.07*	0.07**
Measuring quantifiable goals	0.23*	0.24*	0.23*
Multidisciplinary team	0.21**	0.16*	0.19**
Control Variables			
Large clinics (>400 patients)	0.06	-0.08	0.01
Specialty site	-0.02	-0.02	-0.02
Organization type: University medical center	0.00	0.00	0.00
Organization type: Community based organization	0.03	-0.06	-0.01
Organization type: Community health center	-0.02	-0.15	-0.09
Organization type: Public health clinic	0.08	-0.10	-0.01
Organization type: Hospital	-0.10	-0.16	-0.13
Region: West	0.00	0.00	0.00
Region: Northeast	-0.16	-0.13	-0.14
Region: South	-0.10	-0.11	-0.10
Region: Midwest	-0.12	-0.11	-0.12

[†] Linear Regression Model, N = 41, R^2 = 0.46, Adj. R^2 = 0.21, p-value = 0.09
[‡] Linear Regression Model, N = 41, R^2 = 0.51, Adj. R^2 = 0.27, p-value = 0.04
[$] Linear Regression Model, N = 41, R^2 = 0.52, Adj. R^2 = 0.29, p-value = 0.03
* $p <= 0.05$
** $p <= 0.01$
*** $p <= 0.001$

References

Argote L, Gruenfeld D, Naquin C. Group learning in organizations. In: Turner, ME, ed. Groups at Work: Advances in Theory and Research. New York: Erlbaum; 2001:369-411.

Asch S, Mangione C, Broder M et al. Does participation in a collaborative improve quality of care for diabetes? Available at: http://www.rand.org/health/projects/icice/asch_abs.html. Accessed May 28, 2007.

Baumgardner JR, Marder WD. Specialization among obstetrician gynecologists - Another dimension of physician supply. Med Care. 1991;29:272-282.

Berwick DM. Continuous quality improvement as an ideal in health care. New Engl J Med. 1989;320:53-56.

Berwick DM. A user's manual for the IOM's 'quality chasm' report. Health Aff. 2002;21:80-90.

Blumenthal D. Quality of care -- What is it? New Engl J Med. 1996; 335:891-894.

Cameron AC, Trivedi PK. Regression analysis of count data. Cambridge: Cambridge University Press; 1998.

Chassin MR. Improving the quality of care. New Engl J Med. 1996;335:1060-1063.

Chassin MR, Galvin, RW. The National Roundtable on Quality. The urgent need to improve health care quality. JAMA. 1998;280:1000-1005.

Chin MH, Cook S, Drum ML et al. Improving diabetes care in Midwest community health centers with the Health Disparities Collaborative. Diabetes Care. 2004;27:2-8. [Erratum, Diabetes Care. 2004. 27. 2099.]

Deming WE. Out of the crisis. Boston: The MIT Press; 1986.

Dudley RA, Landon BE, Rubin HE, et al. Assessing the relationship between quality of care and the characteristics of health care organizations. Med Care Res Rev. 2000;57: 116-135.

Edmondson AC. Psychological safety and learning behavior in work teams. Admin. Sci. Quart. 1999;44:350-383.

Edmondson AC, Bohmer R, Pisano GP. Disrupted routines: Team learning and new technology adaptation. Admin. Sci. Quart. 2001;46:685-716.

Ferlie EB, Shortell SM. Improving the quality of health care in the United Kingdom and the United States: A framework for change. Milbank Q. 2001;79:281-315.

Franks P, Williams GC, Zwanziger J, et al. Why do physicians vary so widely in their referral rates? J Gen Intern Med. 2000;15:163-168.

Grossman E, Keegan T, Lessler AL, et al. Inside the health disparities collaborative: A detailed exploration of quality improvement at community health centers. Med Care. 2008;46:489-496.

Hoffman C, Rice D, Sung H-Y. Persons with chronic conditions: their prevalence and costs. JAMA. 1996;276:1473-1479.

Homer CJ, Forbes P, Horvitz L, et al. Impact of a quality improvement program on care and outcomes for children with asthma. Arch Pediatr Adolesc Med. 2005;159:464-469.

Horbar, JD, Rogowski J, Plesk P, et al. Collaborative quality improvement for neonatal intensive care. Pediatrics. 2001;107:14-22.

Institute of Medicine (IOM). Crossing the Quality Chasm: A New Health System for the 21st Century. Washington, D.C.: National Academy Press; 2001.

Institute for Healthcare Improvement. 2003. Breakthrough series collaboratives.
Available at: www.ihi.org/collaboratives/. Accessed May 28, 2008.

Landon BE, Wilson IB, McInnes DK, et al. Effects of a quality improvement
collaborative on the outcome of care of patients with HIV infection: the EQHIV study.
Ann Intern Med. 2004;140:887-896.

Landon BE, Hicks LS, O'Malley AJ, et al. Improving the management of chronic disease
at community health centers. New Engl J Med. 2007;356:921-934.

Leape LL, Berwick DM. Five years after to err is human - What have we learned?
JAMA. 2005;293:2384-2390.

LescoeLong MA, Long MJ, Amidon RL, et al. The relationship between resource
constraints and physician problem solving - Implications for improving the process of
care. Med Care. 34. 931-953.

Lipsey MW, Wilson DB. The way in which intervention studies have Personality and
why it is important to meta-analysis. Eval Health Prof. 2001;24:236–254.

Marsden PV, Landon BE, Wilson IB, et al. The reliability of survey assessments of
characteristics of medical clinics. Health Serv Res. 2006; 41:265-283.

McInnes DK, Landon BE, Wilson IB, et al. The impact of quality improvement programs
on systems, processes and structures in medical clinics. Med Care. 2007;45:463-471.

McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in
the United States. New Engl J Med. 2003;348:2635-2645.

Mittman BS. Creating the evidence base for quality improvement collaboratives. Ann
Intern Med. 2004;140:897-901.

Nunnally JC. Psychometric Theory. New York: McGraw-Hill; 1967.

Ovretveit J, Bate P, Cleary PD, et al. Quality collaboratives: lessons from research. Qual Saf Health Care. 2002;11:345-351.

Pearson ML, Wu S, Schaefer J, et al. Assessing the implementation of the Chronic Care Model in quality improvement collaboratives. Health Serv Res. 2005;40:978-996.

Plsek P. Collaborating across organizational boundaries to improve quality of care. Am J Infect Control. 1997;25:85-95.

Rothman AA, Wagner EH. Chronic illness management: What is the role of primary care? Ann Intern Med. 2003;138:256-262.

Sarin S, McDermott C. Effect of team leader characteristics on learning, knowledge application, and performance of cross-functional new product development teams. Decision Sci. 2003;34:707-739.

Scherer FM. Industrial market structure and economic performance. Chicago: Rand McNally; 1970.

Schonlau M, Mangione-Smith R, Chan KS, et al. Evaluation of a quality improvement collaborative in asthma care: does it improve processes and outcomes of care? Ann Fam Med. 2005;3:200-208.

Shortell SM., Bennett CL, Byck GR. Assessing the impact of continuous quality improvement on clinical practice: What it will take to accelerate the progress. Milbank Q. 1998;76:593-624.

Shortell SM, O'Brien JL, Carman JM, et al. Assessing the impact of continuous quality improvement/total quality management: Concept versus implementation. Health Serv Res. 1995;30:377–401.

Shortell SM, Jones RH, Rademaker AW, et al. Assessing the impact of total quality management and organization culture on multiple outcomes of care for coronary artery bypass graft surgery patients. Med Care. 2000;38:207–217.

Shortell SM, Zazzali JL, Burns LR, et al. Implementing evidence-based medicine: The role of market pressures, compensation incentives, and culture in physician organizations. Med Care. 2001;39:62–78.

Shortell SM., Marsteller JA, Lin M, et al. The role of perceived team effectiveness in improving chronic illness care. Med Care. 2004;42:1040-1048.

Wagner EH, Austin BT, Davis C, et al. Improving chronic illness care: Translating evidence into action. Health Aff. 2001;20:64-78.

Wagner EH, Austin BT, von Korff M. Organizing care for patients with chronic illness. Milbank Q. 1996;74:511-544.

Wagner EH. The role of patient care teams in chronic disease management. BMJ. 200;320:569-572.

Wilson T, Berwick DM, Cleary PD. What do collaborative improvement projects do? Experience from seven countries. Jt Comm J Qual Patient Saf. 2003;29:85-93.

Zammuto RF, Krakower JY. 1999. Quantitative and Qualitative Studies of Organizational Culture. In: Pasmore WA, Woodman RW, eds. Research in Organizational Change and Development Vol. 5. Greenwich: JAI Press; 1999: 83–114.

Appendix: Items from the clinician's survey used for factor analysis

1. How clearly has the clinical leadership stated its vision for improving the quality of HIV care and services?
    - Not at all
    - A little
    - Somewhat
    - Very

2. How responsive is clinical leadership to ideas for improving care?
    - Not at all
    - A little
    - Somewhat
    - Very

3. How would you rate your clinical leadership's ability to implement new quality improvement programs?
    - Poor
    - Fair
    - Good
    - Very good
    - Excellent

4. How supportive was your clinical leadership about your clinic's participation in the HIV Collaborative?
    - Not at all
    - A little
    - Somewhat
    - A lot

5. Thinking about decisions relating to HIV clinical policies and procedures, such as the adoption of new guidelines, how much do you participate in these kinds of decisions?
    - Not at all
    - A little
    - Some
    - A lot

6. HIV CLINICAL STAFF includes all personnel directly involved in HIV clinical care, such as physicians, nurses, physician assistants, social workers, and case managers. How much initiative does HIV clinical staff, other than the clinical leadership, take in developing new ideas to improve the quality of HIV care?
    - None at all
    - A little
    - Some
    - A lot

7. In this clinic, how much do HIV clinical staff work together to improve HIV patient care?
   - Not at all
   - A little
   - Some
   - A lot

8. How much education or training are HIV clinical staff given in quality improvement techniques?
   - None at all
   - A little
   - Some
   - A lot

9. In this clinic, how receptive would the HIV clinical staff be if you, or someone in your position, proposed a new idea to improve HIV care, such as a way to increase patient medication adherence?
   - Not at all
   - A little
   - Somewhat
   - A lot