



HEALTH

- CHILD POLICY
- CIVIL JUSTICE
- EDUCATION
- ENERGY AND ENVIRONMENT
- HEALTH AND HEALTH CARE
- INTERNATIONAL AFFAIRS
- NATIONAL SECURITY
- POPULATION AND AGING
- PUBLIC SAFETY
- SCIENCE AND TECHNOLOGY
- SUBSTANCE ABUSE
- TERRORISM AND HOMELAND SECURITY
- TRANSPORTATION AND INFRASTRUCTURE

This PDF document was made available from www.rand.org as a public service of the RAND Corporation.

[Jump down to document](#) ▼

The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world.

Support RAND

[Browse Books & Publications](#)

[Make a charitable contribution](#)

For More Information

Visit RAND at www.rand.org

Explore [RAND Health](#)

View [document details](#)

Limited Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law as indicated in a notice appearing later in this work. This electronic representation of RAND intellectual property is provided for non-commercial use only. Permission is required from RAND to reproduce, or reuse in another form, any of our research documents for commercial use.

This product is part of the RAND Corporation reprint series. RAND reprints reproduce previously published journal articles and book chapters with the permission of the publisher. RAND reprints have been formally reviewed in accordance with the publisher's editorial policy.

The Role of Perceived Team Effectiveness in Improving Chronic Illness Care

Stephen M. Shortell, PhD, MPH,* Jill A. Marsteller, PhD,* Michael Lin, MSPH,*
Marjorie L. Pearson, PhD,† Shin-Yi Wu, PhD,† Peter Mendel, PhD,† Shan Cretin, PhD,† and
Mayde Rosen, RN, BSN†

Background/Objectives: The importance of teams for improving quality of care has received increased attention. We examine both the correlates of self-assessed or perceived team effectiveness and its consequences for actually making changes to improve care for people with chronic illness.

Study Setting and Methods: Data were obtained from 40 teams participating in the national evaluation of the Improving Chronic Illness Care Program. Based on current theory and literature, measures were derived of organizational culture, a focus on patient satisfaction, presence of a team champion, team composition, perceived team effectiveness, and the actual number and depth of changes made to improve chronic illness care.

Results: A focus on patient satisfaction, the presence of a team champion, and the involvement of the physicians on the team were each consistently and positively associated with greater perceived team effectiveness. Maintaining a balance among culture values of participation, achievement, openness to innovation, and adherence to rules and accountability also appeared to be important. Perceived team effectiveness, in turn, was consistently associated with both a greater number and depth of changes made to improve chronic illness care. The variables examined explain between 24 and 40% of the variance in different dimensions of perceived team effectiveness; between 13% and 26% in number of changes made; and between 20% and 42% in depth of changes made.

Conclusions: The data suggest the importance of developing effective teams for improving the quality of care for patients with chronic illness.

Key Words: quality improvement, chronic illness, team effectiveness, patient satisfaction focus, organizational culture

(*Med Care* 2004;42: 1040–1048)

From the *University of California, Berkeley, and †Rand Corporation, Santa Monica, California.

Supported by grant #98-0440 from the Robert Wood Johnson Foundation. Reprints: Stephen M. Shortell, PhD, University of California, Berkeley, 140 Warren Hall #7360, Berkeley, CA 94720-7360. E-mail: shortell@uclink.berkeley.edu.

Copyright © 2004 by Lippincott Williams & Wilkins
ISSN: 0025-7079/04/4211-1040

Growing evidence that care provided to the chronically ill is inadequate^{1–4} has led to increased attention on the role of health care teams and organizations as being potential levers for improving the quality of care provided to patients with chronic illness.^{5–12} Wagner et al^{6,13–15} developed a comprehensive systematic approach for improving care of the chronically ill. The chronic care model (CCM) has 6 key components involving: (1) community resources and policies, ie, identification of community resources to support chronic care management and coordinated planning between the health provider team and community settings; (2) patient self-management; (3) decision support, ie, systems including the use of evidence-based guidelines and protocols; (4) delivery system redesign, such as making greater use of group visits; (5) the use of clinical information systems, such as disease registries; and (6) health system/organization change such as aligning financial incentives to reward achievement of chronic care improvement goals.

The goal of the CCM is to improve patient outcomes by promoting productive interactions between informed, activated patients and better prepared health care teams. Yet despite the importance of teams, relatively little systematic attention has been given to examining team effectiveness or performance.¹⁶ Researchers have argued that effective coordination of care for chronically ill patients requires meaningful communication among team members, strong leadership, and an appreciation of roles among multiple disciplines.^{17,18} Such coordination may permit development and implementation of complex care plans that address several aspects of the causes and effects of the chronic illness.¹⁹ For example, the rehabilitation of frail geriatric patients in both inpatient and outpatient settings has emphasized the use of interdisciplinary teams in needs assessment and care management. The use of interdisciplinary teams has also improved the planning and provision of care in the areas of nutrition, cognition, and depression.^{20,21} Increasing our knowledge of the role of teams in quality improvement initiatives is particularly important given that 97% of US health care organizations report the use of teams in one form or another.²²

The present work focuses on the central role of teams in implementing the chronic care model and addresses 2 questions: (1) Whether perceived team effectiveness is associated with variation in the number and depth of changes (ie, changes expected to have greater impact on patient outcomes) made to improve care? and (2) What explains differences in perceived team effectiveness?

Study Framework and Hypotheses

Figure 1 provides a summary of the study framework and the hypothesized relationships. Based on current literature,^{16,23,24} we identified 4 aspects of perceived team effectiveness potentially relevant to quality improvement work: (1) overall team effectiveness—involving the extent to which the team felt it had the necessary information, authority, autonomy and related items to do its work; (2) team skill—reflecting the team’s ability to make changes which also serves as a source of team cohesion; (3) participation and goal agreement—reflecting the unity of the team behind a superordinate goal and its’ respect for individual contributions; and (4) organizational support—reflecting the teams’ ability to obtain resources and the suitability of reward structures that encourage its work. The utility of using perceived team effectiveness measures has been established in the literature.^{18,24–26}

We also identified 3 major factors that might influence perceived team effectiveness—the organization’s culture, its commitment to quality improvement, and whether or not a team has a “champion” who is a passionate advocate for its work. The organizational theory literature at large as well as in health care settings suggests that the culture of the organization and support for a total quality management approach will have an important impact on perceived team effectiveness.^{27–31} Culture is the extent to which organizations value

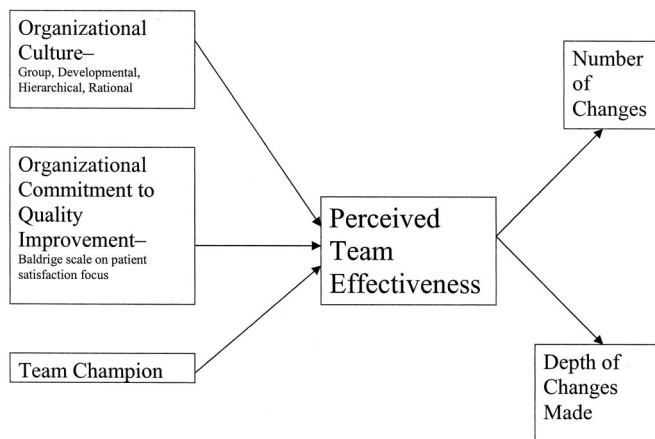


FIGURE 1. Framework for assessing perceived team effectiveness, controlling for team size, team composition, and disease treated.

and emphasize such factors as: teamwork and participation—group culture; risk-taking, innovation, and change—developmental culture; rules, regulations, and bureaucracy—hierarchical culture; and efficiency, goal attainment, and achievement—rational culture.^{32–34} Each of these dimensions of culture can help facilitate effective quality improvement teams. A group culture that emphasizes teamwork and encourages participation facilitates team decision-making and goal agreement. A developmental culture encourages risk-taking and promotes innovative solutions to problems. A hierarchical culture recognizes the need for authority and accountability through the use of some rules and guidelines. Finally, a rational culture focused on achievement and goal attainment assists teams in developing relevant measures of success and in taking corrective actions. In contrast to existing work^{28,29,31} that emphasizes the importance of a single dominant culture (eg, group) we suggest that all 4 dimensions are potentially important for perceived team effectiveness and that it is the relative balance among the 4 that is most likely to be associated with perceived team effectiveness. This suggests the following hypothesis:

H1: The greater the degree of balance among the 4 dimensions of an organization’s culture, the greater the degree of perceived team effectiveness.

Research also suggests that an organization’s commitment to certain superordinate goals, such as total quality management/continuous quality improvement, can influence perceived team effectiveness.³⁵ In following the Malcolm Baldrige National Quality Award, we assessed 7 dimensions of a total quality management approach, including leadership, information and analysis, strategic quality planning, quality results, employee involvement in quality planning, human resource utilization, and customer satisfaction.³¹ In health care settings, having a focus on “customer” or patient satisfaction has received great attention.⁵ We hypothesized that organizations committed to patient satisfaction and related dimensions as a superordinate goal are more likely to provide their teams with the education, training, resources, support, involvement, and recognition required to be effective.

H2: The greater the organization’s commitment to total quality management/continuous improvement, and, in particular, a focus on patient satisfaction, the greater the perceived team effectiveness.

An organization’s culture and overall commitment to quality improvement and patient satisfaction provide a set of preconditions for perceived team effectiveness that is largely external to the team itself. The literature suggests that a set of internal team characteristics also are likely to be important, including team size, experience in working together, team stability, team composition, and the presence or absence of a team champion.^{16,23} Given that most teams were recently formed and there was relatively little turnover, we focused on whether or not a team champion was present. The literature

suggests that the presence of such an individual would be positively associated with perceived team effectiveness^{16,23} and the success of quality improvement initiatives.^{36–41}

H3: The presence of a team champion will be positively associated with greater perceived team effectiveness.

Switching from the suggested correlates of perceived team effectiveness to its consequences, we note that certain clinical interventions have been shown to improve patient care processes and outcomes^{6,29,42–44} but the role played by teams and perceived team effectiveness in implementing new clinical treatments is largely unstudied. We hypothesize that more effective teams are better able to make necessary changes to improve care because they share common goals, are able to share learning and knowledge, draw on each member's comparative advantage, are able to use data and feedback for purposes of improvement, and are rewarded for doing so.

H4: The greater the perceived team effectiveness, the greater the number and depth of changes made to improve quality of care.

Data, Variables, and Methods

Data

Data come from the RAND/UC Berkeley evaluation of the Chronic Care Breakthrough Series Collaboratives, co-sponsored by "Improving Chronic Illness Care" (ICIC; the ICIC program is housed in the MacColl Institute for Healthcare Innovation within the Group Health Cooperative of Puget Sound, Seattle) and the Institute for Healthcare Improvement (IHI) and supported by the Robert Wood Johnson Foundation. The evaluation focused on collaboratives designed to improve the care of patients with asthma, diabetes, congestive heart failure, and depression through the application of the chronic care management model^{43,45} using the rapid-cycle plan-do-study act change methodology recommended by the IHI.⁴⁶ Forty-one organizations (or 47% of the 88 eligible) in 21 states and Puerto Rico volunteered to participate in some portion of the evaluation with 40 teams providing complete data for analysis.⁴⁷ Analysis is based on surveys of individuals on the breakthrough series (BTS) intervention teams. Data were collected on team members' assessments of organizational culture and of their organization's commitment to quality improvement collected at baseline or early in the intervention, as well as their evaluation of team effectiveness collected after the completion of the intervention. Individual measures were aggregated to the team level (aggregation is justified based on significant analysis of variance results indicating greater between-team than within-team variation). In addition, data were collected on number and depth of changes made to patient care processes, team size, and team composition.

Variables

Organizational Culture

Team members assessed their organization's culture using the competing values framework, in which respondents distributed 100 points across 4 sets of organizational statements according to the descriptions that best fit their own organization^{29,31–34} (a copy of the instrument is available from the senior author upon request). These statements reflect the 4 culture types: (1) group culture, based on norms and values associated with affiliation, teamwork, and participation; (2) developmental culture, based on risk-taking innovation and change; (3) hierarchical culture, reflecting the values and norms associated with bureaucracy; and (4) rational culture, emphasizing efficiency and achievement.

Given our hypotheses that a more balanced culture would be positively associated with perceived team effectiveness, we constructed a measure that reflects how evenly team members distributed points across the 4 culture areas using the Blau⁴⁸ index of heterogeneity (which is one minus the Hirschman–Herfindahl Index). This measure is calculated as $H = 1 - \sum p_i^2$, where "i" is the number of categories possible (in this case four) and "p" is the proportion of points assigned to that culture type. Teams that apportioned points in a 25/25/25/25 pattern, for example, would receive the highest score on the balance measure, while teams with more points concentrated in one culture or another would receive lower balance scores.

Baldrige Quality Improvement Scales

To reduce respondent burden, we developed an abbreviated Baldrige scale based on the 4 dimensions of leadership, employee involvement in quality planning, human resource utilization, and a focus on customer (ie, patient) satisfaction. For present analysis, we focused on patient satisfaction or "patient centeredness" because of its emphasis in the literature.⁵ BTS team respondents agreed or disagreed (on a scale from 1 to 5) with statements reflecting how well their organizations had implemented a focus on patient satisfaction. The specific scale is shown in the Appendix table and indicates high internal consistency reliability (Cronbach alpha = 0.86).

Team Champion

A dummy variable measured whether or not any member of the team reported that a nurse or physician acted as a specific facilitator of change in the improvement process.

Team Effectiveness Measures

After completion of the intervention, team members retrospectively assessed the effectiveness of their team based on a version of the team-effectiveness instrument developed by Lemieux–Charles et al.²⁴ Respondents agreed or disagreed

(on a scale from one to seven) with statements reflecting aspects of the way the team worked together and its environment. The scales are also shown in the Appendix table demonstrating high internal consistency reliability with Cronbach Alphas ranging from 0.85 to 0.95.

Number of Changes Made

On the basis of monthly and summary reports of participating teams and follow-up interviews with key informants, the number of actions taken by each team to improve care was coded using a decision tree that aligned reported change activities with the 6 specific elements of the CCM model.⁴⁹ For example, a change in delivery system redesign, would be sorted into a second level reflecting which specific aspect of the delivery system was involved such as care management roles, team practice, care coordination, proactive follow-up, planned visits or the visit system itself. A third level involved further description; for example, a change to the visit system might relocate a service, streamline the appointment process, or coordinate scheduling with other providers.

Teams averaged more than 50 different change activities across all 6 of the dimensions. Most of the changes involved improving information support whereas the fewest number of changes were made in regard to developing community linkages. We validated the count of changes made with the independent assessments of the chronic care collaborative regarding how well the teams had done ($r = 0.39$; $P \leq 0.03$).

Depth of Changes Made

Based on the senior leader reports, a measure was also constructed of the expected impact of the changes made.⁴⁹ This was judged “based on materials distributed to participants in the chronic care collaboratives, notes from collaborative sessions, and review and input from researchers and QI facilitators with extensive CCM expertise.”⁴⁹ Scores of 0, 1, or 2 were assigned for activities in each of the 6 CCM components—0 for no change, 1 for some change and 2 for changes expected to have greater impact on patient outcomes. These scores were summed across all possible areas of activity listed in the 3-level coding tree. The depth of changes made ranged from 37% to 75% of the highest depth rating possible. Depth of changes also was validated against the final faculty assessments ($r = 0.30$; $P \leq 0.08$).

Team size was determined based on the full number of providers and other staff at a given site who were designated to receive a survey and who were described by the site contact person as being members of the BTS team. We test both linear and inverted-U shaped specifications. *Team Composition* was measured by the percentage of physicians on the team.

Disease

It may be more difficult to successfully implement changes in depression or diabetes care, for example, than it is in say, asthma, which features a better-understood technology and less chance of being part of a complicated cluster of conditions (T. Bodenheimer, personal communication, 2003). To take this into account, we constructed dummy variables for diabetes, congestive heart failure, depression, and asthma.

Analytic Approach

Multivariate ordinary least squares regression analysis was used to examine the relationship of organizational culture, an emphasis on patient satisfaction (a key Baldrige dimension), and the presence of a team champion to overall perceived team effectiveness and the additional 3 components—team skill, participation, and goal agreement, and organizational support—taking into account team size, composition, and disease.

In the second part of the analysis, we used mediated regression.⁵⁰ The quality improvement change measures (number and depth of changes made) were regressed on culture, patient satisfaction focus, presence or absence of a champion, and the control variables. Also, perceived team effectiveness was regressed on number and depth of changes alone. Then, perceived team effectiveness was added to the equations to determine its effects not only on performance but also on the relationship of culture and patient satisfaction focus to performance.

RESULTS

Table 1 presents the characteristics of the study population. Table 2 provides the results examining the correlates of perceived team effectiveness. As shown, cultural balance is marginally associated with overall perceived team effectiveness providing some support for the first hypothesis. Also, having a patient satisfaction focus is positively associated with overall perceived team effectiveness and is statistically significant in 2 of the remaining 3 equations thus offering relatively strong support for the second hypothesis. Table 2 also indicates that the presence of a team champion is consistently and significantly positively associated with perceived team effectiveness in all 4 equations thus offering strong support for the third hypothesis. As shown, team size is negatively associated with overall perceived team effectiveness and with the subdimension of participation and goal agreement. Team size is also negative in the other 2 equations but does not approach statistical significance. The percentage of physicians on the team is marginally positively associated with overall perceived team effectiveness and the subdimension of team skill. It is also positive in the remaining 2 equations but not statistically significant. Finally, whether or not the team was an asthma team versus diabetes, congestive heart failure, or depression is not significant in any of the

TABLE 1. Descriptive Statistics of Study Population

Measure	n	Mean	SD	Minimum	Maximum
Team size	40	6.53	3.04	3.00	14.00
Have team champion (%)	40	27.50		0.00	1.00
Physicians on team (%)	40	25.68		0.00	60.00
Cultural balance	40	0.70	0.05	0.47	0.75
Patient satisfaction focus	40	3.63	0.46	2.52	4.56
Human resource utilization	40	3.13	0.47	2.22	4.11
Employee involvement in quality planning	40	3.52	0.47	2.44	4.53
Leadership	40	3.83	0.53	2.60	4.67
Overall perceived team effectiveness	40	5.24	0.74	3.47	6.64
Perceived team skill and autonomy	40	5.03	0.90	3.13	6.73
Perceived participation and goal agreement	40	5.85	0.64	4.57	7.00
Perceived organizational support	40	4.78	0.93	2.20	6.27
Number of changes	40	41.83	21.04	8.00	130.00
Depth of changes	40	22.85	6.38	8.00	35.00
Asthma team (%)	40	30.00		0.00	1.00
CHF team (%)	40	22.50		0.00	1.00
Depression team (%)	40	12.50		0.00	1.00
Diabetes team (%)	40	35.00		0.00	1.00

CHF indicates congestive heart failure.

TABLE 2. Models for Perceived Team Effectiveness

Independent Variable	Overall Perceived Team Effectiveness Coefficient (SE)	Participative Norms and Goal Agreement Coefficient (SE)	Team Skill Coefficient (SE)	Organizational Support Coefficient (SE)
Constant	1.11 (1.58)	3.86 (1.41)	1.06 (2.18)	-0.57 (2.19)
Team size	-0.06 (0.03)*	-0.08 (0.03) [‡]	-0.05 (0.04)	-0.06 (0.04)
Team champion	0.69 (0.21) [‡]	0.67 (0.18) [‡]	0.67 (0.29) [†]	0.69 (0.29) [†]
Patient satisfaction focus	0.49 (0.23) [†]	0.23 (0.20)	0.63 (0.31) [†]	0.64 (0.31) [†]
Cultural balance	3.10 (2.33)*	1.89 (2.08)	1.97 (3.22)	4.03 (3.24)
Asthma	0.09 (0.21)	0.14 (0.19)	0.14 (0.29)	0.13 (0.30)
Percentage of physicians on teams	1.27 (0.64)*	0.44 (0.57)	1.67 (0.88)*	1.33 (0.88)
n	40	40	40	40
F	5.29	4.80	3.04	3.48
P value	0.0006	0.0013	0.0176	0.0089
Adj R-Sq	0.40	0.37	0.24	0.28

*Indicates $P < 0.10$; [†] $P < 0.05$; [‡] $P < 0.01$.

equations. The equations explain between 24-40% of the variance in perceived team effectiveness. Sensitivity analyses and different model specifications did not substantially change these results.

Table 3 indicates that overall perceived team effectiveness is significantly and positively associated with both the number and depth of changes made to improve the quality of

care for patients with chronic illness. Thus, there is consistent support for the fourth hypothesis. Cultural balance is also positive and significant in both the unmediated and mediated analyses involving number of changes made but loses significance in the mediated analysis of depth of changes made indicating that its effect is likely accounted for by its contribution to perceived team effectiveness. Sobel/Goodman tests

TABLE 3. Models for Number of Changes and Depth of Changes

Independent Variable	Number of Changes (Unmediated) Coefficient (SE)	Number of Changes (Mediated) Coefficient (SE)	Depth of Changes (Unmediated) Coefficient (SE)	Depth of Changes (Mediated) Coefficient (SE)
Constant	-40.13 (57.07)	-49.62 (52.91)	-7.42 (16.73)	-11.13 (14.23)
Team size	7.92 (5.63)	5.79 (5.27)	4.73 (1.65) [‡]	3.90 (1.42) [‡]
Team size squared	-0.41 (0.35)	-0.22 (0.33)	-0.26 (0.10) [†]	-0.19 (0.09) [†]
Patient satisfaction focus	-16.14 (7.71) [†]	-21.58 (7.43) [‡]	-2.66 (2.26)	-4.79 (2.00) [†]
Cultural balance	160.64 (78.74) [†]	118.85 (74.58) [*]	33.86 (23.08) [*]	17.54 (20.05)
Asthma	-11.17 (7.25)	-10.75 (6.71)	-3.68 (2.13) [*]	-3.52 (1.80) [†]
Overall perceived team effectiveness		12.00 (4.62) [‡]		4.69 (1.24) [‡]
n	40	40	40	40
F	2.21	3.28	2.84	5.66
P value	0.0762	0.0122	0.0303	0.0004
Adj R-Sq	0.13	0.26	0.19	0.42

*Indicates $P < 0.10$; [†] $P < 0.05$; [‡] $P < 0.01$.

of mediation confirmed that team effectiveness does not mediate the effect of cultural balance on the number of changes made (2-tailed $Z = 1.06$, $P = 0.28$) but nears significance for depth of changes (2-tailed $Z = 1.56$, $P = 0.12$). Team size exhibits an interesting curvilinear effect in regard to the depth of changes made indicating that greater size has a positive impact on depth of changes made up to a point and then as teams become larger a negative association is observed. Somewhat surprising is the negative and statistically significant association between patient satisfaction focus and both the number of changes made and depth of changes made in the mediated analysis. It may be that teams functioning in organizations with a high degree of emphasis on patient satisfaction at the outset of the collaborative felt less need to make changes to improve care and less need to make substantive changes.

Although not shown in tables, perceived team effectiveness alone is significantly related to depth ($b = 2.95$, $P = 0.03$) but not to number of changes ($b = 6.39$, $P = 0.165$). Adding perceived team effectiveness to the model of number of changes weakens the significant positive effect of cultural balance but does not act as a mediator. In the depth of changes model, adding perceived team effectiveness appears to mediate the effect of cultural balance. Although tests of mediation were not significant at conventional levels, Baron and Kenny indicate that these tests are predisposed to find no mediation effect because “successful mediators measured with error are most subject to...overestimation [of the effect of the independent variables on the dependent variable] bias.” (Companion analyses using the organization’s dominant culture in the equations yielded essentially non-significant findings.) Including perceived team effectiveness also permits

detection of the earlier-noted significant negative effect of patient satisfaction focus suggesting that teams in organizations with a high baseline score for patient-centered focus may have felt less need to make improvement changes. Finally, in analyses not shown, the presence of a team champion and the percentage of team members that were physicians were not associated with either the number or depth of changes made. As previously noted, however, having a team champion was consistently associated with perceived team effectiveness and percentage of team members who were physicians was marginally associated with overall perceived team effectiveness.

DISCUSSION

We found that teams that perceive themselves to be more effective actually take more actions to improve care. We also found that teams with a champion, those with a focus on satisfying patients and, to a lesser extent, those operating in an organization with more balanced cultures and with physician presence perceived themselves to be more effective. These findings have important implications for clinical leaders and managers searching for ways to improve care.

Although others have found an association between organizational culture and perceived team effectiveness,²⁵ quality improvement implementation,^{28,29} and selected outcomes of care,³¹ these findings have been based on the determination of a dominant organizational culture in cross-sectional studies of naturalistic settings, that is, settings not undergoing an intervention or participating in a specific demonstration. We hypothesized that voluntary teams participating in a specific intervention/demonstration program designed to improve care would require a balance among such

cultural dimensions as participation and affiliation, innovation and change, the presence of some rules, guidelines and direction, and an emphasis on goal achievement. Our data provide some support for this hypothesis. (Companion analyses using the organization's dominant culture in the equations yielded essentially nonsignificant findings.) Also, organizations with a greater degree of cultural balance appear to have a greater focus on patient satisfaction, ($r = 0.46$). In the multivariate regressions the latter dominates, but the 2 appear to go hand in hand. It would appear that health care organizational leaders would be well served to pay attention to balancing and integrating values that emphasize group participation and teamwork, a focus on achievement, an openness to innovation, and the need for some rules and accountability in promoting the perceived effectiveness of quality improvement teams.

An emphasis on patient satisfaction is consistently associated with greater perceived team effectiveness. This supports the recommendations of the Institute of Medicine Crossing the Quality Chasm report and that of others emphasizing patient centeredness as a core value and design criterion for improving quality of care.⁵ As the specific items indicate, this means the organization does a good job of assessing patient needs and expectations; resolving patient complaints promptly; studying patient complaints to identify patterns and prevent the same problems from recurring; using data from patients to improve services; and using data on patient expectations when designing new services.

The findings also highlight the importance of having a team champion.^{38–41} Champions provide motivation, encouragement, and work to acquire the resources and support needed for the team to succeed.

The presence of a greater percentage of physicians on a team was also marginally associated with overall perceived team effectiveness and the level of assessed team skill in making changes. Given team size in the sample, we found that having 2 to 3 physicians on the team was optimal for team effectiveness. Physicians did not numerically dominate the teams, but their presence provided important legitimacy to team efforts as well as technical expertise. Getting physicians to become more actively involved in quality improvement teams has been a major barrier and challenge to quality improvement initiatives.^{51–53}

Finally, the data suggest that larger size makes it more difficult to develop effective teams particularly in regard to establishing participation and arriving at agreements on goals.²³ Team size has to be managed carefully. Small teams may not have a sufficient source of ideas, skills, experience, "clout," or "mass" to get the job done. In contrast, large teams may incur increased costs of coordination, communication, conflict, and related disadvantages of large size.²³ Maximization of the final regression equations for depth and number

of changes indicates that the optimal team size based on this sample is 10 and 13, respectively.

The finding that more teams who perceive themselves to be more effective make more changes to improve chronic illness care and more in-depth changes lends support to those who highlight the importance of the team or "microsystem" as a key lever for improving quality of care.^{54–56} Also, promoting a balanced culture not only contributes to perceived team effectiveness but exerts some independent effect on changes made to improve quality of care.

Limitations and Future Directions

The findings need to be considered within the context of a number of study constraints and limitations. First, the results are based on an examination of teams and organizations that *volunteered* to participate and, thus, were relatively highly motivated to make changes. The results may not be generalizable to other health care teams or organizations lacking such motivation. Based on existing theory and research, we were able to develop a parsimonious model for analysis. But the findings are, nonetheless, based on a relatively small number of observations and are subject to the possibility of the results being driven by a few "outlier" organizations. We conducted multiple sensitivity analyses in which we deleted outlier organizations and found that the results were virtually unchanged across all equations. This increases the confidence in the results.

Also, the results are based on cross-sectional analysis involving associations among the data thus limiting the ability to draw causal inferences. While data on culture and quality improvement were collected prior to measurement of perceived team effectiveness, we cannot definitively say that greater patient centeredness, for example, actually causes greater perceived team effectiveness. Further, team members' assessments of their effectiveness may have been influenced by the number and depth of changes that they made even though they had no knowledge of their scores on these variables when they made their effectiveness judgments. More fine-grained analysis might be able to assess the possible dynamic interplay between teams making early quick plan-do-study act cycles of change that then give them confidence in their ability to make further changes to improve care. Finally, because of a lack of variation, we were not able to examine the role of team experience or turnover. These are issues for further research.

Keeping these limitations in mind, the results provide a strong foundation for further work. In particular, there is need for longitudinal studies whereby one could measure changes in culture, quality improvement practices, and related variables over time in relationship to changes in perceived team effectiveness and the number and depth of actions taken to improve care. Also, there is need to examine differences between quality improvement teams and everyday practice

Appendix. Measurement Scales

Baldrige Award Patient Satisfaction Focus (Cronbach alpha = 0.86)

The organization does a good job of assessing current patient needs and expectations; staff promptly resolve patient complaints; patients' complaints are studied to identify patterns and prevent the same problems from recurring; the organization uses data from patients to improve services; and the organization uses data on customer expectations and/or satisfaction when designing new services.

Overall Perceived Team Effectiveness (Cronbach alpha = 0.95)

Comprises all of the questions in scales below as well as the following: our team got all the information we needed to plan our work; our team had the authority to manage its work pretty much the way members wanted to; there was a great deal of room for initiative and judgment in the work that we did; the participants on our team are "process owners" for this work, that is, they have substantial influence in managing care and influencing others to make improvements in care; when our team did not know something it needed to know to do its work, there were people available to teach or help; almost all of our change cycles have avoided "low leverage" changes such as education alone; there were one or more well respected member of staff that supported our project with their time, and verbal encouragement; our team was able to identify measures that were tracked on a regular basis to assess our progress.

Perceived Team Skill (Cronbach alpha = 0.90)

Our team has been able to use measurement very effectively to design and test changes; after we have completed a change, team members are excellent in reflecting and learning from the results; members of our team were very successful in using information from our change cycles to design new tests of change; in making changes, our team was able to easily adapt change ideas to match the needs of our organization; our team applied enough knowledge and skill to the work to get the work done well.

Perceived Participation and Goal Agreement (Cronbach alpha = 0.90)

Project team members agreed on the project's overall goals; most members of my team got a chance to participate in decision-making; certain individuals in this group had special skills and knowledge that the rest of us count on; the contribution of every group member was listened to and considered; the project's goals were understood by all the project team members.

Perceived Organizational Support (Cronbach alpha = 0.85)

This organization makes sure people have the skills and knowledge to work in teams; a team that does a good job in this organization does not get any special rewards or recognition (reverse-coded to account for negative wording); senior management in the organization strongly supports our work; senior management regularly reviews our progress in making change; senior managers in my organization see success in this project as a high priority for the organization.

All scales were factor analyzed using varimax rotation with eigenvalues of 1.0 or higher selected for analyses. Criteria for including an item in a scale were clean factor loadings of at least 0.4.

teams regarding whether the lessons learned and actions taken by the improvement teams are adopted and implemented by other teams in the organization. Further, the composition of teams in regard to ethnic diversity, prior work experience, prior experience in working in teams, age, gender, and related variables could be examined.²⁶ Research that examines patient physiological and patient satisfaction outcomes as a function of perceived team effectiveness and the number and types of changes actually made to improve care would further validate the importance of health care teams. The present research provides a validation of the perceived team effectiveness measures given their correlation with the actual number and depth of changes made but additional work incorporating patient outcomes would provide even stronger support. Finally, qualitative fieldwork could provide potentially more specific insights into the dynamics of health care teamwork than was possible in the current research.

ACKNOWLEDGMENTS

We express appreciation to Emmett Keeler for his comments on an earlier draft of this article and to Stephanie Wang and Jackie Henderson for their support in manuscript preparation and to the anonymous reviewers for their suggestions. We also want to thank all of the organizations and team members who participated in the evaluation.

REFERENCES

- Schuster MA, McGlynn EA, Brook RH. How good is the quality of health care in the United States (review)? *Milbank Q.* 1998;76:517-63, 509.
- Starfield B. Quality of care research: internal elegance and external relevance. *JAMA.* 1998;280:1006-1008.
- Casalino L, Gillies RR, Shortell SM, et al. External incentives, information technology, and organized processes to improve health care quality for patients with chronic diseases. *JAMA.* 2003;289:434-441.
- McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med.* 2003;348:2635-2645.
- Institute of Medicine, Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century.* Washington, DC: National Academy Press; 2001.
- Wagner EH. The role of patient care teams in chronic disease management [see comments]. *BMJ.* 2000;320:569-572.
- Fargason CA, Haddock CC. Cross-functional, integrative team decision making: essential for effective QI in health care. *Quality Rev Bull.* 1992;7:157-163.
- Curley C, McEachern JE, Speroff T. A firm trial of interdisciplinary rounds on the inpatient medical wards: an intervention designed using continuous quality improvement. *Med Care.* 1998;36(8 Supp):AS4-12.
- Goldberg HI, Wagner EH, Fihn SD, et al. A randomized controlled trial of CQI teams and academic detailing: can they alter compliance with guidelines? *Joint Commission J Quality Improvement.* 1998;24:130-142.
- Solberg LI, Kottke TE, Brekke ML. Will primary care clinics organize themselves to improve the delivery of preventive service? A randomized controlled trial. *Prev Med.* 1998a;27:623-631.
- Solberg LI, Brekke ML, Kottke TE, et al. Continuous quality improvement in primary care: what's happening? *Med Care.* 1998b;36:625-635.
- Lawrence D. *From Chaos to Care: The Promise of Team-Based Medicine.* Cambridge, MA: Perseus Publishing; 2002.
- Wagner EH, Austin BT, Korff MV. Organizing care for patients with

- chronic illness. *Milbank Q.* 1996a;74:511–543.
14. Wagner EH, Austin BT, Von Korff M. Improving outcomes in chronic illness. *Managed Care Q.* 1996b;4:12–25.
 15. Wagner EH, Davis C, Schaefer J, et al. A survey of leading chronic disease management programs: are they consistent with the literature? *Managed Care Q.* 1999;7:56–66.
 16. Cohen SG, Bailey DE. What makes teams work: group effectiveness research from the shop floor to the executive suite. *J Manage.* 1997;23:239–290.
 17. Keough ME, Field TS, Gurwitz JH. A model of community-based interdisciplinary team training in the care of the frail elderly. *Acad Med.* 2002;77:936.
 18. Strasser DC, Falconer JA, Martino-Saltzman D. The rehabilitation team: staff perceptions of the hospital environment, the interdisciplinary team environment, and inter-professional relations. *Arch Physical Med Rehabil.* 1994;75:177–182.
 19. Boulton C, Kane RL, Pacala JT, et al. Innovative healthcare for chronically ill older persons: results of a national survey. *Am J Managed Care.* 1999;5:1162–1172.
 20. Wells JL, Seabrook JA, Stolee P, et al. State of the art in geriatric rehabilitation. part I: review of frailty and comprehensive geriatric assessment. *Arch Phys Med Rehabil.* 2003a;84:890–897.
 21. Wells JL, Seabrook JA, Stolee P, et al. State of the art in geriatric rehabilitation. Part II: clinical challenges. *Arch Phys Med Rehabil.* 2003b;84:898–903.
 22. Gordon J. Work teams: how far have they come? *Training* 1992;59–65.
 23. Fried BJ, Topping S, Rundall TG. Groups and teams in health services organizations. In: Shortell SM, Kaluzny AD, eds. *Health Care Management: Organization Design And Behavior.* Albany, NY: Delmar Publishers; 2000:154–190.
 24. Lemieux-Charles L, Murray M, Baker G, et al. The effects of quality improvement practices on team effectiveness: a mediational model. *J Organizational Behav.* 2002;23:533–553.
 25. Strasser DC, Smits SJ, Falconer JA, et al. The influence of hospital culture on rehabilitation team functioning in VA hospitals. *J Rehabil Res Devel.* 2002;39:115–125.
 26. Alexander JA, Jinnett K, D'Aunno TA, et al. The effects of treatment team diversity and sex on assessments of team functioning. *Hospital Health Services Administration.* 1996;41:37–53.
 27. Hackman, JR. Introduction: work teams in organizations: an orienting framework. In: Hackman JR, ed. *Groups That Work (and Those That Don't) Creating Conditions for Effective Teamwork.* San Francisco, CA: Jossey-Bass 1990;1–14.
 28. Shortell SM, O'Connor EJ, Boerstler H, et al. Assessing the evidence on continuous quality improvement: is the glass half empty or half full? *J Hospital Health Services Administration.* 1995a;40:4–24.
 29. Shortell SM, O'Brien JL, Carman JM, et al. Assessing the impact of continuous quality improvement/total quality management: concept versus implementation. *Health Services Res.* 1995b;30:377–401.
 30. Baker RG, Murray M, Tasa K. Quality in action: an instrument for assessing organizational culture for quality improvement. First International Scientific Symposium on Improving Quality and Value in Health Care, Orlando, FL, 1995.
 31. Shortell SM, Jones RH, Rademaker AW, et al. Assessing the impact of total quality management and organizational culture on multiple outcomes of care for coronary artery bypass graft surgery patients. *Medical Care.* 2000;38:207–217.
 32. Quinn RE, Rohrbaugh J. A spatial model of effectiveness criteria: towards a competing values approach to organizational analysis. *Manage Sci.* 1983;29:363–377.
 33. Quinn R, Kimberly J. Paradox, planning, and perseverance: guidelines for managerial practice. In: Quinn R, Kimberly J, eds. *Managing Organizational Transitions.* Homewood, IL: Dow Jones-Irwin; 1984:295–313.
 34. Zammuto R, Krakower J. Research in organizational change and development. *Quantitative and Qualitative Studies of Organizational Culture.* Greenwich, CT: JAI Press; 1999;5:83–114.
 35. Pinto MB, Pinto JK, Prescott JE. Antecedents and consequences of project team cross-functional cooperation. *Manage Sci.* 1993;39:1281–1297.
 36. Palmer RH, Hargraves JL, Orav EJ, et al. Leadership for quality improvement in group practices. *Med Care.* 1996;34(9 Suppl):SS40–SS51.
 37. Berner ES, Baker CS, Funkhouser E, et al. Do local opinion leaders augment hospital quality improvement efforts? a randomized trial to promote adherence to unstable angina guidelines. *Medical Care.* 2003;41:420–431.
 38. The Joint Commission Journal of Quality Improvement. Improving care for acute myocardial infarction: experience from the cooperative cardiovascular project. The Cooperative Cardiovascular Project Best Practices Working Group; 1998.
 39. Harper PG, Baker NJ, Reif CJ. Implementing community-oriented primary care projects in an urban family practice resident program. *Family Med.* 2000;32:683–690.
 40. Venketasubramanian N. Stroke pathways. *Ann Acad Med Singapore.* 2001;30:27–35.
 41. Ananth S. Small steps toward integrating CAM. *Health Forum J.* 2003;46:43.
 42. Ferguson TB Jr, Peterson ED, Coombs LP, et al. Use of continuous quality improvement to increase use of process measures in patients undergoing coronary artery bypass graft surgery: a randomized controlled trial. *JAMA.* 2003;290:49–56.
 43. Wagner EH, Austin BT, Davis C, et al. Improving chronic illness care: translating evidence into action. *Health Affairs.* 2001a;20:64–78.
 44. Wells KB, Sherbourne CD, Schoenbaum M, et al. Impact of disseminating quality improvement programs for depression in managed primary care: a randomized controlled trial. *JAMA.* 2000;283:212–220.
 45. Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Joint Commission J Quality Improvement.* 2001b;27:63–80.
 46. Kilo CM. A framework for collaborative improvement: lessons from the Institute for Healthcare Improvement's Breakthrough Series. *Quality Manage Health Care.* 1998;6:1–13.
 47. Cretin S, Shortell SM, Keeler EB. An evaluation of collaborative interventions to improve chronic illness care: framework and study design. *Eval Rev.* 2003;28:28–51.
 48. Blau P. *Inequality and Heterogeneity.* New York: Free Press; 1977.
 49. Pearson ML, Wu SY, Schaefer J, et al. A method for assessing the implementation of the chronic care model in quality improvement collaboratives. *Rand Health.* 2003;March 11.
 50. Baron RM, Kenny DA. The moderator/mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Personality Social Psychology* 1986;51:1179–1182.
 51. Berwick DM, Godfrey AB, Roessner J. *Curing Health Care.* San Francisco: Jossey-Bass; 1990.
 52. Blumenthal D, Kilo CM. A report card on continuous quality improvement. *Milbank Q.* 1998;76:625–648.
 53. Nagi SZ. Teamwork in health care in the US: a sociological perspective. *MMFQ Health Soc.* 1976;53:75–91.
 54. Quinn JB. *Intelligent Enterprise: a Knowledge and Service Based Paradigm for Industry.* New York: The Free Press; 1992.
 55. Nelson EC, Batalden PB, Huber TP, et al. Microsystems in health care: part 1. learning from high-performing front-line clinical units. *Joint Commission J Quality Improvement* 2002;28:472–493.
 56. Nelson EC, Batalden PB, Huber TP, et al. Microsystems in health care: part 2. creating a rich information environment. *Joint Commission J Quality Safety* 2003;29:5–15.