

# **HEALTH CENTERS AND THE MEDICALLY UNDERSERVED: BUILDING A RESEARCH AGENDA**

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## **Health Center Quality Improvement**

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# THE COMMUNITY HEALTH CENTER QUALITY IMPROVEMENT RESEARCH AGENDA

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## INTRODUCTION

The goal of this paper is to provide a framework for discussing the quality improvement research agenda in the Community Health Center (CHC) setting. We begin by first reviewing initial evaluations of quality in the CHC setting. We then summarize the quality improvement (QI) efforts in CHC settings to date. Drawing upon the lessons learned and questions raised by these endeavors, we then present the “top ten” QI research questions for CHCs in the coming decade.

## THE QUALITY OF COMMUNITY HEALTH CENTER CARE

Since their formation from grassroots efforts in urban Boston and then in rural Mississippi during the 1960's, the goal of Community Health Centers has been to improve the health of underserved communities across the nation. CHCs have endeavored to empower the communities in which they work not only through the provision of health care, but also through health-related jobs and by addressing the root causes of poor health such as lack of employment, education, or healthy physical environments.<sup>1-4</sup>

CHCs are unique philosophically, organizationally, and financially among primary care providers. The location, service obligations, and governance of CHCs have been encoded into law. Public Health Service Act Section 330 states that in order to qualify for federal support, CHCs must: (1) be located in medically underserved areas or serve a high need community; (2) provide comprehensive primary care services as well as supportive services that promote access to health care; (3) be available to all residents within their service area regardless of ability to pay; (4) be governed by a community board composed by health center users; and (5) meet other performance and accountability requirements regarding their administrative, clinical and financial operations.<sup>5</sup> Additionally, although CHCs operate as independent, free-standing corporations, the Bureau of Primary Health Care provides decentralized regulatory oversight, special funding arrangements, and technical support for this special category of providers.

In the decades following formation, CHCs were judged for the quality of care that they provided. The research questions during this period focused mainly on whether CHCs provided good health care, and not upon how they managed to do so despite significant resource constraints and their unique approach to the provision of care. In general, CHCs demonstrated that they were capable of providing access to primary health care, quality primary care, and cost-effective care to needy and disenfranchised populations despite constrained human and capital resources.<sup>6-11</sup>

The literature on quality improvement efforts in CHCs begins in the 1990s. This marked the transition from questions about whether CHCs provided good care, to questions about how that care can be continually improved. For the most part, these QI efforts have centered upon ensuring the delivery of evidence-based practices in the realms of cancer screening, immunizations, and diabetes care. Again, the care delivered by CHCs for these conditions was comparable or better than the care provided in other health care settings.<sup>12-16</sup>

Looking towards the goals of Healthy People 2010, many currently view CHCs as uniquely positioned to help eliminate disparities in health.<sup>15, 17-22</sup> For one, there is evidence to support that CHCs users are not differentially treated based on race or ethnicity. In fact CHCs reach out to provide care to significant proportion of racial and ethnic minorities.<sup>23</sup> Second, the fact that CHCs are able to provide

quality health care to disenfranchised groups may be a critical element in narrowing gaps in health care and outcomes.<sup>24</sup> This ability of CHCs to fill this role will be yet another test of CHC tenacity and inventiveness. Providing quality health care and eliminating racial disparities must be accomplished in face of a fragmented safety net, rising numbers of uninsured and underinsured, and a Presidential mandate to increase the number of clients served per site.<sup>25</sup>

## METHODS

Our goal was to review the written experiences of quality improvement efforts within the federally-qualified CHC setting. We recognize that a broader quality improvement literature exists, but limit this review to CHC-based efforts. For one, CHCs are currently engaged in the Health Disparities Collaborative, one of the largest and most innovative quality improvement efforts underway in the country. Secondly, CHCs are unique entities practicing in special circumstances. Lessons from other health care entities (e.g. - private practice offices) or other environments (e.g. - pure fee-for-service or managed care settings) may not translate well into CHC settings. For example, the Veterans Affairs system has also made tremendous strides in leading QI efforts and research, but has a more narrowly defined population to serve, is centrally administered and funded, and controls services beyond the primary care outpatient setting.<sup>26</sup>

Our definition of quality of care focuses on effectiveness including processes of care and outcomes. We recognize that broader concepts of quality exist such as the Institute of Medicine domains of effectiveness, efficiency, safety, timeliness, patient-centeredness, and equity, but that research within many of these areas is only beginning to emerge.<sup>27, 28</sup>

We used a four-pronged approach to cast a wide but specific net. (1) **Database search.** We searched the following electronic databases: Medline, CINAHL, CCTR, PsychInfo, Cochrane DSR, ACP Journal Club, DARE, and EBM Reviews. We used wide range of search terms and combinations thereof. We used established Medical Subject Heading (MeSH) terms such as “Quality Assurance” and “Diabetes Mellitus”, and free-text terms such as “physician reminder” or “quality improvement” in the same database search. (2) **Known author and organization search.** We used our own database of articles and materials to compile a comprehensive list of authors and organizations known to have done work on this topic. Relevant bibliographies or publication lists from these authors and/or organizations were assembled using the above databases, as well as the Google search engine on the World Wide Web. (3) **Institutional document search.** Brief interviews with key persons from the National Association of Community Health Centers, Health Resources and Services Administration, and the Bureau of Primary Health Care were conducted in order to obtain institutional documents related to quality improvement in CHCs. (4) **References search.** Finally, we cross-checked all of the reference lists of included studies to make sure that all relevant articles were included. Additional details regarding the search strategy are available from the authors.

Studies were included if they occurred in the CHC setting and met our definition of a quality improvement intervention. An intervention was considered a quality improvement one if the effort was directed at changing elements within an organization in order to increase the appropriate provision of health care. If CHC status was unclear, then authors were contacted for clarification. If the intervention was conducted in more than one health care setting, CHCs had to comprise at least one-third of the total settings. This was to assure that effects could be reasonably attributed to CHCs. QI efforts in school-based health clinics, hospital-based clinics, and public or county clinics were excluded. Editorials and/or commentaries were only included if they supplemented information contained within a qualifying article. Studies only assessing the patient perspective without connecting these perspectives with changing CHC practices were excluded.<sup>29-34</sup> Studies published outside the United States or in non-English languages were systematically excluded.

In addition to a thorough review of the literature, we drew upon our team's knowledge and experience regarding the Health Disparities Collaborative (HDC), the largest quality improvement undertaking in the CHCs to date. For the past 6 years, our team has been involved in analyzing issues of effectiveness, sustainability, spread and costs of the Collaborative and it is one of the largest evaluations of QI in CHCs to date. To this end, we have conducted approximately one hundred interviews with CHC staff (provider, non-provider, QI team leader, CEO, and Medical Directors), and collected data from thousands of surveys and charts. Since our analyses are still underway, we make a concerted effort to strike the proper balance between applying informed experience and drawing premature conclusions for the purposes of this paper. (A summary of the HDC is available in **Appendix A**.)

### **QUALITY IMPROVEMENT INTERVENTIONS IN CHCS**

We identified 19 unique evaluations of QI interventions in CHC settings. (See **Appendix B** for summary.) Taken as a group, these interventions were viewed as successful although significant barriers were encountered and must be dealt with in future QI designs.

Approximately one-third of the identified studies were conducted in a single CHC, while another one-third was conducted in two CHCs, and the remaining one-third were conducted in 3-5 CHCs except for the three largest which were conducted in 7-19 CHCs. For the most part, authors described choosing CHCs based on working relationships with them or on characteristics they believed predisposed them to performing well in the intervention. About one-quarter of the interventions lasted 12-17 months, while a little over one-third lasted 2-3 years, and almost one-fifth lasted 4 years.

Generally, interventions targeted diabetes, cancer screening (mainly breast, cervical, and colorectal although one targeted oral-pharyngeal cancer), smoking cessation, tuberculosis screening, adult- and pediatric immunizations, adolescent preventive health services, and domestic violence screening. Study designs primarily comprised cross-sectional assessments pre- and post-intervention, but also included a single center case-series description at the simplest and nested cohort analyses at the most complex. While some studies were able to use randomization in aspects of the studies, none were true randomizations of the intervention design.

Interventions comprised a mix of the following tactics: gaining leadership buy-in, targeting provider staff with condition-specific information, targeting non-provider staff with condition-specific information, generating provider reminders, reformatting the way care information is documented (e.g. using flow sheets or patient registry), and providing verbal or written feedback about performance to staff. In a few cases, information technology was used to assist in the intervention effort (e.g. computerized physician reminders, computerized patient registry). In two cases, staff was trained on a specific QI methodology (PDSA cycles). In rare instances, visit duration was lengthened or lines of communication were reformatted; otherwise interventions worked very hard to fit within the constraints of traditional office-based practices. Financial incentives were not tied to quality improvement activities or attainment of quality measures in these interventions, although a handful of studies provided lump-sum payments to offset the additional administrative costs of the intervention.

In these studies, a good proportion of QI interventions were generally able to improve the health care services provided for their respective targeted conditions in a statistically significant way. For diabetes (5 studies), care generally improved despite variations in the process measures used and in the intensity and duration of the interventions. For cancer screening (7 studies), care also improved despite differences in the number of conditions being targeted within an intervention and in the intensity and duration of the interventions. Interventions targeted at smoking cessation varied too widely to draw

conclusions from the group – two included providing counseling but in very different patient populations, while the other assessed smoking status without necessitating cessation counseling. Immunization interventions were also too disparate to consider as a cohesive set – one targeted Hepatitis B status in a pediatric Southeast Asian population, another focused upon missed vaccine opportunities in a general pediatric setting, and a third worked towards improving adult influenza vaccine status. The remainder of interventions only comprised a single trial.

Despite generally positive findings, we caution the reader against drawing too many conclusions from the research currently available. Drawing definitive conclusions about the effectiveness of QI interventions from the current body of literature would be like deciding drug effectiveness in a series of clinical trials in which the drug dosage varied, the side-effects had not been previously described, the half-life was unknown, and the pertinent patient characteristics were ill-described.

As Appendix B illustrates, QI interventions vary tremendously with respect to their content and duration. It also shows that the burden of QI interventions on their hosting CHC organizations varies tremendously—for example, data collecting activities related to QI efforts can rest entirely upon the CHC staff or be completely supplied by funded external research personnel. The summary also shows that the half-life (i.e. sustainability) of these interventions is unknown. Many interventions performed well for a specified period of time and then waned, while other interventions probably were not evaluated for a long enough period of time (e.g. it may be difficult for aggregate HgA1c's to change significantly within a single year if only one-third of patients are with any given center for longer than a year).<sup>35-39</sup> In addition, journals may be biased towards publishing studies that demonstrate a positive effect of QI interventions. Lastly, the paucity of typology regarding the pertinent organizational characteristics of CHCs impairs our ability to ascertain why centers receiving the “same” intervention did not perform the same.<sup>40,41</sup> While the future of QI intervention still looks promising, several lines of questioning need to be pursued in order to propel the field of QI develop and evaluation forward.

## **TOP TEN QI RESEARCH QUESTIONS FOR CHCs**

### **1. What is the best model (or are the best models) for QI in CHCs?**

One of the most fundamental questions is what model or models of QI should be promoted in CHCs. Currently the HDC is the dominant paradigm, and evaluations have demonstrated that the HDC has improved the quality of diabetes care. However, whether or not the HDC, modifications of the HDC, or alternatives, are the most appropriate models for all CHCs is a basic unanswered question. In addition, although the Chronic Care Model includes community outreach as one of its components, the major emphasis of the HDC is improving office-based ambulatory health care. This focus addresses an important area, but risks losing sight of the broader factors impacting the health of a CHC's catchment population, a perspective fundamental to the CHC movement. For example, what enabling services improve the health care and health of patients and thus might be an important part of a QI intervention? What types of community supports and partnerships can enhance the quality of ambulatory care and improve overall health status?

### **2. How can we increase the chances that QI interventions will be successfully implemented?**

One of the ways that we can increase the chances of QI success is by developing a fuller grasp of elements that significantly influence CHC ability to initiate, implement, and sustain QI activities. Many QI interventions have a “black box” feel that make replication and improvement difficult. Studies to date suggest that key ingredients, such as leadership buy-in and strong champions, must to be present in order

for organizations to initiate QI interventions. The mere presence of these factors, however, does not guarantee success in either completing a QI program or achieving the desired result. Even among CHCs that are viewed as likely to succeed, many drop out or demonstrate improvements that only trend towards significance.<sup>37, 42</sup> This may be due to imprecise use of terms like “buy-in” and “champions”, but may also be due to an incomplete assessment of the full constellation of factors necessary for success. Moreover, how do we increase the likelihood that CHCs will have strong, positive leaders and champions for QI interventions? More insight into successful implementation strategies would be valuable such that improvement infrastructures can be more indelibly imbedded within organizations.

A particularly important relationship to study is the one between CHC finances and CHC ability to implement and sustain QI. CHCs tacitly bear the costs of QI programs, and a more accurate assessment of the resources that must be marshaled in order for a QI program to flourish would help CHC leaders determine whether they are financially strong enough to take on a QI effort. Also, since QI methods rely heavily upon team dynamics, it is important to have a firmer grasp of the interpersonal dynamics that must exist in order for a QI effort to be successful.<sup>43</sup> As these and other key characteristics are elucidated, decisions can be made regarding how to groom or supplement those characteristics either prior to or as part of a QI intervention.

### **3. What is the best way to sustain QI activities?**

At the current time, there are several major roadblocks to achieving greater QI sustainability in CHCs. These barriers include personnel turnover, the challenge of institutionalizing quality improvement culture and processes, traditional concepts of productivity, and lack of reimbursement for quality improvement activities. (Turnover, institutionalization, and productivity are discussed in this section, while reimbursement is dealt with in a subsequent section of the paper.)

Employee turnover rate has been cited as an impediment to improving quality in many account of QI in CHCs. Turnover is not a new problem, but deserves a careful look because predominant models of QI require a constancy of team members.<sup>44</sup> One approach is to consider whether strategies aimed primarily at improving employee retention can secondarily improve QI efforts. Another approach is to investigate whether QI interventions themselves mitigate the problem of employee turnover. Anecdotally, QI interventions help CHCs retain employees because they provide employees with a mechanism for participating in the decision-making process at their health center. In other situations, QI interventions contribute to burnout and resignations because they lay additional burdens upon staff without commensurate reimbursement or support.<sup>45, 46</sup> A better understanding of when and how QI interventions contribute to employee retention versus resignation would be a tremendous advancement in dealing with this problem.<sup>1</sup>

Institutionalizing change is challenging. It is difficult to create a culture in which quality improvement is valued and supported. The best methods for sustaining leadership and provider buy-in and training new employees is unclear. Greater insight into the tools and support necessary to translate quality philosophies into ongoing practice would help sustain QI activities.

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<sup>1</sup> We offer one caveat with regards to turnover. Although the tendency is to view turnover as a wholeheartedly bad thing, it is not necessarily so. While most organizations would rather not deal with the expense of constantly training new staff, turnover as a result of upward mobility would be consistent with the CHC mission. CHCs were founded with the intention of providing health-related job training in addition to direct health services. A certain degree of turnover may actually signify that the CHC is successful this aspect of its functioning. So any investigation into the relationship between turnover and QI interventions should take this caution into account.

Provider productivity requirements can be at cross-purposes with QI efforts. First and foremost, it creates a system in which there is no way for CHCs to regularly engage providers in QI planning activities without being penalized with a large opportunity cost for time not seeing patients. Secondly, simplistic productivity standards predetermine how much time the provider will spend with the patient regardless of what the patient needs, and creates incentives for seeing healthy patients with self-limited benign illnesses as opposed to ill patients with complicated chronic problems. With more modern abilities to capture the products of physician work, perhaps it is time to replace a simplistic concept of productivity and replace it with a more sophisticated one that is more compatible with assuring quality and quality improvement for the greatest number of people. Productivity concerns also raise questions about how efficiency and clinic redesign initiatives may complement health care oriented QI interventions.

#### **4. How should QI interventions be tailored to different CHCs?**

In addition to having more precise concepts of what QI interventions should entail and of what CHC characteristics matter (as proposed above), we presuppose that greater goodness-of-fit between QI and CHC will enhance CHC ability to initiate and sustain QI programs.<sup>47, 48</sup> A better comprehension of CHC organizational stage-of-development or readiness for change would also aid in the design of tailored interventions. Size and age of the organization may matter as well. Most of the QI interventions to date were conducted in more established CHCs. The applicability of these same techniques within younger, smaller CHCs is unclear, but essential to establish given the expansion currently underway in the CHC program. For example, it could be that some younger CHCs initially need QI techniques that focus more upon establishing buy-in and skills development of key leaders rather than personnel-intensive interventions like the rapid-PDSA-cycles that presume the CHC has strong leadership support. Alternatively, it could be that CHCs with less QI experience adopt changes easier. In a QI intervention aimed at improving adolescent preventive health services, CHCs without an adolescent program performed better than the CHCs with pre-existing programs.<sup>49</sup>

An appreciation of CHC heterogeneity does not mean that every QI intervention must be individually tailored to specific CHC situations; doing so would be impractical. Instead, a fine line must be walked between providing structure and giving autonomy. Research should be able to help draw this line by identifying sub-groups of CHCs and sub-categories of QI interventions that may work well together and test combinations that seem to be best.

#### **5. Can the elements of successful multi-component interventions be prioritized?**

In a setting of limited resources, a better understanding of whether elements of multi-component interventions can be prioritized may facilitate the cost-effectiveness of QI interventions. The first and foremost question to answer is whether multi-component interventions comprise more than the sum of their parts and derive their impact from the fact that they are delivered as a whole. If the synergies are critical, then deconstructing the intervention could be a big mistake. A secondary question would be to ascertain which component of a multi-dimensional intervention provides the greatest impact on the desired results. It is also possible that different components are more powerful in different CHCs, and thus individualization may be critical. And third, if there is a way to disassemble multi-component interventions, is there a way to prioritize the individual components in a strategic manner? Answers to these questions would have important implications for QI intervention affordability, the timeframe in which results could be expected, and the degree of program success.

## **6. How can QI interventions improve the overall quality of care?**

To date, QI efforts in CHCs have focused upon improving condition-specific care for certain subsets of patients. However, providing support and incentives for identifying and servicing a small subset of needs may put the person's other needs at risk for neglect. In the coming decade, QI research should investigate methods for improving an individual's **overall** health care, not just that within isolated dimensions. Also, developing methods, data systems, and patient registries that will allow seamless tracking of multiple conditions will be essential.

One strategy for improving both overall care and condition-specific care is to include broad measures of quality in addition to disease-specific items. For example, an office visit may be evaluated not only upon whether or not immunizations were provided, but also by what proportion of issues raised by the patient were resolved by the provider in that office visit or another unit of time, or the quality of shared decision-making between the patient and provider.<sup>50-54</sup>

## **7. What are the unintended consequences of quality improvement?**

As noted above, QI interventions are complex ones that involve multiple components and diverse personnel.<sup>55</sup> With the trend towards increasing the number of CHC activities and personnel affected by QI interventions, attention must be paid to understanding the unintended consequences of these efforts. Ostensibly, both positive and negative unintended consequences occur as a result of QI and the critical mission is to determine the extent to which quality improvement truly transforms health care as opposed to simply shifts resources in response to reordered priorities.

Positive unintended consequences are likely to occur when QI tools are adopted for situations or conditions that are not of QI focus. Studies thus far have not reflected whether additional gains have been wrought off existing QI efforts. For example, we do not know whether QI projects focused on diabetes care have, as a by-product, lead to commensurate improvements in cardiovascular care. We also do not know which QI techniques, if any, are adopted for non-disease aspects of CHC functioning. Anecdotes have informed us that some CHCs involved in the HDC have adopted PDSA-cycles for conditions or situations not officially part of the original intervention.<sup>45</sup> Maximization of the unintended benefits will undoubtedly contribute to the ability of CHCs to implement and sustain QI activities.

Negative unintended consequences are most likely to occur when QI investments draw resources or attention away from other CHC activities or conditions. Unfortunately, the complex nature of QI interventions makes it difficult to predict when and where these consequences would occur. Others have already suggested that patient level trade-offs already occur –one health problem may be neglected when multiple health problems are present.<sup>56</sup> The task is to determine whether center level trade-offs also exist – do QI efforts in one area (e.g. adult cancer screening) lead to systematic neglect of another program (e.g. developmental screening for children)? Knowledge and avoidance of negative unintended consequences will contribute to the implementability of individual QI projects as well as protect overall quality of care provided by CHCs.

## **8. What are the cost implications of QI interventions from both the business-case and societal vantage points?**

Most likely QI interventions cost CHCs money in the short term. The question is whether these costs constitute worthwhile investments that pay health dividends in the long run. This analysis must be done from the perspective both of the CHC (i.e. the business-case vantage point), and from society at large (i.e. the societal vantage point such as through societal cost-effectiveness analysis). This is

necessary because costs generated for QI make it more expensive for CHCs to provide care, but cost savings (e.g. – prevented hospitalization from better ambulatory care) may accrue to another entity such as an insurance plan. QI interventions must be viable from the CHC’s perspective to be practically sustainable. The QI intervention is only likely to be worthwhile if it has societal value.

## **9. What financial incentives should be used to promote QI activities in CHCs?**

It is unclear what are the most effective financial and non-financial incentives for promoting QI activities in CHCs. Probably the hottest national incentive issue is pay-for-performance (P4P).<sup>57, 58</sup> Proponents of P4P argue that such programs will improve quality of care and increase QI efforts because higher quality care will be financially rewarded. However, a host of critical questions remain unanswered. What types of case-mix adjustment instruments are necessary to create an equal playing field (See #10)? What will the effect of P4P be on racial and ethnic disparities in health care? How do we avoid creating perverse incentives for providers to dump patients who will hurt them in P4P measures? We are unaware of any P4P initiatives inside the CHC program, and it would be helpful to start figuring out ways that this might work. None of the identified studies described the use of financial incentives in their QI interventions. Financial incentives for QI are necessary because QI is an expensive undertaking. If there are no mechanisms for off-setting costs related to QI, the implementability and sustainability of QI efforts will be threatened.

## **10. How should case-mix adjustments be used to improve assessments of QI interventions?**

Risk adjustment is a technique that facilitates fair comparisons between groups of patients when equity cannot be achieved through randomization.<sup>59-61</sup> Risk adjustment in the outpatient setting is a fairly recent occurrence, and has been used mainly to derive capitated payment systems for Medicare- and Medicaid managed care organizations.<sup>62</sup> Aside from the use of risk adjustment among these purchasers of health care, we are unaware of systematic uses of risk adjustment in the CHC program.

The greatest risk of not adjusting for case-mix in CHC QI is the uncertainty it creates when evaluating the quality of the health services that are delivered over time. Currently, CHCs are judged upon the changes they are able to make relative to their own baselines or by comparing their achievements to an absolute standard-of-care.<sup>13, 14</sup> We therefore do not know if improvements in health care (or lack thereof) are due primarily to the QI intervention or to fluctuations within patient populations served by CHCs. Healthier patients can move into a CHC population and make a QI program look as if it is doing better than it really is – this could happen with Medicaid expansion programs where less stringent eligibility requirement allow healthier portions of the population to become medically insured. Similarly, sicker patients can move into a CHC population and make a QI program look as if it is doing worse than it really is– this can happen if a local safety net provider cuts back or shuts down, or if healthier patients leave CHCs for private offices.<sup>63, 64</sup> Thus, risk-adjustment can offer more meaningful analysis to individual CHCs when they reflect upon the care they have provided to patient populations over time.

Risk adjustments may also help compare CHCs to one another with respect to QI gains. Again, although all CHCs work with medically vulnerable populations, there still is unaccounted heterogeneity amongst this group of providers. Accounting for risk would allow benchmarking of CHCs against one another and would allow the Bureau of Primary Health Care to differentiate those struggling with especially risky patients from fundamentally poor performers. More sophisticated risk adjustments would also allow proper comparisons between CHCs and other health care providers, and also help mitigate potential problems with P4P.

## **CONCLUSIONS**

CHCs have demonstrated their forward-thinking capacity by incorporating QI techniques and technologies into the majority of CHC practices, and have already made a significant contribution to the field of quality improvement research. Continued collaboration amongst CHCs, policymakers, and researchers ensure that quality improvement efforts continue to offer the most innovative and effective strategies for delivering high-quality cost-effective health care for vulnerable populations. We are currently faced with a number of important unanswered questions and no doubt the coming decade will bring interesting answers and even more enticing problems and possible solutions.

## APPENDIX A: HEALTH DISPARITIES COLLABORATION EVALUATION SUMMARY

The largest quality improvement undertaking in CHCs has been the Health Disparities Collaborative™ (HDC) and its evaluation is still underway. Initiated by the Bureau of Primary Health Care (BPHC) in 1998, the goal of the HDC has been to improve “health outcomes for all medically underserved people with chronic diseases.”<sup>65,66</sup> At inception, the HDC represented the state-of-the-art in quality improvement and chronic disease management methods. The QI method employed in this intervention was based upon the Institute for Healthcare Improvement’s (IHI) adaptation of continuous quality improvement methods to emphasize rapid Plan-Do-Study-Act (PDSA) cycles (Associates in Learning’s Model for Improvement) taught through Learning Sessions and was called the Breakthrough Series.<sup>2</sup> The chronic disease management approach used by the HDC is Edward Wagner’s Chronic Care Model (CCM) which posits that multiple dimensions of patient care need to be addressed in order to for health care services and patient outcomes to be improved. The CCM outlined six dimensions deserving focus: community outreach, health system interaction, clinical information systems, delivery system design, provider decision support, and patient self-management support. With inclusion of community outreach and empowering provider-patient interactions in its model, CCM fit well with CHC activities and ideology.

The first HDC focused upon improving care for a single condition, diabetes. Aside from health centers indicating their desire to improve care for this one condition, diabetes was considered a model disease for improvement because it was relatively common and because providers in a variety of health care settings were unable to meet quality-of-care standards as outlined by the American Diabetes Association.<sup>67,68</sup> It was also particularly amenable to a quality improvement intervention because processes-of-care associated with better care were relatively easy to measure (e.g. foot exams for diabetic neuropathy, ophthalmology referral for retinal exams), and because it had a clinically valid outcome measure (HgbA1c). Over the subsequent years the HDC expanded the number of Collaborative conditions for which it offered training and support. Asthma, depression, cardiovascular disease, cancer screening and HIV/AIDS were some of the additional conditions. By 2004, the HDC began developing programs that were not necessarily disease-specific. This was partly in response to CHC demand as was the case for the Finance Collaborative, and but also in recognition that many conditions shared care processes as was the case for the Prevention Collaborative.

Organizationally, the HDC was a substantial undertaking. With the IHI providing the technical assistance for the quality improvement methodology and the CCM, the BPHC and its Primary Care Associations worked with CHC Associations at state, regional and national levels to select and recruit individual CHCs into the program. Initially, only 5 well-led high-functioning health centers were chosen to pilot the HDC in 1998. By 2002, the HDC selection process was opened to a greater number of health centers, but CHCs still had to apply on-line for participation in the Collaborative of their interest (at that time asthma, depression, diabetes, or cardiovascular disease were available) and thus the program was biased towards the CHCs with the resources and capabilities to complete a fairly extensive application. By 2004, 497 CHCs were participating in the HDC.<sup>65</sup>

For the individual CHCs, the quality improvement and disease management methods of the HDC were introduced by first asking participating health centers to assemble a multi-disciplinary QI team of 3-5 members that would regularly meet with the support of senior administrative leadership. Initially and then periodically over the ensuing year, key members of individual CHC teams traveled to regional or national learning sessions where they underwent training by IHI staff and shared experiences and best practices with one another. In addition to the initial and periodic learning sessions, CHCs received

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<sup>2</sup> Also being used by the VA system and WHO at that time.

technical assistance throughout the year from regionally-based HDC coordinators and directors drawn from those state and regional Primary Care Associations. This support utilized several different modes of communication including telephone conference calls, Internet-based listservers, site visits, feedback on required monthly reports and three regional meetings.

**APPENDIX B. Summary of QI Interventions conducted in CHC Settings**

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details NS = Not-specified	Main Study Findings * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Barker 2001 <sup>69</sup>	Improve oral-pharyngeal cancer awareness among health professionals	Provider education	Cross-sectional pre- and post-intervention	# of CHCs involved: NS Selection criteria used: NS Time frame: 3 months Financial Support : No Technical Support: No	Knowledge and perceived competence increased*	Small provider response rate
Chin, 2001 <sup>70</sup> Chin, 2004 <sup>35</sup>	Improve diabetes care "Health Disparities Collaborative (HDC)"	Staff education Provider education Decision support QI tools Office redesign Partnership with outside agency	Cross-sectional and pre- and post-intervention	# of CHCs involved: 19 Selection criteria used: Yes Time frame: 12 months Financial Support : No Technical Support: No	Process measures of care, as reported by chart review and provider surveys, improved*  Outcome measure improved	Noted that CHCs reported insufficient resources to implement program  Time frame in which to expect intervention results is unclear  Sustainability questioned
Gottlieb, 2001 <sup>40</sup> Goodson, 1999 <sup>42</sup>	Improve primary care screening and immunizations "Putting Prevention Into Practice"	Office Materials Physician Reminder System Patient Education Provider Education	Cross-sectional and pre- and post-intervention	# of CHCs involved: 2 Selection criteria used: Yes Time frame: 39 months Financial Support : Yes Technical Support: Yes	Process measures of care, as reported by chart review, improved*	Concerned about center selection bias  Sustainability questioned  Providers noted as expressing difficulty prioritizing multiple patient needs

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details NS = Not-specified	Main Study Findings * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Harwell, 1998 <sup>71</sup>	Improve domestic violence screening "RADAR"	Patient education Provider education	Cross-sectional and pre- and post-intervention	# of CHCs involved: 12 Selection criteria used: NS Time frame: 12 months Financial Support : No Technical Support: Yes	Increased knowledge on immediate posttest*  Decreased knowledge at 3-month posttest*  Increased screening rates as reported by chart review	Sustainability questioned Concerned that single-component intervention may be inadequate
Harwell, 2002 <sup>36</sup>	Improve diabetes care "HDC"	Patient education Provider education Patient registry Office redesign Staff Education Information Technology (IT) tools	Cross-sectional and cohort pre- and post-intervention	# of CHCs involved: 4 Selection criteria used: Yes Time frame: 30 months Financial Support : No Technical Support: No	Some processes of care improved*  Outcome measure improved for cross-sectional analysis but not for cohort analysis*	Expressed difficulties accounting for changes in case-mix  Noted that CHCs have difficulty meeting data collection needs

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details NS = Not-specified	Main Study Findings * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Klein, 2001 <sup>49</sup>	Improve adolescent health screening services  "Guidelines for Adolescent Preventive Services"	Patient education Provider education Staff education Decision Support Tools Office Redesign	Cross-sectional pre- and post-intervention	# of CHCs involved: 5 Selection criteria used: Yes Time frame: 26 months Financial Support : Yes Technical Support: Yes	Processes of care, as reported by patients, improved*	Key personnel buy-in needed Intervention facilitated by CHCs ability to increase patient visit length Time frame in which to expect intervention results is unclear CHCs may vary in degree of Intervention uptake
Ngo-Metzger, 2001 <sup>72</sup>	Improve Hepatitis B immunization in Vietnamese children	Patient education Patient reminder system Office redesign	Case-Series	# of CHCs involved: 1 Selection criteria used: Yes Time frame: 30 months Financial Support : No Technical Support: No	Immunization status increased	Validity of parent report of services received questioned  Intervention tailored to CHC sub-population
Pbert 2004 <sup>37</sup> Zapka 2004 <sup>73</sup> Okene 2002 <sup>74</sup>	Decrease smoking rates in pregnant woman	Patient education Provider education Staff education Physician reminders Partnership with outside agency Office redesign	Case-Control	# of CHCs involved: 5 Selection criteria used: Yes Time frame: 42 months Financial Support : No Technical Support: No	Smoking rates decreased during pregnancy*  Smoking rates increased during post-partum follow-up*	Key personnel buy-in needed Sustainability questioned Patient response rates decreased over time Providers expressed difficulty prioritizing components of intervention Time frame in which to expect intervention results is unclear Existing providers inadequate as sole source of intervention

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details NS = Not-specified	Main Study Findings * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Roetzheim, 2004 <sup>75</sup>	Improve cancer screening "Cancer SOS"	Provider education Staff education Physician reminders Office redesign	Cross-sectional pre- and post-intervention	# of CHCs involved: 5 Selection criteria used: Yes Time frame: 12 months Financial Support : No Technical Support: No	Majority of process measures increased*	Effects of individual components of multi-component intervention unknown Questioned whether intervention was generalizable Key personnel buy-in needed Cost-effectiveness unknown Intervention only addresses a subset of all preventative health care needs
Roetzheim, 2005 <sup>38</sup>	Improve cancer screening "Cancer SOS"	Provider education Staff education Physician reminders Office redesign	Cross-sectional pre- and post-intervention	# of CHCs involved: 5 Selection criteria used:: Yes Time frame: 24 months Financial Support : No Technical Support: No	Previous improvements in process measures lose statistical significance	Sustainability questioned Intervention compliance decreased over time Staff turnover New staff not educated for intervention Questioned effectiveness of office-based interventions versus alternative models

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details	Main Study Findings	Key Observations or Discussion Points made by Study Authors
				NS = Not-specified	* = finding was statistically significant	
Sabnis, 2003 <sup>76</sup>	Decrease missed opportunities for childhood vaccination	Provider education Staff education Physician reminders Decision support Office redesign	Cross-sectional pre- and post-intervention	<i># of CHCs involved:</i> 1 <i>Selection criteria used::</i> Yes <i>Time frame:</i> 24 months <i>Financial Support :</i> No <i>Technical Support:</i> No	Missed opportunities were decreased*	Key personnel buy-in needed Patient preferences may not coincide with intervention goals Effects of individual components of intervention unknown
Shane-McWhorter, 2005 <sup>77</sup>	Improve diabetes care and outcomes	Patient education Provider education Physician reminders Partnership with outside agency	Case-control with cohort and Cross-sectional analysis	<i># of CHCs involved:</i> 2 <i>Selection criteria used::</i> Yes <i>Time frame:</i> 36 months <i>Financial Support :</i> Yes <i>Technical Support:</i> No	Processes of care increased  Outcome measures decreased	Cost-effectiveness unknown Patient response rates decreased over time Difficult to track high patient mobility Intervention tailored to center's subpopulation Patient ability to afford recommended care limited
Steele, 2005 <sup>78</sup>	Improve screening for latent tuberculosis infection	Physician reminder system IT tools	Cross-sectional pre- and post-intervention	<i># of CHCs involved:</i> 2 <i>Selection criteria used::</i> Yes <i>Time frame:</i> 7 months <i>Financial Support :</i> No <i>Technical Support:</i> No	Screening rates improved*	Sustainability questioned Providers expressed difficulty prioritizing multiple patient needs

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details  NS = Not-specified	Main Study Findings  * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Wagner, 2001 <sup>66</sup>	Improve diabetes care  "Chronic Care Model + Breakthrough Series"	Patient education Provider education Office Redesign QI Tools	Cross-sectional pre- and post-intervention	# of CHCs involved: 7 Selection criteria used:: Yes Time frame: 13 months Financial Support : Yes Technical Support: No	Processes of care improved  Outcomes improved	Sustainability questioned Key personnel buy-in needed Effects of individual components of intervention unknown Provider resistance Rapid turnover in leadership and staff Incentives that favor productivity rather than quality Concerned with cost of QI effort Providers unfamiliar with population-based approaches to medicine Intervention uptake variation by individual centers
Walker, 1995 <sup>79</sup>	Improve diabetes care	Patient education Staff education Provider education Office Redesign	Case-control with Cross-sectional analysis	# of CHCs involved: 1 Selection criteria used:: NS Time frame: 12 months Financial Support : No Technical Support: No	Processes of care improved	Difficult to track patients due to high mobility of patients Limited validity of chart audit Staff turnover Competing demands on provider time: acute vs. chronic problems Provider resistance Language barriers noted Lack of equipment Uptake of intervention may vary by CHC Difficulty prioritizing intervention components

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details	Main Study Findings	Key Observations or Discussion Points made by Study Authors
Walker, 2001 <sup>41</sup>	Improve diabetes care	Patient education Staff education Provider education		NS = Not-specified  <i># of CHCs involved: 3</i> <i>Selection criteria used: Yes</i> <i>Time frame: 26 months</i> <i>Financial Support : No</i> <i>Technical Support: No</i>	* = finding was statistically significant  Processes of care improved  Some targeted diabetes behaviors improved  Documentation of patient education declined in post-intervention period	Staff attrition Key personnel buy-in Uptake of intervention may vary by CHC Role of CHC in choosing intervention components CHCs may vary with respect to health resources at its disposal Competing demands on provider time Provider attrition Need for intervention tailoring unknown
Yarnall, 1998 <sup>39</sup>	Improve cancer screening and smoking cessation counseling	Staff education Provider education Physician reminder system IT tools	Cross-sectional pre- and post-intervention	<i># of CHCs involved: 1</i> <i>Selection criteria used: NS</i> <i>Time frame: 24 months</i> <i>Financial Support : No</i> <i>Technical Support: No</i>	Processes of care improved at first post-test  Processes of care declined at second post-test	Key personnel buy-in needed Difficulty integrating IT into provider workflow Difficulty integrating new IT system with new IT system Provider resistance Provider turnover Concern about meeting competing patient needs Would have liked to use financial incentive to motivate providers Provider time constraints

Author	Intervention Goal	Intervention Design	Evaluation Design	Methodological Details NS = Not-specified	Main Study Findings * = finding was statistically significant	Key Observations or Discussion Points made by Study Authors
Zapka, 1992 <sup>80</sup> Zapka, 1993 <sup>81</sup>	Improve cancer screening rates	Patient education Provider education	Cross-sectional pre- and post-intervention	# of CHCs involved: 1 Selection criteria used: NS Time frame: 36 months Financial Support : No Technical Support: No	Screening rates improved	Difficulties accounting for changes in case-mix Staff turnover Staff attrition Competing demands on center resources Competing demands on provider time: acute vs. chronic problems
Zimmerman, 2003 <sup>22</sup>	Improve influenza vaccination rates	Patient education Provider education Physician reminder systems Office Redesign	Time series with Cross-sectional and cohort analysis	# of CHCs involved: 2 Selection criteria used: NS Time frame: 12 months Financial Support : Yes Technical Support: No	Increased vaccination rates  No racial disparities in vaccination rates	Patient preferences for care may not coincide with intervention goals Role of center in choosing intervention components Patient response rates decreased over time

## REFERENCES

1. Breyer PR. Neighborhood health centers: an assessment. *Am J Public Health*. Feb 1977;67(2):179-182.
2. Dievler A, Giovannini T. Community Health Centers: Promise & Performance. *Medical Care Research and Review*. 1998;55(4):405-431.
3. Geiger HJ. CHCs: Health Care as an Instrument of Social Change. In: Sidel VW, Sidel RS, eds. *Reforming Medicine*. New York: Pantheon Books; 1984:11-32.
4. Sardell A. *The U.S. Experiment in Social Medicine: The Community Health Center Program, 1965-1986*. Pittsburgh: University of Pittsburgh Press; 1988.
5. Public Health Service Act 42 USC 254b; 1992.
6. Falik M, Needleman J, Wells BL, Korb J. Ambulatory care sensitive hospitalizations and emergency visits: experiences of Medicaid patients using federally qualified health centers. *Med Care*. Jun 2001;39(6):551-561.
7. Hedberg VAMD, Byrd RSMDMPH, Klein JDMDMPH, Auinger PMS, Weitzman MMD. The Role of Community Health Centers in Providing Preventive Care to Adolescents. *Archives of Pediatrics and Adolescent Medicine*. June 1996;150(6):603-608.
8. Regan J, Lefkowitz B, Gaston MH. Cancer Screening among Community Health Center Women: Eliminating the Gaps. *J Ambul Care Manage*. 1999;22(4):45-52.
9. Shi L, Starfield B, Xu J, Politzer R, Regan J. Primary Care Quality: Community Health Center and Health Maintenance Organization. *Southern Medical Journal*. 2003;96(8):787-795.
10. Starfield B, Powe NR, Weiner JR, et al. Costs vs. Quality in Different Types of Primary Care Settings. *JAMA*. December 28 1994;272(24):1903-1908.
11. Ulmer C, Lewis-Idema D, Von Worley A, et al. Assessing Primary Care Content: Four Conditions Common in Community Health Centers. *J Ambulatory Care Manage*. 2000;23(1):23-38.
12. Chin MH, Auerbach SB, Cook S, et al. Quality of diabetes care in community health centers. *Am J Public Health*. Mar 2000;90(3):431-434.
13. Gaston MHMD, Vinicor FMDMPH. Improving Diabetes Care in Community Health Centers. *American Journal of Public Health Taking On Tobacco*. February 2001;91(2):319.
14. Rust G, Curtin T. Diabetes Care in Community Health Centers: A Reasonable Standard of Comparison? *American Journal of Public Health*. February 2001;91(2):318-319.
15. Shields AE, Finkelstein JA, Comstock C, Weiss KB. Process of care for Medicaid-enrolled children with asthma: served by community health centers and other providers. *Medical Care*. Apr 2002;40(4):303-314.
16. Wylie-Rosett J, Basch C, Walker EA, et al. Ophthalmic referral rates for patients with diabetes in primary-care clinics located in disadvantaged urban communities *Journal of Diabetes and its Complications* January-March 1995;9(1):49-54.
17. Baquet CR, Carter-Pokras O, Bengen-Seltzer B. Healthcare disparities and models for change. *American Journal of Managed Care*. Sep 2004;10 Spec No:SP5-11.
18. Frick KD, Regan J. Whether and where community health center users obtain screening services. *Journal of Health Care for the Poor & Underserved*. Nov 2001;12(4):429-445.
19. Mayberry RM, Mili, Fatima, Ofili, Elizabeth. Racial and Ethnic Differences in Access to Medical Care. *Medical Care Research and Review*. 2000;57(Supplement 1):108-145.

20. Mays GP, Hesketh HA, Ammerman AS, Stockmyer CK, Johnson TL, Bayne-Smith M. Integrating preventive health services within community health centers: lessons from WISEWOMAN. *Journal of Women's Health*. Jun 2004;13(5):607-615.
21. Valdin A, Cargill LC. Access and barriers to mammography in New England community health centers. *Journal of Family Practice*. Sep 1997;45(3):243-249.
22. Zimmerman RK, Nowalk MP, Raymund M, et al. Tailored Interventions to Increase Influenza Vaccination in Neighborhood Health Centers Serving the Disadvantaged. *Am J Pub Health*. 2003;93:1699-1705.
23. Roby D, Rosenbaum S, Hawkins D, Zuvekas A. *Exploring healthcare quality and effectiveness at Federally-Funded Community Health Centers: Results from the Patient Experience Evaluation Report System (1993-2001)*. Washington, D.C.: National Association of Community Health Centers; March 2003.
24. Shi L, Stevens GD, Wulu JT, Jr., Politzer RM, Xu J. America's Health Centers: reducing racial and ethnic disparities in perinatal care and birth outcomes. *Health Serv Res*. Dec 2004;39(6 Pt 1):1881-1901.
25. Secretary OotP. Fact Sheet: Expanding Access to Health Care for Millions of Americans. Available at: <http://www.whitehouse.gov/news/releases/2004/05/20050525-5.html>. Accessed October 11, 2005.
26. Feussner JR, Kizer KW, Demakis JG. The Quality Enhancement Research Initiative (QUERI): from evidence to action. *Med Care*. Jun 2000;38(6 Suppl 1):I1-6.
27. Elder NC, Dovey SM. Classification of medical errors and preventable adverse events in primary care: a synthesis of the literature. *J Fam Pract*. Nov 2002;51(11):927-932.
28. Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century* Washington, D.C.: National Academy Press; 2001.
29. Kenney KA, Blake SC, Maloy K, Ranji UR, Salganicoff A. *Hearing Their Voices: Lessons from the Breast and Cervical Cancer Prevention and Treatment Act. Focus Group Findings from California*. Washington, D.C.: The Henry J. Kaiser Family Foundation; Fall 2004. 7146.
30. Lipkus IM, Rimer BK, Lyna P, Pradhan AA. Colorectal Screening Patterns and Perceptions of Risk Among African-American Users of a Community Health Center. *J Comm Health*. 1996;21(6):409-427.
31. Morris LA, Ulmer C, Chimnani J. A Role for Community HealthCorps Members in Youth HIV/AIDS Prevention Education. *J Sch Health*. 2003;73(4):138-142.
32. Ngo-Metzger Q, Massagli MP, Clarridge BR, et al. Perspectives of Chinese and Vietnamese Immigrants. *J Gen Intern Med*. 2003;18:44-52.
33. Reis J, Trockel M, King T, Remmert D. Computerized Training in Breast Self-Examination: A Test in a Community Health Center. *Cancer Nursing*. 2004;27(2):162-168.
34. Stanton MP, Nix GS. Effect of a Hypertension Teaching Protocol on Patient and Staff Satisfaction in a Rural Community Health Center. *Lippincott's Case Management*. 2003;8(3):125-132.
35. Chin MH, Cook S, Drum ML, et al. Improving diabetes care in midwest community health centers with the health disparities collaborative. *Diabetes Care*. Jan 2004;27(1):2-8.

36. Harwell TS, McDowall JM, Gohdes D, Helgerson SD. Measuring and improving preventive care for patients with diabetes in primary health centers. *Am J Med Qual.* Sep-Oct 2002;17(5):179-184.
37. Pbert L, Ockene JK, Zapka J, et al. A Community Health Center Smoking-Cessation Intervention for Pregnant and Postpartum Women. *Am J Prev Med.* 2004;26(5):377-385.
38. Roetzheim RG, Christman LK, Jacobsen PB, Schroeder J, Abdulla R, Hunter S. Long-term results from a randomized controlled trial to increase cancer screening among attendees of community health centers. *Ann Fam Med.* Mar-Apr 2005;3(2):109-114.
39. Yarnell KSH, Rimer BK, Hynes D, et al. Computerized Prompts for Cancer Screening in a Community Health Center. *J Am Board Fam Pract.* March/April 1998;11(2):96-104.
40. Gottlieb NH, Huang PP, Blozis SA, Jong-Long G, Smith MM. The Impact of Put Prevention Into Practice on Selected Clinical Preventive Services in Five Texas Sites. *Am J Prev Med.* 2001;21(1):35-40.
41. Walker EA, Engel SS, Zybert PA. Dissemination of Diabetes Care Guidelines: Lessons Learned from Community Health Centers. *The Diabetes Educator.* 2001;27(1):101-110.
42. Goodson P, Gottlieb NH, Smith MM. Put Prevention Into Practice: Evaluation of Program Initiation in Nine Texas Clinical Sites. *Am J Prev Med.* 1999;17(1):73-78.
43. Cohen D, McDaniel RR, Jr., Crabtree BF, et al. A practice change model for quality improvement in primary care practice. *J Healthc Manag.* May-Jun 2004;49(3):155-168; discussion 169-170.
44. Reynolds RA. Improving access to health care among the poor--the neighborhood health center experience. *Milbank Mem Fund Q Health Soc.* Winter 1976;54(1):47-82.
45. Chin MH, et al. Health Disparities Collaboration Evaluation.
46. Elwyn G, Rhydderch M, Edwards A, et al. Assessing organisational development in primary medical care using a group based assessment: the Maturity Matrix. *Qual Saf Health Care.* Aug 2004;13(4):287-294.
47. Ruhe MC, Weyer SM, Zronek S, Wilkinson A, Wilkinson PS, Stange KC. Facilitating practice change: lessons from the STEP-UP clinical trial. *Prev Med.* Jun 2005;40(6):729-734.
48. Stange KC, Goodwin MA, Zyzanski SJ, Dietrich AJ. Sustainability of a practice-individualized preventive service delivery intervention. *Am J Prev Med.* Nov 2003;25(4):296-300.
49. Klein JD, Allan MJ, Elster AB, et al. Improving adolescent preventive care in community health centers. *Pediatrics.* Feb 2001;107(2):318-327.
50. Flocke SA, Stange KC, Goodwin MA. Patient and visit characteristics associated with opportunistic preventive services delivery. *J Fam Pract.* Sep 1998;47(3):202-208.
51. Kirk SA, Campbell SM, Kennell-Webb S, Reeves D, Roland MO, Marshall MN. Assessing the quality of care of multiple conditions in general practice: practical and methodological problems. *Qual Saf Health Care.* Dec 2003;12(6):421-427.
52. Yawn B, Goodwin MA, Zyzanski SJ, Stange KC. Time use during acute and chronic illness visits to a family physician. *Fam Pract.* Aug 2003;20(4):474-477.
53. Yawn B, Zyzanski SJ, Goodwin MA, Gotler RS, Stange KC. Is diabetes treated as an acute or chronic illness in community family practice? *Diabetes Care.* Aug 2001;24(8):1390-1396.
54. Yawn B, Zyzanski SJ, Goodwin MA, Gotler RS, Stange KC. The anatomy of asthma care visits in community family practice. *J Asthma.* Dec 2002;39(8):719-728.

55. Campbell M, Fitzpatrick R, Haines A, et al. Framework for design and evaluation of complex interventions to improve health. *Bmj*. Sep 16 2000;321(7262):694-696.
56. Redelmeier DA, Tan SH, Booth GI Affiliation: Department of Medicine UoTSHSCONC. The treatment of unrelated disorders in patients with chronic medical diseases. *N Engl J Med*. May 21 1998;338(21):1516-1520.
57. Dudley RA. Pay-for-performance research: how to learn what clinicians and policy makers need to know. *Jama*. Oct 12 2005;294(14):1821-1823.
58. Rosenthal MB, Frank RG, Li Z, Epstein AM. Early experience with pay-for-performance: from concept to practice. *Jama*. Oct 12 2005;294(14):1788-1793.
59. Majeed A, Bindman AB, Weiner JP. Use of risk adjustment in setting budgets and measuring performance in primary care II: advantages, disadvantages, and practicalities. *Bmj*. Sep 15 2001;323(7313):607-610.
60. Majeed A, Bindman AB, Weiner JP. Use of risk adjustment in setting budgets and measuring performance in primary care I: how it works. *Bmj*. Sep 15 2001;323(7313):604-607.
61. Richardson D, Tarnow-Mordi WO, Lee SK. Risk adjustment for quality improvement. *Pediatrics*. Jan 1999;103(1 Suppl E):255-265.
62. Welch WP. Outpatient encounter data for risk adjustment: strategic issues for Medicare and Medicaid. *J Ambul Care Manage*. Jul 2002;25(3):1-15.
63. Landon BE, Epstein AM. Quality management practices in Medicaid managed care: a national survey of Medicaid and commercial health plans participating in the Medicaid program. *Jama*. Nov 10 1999;282(18):1769-1775.
64. Tang SF, Yudkowsky BK, Davis JC. Medicaid participation by private and safety net pediatricians, 1993 and 2000. *Pediatrics*. Aug 2003;112(2):368-372.
65. Bureau of Primary Health Care. Health Disparities Collaborative. Available at: <http://www.healthdisparities.net/hdc/html/home.aspx>. Accessed October 14, 2005.
66. Wagner EH, Glasgow RE, Davis C, et al. Quality improvement in chronic illness care: a collaborative approach. *Jt Comm J Qual Improv*. Feb 2001;27(2):63-80.
67. Mayfield JA, Rith-Najarian SJ, Acton KJ, et al. Assessment of diabetes care by medical record review. The Indian Health Service model. *Diabetes Care*. Aug 1994;17(8):918-923.
68. Peters AL, Davidson MB, Schriger DL, Hasselblad V. A clinical approach for the diagnosis of diabetes mellitus: an analysis using glycosylated hemoglobin levels. Meta-analysis Research Group on the Diagnosis of Diabetes Using Glycated Hemoglobin Levels. *Jama*. Oct 16 1996;276(15):1246-1252.
69. Barker GJ, Williams KB, McCunniff MD, Barker BF. Effectiveness of an Oral and Pharyngeal Cancer Awareness Program for Health Professionals. *J Cancer Educ*. 2001;16:18-23.
70. Chin MH, Cook S, Jin L, et al. Barriers to providing diabetes care in community health centers. *Diabetes Care*. Feb 2001;24(2):268-274.
71. Harwell TS, Casten RJ, Armstrong KA, Dempsey S, Coons HL, Davis M. Results of a domestic violence training program offered to the staff of urban community health centers. Evaluation Committee of the Philadelphia Family Violence Working Group. *Am J Prev Med*. Oct 1998;15(3):235-242.

72. Ngo-Metzger Q, Tran LQ, Sugrue-McElearney E, Levy ER, Williams G, Phillips RS. Hepatitis B Vaccination Among Vietnamese-American Children in a Boston Community Clinic. *Asian American and Pacific Islander Journal of Health*. 2001;9(2):179-187.
73. Zapka J, Goins KV, Pbert L, Ockene JK. Translating Efficacy Research to Effectiveness Studies in Practice: Lessons from Research to Promote Smoking Cessation in Community Health Centers. *Health Promotion Practice*. 2004;5(3):245-255.
74. Ockene J, Ma Y, Zapka J, Pbert L, Valentine Goins K, Stoddard A. Spontaneous cessation of smoking and alcohol use among low-income pregnant women. *Am J Prev Med*. Oct 2002;23(3):150-159.
75. Roetzheim RG, Christman LK, Jacobsen PB, et al. A Randomized Controlled Trial to Increase Cancer Screening Among Attendees of Community Health Centers. *Ann Fam Med*. July/August 2004;2(4):294-300.
76. Sabnis SS, Pomeranz AJ, Amateau MM. The effect of education, feedback, and provider prompts on the rate of missed vaccine opportunities in a community health center. *Clin Pediatr (Phila)*. Mar 2003;42(2):147-151.
77. Shane-McWhorter L, ODerda GM. Providing Diabetes Education and Care to Underserved Patients in a Collaborative Practice at a Utah Community Health Center. *Pharmacotherapy*. 2005;25(1):96-109.
78. Steele AW, Eisert S, Davidson A, et al. Using Computerized Clinical Decision Support for Latent Tuberculosis Infection Screening. *Am J Prev Med*. 2005;28(3):281-284.
79. Walker EA, Wylie-Rosett J, Shamoon H, et al. Program development to prevent complications of diabetes. Assessment of barriers in an urban clinic. *Diabetes Care*. Sep 1995;18(9):1291-1293.
80. Zapka JG, Chasan L, Barth R, Mas E, Costanza ME. Emphasizing screening activities in a community health center: a case study of a breast cancer screening project. *J Ambul Care Manage*. Jan 1992;15(1):38-47.
81. Zapka JG, Harris DR, Hosmer D, Costanza ME, Mas E, Barth R. Effect of a community health center intervention on breast cancer screening among Hispanic American women. *Health Serv Res*. Jun 1993;28(2):223-235.

**Reaction to Paper by Alyna Chien, MD, MS, Amy E. Walters, MPH, Marshall H. Chin, MD, MPH on “The Community Health Center Quality Improvement Research Agenda” by M. Rashad Massoud, MD, MPH**

The paper represents a well balanced overview of quality improvement activities taking place in the community health centers through the HRSA BPHC Health Disparities Collaborative. The research questions identified are interesting and can further our understanding of the issues which can further improvement in the care the community health centers are providing.

The research questions #2 and #4 talk about a “black box” feel to the improvements and “tailoring” of quality improvement interventions to different community health centers. Answers to these questions can be found in the model for improvement used in the Health Disparities Collaborative. The model emphasizes small tests of change, and plotting results in real time to study if these tests have yielded the desired improvements. A “change package” – a high level description of changes which have been shown to yield improvement forms the basis for the testing. Properly applied, this allows the team testing a change to see if a specific idea can be made to work in their context, or not, and therefore potentially remove the black box feel described. Additionally, the model emphasizes testing changes locally as opposed to prescriptive solutions - therefore tailoring the changes to different circumstances is embedded in the process of testing.

Another set of research questions which could be of interest relate to how to spread and sustain the improvements accomplished by the health disparities collaborative. These questions have several components:

1. Spread to other populations of focus within the same health center. Community health centers start testing changes in a certain population. Many times, these populations are in the testing physicians’ practice or one physical location. The shift to other populations has not been straightforward. Study of the factors influencing this spread can yield important information which could help improve the work of the community health centers.
2. Spread to other diseases and conditions. Community health centers which participated in certain collaboratives and made improvements in certain areas have not necessarily made improvements in conditions tackled by collaboratives in which they did not participate. Understanding what it would take for this uptake to happen would be of great importance to improvement in the community health centers.
3. Sustainability of the improvement accomplished. Understanding how we can maintain the improved levels of performance over time, especially in view of personnel and other changes.
4. Sustainability of the effort and continuity of the work which led these improvements. It would be of great value to understand why & how some community health centers have built on their participation in the Health Disparities Collaborative to develop their internal continuous improvement infrastructure and undergo significant transformation as a result of that.

“Reactor” Paper – George Rust, M.D., M.P.H.

Reacting to “The Community Health Center Quality Improvement Research Agenda”, by Alyna Chien MD MS, Amy E. Walters MPH, Marshall H. Chin MD MPH

This paper provided an excellent review of the existing body of literature generated by quality improvement research in Community Health Center settings. It also lays out a series of questions related to the future of this research. In this reactor paper, I will comment briefly on the body of research described, but focus more on three dimensions in which our CHC-based research must grow if it is to have an impact on the elimination of racial-ethnic, geographic, and socioeconomically driven health disparities among the populations that CHCs serve.

The article by Drs. Chien, Walters, and Chin documents a tremendous amount of quality improvement research which has already been done and which is achieving meaningful results in under-resourced, primary care settings that serve high-disparity populations. In many respects this offers encouragement that the world of community and migrant health centers can follow the path established in the last decade by the Veterans Health Administration, which transformed its image from that of a safety net, bureaucratically-encumbered health care organization to being a customer-responsive health care delivery system on the cutting edge of quality improvement. Community and migrant health centers have the potential not only to move along this path, but to establish their own path of being leaders in the nation for the elimination of racial and ethnic health disparities, even as they continue to promote excellence in primary care for all the populations they serve.

In order to move further in this agenda, there are three additional areas in which we must advance:

1. **Make a Difference and Prove It!**

We must be hard on ourselves in developing rigorous study designs to document and prove the results that we are achieving, even as we continue to cultivate the partnership between front-line clinicians, community participants, and academic researchers. In other words we must all work together to make a difference, but we must also work together to prove it in a scientifically-rigorous, evidence-based way. Although complicated to manage, we have demonstrated in our own work that it is possible to conduct a rigorously designed, group randomized controlled trial of a quality improvement intervention across many states in community health center settings. Our recently published study in the *Journal of Asthma* was titled "Translation-Squared", and focused on providing training, practice tools and templates, and also patient education resources to the community health centers which were committed to improving care and outcomes for their asthma patients. Centers were chosen randomly even before they committed to participation in the project, in order to make sure that were not selecting only the most highly motivated centers. Improvements in quality of care were modest, but real and methodologically rigorous. From this experience we now will be better able to design and improve the interventions in the future, as well as to measure outcomes beyond the clinic walls.

2. **Move from Quality Improvement within Clinic to Community-Wide Health Outcomes**

Our research must also grow beyond traditional quality assurance and quality improvement models, to a vision of improving population based health outcomes. There are two practical

dimensions to this paradigm shift. First, we must move away from quality improvement that focuses only on one disease at the time. Instead we must focus on persons rather than diseases, in the context of families and communities. At a practical level, most of our patients with one chronic disease have multiple co-morbidities. Mental health needs abound. Health outcomes for the average client can only be improved if healthy behaviors and chronic disease management are coordinated in a way that meets the needs of the individual person in the context of their personal realities.

A second application of moving to population health outcomes as the focus of CHC-based research is that we must focus not only on process improvements within the walls of the clinical practice or the community health center, but focus on health outcomes for the entire population we serve in each community. This means that we must be willing to tie our interventions within the community health center to outcomes experienced by uninsured and Medicaid clients within the zip codes and counties that define the CHC catchment area. Surely community health centers make a difference in impacting the rate of primary care sensitive emergency room visits among the uninsured, but have we proven it? And if we design an intervention to improve asthma care and outcomes for a safety net CHC population, should we not see reductions in ED visits and hospital admissions for uninsured and Medicaid children living within the zip codes served by the health center?

### **3. Rapidly-Cycle Change Interventions and Outcomes Measurement:**

We must also move in our research from academic cycle time to private-sector rapid-change cycle time. For example, our typical NIH grant involves a pre-grant planning and development phase, followed by a grant award, a pre-intervention phase, an implementation / intervention phase, and an evaluation / analysis phase. This results in a cycle time of three to five years to design and implement and evaluate one intervention. In our work with private sector disease management companies, we receive a minimum of biweekly or monthly data feeds which provide moment to moment feedback on the effectiveness of our interventions. There are also significant financial incentives for modifying interventions rapidly in order to achieve the optimal outcomes. In the words of the management wizard Tom Peters, we no longer have time for Ready-Aim-Fire, but instead our model must become Fire-Aim, Fire-Aim, Fire-Aim. . . . His advice in a rapidly changing environment is that by the third cycle of changing the intervention we will be much closer to hitting our target than we were on the first cycle, and meanwhile the environment will be changing sufficiently to force us to re-adjust our aim anyway. If we are to eliminate racial and ethnic health disparities, and achieve consistently excellent quality of care and optimal health outcomes for our CHC populations, then it will take rapid-cycling of measurement, intervention, re-measurement, re-designed interventions, etc. These feedback loops can not be “tacked-on” (QA audits, disease registries, etc.), but must be built into the systems and processes of care at every level.

If we build on our current successes in quality improvement in underserved settings, and grow in these new dimensions of population-health outcomes management and rapid-cycle change models, then we can indeed change the world. And with rigorous study design, we can even prove it!

# Community Health Centers Link Quality Improvement and Research

Reaction to the paper by Chien, Walters and Chin

Kurt C. Stange, MD, PhD

This wonderful paper<sup>1</sup> links a brief historical overview with a rigorous synopsis of Community Health Center (CHC) quality improvement research. It then goes beyond to suggest important questions for further CHC quality improvement research. The paper shows how quality improvement work, which is locally useful, can be used to generate new knowledge that is transportable beyond the local setting.

Implementers of a recent call for transformative change in primary care<sup>2</sup> are working to blur the distinction between quality improvement and research. Quality improvement (QI) has become part of the bread and butter of CHCs. Research is on the ascendancy in CHCs, but on most busy days probably feels like just one more thing on a never ending "to do" list. But what if QI and research were almost the same thing? What if the local knowledge and wisdom generated on the front lines of caring for patients and communities were systematically captured, interpreted by the participants, and interactively disseminated?

The distinction between QI and research is subtle. QI involves local efforts to understand and to use this understanding to improve care. To become research, QI work must be put into the context of what already is known in the area. It must include methodological thoroughness and larger perspective to advance knowledge beyond the local setting. It must provide additional human participant protections.

Quality improvement in CHCs, as encapsulated by Chien and colleagues, involves understanding current practice, making efforts to improve that practice, and assessing the effect on process and outcome. The approaches used vary with the unique character of the local sites, and Chien et al caution us to not draw too many general conclusions. Their top ten research questions dance between local and transportable knowledge. This tension reflects a unique opportunity of QI research in CHCs: to generate new knowledge from the front lines of a fragmented, dysfunctional and inequitable health care system - knowledge that is both difficult to transport and yet immediately applicable because it is so context dependent and relevant.

Fortunately, there are models to follow for this important work. They are:

- Community-Oriented Primary Care<sup>3-5</sup>
- Community-Based Participatory Research<sup>6,7</sup>
- Practice-Based Research Networks<sup>8,9</sup>
- Mixed method approaches that integrate quantitative and qualitative methods<sup>10-12</sup>

These models link practice and public health, bring together the perspectives of healers and communities, and combine numbers and narratives to provide understanding of phenomena and context. The challenges for this work in the current environment are considerable, but so are the opportunities.<sup>13</sup>

We should consider how we can act on the top ten questions raised by Chien and colleagues. We should engage our partners in asking and answering more questions that tap into the wisdom of CHC workers and the individuals and communities they serve. The resulting knowledge will improve care on the front lines of a dysfunctional health care system, and will inform efforts to transform that system.

1. Chien A, Walters AE, Chin MH. The community health center quality improvement research agenda. Paper presented at: Health Centers and the Medically Underserved: Building a Research Agenda; December 2, 2005, 2005; Rockville, MD.
2. Future of Family Medicine Project Leadership Committee. The Future of Family Medicine: a collaborative project of the family medicine community. *Ann Fam Med*. 2004;2:S3-S32.
3. Nutting PA. *Community-Oriented Primary Care: From Principals to Practice*. Washington, DC: U.S. Government Printing Office; 1987. DHHS Publication No. HRS-A-PE 86-1 (Now available from the University of New Mexico Press).
4. Mullan F, Epstein L. Community-oriented primary care: new relevance in a changing world. *Am J Public Health*. 2002;92(11):1748-1755.
5. Williams RL. Motherhood, apple pie, and COPC. *Ann Fam Med*. 2004;2(2):100-102.
6. Macaulay AC, Comanda LE, Freeman WL, et al. Participatory research maximises community and lay involvement. *BMJ*. 1999;319:774-778.
7. Minkler M. Using participatory action research to build healthy communities. *Public Health Rep*. 2000;115:191-197.
8. Thomas P, Griffiths F, Kai J, O'Dwyer A. Networks for research in primary health care. *BMJ*. 2001;322:588-590.
9. Nutting PA, Beasley JW, Werner JJ. Practice-based research networks answer primary care questions. *JAMA*. 1999;281:686-688.
10. Stange KC, Miller WL, Crabtree BF, O'Connor PJ, Zyzanski SJ. Multimethod research: approaches for integrating qualitative and quantitative methods. *J Gen Intern Med*. 1994;9:278-282.
11. Crabtree BF, Miller WL, eds. *Doing Qualitative Research*. Thousand Oaks: Sage; 1999.
12. Borkan JM. Mixed methods studies: a foundation for primary care research. *Ann Fam Med*. 2004;2(1):4-6.
13. Nutting PA, Stange KC, eds. *Contemporary Challenges for Practice-Based Research Networks*. 3 (suppl 1): *Ann Fam Med*; 2005.

**The Context for Community Health Center Quality Improvement**  
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Many of us who work in community health centers choose to do so because it provides the opportunity to incorporate core beliefs and passion for social justice in our professional lives; quality improvement and providing high quality care are advocacy on behalf of the underserved. The authors propose a series of research questions for a community health center improvement research agenda and in this context quality improvement that is advocacy on behalf of the underserved requires special attention as well as evidence based answers to:

- 1. What are the best models of quality improvement ?*
- 2. How can we increase the chances that QI interventions will be successfully implemented?*
- 3. What is the best way to sustain QI activities?*

The legacy of the community health center movement compels to us look at the research agenda for improvement in a much broader context. The authors acknowledge the Institute of Medicine's vision for health care as detailed in the 2001 publication of "Crossing the Quality Chasm". Community health centers have long embraced the concepts of providing effective, efficient, safe, patient centered care in a timely and equitable fashion. The research agenda for community health center improvement must support the pursuit of this vision on behalf of the communities we serve.

The authors also cite the important role of the community health center as an economic engine and social force within the community. This provides an important framework for the way in which the community health center improvement research agenda should respond to the three questions posed by the model for improvement:

*What are we trying to accomplish?*

*How will we know that change is an improvement?*

*What change can we make that will result in improvement?*

In particular, the measures by which we will know that change is an improvement must include those that look at the entire community and not just the practice itself.

Community health centers have the word "community" in their title and our *raison d'être* is to improve the quality of life in the communities we serve as well as the quality of care for the patients who receive care in our clinics.