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The Costs of Participating in a Diabetes Quality Improvement Collaborative: Variation Among Five Clinics

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Article-at-a-Glance

Background—Quality improvement collaboratives (QICs) support rapid testing and implementation of interventions through the collective experience of participating organizations to improve care quality and reduce costs. Although QICs have been societally cost-effective in improving the care of chronic diseases, they may not be adopted by outpatient clinics if their costs are high. Diabetes QICs warrant reexamination as secular trends in the quality of diabetes care, new care guidelines for diabetes, and evolving strategies for quality improvement may have altered implementation costs.

Methods—The costs over the first four years—from June 2009 through May 2013—of an ongoing diabetes QIC were characterized by activities and over time. The QIC, linking six clinics on Chicago's South Side, tailored interventions to minority populations and built community partnerships. Costs were calculated from clinic surveys regarding activities, labor, and purchases.

Results—Data were obtained from five of the six participating clinics. Cost/diabetic patient/year ranged across clinic sites from \$6 (largest clinic) to \$68 (smallest clinic). Clinics spent 62%–88% of their total QIC costs on labor. The cost/diabetic patient/year changed over time from Year 1

(range across clinics, \$5–\$51), Year 2 (\$11–\$84), Year 3 (\$4–\$57), to Year 4 (\$4–\$80), with costs peaking at Year 2 for all clinics except Clinic 4, where costs peaked at Year 4.

Discussion—Cost experiences of QICs in clinics were diverse over time and setting. High per-patient costs may stem from small clinic size, a sicker patient population, and variation in personnel type used. Cost decreases over time may represent increasing organizational learning and efficiency. Sharing resources may have achieved additional cost savings. This practical information can help administrators and policy makers predict, manage, and support costs of QICs as payers increasingly seek high-value health care.

As American policy makers seek ways to improve quality of care and population health at lower costs,^{1–3} the quality improvement collaborative (QIC) has emerged as one popular approach to catalyze such change. QICs bring together multiple health care organizations to improve their care services, allowing organizations to use the collective experience of the group to more rapidly implement local quality improvement (QI) interventions. QICs have improved the care of such chronic conditions as diabetes, asthma, and heart failure.^{4,5} QICs have also been found to be a societally cost-effective model for large-scale practice change in the outpatient setting.^{6,7} However, attempts to further promote QICs may be hampered by the limited research on the costs of QI from the perspective of the investing organizations. The costs of resources needed to improve care may be so high that individual organizations may choose not to embark on potentially burdensome QI efforts.^{8,9} In addition, the benefit of the investment is often unclear for freestanding outpatient practices; an effort to improve quality of care for a chronic condition may reduce hospitalizations and accrue financial savings that the outpatient practice never sees.

Understanding costs in detail would aid the design and operation of new payment models in health care, such as pay for performance, accountable care organizations, and the patient-centered medical home (PCMH). These increasingly popular mechanisms, supported by the Affordable Care Act¹⁰ and the Center for Medicare and Medicaid Innovation Center,¹¹ may encourage health care organizations to improve quality of care for chronic conditions through such means as QICs.

QICs in outpatient settings have a wide range of implementation costs across individual health centers, different collaboratives, and different diseases.^{5,12–16} For diabetes, the direct costs of improvement, including labor, materials, and additional overhead, were \$541 per diabetic patient per year in a 2003 collaborative in the United States⁷ and €11 (then equivalent to \$15) per diabetic patient per year in a 2005 Dutch collaborative.⁶ The range of costs across the individual health centers in a collaborative in the United States was \$6 to \$22 per patient per year, divided across the total patient population.¹³ However, there are numerous reasons to believe that the direct costs of improvement have since changed. National trend data indicate that the baseline quality of diabetes care has improved¹⁷; therefore, continuing QI efforts may lead to increased marginal implementation costs per unit improvement as the target population of patients with poorly controlled diabetes shrinks.¹⁸ In contrast, the availability of electronic health records (EHRs) may reduce the cost of data collection required for such QI activities as coordinating care and tracking patient outcomes.¹⁹ In addition, new clinical recommendations regarding individualized

glycemic control, prevention of hypoglycemia, and first-line pharmaceutical agents²⁰ may all change the clinical costs of diabetes care through changes in visit frequency and laboratory testing.

In this article, we describe the costs of implementing an ongoing diabetes QIC, which includes the delivery system redesign and information support associated with traditional QICs, as well as emphases on patient self-management, provider training, and community partnerships. The QIC also employed elements of the National Quality Strategy to improve minority health and reduce health disparities.²¹ The collaborative has been linked to reductions in hemoglobin A1C among patients enrolled in culturally tailored diabetes classes,²² improvements in the perceived ability to change patient behavior among providers,²³ an increase in awareness of healthy lifestyles among community members,²³ and the establishment of partnerships between clinics and community organizations.^{24,25} Preliminary data also suggest clinicwide improvement in diabetes-related outcomes and processes, including increased likelihood that patients receive an influenza vaccination, have a hemoglobin A1C < 8%, have a low-density lipoprotein (LDL) < 100 mg/dL, and have a blood pressure < 130/80 mm Hg.²⁶ As part of this paper, we describe the QI initiatives taking place at each clinic, exemplifying the multifactorial approaches of this collaborative. We also catalog the financial implications to each participating clinic over time. To better characterize each clinic's experiences and clarify how health centers chose to allocate resources, we detail costs by activity and personnel type. The clinics span federally qualified health centers, an academic primary care group, and an academic endocrinology clinic, which demonstrate a variety of previous QI experiences, implementation methods, and payment models.

Methods

Overview

We conducted a descriptive analysis of the activities and costs associated with a diabetes QIC at five clinics on the South Side of Chicago. The costs are detailed longitudinally over the first four years of the collaborative, from June 2009 through May 2013. We report per-patient costs of implementing the collaborative at each clinic site over time. We also report total costs, the number of staff involved, the amount of staff time involved, and cost breakdowns by personnel type and by activity type to further characterize the QIC at each clinic site.

QI intervention

The collaborative, which has previously been described in detail,^{23–25} was based on a well-known model for organizational QI²⁷ and the Chronic Care Model.²⁸ Furthermore, the collaborative tailored interventions to African Americans, the primary demographic group on the South Side, as well as Latinos.

Each clinic created a QI team, consisting of physicians, nurse practitioners, clinical support staff, administrative staff, and/or clinic leadership. One clinic staff member was appointed as a team leader responsible for overseeing local QI efforts. Quarterly in-person half-day

meetings with members of the QI team from each clinic enabled participants to engage in cooperative learning and share local experiences. The teams received QI training, which included the Plan-Do-Study-Act methodology, from project coaches.

A research project team, which included physicians [including M.E.P., M.H.C.] and project management staff, supported the collaborative and served as project coaches. The team collected data to track the progress of patient and practice measures, offered technical support to clinics, and organized the collaborative learning sessions.

Support

Each clinic was originally allocated \$20,000 per year for participation in a five-year diabetes QIC. The clinics were then designated to receive an additional \$20,000 per year for study Year 2 through Year 4, when the project received another source of funding, for a total of \$40,000 per year. Clinics were permitted to use funding for personnel time and direct costs associated with diabetes QI efforts. Clinics were not permitted to use funding for salary support toward usual-care duties.

Data Sources

Cost estimates were calculated from surveys completed and reviewed by team leaders and staff, consistent with prior methods of cost data collection.^{6,12–15} Surveys were tailored to each site's activities on the basis of research team field notes, meeting attendance records, and minutes from collaborative meetings. The survey collected information about the staff members involved in the collaborative, the positions of these staff members, the time each staff member spent on specific collaborative-related activities, and the purchase of any equipment or contracted services. Additional information about equipment and services purchased was obtained from budget justification forms completed biannually by each clinic site. We estimated salaries on the basis of national averages by occupation, similar to another evaluation that also estimated salaries using such criteria as occupation and government service level.¹² Use of standard salaries across clinics also served to minimize salary differences as a factor contributing to overall cost differences. Occupation-specific salaries were obtained from the May 2012 Bureau of Labor Statistics National Industry-Specific Occupational Employment and Wage Estimates for Outpatient Care Centers.²⁹

Data Analysis

Perspective—The costs of the QIC and constituent activities were calculated from the perspective of each individual clinic. We included all clinic staff time dedicated to QIC activities, whether or not it was paid time, to determine the true value of the QIC. We excluded clinic staff time toward data collection conducted for the research team, as well as all research team time.

Calculating QI costs—Costs were calculated using survey data. Cost of staff time was calculated for each staff member by multiplying hours spent on the QIC by the hourly wage rate. We included all time devoted by QI team members to the collaborative meetings and the implementation of QI interventions. We included both paid and unpaid time to best reflect the entire resource burden associated with the QIC and because most staff members

earned a fixed salary regardless of hours worked. We did not include any changes in provider behavior that were affected by any QI interventions (for example, a provider taking time to refer a patient to a new patient-directed QIC initiative), as these became regular costs of delivering care rather than costs of implementing the collaborative. All per-patient costs were calculated by dividing total costs by the number of diabetic patients at each site, as this is the population the QIC targeted.

Assigning Costs to Resource Type—We categorized costs as labor and nonlabor. The labor costs included the cost of QI team time that went toward the activities associated with the collaborative (as described by activity type below). The nonlabor costs included all purchases associated with local QI efforts. Nonlabor costs did not include any changes in clinical resources used (for example, laboratory testing).

Assigning Costs to Activity Type—We assigned QI team hours and costs to the following seven types of activities:

1. Patient-directed interventions (including planning and implementing QI interventions involving patients)
2. Provider training (including attending training sessions, attending conferences, conference fees, and travel cost)
3. Delivery system redesign (such as care coordination outside clinical encounters, changes to referrals systems, and other system redesign)
4. Community engagement (including activities available to the public and activities building relationships with community organizations)
5. Collaborative meetings (including planning and attending meetings)
6. Internal QI meetings (including planning and attending meetings)
7. Information support (such as work related to electronic medical records, information technology, and data gathering)

We placed all other activities in an “Other” category.

Assigning Costs to Activity Type—We categorized the time and the associated costs of each staff member by personnel type. Personnel type was based on the titles and/or positions provided for each staff member in the cost survey. Categories included physicians (including physicians with additional administrative responsibilities, such as medical directors); all nursing staff (including nurse practitioners, registered nurses, and licensed practical nurses); educators, Certified Diabetes Educators (CDEs), and nutritionists; social workers and case managers; nonmanagerial administrative staff; and managers. All staff who occupied both clinical and administrative roles were categorized by their clinical roles.

Results

Clinic Characteristics

Data were obtained from five of six clinics participating in the QIC. Clinic 1 is an academic primary care clinic, Clinic 2 is an academic endocrinology clinic, and Clinics 3, 4, and 5 are federally qualified health centers. Clinics 4 and 5 are both part of the same large citywide network of community health clinics. All clinics are diverse in terms of patient volume, patient demographics, and payer mix (Table 1, page 21). Clinic 1 is by far the largest clinic, with more patients annually than all other clinics combined. All of the clinics have large African American populations, with Clinic 3 also having a large Latino population. Both Clinic 1 and Clinic 2 had fewer Medicaid and uninsured patients, and more private pay patients, than the other three sites. Administrative and leadership changes in the sixth clinic prevented participation in this cost study.

QI Collaborative Activities

Leaders and QI team members from all sites attended the 17 quarterly collaborative meetings required in the time frame under study. Activities reported by all clinics in the four-year period included internal QI meetings to plan and coordinate local QIC efforts, self-management classes tailored to African American patients, and care coordination to improve patient follow-up. Examples of activities occurring at only certain sites included tracking referrals to endocrinologists and EHR enhancements specific to diabetes care. Examples of community-based activities, which occurred off site but engaged clinic staff, included developing a program about diabetes care for a local television program and running grocery store tours for patients with diabetes. Activities varied in scope and the amount of resources they required. The average number of discrete QIC activities at each clinic over time changed from 4–8 activities in Year 1 to 6–13 in Year 2, 4–12 in Year 3, and 6–13 in Year 4.

Costs of implementation

Table 2 (page 22) lists the annual costs of implementing the QIC at each clinic averaged over the four-year period, the cost per diabetes patient per year, and key characteristics that clarify the effort invested in the QIC. The average annual costs ranged from \$15,000 to \$39,000 across clinics. The costs/diabetes patient/year ranged from \$6 to \$68 across clinics. The range of the numbers of staff members involved during the collaborative was 9 to 15 individuals, and the range of average staff time/week was 7 to 10 hours/week. The primary resource in the collaborative was labor, which accounted for an average of 62%–88% of the clinics' total QIC costs.

Figure 1 (above) shows the costs per patient per year at each clinic during the four-year period. Over time, the costs changed between each year—Year 1 (range across clinics, \$5–\$51), Year 2 (\$11–\$84), Year 3 (\$4–\$57), and Year 4 (\$4–\$80)—of the QIC. Costs peaked at Year 2 for all clinics, except Clinic 4, where costs peaked at Year 4.

Figure 2 (page 22) and Figure 3 (page 23) show cost breakdowns relating to activity and personnel type, respectively. In terms of QIC activity type, the breakdown of resource allocation averaged over the four years included patient-directed interventions (range across

clinics, \$0.55–\$22.52 per patient per year), provider training (\$0–\$8.11), delivery system redesign (\$0–\$2.36), community engagement (\$0.20–\$3.08), collaborative meetings (\$0.88–\$5.06), internal QI meetings (\$0.67–\$12.01), information support (\$0–\$10.30), and other activities (\$0.37–\$6.87). At most clinics, other activities included general administrative duties related to the QIC that could not otherwise be attributed to specific other QI initiatives. In terms of personnel type, the breakdown of labor costs included physicians (range across clinics, \$0.56–\$5.42), nursing (\$2.23–\$6.03), educators/CDEs/nutritionists (\$0–\$33.35), social workers/case managers (\$0–\$0.47), nonmanagerial administrative staff (\$0.33–\$6.69), and managerial administrative staff (\$0–\$5.12). These costs corresponded to the following hours per week, averaging hours worked by all individuals in each personnel type, and rounding to the nearest quarter hour: physicians (range across clinics, < 0.25 hour/week–2 hours/week), nursing (0.5 hours/week–4.5 hours/week), educators/CDEs/nutritionists (0 hours/week–4.25 hours/week), social workers/case managers (0 hours/week–0.25 hours/week), nonmanagerial administrative staff (0.25 hours/week–2.25 hours/week), and managerial administrative staff (0 hours/week–0.5 hours/week). Of note, in Clinics 1 and 2, physicians and nursing time comprised a greater proportion of total staff time on the collaborative, while in Clinics 4 and 5, educators/CDEs/nutritionists and administrative staff comprised a greater proportion.

Discussion

The cost experiences of QICs in the five clinics were diverse over time and setting. We described an ongoing QIC with clinics experiencing a wide range of costs, from \$6 to \$68 per diabetic patient per year. The differences in cost across clinics may be attributed primarily to differences in the kinds of QI interventions undertaken, the number of interventions pursued, the type of personnel used, and the labor time required. These differences arose despite the standard approach to QI across clinics, including the same amount of grant funding, technical assistance, and information sharing. Although we cannot identify which factors were most predictive of QIC costs, we hypothesize some associations. For example, per-patient costs were inversely related to clinic size, such that the clinic with the lowest annual per-patient costs had the largest diabetic patient population, while the clinic with the highest per-patient costs had the smallest diabetic patient population. This may stem from the relatively fixed nature of QIC costs, as demonstrated by the significant proportion of time devoted to up-front planning and regular meetings; therefore, QICs may be scalable for large clinics, though expensive per-patient for smaller clinics. In addition, patient-level characteristics, such as race/ethnicity and insurance status, may have influenced costs. The clinics with the highest per-patient costs had high proportions of minority patients. The higher costs of QI for these clinics may reflect the fact that those clinics were providing care for an African American population, with its higher risk of having diabetes and, among those patients with diabetes, a higher likelihood of poor glycemic control and downstream complications.^{2,30} The clinics with higher per-patient costs also had higher proportions of uninsured patients. Multiple studies have shown that uninsured patients earn lower incomes, self-report poorer health, and use fewer preventive services for diabetes complications.^{31–33} Improving the quality of care for these patients may thus require more resources and expense than for insured patients. Finally, although labor time comprised the

vast majority of costs, the breakdown of personnel type was strikingly different across clinics. Notably, the clinics using the most physician and nursing time had higher total costs but the lowest per-patient costs, suggesting that clinics may expect low per-patient costs with appropriate allocation of provider time and other expensive labor resources.

One important trend over time involves the peaking of costs at Year 2 of the collaborative for four of the five clinics. Previous descriptions of QICs also showed that costs were higher in earlier years of collaboratives, as clinics prepare and design QI projects.¹² In this QIC, the early phases were also characterized by multiple different QI interventions, while clinics pursued fewer projects over time. Another explanation for the downtrend in costs involves the idea of “learning” organizations, in which it takes significant time, and in turn financial investment, to build the organizational capacity that allows for rapid and efficient implementation of QI later.³⁴

One difference between this QIC and QICs previously analyzed involves the incorporation of several recommended strategies to improve minority health and reduce disparities, aims that were recently integrated into the National Quality Strategy and may influence the cost structure of QICs.²¹ First, this QIC primarily targeted African Americans, a population with high costs of care² and poorer diabetes-related outcomes, as stated earlier.³⁰ Second, we targeted a specific geographic region. Whereas most previous published QIC cost analyses involved clinics across several states or regions, this QIC targeted one city area, the South Side of Chicago. Third, the QIC created partnerships between health care and community organizations.^{35,36} These strategies affected the time line and composition of costs and benefits to clinics in several ways. Focusing on a specific geographic location meant that clinics spent little to no money on travel expenses. The proximity also facilitated partnerships among the clinics, as well as partnerships with surrounding community organizations, as described in other articles about this collaborative.^{24,25} By encouraging clinics to build partnerships with established community organizations, QI initiatives may be more sustainable,^{24,37,38} giving clinics a larger payoff over the long term for their initial investment. Future work should clarify the association between strategic community partnerships and sustainability, and its impact on cost.

Although these data provide new insights on the variation in costs among clinics participating in an ongoing QIC, the study has several limitations. Our study reflects the QIC experiences of five clinics in Chicago, thus limiting generalizability. In addition, it is difficult to compare these cost figures to those in other studies, given a lack of standardization in data collection methods across studies. Clinics should consider how the particular context of their organization (for example, local market conditions, past experience with QI, availability of volunteer/unpaid resources) would affect their own QIC cost experience. This study permits us to generate ideas regarding contributors to QIC costs, but the small sample size limits our ability to conduct robust statistical analyses. Furthermore, one of the six clinics in the collaborative did not participate in the cost data collection process, so our sample selected for clinics with less turnover in leadership and more consistently engaged staff.

In addition, we found that only one clinic (Clinic 2) of the five reported spending more than the allotted grant funding, which contrasts with previous case studies.¹³ Recall bias may have contributed to these findings, as our cost calculations were based on self-reported time associated with specific activities; respondents may have only reported activities on which they spent substantial time and effort. For example, the QIC support team provided training and materials for certain specific interventions to all clinic sites; however, only certain clinic sites listed these interventions as activities occurring at their sites. Another explanation for the relatively low costs is the use of standard salary data, which may underestimate true salaries.

Nonetheless, our study clarifies the ongoing cost structure of implementing a QIC in an outpatient center. Providing details regarding activities and personnel involved allows for meaningful interpretation of these costs. The information is valuable as payers increasingly seek high-value health care³ and as outpatient care centers change to meet these expectations. Unpacking these costs is also important in light of new financing models in the health care system, many of which are stimulated by the Affordable Care Act.¹⁰ Examples of these new models, which continue to expand, include the PCMH model, which sometimes pays a per-member per-month fee to clinics that meet PCMH certification; Centers for Medicare & Medicaid Services billing codes for complex disease management that allow centers to bill for certain QI activities under traditional fee-for-service; and shared savings programs through accountable care organizations that reward centers if the total cost of their patient panels is below a target amount.³⁹ These new financial models typically require clinics to meet quality standards, which may incentivize clinics to pursue QI efforts such as QICs. QIC implementation costs must be considered in light of these potential sources of financial gain.

Ultimately, our description of costs over time for individual clinics enables policy makers to design the next generation of such incentives, to better encourage outpatient QI. Our description also provides realistic expectations for administrators at a variety of health centers undertaking such QI initiatives, which can inform the implementation and management costs of QI.

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References

1. US Department of Health and Human Services. [Accessed Nov 30, 2015] 2011 Report to Congress: National Strategy for Quality Improvement in Health Care. Mar. 2011 <http://www.ahrq.gov/workingforquality/nqs/nqs2011annlrpt.htm>

2. Council of Economic Advisors. 2013 Economic Report of the President. Washington, DC: United States Government Printing Office; 2013. Reducing costs and improving the quality of health care; p. 161-183. http://www.whitehouse.gov/sites/default/files/docs/erp2013/ERP2013_Chapter_5.pdf [Accessed Nov 30, 2015]
3. Berwick DM, Nolan TW, Whittington J. The triple aim: Care, health, and cost. *Health Aff (Millwood)*. 2008; 27:759–769. [PubMed: 18474969]
4. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. *JAMA*. 2002 Oct 9;288:1775–1779. [PubMed: 12365965]
5. Schouten LM, et al. Evidence for the impact of quality improvement collaboratives: Systematic review. *BMJ*. 2008 Jun 28;336:1491–1494. [PubMed: 18577559]
6. Schouten LM, et al. Cost-effectiveness of a quality improvement collaborative focusing on patients with diabetes. *Med Care*. 2010; 48:884–891. [PubMed: 20808258]
7. Huang ES, et al. The cost-effectiveness of improving diabetes care in U.S. federally qualified community health centers. *Health Serv Res*. 2007; 42:2174–2193. [PubMed: 17995559]
8. Bailit M, Dyer MB. Beyond bankable dollars: Establishing a business case for improving health care. *Issue Brief (Commonw Fund)*. 2004; 754:1–12. [PubMed: 15346603]
9. Leatherman S, et al. The business case for quality: Case studies and an analysis. *Health Aff (Millwood)*. 2003; 22(2):17–30. [PubMed: 12674405]
10. GovTrack. [Accessed Nov 30, 2015] H.R. 3590 (111th): Patient Protection and Affordable Care Act. Public Law 111–148. Mar 23. 2010 <http://www.govtrack.us/congress/bills/111/hr3590>
11. Howell BL, Conway PH, Rajkumar R. Guiding principles for Center for Medicare & Medicaid Innovation model evaluations. *JAMA*. 2015 Jun 16;313:2317–2318. [PubMed: 25893889]
12. Liu CF, et al. Organizational cost of quality improvement for depression care. *Health Serv Res*. 2009; 44:225–244. [PubMed: 19146566]
13. Huang ES, et al. The cost consequences of improving diabetes care: The community health center experience. *Jt Comm J Qual Patient Saf*. 2008; 34:138–146. [PubMed: 18419043]
14. Culler SD, et al. Cost estimates for operating a primary care practice facilitation program. *Ann Fam Med*. 2013; 11:207–211. [PubMed: 23690319]
15. Fremont AM, et al. An HIV collaborative in the VHA: Do advanced HIT and one-day sessions change the collaborative experience? *Jt Comm J Qual Patient Saf*. 2006; 32:324–336. [PubMed: 16776387]
16. Chin MH. Quality improvement implementation and disparities: The case of the health disparities collaboratives. *Med Care*. 2010; 48:668–675. [PubMed: 20613665]
17. Ali MK, et al. Achievement of goals in U.S. diabetes care, 1999–2010. *N Engl J Med*. 2013 Apr 25;368:1613–1624. [PubMed: 23614587]
18. Gandjour A, Lauterbach KW. When is it worth introducing a quality improvement program? A mathematical model. *Med Decis Making*. 2003; 23:518–525. [PubMed: 14672112]
19. Hsiao CJ, et al. Office-based physicians are responding to incentives and assistance by adopting and using electronic health records. *Health Aff (Millwood)*. 2013; 32:1470–1477. [PubMed: 23840050]
20. Inzucchi SE, et al. Management of hyperglycemia in type 2 diabetes: A patient-centered approach: Position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*. 2012; 35:1364–1379. [PubMed: 22517736]
21. Cartwright-Smith L, Rosenbaum S, Mehta D. Disparities reduction and minority health improvement under the ACA. *LegalNotes*. 2011 Mar; 3(1):1–6. <http://www.rwjf.org/en/library/research/2011/03/disparities-reduction-and-minority-health-improvement-under-the-.html>.
22. Peek ME, et al. Culturally tailoring patient education and communication skills training to empower African-Americans with diabetes. *Transl Behav Med*. 2012; 2:296–308. [PubMed: 24073128]
23. Peek ME, et al. Putting theory into practice: A case study of diabetes-related behavior change interventions on Chicago's South Side. *Health Promot Pract*. 2014; 15:40S–50S. [PubMed: 25359248]

24. Chin MH, et al. Expanding and sustaining integrated health care-community efforts to reduce diabetes disparities. *Health Promot Pract*. 2014; 15:29S–39S. [PubMed: 25359247]
25. Peek ME, et al. Early lessons from an initiative on Chicago's South Side to reduce disparities in diabetes care and outcomes. *Health Aff (Millwood)*. 2012; 31:177–186. [PubMed: 22232108]
26. Peek, ME., et al. AcademyHealth. [Accessed Nov 20, 2015] Integrating Multi-Level Interventions to Improve Diabetes Care and Outcomes. AcademyHealth 2014 Annual Research Meeting Poster Presentations, A, #280. <http://www.academyhealth.org/files/ARM/photos/2014%20ARM%20Posters2.pdf>
27. Institute for Healthcare Improvement (IHI). The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. Boston: IHI; 2003.
28. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q*. 1996; 74:511–544. [PubMed: 8941260]
29. Bureau of Labor Statistics. [Accessed Nov 30, 2015] National Industry-Specific Occupational Employment and Wage Estimates. NAICS 621400 - Outpatient Care Centers. May. 2012 Updated: Jan 6, 2014 http://www.bls.gov/oes/2012/may/naics4_621400.htm
30. Agency for Healthcare Research and Quality (AHRQ). 2011 National Healthcare Disparities Report. Rockville, MD: AHRQ; 2012. AHRQ Pub no 12-0006
31. Ayanian JZ, et al. Unmet health needs of uninsured adults in the United States. *JAMA*. 2000 Oct 25;284:2061–2069. [PubMed: 11042754]
32. Nelson KM, et al. The association between health insurance coverage and diabetes care; data from the 2000 Behavioral Risk Factor Surveillance System. *Health Serv Res*. 2005; 40:361–372. [PubMed: 15762896]
33. Hadley J. Sicker and poorer—The consequences of being uninsured: A review of the research on the relationship between health insurance, medical care use, health, work, and income. *Med Care Res Rev*. 2003; 60:3S–75S. [PubMed: 12800687]
34. Ferlie EB, Shortell SM. Improving the quality of health care in the United Kingdom and the United States: A framework for change. *Millbank Q*. 2001; 79:281–315.
35. US Department of Health and Human Services. [Accessed Nov 30, 2015] 2013 Annual Progress Report to Congress: National Strategy for Quality Improvement in Health Care. Jul. 2013 <http://www.ahrq.gov/workingforquality/nqs/nqs2013annlrpt.htm>
36. US Department of Health and Human Services (HHS). A Nation Free of Disparities in Health and Health Care: HHS Action Plan to Reduce Racial and Ethnic Health Disparities. Washington, DC: HHS; 2011. http://minorityhealth.hhs.gov/npa/files/Plans/HHS/HHS_Plan_complete.pdf [Accessed Nov 30, 2015]
37. Bray P, et al. After the collaborative is over: What sustains quality improvement initiatives in primary care practices? *Jt Comm J Qual Patient Saf*. 2009; 35:502–508. [PubMed: 19886089]
38. Edwards JC, et al. Sustainability of partnership projects: A conceptual framework and checklist. *Jt Comm J Qual Patient Saf*. 2007; 33(12 Suppl):37–47. [PubMed: 18277638]
39. Edwards ST, et al. Structuring payment to medical homes after the Affordable Care Act. *J Gen Intern Med*. 2014; 29:1410–1413. [PubMed: 24687292]

Quality Improvement Collaborative (QIC) Costs per Patient Over Time, Across Clinics

Figure 1. Over time, the costs changed between each year—Year 1 (range across clinics, \$5–\$51), Year 2 (\$11–\$84), Year 3 (\$4–\$57), and Year 4 (\$4–\$80)— of the QIC. Costs peaked at Year 2 for all clinics, except Clinic 4, where costs peaked at Year 4.

Quality Improvement Collaborative (QIC) Costs per Patient per Year, by Activity Type and Across Clinics

Figure 2.

In terms of QIC activity type, the breakdown of resource allocation averaged over the four years included patient-directed interventions (range across clinics, \$0.55–\$22.52 per patient per year), provider training (\$0–\$8.11), delivery system redesign (\$0–\$2.36), community engagement (\$0.20–\$3.08), collaborative meetings (\$0.88–\$5.06), internal QI (quality improvement) meetings (\$0.67–\$12.01), information support (\$0–\$10.30), and other activities (\$0.37–\$6.87).

Quality Improvement Collaborative Costs per Patient per Year, by Personnel Type and Across Clinics

Figure 3.

The breakdown of labor costs included physicians (range across clinics, \$0.56–\$5.42), nursing (\$2.23–\$6.03), educators/CDEs/nutritionists (\$0–\$33.35), social workers/case managers (\$0–\$0.47), nonmanagerial administrative staff (\$0.33–\$6.69), and managerial administrative staff (\$0–\$5.12).

Table 1

Clinic Characteristics

	Clinic 1	Clinic 2	Clinic 3	Clinic 4	Clinic 5
Annual Patient Volume					
Total patients	19,052	6,817	6,310	3,440	2,468
Total encounters	62,690	15,575	20,444	11,133	7,095
Diabetes patients	3,549	2,107	690	364	218
Diabetes encounters	9,601	5,479	1,795	825	541
Patient Characteristics					
Mean age (years)	56	55	42	39	37
Female (%)	67	71	72	76	73
African American (%)	52	37	34	89	91
Patient Insurance Status					
Medicaid (%)	10	8	50	60	59
Medicare (%)	36	27	5	11	9
Private insurance (%)	54	55	8	12	12
Uninsured (%)	< 1	< 1	37	16	20

Table 2

Quality Improvement Collaborative Costs and Characteristics by Clinic

	Clinic 1	Clinic 2	Clinic 3	Clinic 4	Clinic 5
Annual cost (\$)	21,354	39,119	18,775	16,761	14,799
Annual labor costs (\$)	18,732	24,300	12,212	12,092	10,962
Annual nonlabor costs (\$)	2,622	14,819	6,563	4,669	3,837
Total costs/diabetes patient/year (\$)	6	19	27	46	68
Total number of staff members involved	11	15	9	13	11
Staff time/week (hours)	7	10	7	8	7