Diabetes Education

Quality Improvement Interventions Through Health Departments

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Background: As the burden of diabetes continues to overwhelm the public health system, there is increased demand on local health departments (LHDs) to improve public health services. Quality improvement (QI) techniques have been shown to be an effective means to improve the delivery of services by LHDs.

Purpose: To evaluate the extent to which the adoption of organizational QI strategies influences the delivery and outreach of diabetes self-management education (DSME) services provided by LHDs.

Methods: A change facilitation model that included QI team development and on-site QI training and facilitation was delivered to six LHDs that provide DSME, during 2010–2011. After training, each LHD developed and implemented a QI project to improve the outreach and delivery of DSME services. Pre- and post-intervention surveys were administered to evaluate the extent of change in DSME outreach and delivery. Data were analyzed in 2011.

Results: The number of individuals who completed an entire course of DSME increased by >100%, and 14% more diabetics attended DSME on a monthly basis. Half of LHDs reported receiving increased numbers of referrals per month, and 15% more healthcare providers referred diabetic patients to the LHD for DSME.

Conclusions: Participation in Community Outreach and Change for Diabetes Management (COACH 4DM) led to improvements in the LHD QI infrastructure, and in the outreach and delivery of services to diabetic patients. The techniques used during COACH 4DM are applicable to a wide variety of contexts and may be an effective tool to improve the delivery of other clinical and community preventive services.

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Background

The Commonwealth of Kentucky is suffering from staggering levels of diabetes: 11.4% of Kentuckians have been diagnosed with diabetes (ranked 4th nationally), and diabetes is the seventh-leading cause of death in the state.[1] Diabetes is also a major threat to the financial well-being of Kentucky; the estimated cost associated with diabetes in Kentucky in 2006 was more than $2 billion.[2] The overwhelming burden of diabetes necessitates that local health departments (LHDs) improve the delivery of public health services that will decrease the prevalence of diabetes and improve health outcomes.

Evidence suggests that quality improvement (QI) techniques may be an effective means to improve the delivery of services by local health departments (LHDs).[3] Although much time and money have been invested in attempts to promote the use of QI techniques in public health, much work needs to be done. In fact, evidence suggests a decline in the use of QI techniques by LHDs between 2005 and 2008, and a general lack of familiarity with the elements of QI and basic QI tools, even among those engaged in QI activities.[4,5] Innovative strategies for incorporating QI training and application in LHDs may be necessary to help LHDs improve the delivery of services they provide to protect population health.

Public health practice-based research networks (PBRNs) may provide an effective venue through which to deliver QI training. Given the often heavy demands on most LHDs

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to provide services to their communities with a minimum of resources, PBRNs may be a natural partner in QI training activities, as they may have access to assets that can complement the pre-existing capacity of LHDs. They also have the ability to evaluate the effectiveness of QI training and techniques in a real-world setting and to tailor interventions to meet departmental needs. The purpose of this study is to evaluate the extent to which the adoption of organizational QI strategies influences the delivery and outreach of DSME services provided by LHDs.

The morbidity and mortality related to diabetes is particularly disturbing because, if properly managed, many adverse complications of diabetes and prediabetes, and thus much of their cost, can be controlled.[6] DSME has been shown to improve glycemic control in people with diabetes, which results in decreased risk of diabetic retinopathy, nephropathy, and neuropathy.[7–9] A systematic review of DSME conducted by the Task Force on Community Preventive Services found that DSME can be an effective public health system–level intervention to improve glycemic control in adults,[10,11] suggesting that DSME may be an important tool in attempts to improve outcomes related to diabetes. However, for many reasons, patients with diabetes often do not receive self-management education about their disease.

Methods

Study Settings

Study sites included six of Kentucky's 56 LHDs that, like the rest of the state, consist of a mix of single-county (2) and district (4) departments that largely served rural areas. The study departments were chosen in 2006 by the Kentucky Department for Public Health (KDPH) as Diabetes Centers of Excellence, which, through support from the Kentucky Diabetes Prevention and Control Program (KDPCP), provide education and support to individuals with diabetes. The KDPCP provides DSME training and curriculum, modeled on the American Diabetes Association (ADA) Clinical Practice Recommendations, to each LHD that provides DSME.

The participating LHDs are all members of the Kentucky Public Health Research Network (KPHReN), a public health PBRN. KPHReN members include 17 LHDs (including single-county, district, and independent departments) and are in close partnership with the KDPH, Kentucky Public Health Association, and the University of Kentucky Center for Clinical and Translational Sciences (CCTS). The six health departments participating in this study serve 34 Kentucky counties (approximately 23% of the state's population) and vary greatly in population served, poverty rates, and methods for delivering DSME services to their communities. This study was approved by IRBs at the University of Kentucky and the Kentucky Cabinet for Health and Family Services.

Study Design

This is a quasi-experimental pre-test/post-test intervention study to examine the impact of a QI training and facilitation model provided to LHD staff on the outreach and delivery of DSME services. The intervention in this study is an evidence-informed systems approach to QI that includes the use of Change Facilitation as a model to promote improvements in DSME services provided to communities by an LHD. Core components of the model include (1) QI team development; (2) on-site QI training; and (3) facilitation in the design, development, and implementation of a specific QI project. The model used in this study has been previously described in brief by the study investigators.[12]

For this study, each site designated a QI team of four to six members. One team member was designated as the QI Champion and served as the QI team leader. Change facilitators are research study coordinators employed by the University of Kentucky CCTS. Each facilitator had previous training in QI principles and practice, clinical and health-services research methods, and previous experience in community-based participatory research through the Kentucky Ambulatory Network (a primary care PBRN). Facilitators provided in-person QI training and facilitation to QI teams at each LHD site. Facilitators also received two 2-hour Community Outreach and Change for Diabetes Management (COACH 4DM) project-specific training sessions led by the study investigators.

Facilitators conducted a monthly half-day QI learning session for 3 consecutive months at each LHD. The three facilitation sessions occurred between September and December 2010. Each team member received a QI manual with information on the following topics: team building; goal setting; aim statements; practice assessment; brainstorming techniques; plan–do–study–act (PDSA); root cause analysis; cause and effect (fishbone) diagramming; process (flow) mapping; and logic models. Each team member also received a copy of *Embracing Quality in Public Health: Michigan's Quality Improvement Guidebook*. Facilitators put specific focus on the PDSA technique during the training sessions and tailored the facilitation sessions to meet the specific needs of each LHD.

Facilitators also used applied learning by aiding each QI team in developing and implementing a 9–12-month QI project specific to their community that was intended to improve the delivery of DSME services. Facilitators encouraged the development of cycles of small positive changes as vehicles to attain larger, sustainable changes following a PDSA framework. They provided support through telephone and e-mail communications with the QI Champion as needed throughout the 9–12-month implementation period for the QI projects. Each participating LHD received $3000 for participation in the study.

Data Collection and Analysis

Pre- and post-intervention surveys were administered to the Centers of Excellence director or QI Champion at each participating site. Pre-intervention surveys were administered prior to the first facilitation session (September 2010), and post-intervention surveys were administered after completion of each LHD QI project (August–September 2011). The surveys looked at eight DSME outreach and service-delivery variables: the number of people attending DSME classes per month, the number completing a series of DSME, the number of referring healthcare providers, the number of referrals received per month, the locations where DSME services were provided, the timing and availability of DSME services, the frequency of

DSME, and the content of DSME classes. The pre-intervention survey determined existing levels of these variables, and the post-intervention survey asked about changes in these variables and also included questions regarding change in the outreach or delivery of DSME services provided.

Pre-intervention and post-intervention surveys were analyzed using SPSS, version 19.0. Descriptive statistics were conducted. Additionally, questionnaires were administered to all participating QI team members after completion of the QI projects. These questionnaires asked the participants to list the most and least helpful components of COACH 4DM, and any additional QI activities initiated by the LHD during or after participating in COACH 4DM. Data were analyzed in 2011.

Results

The QI projects implemented by the LHDs focused on two major themes: increasing community outreach to patients and providers (three projects) and improving internal operations related to the delivery of DSME services (three projects). Motivations for the projects were diverse. For example, one of the projects that focused on internal operations was targeted toward process improvement relative to departmental operations with a private Medicaid managed care provider. Two of the six QI teams reported creating QI projects that would help satisfy the standards and measures contained in the voluntary national accreditation program overseen by the Public Health Accreditation Board. The projects used innovative methods of reaching target populations. For example, one site began sending personalized invitations to friends and acquaintances of DSME clients who also had diabetes.

The QI projects led to changes in the delivery of DSME services to the community in response to data gathered on patient needs and preferences. Prior to the intervention, LHDs primarily offered services in the LHD, hospitals, and physicians' offices, with a few classes delivered in community centers and faith-based organizations. After the intervention, 50% of the participating LHDs reported increasing outreach by offering classes in additional community gathering places, such as libraries, gas stations, and convenience marts. This is in keeping with the conclusion from the Task Force on Community Preventive Services that DSME is an effective intervention when delivered to adults with diabetes in community gathering places, specifically locations other than home, clinic, school, or worksite, and follows recommendations from the *Guide to Community Preventive Services*.[10] Participants also reported changing the frequency, duration, and timing of DSME classes. For example, one LHD began offering night classes; another increased session length but decreased session frequency.

The changes brought about by the projects seemed to have a notable impact on a number of the DSME-related variables examined. Table 1 displays the average number of individuals participating in DSME classes per month, the number of individuals that completed an entire course of DSME training, and the number of healthcare providers who referred patients to the LHD for DSME per month. An increase of 14% was observed in the average number of individuals participating in DSME classes per month. A more than 100% increase was observed in the average number of individuals completing a full course of DSME training. An increase of almost 15% post-intervention was observed in the average number of providers referring per month. A seasonal pattern in participation was observed, with significant decreases in attendance during the winter months. Attendance post-intervention was higher, even in the winter months (Figure 1).

Study participants reported that certain aspects of COACH 4DM were quite effective in helping them to develop and implement a QI project, and others less helpful. Development of a QI team, and the project facilitation sessions, were ranked as being the most helpful aspects of COACH 4DM by the majority of respondents (seven each). Regular contact with a facilitator was ranked as being the least helpful aspect of the project by the majority of respondents (eight).

Discussion

The QI projects developed and supported during COACH 4DM led to improvements in DSME service-delivery outcomes. Although notable gains were seen in the number of patients receiving DSME, the number of patients completing an entire series of DSME classes increased by more than 100%. This is particularly notable because diabetes self-management requires comprehensive education. Patients who receive any amount of DSME can benefit, but those who complete an entire training series will be more knowledgeable and better equipped to care for their disease. In fact, evidence suggests that sustained improvement in glycemic effects

Table 1. Participation of individuals in DSME training and number of referring providers, mean *n*

	Pre-intervention	Post-intervention
Participating in DSME classes/month	28	32
Completing entire DSME training course	71	149
Healthcare providers referring patients for DSME/month	22.5	26

DSME, diabetes self-management education

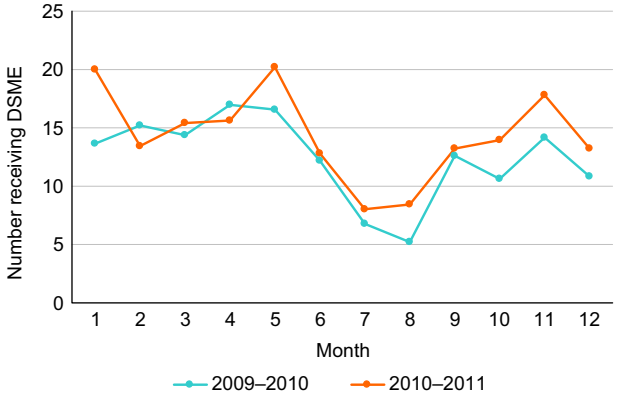

Figure 1. Number of people receiving DSME from local health departments, before and after quality improvement facilitation, 2009–2011
DSME, diabetes self-management education

may require longer self-management educational interventions.[7] As a result, DSME may be more effective after participants complete the full array of classes offered.

The QI projects in this study also resulted in an increased network of referring healthcare providers. Because of the overwhelming burden of chronic disease, healthcare providers may have less time to devote to prevention education, such as DSME. Providing DSME through the LHD can ease the burden on physicians and other healthcare providers, and provide a more comprehensive series of educational opportunities for diabetic patients. In addition, this may strengthen ties between the LHDs and other public health system partners, and as a result lay the groundwork for increased referrals for other health conditions not related to diabetes, leading to a stronger public health system.

Accessibility is a major concern related to the provision of clinical public health services to populations. The *Guide to Community Preventive Services* concludes that offering DSME at community gathering places is an effective way to improve health outcomes related to diabetes. This suggests that LHDs may wish to increase the accessibility of the preventive services they offer to their communities. The QI training provided in the COACH 4DM project led to substantial, patient-focused changes that increased the accessibility of DSME services. Further research should be done to determine if the techniques used in the COACH 4DM project are effective in increasing patient accessibility to other public health programs.

Sustainability is also a major concern when implementing activities intended to improve LHD operations. If the QI activities initiated during COACH 4DM are abandoned after the project is completed, they may be of little long-term benefit to the department or the population it serves. These results indicate that the QI training and projects implemented during COACH 4DM may be sustainable.

While participants reported that the initial training and formation of the QI teams was quite useful, prolonged contact with the change facilitators appeared to be of little use. The teams, once formed and trained, were able to function effectively with little support. This suggests that the QI teams may continue to work to facilitate change in their agencies. Five of the six QI teams formed reported that their department had undertaken additional QI activities since participating in COACH 4DM, further evidence of the potential sustainability of the project. The initial investment necessary to provide QI training through a project like COACH 4DM may yield long-term benefits.

The heterogeneity of LHDs may pose major challenges to attempts to provide training for quality improvement. Like the LHDs in many states, the LHDs involved in this project all operate in a unique local context that substantially affects the services they deliver. Some serve single counties, whereas others serve districts; some are primarily rural, and others contain urban areas. These differences can pose difficulties in providing QI training that is relevant in a number of contexts. The change facilitation model provided through the COACH 4DM project seemed to be applicable to a wide variety of departmental contexts: the LHDs got basic training in QI, but were also provided with the support to adapt it to a number of innovative projects tailored to the unique needs of their communities. This suggests that the QI training and facilitation techniques used in COACH 4DM may be effective methods to incorporate QI across a wide variety of departmental contexts.

Limitations

This project, like all research, had some limitations. A relatively small number (six) of LHDs were involved in the project. It is important to note, however, that this small number of LHDs served a large portion of the state: 34 counties, and almost one quarter of the population of Kentucky. This research involved LHDs from only one state and LHDs that may be predisposed to being relatively high performers with regard to DSME (since they were designated as Centers of Excellence), so these results may not be generalizable. Future research should be conducted to determine if similar improvements are found in LHDs in other states, and without the infrastructure found in the Centers of Excellence.

Another limitation in the study design is that no control groups were matched with the LHDs receiving the intervention. Although this would have been optimal, the researchers were advised that denying treatment to certain populations (in this case, the population served

by a control department) involved in the study would be controversial. Resources were not available to implement a project using another design, such as a cross-over design.

In addition, the project focused on process-related outcomes. Future research should include health-related outcome measures to confirm the effectiveness of the study protocol on improving patient outcomes. This project used self-reported data and is susceptible to the biases inherent in self-reporting, and the survey used to obtain the data was not validated. However, in spite of these limitations, the results and conclusions of this study provide important insight about ways to improve the delivery of public health services and foster a QI culture in LHDs.

Conclusion

The ultimate responsibility of local health departments is to protect and promote the health of the populations they serve. COACH 4DM was intended to provide the departments involved with a framework from which they can continue to improve the services they provide and improve the health of the populations they serve. It led to substantial improvements in the QI infrastructure of the departments involved in the project. They were able to assemble a QI team that, after training, helped effect positive changes in LHD outreach and practice activities, and resulted in improved service delivery and patient care. More patients were trained to care for their diabetes, and will likely experience improved health outcomes as a result.

The COACH 4DM project demonstrates the suitability of the PBRN model for conducting research in an LHD setting. COACH 4DM was able to mobilize the volume of resources available to a PBRN, such as the in-kind use of change facilitators, and combine it with a relatively small incentive package ($3000 per LHD) to improve service delivery and lay the groundwork for systems-level change. Researchers interested in engaging practice partners in projects may wish to consider how to best array the full range of assets available to them. Although COACH 4DM was targeted toward a specific condition, the techniques used during COACH 4DM are applicable to a wide variety of contexts and likely could be used to improve the delivery of other clinical and community preventive services.

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