

Improved Cardiovascular Risk Factors Control Associated with a Large-Scale Population Management Program Among Diabetes Patients

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ABSTRACT

BACKGROUND: Optimal cardiovascular risk factors control among individuals with diabetes remains a challenge. We evaluated changes in glucose, lipid, and blood pressure control among diabetes patients after implementation of a large-scale population management program, known as Preventing Heart Attacks and Strokes Everyday, at Kaiser Permanente Northern California (KPNC), during 2004-2013.

METHODS: We used National Committee for Quality Assurance Healthcare Effectiveness Data and Information Set cut points to identify prevalence of poor glycemic (hemoglobin A1c > 9%) control, good lipid control (low-density lipoprotein cholesterol < 100 mg/dL), and good blood pressure control (blood pressure < 140/90 mm Hg) in each year (N range = 97,879-22,118 over the entire period). We assessed trends in risk factor control based on Joinpoint regression and average annual percentage change (AAPC) compared with published National Committee for Quality Assurance Healthcare Effectiveness Data and Information Set commercial rates.

RESULTS: We found that the prevalence of poor glycemic control (hemoglobin A1c > 9%) declined in both KPNC and nationally, but was statistically significant only in KPNC (AAPC = -4.8; $P < .05$). The prevalence of good lipid control (low-density lipoprotein cholesterol < 100 mg/dL) increased significantly in KPNC (47% to 71%; AAPC = +4.3; $P < .05$), but there was no significant improvement nationally (40% to 44%; AAPC = +1.4; $P = .2$). The prevalence of blood pressure control (<140/90 mm Hg) was higher in KPNC (77% to 82%; AAPC = +1.1; $P < .05$) versus nationally (57% to 62%; AAPC = +1.9; $P < .05$) during the reported years 2007-2013.

CONCLUSIONS: Relative to national benchmarks, a substantially greater improvement in risk factor control among adults with diabetes was observed after implementation of a comprehensive population management program.

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INTRODUCTION

Between 1990 and 2010, the number of adults reporting a diagnosis of diabetes more than tripled, from 6.5 million to 20.7 million.¹ Optimal risk factor control among individuals with diabetes, a population at high risk for atherosclerotic cardiovascular disease, is considered the cornerstone for contemporary clinical practice.²⁻⁴ However, it has proven challenging to achieve risk factor control in practice.⁵ Although protocol-driven risk factor reduction may provide an

effective means for risk factor control, a significant proportion of patients with diabetes fail to achieve prespecified targets for major modifiable cardiovascular risk factors in clinical trials,⁶ and risk factor control has been even less effective in usual care settings.⁷ In 2004, Kaiser Permanente Northern California (KPNC), an integrated healthcare delivery system, launched the Preventing Heart Attacks and Strokes Everyday (PHASE) program. A major focus of this population management program was to consistently deliver evidence-based preventive therapies for controlling blood glucose, low-density lipoprotein cholesterol (LDL-C), and blood pressure among patients with diabetes.⁸ Previously it has been reported that implementation of a large-scale hypertension control program was associated with a significant improvement in blood pressure control among adults diagnosed with hypertension in KPNC compared with national rates.⁹ However, trends in multiple risk factor control after initiation of this population-based risk factor management program for individuals with diabetes have not been reported.

METHODS

We estimated prevalence and temporal trends in quality measures of hemoglobin A1c (HbA1c), LDL-C, and blood pressure (BP) control, as reported to the National Committee for Quality Assurance (NCQA), after the implementation of the PHASE program among individuals with diabetes in KPNC. We contrasted these results with prevalence of control from US National Healthcare Effectiveness Data and Information Set (HEDIS) commercial data for individuals with diabetes during the same period; HEDIS is used by more than 90% of America's health plans to measure performance on important dimensions of care and service.¹⁰

The KPNC PHASE quality improvement program included 4 major components. First, KPNC established a diabetes registry¹¹ to identify potentially eligible individuals with diabetes for cardiac risk reduction activities. The registry was updated quarterly using outpatient diagnostic codes, pharmacy data, and hospitalization records from health plan databases, and diagnoses were verified through chart review audits of random samples of identified members. Similar to the NCQA Healthcare Effectiveness Data and Information Set (HEDIS) specifications, patients were not included on the basis of elevated HbA1c measurements alone, but rather a combination of inpatient diagnoses of diabetes, outpatient diagnoses of diabetes, and diabetes medication prescriptions.

Second, KPNC reported annual prevalence of hypertension, LDL-C, and HbA1c control to the NCQA in accordance with HEDIS specifications.¹⁰ The NCQA HEDIS definition for good blood pressure control was determined using the blood pressure reading from the most recent outpatient clinic measurement recorded during the measurement year. In KPNC, typical practice included blood pressure measurement by automated sphygmomanometers operated by trained medical assistants, with repeat measurements performed as needed by physicians using aneroid sphygmomanometers, and has been previously described.⁹ The NCQA HEDIS quality goal performance for LDL-C < 100 mg/dL and HbA1c > 9% was determined using the most recent laboratory values obtained in the measurement year; individuals without an LDL-C or HbA1c measurement in the reporting period were considered to have an LDL-C ≥ 100 mg/dL or HbA1c ≥ 8% and therefore not controlled.

More frequent internal cardiovascular risk factor control reports were developed for quality improvement use every 1 to 3 months for each KPNC medical center and distributed to the center directors. During the study period a central management team identified centers that demonstrated successful practices and disseminated effective strategies to the other medical centers.

Third, a comprehensive and simplified evidence-based cardiovascular risk factor control algorithm for step therapy was developed in 2004 to aid clinicians (**Figure 1**). The treatment algorithm combined the recommendations of 4 different guidelines (Coronary Artery Disease Guideline, Diabetes Guideline, Cholesterol Guideline, and Hypertension Guideline) and presented summary recommendations for patients in a single simplified format, referred to as "PHASE on a Page." The guidelines and treatment algorithm were updated every 2 years or more frequently according to emerging clinical trial evidence and national guidelines. Clinicians were encouraged to follow the algorithm unless clinical discretion required otherwise. Dissemination of guidelines and the treatment algorithm occurred through distribution of printed documents, e-mail, clinical tools (eg, pocket cards), videoconferences, lectures, partnering with pharmacy managers, and use of the electronic medical record (EMR) decision support tools.

Fourth, medical centers used nurse and pharmacist care managers, working under system-wide designed and locally endorsed treatment protocols with referral from and under the supervision of primary care physicians, to identify, contact, educate, engage, treat, and follow eligible patients with diabetes whose cardiovascular risk factors could be managed

CLINICAL SIGNIFICANCE

- Relative to national benchmarks, a substantially greater improvement in risk factors control among adults with diabetes was observed after implementation of a population management program, using an evidence-based treatment protocol, performance metrics, and diabetes care managers, in an integrated health care system.
- A population management program to control cardiovascular risk factors in people with diabetes may be an effective and potentially scalable model, transportable to other health care systems.

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