Effect of a primary care intervention to reduce cardiovascular risk

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Abstract

Introduction: most primary care practices have not developed a systematic approach to estimating cardiovascular disease risk.

Objective: To evaluate the effect of the intervention on 10-year PREC risk for high-risk patients.

Methods: A stepwise cluster randomized trial was conducted to evaluate the effect of the intervention on the risk of PREC for individuals with ≥10 % risk.

Results: the mean 10-year PREC risk score among high-risk patients was 23.4% (SD ± 12.6%).

Conclusions: In conclusion, a substantial reduction was observed in the 10-year PREC risk score from baseline to follow-up.

Keywords: cardiovascular disease, primary care, risk, intervention source: DeCS

Resumen

Introducción: la mayoría de las prácticas de atención primaria no han desarrollado un enfoque sistemático para calcular el riesgo de enfermedad cardiovascular.

Objetivo: evaluamos el efecto de la intervención sobre el riesgo de PREC a 10 años para pacientes de alto riesgo.

Método: Se realizó un ensayo aleatorizado por conglomerados escalonados para evaluar el efecto de la intervención sobre el riesgo de PREC para individuos con ≥10 % de riesgo.

Resultados: la puntuación media de riesgo de PREC a 10 años entre los pacientes con alto riesgo fue del 23,4 % (DE ± 12,6 %).

Conclusiones: En conclusión, observamos una reducción sustancial en la puntuación de riesgo de PREC a 10 años desde el inicio hasta el seguimiento.

Palabras clave: enfermedad cardiovascular, atención primaria, riesgo, intervención fuente: DeCS

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Introduction

Cardiovascular disease (CVD) remains the leading cause of death worldwide and is particularly devastating in the United States and Latin America, with stroke belt “hot spots” defined by the prevalence and mortality of cerebrovascular disease[1]. However, despite evidence-based guidelines supporting new prescribing algorithms designed to mitigate high risk, primary care physicians’ adoption has been slow. Adding to the problem, implementing CVD risk reduction guidelines has been more challenging in rural areas, contributing to rural-urban disparities[2].

Recently introduced evidence-based guidelines recommend determining the 10-year atherosclerotic cardiovascular disease risk score (PREC) to guide decisions about initiating and intensifying CVD risk-reducing medications. Without using these risk scores, physicians would use isolated cholesterol scores, known vascular disease, or a general clinical gestalt to use these therapies, resulting in relatively underprescribing of available treatments. Examples include risk-based aspirin and statin recommendations published by the US Preventive Services Task Force (PSVTF)[3]. However, most primary care practices have not systematically calculated scores or implemented these guidelines. Calculating the risk score can be a barrier for busy clinicians because many electronic health records (EHRs) have limited capacity to do so. In addition, many EHRs do not generate quality measure performance reports for new measures. These limitations are particularly problematic for small primary care practices that lack RSE programming and financial resources to pay for customized reports designed to improve care using new evidence with strong clinical impact[4].

Improvement targets included newer evidence described by the recent GTSVEU recommendations for aspirin use for primary prevention and the 2013 recommendations for statin therapy. Previous underutilized recommendations, such as smoking cessation counseling and improved hypertension control, have also been applied in dashboards as facilitating targets. This study evaluated the effect of an intervention on 10-year PREC risk for the patient population defined as high risk (≥10 percent) because previous recommendations, based on expert consensus, target this group for medical treatment[5,6].

Method

A stepwise cluster randomized trial was conducted to evaluate the effect of the intervention on 10-year PREC risk for individuals with ≥10 percent risk at baseline. Practice data were collected initially when no practice cohort was exposed to the intervention. Then, at regular successive intervals, a cohort was randomized from control to intervention. The stepwise design provided a rigorous control group that accounted for secular trends while alleviating ethical concerns around withholding an intervention with potential benefit to a large at-risk population. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

Of the primary care practices enrolled in the province of Tungurahua, 47 withdrew before their actual start, and 26 never provided the necessary data for analysis. Therefore, 219 met our analysis criteria. Practices were randomly assigned start dates creating six cohorts. Before the assigned start dates, all practices served as controls and remained as controls until the beginning of their particular phase of intervention. For example, the three cohorts of high-readiness practices received the intervention first, followed by the three low-readiness cohorts. The first cohort began the intervention in January 2018, and each subsequent cohort joined every two months after that. All practices began the intervention in late 2018 and ended on December 31, 2019.

The intervention consisted of educational tools (web-based modules and live webinars), on-site practice facilitation (PF), and a practice-specific cardiovascular population dashboard that included risk stratification and monthly audit and feedback with measure-specific run charts to guide quality improvement. Run charts were provided at the practice and individual physician level and used for comparisons to baseline without specific benchmarking.

They were trained using online modules and a one- to two-month apprenticeship visiting primary care practices with an experienced practice facilitator. All facilitators then participate in monthly calls, a real-time distribution list and biennial face-to-face professional development meetings.

The registry was used to calculate 10-year PREC risk scores and produce practice-specific information that included PREC risk stratification of adult patients aged 40 to 79. The formula used to calculate 10-year PREC risk included age, sex, race, systolic blood pressure, diastolic blood pressure, total cholesterol, HDL cholesterol, history of diabetes, smoking history, and hypertension treatment status. In addition, patient classification and risk scores were linked to checklists of unmet risk reduction treatment opportunities.

Key measures targeted by the intervention included standard measures: hypertension control, aspirin for established cardiovascular disease, and smoking cessation counseling.

The target group for the proactive intervention was patients aged 40 to 79, whose calculated 10-year PREC risk score was ≥10 percent at baseline. As a primary outcome, there was a change in the average 10-year PREC risk score for all patients in participating practices five quarters after the start of the intervention compared with baseline. The change in 10-year PREC risk was calculated as the difference between the first available score before the start of the intervention and the postintervention score determined 15 months after the start of the 1-year intervention. One-sample t-tests were used to assess differences. In addition, linear regressions were performed to identify single and multiple associations between patient and practice-level characteristics and reductions in PREC score. Database and statistical processing of the data were performed and analyzed in SPSS 26 statistical software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

A total of 437 556 patients in 219 practices had a calculated PREC risk of 146 826 scores with a 10-year risk ≥10 percent at baseline. Practices averaged 6.4 providers per site. At baseline, the mean 10-year PREC risk score among high-risk patients was 23.4 percent (SD ± 12.6 percent). After the intervention, the mean score was 17.1 % (SD ± 11.5 %), a mean absolute risk reduction of 6.3 % (95 % CI: 6.3, 6.4). In addition, an absolute risk reduction of 4.0 percent was attributed to the intervention when staggered controls and calendar time were incorporated into the analysis. In the sensitivity analysis that excluded any estimate of the beneficial effect of aspirin, the post-intervention risk score was 17.5 percent (SD ± 11.7 percent), while the absolute benefit attributable to the intervention remained at 4.0 percent using the stepped wedge. Seventy-seven percent of high-risk patients experienced a risk reduction. Table 1 shows the significant results for the combined model.

Table 1. Results of bivariate analysis showing means and overall risk reduction of the 10-year atherosclerotic cardiovascular disease risk score of patients at high risk (≥10 %) at baseline versus three months after the intervention.

Variable	**Mean initial risk score (standard deviation)**	**Post-intervention risk score (95 % confidence interval)**	**Absolute risk reduction (95 % confidence interval)**
n = 146 826			
Total population	23,4 (12,6)	17,1 (11,5)	6.35 (6.29, 6.41)
Age ≥ 65 years	27,4 (13,5)	21,0 (11,9)	6,48 (6,39, 6,56)
Age < 65 years old	17,9 (8,5)	11,7 (8,1)	6.17 (6.09, 6.25)
Male	24,5 (12,9)	18,1 (11,4)	6,48 (6,40, 6,57)
Female	22,3 (12,1)	16,1 (11,4)	6.19 (6.10, 6.29)
metropolitan housing	23,3 (12,4)	16,6 (11,2)	6,69 (6,60, 6,78)
Rural Housing	23,5 (12,7)	17,5 (11,8)	6.03 (5.95, 6.11)

Source: statistical analysis, $P \leq 0.05$. All reductions in risk score within each subgroup are statistically significant ($P < 0.05$).

We decompose the final risk-adjusted scores using the results into variability over time within-subject, between subjects within the same center, and between practices. To examine the amount of variation at each level, i.e., to compare variability over time within-subject, between subjects within the same center, and between practices, we ran the unconditional means model and estimated variance components. From the estimates, 31 % of the total variability in the final adjusted risk score (outcome) was due to differences over time for each subject, 66 % of the total variability was due to differences between subjects in the same practice, and only 3 % of the total variability is due to differences between practices.

Discussion

Adopting important evidence into clinical practice has often been slow, even when interventions demonstrate improved survival in multiple trials. We selected small, rural primary care practices because CVD rates are higher in rural regions and small practices often have fewer resources to implement new evidence, apply population management techniques, and redesign workflows. The study engaged these practices with a practice support intervention that combined FP with population-based informatics tools. This strategy was designed to drive improvement in CVD risk and, in general, accelerate the implementation of new evidence in primary care[7] .

Our intervention combined on-site practice facilitation and informatics support compared to previous efforts that used single interventions to achieve limited improvements. The one-year intervention offered a substantial reduction in the PREC risk score for patients identified as high risk (PREC risk ≥ 10 percent) through the implementation of two new evidence-based measures (risk-based aspirin and statin prescribing) and thereby achieving better adherence to standard blood pressure management parameters. In studies examining computer support alone, the effect on CVD risk reduction through primary prevention has been limited. Karmali et al. recently published a Cochrane review on risk scoring to improve the primary prevention of CVD[8]. Incorporating 41 randomized controlled studies, they demonstrated no statistically significant effect of clinically integrated risk stratification on the prevention of CVD events, although there were slight increases in the prescription of lipid-lowering and blood pressure-lowering medications. In a similar review, Groenhof et al. (2019) evaluated the effects of clinical decision support tools and observed no effect on cardiovascular risk factors or treatment goal attainment[9]. Peiris et al. conducted a randomized cluster trial in 60 Australian primary care practices using a software program integrated into the CSR that provided care points, CVD risk scores, and clinical recommendations[10].

Practice facilitation is a multimodal approach that incorporates various intervention components to address the challenges of implementing evidence-based guidelines in primary care settings. The degree of informatics support available to practice facilitators is often variable. In a meta-analysis evaluating the impact of FP on the adoption of evidence-based guidelines, Baskerville and colleagues noted the effect as“moderately robust” in improving preventive services[11]. In addition, PF has previously been shown to improve diabetes and asthma care[12]. Wang, in a more recent review of PF in chronic disease management, showed generally positive results on cardiovascular measures such as blood pressure control and cholesterol treatment in studies involving fewer than 50 practices[13]. However, others have reported significant barriers to CVD risk reduction. For example, in a recent pragmatic facilitation trial in Canada that focused on improving eight facets of cardiovascular care in 84 primary care practices, the intervention failed to improve adherence to good practice guidelines[14]. In the results, using practice facilitation with access to informatics tools, the absolute reduction in 10-year PREC risk of 4.0 percent would translate to 5800 events over 10 years if the new treatments were sustained over time. This benefit is much more substantial than previous CVD risk interventions using only informatics or practice facilitation tools[15].

The findings suggest that computer-supported FP can effectively promote the implementation of evidence-based guidelines to reduce CVD risk among patients treated in small rural practices and accelerate the dissemination of newer evidence as incorporated in the 2013 AHA-ACC cholesterol guidelines and 2016 aspirin GTSVEU[16].

The sensitivity analysis showed that aspirin use had a minimal effect on the overall risk reduction attributable to our intervention. Although the evidence for aspirin use in primary prevention is less convincing and the risk reduction effect of PREC is less pronounced than that of statins, the GTSVEU has recommended low-dose aspirin to reduce the risk of CVD among patients at increased risk for this disease[17]. The recent completion of three randomized controlled trials addressing the use of low-dose aspirin for primary prevention in older patients has led the AHA and others to recommend a more nuanced and parsimonious approach to the use of low-dose aspirin for primary prevention[18]. The algorithm emphasized the use of aspirin for primary prevention only for patients 40 to 59 years of age with a PREC risk score ≥10 percent. These parameters are consistent with the latter approaches. Thus, risk tools and population strategies remain relevant in the aspirin setting, although the minimal benefit demonstrated through our sensitivity analysis suggests that aspirin for primary prevention of CVD provides only a marginal impact relative to the entire intervention [21].

As with statins, there is strong evidence that blood pressure lowering with medication is effective but underutilized. Although the evidence for blood pressure lowering is older and better established, the availability of risk scores and a clear demarcation of individual treatment opportunities on the dashboard probably added more urgency to intensifying blood pressure treatment for the high-risk group[19,20,22].

Conclusions

In conclusion, there was a substantial reduction in the 10-year PREC risk score from baseline to follow-up. This reduction was large, clinically meaningful, and unlikely due to secular trends or other factors that may have changed practice at the study sites.

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