

Management of cardiovascular risk factors in Venezuela by educating physicians working in primary healthcare services

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Summary. Recent studies in Latin-America corroborated the prevalence of hypertension, elevated plasma cholesterol, metabolic disorders and other cardiovascular risk factors (CVRF) along with lack of disease awareness. Treatment and preventive measures indicated the urgent need for patient and physician education. Limited studies have been conducted to demonstrate the effectiveness of continual professional development (CPD) and its ability to positively improve health care outcomes. A study was done in Venezuela to measure the effectiveness of a blended web-based education in the management of CVRF by primary health care physicians (PCP), working in primary care services. A pilot group of 37 PCP, from the Caracas metropolitan area, completed a 12-week educational intervention consisting of weekly online problem-based sessions on CVRF management and face-to-face workshops on physician and patient behavioral changes, using principles of therapeutic education. A cohort of 303 of their patients with uncontrolled grade I-II arterial hypertension and/or elevated plasma cholesterol were included and followed up for a 6-month period. Significant changes in the cognitive aspects and attitudes about the management of CVRF occurred among the PCP, who were highly satisfied with the content and format of the educational intervention. We also found a positive role in inducing changes in the entire patient cohort, particularly on the plasma lipid profile, blood pressure, and lifestyle changes. Results of this pilot study reflect the effective use of CPD on patient care and PCP interactions in creating synergy and understanding with participating institutions. There is a need of large scale implementation and more extensive comparison with other educational approaches.

Key words. Blended educational intervention. Cardiovascular risk factors. Performance measurement and cognitive improvement. Primary care.

Manejo de factores de riesgo cardiovascular en Venezuela mediante educación de los médicos que trabajan en atención primaria de salud

Resumen. Estudios recientes en América Latina corroboraron la prevalencia de la hipertensión arterial, el colesterol elevado en plasma, los trastornos metabólicos y otros factores de riesgo cardiovascular (FRCV), todo esto sumado a la falta de control de la enfermedad, la escasa adhesión al tratamiento y el uso de pocas medidas preventivas, lo que derivó en la necesidad de educar tanto al médico como al paciente. Se han realizado estudios limitados para demostrar la eficacia del desarrollo profesional continuo y su capacidad de influir positivamente en los indicadores de salud del paciente. En Venezuela se llevó a cabo un estudio para tratar de medir la efectividad de un curso combinado basado en actividades *online* y presenciales sobre el manejo de los FRCV, dirigido a médicos que trabajan en atención primaria. Un grupo piloto de 37 médicos de atención primaria del área metropolitana de Caracas completó una intervención educativa de 12 semanas, la cual consistió en sesiones semanales en línea, utilizando la estrategia educativa basada en problemas sobre el manejo de los FRCV, así como talleres presenciales relacionados con los cambios de comportamiento del médico y del paciente, utilizando los principios de la educación terapéutica. Se trabajó con una cohorte de 303 pacientes con hipertensión arterial de grado I-II no controlada y/o colesterol plasmático elevado, y se llevó a cabo un seguimiento durante seis meses. Los resultados evidenciaron cambios significativos en los médicos respecto a los aspectos cognitivos y al estilo de su práctica profesional en el manejo de los FRCV. Los participantes se mostraron muy satisfechos con el contenido y el formato de la intervención educativa. De igual manera, encontramos un resultado positivo en la inducción de cambios en toda la cohorte de pacientes, sobre todo en el perfil lipídico, la presión arterial y la modificación del estilo de vida. Sería interesante su aplicación a mayor escala para medir su efectividad a largo plazo.

Palabras clave. Atención primaria. Factores de riesgo cardiovascular. Intervención educativa combinada. Medición del rendimiento y mejora cognitiva.

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Introduction

Emerging countries, including those from Latin America [1], are also undergoing an epidemiologic transition to an increased prevalence of non-communicable and cardiovascular diseases (CVD). There are also new dimensions to this alarming situation. Over the past two decades, deaths from CVD have been declining in high-income countries, but have increased at an astonishingly fast rate in low- and middle-income countries. About 80% of cardiovascular and diabetes deaths are expected to occur in the emerging world [2-4]. The needs of their populations demand more focused attention on primary and secondary cardiovascular and diabetes disease prevention and particularly on the proper management of cardiovascular known and neglected CVRF (hypertension, smoking, hypercholesterolemia, diabetes, and sedentary life style among others).

Recent cross-sectional studies conducted among 11,550 subjects, aged 25-64 years, from seven cities across Latin America showed that the overall prevalence of hypertension, elevated plasma cholesterol, diabetes and other CVRF differ widely [5,6], with disease awareness, treatment and control far from desirable, particularly for the above mentioned conditions [7,8], indicating the need for further patient and physician participative education.

There is growing evidence of the effectiveness of continuing medical education (CME) and professional development (CPD) in improving clinical behavior change [9,10]. However, limited measuring studies have been conducted to demonstrate CME effectiveness to positively impact health care outcomes [11,12]. Internal and external factors related to medical practice and the learning environment can easily influence the outcomes of a CME intervention [13] and may account for this paucity of studies, no longer restricted to knowledge gained, but also on consequent changes in physician performance and patient satisfaction. Formal initiatives for the accreditation of educational programs for physician's recertification designed to improve competence, performance or patient outcomes have been recommended [14-16].

The Panamerican Federation of Associations of Medical Schools (PAFAMS, Caracas, Venezuela) is an academic non-governmental organization, whose mission is to improve medical education through institutional accreditation and the maintenance of high quality and professionalism of the graduates of medical schools in Latin America including innovative CME/CPD efforts [17].

PAFAMS was one of the organizers of the Project Globe Consortium for Continuing Professional Development (Project Globe), a non-profit organization of public and private institutions throughout the emerging world to develop pilot educational interventions addressing key morbidities confronting physicians working in primary care services, to serve as the foundation for larger scale experiences. The countries involved in the initial planning phase were Egypt, Colombia, Russia, Turkey, and Venezuela. Government representatives and members of professional associations for family physicians and general practitioners' associations were involved in each country. Surveys on educational needs conducted among a representative sample of primary care physicians showed that additional education in the management of cardiovascular disease risk factors was perceived as a necessary starting action. A web-based, blended educational intervention was created to address such need.

A study in Russia, part of this global effort, involved 30 PCP in the greater Moscow area updated the management of CVRF of 600 patients showed significant reduction in them, concluding that the sequential education of physicians had a favorable impact on the clinical course of patients' markers [18].

In addition, a study on the level of knowledge about CVRF in a community of Valencia, Naguanagua, Venezuela, with a sample of 205 patients, indicated a high frequency of abdominal obesity (67%); overweight-obesity (38%) and hypertension (26%). Almost 60% of respondents claimed to know CVRF, but only 14.7% recognized the factors considered to define the level of knowledge [19].

An unrestricted grant was received from Pfizer Inc. (New York). Pfizer representatives attended the planning meetings in each country as observers. No commercial influence on the curriculum contents or faculty selection was permitted.

Methodology

This is a prospective, open-label, randomized, multicenter study over one year, counting with the approval of the National Center for Bioethics of Venezuela (CENABI). The first task was to develop partnerships with leaders, physicians, medical educators, scholars and institutions in the country, responsible for medical education. Assessment of the educational needs of physicians at the first level of care was done through focus groups and an online survey of general practitioners and family physicians.

The primary objectives were: 1) In terms of education, to measure the effectiveness of the Course (named as IMCARDIO and created as part of this endeavor) to improve physician's competencies in the management of CVRF including the use of behavioral change techniques on their patients, and, 2) Assess the impact on health outcomes in patients under the care of these physicians by evaluating changes in surrogate markers of disease progression, such as lowering patient's blood pressure (to less than 140/90 mmHg) and blood cholesterol (to less than 5 mmol/L or 190 mg/dL) through the appropriate therapeutic interventions.

The intervention took place in four phases.

First phase: the needs assessment

The first identification step consisted in creating awareness by holding informational sessions with professional medical associations, the National Academy of Medicine and the Venezuelan Medical Association. Identified PCPs in Venezuela sum up approximately 9,390 (7,749 registered general practitioners and 1,641 family physicians).

An assessment of the educational needs of primary care physicians was conducted through electronic surveys and focus group.

Criteria of inclusion: practicing PCPs (family physicians and general practitioners); registered with their respective scientific society, and access to internet with a reliable electronic address.

Some 751 PCPs accomplished all criteria. Mails were received at: http://www.globecpd.org/assessment_ES/dumpdata.pl?old=OLD. Those who didn't answer questions properly were eliminated, ending with a total valid sample of 654 PCPs. Basic assumptions: margin of error: 3%; confidence level: 95%; working population: 654 vs the recommended sample size of 442. Composition of the answered surveys: 654; female: 71%; male: 29%; general medicine: 39%; family medicine: 30%; not reported: 31%; time of graduation: 14 ± 8 years.

The needs assessment included PCPs with knowledge and behavioral evaluation, identification of patient cohorts, and organization of data bases.

Second phase: the learning strategy

Based on the assessment the training and educational needs of 73 selected physicians, a course was designed by blending critical reading, literature search, online educational instruction on CVRF, and training on the proper use of the instruments designed to collect the data.

The blended learning strategy used with the technical infrastructure and Learning Management System (LMS) of The Santa Fe de Bogota Foundation (Colombia), through an strategic alliance with its Division of Education, offering the courses and providing record keeping and management service data.

An instructional Course on Management of CVRF was developed, based on the results of the needs assessment, which consisted of three modules:

- *Module I:* overview of the CVRF, providing the knowledge needed for the identification and diagnosis of different syndromes, pathological and lifestyles entities that are considered CVRF.
- *Module II:* clinical management of patients with CVRF, providing the necessary knowledge to properly manage patients and implementation of the goals.
- *Module III:* behavioral changes in patients with CVRF providing the knowledge and strategies needed to develop skills and ability to generate lifestyle modification in them.

Each of these modules offered over the Internet were accompanied by three workshops of four hours each. Total credit: 66 hours.

Third phase: the educational intervention for PCPs

This phase consisted of two major components:

- A weekly problem-based on line session focused on management of CVRF developed in cooperation with Fundación Santa Fe de Bogota (Colombia).
- A series of three face-to-face workshops of four hours each, focused on physician and patient behavior change.

The online component was provided over a twelve week period for a total of sixty-six hours. The curricular content was offered in the above mentioned three modules and three integrated workshops. Enrolled PCPs completed weekly 5.5 hours, asynchronous lessons, followed by mandatory weekly one-hour synchronous on-line tutorials. On-line material was accessed through a dedicated website and the educational tools varied according to the instruction design and included case analysis, short lectures, slide presentations, and clinical exercises. Supportive printed material was provided to the participants as per the course curriculum.

The face-to-face workshops were designed to induce behavioral changes in both patients and physicians, using principles of therapeutic education

[17-19] including the Focus/PDCA model. PDCA is based on the 'deming cycle' as described by Dr. W. Edwards Deming, probably the father of modern quality control, and the ABCs of PDCA was based on Grace Gorenflo and John W. Moran's effective communication techniques to leverage the patient-physician relationship and patient adherence. Coaching and training on effective use of on-line learning resources was also provided.

PCPs were assigned tutors during the 12-week intervention period. Direct and open communication was established between students, faculty and tutors. Patients were recruited and enrolled by the PCP's after the PCP's completed all components of the course.

Fourth phase: assembling components and implementation

PCPs as general practitioners as well as family physicians from Venezuelan Institute of Social Security (IVSS) were selected, who worked in the metropolitan area of Caracas and volunteered for the pilot study were selected.

Of the 73 selected physicians, 37 (50.68%) completed the study. There were several well recognized causes for attrition of doctors, including: migrations to other cities or places, covering locum, retirement and vacations, among other logistical reasons. Each participating physician shared inclusion criteria as having interest in the study, access to computer and internet, enrolled 10 to 15 patients aging between 40 and 75 who consented to participate in the study, with some CVRF including hypertension grade I or II and/or high cholesterol in plasma (> 240 mg/dL) without having yet developed clinically recognized cardiovascular disease. The patient recruitment period began one month before the start of the baseline data collection.

Physician's assessments

Physician's assessments were made following the first three levels of learning evaluation [20]:

- *Perception.* At the completion of the IMCARDIO course, participating physicians were required to complete a course evaluation form for overall satisfaction using visual analog scales and open-ended questions, to provide an opportunity for students to reflect on their learning and the impact on their practice.
- *Knowledge.* Knowledge tests were applied at the baseline, and then every three months during the twelve month study evaluation period.

- *Practice behavior, skills and attitudes.* Practice self-assessment questionnaires were administered to participating PCP's, at the baseline (before taking the IMCARDIO program) and then quarterly for up to twelve months. This assessment's objective was to identify their current practices in CVRF management, challenges they faced and factors contributing to success.

Patients inclusion criteria

Going to the doctor during the selection period, submitting at least one confirmed CVRF (including hypertension and/or hypercholesterolemia), age between 25 to 75 years, ability to follow doctor's instructions, signing the informed consent.

529 patients entered the total study, of which 128 (24.20%) left the study for different reasons (death, migrations or change of physician to another clinic, physician retirement, lack of continuity of attendance, among others), shaped the working sample of 401 patients.

Exclusion criteria

Patients with a prior cardiovascular event, inability to follow the doctor's instructions and patients who did not sign the informed consent.

Patient assessments

Patients attended their regularly scheduled appointments in the clinic and underwent evaluations (baseline and then quarterly for a twelve month period):

- *Clinical evaluations:* including body mass index, sitting blood pressure, abdominal circumference; lifestyle (smoking, alcohol, physical activity, diet, adherence)
- *Laboratory tests:* including total cholesterol and subfractions (LDL, HDL), triglycerides, and fasting plasma glucose.

The variables that were evaluated in this study were:

1. Physician's knowledge.
2. Clinical practice.
3. Satisfaction of participants were assessed through questionnaires and online surveys.
4. Biomarkers of patients collected by the physician at each visit with the selected patient through the record sheet designed for this purpose, which included: cholesterol, blood pressure, triglycerides, smoking, exercise, blood glucose levels, body mass index, abdominal circumference, use

of antihypertensive and lipid-lowering medications adherence.

The variables 1, 2 and 4 were collected at baseline and every three months and variable 3 was evaluated only after the completion of the course, as implemented in this study practice.

A database (Excel) with the above mentioned assessments was prepared and transferred into SAS software (v. 9.1) for statistical analysis. Conventional descriptive statistics was used. Statistical software SPSS v. 17 were used for the analysis of results.

Results

A total of 73 PCPs were initially enrolled and completed IMCARDIO course. Of those who began the program, 37 were able to provide information about the patients enrolled in their clinics during the twelve month period. Of the 529 patients that initially consented to participate in this study, 303 were closely followed. There were 219 female (72%) and 84 male (28%), and average age was 64.3y. The long term follow-up of such patients required overcoming a number of extreme and very challenging logistical problems. The reasons for dropping out of both patients and physicians were already mentioned.

- *Impact upon patient cohort.* The administrative reforms and the reallocation of facilities and physicians within the IVSS system caused disruption in patient care within the system. A cohort of 303 patients was able to be fully evaluated during a 6-month period (baseline, month 3 and 6).
- *Impact upon PCPs.* There is a significant effect of the educational intervention on physicians in the acquisition and reinforcement of knowledge, skills, experience and attitudes to minimize CVRF in their patients. PCPs were highly satisfied with the content and format of the educational intervention.

Table I clearly indicates that knowledge acquisition by PCPs increased during the intervention, they started with an average score of 3.59 and at 6mo the score was 8.96. We found that close to 50% of the sample initiated the project with low to medium knowledge (between 2.5 and 5.5 points) on the management of CVRF. PCPs practice skills acquisition also improved from 3.80 at the beginning to 4.24 at 6mo.

For the determination of changes in CVRF throughout the evaluation period comparison of

means were applied through subsidiaries or paired samples *t*-test applying.

The results showed in table II indicated very significant changes such as the effective and substantial decrease in total cholesterol from 219.71 to 196.94 mg/dL, LDL cholesterol from 136.18 to 116.78 mg/dL, triglycerides from 179.88 to 166.71 mg/dL, and HDL levels increased from 44.89 to 48.17 mg/dL. On the other hand, systolic blood pressure decreased from 140.45 to 131.79 mmHg, diastolic blood pressure from 86.77 to 81.21 mmHg, and BMI from 29.08 to 27.65.

Discussion

This study represents an open evaluation of a blended educational intervention completed by a group of PCPs on the management of CVRF among a cohort of patients attending outpatient clinics in the metropolitan area of Caracas, Venezuela. It was offered during a twelve week period to primary care physician cohort.

The results indicate very significant and positive changes in patient behavior when there is a relevant and effective educational intervention (inductively) in medical and associated primary care centers through the fair application of medication and influence exerted by such personnel to staff patients.

The study demonstrated a positive and successful improvement in physician knowledge and practice, as well as patient cardiovascular risk status as measured by accepted markers of cardiovascular health.

Abnormal lipid levels, smoking habits, hypertension, diabetes, abdominal obesity, psychosocial factors, excessive alcohol intake, unhealthy diet, and sedentary lifestyle account for most of the CV risk of myocardial infarction, in both sexes, and at all ages in all regions of the world [21].

A significant improvement in most measured CVRF, mainly lipids and blood pressure was observed in the overall cohort. Patients also reported changes in the medication prescribed, improved compliance to medication as well as changes in lifestyle (diet, increased physical activity). This outcome correlates with more informed attentive care and follow up provided by the PCPs involved in the study.

Regrettably, beyond any control, relocation of physicians and patients challenged full time evaluation originally included in the study as many of these limiting factors occur in the emerging world. However, the educational intervention proved to be successful in all parameters assessed such as knowl-

Table I. Results of cognitive test and practice self assessment (mean \pm standard error of the mean).

	Basal	Month 3	Month 6
Cognitive testing (max. 10)	3.59 \pm 0.20	8.81 \pm 0.17 $t = -23.40^a$	8.96 \pm 0.22 $t = -16.53^a$
Practice self assessment	3.80 \pm 0.10	4.17 \pm 0.50 $t = -4.98^a$	4.24 \pm 0.27 $t = -4.90^a$

^a Paired *t* test compared to baseline; all *p* values < 0.05.**Table II.** Changes in risk factors during the evaluation period (mean \pm standard error of the mean).

	Basal	Month 3	Month 6
Body mass index	29.08 \pm 0.29	26.95 \pm 0.48 $t = 4.74^a$	27.65 \pm 0.40 $t = 3.19^a$
Total cholesterol (mg/dL)	219.71 \pm 2.94	199.30 \pm 2.84 $t = 6.37^a$	196.94 \pm 3.19 $t = 6.40^a$
LDL-cholesterol (mg/dL)	136.18 \pm 2.83	121.87 \pm 2.61 $t = 4.84^a$	116.78 \pm 3.06 $t = 5.56^a$
HDL-cholesterol (mg/dL)	44.89 \pm 0.98	47.50 \pm 1.10 $t = -2.53^a$	48.17 \pm 0.82 $t = -5.04^a$
Plasma glucose (mg/dL)	103.97 \pm 2.17	104.78 \pm 2.56 $t = -0.42^a$	102.54 \pm 2.35 $t = 1.05^a$
Triglycerides	179.88 \pm 5.52	159 \pm 5.77 $t = 4.06^a$	166.71 \pm 7.00 $t = 1.80^a$
Systolic blood pressure	140.45 \pm 1.24	136.31 \pm 3.74 $t = 1.04^a$	131.79 \pm 1.08 $t = 7.06^a$
Diastolic blood pressure	86.77 \pm 0.74	80.29 \pm 0.61 $t = 9.85^a$	81.21 \pm 0.59 $t = 7.69^a$

^a Paired *t* test compared to baseline; all *p* values < 0.05.

edge gained, satisfaction, and changes in practice. Nevertheless, results are significant and should generate further hypotheses to be tested in comparative studies.

In conclusion, the impressive results for both physicians and patients are encouraging and suggest the need to expand programs of this kind to other chronic illnesses, even the development of a core curriculum for physicians working in primary care services [22].

With further research and a more sharply focused curriculum, this study may offer an alternative model for CPD among PCPs in the emerging world.

Project Globe Consortium in Venezuela in its pilot phase showed that the effective educational intervention induced significant and effective changes in a patient population with a high prevalence of CVRFs, which should sustain its application and expansion.

Although limited published information about educational interventions focused on key measured performance improvement for PCPs from the emerging world is currently available, our experience has shown that this kind of research and interventions can lead to patient care and population health improvements, thus offering an alternative model for CPD among PCP in the emerging world.

There is conclusive evidence that well designed educational intervention induces significant and effective changes in both PCP's and patient population with a high prevalence of CVRF.

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