Research

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A cardiovascular educational intervention for primary care professionals in Spain:

positive impact in a quasi-experimental study

Abstract

Background
Routine general practice data collection can help identify patients at risk of cardiovascular disease.

Aim
To determine whether a training programme for primary care professionals improves the recording of cardiovascular disease risk factors in electronic health records.

Design and setting
A quasi-experimental study without random assignment of professionals. This was an educational intervention study, consisting of an online-classroom 1-year training programme, and carried out in the Valencian community in Spain.

Method
The prevalence rates of recording of cardiovascular factors (recorded every 6 months over a 4-year period) were compared between intervention and control group. Clinical relevance was calculated by absolute risk reduction (ARR), relative risk reduction (RRR), and number of patients needed-to-attend (NNA), to avoid under-recording, with their 95% confidence intervals (CIs). Linear regression models were used for each of the variables.

Results
Of the 941 professionals initially registered, 78.1% completed the programme. The ARR ranged from 1.87% (95% CI = 1.79 to 1.94) in the diagnosis of diabetes to 15.27% (95% CI = 15.14 to 15.40) in the recording of basal blood glucose. The NNA ranged from 7 in blood pressure, cholesterol, and blood glucose recording to 54 in the diagnosis of diabetes. The RRR ranged from 26.7% in the diagnosis of diabetes to 177.1% in the recording of the Systematic Coronary Risk Evaluation (SCORE). The rates of change were greater in the intervention group and the differences were significant for recording of cholesterol (P<0.001), basal blood glucose (P<0.001), smoking (P<0.001), alcohol (P<0.001), microalbuminuria (P = 0.001), abdominal circumference (P<0.001), and SCORE (P<0.001).

Conclusion
The education programme had a beneficial effect at the end of the follow-up that was significant and clinically relevant.

Keywords
cardiovascular diseases; health education; prevention and control; registries.

INTRODUCTION

The volume of new information in the cardiovascular field and the speed at which this appears requires continuous training for physicians to stay up-to-date and make the best clinical decisions.[1] Participation by physicians in training programmes improves their clinical awareness and application of new evidence-based knowledge.[2] The 21st century physician should understand clinical epidemiology, information technology, and healthcare guidelines to minimise uncertainties in the diagnostic and therapeutic processes.[3] In Spain instruments are being integrated in the health services' electronic health records (EHRs) with experience-based postgraduate training programmes, such as the ESCARVAL project.[4]

Application of new technologies in the field of health sciences has resulted in the internet being used by many healthcare professionals and providers of further education to offer the most up-to-date training in decision making. Online education should be based on the guidelines for best clinical practice and provide an alternative that complements traditional training programmes.[5] Internet-based learning is just as useful as face-to-face training and may be very effective at improving clinical practice.[6-10]

The high mortality rate associated with cardiovascular diseases and the high population prevalence of risk factors such as hypertension, smoking, obesity, physical inactivity, dyslipidaemia, and diabetes mellitus[11] are primary topics in all healthcare strategy plans.[12] Consensus agreements recommend establishing strategies to detect and manage risk factors in the earliest stages. This early identification will reduce the likelihood of patients experiencing events, improve the quality of life in society, and reduce social and healthcare expenditure.[1,3,13,14] The detection and diagnosis of risk factors in their very early stages, together with the systematic implantation in clinical practice of preventive activities, are key to achieving a reduction in cardiovascular diseases. This requires training for healthcare professionals in their application. In Spain, preventive activities should undoubtedly be undertaken by primary care teams (nurses and physicians)[1,15] because these are the people closest to the patients and in a 1-year period over 90% of the population

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Submitted: 14 January 2014; **Editor's response:** 1 April 2014; **final acceptance:** 30 May 2014.

How this fits in

It is known that educational strategies for professional development should be continuous and permanent, and that detection and control of risk factors are key to achieving a reduction in cardiovascular diseases. This study demonstrated the efficacy of an educational intervention to improve cardiovascular risk factors screening by primary health professionals.

attend primary care health centres.[12,15]

Measures for the prevention of cardiovascular diseases are often delayed because of the lack of control of the risk factors.[16] In an attempt to improve this situation, a mixed education programme was designed in the Spanish region of Valencia composed of an internet-based course lasting 1 academic year complemented by face-to-face workshops about cardiovascular skills. The aim of this study was to assess the differences in the record rates of cardiovascular indicators in the medical records of patients attending over a period of 48 months, comparing results between those professionals who did the course and those who did not.

This educational activity formed part of the ESCARVAL project,[4] and was combined with cross-sectional research to map cardiovascular risk and longitudinal research to obtain prognostic indicators in patients with cardiovascular risk factors and scales of the risk of cardiovascular events for the population of the Valencian Community.[4]

METHOD

Setting

The Valencian Health Agency is the organism entrusted with public health care in the Valencian community, covering a population of over 5.5 million people. Primary care is provided at health centres, which have basic attendance units, usually composed of a physician and a nurse who are assigned a quota of patients, 1500 patients at least each unit. This unit can access the centralised computerised patient record system ABUCASIS, and record the patient processes and test results.

The Valencian Community is one of the autonomous regions in Spain with the highest rates of cardiovascular disease and death.[17] Consequently, the 2005–2009 health plan was designed with the main aim of reducing these rates via a strategic plan.[12] The ESCARVAL project was created in 2007 to help fulfil this plan by means of a mixed education programme.

Design, population, and data collection

The study used a quasi-experimental design without random assignment of professionals, as participation was voluntary. It was an educational intervention study in which the intervention group was composed of healthcare professionals (nurses and physicians) who undertook and passed the educational programme, with the control group being composed of all other health professionals in the Valencian Community public health system.

All EHR assigned to participants were analysed by software to assess the cardiovascular indicator records. The results were obtained from the ABUCASIS computerised medical records, a unique, centralised computerised system for ambulatory care in the Valencian Community started in the spring of 2003. The assessment indicators agreed by the scientific committee of the ESCARVAL project and which were indicators of improvements in the quality of health care, were those associated with cardiovascular screening incorporated into the promotion and preventive activities programme of the Spanish Society of Family and Community Medicine in 2007 (PAPPS):[1] screening of blood pressure, basal blood glucose, total cholesterol, and smoking and alcohol habits. Data were also recorded about the prevalence rates of hypertension, dyslipidaemia, and known diabetes determined from the medical records, as well as abdominal circumference, microalbuminuria, and cardiovascular risk calculated with the Systematic Coronary Risk Evaluation (SCORE) tables for countries like Spain (a southern European country), which have a low cardiovascular risk, as recommended by the guidelines.[18]

The baseline evaluation was undertaken before the educational programme, in December 2006. A longitudinal prospective study was made of the EHR every 6 months over eight periods, with the last of these taking place between 1 July and 31 December 2010.

Educational intervention

The mixed education programme consisted of 1 year of tutored, personalised online training, with two face-to-face workshops of 4 hours at the start and end of the training. The workshops took place in each of the 23 health departments of the Valencian Community and were given by primary care professionals (nurses and physicians).

The online training took place at the virtual campus of the Valencian School of Health Studies, belonging to the Valencian Community Health Ministry. The training course was divided into three modules:

- cardiovascular clinical skills module covering diagnostic procedures, use of cardiovascular risk charts, treatments, therapeutic inertia, and compliance;
- a lifestyles and dietary and hygienic measures module including recommendations in prevention and health promotion based on the Prevention Programme (PAPPS) of semFYC, and;
- a cardiovascular research skills module covering data collection procedures, study designs, data analysis, and use of reviews and meta-analysis in clinical practice.

Each module lasted 10 weeks and the assessment was done for the next 2 weeks. The modules included text units and online discussion forums tutored individually by specialists in cardiovascular disease. The first face-to-face workshop covered the development skills to predict the cardiovascular risk and the last workshop was about the proper use of computerised medical records (ABUCASIS).

Data analysis

A descriptive analysis was completed on the study variables. The qualitative variables are expressed with their absolute value and 95% confidence intervals (CIs). To determine the temporal evolution of the different values during the follow-up period, linear regression equations were done for each of the variables recorded in the intervention group and in the control group, estimating the slopes in each equation. To determine whether the growth rates differed between the two groups during the follow-up period, the presence or otherwise of significant differences between the groups was determined.[19] Statistical significance was assessed at $P<0.05$ and 95% CI.

For clinical significance, four measures of association were calculated: relative risk (RR), absolute risk reduction (ARR), relative risk reduction (RRR), and number-needed-to-treat (NNT).[20] NNT was adapted for this study and called NNA 'number-needed-to-attend'. The calculations were made using the SPSS statistical package program. (version 15.0.1).

RESULTS

A total of 1411 healthcare professionals from different health centres in the Valencian Community enrolled voluntarily in the education programme between March and June 2007. Of these, 470 healthcare professionals abandoned the programme between the first face-to-face workshop and registration in the first module, resulting in 941 professionals registering and starting the online course. From these, 686 passed the three modules at the first attempt and 78 passed at the second attempt. Thus, 735 obtained accreditation, of whom 380 where primary care physicians and 355 nurses. The control group was composed of the other healthcare professionals, a total of 2934 physicians and nurses.

Table 1 shows the number of medical histories assigned to professionals who undertook and passed the educational programme (participating professionals) and those assigned to clinicians who did not do the training (non-participating professionals) at different times during the follow-up. The mean medical histories per participant ranged from 1020 to 1642. Medical histories from patients who were seen by different doctors during the study were excluded.

The prevalence rates of recording of hypertension, dyslipidaemia, and diabetes during the follow-up in the intervention and control groups are shown in Figure 1. The prevalence rates for recording of blood pressure, total cholesterol, basal blood glucose, and microalbuminuria (all measured in people with no diagnosis of hypertension, diabetes, or dyslipidaemia) according to group are shown in Figure 2. Figure 3 shows the recording of smoking habit, alcohol consumption, SCORE, and the abdominal circumference in the

Table 1. Number of medical histories assigned to participating and non-participating professionals at the different times

	Intervention group			Control group		
Date	PCU[a]	Histories	Mean	PCU[a]	Histories	Mean
To Dec 06	380	490 921	1291.90	2934	2 992 648	1019.99
Jan 07–Jun 07	380	497 137	1308.26	2.934	3 030 738	1032.97
Jul 07–Dec 07	379	559 736	1476.88	2.987	3 602 771	1206.15
Jan 08–Jun 08	369	587 652	1592.55	2821	4 173 479	1479.43
Jul 08–Dec 08	369	591 228	1602.24	2846	4 198 673	1475.29
Jan 09–Jun 09	369	594 705	1611.67	2868	4 223 606	1472.67
Jul 09–Dec 09	369	604 634	1638.57	2934	4 604 643	1569.41
Jan 10–Jun 10	368	601 867	1635.51	3004	4 763 532	1585.73
Jul 10–Dec 10	372	610 931	1642.29	3055	4 925 712	1612.34

PCU = primary care unit (nurse and physician).

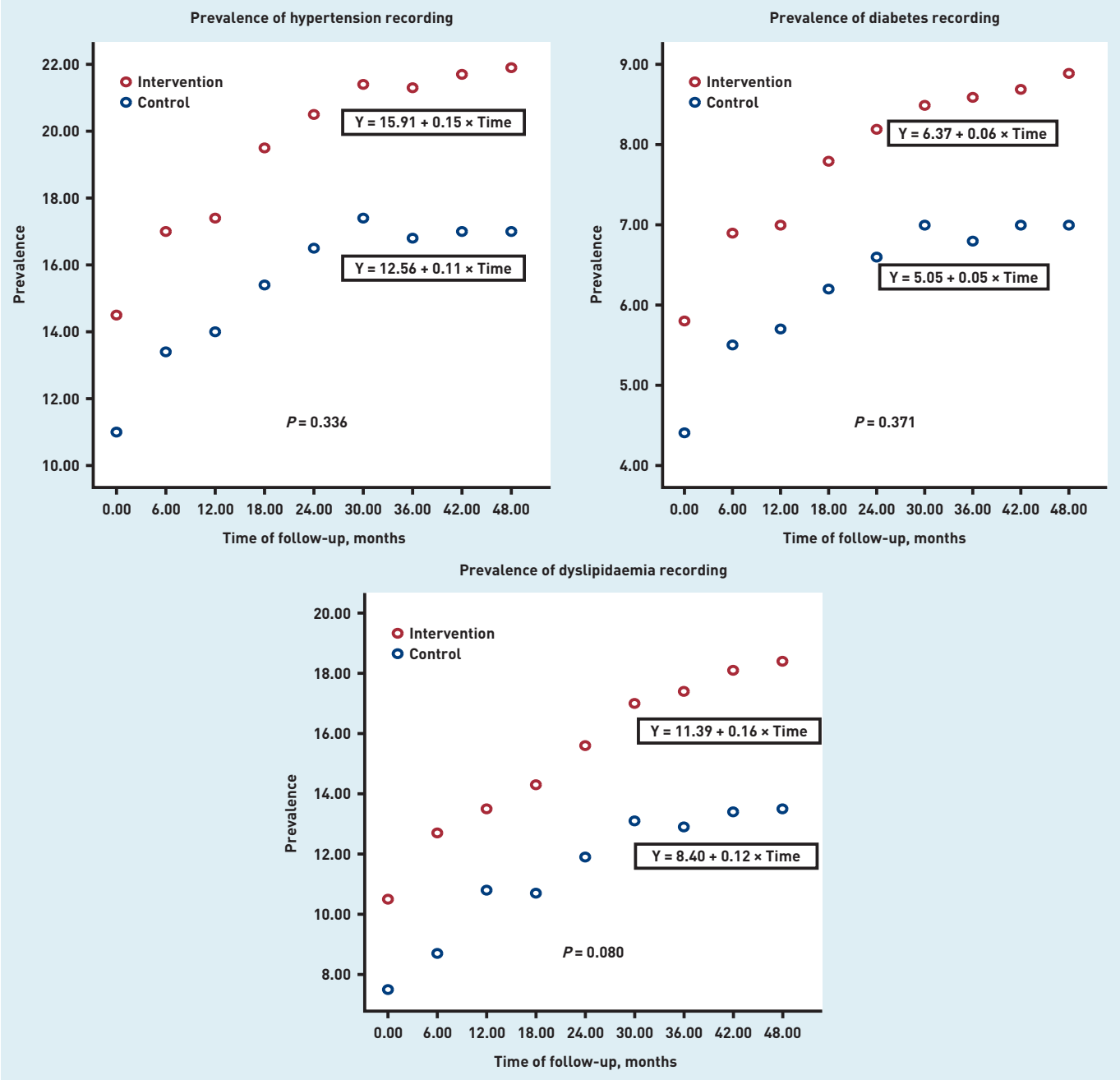

Figure 1. Hypertension, dyslipidaemia, and diabetes recording in the medical records during the follow-up in the intervention and control groups.

intervention and control groups throughout the follow-up period. In all cases the regression equation slope was estimated and study of the statistical significance between the results in both groups during the follow-up showed them to be significantly different from 0 ($P<0.001$) for the recording of cholesterol, basal blood glucose, microalbuminuria, smoking, alcohol consumption, SCORE, and abdominal circumference.

The prevalence rates of cardiovascular information recording at baseline before the educational programme and at the end of the follow-up period for both groups are shown in Table 2.

To determine the association between the educational intervention and the differences in recording rates, the measures of association were calculated (Table 3).

DISCUSSION

Summary

Many countries have achieved an important reduction in cardiovascular death with a better understanding and control of the associated risk factors.[21] This study

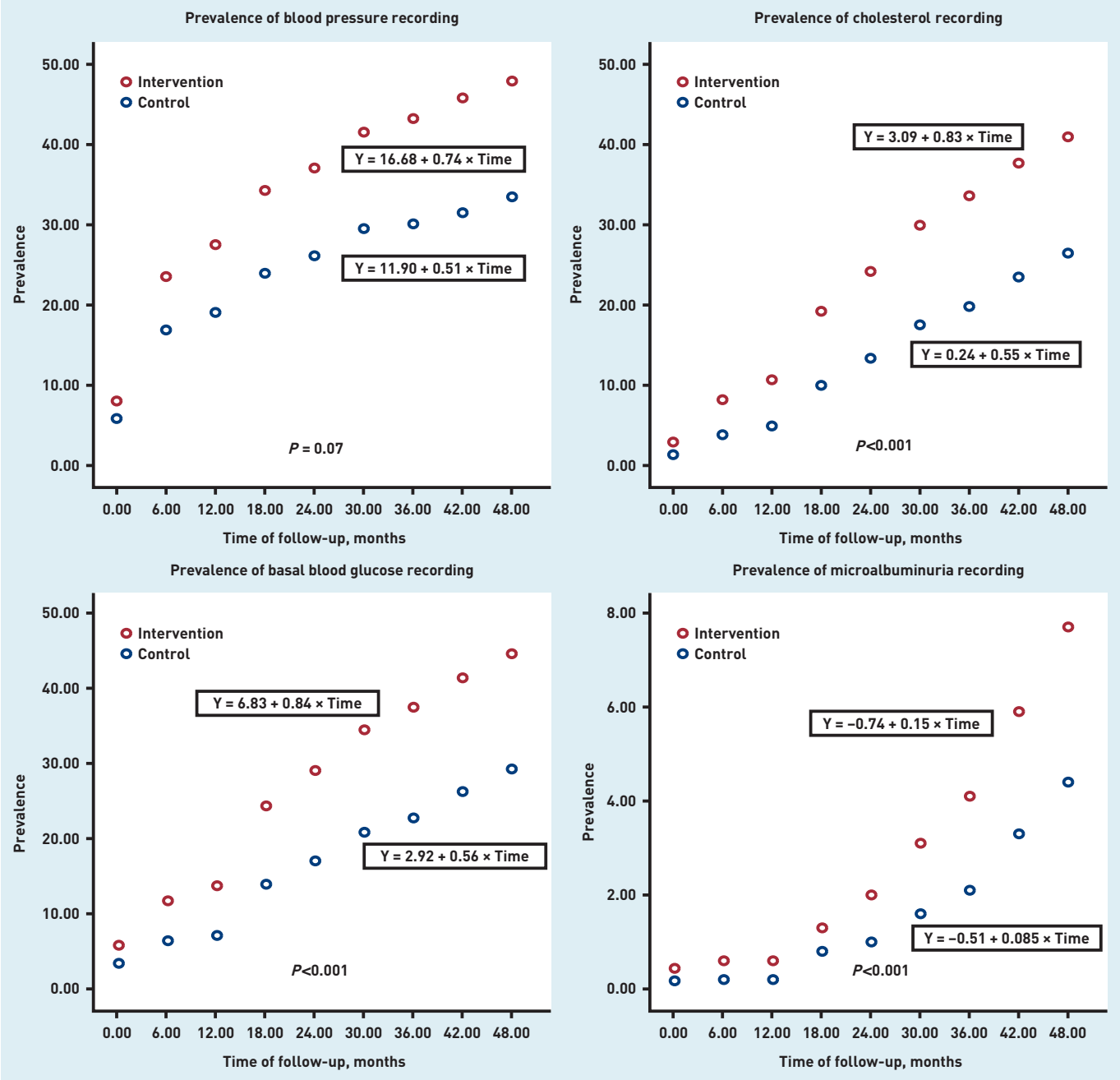

Figure 2. The blood pressure, total cholesterol, basal blood glucose, and microalbuminuria recording in medical records during the follow-up in the intervention and control groups.

demonstrated the efficacy of an educational intervention to improve cardiovascular screening by primary health professionals.

The prevalence rates of cardiovascular risk factor records were higher in the intervention group than in the control group at all times during the follow-up of this study. In all cases the regression equation slope was greater in the intervention group than in the control group, and the study of the statistical significance between the values in both groups during the follow-up showed them to be significantly different from 0 for recording of cholesterol, basal blood glucose, microalbuminuria, smoking, alcohol consumption, SCORE, and abdominal circumference, meaning that the growth rates differed between groups during the follow-up, independent of the baseline status.

Regarding clinical significance, Table 3 shows the measures of association where RR ranged from 1.27 for diagnosis of diabetes to 2.77 for recording the SCORE value, meaning that the intervention group was 2.77 times more likely to record the SCORE value than the control group. The RRR ranged from 26.7% for diagnosis

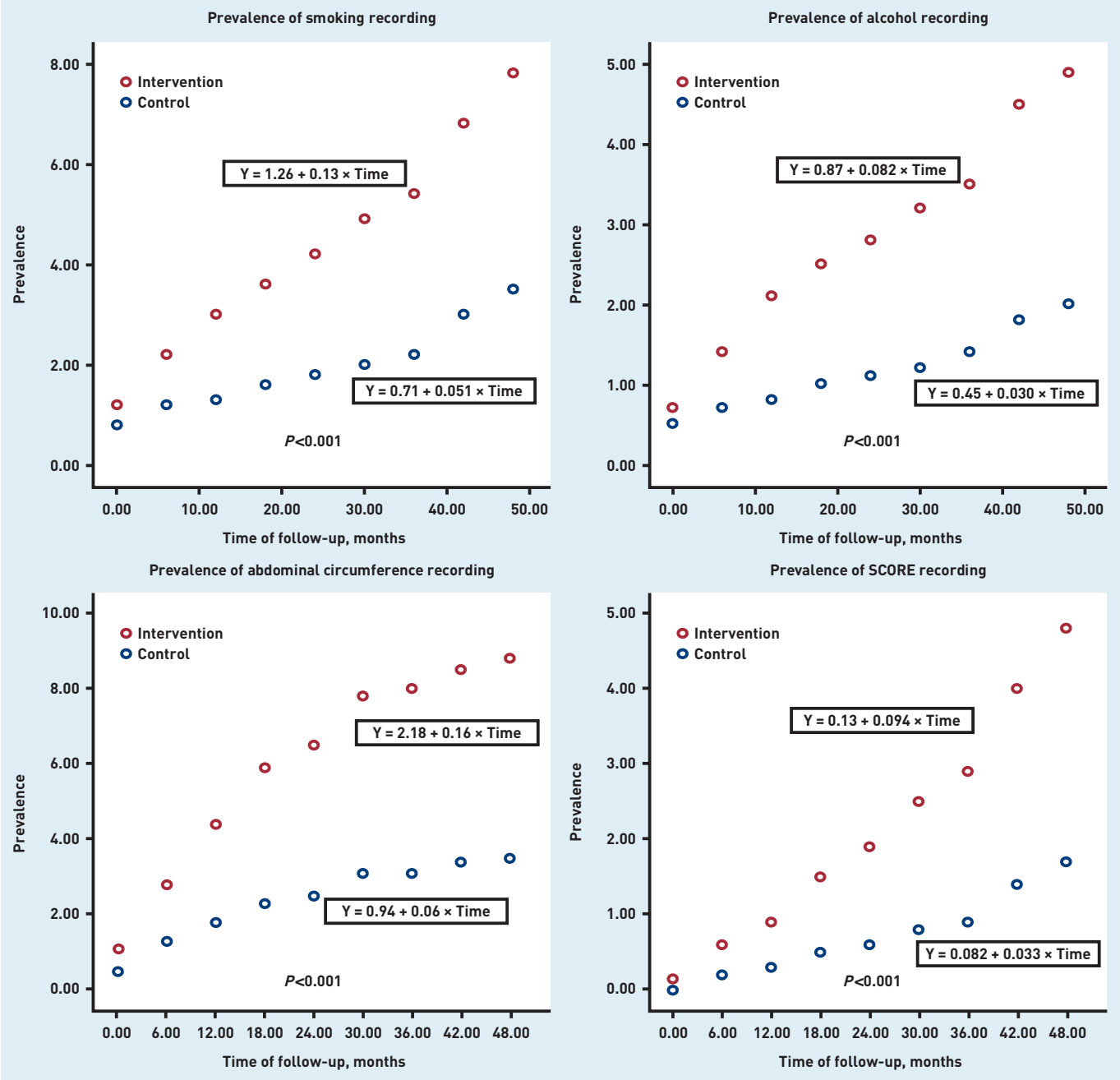

Figure 3. Smoking habit, alcohol consumption, SCORE, and the abdominal circumference recording in the medical records during the follow-up in the intervention and control groups.

of diabetes to 177.1% for recording the SCORE value, which showed how much more the intervention group recorded compared with the control group for the various study variables, that is, the number of cases of diabetes recorded by physicians who completed the course was 26.7% times greater than the number of cases of diabetes recorded by the physicians who did not complete the course.

The ARR ranged from 1.87% for the diagnosis of diabetes mellitus to 15.27% for the recording of basal blood glucose. Thus, for each 100 patients, a physician who did the training programme recorded the basal blood glucose 15.27 times more than a physician who did not do the training. The highest NNA value, 54, corresponded to the diagnosis of diabetes mellitus, that is for each of the 54 patients, a physician who completed the course recorded one more case of diabetes than a physician who did not complete the course.

All the parameters studied showed a clearly beneficial effect in favour of the educational intervention at the end of the follow-up period that was significant and clinically relevant.

Table 2. Prevalence rates of cardiovascular information recording at baseline and at the end of the follow-up for both groups

		Prevalence rates of cardiovascular information recording, %										
		HTA	Dys	DM	BP	Cho	BBG	Smk	Alc	SCORE	Malb	AC
Before training programme	Intervention group	14.5	10.5	5.8	8.0	2.6	5.8	1.2	0.7	0.1	0.4	1.1
	Control group	11.0	7.5	4.4	5.8	1.3	3.4	0.8	0.5	0.0	0.2	0.5
After training programme	Intervention group	21.9	18.4	8.9	48.1	41.2	44.5	7.8	4.9	4.8	7.7	8.8
	Control group	17.0	13.5	7.0	33.6	26.6	29.2	3.5	2.0	1.7	4.4	3.5

AC = abdominal circumference. Alc = alcohol. BBG = basal blood glucose. BP = blood pressure. Cho = cholesterol. DM = diabetes. Dys = dyslipidaemia. HTA = hypertension. Malb = microalbuminuria. SCORE = Systematic Coronary Risk Evaluation. Smk = smoking.

Strengths and limitations

The present study is strengthened by its methodology which allowed comparative estimations between the intervention and control groups. In addition, calculating the linear regression equation slopes minimised the possible selection bias with respect to the baseline situation. Of note, too, is the important sample size, as the study included 99% of all medical histories, almost 6 million people in the whole autonomous community, in addition to which the data were collected from a single, homogeneous, anonymous, computer-based system. This enabled measurement of the efficacy of the intervention at nine different times during the follow-up period and improved the facility to participate in the course. As attendants were unaware measurements would be made during the follow-up period, the Hawthorne effect was minimised. Finally, this study highlights and promotes the importance of continuing professional development (CPD), and in future it will be determined whether the intervention has an effect not only on the attitudes and practice of the professionals but also on the morbidity and mortality of their patients as this is one of the objectives of the ESCARVAL Project.[4]

The limitations of the study derive from the inherent lack of randomisation, as it is not possible in these types of studies to force the professionals to do the educational course against their will. Differences in the prevalence rates measured at baseline before the intervention could reflect differences between the professionals, as it seems unlikely that the patients were different because the population assigned to the various quotas was similar in the number and percentage of retired and active persons. The control group also tended to experience an increase in recording, which could be caused by the Hawthorne effect and to improvements in the computerised system over the study period. As the details of the professionals

Table 3. Activities assessed 48 months after starting the follow-up.

	Did the training		Clinical relevance							
Activity	Yes	No	RR	95% CI	RRR	95% CI	ARR	95% CI	NNA	95% CI
Diagnosis of hypertension	133 821	838 521	1.29	1.28 to 1.29	28.75	28.09 to 29.35	4.88	4.77 to 4.99	21	21 to 21
Diagnosis of dyslipidaemia	112 182	663 377	1.36	1.36 to 1.37	36.35	35.56 to 37.13	4.89	4.79 to 5.00	21	21 to 21
Diagnosis of diabetes mellitus	54 120	344 369	1.27	1.26 to 1.28	26.71	25.65 to 27.82	1.87	1.79 to 1.94	54	52 to 56
Record abdominal circumference	53 797	174 365	2.49	2.46 to 2.51	148.89	146.51 to 151.19	5.27	5.19 to 5.34	19	19 to 20
Record the SCORE	29 596	86 116	2.77	2.74 to 2.81	177.15	173.59 to 180.78	3.10	3.04 to 3.15	33	32 to 33
Record microalbuminuria	47 036	214 791	1.77	1.75 to 1.78	76.71	75.01 to 78.44	3.34	3.27 to 3.41	30	30 to 31
Record blood pressure	293 634	1 654 710	1.43	1.43 to 1.43	43.19	42.75 to 43.55	14.47	14.34 to 14.60	7	7 to 7
Record basal blood glucose	271 572	1 437 558	1.52	1.52 to 1.53	52.35	51.81 to 52.80	15.27	15.14 to 15.40	7	7 to 7
Record total cholesterol	251 431	1 310 772	1.55	1.54 to 1.55	54.71	54.19 to 55.23	14.54	14.42 to 14.67	7	7 to 7
Record smoking	47 915	170 478	2.27	2.24 to 2.29	126.69	124.44 to 128.88	4.38	4.31 to 4.45	23	23 to 24
Record alcohol	29 721	98 166	2.44	2.41 to 2.47	144.15	141.00 to 147.24	2.87	2.82 to 2.93	35	35 to 36

ARR = absolute risk reduction. NNA = number-needed-to-attend. RR = relative risk. RRR = relative risk reduction.

involved were encrypted and therefore anonymous, it cannot be determined whether there existed differences between the intervention and control groups concerning sociodemographic and educational characteristics. The motivation of the participating professionals may introduce a bias but multivariate analysis was used. The authors also acknowledge that a minimal percentage (<5%) of the nurses who did the course worked with a physician who did not do the course, which could have improved the results in the control group. In addition, there was not 100% physician–nurse team participation in the intervention group, which could lead to underestimation of efficacy of the educational course as measured from the results.

Comparison with existing literature

In view of the wide variety of training techniques and objectives of studies that assess the effect of an educational programme, results are difficult to compare. There are studies that suggest face-to-face training is comparable with online training,[6,7,22,23] although many indicate that the computer platforms need to be improved as participants encountered difficulty using them.[24,25] Nevertheless, most studies found an increase in knowledge and satisfaction when approaching the problems dealt with in the training courses.[9] Educational courses, independently of the technique used, improve control of hypertension, dyslipidaemia, and diabetes, as well as behaviour, particularly concerning the prevention of events in patients with a high cardiovascular risk.[26] Finally, some authors conclude that internet training is efficient in different fields.[27,28]

Implications for practice

A training programme for primary care professionals increased the prevalence rates of cardiovascular risk factor records. The improvement was clinically significant and relevant. Educational strategies should be continuous and constant, and a good solution would be to introduce reminders on the EHR or any electronic systems used by professionals.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical approval

The study was approved by the ethics committee of the Public Health General Office in 2007.

Provenance

Freely submitted; externally peer reviewed.

Competing interests

The authors have declared no competing interests.

Acknowledgements

We are grateful to Conselleria de Sanidad for allowing access to the ABUCASIS system and Antonio Fernandez who provided technical support during the study period.

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