Original Research

The quality of cardiovascular disease prevention in rural primary care

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Abstract

Objective: To measure the differences in the recording of risk factors and lifestyle advice between those at high risk of cardiovascular disease and those diagnosed with cardiovascular disease, and to identify the practice characteristics associated with such recording in rural primary care.

Design: A cross-sectional observation study of 14 general practices. Medical records were audited to measure recording of risk factors and lifestyle advice for those at high risk of and those diagnosed with cardiovascular disease. Practice characteristics were collected, with logistic regression used to test for an association with the recording of risk factors.

Setting: General practices in rural Australia.

Participants: Each practice was asked to identify 20 patients; 10 at high risk and 10 diagnosed with cardiovascular disease.

Main outcome measures: The recording of risk factors and lifestyle advice in patient records and practice characteristics.

Results: 282 records were audited with 142 being high risk and 140 diagnosed with cardiovascular disease. Measures recorded significantly less in the high-risk group were: blood pressure (94% versus 99%; P = 0.019); physical activity (24% versus 56%; P = 0.000); dietary advice (32% versus 51%; P = 0.001); and physical activity advice (34% versus 56%; P = 0.000).

Recording of risk factors was positively associated with practice involvement in quality improvement (P < 0.001), continuing education (P < 0.001), and greater percentage of general practitioners (P < 0.05) and practice nurses (P < 0.001).

Conclusions: There is substantial room for enhanced cardiovascular disease prevention through rural primary care in Australia, particularly for high-risk patients. This study has demonstrated an association between practice factors (including targeted education, quality improvement activities and appropriate workforce) and improved preventive activities.

KEY WORDS: *cardiovascular risk factor, CVD research, health service model, model of care, primary health care.*

Introduction

Cardiovascular diseases (CVDs) are a significant contributor to escalating health care costs and a major cause of mortality and morbidity worldwide.[1,2] CVD is a leading cause of death in Australia.[3] This results in life years lost and many of those that survive live with some degree of dependence on the health system.[4–6]

In comparison with their metropolitan counterparts, rural and remote Australians have worse risk factor profiles and higher rates of hospitalisation and death for CVD.[7,8] Evidence indicates that this differential can be reduced by the improved integration of evidence-based CVD prevention and management activities into rural primary care.[9] Modelling shows that improvements in general practice CVD prevention and screening can significantly reduce premature heart disease deaths in Australia.[6]

What is already known on this subject:
- *Rural Australians have substantially worse outcomes from cardiovascular disease than those living in metropolitan areas.*
- *This gap can be reduced by improved cardiovascular prevention activities in primary care, but there is little empirical evidence regarding the quality of cardiovascular disease prevention in rural settings, or the characteristics associated with quality of care.*

What this study adds:
- *Instruments to measure quality of cardiovascular prevention in primary care from the European-based EPA-CVD study can be successfully adapted to the rural Australian setting.*
- *Targeted education, quality improvement activities and an appropriately prepared and supported workforce were significantly associated with enhanced quality of cardiovascular disease prevention available through rural primary care in Australia, particularly for high-risk patients.*

Identification and monitoring of risk factors are only part of the management equation. Brief advice given by a general practitioner (GP) or general practice staff during routine consultations has been shown to improve the quality of CVD management and prevention, particularly in relation to smoking cessation.[10] Therefore, systematic identification of risk factors and brief interventions in the form of lifestyle counselling can improve the quality of CVD management and prevention.[11–13]

The European Practice Assessment CVD (EPA-CVD) study was an international project investigating cardiovascular care and risk management in primary care in Europe.[14] It involved up to 36 practices in each of 10 European countries (Austria, Belgium, England, Finland, France, Germany, The Netherlands, Slovenia, Switzerland and Spain) and showed wide variation within and between countries for quality of care, and that variation in care related to a range of factors including the structure of the care provision and practice characteristics.[15,16]

This paper reports the findings of a study of general practices in rural Victoria, Australia, using the EPA-CVD instruments. The study aimed to measure the differences in recording of risk factors and lifestyle advice between patients at high risk (HR) for CVD as compared with a group with established disease. Based on the EPA-CVD study[16] the expectation was that people at HR, but without formal diagnosis of CVD, would have lower levels of recorded risk factors, which matters because the recording of and subsequent response to modifiable risk factors can delay or prevent the incidence of CVD. It also identified the practice characteristics associated with the documentation of risk factors.

Methods

During 2012, we conducted medical record audits in general practice settings in rural Victoria. Our method replicated the protocol used for the EPA-CVD study.[14,15]

We used a two-stage sampling strategy to recruit Victorian general practices in towns with populations of 25 000 or less (classified rural or remote according to

Rural, Remote and Metropolitan Areas classification system[17]). Seventy practices were sent information about the study and received a follow-up telephone call. Those interested in participation were visited by the principal researcher to obtain informed consent.

In keeping with the EPA-CVD protocol,[14] each practice was asked to identify and obtain consent from 20 patients; 10 at HR for CVD and 10 diagnosed with CVD. Inclusion in the HR group required at least three of the following: men, over 60 years of age, smoker, hypertensive and hypercholesterolaemic.

The inclusion criteria for the CVD group were a confirmed diagnosis of CVD being myocardial infarction, angina pectoris, vascular surgery or peripheral vascular disease.

For both groups, the exclusion criteria were: the patient being new to the practice (<12 months), had diabetes mellitus, were terminally ill, had cognitive or psychiatric impairment, or were non-English speaking.[14,16]

Using the previously validated EPA-CVD instrument, practice staff manually abstracted data from the patients' medical records, focusing on recorded risk factors and lifestyle advice from the previous 15 months of primary care.[14]

Participating practices also completed a practice characteristics questionnaire.[14] The questions were organised into the categories outlined in Table 1. Each practice was given a score for each category based on the number of affirmative responses, staff full-time equivalents (FTEs) and hours of continuing professional development (CPD).

Using χ^2 for nominal variables and independent samples t-test for continuous variables, differences in patient characteristics and recording between the HR and CVD samples were measured.

The number of recorded risk factors *for each patient* was used as a measure of preventive care (6 = all risk

TABLE 1: *Classification and scoring of items in the practice characteristics questionnaire*

Category	Number of questionnaire items (n)	Type of items in category	How score was calculated
Quality improvement	11	Reports, audits, community engagement.	Mean of the sum of all affirmative responses.
Prevention activities	12	Recall of patients, registries, prevention activities.	Mean of the sum of all affirmative responses.
Chronic illness management activities	5	Recall of chronic patients, medication reviews.	Mean of the sum of all affirmative responses.
Information management	13	Information systems, integrated systems, electronic records and resources.	Percentage of affirmative responses.
Proportion of GPs as part of the workforce	FTE/practice		FTE of GP partners, salaried GPs and GP registrars as a proportion of total practice FTE.
Proportion of nurses as part of the workforce	FTE/practice		FTE of nurses as a proportion of total practice FTE.
Hours of CPD	Hours of CPD		Mean CPD hours per category of staff per practice.

CPD, continuing professional development; FTE, full-time equivalent; GP, general practitioner.

factors recorded and 0 = no risk factors recorded). This number was then used to measure the relationship between practice characteristics and the likelihood that risk factors were recorded, using multivariate linear regression. The odds of risk factors being recorded was related to practice characteristics using unconditional logistic regression. Patients were cluster sampled from practices with the potential for within-practice correlation among individuals. For this reason all statistical analyses adjusted standard errors for the level of within-practice correlation using Taylor series linearisation. This approach inflates the naïve standard errors according to the intra-cluster correlation. Otherwise statistical significance and odds ratios can be interpreted as per usual.

Participating GPs were presented with results from their individual practice and, during a semistructured interview, were asked if the results reflected actual practice. This step was used to ascertain if measures reflected clinical reality or were related to documentation failures or trends.

Ethics approval for the project was obtained through the Monash University Human Research and Ethics Committee (approval number: CF12/0001 – 2011001965).

Results

Practice and patient characteristics

Seventy rural general practices were invited to participate in the study with 16 responding. Two of these practices withdrew with the remaining 14 participating (20%).

The practices varied from 452 to 33 198 patients and 1200 to 70 000 consultations in the last year. Staffing levels ranged from 0.1 to 5.0 FTE of GPs and 0.2 to 5.5 FTE of nurses.

Data were obtained from 282 medical records with 142 patients identified as HR and 140 patients with CVD.

The CVD group was significantly older, with a mean age of 72 years (standard deviation (SD) 9.7) compared with 67 years (SD 6.7) for the HR group. All recorded risk factors (except high blood glucose) were significantly worse for the HR group when compared with the CVD group. A summary of the patient characteristics is provided in Table 2.

Recording of risk factors

In the HR and CVD patients in general, risk factors such as blood pressure, smoking status, cholesterol and blood glucose were more likely to be recorded (ranging from 97 to 81%), than risk factors such as weight/body mass index (BMI) and physical activity (61 and 40% respectively).

The recording of risk factors in the medical records was significantly less for the HR group compared with the CVD group for blood pressure (94 versus 99%, $P = 0.019$) and physical activity (24 versus 56%, $P = 0.000$).

Smoking status was significantly less recorded for the CVD group than the HR group (90 and 100% respectively, $P = 0.000$). Details are provided in Table 3.

TABLE 2: *Differences in patient characteristics between patients at high risk and those diagnosed with cardiovascular disease*

Parameter	HR (n = 142)	CVD (n = 140)	P value
Men (%)	90.8	82.9	0.047*
Mean age (years) ± SD	67.3 ± 6.7	72.1 ± 9.7	0.000**
High blood pressure (%)†	44.0	30.2	0.018*
High cholesterol (%)‡	51.7	15.6	0.000**
Smokers (%)	21.1	10.0	0.000**
BMI > 30 kg m^{-2} (%)	41.7	24.0	0.029*
High blood glucose (%)§	4.0	5.6	0.602

*$P < 0.05$, **$P < 0.001$. †Defined as a mean of 1–3 blood pressure measurements if mean systolic blood pressure values are over 140 mmHg or diastolic over 90 mmHg. ‡Defined as total cholesterol levels over 5 mmol L^{-1} or 200 mg dL^{-1}. §Defined as levels over 6.1 mmol L^{-1} or 110 mg dL^{-1} for fasting blood glucose. BMI, body mass index; CVD, diagnosed with cardiovascular disease; HR, high risk for developing cardiovascular disease.

TABLE 3: *Differences in recording of risk factors between patients at high risk and those diagnosed with cardiovascular disease*

Patients % (95% CI)

Parameter	HR (n = 142)	CVD (n = 140)	P value	Total (n = 282)
Blood pressure	94.4 (0.91–0.98)	99.3 (0.98–1.01)	0.019*	96.8 (0.95–0.99)
Cholesterol	83.1 (0.77–0.89)	88.4 (0.83–0.94)	0.205	85.7 (0.82–0.90)
Smoking status	100	90.0 (0.85–0.95)	0.000**	95.0 (0.93–0.98)
Weight/BMI	55.6 (0.47–0.64)	66.4 (0.59–0.74)	0.063	61.0 (0.55–0.67)
Blood glucose	81.7 (0.75–0.88)	79.7 (0.73–0.87)	0.675	80.7 (0.76–0.85)
Physical activity	24.1 (0.17–0.31)	55.9 (0.47–0.64)	0.000**	39.9 (0.34–0.46)

*$P < 0.05$, **$P < 0.001$. BMI, body mass index; CVD, diagnosed with cardiovascular disease; HR, high risk for developing cardiovascular disease.

TABLE 4: *Differences in recording of lifestyle advice between patients at high risk and those diagnosed with cardiovascular disease*

Patients % (95% CI)

Parameter	HR (n = 142)	CVD (n = 140)	P value	Total (n = 282)
Smoking advice	51.9 (0.32–0.72)	53.8 (0.22–0.85)	0.906	52.5 (0.36–0.69)
Diet advice	32.1 (0.24–0.40)	51.4 (0.43–0.60)	0.001*	41.7 (0.36–0.48)
Physical activity advice	34.1 (0.26–0.42)	55.7 (0.47–0.64)	0.000**	45.0 (0.39–0.51)

*$P < 0.01$, **$P < 0.001$. CVD, diagnosed with cardiovascular disease; HR, high risk for developing cardiovascular disease.

Recording of lifestyle advice

Dietary advice (32 versus 51%, $P = 0.001$) and physical activity (34 versus 56%, $P = 0.000$) were significantly less for the HR group than the CVD group. Details are provided in Table 4.

Practice characteristics associated with the recording of risk factors

For all patients, the number of recorded risk factors was used as a measure of cardiovascular preventive care. Using a multivariate linear regression analysis, the fol-

TABLE 5: *Logistic regression of the association between practice characteristics and the likelihood that risk factors were documented*

Practice characteristic	Mean	Median	Regression coefficient	95% CI	Design effect
Increasing prevention activities	6.44 items	7	0.25**†	0.13–0.36	0.54
Increasing QI activities	5.88 items	5	0.10**†	0.08–0.12	0.30
Increasing GP CPD hours	45 hours/year	30 hours/year	0.01**‡	0.01–0.02	0.78
Increasing % of GPs	38.6%	36%	0.04*‡	0.01–0.07	0.66
Increasing % of Nurses	16.7%	15%	0.05**‡	0.04–0.07	0.55
Increasing information systems and processes	87.0%	92.3%	−0.05**†	−0.06 to −0.04	0.50

*P < 0.05, **P < 0.01,

†Calculated using mean. ‡Calculated using median. CPD, continuing professional development; GP, general practitioner; QI, quality improvement.

lowing practice characteristics were associated with a higher level of documentation of risk factors: a higher percentage of nurses of the total FTE (all staff) in the practice, a higher percentage of GPs of the total FTE (all staff) in the practice, of average GP CPD hours per FTE; and higher involvement in quality improvement and prevention activities.

Conversely, an increase in the number of information systems and processes was negatively associated with the recording of risk factors. Details are provided in Table 5.

GP validation of results

All GPs stated that they believed the documentation measures presented to them were a fair reflection of their clinical practice.

Discussion

This study set out to assess the differences in the recording of risk factors and lifestyle advice between patients at HR for developing CVD and those with CVD in rural Australian primary care, and to explore the practice characteristics associated with such recording.

HR group compared with CVD group

Our study found that patients with established CVD tended to have their risk factors better recorded, better controlled and received more lifestyle counselling compared with those in the HR group. This is consistent with a recently published Australian study identifying major gaps in risk factor management for HR patients.[18]

This can be explained by patient and funding characteristics. Firstly, patients diagnosed with CVD are likely to be motivated by their diagnosis to identify and manage their risk factors.[19] Secondly, Australian primary care funding includes financial incentives for the development of management plans for those diagnosed with CVD.

This type of incentive could be considered for patients at HR of developing CVD.

The largest difference in recording of risk factors was for physical activity (24% versus 56%). It was significantly less recorded for the HR group. Documentation of physical activity in our HR group was the lowest recorded value when compared with all 10 of the countries in the EPA-CVD study.[16]

The HR group also received significantly less documented advice regarding their diet (32% versus 51%) and physical activity (34% versus 56%). This was despite a higher proportion of the HR group being younger and having documented hypertension, hypercholesterolaemia, obesity and record of smoking.

This strongly suggests that there is substantial room for improvement in the documentation and provision of cardiovascular preventive care in rural Australian general practices.

Practice characteristics associated with the recording of risk factors

The study showed that several practice characteristics are either positively or negatively associated with the recording of CVD risk factors.

Australian practice characteristics such as engagement in quality activities, having a preventative health approach, more clinicians (GPs and nurses) in the team and greater GP CPD were associated with increased recording of risk factors and lifestyle advice. Consistent with the EPA-CVD study and other studies and reviews,[20–22] our research demonstrated that improved

clinical practice was associated with participation in education and quality improvement activities.

It is interesting that the more information systems and processes used in the practice, the worse the recording of risk factors was. Research in Australia suggest that factors such as documentation burden, user friendliness of systems and the computer as the 'third person' in the consult might explain this.[23] This warrants further study so that the increasing use of electronic systems facilitates care rather than creating a burden.

The complexity of managing multiple risk factors in general practice is not to be underestimated. A recent Australian study listed barriers to preventive care such as lack of time and skill, priorities and unmotivated patients.[11] Our results suggest that targeted, planned quality improvement, education and appropriate clinical workforce might help overcome these barriers.

Comparison with EPA-CVD

Similarities can be seen with the EPA-CVD study where blood pressure, cholesterol, smoking and blood glucose were the most likely risk factors to be recorded across the entire sample. There were, of course, exceptions. For example, France was found to have recorded weight/BMI in 93% of HR patients compared with the EPA-CVD study mean of 66%, and just 56% in our HR group. Documentation levels are perhaps attributed as much to a country's cultural values as best practice guidelines.

Although blood pressure, smoking, cholesterol and blood glucose were well recorded in our study, there remained a large proportion of patients with poorly controlled levels according to current best practice guidelines.[24]

In our study the HR group measured significantly less documentation of lifestyle advice regarding their diet (32% versus 51%) and physical activity levels (34% versus 56%). Poor recording of brief lifestyle advice was also noted in the EPA-CVD study, with mean levels of 43% for diet and 39% for physical activity.

Strengths and limitations

A major strength of this audit was the implementation of a validated methodology used in one of the largest primary care studies of CVD risk and management in the world.[11,20,21] The tools developed through EPA-CVD proved to be usable in the Australian context.

As with the main EPA-CVD study, not all aspects of quality were assessed such as communication, empathy, teamwork, consultation time. Quality of lifestyle advice, counselling and continuity of care require other methodologies, such as in-depth interviews.[16] This study measured documentation as a proxy for quality of care

and validated this through presentation of individual practice results with the relevant GPs. Documentation (and monitoring) in the absence of clear recorded actions and prescribing for HR individuals with uncontrolled risk factors is only the start of the process; a fundamental trigger to that action is still required. Even with the inclusion of feedback of individual practice results with the relevant GPs as a validation measure, the results can only be seen as comparative trends rather than exact measures of clinical practice. In addition, our inclusion criteria for HR patients required the identification of patients with at least three documented risk factors. In itself, this will create a bias towards a higher risk factor documentation rate but remains comparable with the EPA-CVD study by replicating the recruitment strategy. There was a small number ($n = 4$) of practices considered 'small' (≤2 GPs) which prevented investigation of the practice size as a characteristic impacting on quality of clinical care. In addition, the study was based in a single state of Australia. The study sample was overrepresented by men (87%) as a result of the inclusion criteria. Follow-up studies should consider criteria to increase representation of women.

Conclusion

Based on this study, there is significant scope for rural Australian primary care services to reduce the development and progress of CVD through improved monitoring and management of risk factors, and the provision of lifestyle advice.

Our results indicate that the gap in preventive care for people at HR of CVD might be reduced with targeted quality improvement and educational programs, and models that promote the role of GPs and nurses in cardiovascular preventive care.

Acknowledgements

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