Association between insurance status and coronary artery calcium score in a regional NSW cohort

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Background

The impact of insurance status on health outcomes and burden of disease is difficulty to quantify given the numerous confounding variables and differing models of healthcare and service delivery internationally[1]. Previous studies have demonstrated that patients in the USA without insurance diagnosed with breast or colorectal cancer are more likely to have higher stage disease at the time of diagnosis[2], and patients in NSW diagnosed with non-small cell lung cancer who are less likely to receive treatment include those without private health insurance[3]. For cardiovascular disease, uninsured patients are less likely to be using preventative statins[4], but the overall impact on cardiovascular disease is currently unclear.

Furthermore, whilst the burden of cardiovascular disease is higher in regional and rural Australia[5], the uptake of private health insurance (PHI) is lower compared to capital cities (national difference 6.7%, NSW difference 7.1%)[6]. It is therefore unknown what the association between insurance status and burden of cardiovascular disease is for this population.

Aims

To explore the association between insurance status and coronary artery calcium score, which corresponds to an absolute risk of major coronary events in the next 15 years[7], in a regional cohort.

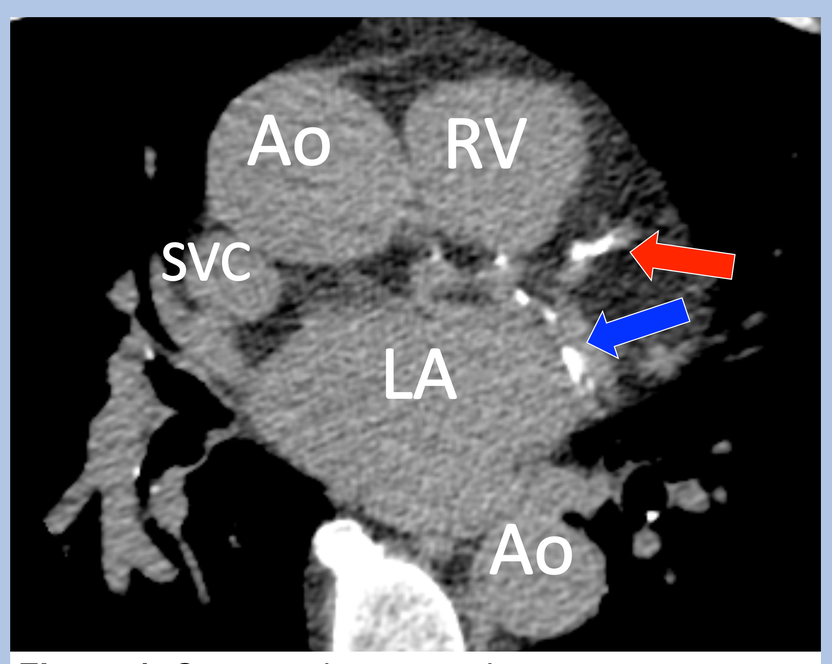

Figure 1: Computed tomography coronary angiography, non-contrast axial slice showing calcium deposits in LAD (red) and LCx (blue)

Methods

Data was obtained from a prospective longitudinal study of low to intermediate risk patients referred for computed tomography coronary angiography (CTCA) in Wagga Wagga, NSW, from 2012 to 2017. Insurance status data and cardiovascular risk factors were recorded at registration. Calcium scores were recorded from formal cardiology reports. Medicare patients and PHI or Department of Veterans Affairs (DVA) patients were compared using independent t-tests or chi square tests for continuous and categorical data respectively. Calcium score was compared using Mann-Whitney U testing and then using multivariate modelling controlling for risk factors associated with higher calcium score on univariate analysis.

Results

1436 patients were included in this study. 672 individuals (46.8%) were Medicare patients, and 764 (53.2%) were private or DVA patients.

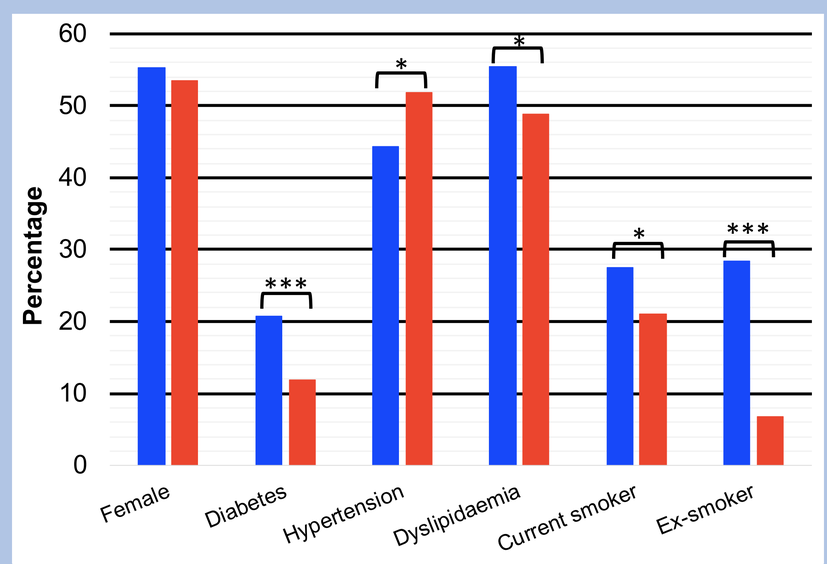

Figure 2: characteristics of Medicare (blue) and private insurance/ DVA (red) groups

PHI/ DVA patients were older (mean age ± S.D. was 59.8±11.8 vs 58.0±12.7; t(1434)=2.82, p=0.005) and more likely to have hypertension (OR [95% C.I.] 1.34 [1.07-1.70]; X^2(1, n=1211)=6.61, p=0.01) but less likely to have diabetes (OR 0.52 [0.38-0.71]; X^2(1, n=1186)=17.00, p<0.001), dyslipidaemia (OR 0.77 [0.61-0.97]; X^2(1, n=1177) =4.99, p=0.03) or a smoking history (OR 0.30 [0.23-0.39]; X^2(1, n=1063)=85.9, p<0.001). There was no significant association with gender (OR 1.076 [0.87-1.33]; X^2(1, n=1434)=0.48, p=0.49).

Calcium scores demonstrated non-parametric distribution and were not significantly different between groups on univariate analysis (median [25th-75th percentiles] 11.0 [0.0-136.0] vs 6.0 [0.0-132.5] for Medicare and PHI/ DVA respectively; Mann-Whitney U p=0.399).

Multivariate modelling controlling for age, gender, hypertension and dyslipidaemia showed the odds of PHI/ DVA patients having an elevated calcium score was 0.74 that of Medicare patients (n=1162, OR 0.74 [0.55-0.98], p=0.035).

Table 1: multivariate model created for odds of increased coronary artery calcium score

Variable	Odds ratio	St. error	p	95% confidence interval
Insurance status	0.736	0.107	0.035	0.553 – 0.979
Age	1.100	0.008	0.000	1.083 – 1.117
Gender	3.860	0.595	0.000	2.853 – 5.223
Hypertension	1.984	0.286	0.000	1.496 – 2.631
Dyslipidaemia	2.086	0.296	0.000	1.579 – 2.756

Conclusions

Private health insurance was associated with reduced odds of elevated coronary artery calcium score, even after controlling for known cardiovascular risk factors.

This data may be subject to selection bias as high coronary artery disease risk individuals may be preferentially investigated with cardiac catheterisation. In addition, missing data points limited the number of patients who could be analysed in the final multivariate model.

Further studies are required to explore associations between health insurance and coronary artery disease for high risk patients.

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