PULMONARY HYPERTENSION PREDICTS ADVERSE CARDIOVASCULAR OUTCOMES IN PATIENTS WITH NON-ADVANCED CKD

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Introduction

Pulmonary hypertension (PH) is an established cardiovascular risk factor in the general population. PH predicts mortality in dialysis patients but such a relationship has not been tested in patients with early CKD stages. In this study we estimated the prevalence and the risk factors of PH in a cohort of 468 patients with CKD stage 2-4 and tested the prognostic impact of this condition to a combined endpoint including cardiovascular death, acute decompensated heart failure, coronary artery disease events as well as cerebrovascular and peripheral artery events.

Methods

Individual patient data were pooled from two inception cohorts with available echocardiography data of the MAURO study (n=80; Reggio Calabria, Italy) and from the CARE FOR HOMe study (n=388; Homburg, Germany) (Figure 1). Pulmonary artery pressure was estimated (ePAP) by echo-Doppler by applying the modified Bernoulli's equation.

Results

PH (ePASP≥35 mmHg) was present in 23% (n=108) CKD patients. At logistic regression analyses, age (OR 1.06; 95% CI 1.04-1.09; p<0.001) and left atrial volume (LAV/BSA) (OR 1.05; 95% CI 1.03-1.07; p<0.001) were independent predictors of PH. During follow-up (median: 3.0 years; IQR 1.9-3.8), 76 subjects (16%) reached the composite endpoint. At Kaplan-Meier survival curves (Figure 2), patients with high ePASP experienced a significantly faster evolution to the combined endpoint (crude HR 2.70; 95% CI 1.68-4.32; p<0.001 Log-rank test; χ2 18.06). Exploratory ROC curves showed that the optimal ePASP value for discriminating patients reaching the endpoint was nearly identical to the currently recommended high ePASP echocardiographic cut-off adopted in this study (36 vs 35 mmHg; Figure 3). At univariate Cox regression models, high ePASP, older age, presence of diabetes mellitus, lower hemoglobin, higher LAV/BSA, higher LVM/BSA, history of CV comorbidities, and lower eGFR all predicted adverse cardiovascular outcomes. In analyses adjusting for baseline associated to high ePASP (p<0.10) and including all univariate predictors of the combined end-point only high ePASP (HR 1.75; 95% CI 1.05- 2.91; p=0.03), diabetes mellitus (HR 1.61; 95% CI 1.02-2.54; p=0.04), LAV/BSA (HR 1.02; 95% CI 1.01-1.04; p=0.04), history of CV disease (HR 3.63; 95% CI 2.18-6.05; p<0.001) and eGFR (HR 0.97; 95% CI 0.96-0.99; p<0.001) maintained an independent relationship with the same combined end-point.
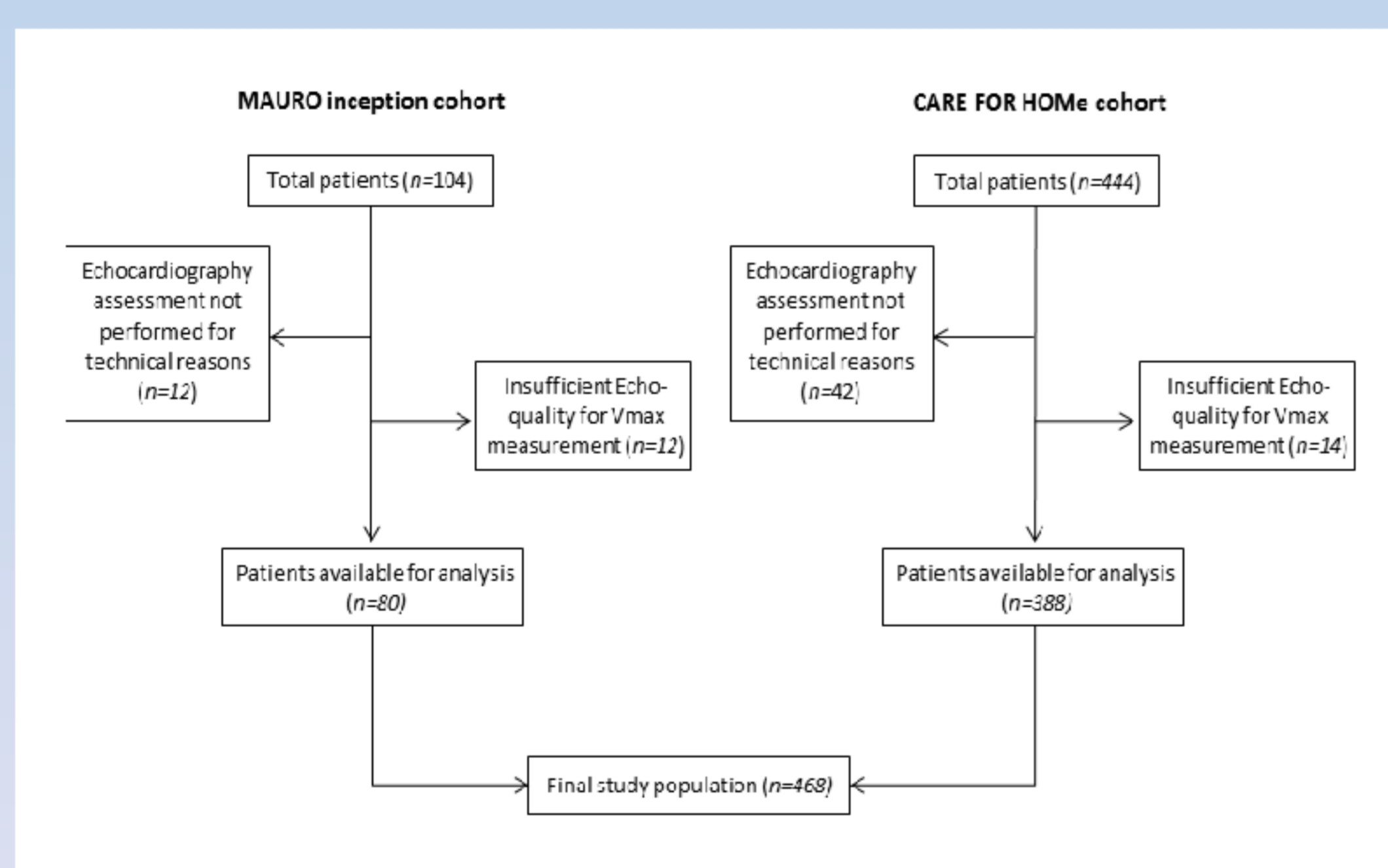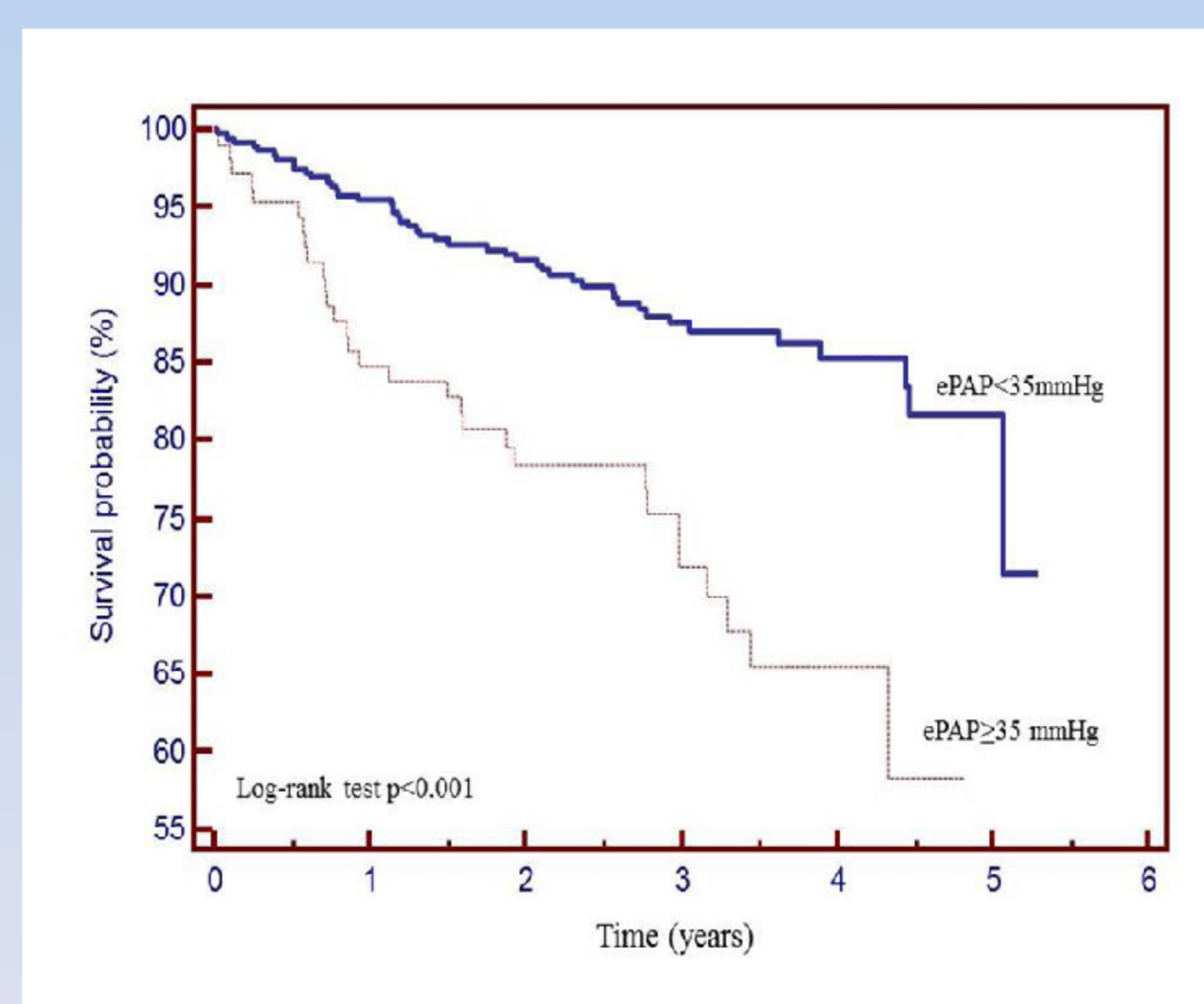

Figure 1: Study flow

Figure 2: Kaplan-Meier survival curves according to ePASP values
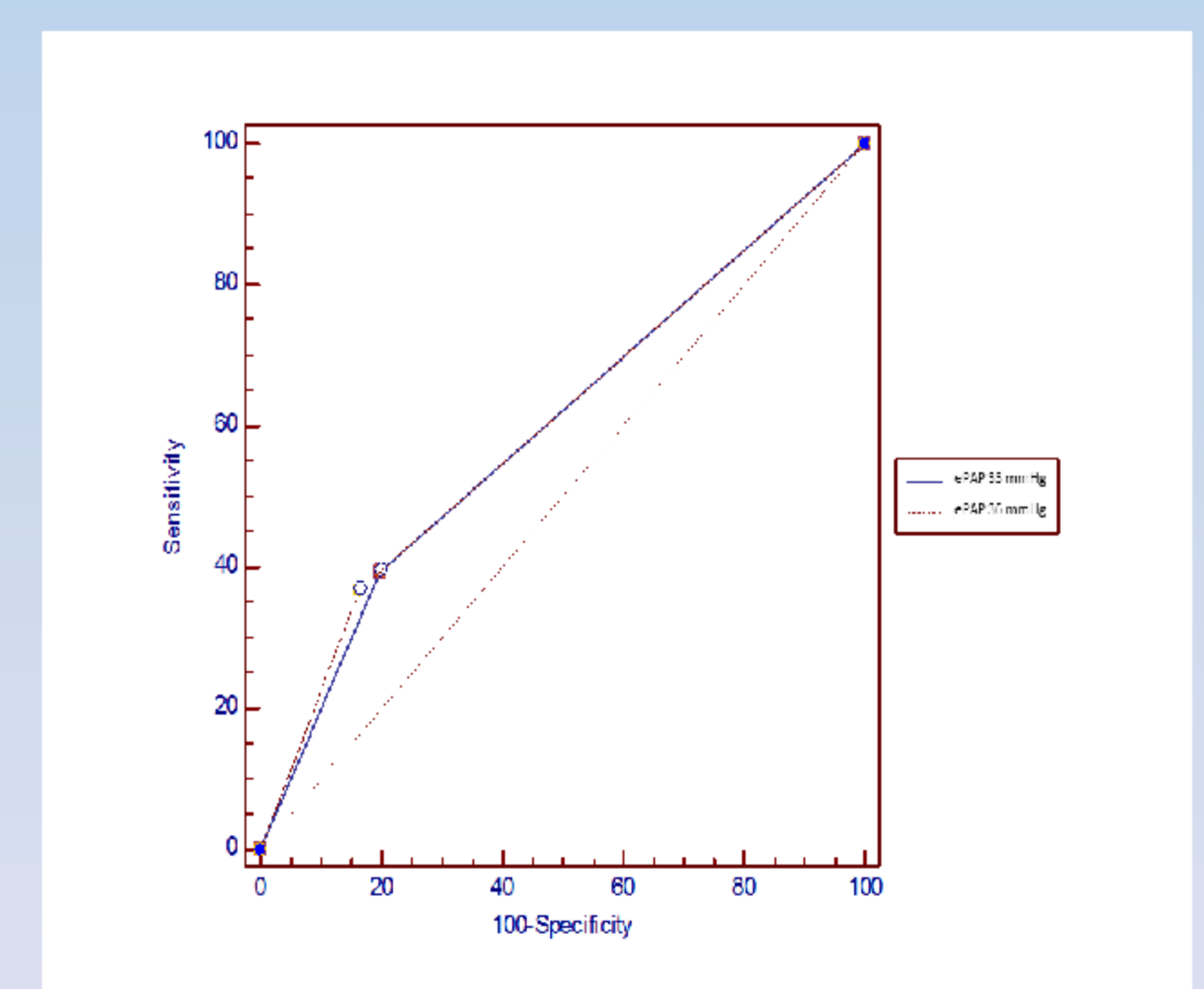

Figure 3: Exploratory ROC curves for ePASP in identifying patients with the composite endpoint

Conclusions

PH is remarkably prevalent in patients with non-advanced CKD and predicts adverse CV outcomes independently of classical and CKD-specific risk factors. Future studies are eagerly awaited to clarify whether PH is a modifiable risk factor in CKD patients.