

**Table S3 Significance testing for baseline characteristics and comorbidity burden across latent classes**

Comorbidity latent classes – Nominal (exploratory) P-values are reported.

Among all classes, patients in Class 1 had the lowest prevalence of dyslipidemia ( $p < 0.001$ ) and CHD ( $p < 0.001$ ), patients in Class 2 had no CKD and broadly lowest prevalence of all comorbidities except for CHD, RA, mental illness & obesity, while Class 4 had lowest prevalence of obesity ( $p < 0.001$ ) and psychoses ( $p < 0.001$ ). Patients in Class 1 had highest prevalence of cancer ( $p < 0.001$ ), weight loss ( $p < 0.001$ ), psychoses ( $p < 0.001$ ), liver disease ( $p < 0.001$ ), and coagulopathy ( $p < 0.001$ ) compared to other classes; members of Class 3 had highest prevalence of CHD and dyslipidemia; Class 4 had highest prevalence of TIA/stroke ( $p < 0.001$ ), chronic pulmonary disease ( $p < 0.001$ ), AF/flutter ( $p < 0.001$ ), valvular disease ( $p < 0.001$ ) and PVD ( $p < 0.001$ ); patients in Class 5 had least proportion of White race (70%), had the overall highest comorbidity burden, specifically the highest prevalence of HTN (99.6%,  $p < 0.001$ ), CKD ( $p < 0.001$ ), obesity ( $p < 0.001$ ), anaemias ( $p < 0.001$ ), diabetes ( $p < 0.001$ ), and HF ( $p < 0.001$ ) compared to patients in other classes (Table 1 and Figure 1).

Overall, mean age ( $\pm$ SD) was 67 ( $\pm$ 13) years, 38% were females, 12% Black, and 43% admitted in Southern hospitals (Table 2). Patients in Class 2 were the youngest (age  $62 \pm 13$  years,  $p < 0.001$ ) and had the highest male proportion (66%,  $p < 0.001$ ), and the lowest hospital costs (\$59,855 (IQR 57,402),  $p < 0.001$ ) compared to patients in other classes (Table 2). On the other hand, Class 4 included the oldest patients ( $75 \pm 11$  years,  $p < 0.001$ ) and fewest Hispanic (2.9%,  $p < 0.001$ ) among all patients admitted with AMI (Table 2 and Figure S2). By both age and gender, 64% of females vs. 51% of males in Class 4 were aged 75+years (Figure S2). Patients in Class 2 and Class 3 spent 2 (IQR 2) days in hospital, while Class 5 had the longest hospital spells of 5 (IQR 5) days ( $p < 0.001$ ).