

P3.040: Lung Cancer Incidence and Competing Mortality by Cardiometabolic Multimorbidity in Screening-Eligible Populations: A Dual-Cohort Study



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INTRODUCTION

- Cardiometabolic multimorbidity (CMM) is prevalent among people eligible for lung cancer screening.
- Previous evidence suggests that CMM are risk factors of lung cancer, and incorporating them may improve screening efficiency.
- Screening people with CMM may also lead to greater harms, because of competing mortality.
- We aimed to quantify the comparative impacts of various CMM patterns with lung cancer incidence and competing mortality.

METHODS

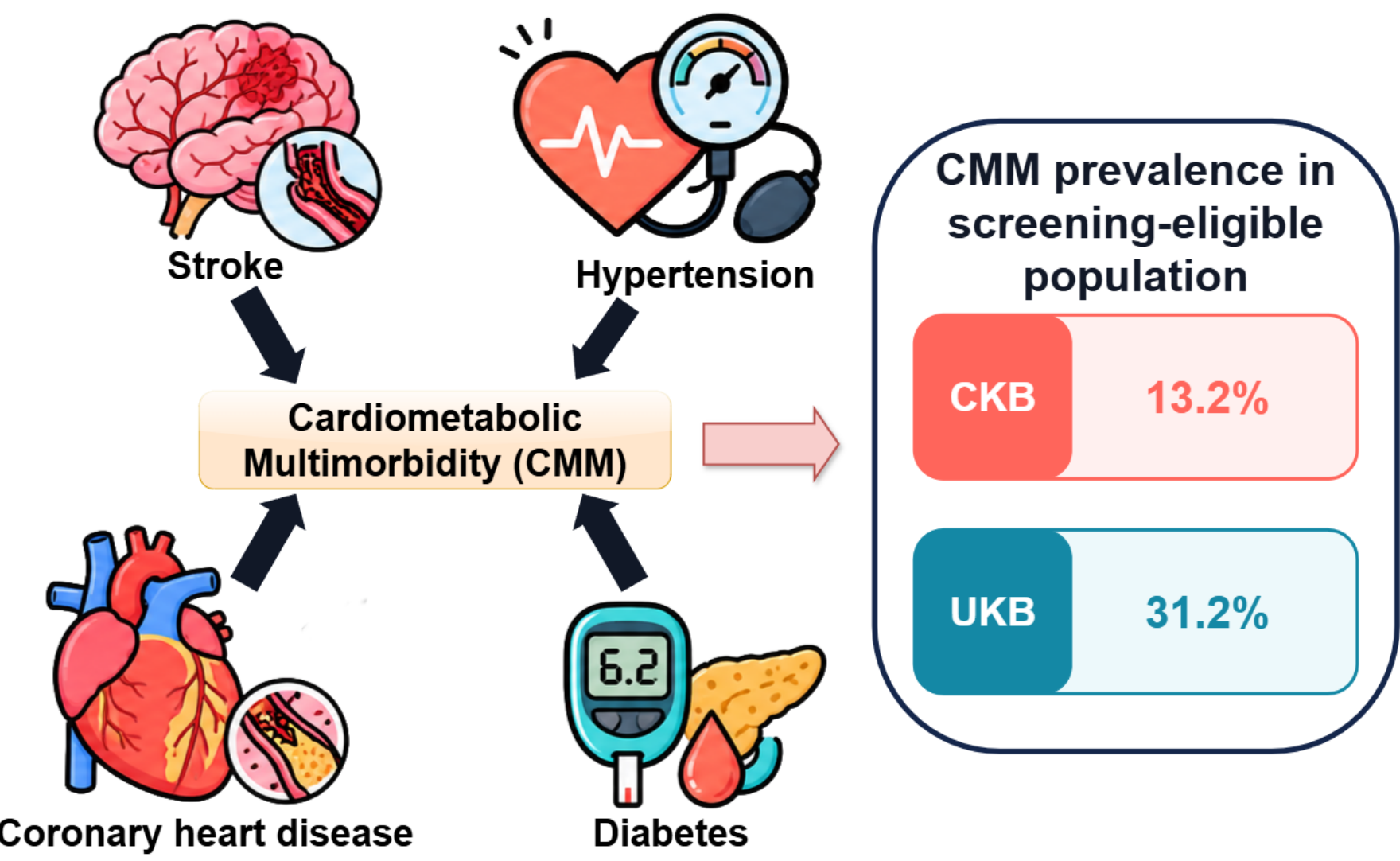
- CMM definition:** Combinations of hypertension, diabetes, coronary heart disease (CHD), and stroke.
- Screening-eligible population:** Selected from the China Kadoorie Biobank (CKB) and UK Biobank (UKB) using the Lung Cancer Risk Score and LLPv2, respectively.
- Flexible parametric survival models:** Estimate hazard ratios (HRs) for the associations of CMM with lung cancer incidence and competing mortality. Relative hazard ratios (RHRs) is defined as:
$$RHR = \frac{HR_{\text{competing mortality}}}{HR_{\text{lung cancer incidence}}}$$
- Pseudo-observation:** Estimate adjusted restricted mean time lost (RMTL) ratio for competing mortality relative to lung cancer incidence over a 10-year horizon. The relative ratio of ratios (RRR) is defined as:

$$RRR = \frac{RMTL\ ratio_{\text{competing mortality}}}{RMTL\ ratio_{\text{lung cancer incidence}}}$$

RESULTS

- 155,229 (30.3%) participants in the CKB and 42,694 (8.5%) in the UKB were screening eligible based on risk prediction models.
- Among the screening eligible participants, the prevalence of CMM were 13.2% and 31.2% in the CKB and UKB, respectively (Figure 1).

Figure 1. Prevalence of CMM among screening-eligible population in CKB and UKB



- In CKB, higher lung cancer risk was associated with CHD & stroke, hypertension & CHD & stroke, diabetes & CHD & stroke, and all four diseases. In UKB, two-disease patterns including hypertension increased lung cancer risk. CMM also increased competing mortality, with risk rising with the number of CMMs in both cohorts.
- In CKB, the highest RHR was observed for diabetes & stroke [3.49, (2.20-5.55)], followed by hypertension & diabetes & stroke [3.28, (2.01-5.34)] and hypertension & stroke [2.83, (2.25-3.55)]. In UKB, the highest RHR was found for diabetes & CHD & stroke [3.76, (2.31-6.11)], followed by all four diseases [3.70, (2.27-6.02)] and diabetes & stroke [2.87, (2.06-3.99)] (Figure 2). The results for RRR were similar with those for RHR.

Figure 2. Pattern-specific HRs and relative hazard ratios (RHRs)

Disease Pattern	CKB		UKB	
	HR (95% CI)	RHR (95% CI)	HR (95% CI)	RHR (95% CI)
Two CMDs				
Hypertension & Diabetes	1.12 (0.96, 1.29) 2.22 (2.14, 2.31)	1.99 (1.71, 2.32)	1.14 (1.00, 1.31) 1.99 (1.87, 2.11)	1.74 (1.50, 2.02)
Hypertension & CHD	1.16 (0.98, 1.37) 1.77 (1.69, 1.85)	1.52 (1.28, 1.81)	1.18 (1.06, 1.31) 1.99 (1.89, 2.09)	1.69 (1.50, 1.89)
Hypertension & Stroke	0.96 (0.77, 1.20) 2.72 (2.59, 2.85)	2.83 (2.25, 3.55)	1.18 (1.03, 1.37) 2.49 (2.34, 2.64)	2.10 (1.80, 2.45)
Diabetes & CHD	1.20 (0.88, 1.64) 2.44 (2.25, 2.65)	2.03 (1.47, 2.81)	1.05 (0.86, 1.30) 2.73 (2.53, 2.94)	2.59 (2.08, 3.23)
Diabetes & Stroke	1.03 (0.66, 1.62) 3.60 (3.29, 3.95)	3.49 (2.20, 5.55)	1.14 (0.83, 1.56) 3.27 (2.94, 3.64)	2.87 (2.06, 3.99)
CHD & Stroke	1.91 (1.36, 2.68) 2.89 (2.60, 3.20)	1.51 (1.06, 2.16)	1.18 (0.96, 1.46) 2.94 (2.71, 3.19)	2.48 (1.98, 3.12)
Three CMDs				
Hypertension & Diabetes & CHD	1.31 (0.93, 1.83) 2.57 (2.36, 2.81)	1.96 (1.39, 2.78)	1.08 (0.88, 1.33) 2.77 (2.56, 2.99)	2.56 (2.05, 3.20)
Hypertension & Diabetes & Stroke	1.14 (0.71, 1.84) 3.74 (3.39, 4.12)	3.28 (2.01, 5.34)	1.09 (0.78, 1.51) 3.27 (2.94, 3.65)	3.01 (2.13, 4.25)
Hypertension & CHD & Stroke	1.93 (1.33, 2.81) 2.99 (2.68, 3.34)	1.55 (1.05, 2.28)	1.12 (0.89, 1.40) 2.98 (2.74, 3.24)	2.66 (2.09, 3.38)
Diabetes & CHD & Stroke	2.39 (1.32, 4.33) 4.17 (3.50, 4.96)	1.74 (0.94, 3.24)	1.04 (0.65, 1.65) 3.89 (3.40, 4.46)	3.76 (2.31, 6.11)
Four CMDs				
Hypertension & Diabetes & CHD & Stroke	2.64 (1.42, 4.93) 4.32 (3.60, 5.19)	1.64 (0.85, 3.13)	1.06 (0.66, 1.68) 3.91 (3.40, 4.49)	3.70 (2.27, 6.02)

CONCLUSION

- Among screening-eligible populations, specific CMM patterns can influence lung cancer incidence and competing mortality to varying extents and may therefore alter the benefit-harm balance of lung cancer screening.
- For participants with the CMM patterns containing the combination of diabetes & stroke, the potential benefits of screening might be largely reduced due to elevated risk of competing mortality.
- Screening guidelines should incorporate cardiometabolic assessment into the selection criteria of eligible populations, and nuanced discussion is needed to inform people with CMM on the potential impact of their comorbidities on the benefits and harms of lung cancer screening.

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