

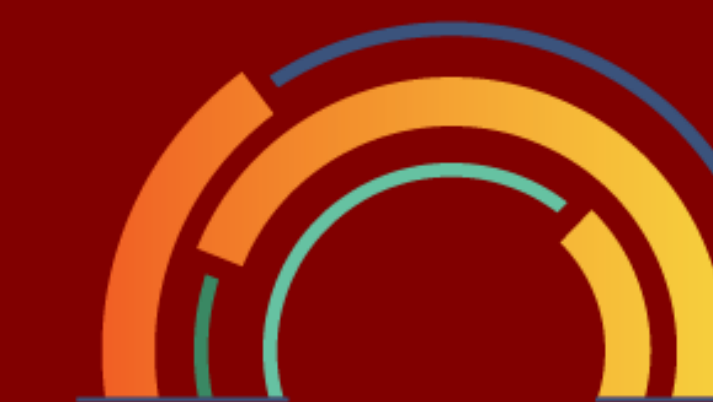


Development and validation of a multimorbidity index predicting mortality among older Chinese adults

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GSA 2021 ANNUAL SCIENTIFIC MEETING

Disruption to Transformation: Aging in the "New Normal"

Introduction

- ◆ There has not been reached an international consensus regarding the standard measurement of multimorbidity.
- ◆ Most weighted multimorbidity indices were developed from hospital patients.
- ◆ Current multimorbidity indices for community-dwelling adults were mostly developed from young or middle-aged populations in western countries.
- ◆ Little research considers the interaction of chronic conditions and distinguish the effects of the coexistence of multiple conditions on mortality.

Objectives

- ◆ To investigate disease combinations significantly associated with 5-year mortality.
- ◆ To develop a multimorbidity index incorporating disease combinations (MIDC) to predict 5-year mortality.
- ◆ To compare the performance of condition count, multimorbidity indices with individual diseases (MI), and MIDC in mortality prediction.

Methods

- ◆ This study included participants aged 65–84 years at baseline (N=14,148) from the Chinese Longitudinal Healthy Longevity Survey (CLHLS).
- ◆ Thirteen chronic conditions, including diabetes, cerebrovascular disease, heart disease, cancer, lung disease, Parkinson's disease, arthritis, hypertension, depressive symptoms, cognitive impairment, sensory impairment, bedridden status, and tooth loss were ascertained at baseline.
- ◆ All-cause mortality was reported by close family members of participants.
- ◆ The association rule mining was performed to identify disease combinations associated with mortality.
- ◆ MI and MIDC were developed by Cox proportional hazards models in the training set (N=8,298).
- ◆ The performance of simple condition count, MI, and MIDC to predict 5-year mortality was compared by Cox proportional hazards models in the validation set (N=3,555).

Results

Table 1. Results of the association rules mining among participants aged 65–84 years (N=11,853)

Rules	Support (%)	Confidence (%)	Lift	Prevalence (%) *
Antecedent	Consequent			
Hypertension, Depressive symptoms	6.6	32.6	1.3	20.4
Hypertension, Sensory impairment	5.1	36.0	1.4	14.2
Sensory impairment, Depressive symptoms	4.6	39.2	1.6	11.6
Hypertension, Lung disease	2.5	33.9	1.3	7.5
Lung disease, Depressive symptoms	2.2	39.2	1.6	5.7
Arthritis, Depressive symptoms	2.0	25.9	1.0	7.9
Cognitive impairment, Depressive symptoms	2.0	58.0	2.3	3.4
Hypertension, Heart disease	2.0	26.2	1.0	7.5
Sensory impairment, Cognitive impairment	1.9	56.7	2.3	3.4
Hypertension, Cerebrovascular disease	1.7	37.2	1.5	4.6
Hypertension, Cognitive impairment	1.7	58.9	2.3	2.8
Hypertension, Tooth loss	1.6	45.5	1.8	3.5
Lung disease, Sensory impairment	1.6	40.6	1.6	3.9

*Prevalence was the proportion of patients with the disease combination among all participants.

Figure 1. Weights, HRs, and 95% CIs of MIDC for 5-year mortality in the training set (N=8,298)

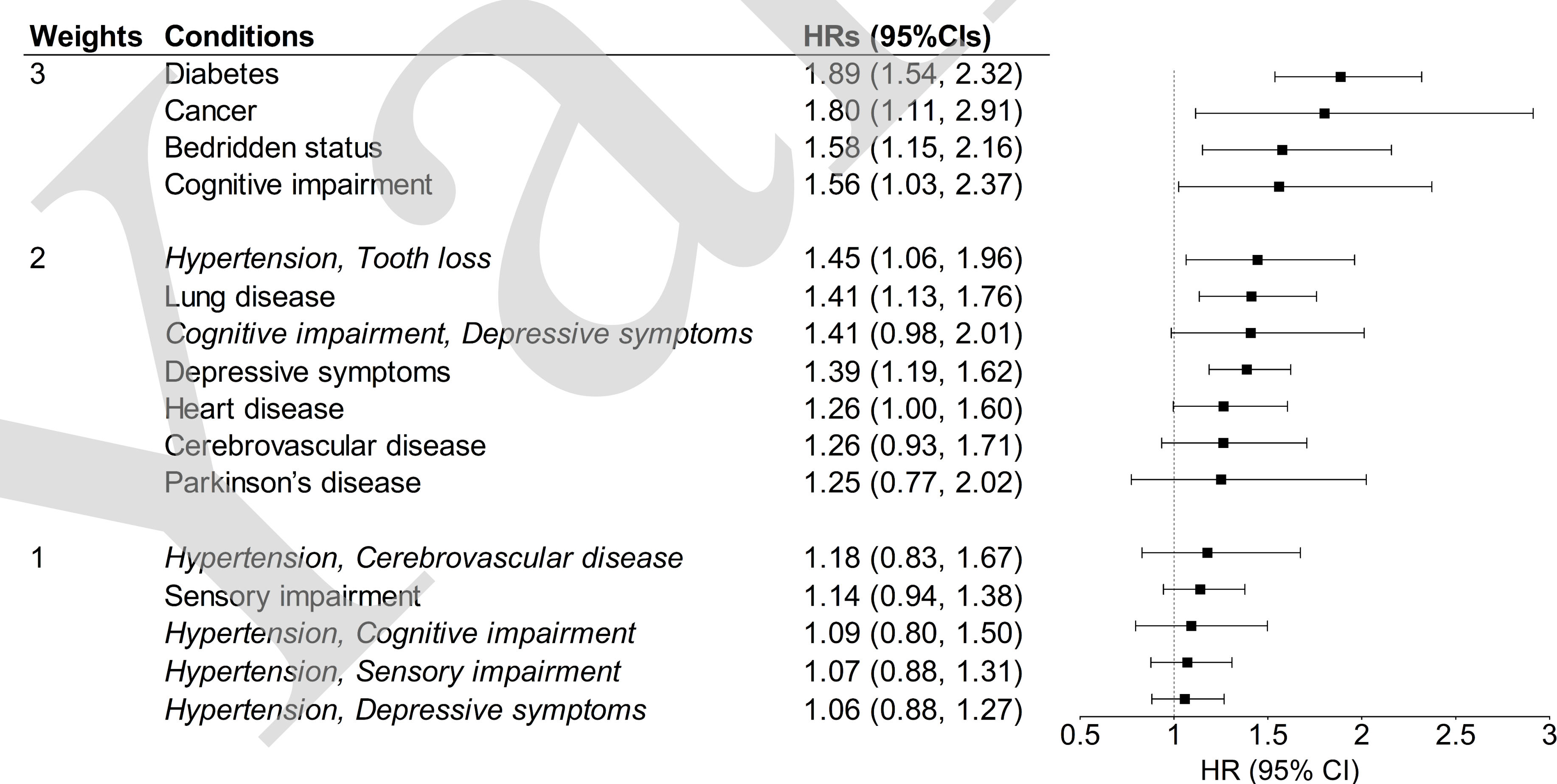


Figure 2. Weights, HRs, and 95% CIs of MI for 5-year mortality in the training set (N=8,298)

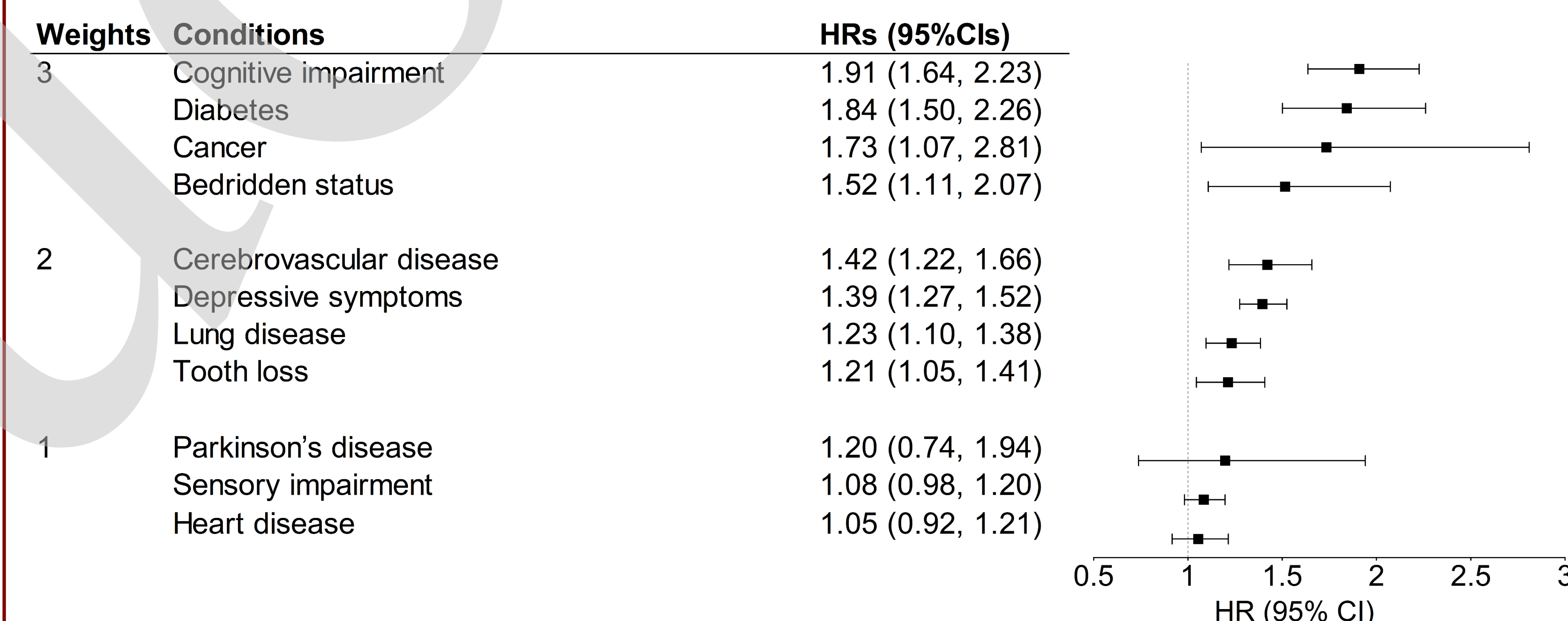


Table 2. C-statistics, IDIs and NRIs for 5-year mortality in the validation set (N=3,555)

Measures of multimorbidity	C-statistic	P-value	IDI	P-value	NRI	P-value
Base model*	0.701	Ref	-	Ref	-	Ref
Base model + Condition count	0.710	<0.001	0.017	<0.001	0.083	<0.001
Base model + MI	0.711	<0.001	0.020	<0.001	0.101	<0.001
Base model + MIDC	0.713	<0.001	0.022	<0.001	0.110	<0.001
Base model + Condition count	0.710	Ref	-	Ref	-	Ref
Base model + MI	0.711	0.231	0.002	0.259	0.017	0.478
Base model + MIDC	0.713	0.016	0.005	<0.001	0.038	0.478
Base model + MI	0.711	Ref	-	Ref	-	Ref
Base model + MIDC	0.713	0.031	0.003	0.090	-0.019	0.965

Note: IDI, Integrated Discrimination Improvement; NRI, Net Reclassification Index
*The base model included age and sex as independent variables.

Conclusions

- ◆ Hypertension and depressive symptoms, as well as hypertension and sensory impairment, were the most prevalent disease combinations among older Chinese adults.
- ◆ Multimorbidity index considering the effects of specific disease combinations provides a more nuanced risk classification of older patients and a qualitative dimension that be useful in clinical practice and research.

Financial disclosure

- ◆ All authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.