

Excess hospital costs of complications in Chinese patients with type 2 diabetes in year of event and beyond – results from the Joint Asia Diabetes Evaluation (JADE) Register (2007-2018)



香港中文大學
The Chinese University of Hong Kong

CU
Medicine
HONG KONG
香港中文大學醫學院
Faculty of Medicine
The Chinese University of Hong Kong



香港糖尿病及肥胖症研究所
HONG KONG INSTITUTE OF
DIABETES AND OBESITY

^{1,2,3,4}Juliana Lui, ^{1,2,3,4}Eric Lau, ^{1,2,3}Aimin Yang, ^{1,2,3}Hongjiang Wu, ⁴Amy Fu, ⁴Vanessa Lau, ¹Kitman Loo, ¹Theresa Yeung, ²Rebecca Yue,

¹Kelly Wong, ^{1,2,3}Ronald Ma, ^{1,2,3}Alice Kong, ^{1,2}Risa Ozaki, ^{1,2,3,4}Andrea Luk, ^{1,2,3}Elaine Chow, ^{1,2,3}Juliana CN Chan

¹Department of Medicine and Therapeutics, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong ²Hong Kong Institute of Diabetes and Obesity, The Chinese University of Hong Kong, Prince of Wales Hospital, Shatin, Hong Kong ³Li Ka Shing Institute of Health Sciences, The Chinese University of Hong Kong Prince of Wales Hospital, Shatin, Hong Kong ⁴Asia Diabetes Foundation, Shatin, Hong Kong

Background

- Type 2 diabetes (T2D) is an expensive disease associated with multiple complications, with China shouldering the highest population with diabetes
- Remarkable increase of 316% in diabetes-related healthcare expenditure from USD 232 billion in 2007 to USD 966 billion in 2021, with China as the second-highest spender globally with expenditures amounting to USD\$165 billion in 2021¹
- Majority of diabetes-related hospital costs linked to treatment of cardiovascular-renal complications ^{2,3}
- Variations in disease profiles⁴, healthcare costs, and utilization⁵ between Asians and Westerners
- First Asian study estimating temporal annual hospital costs associated with comprehensive array of diabetes complications in year of event and subsequent annual time categories
- Utilizing 12-years follow-up data from Hong Kong JADE Register including Chinese patients with T2D enrolled in 2007-2018.

Methods

- 19,921 Chinese patients with T2D underwent structured assessment guided by JADE web platform with outcomes retrieved from territory-wide electronic medical records.
- Inpatient and outpatient unit costs were obtained from the Hospital Authority gazette.
- Non-fatal events defined by ICD 9 codes, death dates retrieved from Death Registry
- Healthcare cost data skewed due to high frequency of zero annual hospital costs.
- Both single equation generalized linear models (GLMs) and two-part models were evaluated. Different GLM specifications (Gaussian, Poisson, and gamma family distributions, identity and log link functions) were compared. Goodness of fit tests and model fit statistics were used to select final GLM model
- Cost regressions adjusted for participants' demographic and clinical characteristics and Elixhauser comorbidity index.
- Excess annual hospital costs associated with diabetes complications were estimated using the recycled prediction method with clustered standard errors generated from 1000 bootstrap resamples.

Results

- Mean age \pm SD: 59.9 \pm 11.9 years, 56.5% men, median diabetes duration: 5.0 (IQR: 1.0-11.0) years, HbA1C: 7.5% \pm 1.6% with median of 8.0 (IQR: 5.0-10.0) years of follow up
- Mean annual hospital costs were \$2,198USD (SD: \$9150USD) per patient.
- Non-zero hospital costs were reported in 25% of the 147,338 person-years of follow up during the study.

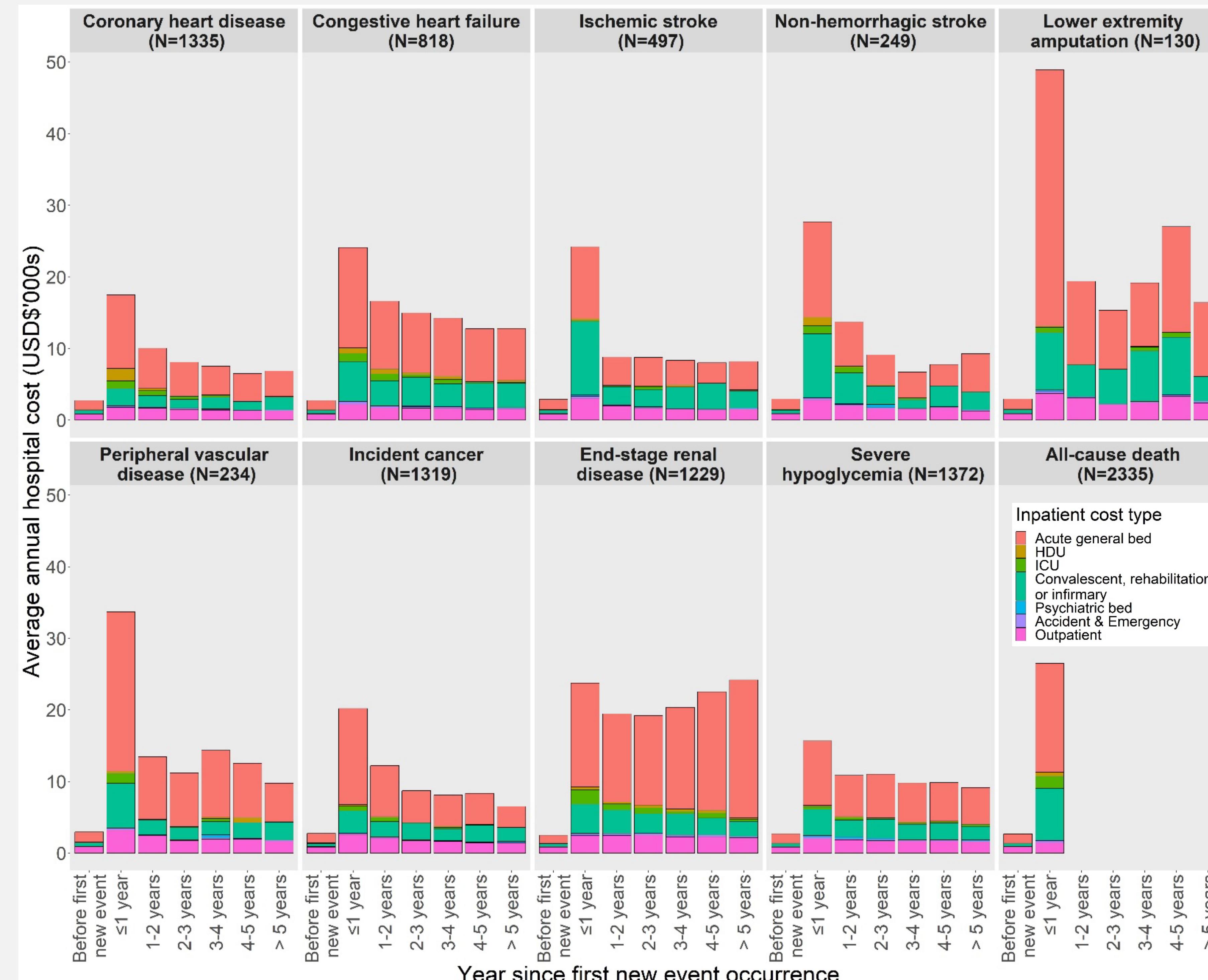


Figure 1. Average annual hospital cost by type of inpatient healthcare utilization in the year of event and subsequent years

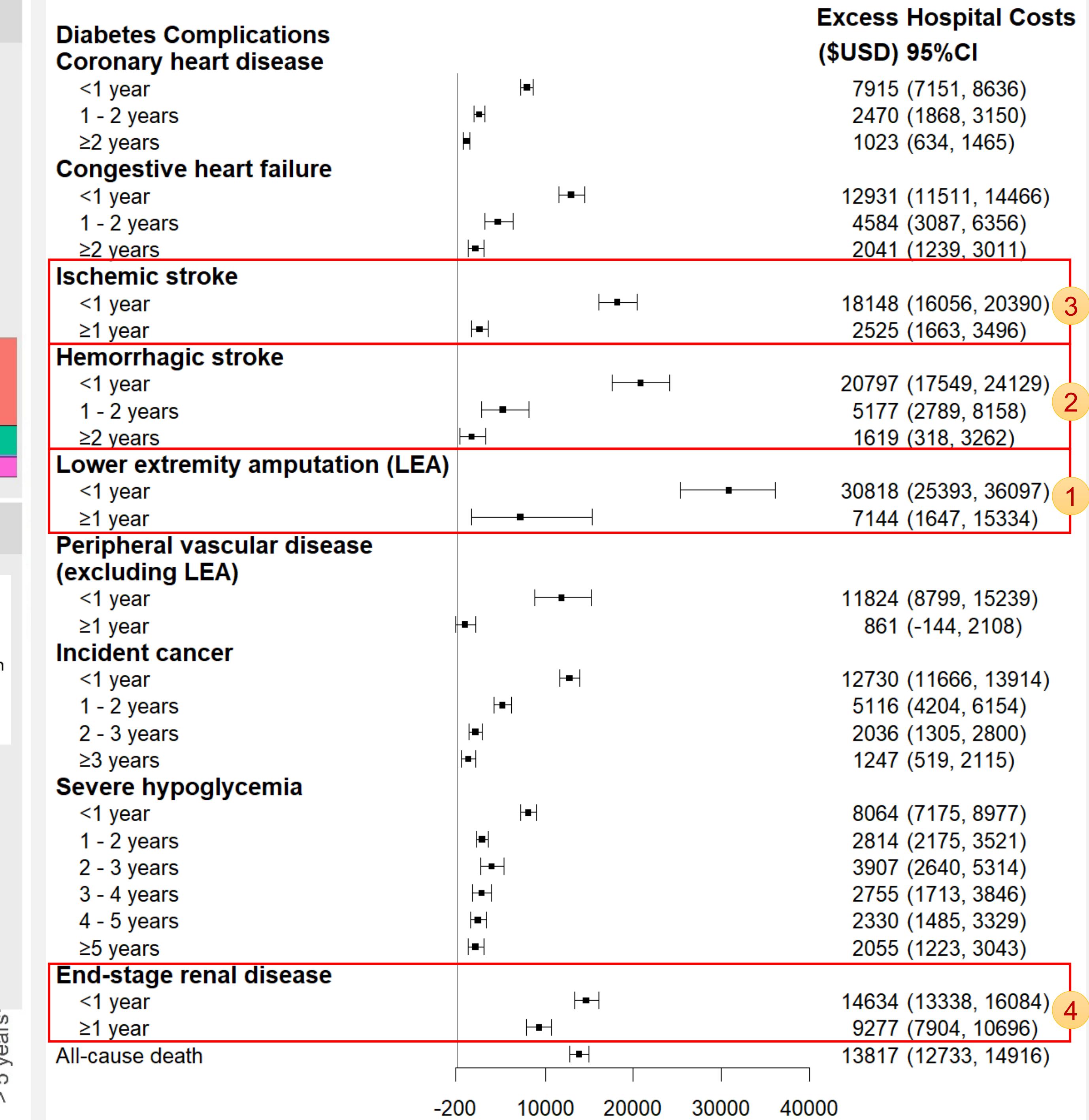


Figure 2. Excess annual hospital costs associated with diabetes related complications

Conclusion

- Results provide evidence for policymakers in shaping healthcare policies and resource allocation strategies for growing diabetes population.
- These findings establish strong basis for long-term cost-effectiveness analyses of interventions and prevention programs in an Asian context.

References

- International Diabetes Federation. IDF Diabetes Atlas, 10th edn. Brussels, Belgium: International Diabetes Federation; 2021.
- Zhang P, Zhang X, Brown J et al. Global healthcare expenditure on diabetes for 2010 and 2030. *Diabetes Res Clin Pract*. 2010;87(3):293-301.
- Clarke PM, Glasziou P, Patel A et al. Event rates, hospital utilization, and costs associated with major complications of diabetes: a multicountry comparative analysis. *PLoS Med*. 2010;7(2):e1000236.
- Ma RC, Chan JC. Type 2 diabetes in East Asians: similarities and differences with populations in Europe and the United States. *Ann N Y Acad Sci*. 2013;1281(1):64-91.
- Lui JNM, Williams C, Keng MJ et al. Impact of New Cardiovascular Events on Quality of Life and Hospital Costs in People With Cardiovascular Disease in the United Kingdom and United States. *J Am Heart Assoc*. 2023;12(19):e030766