Development of an Interactive Tool for Better Understanding and Communication of Gastric Cancer Survival and Competing risk

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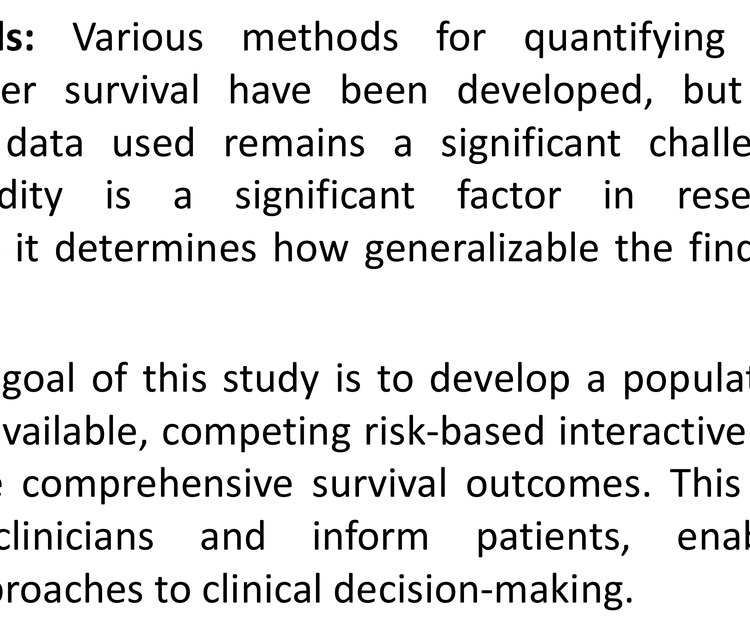
INTRODUCTION

- **Gastric Cancer:** Gastric cancer is the fifth most frequently diagnosed cancer and the fifth leading cause of cancer-related deaths worldwide. Through the screening programs and advancements in treatment options, the long-term outcomes for patients with gastric cancer have significantly improved.
- **Survival and Competing Risk:** Most gastric cancer survival studies are limited to relative or overall survival using conventional models. However, these models are inappropriate when competing events exist, as they treat other causes of death as censored data, leading to biased results. In such cases, competing risk analysis is a more suitable approach, as it considers competing events when predicting survival outcomes.
- **Prognostic Tools:** Various methods for quantifying and presenting cancer survival have been developed, but the validity of the data used remains a significant challenge. Population validity is a significant factor in research methodology, as it determines how generalizable the findings are.
- **Study Aim:** The goal of this study is to develop a population-based, publicly available, competing risk-based interactive tool to provide more comprehensive survival outcomes. This tool will support clinicians and inform patients, enabling personalized approaches to clinical decision-making.

METHODS

- **Study population:** Utilizing the Cancer Public Library Database, a population-based database established under K-Cure project, we used data from 166,905 primary gastric cancer patients diagnosed between 2014 and 2019.
- **Statistical analysis:** Standard survival analysis was performed using the Kaplan-Meier method and Cox regression, while competing risks were analyzed using the Cumulative Incidence Function and Fine-Gray method for sub-distribution hazard. To develop the online tool, the model was fitted using the corresponding model parameters exported. The web application has been developed with R Shiny.



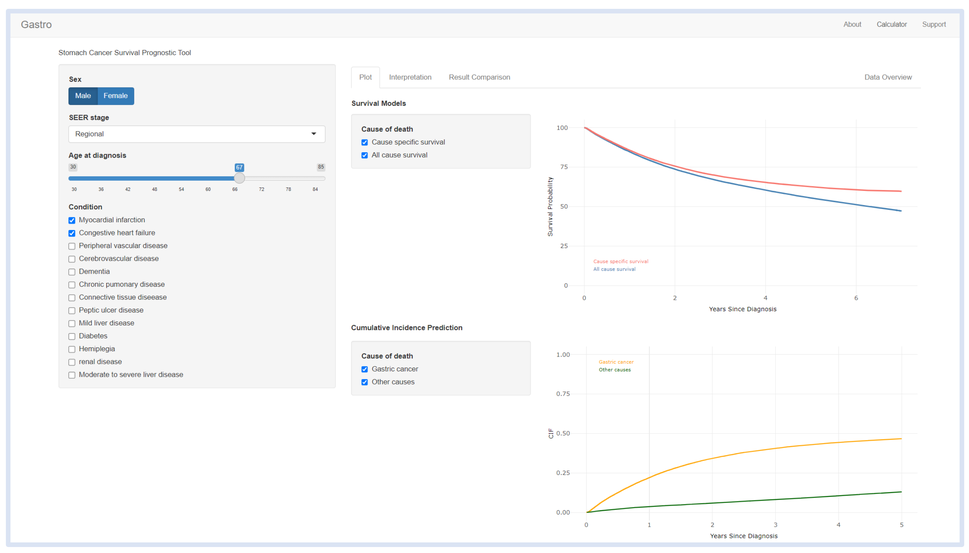
	Yes	No
Death	43,507 (26.1%)	123,398 (73.9%)
Gastric cancer death	34,875 (20.9%)	132,030 (79.1%)
Other cause death	8632 (5.2%)	158,273 (94.83%)

RESULTS

- *Table 1. 5-year survival statistics by gender and age*

	All cause survival (%) [95% CI]		Probability of death from other cause (%) [95% CI]		Probability of death from gastric cancer (%) [95% CI]	
	5-year	95% CI	5 year	95% CI	5 year	95% CI
Sex						
Male	70.7	[70.3; 70.9]	7	[6.9; 7.3]	22.1	[21.9 ; 22.4]
Female	70.7	[70.3; 71.2]	5	[4.5 ; 5]	24.5	[24.1 ; 24.5]
Age						
30-54	79.2	[78.9 ; 79.7]	1.9	[1.7; 2]	18.9	[18.4 ; 19.4]
55-64	78.9	[78.3 ; 79.4]	3.9	[3.6; 4.1]	17.2	[16.7 ; 17.7]
65-74	70.1	[69; 70.7]	8.6	[8.2; 8.8]	21.3	[20.1; 21.8]
75-85	39.1	[38.3; 40]	14.1	[13.5; 14.6]	46.9	[46.1; 47.7]

- *Figure 1. Screenshot of the gastric cancer survival interactive tool page.*



- The results are presented in various interactive formats, enhancing the understanding of individual risk and differences between multiple measures. It also offers a detailed overview of the population's survival statistics, allowing for comparison and advocacy of individual estimates.

CONCLUSIONS

- This interactive tool is presented as a predictive tool that engages users through its interactive features, thereby improving the understanding of gastric cancer survival statistics. Future development will focus on incorporating additional variables to enrich the tool's predictive capabilities.

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