GASTRO: Development of an AI-Powered Personalized Prognosis Communication Tool for Gastric Cancer Using Population-Based Cancer Data and Competing Risks Approach

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국립암센터 NATIONAL CANCER CENTER

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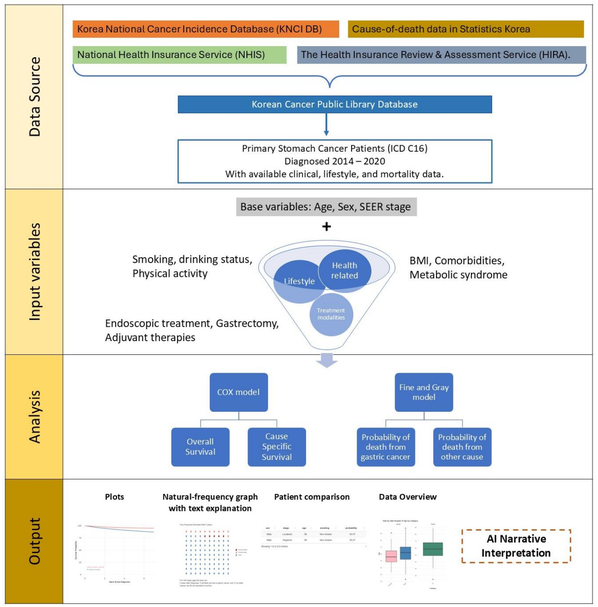
INTRODUCTION

- **Gastric Cancer:**
  - Ranked 5th for incidence and mortality worldwide in 2022.
  - Improved detection and long-term outcomes in screened populations, such as South Korea.
- **Why long-term survival matters:**
  - As more patients survive initial therapy, competing other causes of death increase; accurate prognosis must account for these competing risks.
  - However, existing prognostic tools rarely incorporate competing events or population-based data, limiting real-world clinical utility.

To address this, we aimed to develop **GASTRO**, a population-based comprehensive competing-risk survival calculator for gastric cancer.

METHODS

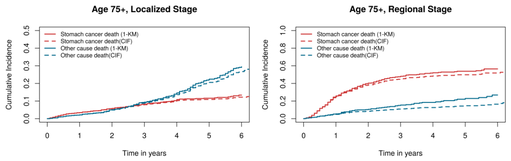


RESULTS

1. Study Population

A total of 180,462 patients with primary gastric cancer (2014–2020) were included, with a maximum follow-up of 8 years. The mean age was 62.8 ± 10.7 years, and 68.2% were male. According to SEER staging, 72.1% presented with localized disease, 19.4% with regional disease, and 8.5% with distant disease.

Figure 1. Comparison of Cause Specific Survival and Cumulative Incidence Estimates for Stomach Cancer Death and Other Cause Death Among Patients Aged 75 Years and Older by SEER Stage



3. Calculator Development

The calculator was implemented using the estimated regression coefficients derived from models and the formula for the Survival Estimate and Cumulative Incidence Function (CIF):

$$\hat{S}(t|\boldsymbol{X}) = exp(-\hat{H}_0(t) \cdot exp(\eta))$$

$$\widehat{CIF}_k(t|\boldsymbol{X}) = 1 - exp(-\hat{H}_{0k}(t) \cdot exp(\eta))$$

4. AI narrative interpretation

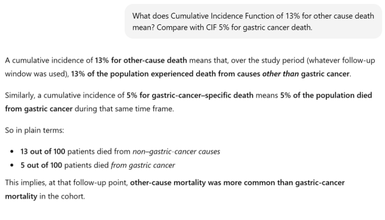


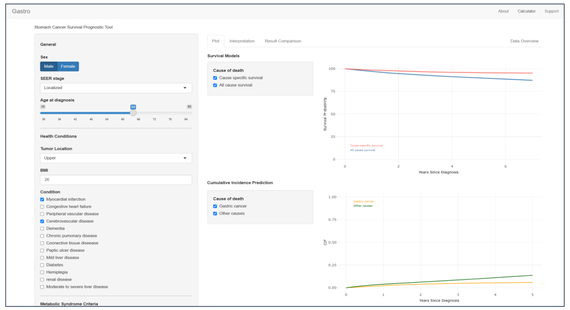
Table 1. 5-year Survival Outcomes and Probability of Death

Estimate	%	95% CI
Overall Survival	72.8	72.5 – 73.0
Cancer Specific Survival	78.3	78.1 – 78.5
Probability of death from gastric cancer	21.3	21.1 – 21.5
Probability of death from other cause	5.9	5.8 – 6.1

2. Model Development

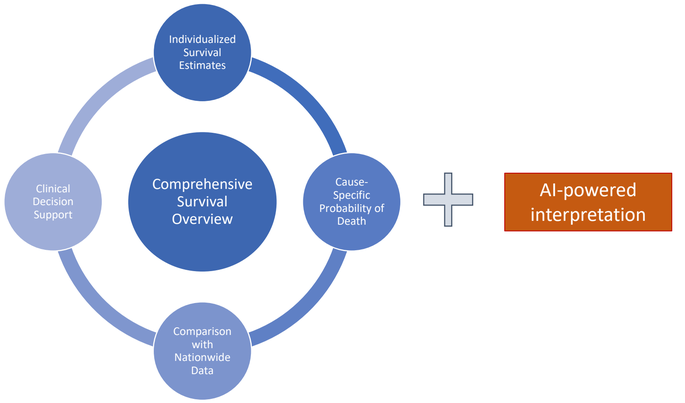
The final models were developed using backward selection, with all variables retained. Model performance was assessed through internal validation using 5-fold cross-validation demonstrated strong performance, with both C-index and AUC exceeding 0.70 in all models, indicating good predictive accuracy.

Figure 2. Screenshot of the GASTRO web-based prognostic tool



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.

IMPLICATIONS OF THE PROGNOSTIC TOOL



CONCLUSIONS

This interactive tool predicts gastric cancer survival using multiple clinical inputs and diverse outputs, facilitating clear clinician-patient communication and informed decision-making.

Future development will integrate additional survival measures and AI-driven interpretation, making sophisticated prognostic insights more accessible and advancing personalized care in gastric cancer.

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- The authors have nothing to declare.

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