Cabrini Research Forum 2026

Cancer or non-cancer death after colorectal cancer surgery: predicting competing risks

Mohammad Asghari-Jafarabadi, Simon Wilkins, Katherine Goodall, Veena Suresh, Rathin Gosavi, Paul J. McMurrick

Cabrini Research; Monash University; Cabrini Monash University Department of Surgery

MONASH University

CABRINI MONASH UNIVERSITY DEPARTMENT OF SURGERY

Better Research Brighter Lives

Analysis cohort: 3,048 patients

Cancer-related deaths: 441

Non-cancer deaths: 188

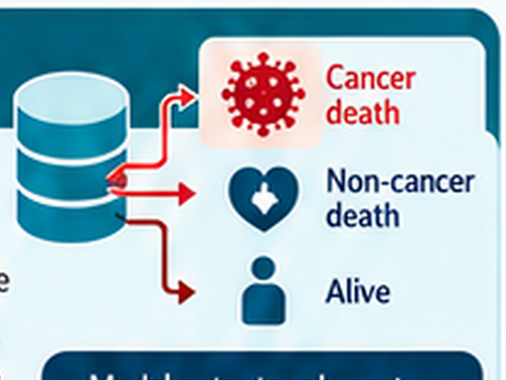
5-year cumulative incidence: 16.3% cancer death | 7.2% non-cancer death

Background

After colorectal cancer surgery, patients may die from colorectal cancer or from other medical conditions. These are competing outcomes and are especially relevant for older or medically complex patients.

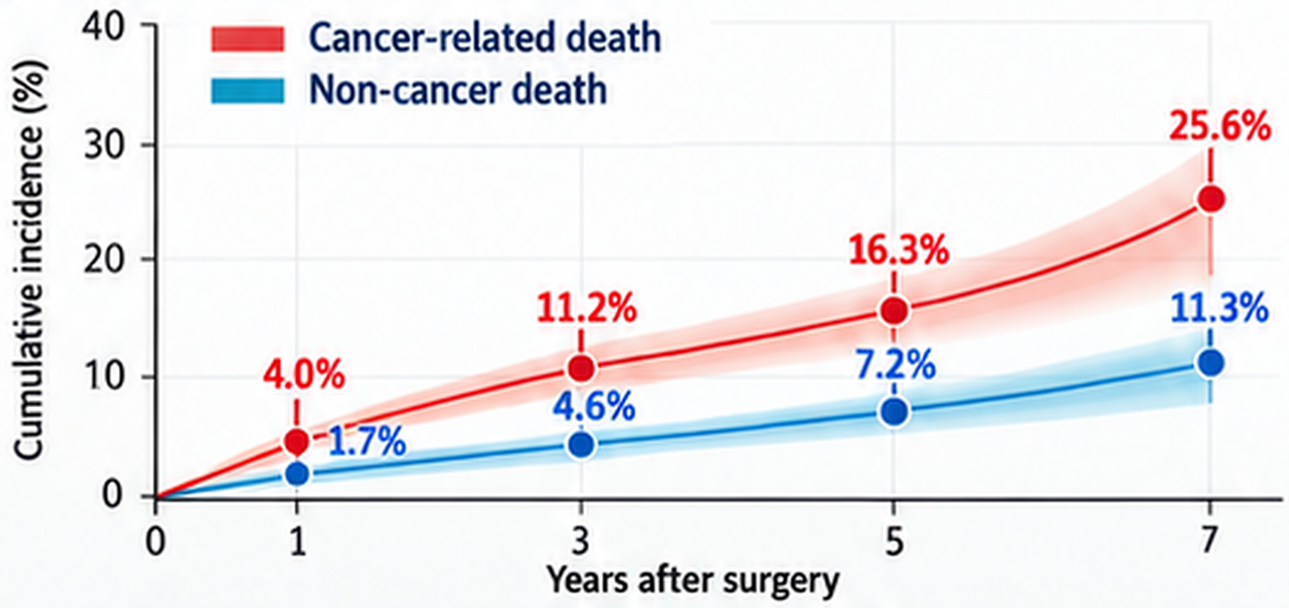
Methods

We analysed 3,048 patients from the Cabrini Monash Colorectal Neoplasia Database. Cancer-related and non-cancer deaths were modelled separately but simultaneously to generate coherent risks of cancer death, non-cancer death and remaining alive. Conventional competing-risk models were compared with a neural-network approach on a locked test sample.



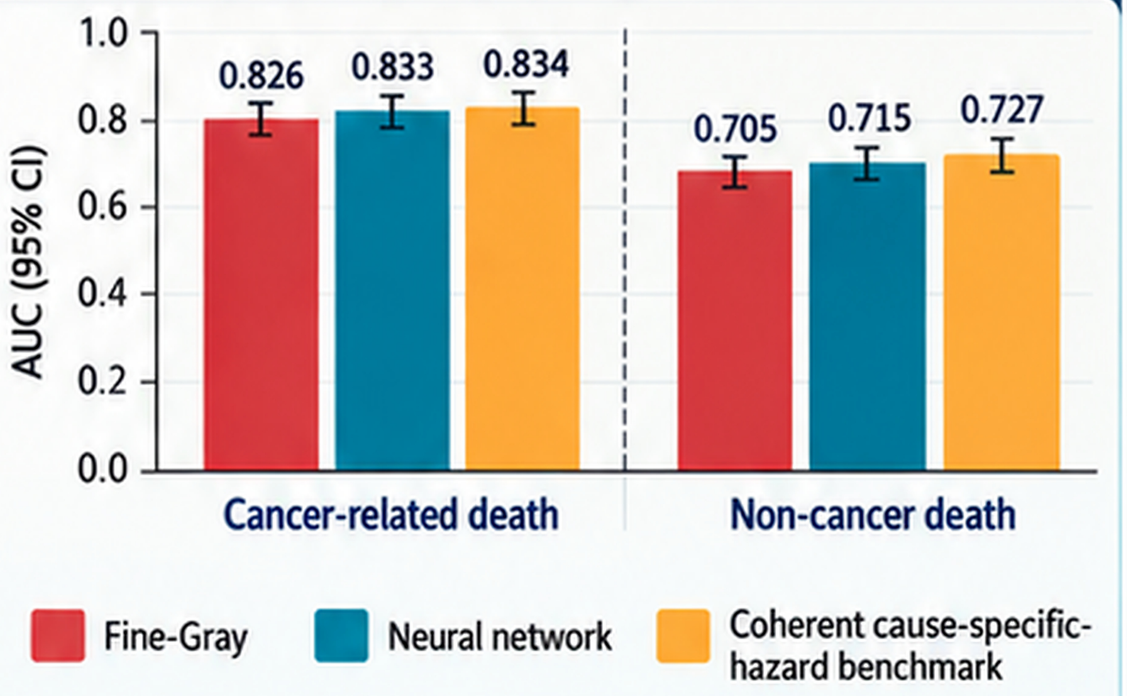
Model outputs coherent probabilities of cancer death, non-cancer death and survival.

Observed cumulative risk



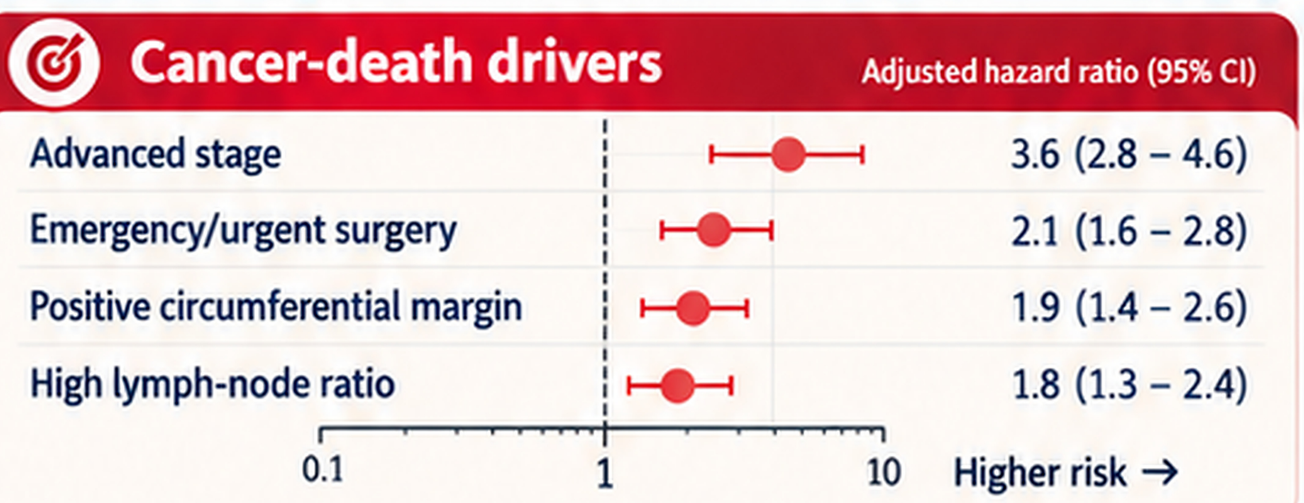
Cancer death	4.0%	11.2%	16.3%	25.6%
Non-cancer death	1.7%	4.6%	7.2%	11.3%

5-year locked test discrimination



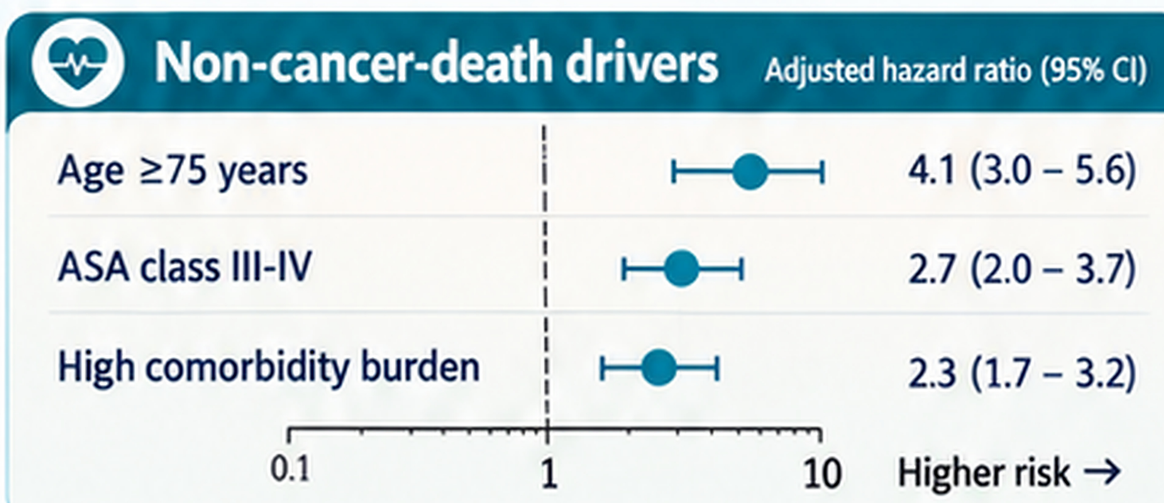
Cancer-death drivers

Adjusted hazard ratio (95% CI)



Non-cancer-death drivers

Adjusted hazard ratio (95% CI)



Key results

- Conventional and machine-learning approaches showed very similar 5-year performance.
- The neural network did not show a clear overall advantage.
- Cancer-related and non-cancer mortality had distinct clinical drivers.
- Two patients with similar cancers may have different overall prognoses because of competing health risks.

Conclusion

Separating cancer-related from non-cancer mortality provides a more clinically meaningful picture than predicting all-cause death alone. A combined risk calculator could support counselling, survivorship planning and multidisciplinary review, especially for older and comorbid patients. External validation is needed before clinical implementation.

Different risks. Better conversations. More personalised care.

References

1. Fine JP, Gray RJ. A proportional hazards model for the subdistribution of a competing risk. JASA. 1999;94:496-509.
2. Putter H, Fiocco M, Geskus RB. Competing risks and multi-state models. Stat Med. 2007;26:2389-2430.

People Research Progress