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How does prognosis change after colorectal cancer surgery?

Dynamic prediction over time

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REAL DATA. DYNAMIC INSIGHTS. BETTER LIVES.

Background

Prognosis after colorectal cancer surgery is not fixed at the time of surgery. It changes as patients remain recurrence-free, develop recurrence, or survive longer.

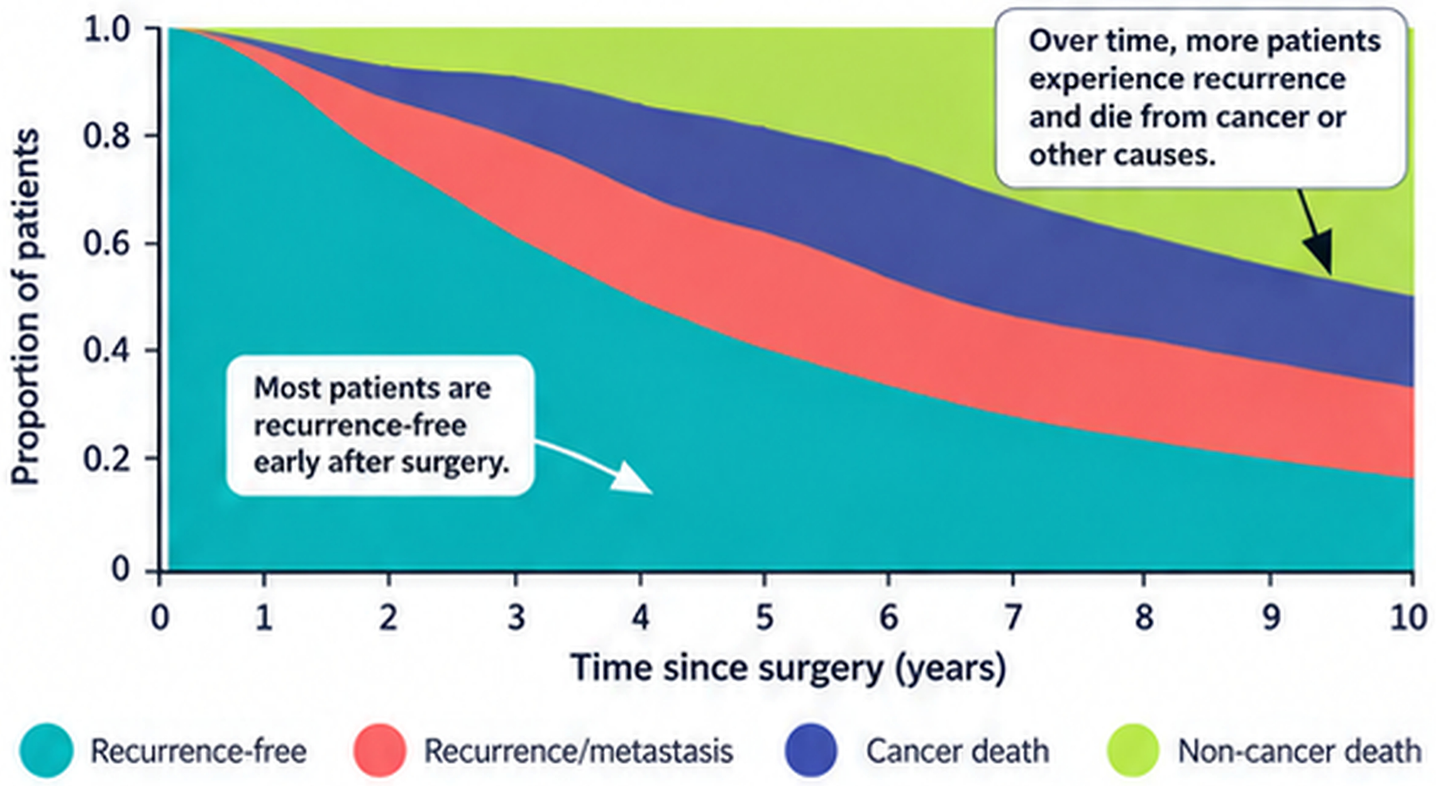
Methods

We analysed 3,271 patients from the Cabrini Monash Colorectal Neoplasia Database using a dynamic multi-state / landmark framework. Risks of recurrence/metastasis, cancer-related death and non-cancer death were updated at clinically relevant times among patients still alive and recurrence-free. Conventional and machine-learning models were compared on a separate test sample.

Cohort outcomes

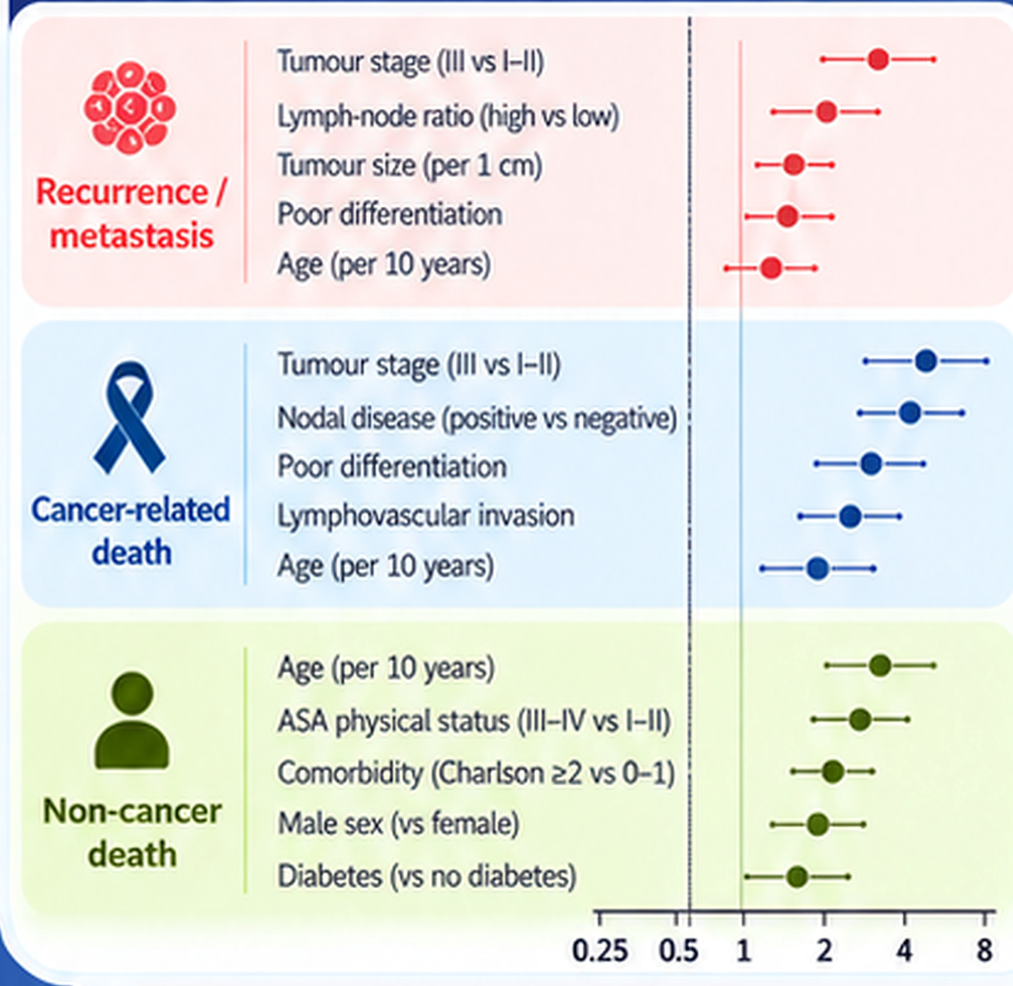
- Recurrence/metastasis: 479
- Cancer-related deaths: 497
- Non-cancer deaths: 198
- Deaths after documented recurrence: 302

Postoperative clinical-state occupancy



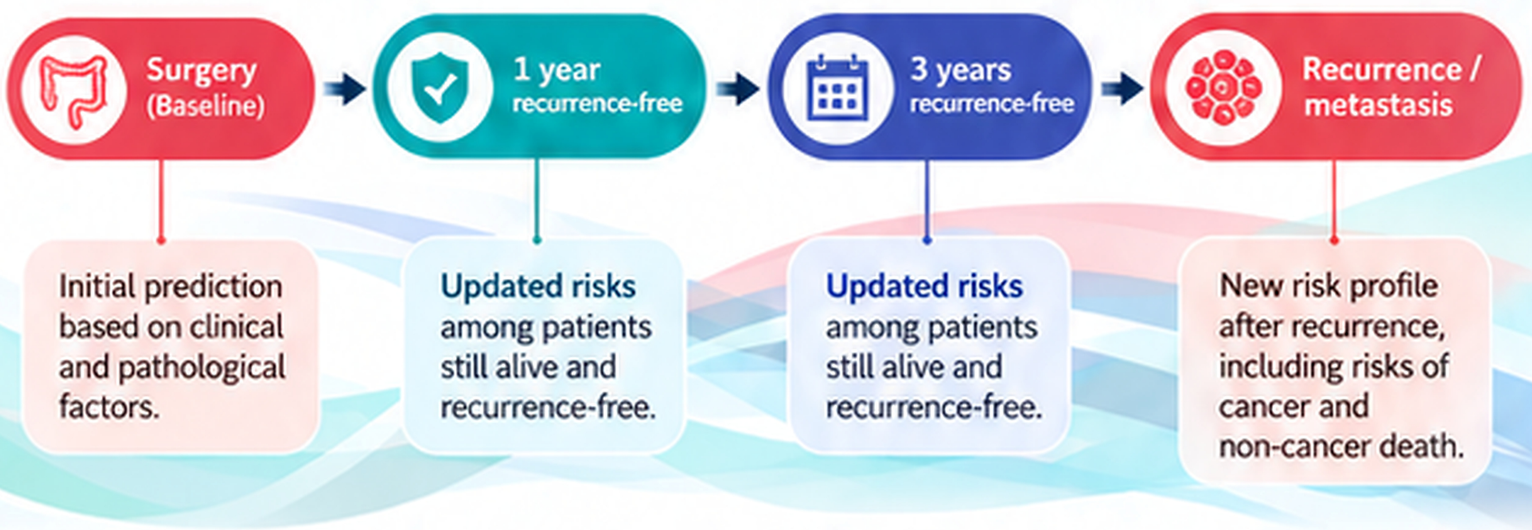
Outcome-specific drivers

Hazard ratio (95% CI) (log scale)



Dynamic prediction

A patient's risk profile is updated at each time point and can be very different from the original estimate at surgery.



Key results

1. At surgery, 5-year prediction was strongest for cancer-related mortality and more modest for recurrence.
2. Patients remaining recurrence-free for 1 or more years had updated outcome risks.
3. Cancer-related mortality was driven mainly by tumour stage and nodal disease.
4. Non-cancer mortality was driven mainly by age, ASA status and comorbidity.

Conclusion

Postoperative colorectal cancer prognosis should be viewed as a changing clinical trajectory rather than a single baseline estimate. Dynamic prediction can support more personalised surveillance, survivorship care, patient counselling and multidisciplinary follow-up. External validation is required before clinical implementation.

References

1. van Houwelingen HC, Putter H. Dynamic Prediction in Clinical Survival Analysis. CRC Press; 2012.
2. Putter H, Fiocco M, Geskus RB. Competing risks and multi-state models. Stat Med. 2007;26:2389-2430.

Abbreviations

ASA = American Society of Anesthesiologists physical status