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Impact of Age on Survival Following Surgery for Non- Metastatic Melanoma

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Disclosures

I have no financial disclosures to report.

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Aim and Study Objectives

- To investigate the impact of age on survival following surgical intervention for non-metastatic melanoma.
 - **Primary Objective:** To determine the impact of age on survival metrics, focusing on overall survival (OS) and long-term survival (LTS).
 - **Secondary Objective:** To identify predictors of long-term survival and develop a nomogram to predict the probability of OS and LTS in patients with non-metastatic melanoma.

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Methodology – Study Population

Data from the National Cancer Database (NCDB) spanning from 2004-2021 was queried.

- **Eligibility:** Patients, age 18 or older with non-metastatic melanoma.
 - **Histology:** Various types of melanoma were included, such as melanoma NOS, superficial spreading, and lentigo maligna.
- **Surgical Cohort:**
 - 18-64 years old
 - 65-74 years old
 - ≥75 years old
- **Non-Surgical Cohort, all ages**

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Methodology – Study Population

Non-Surgical Cohort, all ages

Surgical treatment was **not part of the first treatment course** for 89.9% of non-surgical patients.

Reason for No Surgery of Primary Site continued

Code	Definition
0	Surgery of the primary site was performed
1	Surgery of the primary site was not performed because it was not part of the planned first course treatment
2	Surgery of the primary site was not recommended/performed because it was contraindicated due to patient risk factors (comorbid conditions, advanced age, progression of tumor prior to planned surgery, etc.)
5	Surgery of the primary site was not performed because the patient died prior to planned or recommended surgery
6	Surgery of the primary site was not performed; it was recommended by the patient's physician, but was not performed as part of the first course of therapy. No reason was noted in patient record
7	Surgery of the primary site was not performed; it was recommended by the patient's physician, but this treatment was refused by the patient, the patient's family member, or the patient's guardian. The refusal was noted in patient record
8	Surgery of the primary site was recommended, but it is unknown if it was performed. Further follow up is recommended
9	It is unknown whether surgery of the primary site was recommended or performed

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Methodology – Statistical Analysis

Long-term survival (LTS): Defined as survival for **5 years or more** (60+ months) after diagnosis.

Overall survival (OS): Time from diagnosis to death or last contact.

Statistical tests:

- **Chi-square test** for categorical variables
- **ANOVA and Kruskal-Wallis** for continuous variables
- **Kaplan-Meier** method for survival estimates
- **Multivariate logistic regression** adjusting for clinical staging and analyzing age-related survival outcomes
- **Nomograms** were based on the multivariate logistic regression model

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Results – Patient and Clinical Characteristics

A total of **766,928 patients** with non-metastatic melanoma were identified.

Patient Characteristics

- Age distribution among surgical patients:
 - 18-64 years: **48.7%**
 - 65-74 years: **24.8%**
 - 75 years or older: **24.3%**
- The median age of the **non-surgical cohort** was **66 years old** (IQR 55-78).
- Sociodemographic:
 - **Non-surgical cohort** had a **higher proportion of uninsured** patients ($p < 0.001$).
 - Non-surgical patients travelled the **furthest** for care among all study cohorts (41.6 mi, SD 134.4) ($P < 0.001$).

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Clinical Characteristics

- Among the surgical cohort, **patients aged ≥ 75** were more likely to have **clinical T4** stage disease (6.8%, $p < 0.001$)
- Of all study patients, the **non-surgical cohort** had a higher proportion of **clinical N+** and **clinical T4** disease ($p < 0.001$).
- Less 2% of patients were managed nonoperatively.

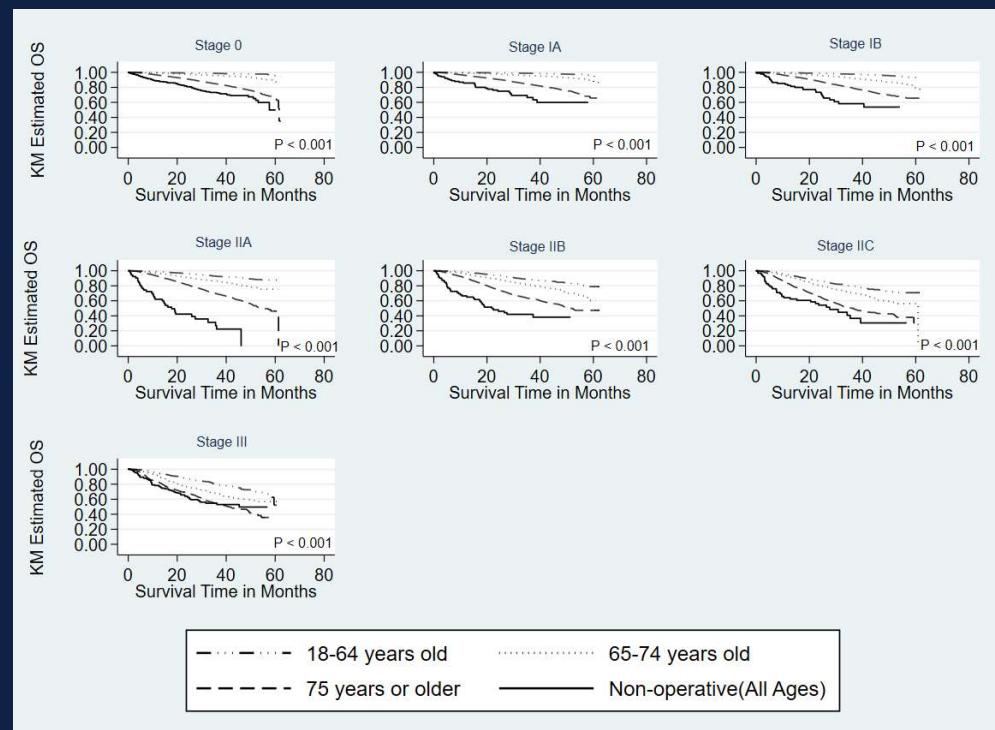
Results – Survival Analysis

In terms of overall survival status, surgical patients aged 75 years or older were least likely to be alive at last contact (50.2%) followed by non-surgical patients (51.5%) compared to the youngest surgical cohort (vs. $P < 0.001$).

By clinical staging surgical patients aged ≥ 75 had **shorter median OS** compared to younger surgical cohorts, but their OS was better than the non-surgical cohort ($p < 0.001$).

Clinical Stage, Age & No Surgery Cohorts	N	Median Overall Survival Time in Months (95% CI)	Mean Overall Survival Time in Months [†] (95% CI)
Stage IIA *			
75 years or older	3,140	54.1 (52.3, NE)	45.7 (44.8, 46.6)
Non-surgical, all ages	54	17.7 (10.6, 32.6)	22.2 (17.4, 26.9)
Total	9,683	61.4 (61.4, NE)	52.7 (52.3, 53.1)
Stage IIB *			
75 years or older	2,520	50.7 (48.6, NE)	43.6 (42.6, 44.7)
Non-surgical, all ages	73	21.9 (15.3, NE)	27.4 (22.4, 32.5)
Total	6,937	NE (NE, NE)	50.4 (49.8, 51.0)
Stage IIC *			
75 years or older	1,444	35.9 (32.4, 39.5)	37.5 (36.1, 38.8)
Non-surgical, all ages	64	27.7 (12.8, 39.3)	28.9 (22.9, 34.9)
Total	3,895	60.9 (59.3, NE)	44.7 (43.9, 45.5)
Stage III *			
75 years or older	589	40.6 (35.7, 49.4)	37.8 (35.8, 39.7)
Non-surgical, all ages	152	45.3 (28.5, NE)	36.7 (32.9, 40.4)
Total	2,397	59.5 (57.2, NE)	45.5 (44.6, 46.5)

Abbreviations: OS, overall survival; CI, confidence interval; NE, not estimable. [†]Mean OS represents mean survival time restricted to longest follow-up time. *Statistically significant at $P < 0.05$



Results – Survival Analysis

- Among those who underwent surgery, patients aged ≥ 75 had a lowest LTS rate (**39.5%**).
- **Non-surgical cohort** had the lowest overall LTS rate (**32.9%**).
- Multivariate analysis indicated 28% lower odds of LTS for surgical patients ≥ 75 years old (OR = 0.72; $p = 0.014$) and significantly reduced odds of survival for those aged 65-74 (61% lower) and age ≥ 75 (88% lower) compared to younger cohorts ($p > 0.001$).

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Results – Nomogram for Overall Survival

Example: **78 y.o.** patient with
T2N0 disease

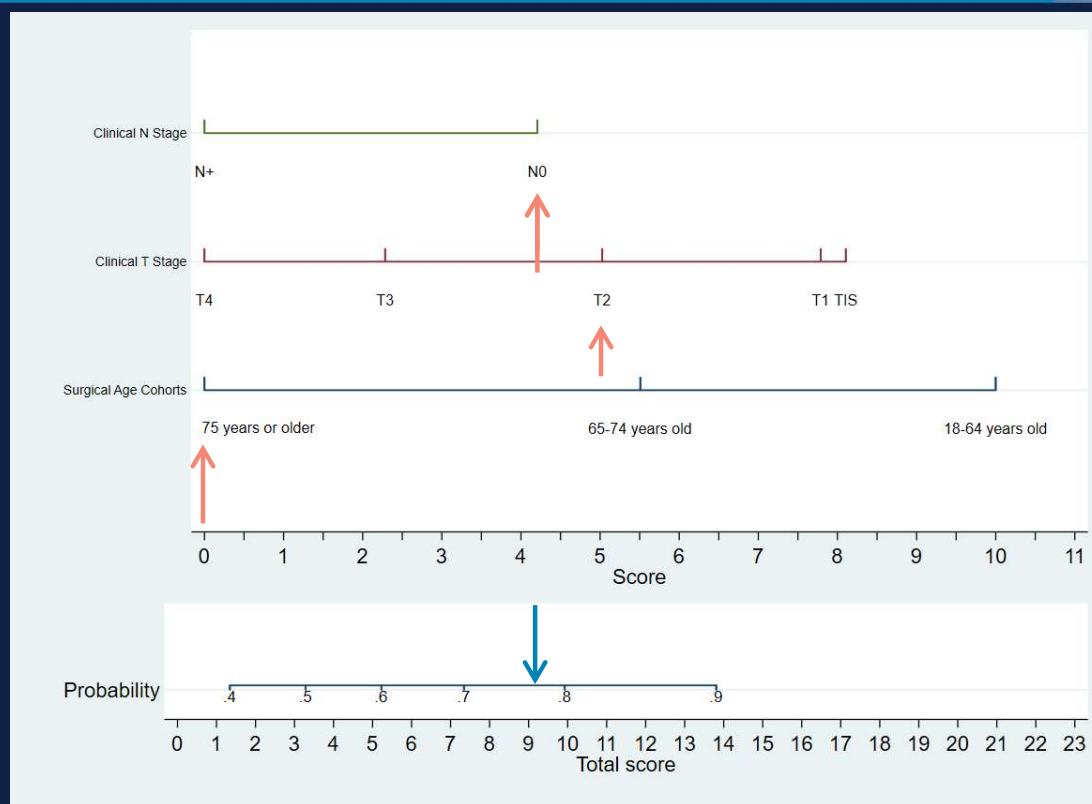
Age: **0 points**

Clinical T Stage: **5 points**

Clinical N Stage: **4.2 points**

Total: **9.2 points**

Probability of OS: **70%**



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Results – Nomogram for Overall Survival

Example: **50 y.o.** patient with
T2N0 disease

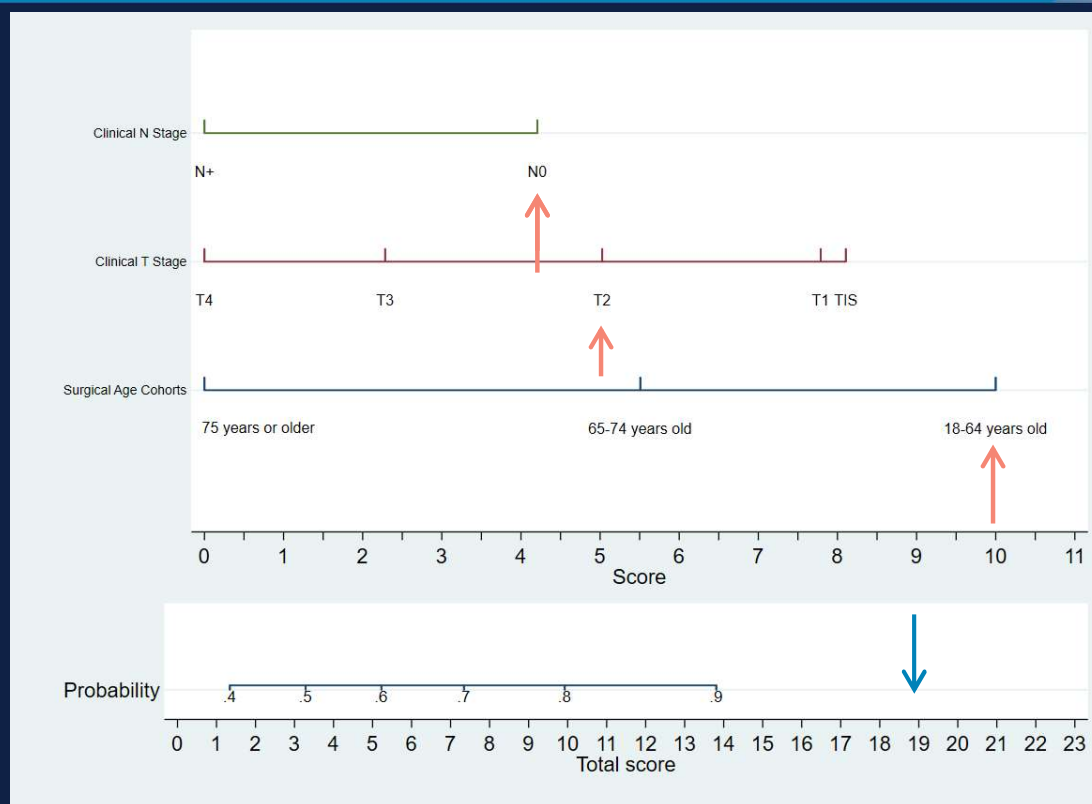
Age: **10 points**

Clinical T Stage: 5 points

Clinical N Stage: 4.2 points

Total: 19.2 points

Probability of OS: >90%



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Conclusion

- **Impact of Age:** Age significantly influences survival outcomes following surgery for non-metastatic melanoma, with older patients having poorer overall and long-term survival.
 - **Non-surgical patients** had the shortest survival across all stages, **reinforcing** the role of surgery in improving outcomes.
 - Overall survival following surgery was improved across all age groups, although the benefits were less pronounced in older patients at higher clinical stages.
- **Nomograms:** Predictive models based on clinical staging and age could help clinicians assess the likelihood of overall and long-term survival, aiding in treatment decision-making.
- **Clinical Implications:** Early surgical intervention in melanoma patients, regardless of age, remains standard of care. The impact of advanced age on survival after surgery must be taken into account when discussing treatment options.

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