Risk of severe COVID-19 and COVID-19 infection in childhood cancer survivors in Sweden: a register-based cohort study

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Background

Cumulative COVID-19 incidence, mortality and prognosis in cancer survivors: A population-based study in Reggio Emilia, Northern Italy

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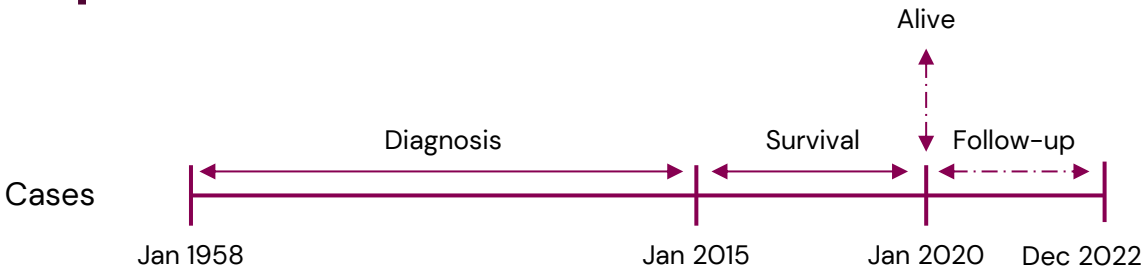
[95% CI = 1.09-1.48] and 1.39 [95%CI = 1.12-1.71], respectively). CS had worse prognosis when diagnosed with COVID-19, particularly those below age 70 (adjusted odds ratio [OR] of death 5.03; [95% CI = 2.59-9.75]), while the OR decreased after age 70. The OR of death was higher for CS with a recent diagnosis, that is, <2 years (OR = 2.92; 95% CI = 1.64-5.21), or metastases (OR = 2.09; 95% CI = 0.88-4.93). CS showed the same probability of being infected, despite a slightly higher probability of being tested than the general population. Nevertheless, CS were at higher risk of death once infected.

Objective

Using data from a long-standing register-based cohort in Sweden, we aimed to assess the differences in the risk of severe COVID-19 and COVID-19 infection between childhood cancer survivors and the general population.

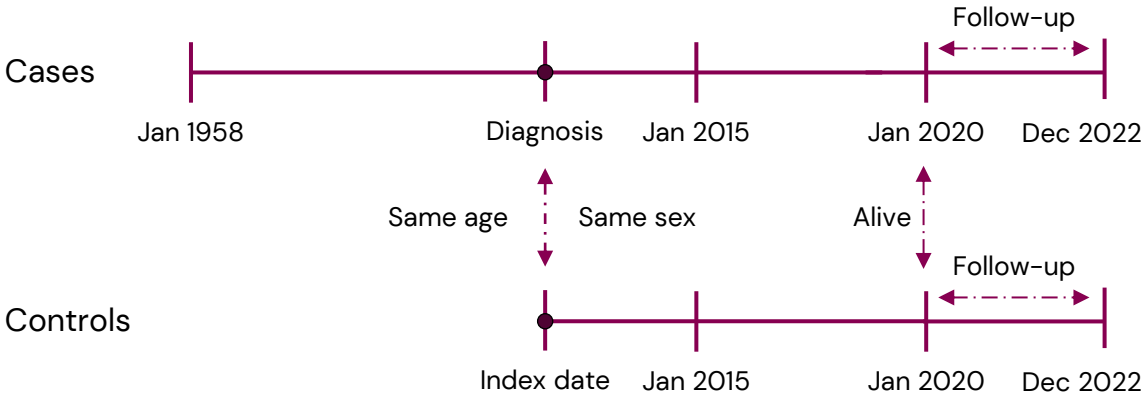
Study population



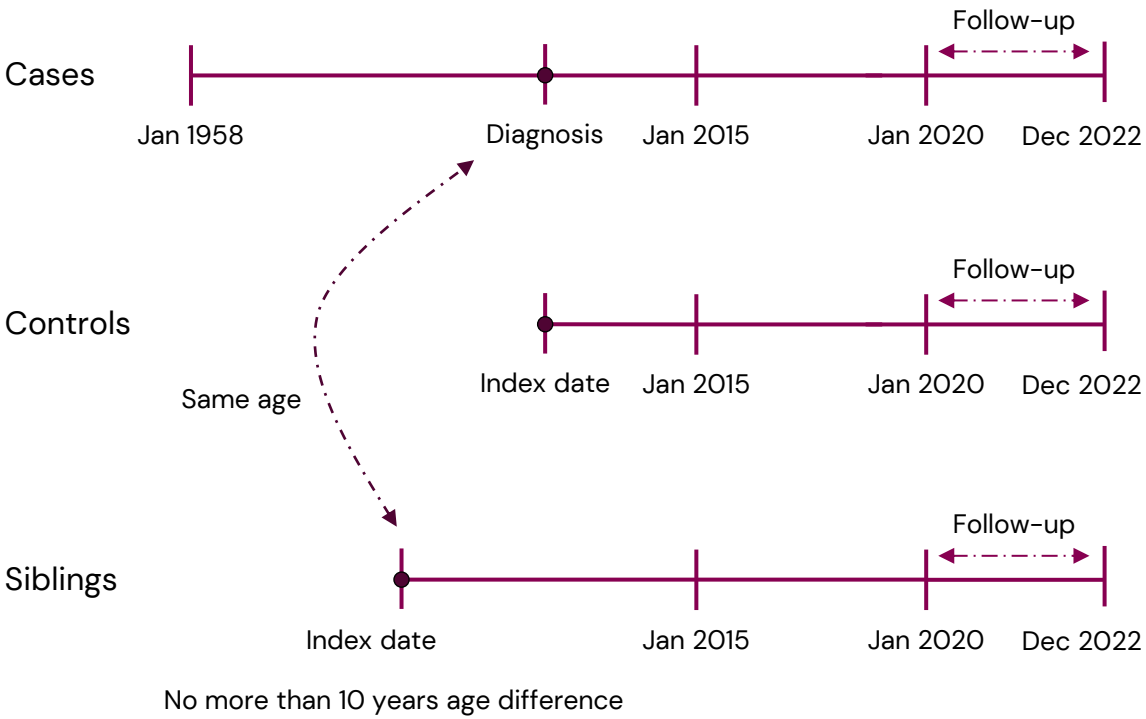
Registry based study nested in the Socioeconomic Consequences in Adult Life after Childhood Cancer (SALiCSS) research program.

Childhood cancer survivors diagnosed in Sweden from 1958 to 2015 and alive in 2020.

Study population



Study population



No more than 10 years age difference

Study variables

Main outcomes

- Severe COVID-19: Hospitalization, admission to intensive care, or death in cases where COVID-19 was the primary diagnosis or where a respiratory disease was the main diagnosis, and COVID-19 was listed as a secondary diagnosis

- COVID-19 infection: Any positive PCR test result or an outpatient contact, hospitalization, admission to intensive care, or death in cases where COVID-19 is listed as diagnosis

Exposure

- Childhood cancer survivor

Confounders

- Gender
- Region of residence
- Highest education
- Comorbidities (COPD, CKD, diabetes, CVD and obesity)
- Previous malignancy after 20 years old
- COVID-19 vaccination

Statistical Analysis

Cox proportional hazards regression models to estimate the hazard ratio with 95% confidence intervals (95%CI) of severe COVID-19 diagnosis or COVID-19 infection.

Age was used as timescale.

For each comparison group and outcome:

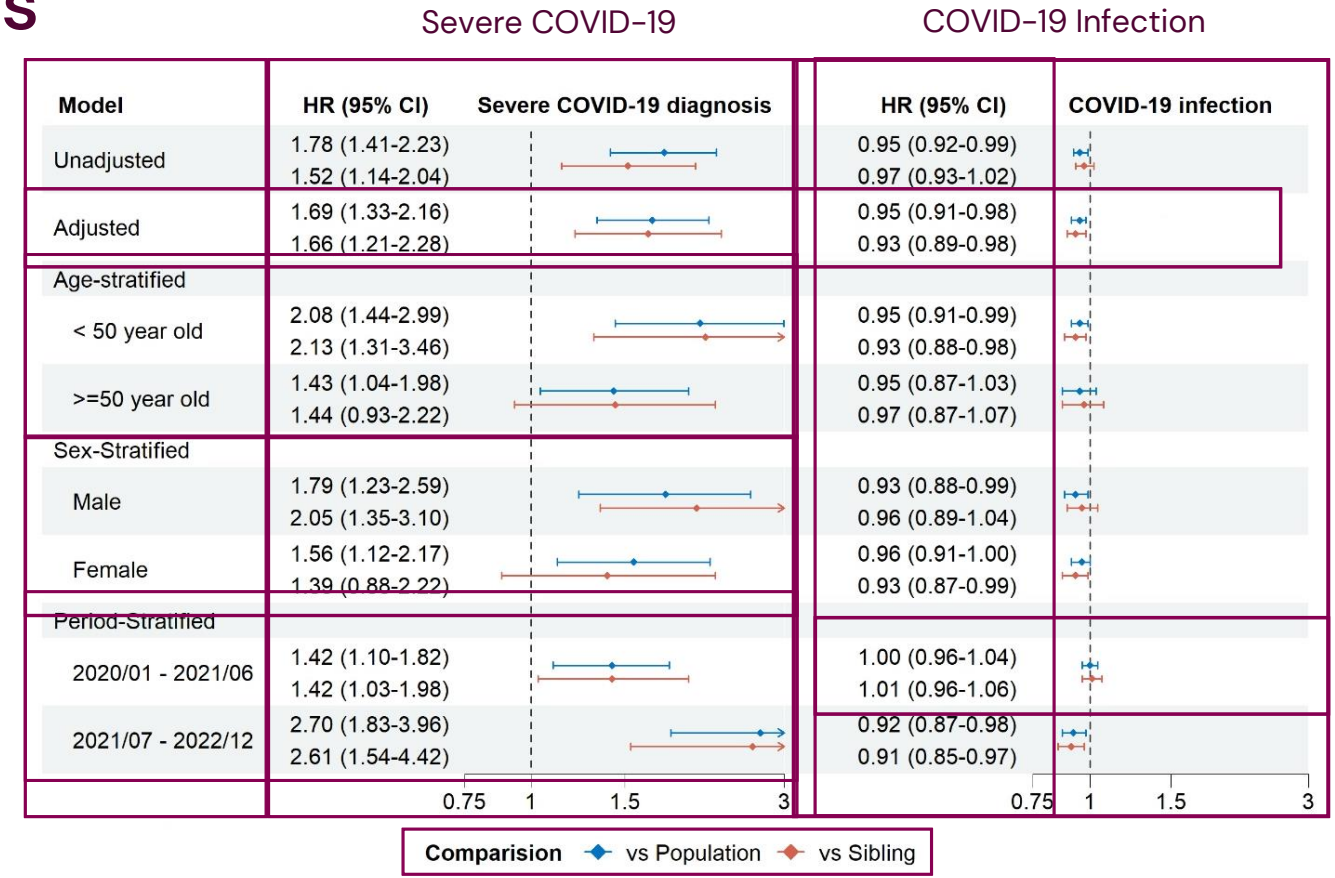
- Unadjusted model
- Adjusted model
- Age stratified (<50 and >=50 years old)
- Gender stratified (male and female)
- Period stratified (2020/01-2021/06 and 2021/07-2022/12)

When the comparison group were the siblings, we used Cox mixed effects models with a random effect term in the family cluster.

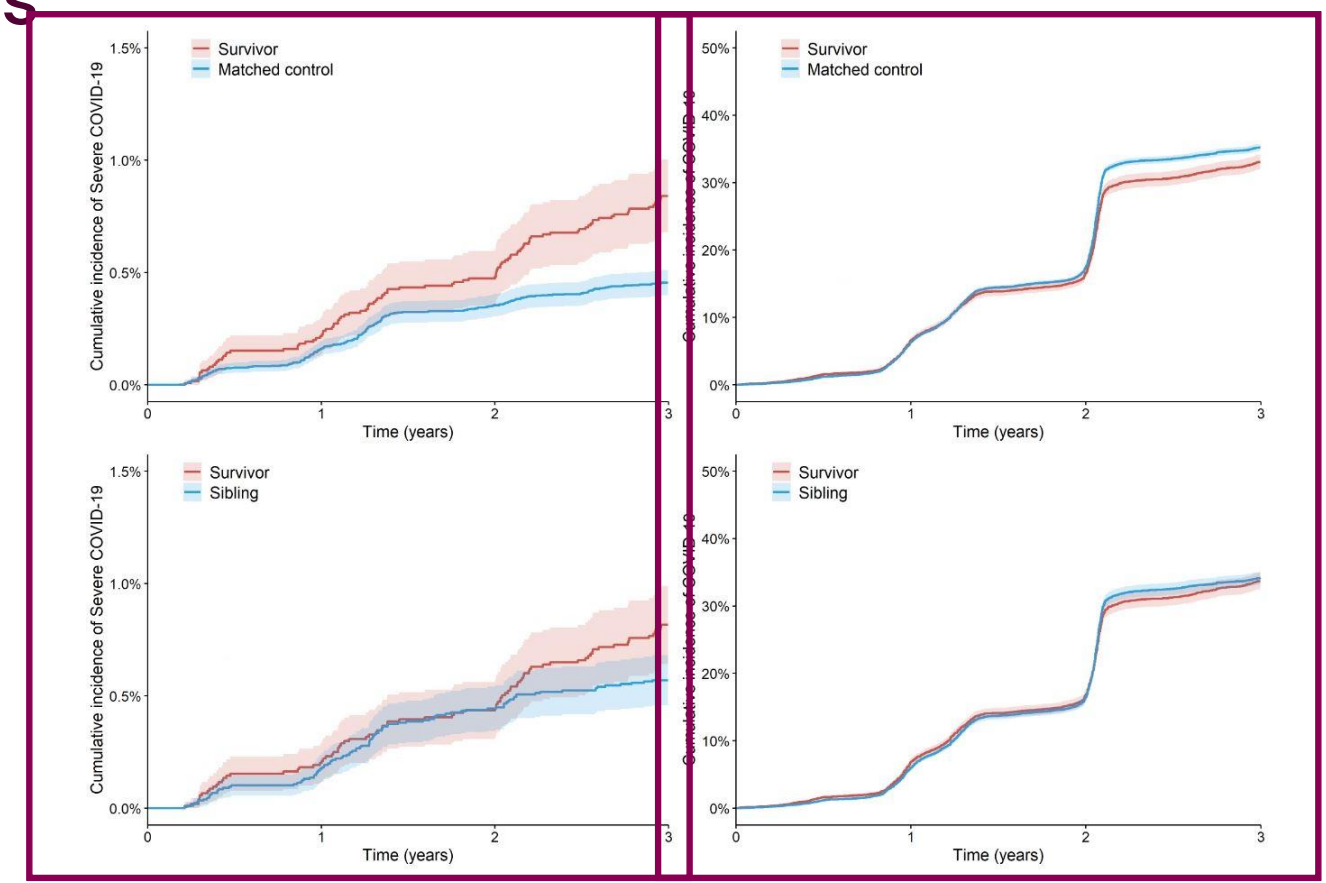
Results

	Survivors N = 12,557	Siblings N = 17,733	Controls N = 55,843
Severe Covid-19	104 (0.8)	100 (0.6)	252 (0.5)
Covid-19 infection	3,498 (27.9)	5,087 (28.7)	16,472 (29.5)

Results


Severe COVID-19
COVID-19 Infection
Model
HR (95% CI)
Severe COVID-19 diagnosis
HR (95% CI)
COVID-19 infection
Unadjusted
1.78 (1.41-2.23)
1.52 (1.14-2.04)
0.95 (0.92-0.99)
0.97 (0.93-1.02)
Adjusted
1.69 (1.33-2.16)
1.66 (1.21-2.28)
0.95 (0.91-0.98)
0.93 (0.89-0.98)
Age-stratified
< 50 year old
2.08 (1.44-2.99)
2.13 (1.31-3.46)
0.95 (0.91-0.99)
0.93 (0.88-0.98)
>=50 year old
1.43 (1.04-1.98)
1.44 (0.93-2.22)
0.95 (0.87-1.03)
0.97 (0.87-1.07)
Sex-Stratified
Male
1.79 (1.23-2.59)
2.05 (1.35-3.10)
0.93 (0.88-0.99)
0.96 (0.89-1.04)
Female
1.56 (1.12-2.17)
1.39 (0.88-2.22)
0.96 (0.91-1.00)
0.93 (0.87-0.99)
Period-Stratified
2020/01 - 2021/06
1.42 (1.10-1.82)
1.42 (1.03-1.98)
1.00 (0.96-1.04)
1.01 (0.96-1.06)
2021/07 - 2022/12
2.70 (1.83-3.96)
2.61 (1.54-4.42)
0.92 (0.87-0.98)
0.91 (0.85-0.97)
0.75
1
1.5
3
0.75
1
1.5
3
Comparision
vs Population
vs Sibling

Results


Survivor
Matched control
Cumulative incidence of Severe COVID-19
1.5%
1.0%
0.5%
0.0%
0
1
2
3
Time (years)
Survivor
Matched control
50%
40%
30%
20%
10%
0%
Time (years)
Survivor
Sibling
Cumulative incidence of Severe COVID-19
Time (years)
Survivor
Sibling
Time (years)

Discussion

Limitations

- Adherence to vaccination was assumed.
- Low statistical power when stratifying by type of tumor.

Strengths

- Long follow-up period and virtually no loss to follow-up.
- Siblings for sensitivity analysis.
- Data from Denmark will be added and used in the final analysis for comparison.

Conclusions

- Although CCS overall were at a lower risk of a COVID-19 infection than their matched comparisons and siblings, their risk of severe COVID-19 was higher.
- CCS are a more vulnerable population and need to be more closely monitored in the occurrence of future health emergencies and pandemics.

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Thank you very much!

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