

Do COVID-19 Pandemic Increase the Risk of Non-COVID-19 Mortality in Frail Elderly? A Real-World Retrospective Cohort Study

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INTRODUCTION

During the SARS-Cov2 pandemic, urgent measures were carried out to face the increasing healthcare demand due to the pandemic, including, among others, the suspension of non-urgent hospital activities and specialist consultations unrelated to COVID-19 disease [1]. These measures, however, significantly restricted access to hospital facilities for patients with chronic conditions, including cancer patients and frail elderly, suggesting a potential increased risk of non-COVID-19 mortality due to a lack of care of these vulnerable populations.

AIMS

The aim of the study was to compare the risk of non-COVID-19 mortality during the pandemic period with the pre-pandemic period specifically among elderly individuals with at least one chronic disease (vulnerable subjects) exploiting the data available in the healthcare utilization data from the Local Health Authority (LHA) of Vercelli province, Piedmont, Italy.

METHODS

This cohort study was conducted using the data available in the healthcare utilization databases of the LHA of Vercelli including: i) the registry of healthcare beneficiaries assisted by the LHA of Vercelli ii) the drug prescription database, iii) the hospital discharge database, iv) the exemptions databases and v) the mortality registry. The information included in the different databases belonging to the same subject were linked through an anonymized individual identification code which prevented the identification of the people included in the databases.

Two cohorts of subjects were selected: the pre-pandemic cohort included all subjects assisted by the LHA of Vercelli alive the 1st January 2018, aged 65 years or older and affected by at least one chronic condition in 2017. The pandemic cohort was made of all subjects alive the 1st January 2020, aged 65 years or older and affected by at least one chronic condition in 2019.

The outcome of interest was death due to causes other than COVID-19. The subjects of both cohorts identified in the mortality registry with a cause of death different from COVID-19 were considered as events.

The information regarding age, sex, vulnerability and the chronic disease from which cohorts' members were affected were retrieved for all subjects. The vulnerability level was defined according to the severity index, an index assigning to each chronic condition the corresponding severity score (from 1 not severe condition to 3 severe condition) according to the Italian Ministry of Health chronic diseases classification available in the COVID-19 vaccination plan [2]. Subjects were classified according to the most severe disease as non-vulnerable (severity index 0-1), vulnerable (severity index 2) and extremely vulnerable (severity index 3), further detail on the severity index are reported elsewhere [3].

Descriptive statistics were used to summarize the demographic and clinical information collected on study subjects overall and according to cohort. Categorical variables were reported as absolute frequencies and percentages by cohort and overall. The Chi square test was used to compare the distribution of subjects' characteristics between cohorts. Multivariable Fine and Gray [4] model was used to calculate the adjusted sub-distribution hazard ratios (asHR) and the corresponding 95%CI to evaluate the relationship between time periods and non-COVID-19 mortality accounting for COVID-19 mortality as competing risk. The rule-out approach was used to assess the impact of the unmeasured confounder seasonal flu on the association estimate.

RESULTS

91777 elderly subjects with at least one chronic disease were included in the study, 46048 belong to the cohort 2018 and 45729 to the cohort 2020. Overall, the proportion of females were slightly more frequent than males (57.58% vs 42.42%) and the mean age was 76.64 years. 44.63% of subjects were classified as vulnerable. Overall, the proportion of deaths tends to increase from 2018 to 2021 varying from 4.62% in 2018 to 5.40% in 2021, however, considering only non-COVID-19 mortality, the proportions of death in 2020 and 2021 were lower than 2019 (4.06% and 4.85% respectively).

Table 1 reports asHR and the corresponding 95%CI derived from multivariable Fine and Gray models for the association between time periods and non-COVID-19 mortality and the p-value of the trend test for age and vulnerability classes.

Table 1. Adjusted subdistribution hazard ratios (asHR), the corresponding 95% confidence intervals (95%CI), for the association between time periods and non-COVID-19 mortality and the p-value of the trend test

	asHR (95%CI)	trend
Pandemic vs pre-pandemic period	0.90 (0.87-0.95)	
Sex		
F vs M	0.73 (0.70-0.76)	
Age classes		
70-74 vs 65-69	1.55 (1.38-1.74)	<0.0001
75-79 vs 65-69	2.63 (2.36-2.93)	
80-84 vs 65-69	4.93 (4.46-5.46)	
85-89 vs 65-69	9.52 (8.62-10.51)	
≥90 vs 65-69	20.47 (18.53-22.61)	
Vulnerability classes		
Vulnerable vs non-vulnerable	1.20 (1.12-1.26)	<0.0001
Extremely vulnerable vs non-vulnerable	2.00 (1.88-2.13)	

The results of Fine and Gray model show that, among subjects that did not die due to COVID-19, the risk of non-COVID-19 mortality was 10% lower during the pandemic period compared to the pre-pandemic one. The results of the rule-out analysis show that part of the decreased risk of non-COVID-19 mortality observed in the pandemic period could be explained by decreased mortality for flu.

CONCLUSIONS

A decreased risk of non-COVID-19 mortality was observed during the pandemic period compared to the pre-pandemic one. An explanation may be that during the pandemic, many frail individuals died from COVID-19, resulting in a chronically ill elderly population that was, on average, healthier and had a lower mortality rate than in the pre-pandemic period, also due to the absence of flu-related deaths. Lack of care did not seem to affect non-COVID-19 mortality during the pandemic period in frail elderly.

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