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Centenarians From Long-Term Care Facilities and COVID-19–Relevant Hospital Admissions



Although the number of centenarians is increasing rapidly in many countries around the world,¹ there is evidence of lower morbidity among centenarians (100+ years of age) and supercentenarians (110+ years)^{2,3} and more extended stays in long-term care facilities (LTCFs) than in younger cohorts of oldest-old.⁴ Although evidence is still sparse, hints exist on protective effects in centenarians during the COVID-19 pandemic.^{5,6} In contrast, a study of excess mortality rates in centenarians who lived in LTCF in the Lombardy region, Italy, found no survival advantage of centenarians compared to those aged 50 and 80 years.⁷ However, this study only looked into all-cause mortality without information on COVID-19. Men seem to be particularly resilient, which could be due to stronger selection effects. Further, among 12 infected centenarian residents from LTCFs in Marseille, France, centenarians showed a higher mortality rate than younger residents.⁸ Although we outlined COVID-19-related mortality rates among older adults in LTCFs compared with prior years,⁹ analyses that stratify these rates for the oldest old and centenarians are lacking.

Methods

Hospital-related claims data by a major health and long-term care insurance fund in Germany during 3 waves of the pandemic (January 2020 until June 2021) have been analyzed. COVID-19–relevant hospital admissions were assessed by a confirmed COVID-19 diagnosis (ICD U07.1) and COVID-

19–relevant primary diagnosis.¹⁰ Thirty-day mortality has been 54.8% (CI 53.8%-55.8%). Chi-square tests and a multivariable logistic regression model to compare the rates across age and gender categories have been established. The regression model, which included all hospital cases from the study population, age, gender, and COVID-19–relevant comorbidities (see Kohl et al⁹ and Günster et al¹⁰; HIV and Down syndrome were excluded because of small numbers), have been specified as independent variables and death in hospital was the dependent variable [adjusted odds ratios (aORs) will be presented]. The ethical review board approved the study.

Results

A total of 412,101 residents aged 80 years and older have been inspected. Of those, 238,904 were aged 80-89 years and 164,933 were 90-99 years (Table 1). At age 80-89 years, men (74.3%) were hospitalized more often than women (63.8%), but less often at age 90-99 years (25.4% and 35.5%, respectively) and 100+ (0.3% and 0.7%). Among the 8264 centenarians from LTCFs, 11 men and 43 women had a confirmed COVID-19 diagnosis in a hospital, of whom 73% (8/11) and 74% (32/43) died in hospital. Although the COVID-19–related hospital admission rates were vastly lower in male as well as female centenarians than in the other age groups, the case fatality rates of female centenarians were significantly higher, but not in male ones. Among the centenarians, 15 residents (all female) were 110 years and older (ie, supercentenarians) and for none of the supercentenarians a hospital admission was recorded. In the multivariable logistic regression model, compared with age 80-89 years, those aged 90-99 (aOR 1.41, 95% CI 1.29-1.55, $P < .001$) and those aged 100+ (aOR 2.91, 95% CI 1.61-5.58, $P = .001$) had an elevated risk of dying. Men had an increased risk of dying (aOR 1.68, 95% CI 1.54-1.83, $P < .001$).

Discussion

We found lower rates of COVID-19–relevant hospital admissions in centenarians than in the younger cohorts of oldest old residents in LTCFs, where the hypothesis of COVID-19–specific resilience in centenarians should be further investigated.^{2,3} However, very likely lower admissions rates could be due to the fact that centenarians were treated differently when it came to COVID-19 infections. This could include a priority for ambulant treatment or that infection prevention measures have been applied more rigorously to centenarians than to their younger counterparts. Although the rates of admission were lower for centenarians, the COVID-19 hospital mortality was higher in female centenarians, providing evidence for age and gender effects even among the oldest old. Concerning gender differences, males have been hospitalized more often aged 80-89 years, but less often aged 90-99 and 100+ years.

Table 1
COVID-19 Cases and COVID-19–Related Deaths in Hospital by Age and Gender

COVID-19 Wave 1-3	Age 80-89 y		Age 90-99 y		Age 100+ y	
	Women, n (%)	Men, n (%)	Women, n (%)	Men, n (%)	Women, n (%)	Men, n (%)
Total	168,122 (54.0)	70,780 (70.2)	135,557 (43.6)	29,266 (29.0)	7482 (2.4)	782 (0.8)
COVID-19–relevant hospital admission	4117 (63.8) {2.4}	2709 (74.3) {3.8}	2291 (35.5) {1.7}	927 (25.4) {3.2}	43 (0.7) {0.6}	11 (0.3) {1.4}
COVID-19 hospital mortality	1944 (59.7) [47.2]	1635 (71.8) [60.4] ^a	1281 (39.3) [55.9]	633 (27.8) [68.3] ^b	32 (1.0) [74.4] ^c	8 (0.4) [72.7] ^{a,b,c}

Percentages in parentheses refer to rate in gender group. Percentages in curly braces refer to the rate of COVID-19–related hospital admission of the age by gender group. Percentages in the square brackets refer to the case fatality in each age by gender group. Percentages with the same superscript are not significantly different at the $P < .05$ level.

Further, female centenarians died more often compared with female noncentenarians. Although we analyzed a large number of centenarians, mortality rates may still lack from statistical power of detecting smaller effects. Centenarians constitute a unique group where aspects of resilience and vulnerability need to be taken into account in treatment and care.

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