

Impact of Influenza and COVID-19 in Hospitals: Analysis of PMSI Data From 2018 to 2022

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BACKGROUND

- Seasonal influenza affects more than 2 million people each year in France and is responsible for 2000 to 8000 deaths when considering both the infection itself and potential decompensations of other diseases during an influenza episode, which is the leading cause of death by infectious disease¹⁻²
- At the peak of the 2020 pandemic, COVID-19 had a major impact on the French healthcare system, leading to hospital saturation³⁻⁴
- While influenza circulation was almost nonexistent during periods of lockdown, we are now observing the co-circulation of these 2 viruses⁵
- With an aging population, an overcrowded hospital system, and the persistence of the omicron variants, it is important to understand the current burden of COVID-19 and influenza

OBJECTIVE

- This study aimed to quantify and characterize hospitalizations associated with influenza and COVID-19 in France from 2018 to 2022 and to estimate their related costs

METHODS

Study Design

- A retrospective, descriptive study was conducted using the French hospital medico-administrative database (PMSI-MCO)
- Each patient who had ≥1 hospitalization between July 1, 2018, and December 31, 2022, with a primary or related *International Classification of Diseases, 10th edition*, coded diagnosis of influenza (J09, J10, J11) and/or COVID-19 (U07.1, U07.2) was included in the present study
- The analyses were conducted over the entire evaluation period, by year, by month, by epidemic season (October-March), and by age group

RESULTS

Study Population

- During the entire study period, 814,534 hospitalizations for COVID-19 and 102,266 hospitalizations for influenza were identified
 - Hospitalization associated with COVID-19 had a substantial impact, even during the omicron period, starting at the beginning of 2022, with 220,404 hospitalizations in 2022 (**Figure 1; Table 1**)
 - Hospitalizations were more frequent among adults aged ≥65 years, with 484,998 hospitalizations (59.5%) attributable to COVID-19 and 44,519 hospitalizations (43.5%) attributable to influenza in this age subgroup
- Patients hospitalized for COVID-19 were generally older than those hospitalized for influenza (mean ages of 65.8 years vs 47.2 years, respectively)

Figure 1. Monthly number of influenza and COVID-19 hospitalizations

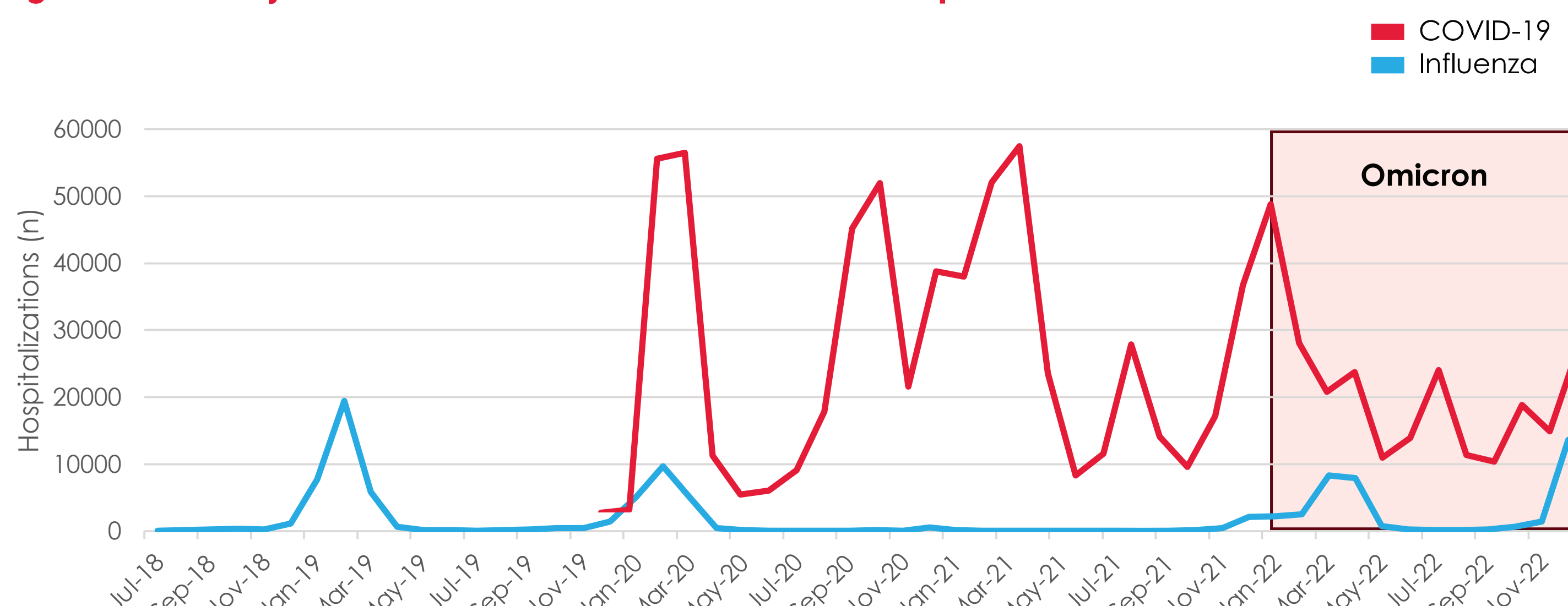


Table 1. Number of influenza and COVID-19 hospitalizations over the study period

	2018*	2019	2020	2021	2022
Influenza	2268	37,223	21,032	3771	37,972
COVID-19	0	0	277,081	317,033	220,404
%COVID-19 of the total**	0%	0%	92.9%	98.8%	85.3%

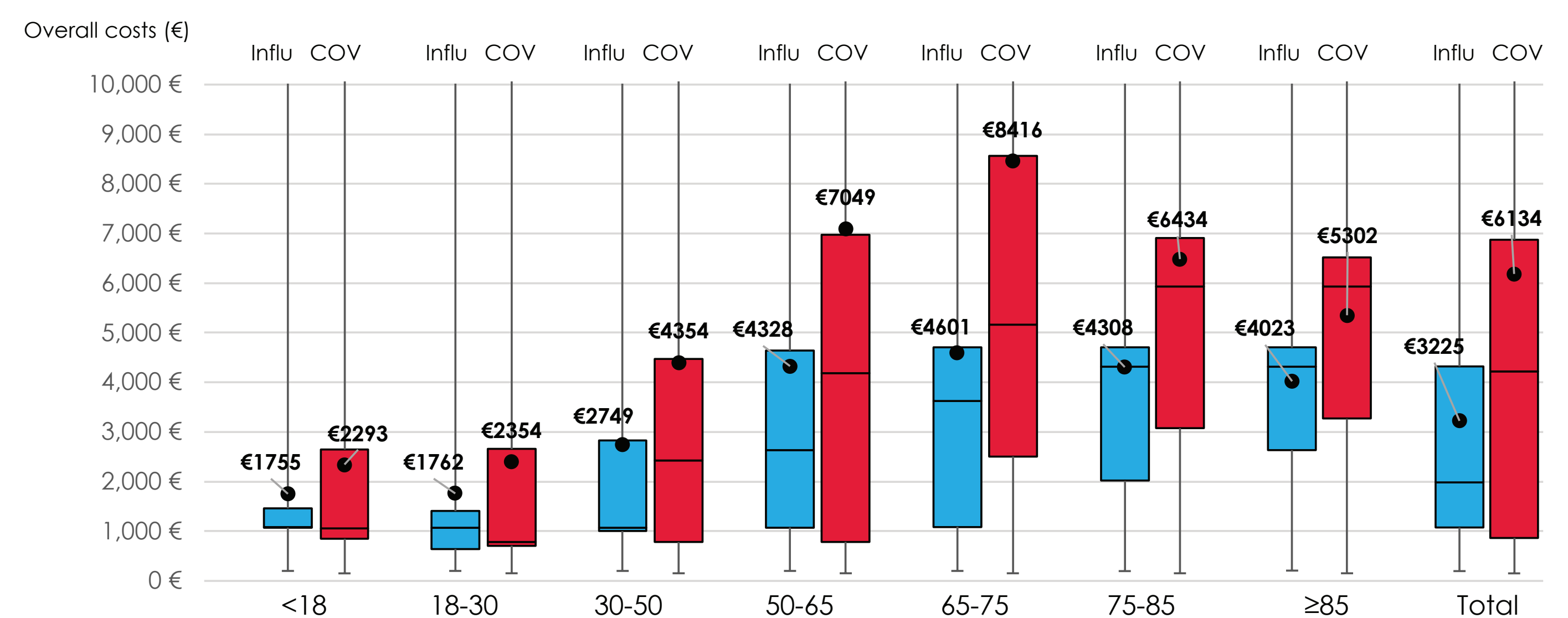
*July 2018 to December 2018.

**%COVID-19 of the total = $N_{COVID-19} / (N_{COVID-19} + N_{Influenza})$.

Impact of COVID-19 and Influenza

- Among patients aged ≥65 years (influenza, n = 44,519; COVID-19, n=484,998), 7.2% of hospitalizations due to influenza and 11.7% of hospitalizations due to COVID-19 required intensive care unit and resuscitation
- In all age groups, the average length of stay in the intensive care unit and resuscitation was higher (13.6 days) for COVID-19 patients compared to those with influenza (8.3 days)
 - Among patients aged ≥65 years, the average length of stay in the intensive care unit and resuscitation was 15.3 days for patients with COVID-19 and 7.7 days for those with influenza
- Overall, costs related to COVID-19 hospitalizations were higher, with a mean cost of €6134 (vs €3225 for influenza)
 - Peak costs were observed among patients aged 65 to 75 years (€8416 for COVID-19; €4601 for influenza) (**Figure 2**)

Figure 2. Costs related to influenza and COVID-19 hospitalizations over the study period, by age group



- In-hospital deaths were observed in 12.3% of patients hospitalized for COVID-19 compared with 3.1% of patients hospitalized for influenza
 - Among those hospitalized due to COVID-19, fewer patients were discharged to their home compared with those hospitalized due to influenza (65.2% vs 85.6%)

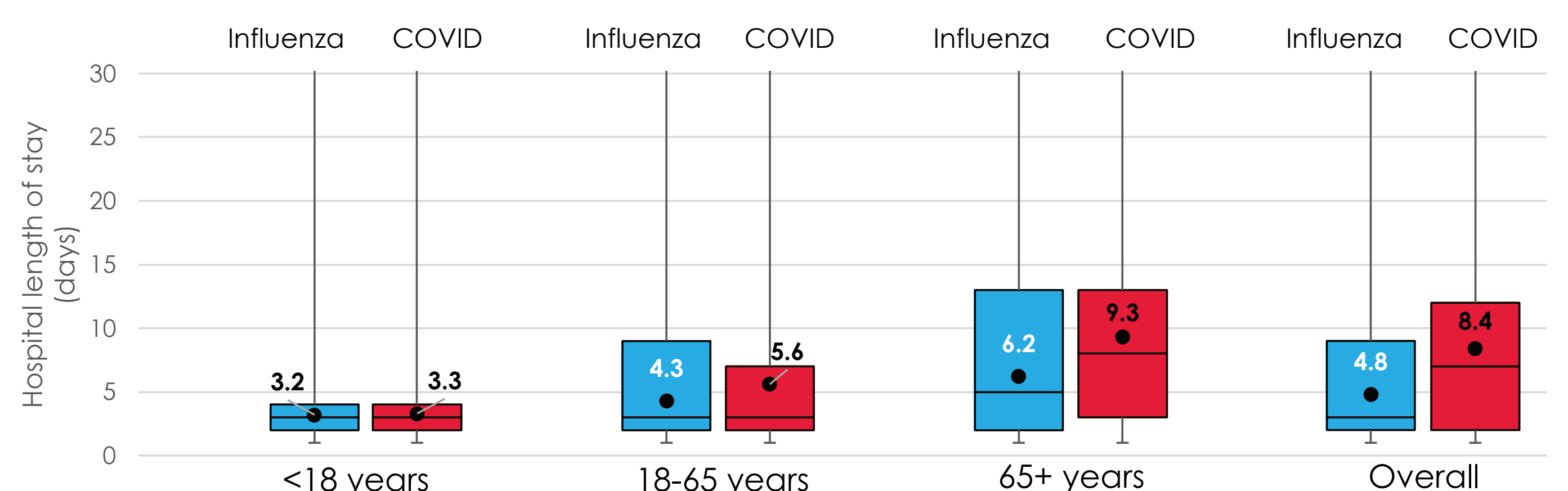
Number of Hospitalizations, Hospital Length of Stay, and Associated Costs From October to December 2022

- During the most recent period of the study (October-December 2022), the number of hospitalizations for COVID-19 was 3 times higher (n = 44,714) than the number of hospitalizations for influenza (n = 15,262; **Table 2**)
- During the same period, adult patients with COVID-19 aged ≥65 years had a longer length of stay on average than those hospitalized for influenza (9.2 days vs 6.0 days, respectively; **Figure 3**)
- During this period, COVID-19 stays were more expensive (€4719 vs €3277) than influenza stays among patients aged ≥65 years, representing a total economic burden of more than €168 million for COVID-19 and €22 million for influenza

Table 2. Number of Hospitalizations, From October 2022 to December 2022, All Age Group

	OCT22	NOV22	DEC22	TOTAL
Influenza	660	1417	13,185	15,262
COVID-19	16,863	12,334	15,517	44,714

Figure 3. Hospital length of stays, from October to December 2022, by age groups



CONCLUSIONS

- This study shows that COVID-19 was associated with a greater hospital economic burden than influenza in terms of the number of hospital admissions, length of stay, and overall costs, over the entire study period and in the most recent study period (October to December 2022)
- These results are in accordance with a prospective multicenter study that shows the impact of omicron variants on mortality and their importance in complications among high-risk populations following COVID-19 infection in recent years⁶
- These results highlight the importance of COVID-19 vaccination campaigns in France, especially among older adults, and the need to improve vaccination coverage in this population, particularly those at risk of severe disease

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Disclosures

CD, NEM, MU, and AC are employees of Moderna and hold stock/stock options in the company. LC is an employee of stève Consultants, which has a research contract with Moderna.

ADDITIONAL INFORMATION

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