

Rapporto sul sistema di sorveglianza ospedaliero COVID-19-Sentinel

Stato: 24 Ottobre 2022

1. Riassunto introduttivo

Il sistema di sorveglianza della COVID-19 negli ospedali svizzeri (CH-SUR) è stato istituito nel 2018 per tenere traccia delle ospedalizzazioni connesse all'influenza. Il 1° marzo 2020, quattro giorni dopo la segnalazione del primo caso confermato di COVID-19 in Svizzera, il programma adattato era pronto per rilevare anche le ospedalizzazioni collegate a infezioni da SARS-CoV-2 confermate in laboratorio.

Attualmente sono 20 gli ospedali che partecipano attivamente al sistema di sorveglianza, tra cui una buona percentuale degli ospedali cantonali e universitari, che coprono un'ampia fascia di pazienti pediatrici e adulti in tutta la Svizzera. Le statistiche di CH-SUR rilevano, tra l'altro, il numero e la durata delle **ospedalizzazioni** nonché le degenze nelle unità di terapia intensiva. Un paziente potrebbe essere ospedalizzato numerose volte o richiedere più ricoveri in un'unità di terapia intensiva (**UTI**) durante lo stesso **episodio** di ospedalizzazione. CH-SUR rileva inoltre se durante l'ospedalizzazione il paziente è deceduto **per o con la COVID-19**.

Criteri di inclusione: CH-SUR raccoglie dati di pazienti ospedalizzati con infezione da SARS-CoV-2 documentata e una degenza di durata superiore alle 24 ore. La conferma dell'infezione è data dal risultato positivo di un test PCR (reazione a catena della polimerasi) o di un test antigenico rapido, nonché da un referto clinico di COVID-19. Le infezioni **nosocomiali** da SARS-CoV-2 sono anch'esse rilevate nella banca dati e descritte in una sezione speciale in calce al presente rapporto.

Dall'inizio della pandemia fino al 23 Ottobre 2022, sono stati raccolti dati relativi a 39,498 **episodi** di ospedalizzazione. Durante lo stesso periodo, attraverso il sistema di dichiarazione obbligatorio sono stati comunicati all'UFSP per l'intera Svizzera 58 869 episodi di ospedalizzazione con infezione da SARS-CoV-2 confermata in laboratorio. Il sistema CH-SUR ha pertanto coperto il 67,1 % circa di tutte le ospedalizzazioni connesse al SARS-CoV-2 dichiarate in Svizzera.

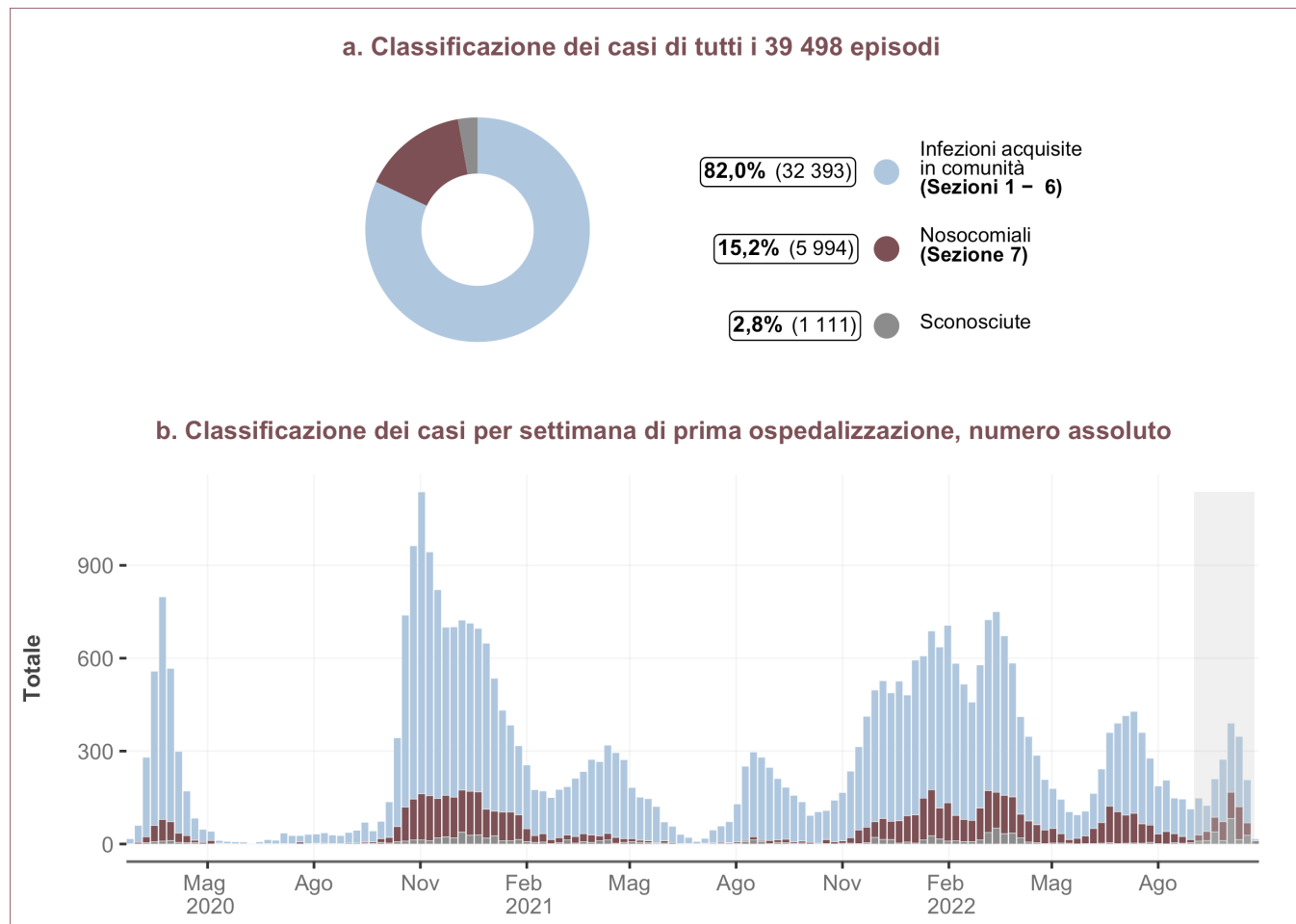
Dal marzo 2022 il presente rapporto si concentra sugli episodi collegati alle infezioni **acquisite in comunità** (descritte nelle sezioni da 2 a 6), mentre una sezione a parte è dedicata alle infezioni **nosocomiali** (sezione 7). La percentuale totale di infezioni nosocomiali tra tutti gli episodi documentati si attesta al 15,2% (5 994 su 39 498), mentre gli episodi collegati a infezioni acquisite in comunità spiegano l' 82,0% (32 393 su 39 498) dei casi (grafico 1). Per il 2,8% degli episodi non è stato possibile effettuare l'attribuzione a casi ospedalieri o acquisiti in comunità.

Tra tutti gli episodi collegati a un'infezione acquisita in comunità per i quali sono disponibili dati completi e rilevanti, il 13,8% ha reso necessaria la degenza in un'unità di terapia intensiva (4 317 su 31 218 episodi dal 26 febbraio 2020 al 31 Agosto 2022) e nel 8,8% dei casi si è verificato un decesso per COVID-19 (2 627 su 29 893 episodi dal 26 febbraio 2020 al 24 Ottobre 2022).

Durante l'ultimo periodo in cui erano disponibili dati sufficienti (dal 01 Luglio 2022 al 31 Agosto 2022) sono stati rilevati episodi di infezioni acquisite in comunità. Di questi, (20,7%) interessavano pazienti non immunizzati, (33,1%) pazienti **completamente immunizzati** con un richiamo e (3,4%) **completamente immunizzati (con richiami aggiuntivi)** (grafico 2). Nello stesso periodo, 127 episodi hanno richiesto la degenza in un'unità di terapia intensiva.

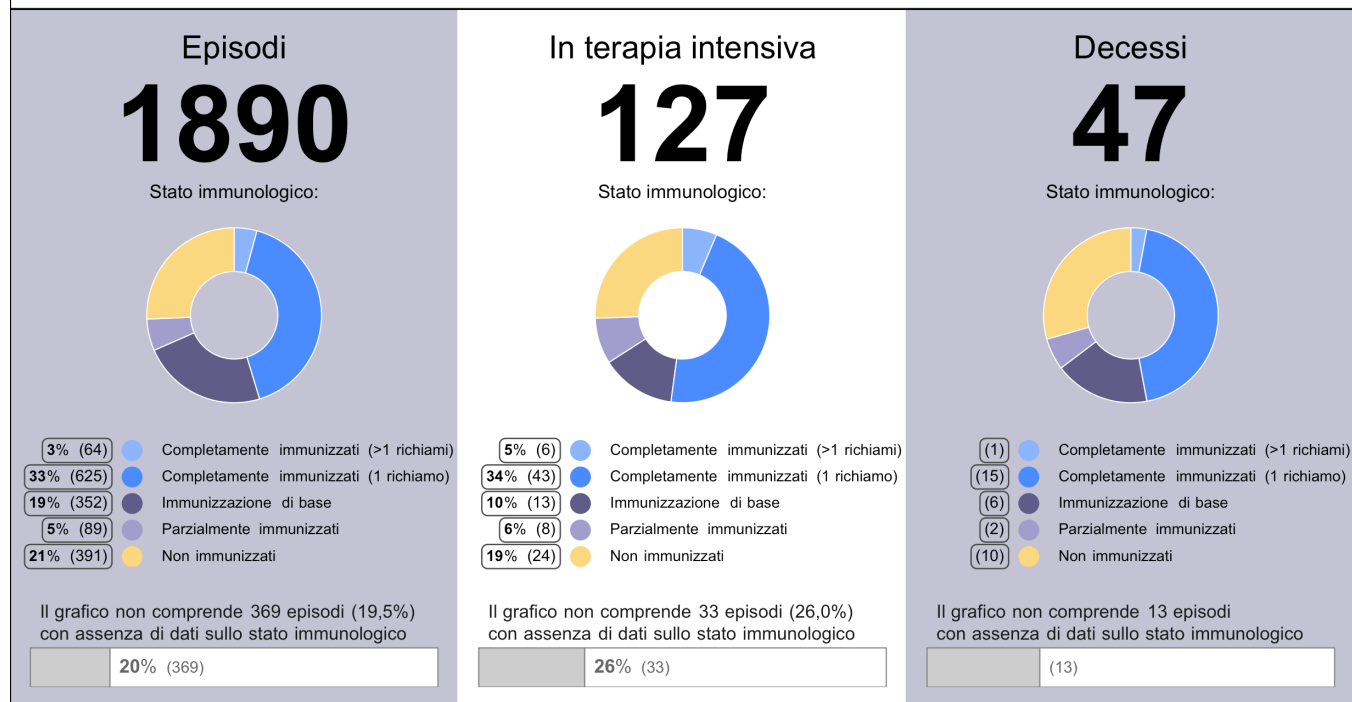
Di questi, 24 (18,9%) interessavano pazienti non immunizzati, 43 (33,9%) pazienti completamente immunizzati con un richiamo e 6 (4,7%) completamente immunizzati con richiami aggiuntivi. Si è verificato un decesso per COVID-19 in 47 casi (2,5% di tutti gli episodi rilevati con esito noto), 10 dei quali per pazienti non immunizzati, 15 per pazienti completamente immunizzati con un richiamo e 1 decesso tra i pazienti completamente immunizzati con richiami aggiuntivi.

Il 1 aprile 2022 la Svizzera è tornata alla situazione epidemiologica normale. Da allora, i test di tutti pazienti al momento del ricovero è stato sostituito da strategie più mirate (vedi le attuali [raccomandazioni di Swissnoso](#)). Questa modifica della strategia di test può aver portato a un calo del numero di casi individuati, riducendo i pazienti identificati principalmente alle persone con sintomi tipici di COVID-19. Per ulteriori definizioni e dettagli sui dati, si veda la sezione [Glossario e informazioni complementari](#) in calce al presente rapporto.



Graphic 1: Classificazione (origine dell'infezione) dei casi. Proportione (normalizzata in %) di episodi per origine dell'infezione (sezione a) e numero assoluto di casi nel tempo (sezione b). Per gli episodi con più ospedalizzazioni, è stata considerata la classificazione del caso relativa alla prima ospedalizzazione. I dati degli ultimi due mesi (evidenziati in grigio) sono considerati provvisori a causa di ritardi nell'immissione dei dati.

Panoramica di episodi CH-SUR, ricoveri in terapia intensiva e decessi dal 01 Luglio 2022 al 31 Agosto 2022



Graphic 2: Panoramica dei dati più recenti su casi di ospedalizzazione collegati a infezioni acquisite in comunità. I dati degli ultimi due mesi sono considerati provvisori a causa di ritardi nell'immissione dei dati e sono pertanto stati omessi.

2. Hospitalizations and demographic characteristics

Between the start of the epidemic in Switzerland and October 23, 2022 and among the 19 hospitals actively participating in CH-SUR, 32,393 **episodes** linked to community acquired infections were registered, accounting for a total of 33,596 hospitalizations. There were more hospitalizations than **episodes** because some episodes include multiple **hospitalizations** (for more details see section **glossary and supplemental information**). An overview of these rehospitalizations is shown in Figure 3.

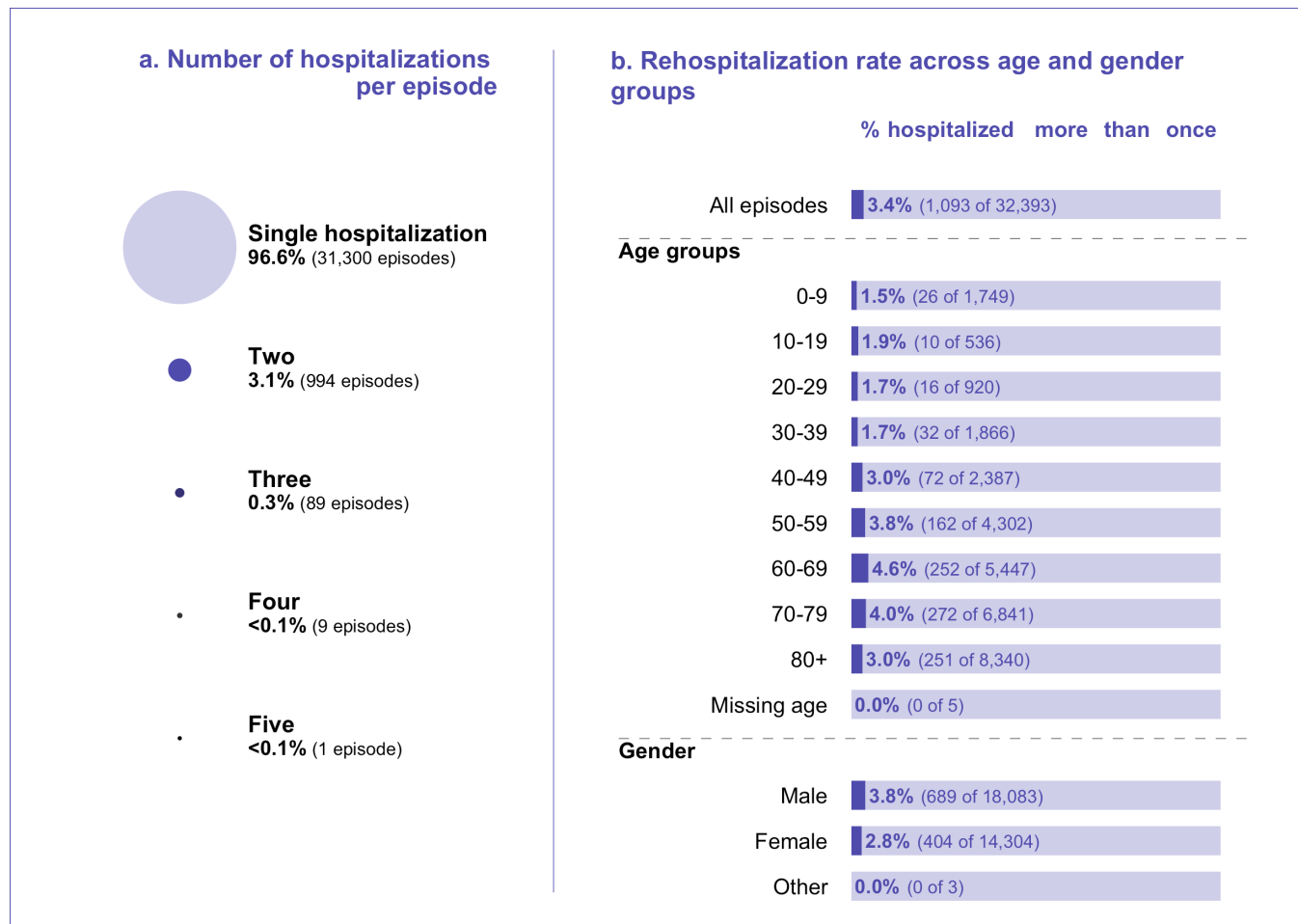


Figure 3: Hospitalizations per episode of hospitalization and rehospitalization rate across demographic groups. Includes records between March 2020 and October 23, 2022.

Most patients (96.6% [31,300 of 32,393]) were hospitalized only once during an episode, while 3% of the registered episodes (1,092 of 32,393) included two to four hospitalizations. Only one episode included five hospitalizations (Figure 3b).

The overall rate of rehospitalization within the same episode was 3.4% (1093 of 32,393) (Figure 3b). The 60-69 age group and the 70-79 age group had the highest rate of rehospitalization at respectively 4.6% (252 of 5,447) and 4.0% (272 of 6,841). Men had a higher rehospitalization rate than women, 3.8% (689 of 18,083) vs 2.8% (404 of 14,304) respectively.

Among all episodes, the majority (55.8% [18,083 of 32,393]) of the episodes concerned male patients (Figure 4a), and the age distribution was skewed towards older persons (Figure 4b). The largest age category corresponded to patients aged 80 and above (26.0% [8,340]).

Figures 4c and 4d show the gender and age distribution ratio over time. Except for January 2022, more men than women were admitted in each month for the entire period of observation. The proportion of episodes concerning patients aged 50 and above was notably high between October 2020 and January 2021, with a peak in November 2020: 88.3% (2,823 of 3,197) of the episodes of patients admitted in this month concerned patients 50 years old and above (Figure 4d). This peak in older age admissions mirrors a similarly-timed peak in admission severity and case fatality ratios described later. An increase in the percentage of episodes of patients aged 50 and above was

observed again from September 2021 to November 2021, reaching a local peak of 75.2% (840 of 1,117) in November 2021. Since April 2022 the percentage of episodes concerning patients aged 50 years old and above has surpassed the level of November 2021 again. Over the month of August 2022, 81.3% (361 of 444) of episodes concerned patients aged 50 and above. Notably, in this last period, we are seeing an increase in the oldest age groups being admitted with 27.5% [122 of 444] of episodes pertaining to patients aged between 70 and 80 years old and 37.1% [408 of 1,101] of episodes pertaining to patients over 80 years old in the month of August 2022.

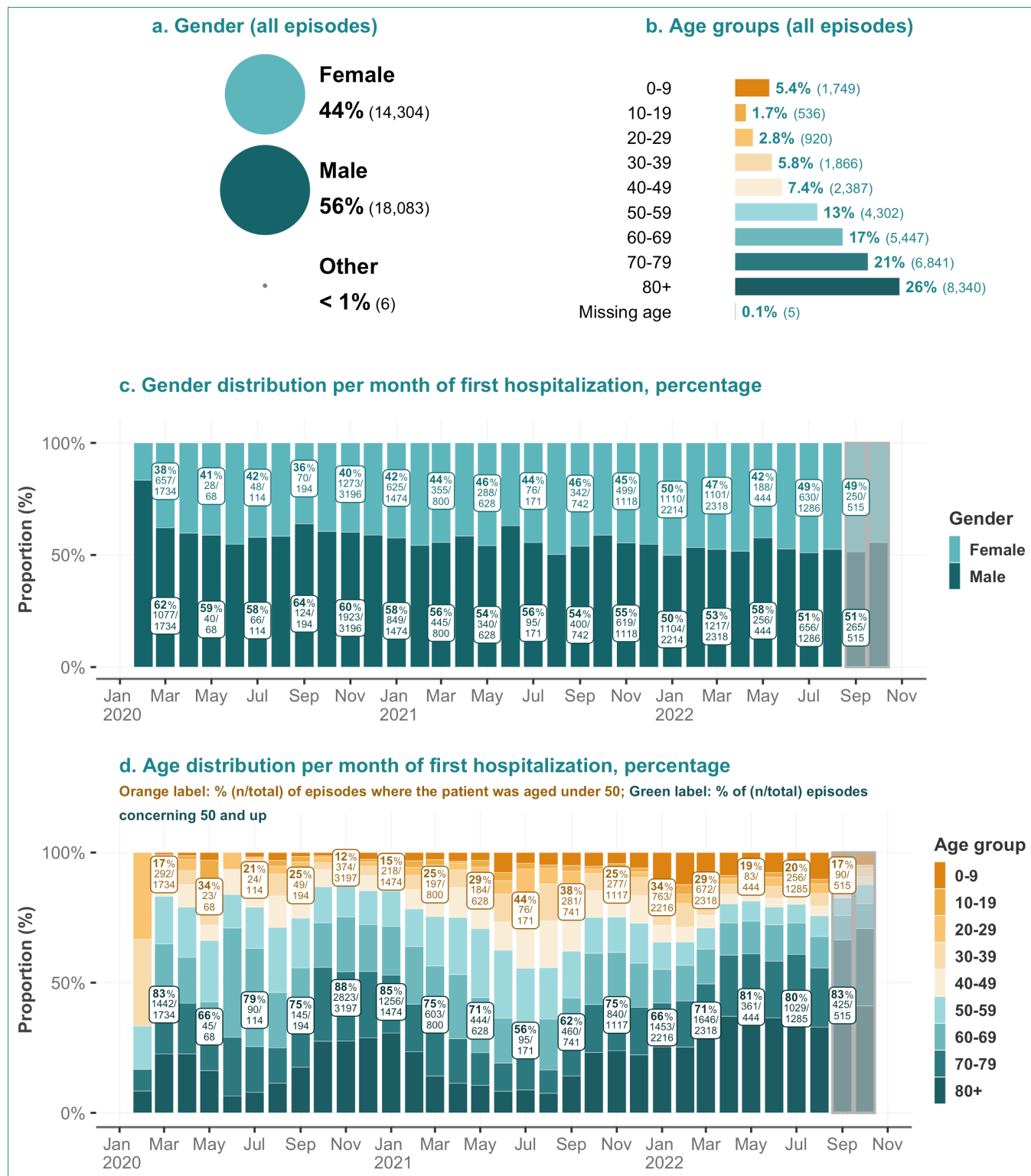


Figure 4: Demographic characteristics: gender and age distribution of admitted hospitalized patients, overall and per month. For episodes with multiple hospitalizations, the admission date of the first hospitalization was used. Data from the last two months (highlighted gray) is considered provisional due to entry delays. The 'other' gender category was removed from panel c, and the missing age group was removed from panel d.

3. Outcomes

3.1. Outcomes overview

Figure 5 shows the final outcomes of CH-SUR episodes over three time intervals. **Episodes** resulting in death, for which COVID-19 was the **cause of death** (died of COVID-19) are shown separately from those with an alternative cause of death (died *with* COVID-19, but not *of* COVID-19). A medical doctor at the hospital for each CH-SUR-participating center determined whether a patient died of COVID or another cause. Episodes where the cause of death was not certain, but there was a COVID-19 diagnosis (in conformity for complete inclusion criteria for CH-SUR) were counted as died of COVID or suspected death of COVID. The outcome “**discharged**” includes patients who were transferred out of the CH-SUR system. Episodes with “pending or missing outcomes” correspond to either patients who were still hospitalized or whose outcomes were not yet recorded in the database at the date of data extraction. Because of the higher proportion of incomplete data during the most recent months, case fatality rates from these months should be interpreted with caution.

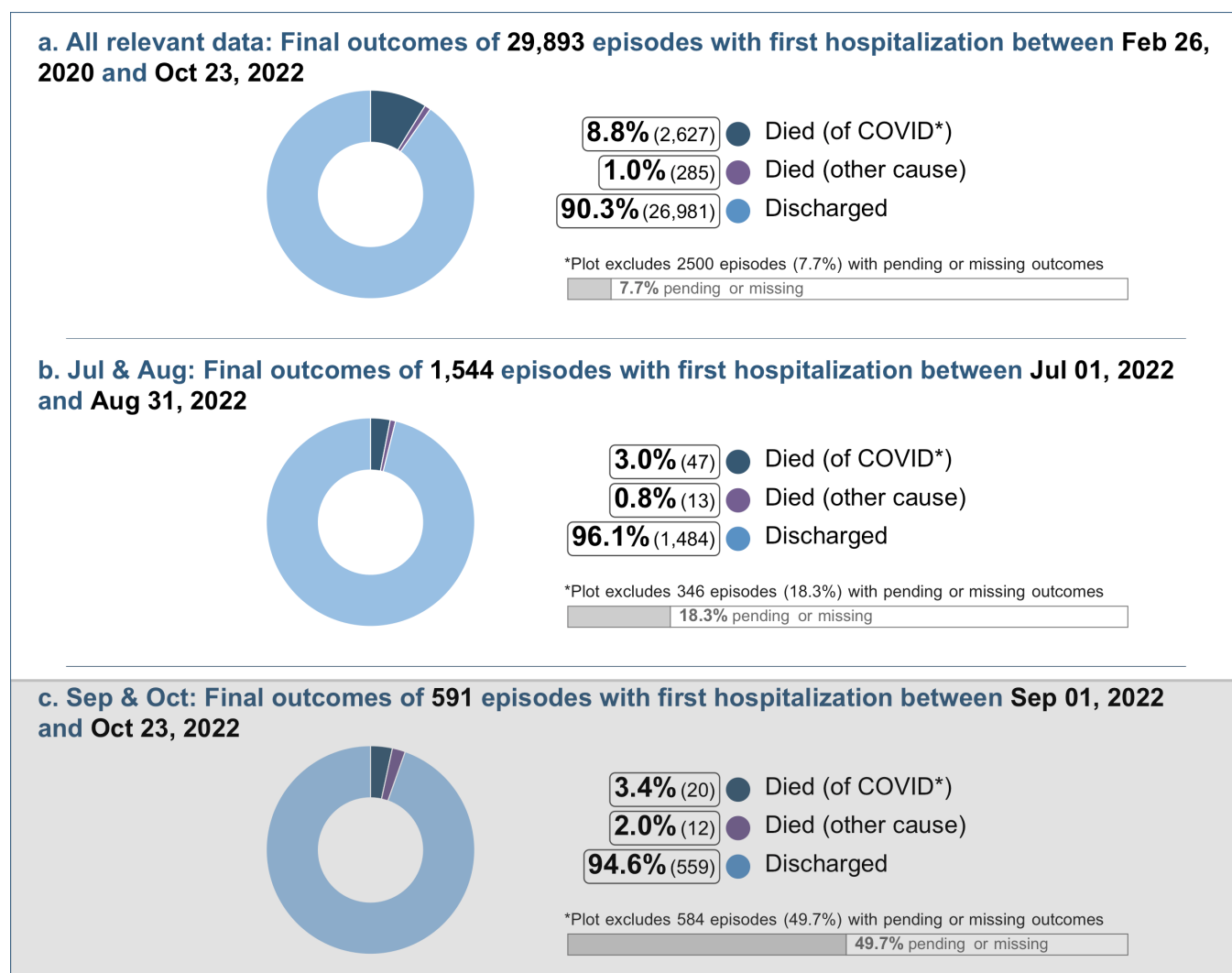


Figure 5: Outcomes for COVID-19 related episodes of hospitalization in CH-SUR hospitals. Includes records up to October 23, 2022. For episodes with multiple hospitalizations, only the final outcome is considered. Patients where the cause of death was not certain, but there was a COVID-19 diagnosis (in conformity for complete inclusion criteria for CH SUR) were counted as Died of COVID or suspected death of COVID. Data from the last two months (highlighted gray) is considered provisional due to entry delays. (* Died of COVID as a confirmed or suspected cause of death)

3.2. Outcomes over time

Figure 6 shows the final outcomes of **episodes** over time (Figure 6a & 6b) and the disease severity score at admission as a function of time (Figure 6c).

The first mortality peak was observed for patients admitted around the beginning of the epidemic: 15.1% (262 of 1,732) of episodes of patients first admitted in March 2020 resulted in death of COVID-19. Mortality decreased after March 2020, but rose again between October 2020 and January 2021, with a peak in December 2020: 13.9% (330 of 2,374) of episodes of patients first admitted in December 2020 resulted in death. An additional peak of mortality was observed during the month of October 2021, when 12.2% (53 of 433) of episodes resulted in death of COVID-19. Since the month of February 2022, mortality has remained at low levels: less than 5% of episodes resulted in death each month.

The high case fatality rates of patients with episodes of hospitalization in March 2020, between October 2020 and January 2021 and during October 2021, are mirrored by the higher admission **severity scores** (Figure 6c) and older patients' ages (Figure 4c) during these periods. Overall, in 31.7% (550 of 1,734) of the episodes with admission date in March 2020, the severity score was above 2. Over the months of October 2020 to January 2021, the proportion of episodes with severity scores of 2 and above was higher as over the rest of the epidemic, representing more than 40% (958 of 2,394) of the admissions in that period. Most recently, during August 2022, 33.3% (201 of 604) of the episodes had a severity score above 2, but this is not mirrored by higher case fatality rates (Figure 5)

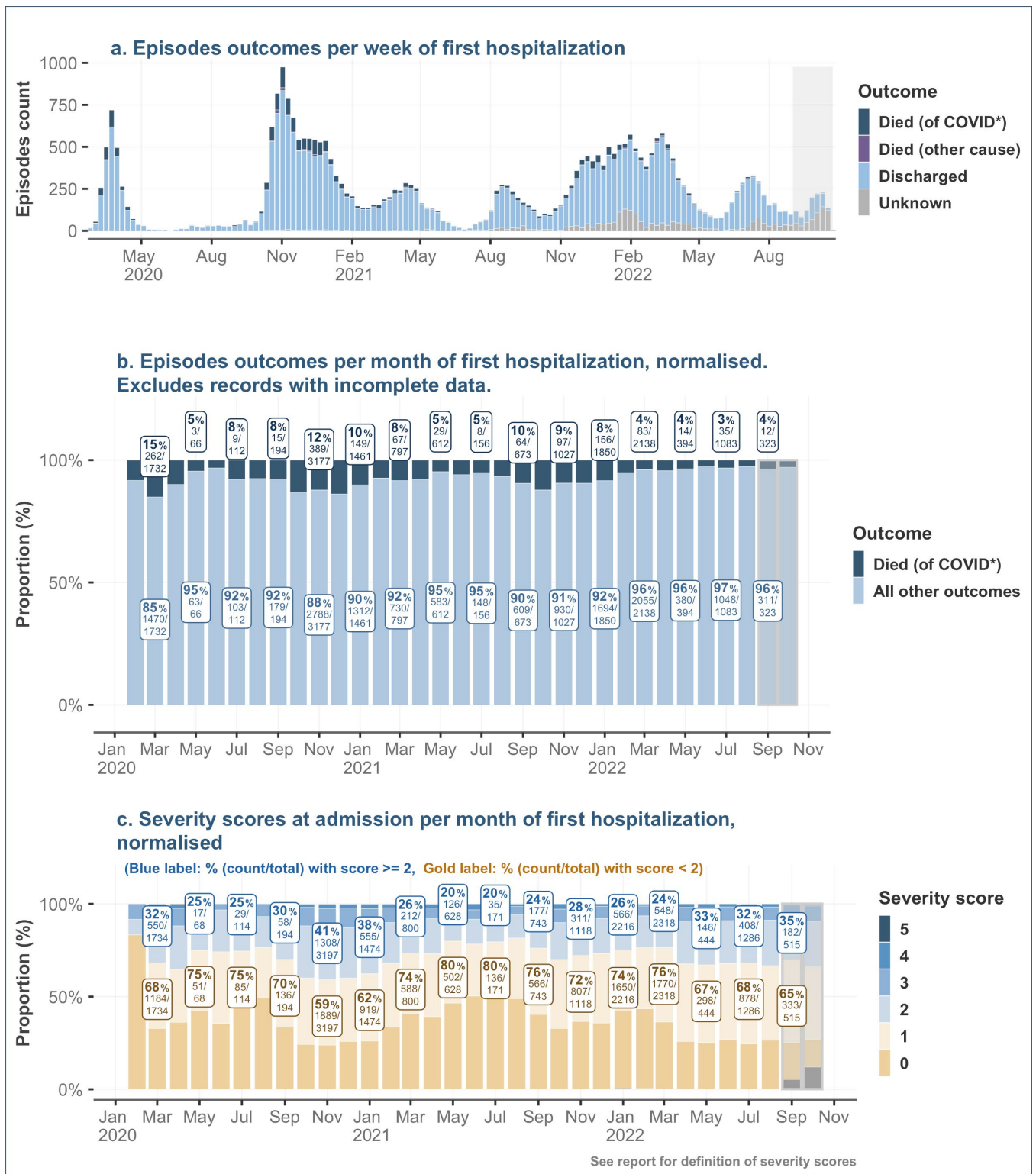


Figure 6: Epidemic curve, episodes' outcomes and severity scores at admission for COVID-19 hospitalizations over time. Includes records up to October 23, 2022. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. Episodes where the cause of death was not certain, but there was a COVID 19 diagnosis (in conformity for complete inclusion criteria for CH SUR) were counted as Died of COVID or suspected death of COVID. (* Died of COVID as a confirmed or suspected cause of death)

3.3. Case fatality rate (CFR) across demographic and risk groups

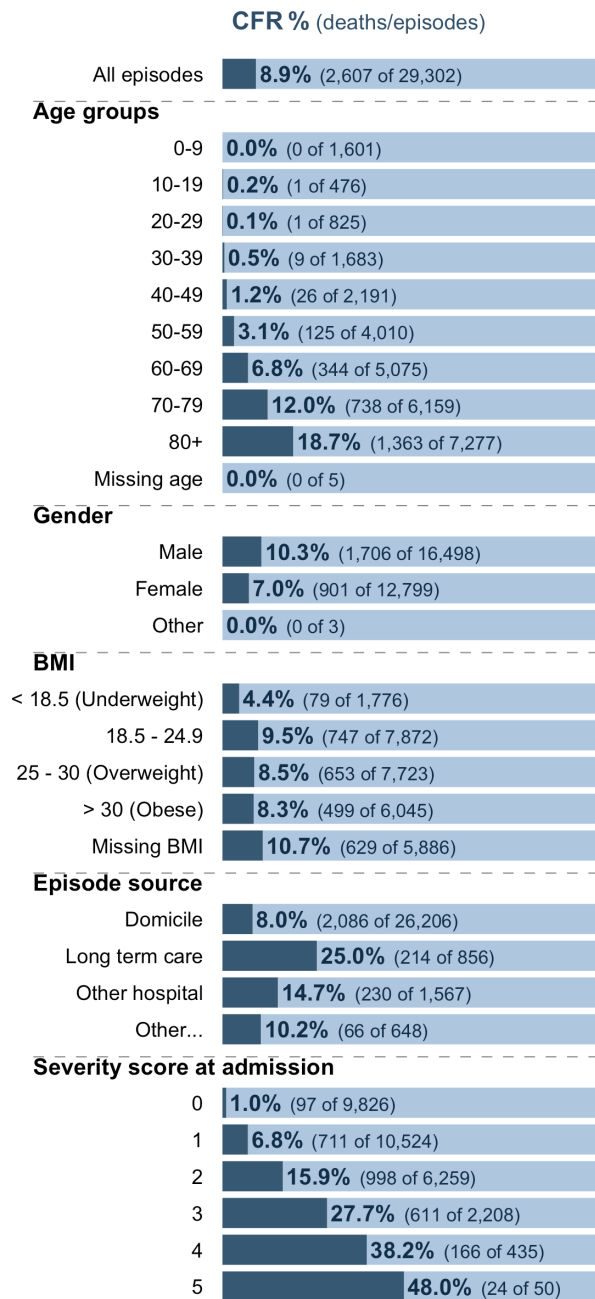
Since the beginning of the epidemic and until August 31, 2022, the case fatality rate (CFR) increases with increasing age, from 0% (0 of 1,601) in episodes of patients aged 0-9, to 3.1% (125 of 4,010) in episodes of patients aged 50-59, and to 18.7% (1,363 of 7,277) in episodes of patients aged 80+. CFR% was greater in men than in women: 10.3% (1,706 of 16,498) vs 7% (901 of 12,799) respectively. In addition, the CFR% was greater for episodes with higher severity scores at admission: 1% (97 of 9,826) of the episodes with severity score 0 resulted in death of COVID-19, while 48% (24 of 50) of the episodes with severity score 5 resulted in death of COVID-19 (Figure 7a).

The overall CFR% of the most recent period for which enough data is available (months July and August 2022, Figure 7b) was lower than the CFR% of the whole epidemic period (3.0% vs. 8.9%). The CFR% of the age groups 70-79 and 80+ were also lower than over the whole epidemic (Figure 7).

Of note, there was no clear mortality difference across different BMI groups. Data regarding vaccination status can be found in section 4.



a. All data: CFR % for 29,302 episodes with first hospitalization between Feb 26 2020 and Aug 31 2022



b. July & August: CFR % for 1,544 episodes with first hospitalization between Jul 01 2022 and Aug 31 2022

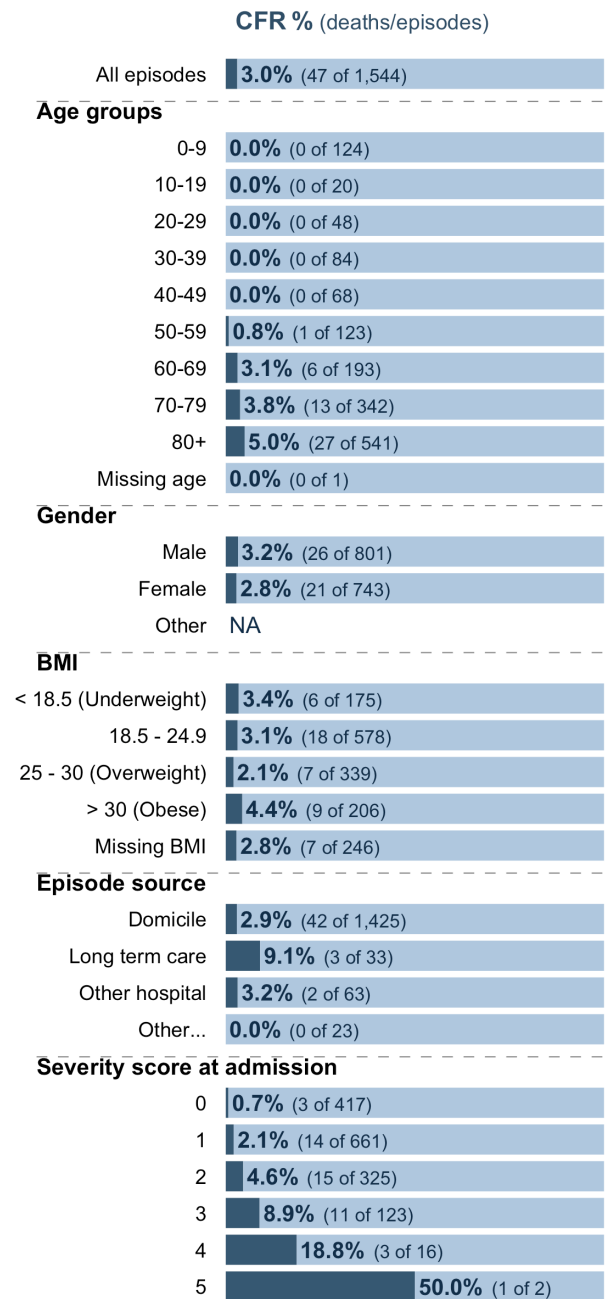


Figure 7: Case fatality rate (CFR) % among demographic and risk groups: percentage of hospitalization episodes in different demographic groups, which ended in the death of the patient of COVID-19 in hospital. Both figures include records up to Aug 31 2022 but records with incomplete data (ongoing hospitalization episodes or with a pending outcome in the database) were not included. Blank rows indicate a count of zero.

4. Immune/vaccination status

4.1. Immune status over time

For these analyses, the **immune status** of a patient considers the previous COVID-19 infections and the vaccine doses received up to the time of a positive COVID-19 test, specifically up to the time when the sample for the test was collected.

The proportion of **fully immunized** patients (with one booster) rose gradually after January 2021 (Figure 8b). This is expected, given the rise in the proportion of the fully vaccinated Swiss population (see **FOPH Dashboard**).

As of October 25, 2022, 69.7% of the Swiss population was vaccinated (Figure 8c). It is important to note that we can know the percentage of the population which is vaccinated (through administrative records), but only approximate the proportion of the population which is immunized. Recent studies from **Corona Immunitas** are indicating that **the population immunization (by vaccination and/or previous infection) is nearing the 100%**. The higher percentage of base immunized, fully immunized (with one booster), and fully immunized (with additional boosters) of recent months (23.1%, 41.1% and 4.2% respectively) within the episodes recorded in CH-SUR (Figure 8b), may therefore be partly linked to the decreasing number of non-immunized persons in the population.

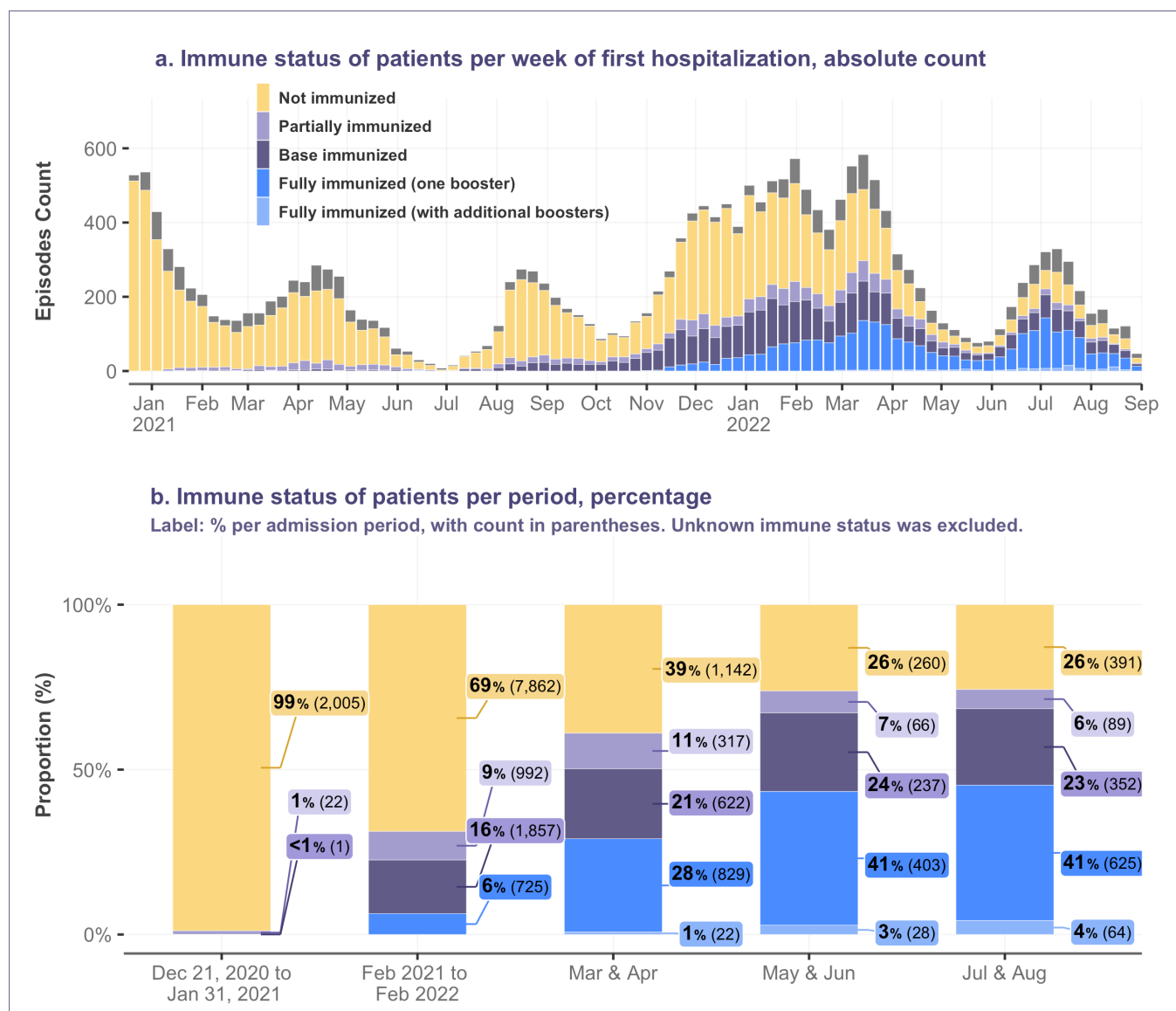


Figure 8: Immune status of patients over time. See glossary for definitions of immune status categories. For episodes with multiple hospitalizations, the immune status for the first hospitalization was considered. Episodes are included since the week vaccination began, Dec 21, 2020. (Vaccination began on Dec 23, 2020, but we include

Dec 22 and 21 to cover a full week.) Episodes with first admission date after Aug 31, 2022 were excluded, as a large proportion of these records have not been completely filled in the database.

4.2. Demographic characteristics by immune status

Fully immunized and **fully immunized (with additional boosters)** hospitalized patients were disproportionately older. Since vaccination initiation, respectively 47% and 47% of the episodes of fully immunized patients (one/additional boosters) corresponded to patients aged 80 and above (Figure 9a, right panels). In contrast, only 18% (2,078 of 11,492) of the episodes of non-immunized patients corresponded to patients aged 80 and above (Figure 9a, left panel).

However, in more recent data, we observe an increase in the proportion of older (aged 80+) as well as younger patients (0 to 9 years old) among the non-immunized episodes. From May 2022 to June 2022, among the episodes of non-immunized patients, 32% (82 of 260) concerned patients aged 0 to 9 years old and 27% (69 of 260) concerned patients aged 80 and above. In the most recent data, from July 2022 to August 2022, 34% (132 of 391) of non-immunized episodes involved patients aged 0 to 9 years and 25% (98 of 391) involved patients aged 80 years and above.

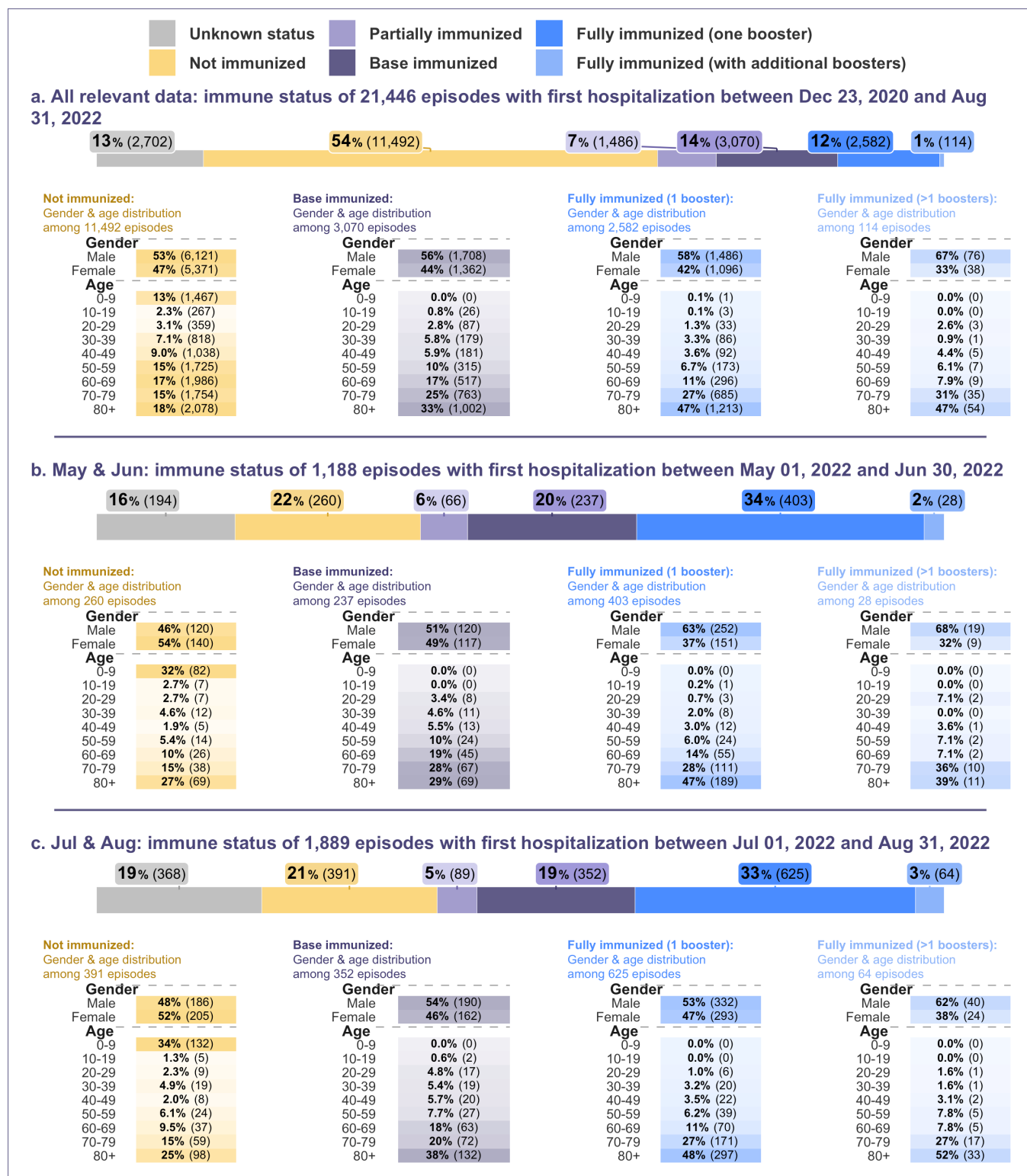


Figure 9: Demographic characteristics of hospitalized patients by immune status, over three different periods. Some patients may be counted more than once, as a single patient can have several episodes. Episodes with first admission date after Aug 31 2022 were excluded, as a large proportion of these records have not been completely filled in the database. Episodes with missing ages or gender are not included in the analysis.

4.3. Outcomes by immune status

Since the date vaccinations began, December 23, 2020, among the 2,208 episodes of fully immunized patients (with one booster), CH SUR registered 91 deaths because of COVID-19 (Figure 10a, right panels: fully immunized). 59 of them corresponded to patients aged 80 years old and above. Within the episode of fully immunized patients with additional boosters episodes, 4 deaths occurred because of COVID as an outcome, all concerned patients over 80 years old. Since vaccination start, 820 episodes ended in COVID-caused deaths among non-immunized patients (Figure 10a, left panel).

During the months of July and August, CH-SUR registered 34 deaths because of COVID-19 of which the immune status was known. Of these, 10 (29.4%) happened among non-immunized patients, 2 deaths (5.9%) among partially immunized patients, 6 deaths (17.6%) among base immunized patients, and 15 deaths (44.1%) among fully immunized patients (with one booster) (Figure 10). The relatively high proportion of fully immunized patients among the deaths compared to non-immunized patients, may be linked to the increasingly low number of non-immunized persons in the population (see section 4.1.)

However, the CFR values by age show that the risk of death for the limited number of people who are hospitalized despite full immunization (with one booster) is generally lower than that of unvaccinated hospitalized people across all age groups. This is specifically true for episodes concerning patients aged over 80 years and above (9.6% CFR for non-immunized episodes compared to 3.9% for fully immunized episodes and 4.3% for fully immunized (with additional boosters) episodes) (Figure 10c, left and right panel). This reflects the protective effect of vaccination on the risk of death.

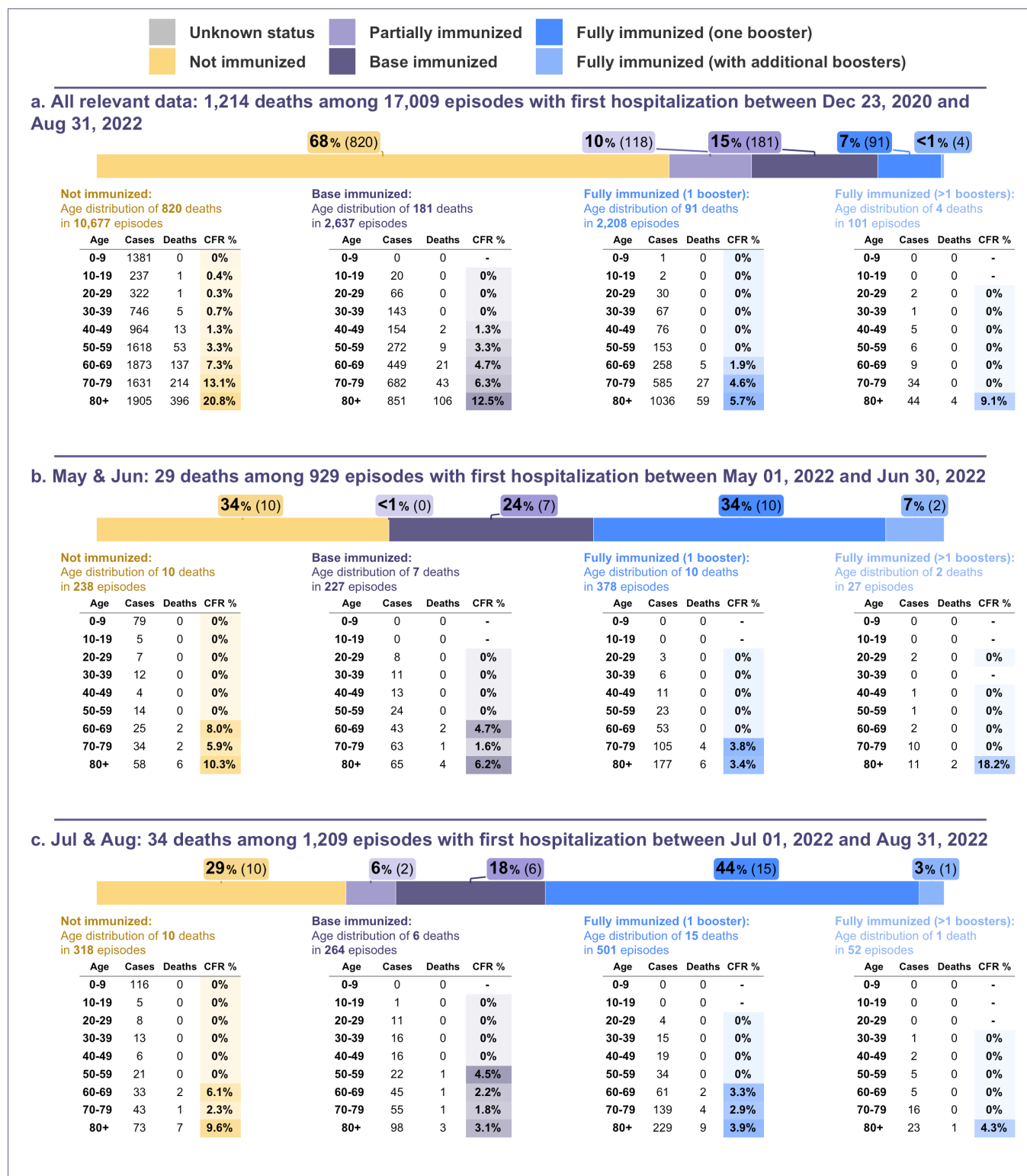


Figure 10: Mortality of CH-SUR hospitalized patients by immune status, age group and hospitalization episode, over three different periods. For partially immunized patients, only number of deaths is shown in the horizontal bar but not the detailed table showing CFR% by age group. The total counts of episodes include episodes with a final patient outcome known (discharged, died of any cause, or transferred out of CH-SUR), and where the patient's immune status was known. Episodes with missing age, missing gender, or missing immune status were not included in the analysis. Counts of deaths only include episodes resulting in death because of COVID-19 (including those with COVID as suspected cause of death). Case-fatality rate (CFR), especially for the fully immunized (with additional booster) category, should be interpreted with caution due to small sample sizes.

5. Intensive care unit (ICU) admission

5.1. ICU admission over time

Figure 11 shows the proportion (in %) of ICU admission over time. The proportion of episodes with ICU admissions peaked between May and July 2020. Notably, this was during a period of low overall hospitalizations. In contrast, the lowest proportion was observed in most recent months since January 2022.

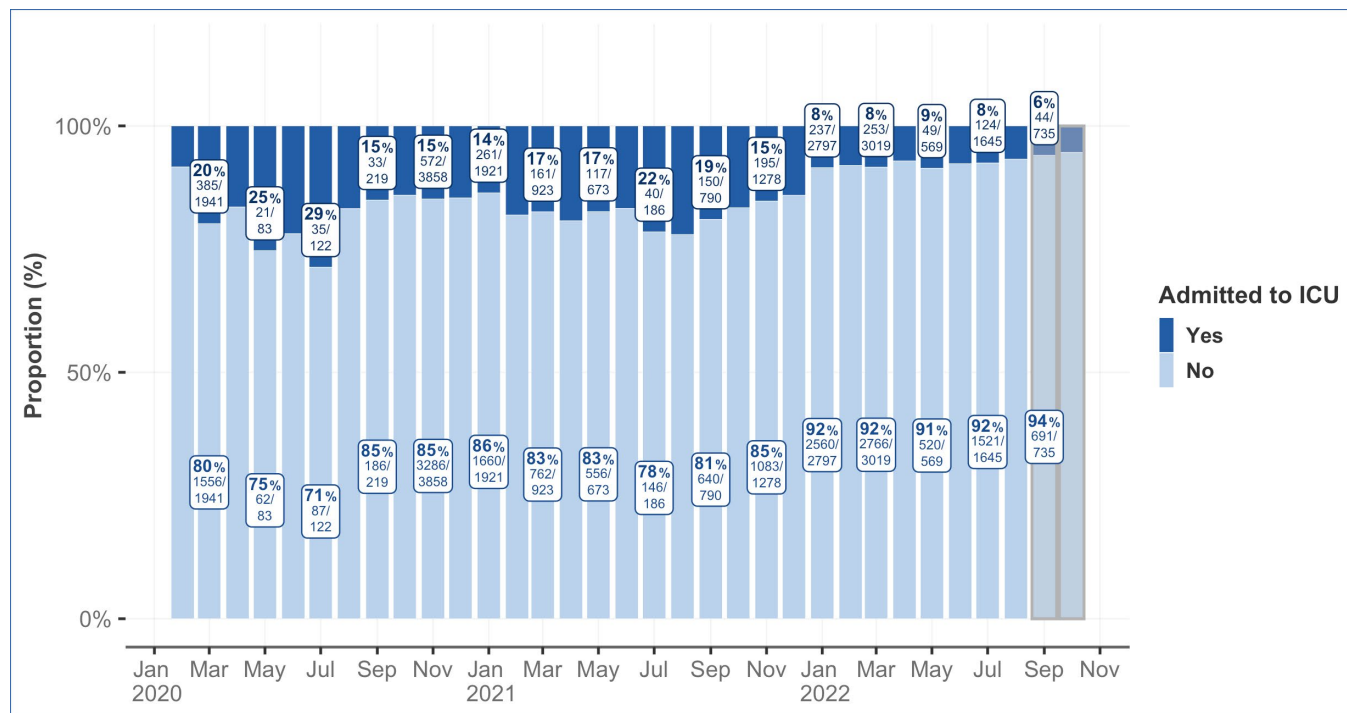


Figure 11: Percentage and proportion of episodes with at least one ICU admission over time. Records with incomplete data (ongoing episodes or with a pending outcome in the database) were not included. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.

5.2. ICU admission across demographic and risk groups

Over the whole period of observation, **ICU** admission probability across ages was roughly bimodal with a peak for the 10-19-year age group and for the 60-69 age group (Figure 12a). The 60-69 age group had the highest probability of admission to the ICU, with 23.1% (1,230 of 5,336) of the episodes including at least one ICU admission. Notably, individuals aged 80 and above were least likely to be admitted to the ICU, with 5.2% (408 of 7,861) of the episodes including at least one ICU admission.

Males were more likely to be admitted to the ICU than females. Overall, admissions to the ICU were registered for 16.8% of the episodes concerning males, compared to 10.1% of the episodes concerning females.

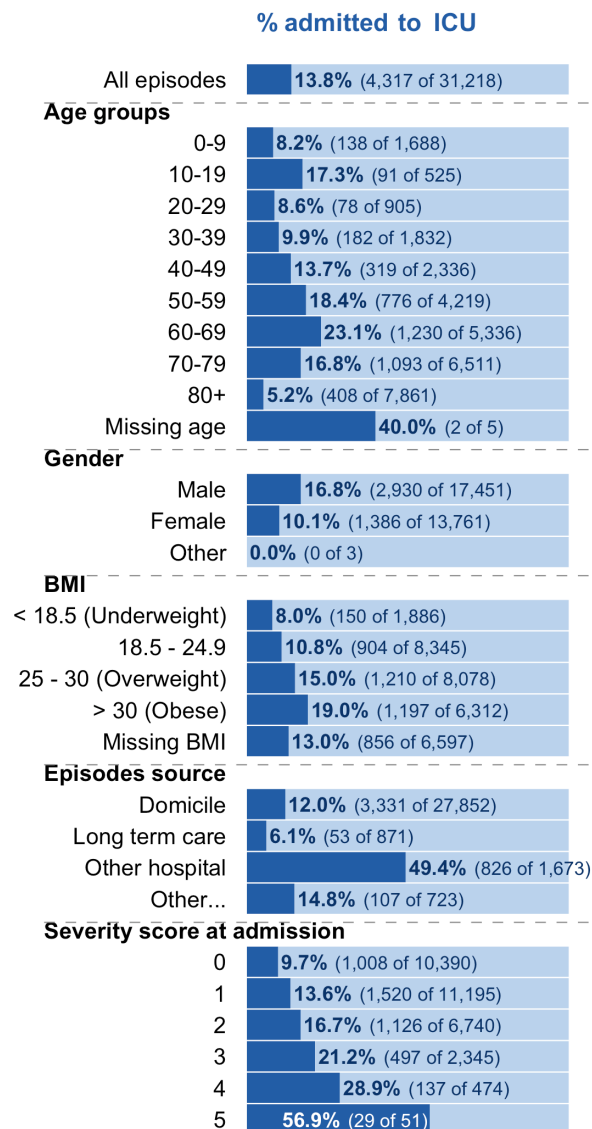
Episodes of patients transferred from other hospitals had a high probability of ICU admission: 49.4% of such episodes (826 of 1,673) required at least one ICU admission (Figure 12a), compared to an overall admission rate of 13.8%.

ICU admission probability also increased slightly with increasing BMI and steeply with increasing admission **severity scores** (Figure 12a).

Figure 12b shows the ICU admissions for the most recent period with available data (July 2022 and August 2022). The distribution of ICU admissions across different population groups during the latest period was roughly similar to the frequencies observed for the whole observation period. However, differences across BMI groups seem to have largely disappeared. Moreover, the relation between ICU admission and increasing severity at admission only shows for patients with severity scores of 3 and above. Given the smaller sample size of this period of observation, larger oscillations in the percentages are expected, making the real trends difficult to identify. For the overall frequency of admission to ICU and all population groups observed, the frequency of admission to ICU was smaller for the months of July and August than for the full epidemic period (Figure 12).



a. All relevant data: Episodes with first hospitalization between Feb 26 2020 and Aug 31 2022



b. Jul & Aug: Episodes with first hospitalization between Jul 01 2022 and Aug 31 2022

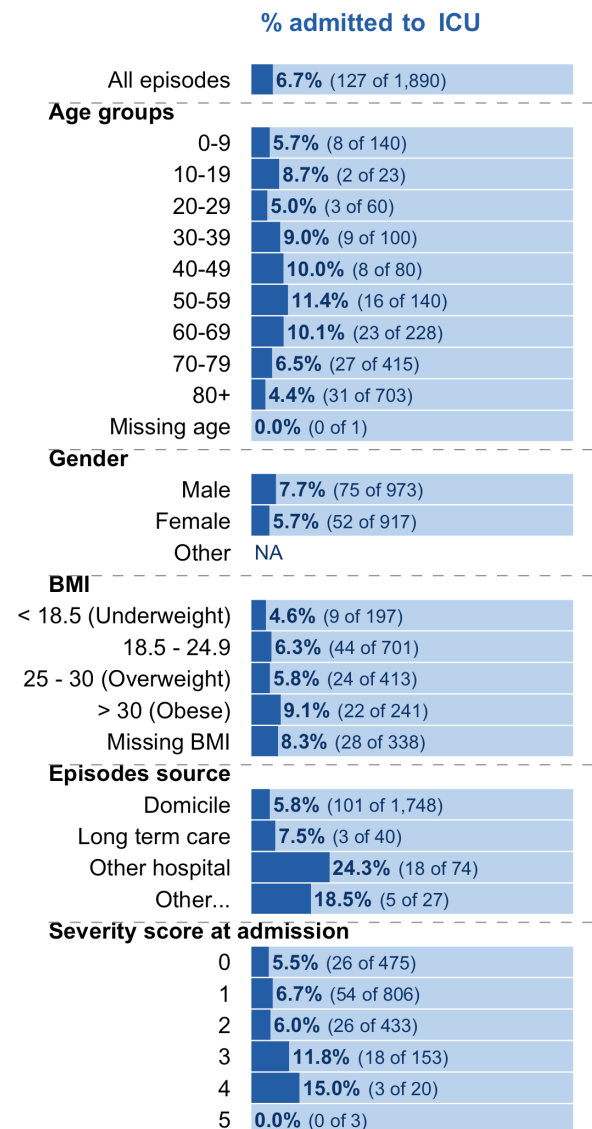


Figure 12: Percentage of hospitalization episodes with at least one ICU admission, grouped by demographic and risk factors, over two time intervals. For episodes with multiple hospitalizations, we considered whether they were admitted to the ICU during any of their hospitalizations. Both panels include records up to Aug 31, 2022 due to data completeness considerations. Records with incomplete data (ongoing episodes or with a pending outcome in the database) were not included. A blank row indicates a count of zero.

5.3. ICU admission rate by immune status

Figure 13 shows the ICU admission rate (number of episodes requiring an admission to the ICU over all episodes registered), stratified by age.

In recent data, from July and August, although episodes include 36.1% of people aged over 80 years old (see section 2 for more information on age distribution), these episodes did not have a high ICU rate (i.e. not many included an ICU stay).

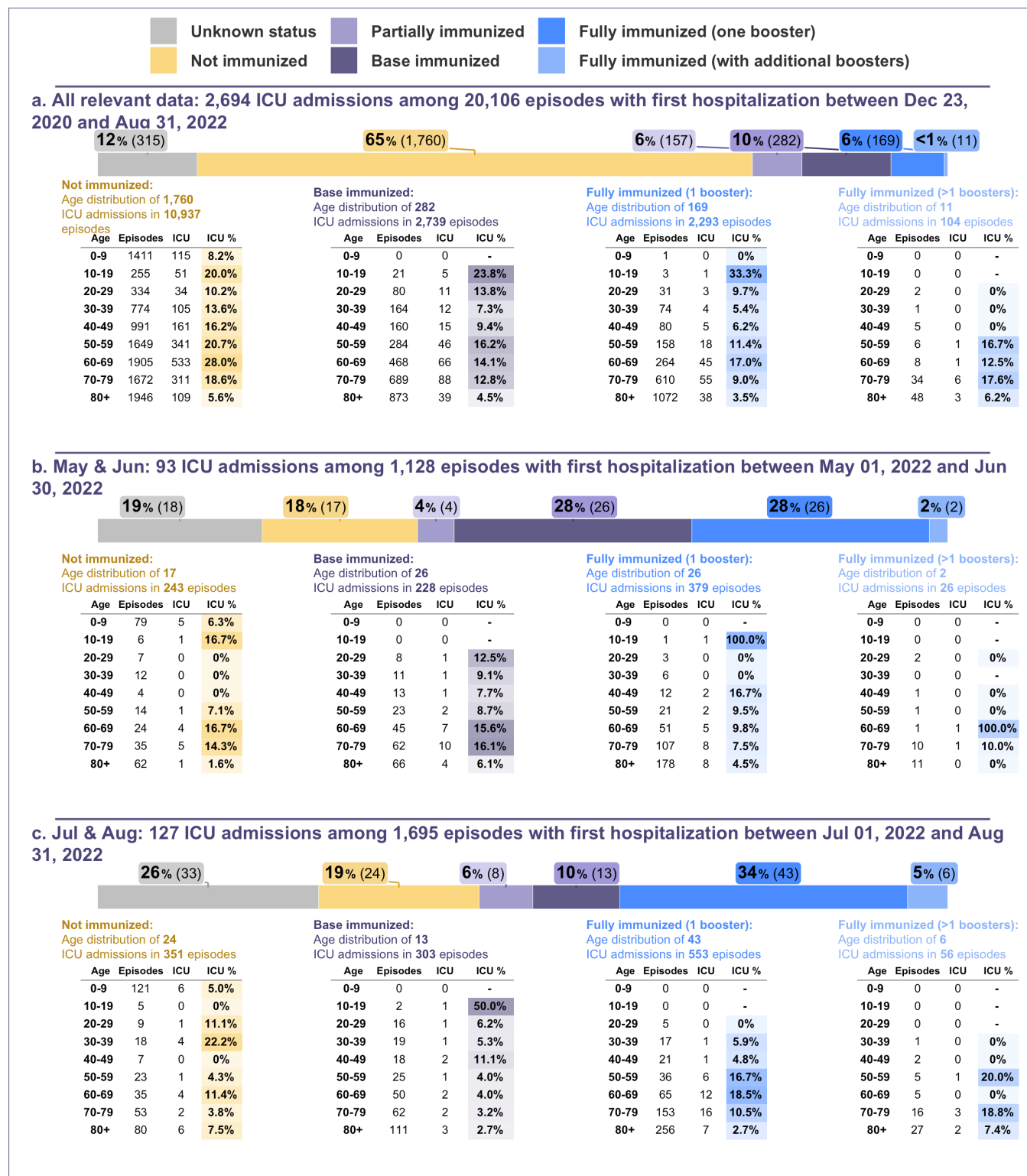


Figure 13: ICU admission over all episodes of CH-SUR hospitalized patients by immune status and age group over three different periods. For partially immunized patients, only number of ICU admissions is shown in the horizontal



bar but not the detailed table showing ICU% by age group. Episodes with missing age, or missing ICU stay were not included in the analysis. ICU admission rates (ICU%), especially for the fully immunized (with additional boosters) category, should be interpreted with caution due to small sample sizes.

5.4. ICU admissions contrasted by immune status

Due to a variance in vaccine coverage, only the recent evolution is represented. Data for September and October 2022 are not meaningful due to their incompleteness and are therefore not yet shown.

In both periods considered, the largest group of episodes with an ICU admission concerned fully immunized patients (with one booster) (28% and 34% of all episodes with ICU admissions in each of the described periods respectively). For most immune status categories shown and in both periods considered, there were more men than women admitted to the ICU (Figure 14).

For episodes of fully immunized patients (with one or more boosters), there is a skew towards older age groups being admitted to the ICU (between May 2022 and Aug 2022 around 93% of these episodes concerned patients aged 50+). In the two time periods, 89.3% (May, Jun) and 95.9% (Jul, Aug) of these episodes concerned patients aged 50+.

In comparison, episodes of non-immunized patients admitted to the ICU included proportionally more patients from younger age groups, as only 64.8% (May, Jun) and 54.5% (Jul, Aug) of the episodes corresponded to patients aged 50 years and above.

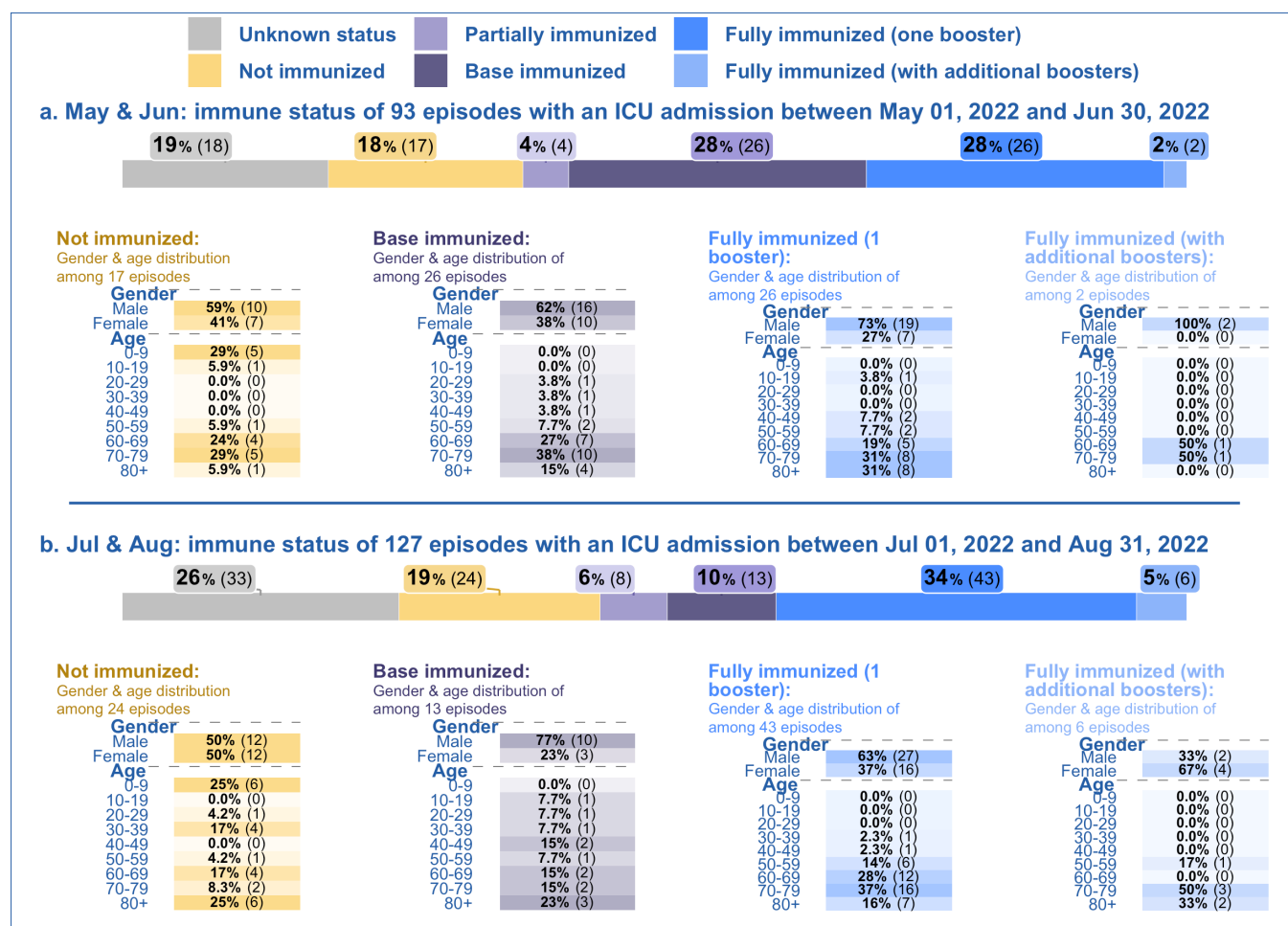


Figure 14: Demographic characteristics of patients in ICU by immune status and episode, over two different periods. Episodes with a first admission date after Aug 31, 2022 were excluded, as a large proportion of these records have not been completely filled in the database. Episodes with missing ages or gender marked as 'Other' are not shown. Data on ICU admissions for the fully immunized (with additional boosters) should be interpreted with caution due to small sample sizes.

6. Treatments

Several treatments have been used since the beginning of the pandemic and guidelines for COVID-19 treatment evolve according to the current state of knowledge. Therapeutic strategies may vary across centers, contributing to the heterogeneity of data. For clarity purpose, the treatments were classified into three categories: antivirals ¹, monoclonal antibodies ² and immune-modulating strategies ³. Combinations of treatments were explored: combinations are defined as the co-administration or the sequential administration of treatments during the same episode.

Figure 15 represents the categories of treatments (including combinations) over time, starting February 2020. This figure illustrates the changes in the overall treatment strategy as well as the increasing proportion of episodes during which no anti-COVID treatment was administered. This may be in line with the increasing proportion of non-severe cases over time.

In the Figure 16, treatments are analysed at the drug-level. The most commonly used drugs and their different combinations are presented.

Figure 17 represents the use of treatments across different patient groups. The global period from December 2020 to November 2021 is compared to the more recent period from December 2021 to October 2022 when the Omicron variant was predominant. In the more recent period, the proportion of patients who did not receive any anti-COVID treatment increased across all groups.

¹ Antivirals comprise: nirmatrevir/ritonavir, remdesivir and other antivirals (chloroquine, lopinavir/ritonavir, ribavirin, tenofovir, etc.).

² Monoclonal antibodies comprise: tixagevimab/cilgavimab, sotrovimab, casirivimab/imdevimab, bamlanivimab/etesevimab, and others (convalescent plasma, etc.).

³ Immune-modulating strategies comprise: corticoids (dexamethasone, prednisone), inhaled corticoids (budesonide), tocilizumab, baricitinib, and others (interferon, etc.).

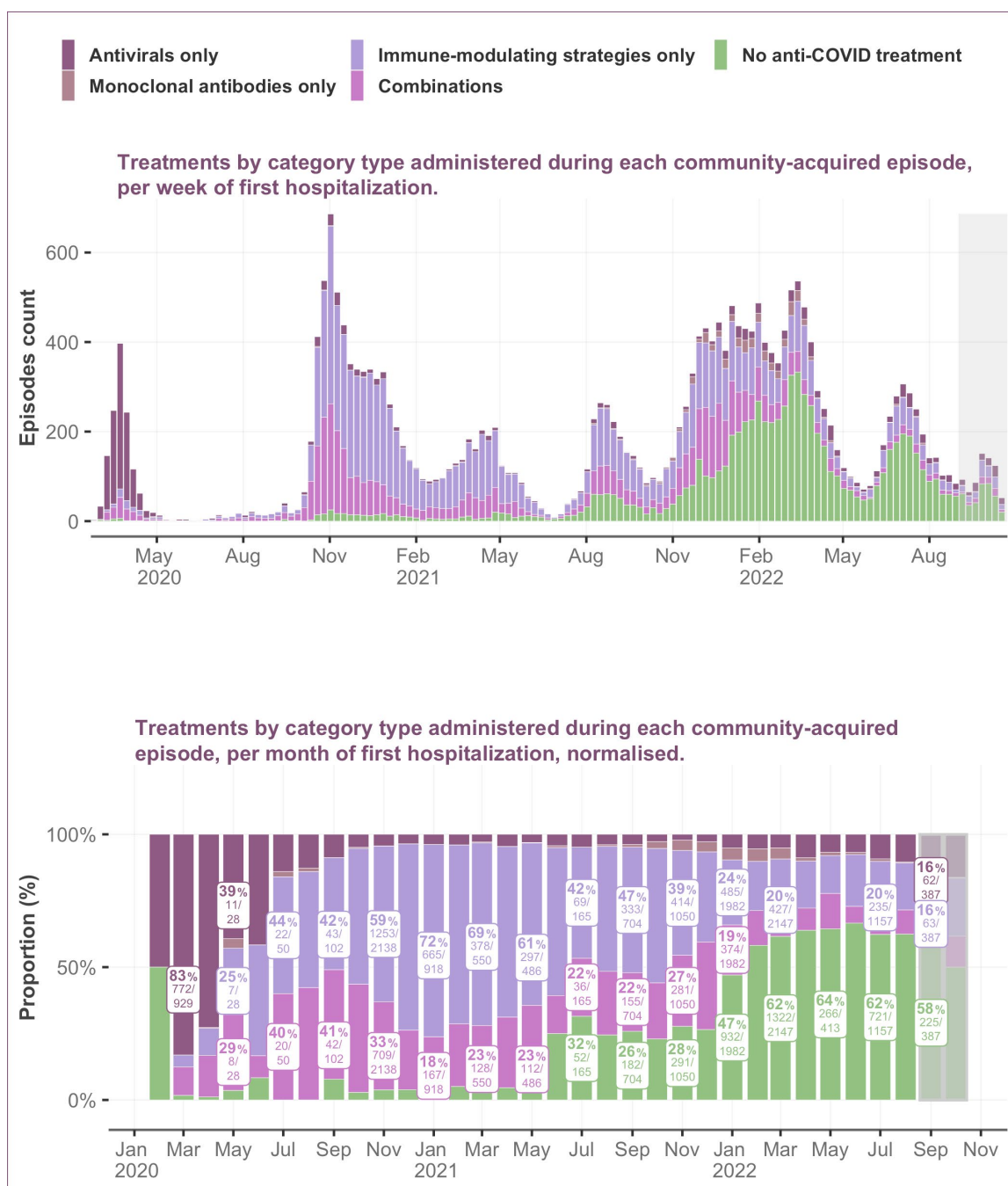
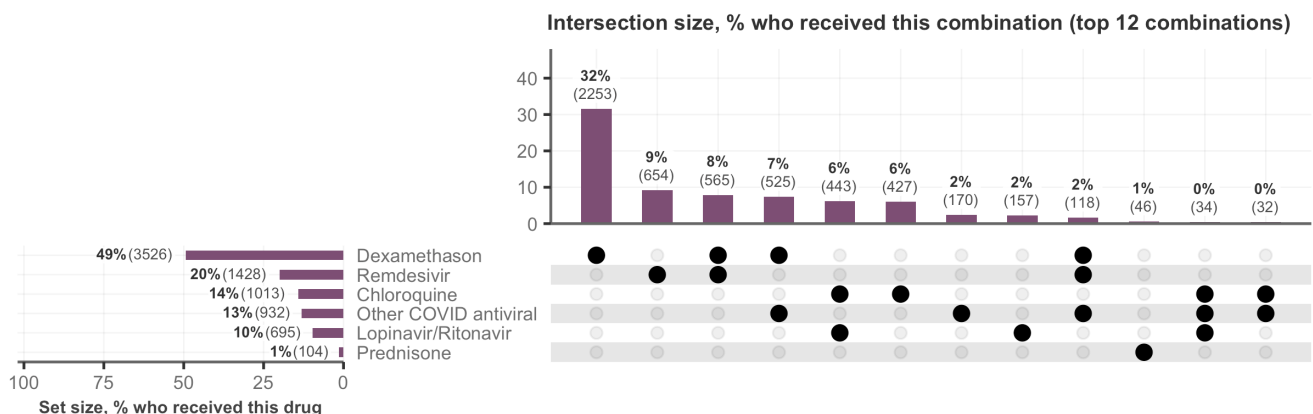


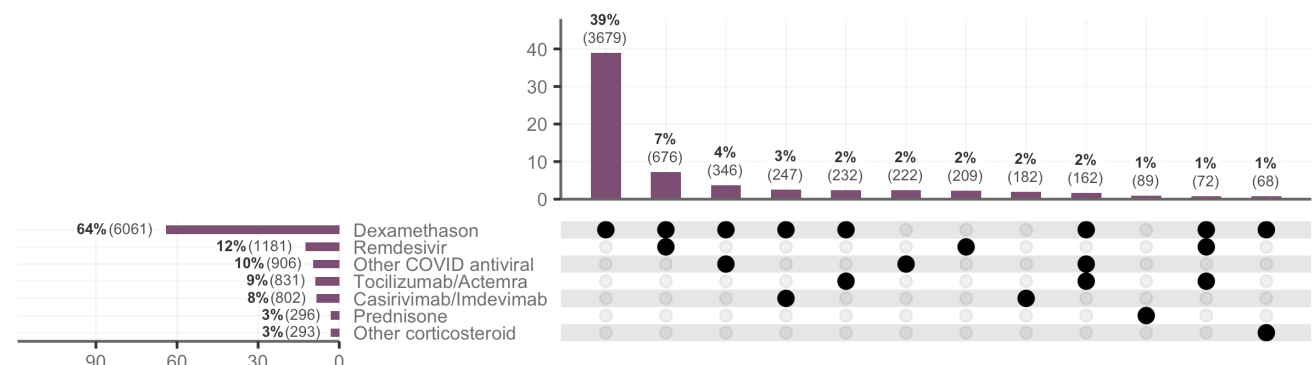
Figure 15: Anti-COVID treatments administered over time. Absolute counts are displayed per week of first hospitalization. Relative counts are presented by month of first hospitalization. Incomplete records were excluded.

a. 7,137 episodes first hospitalized in 2020



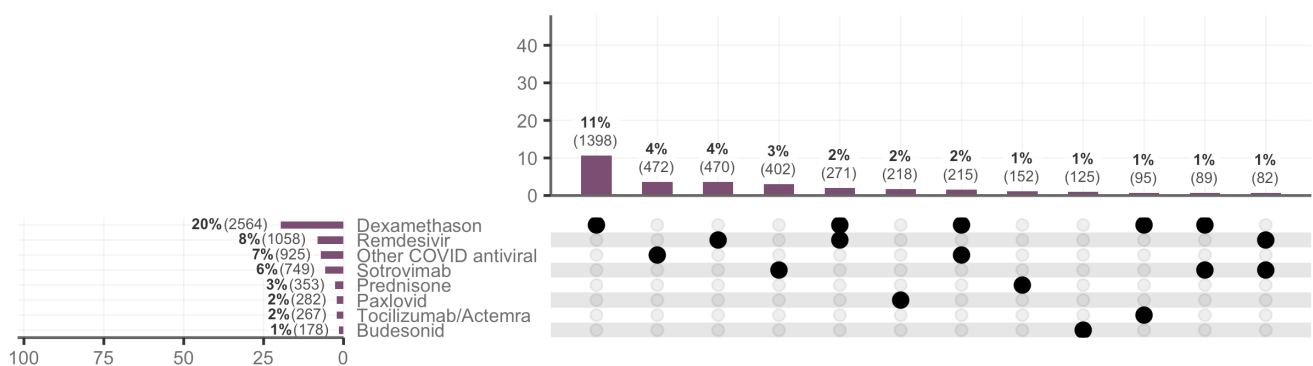
20.9% of episodes (1,495) in this period received no anti-COVID treatment

b. 9,452 episodes first hospitalized in 2021



24.1% of episodes (2,274) in this period received no anti-COVID treatment

c. 13,104 episodes first hospitalized in 2022



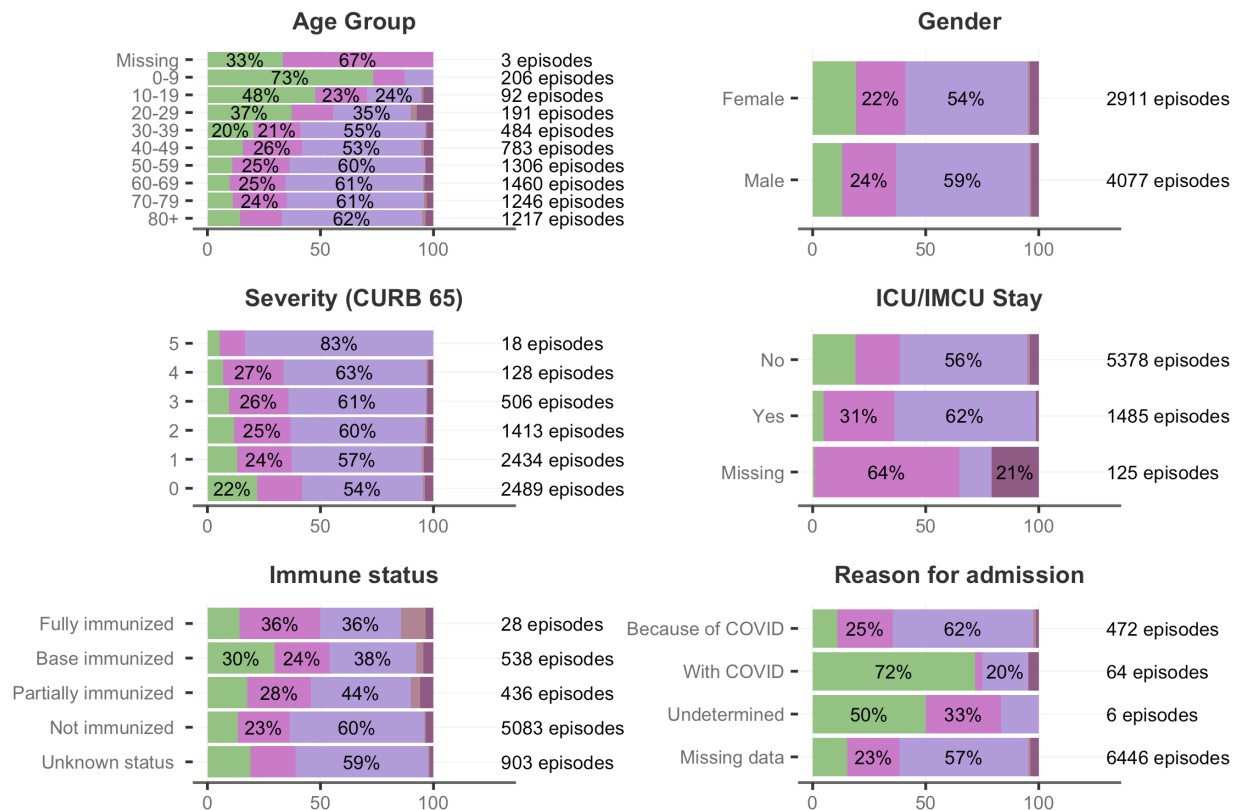
62.9% of episodes (8,236) in this period received no anti-COVID treatment

Figure 16: Anti-COVID treatments administered over three periods. Horizontal bars to the left represent the % of episodes who received a specific drug. Vertical bars show the % of episodes who received the combination of drugs indicated with the black dot(s) directly below the bar. Only the top 12 combinations are shown for each time period.



Antivirals only Immune-modulating strategies only No anti-COVID treatment
Monoclonal antibodies only Combinations

Treatments for community acquired episodes from Dec 2020 to Nov 2021



Treatments for community acquired episodes from Dec 2021 to Oct 2022

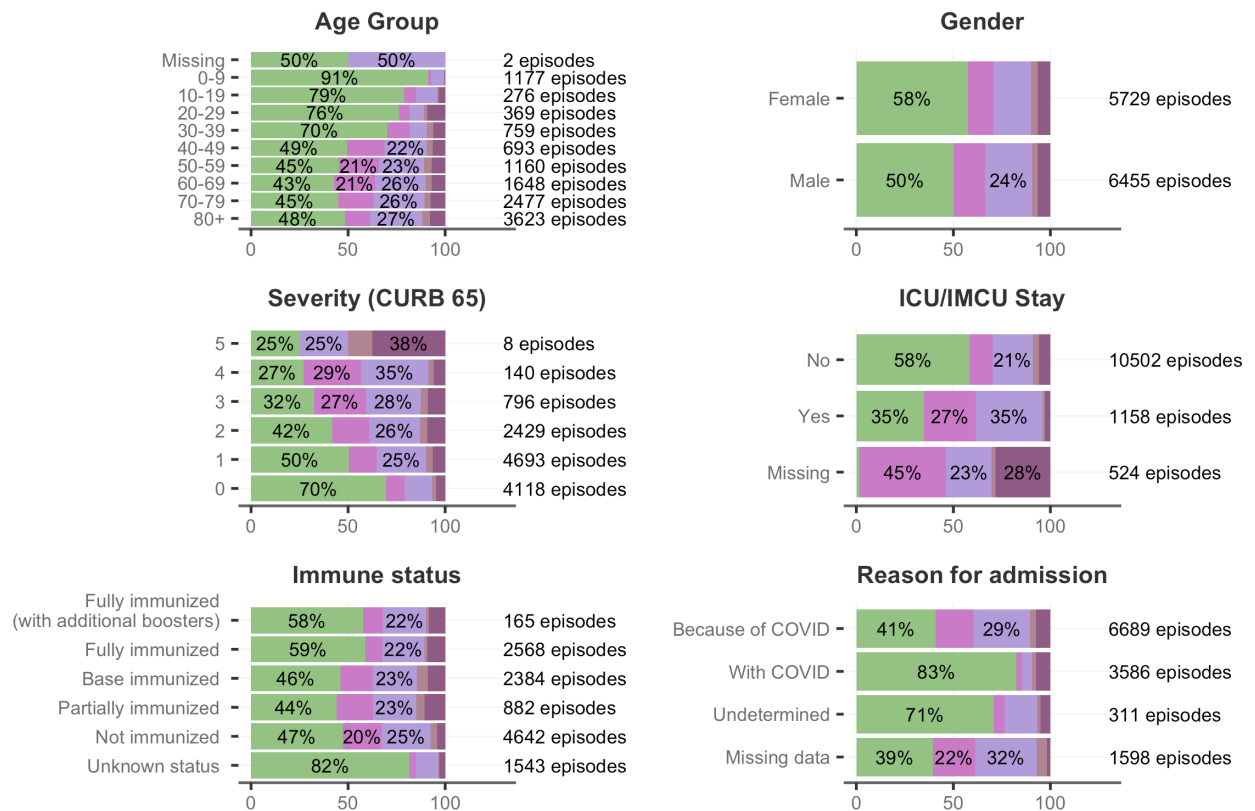


Figure 17: *Anti-COVID treatments administered stratified across different demographic groups. Two time periods are represented: a time period since vaccination began until November 2021, and a recent timeframe since the Omicron variant became dominant (Dec 2021) until the most recent data.*

7. Nosocomial cases

The proportion of **episodes** with nosocomial infections peaked in January 2021 and again in July 2022 with 30% or more of the episodes in this latter period linked to infections of nosocomial origin (Figure 18c). In recent months, this proportion rose since September 2022, accounting for 22.4% of the episodes registered in CH-SUR over the month of September 2022 and 27.2% in October 2022. The peaks in 2022 might be partially explained by periods of higher virus circulation and temporary increases in nosocomial systematic testing in some hospitals. As testing strategies vary across hospitals and over time, these data should be interpreted with caution.

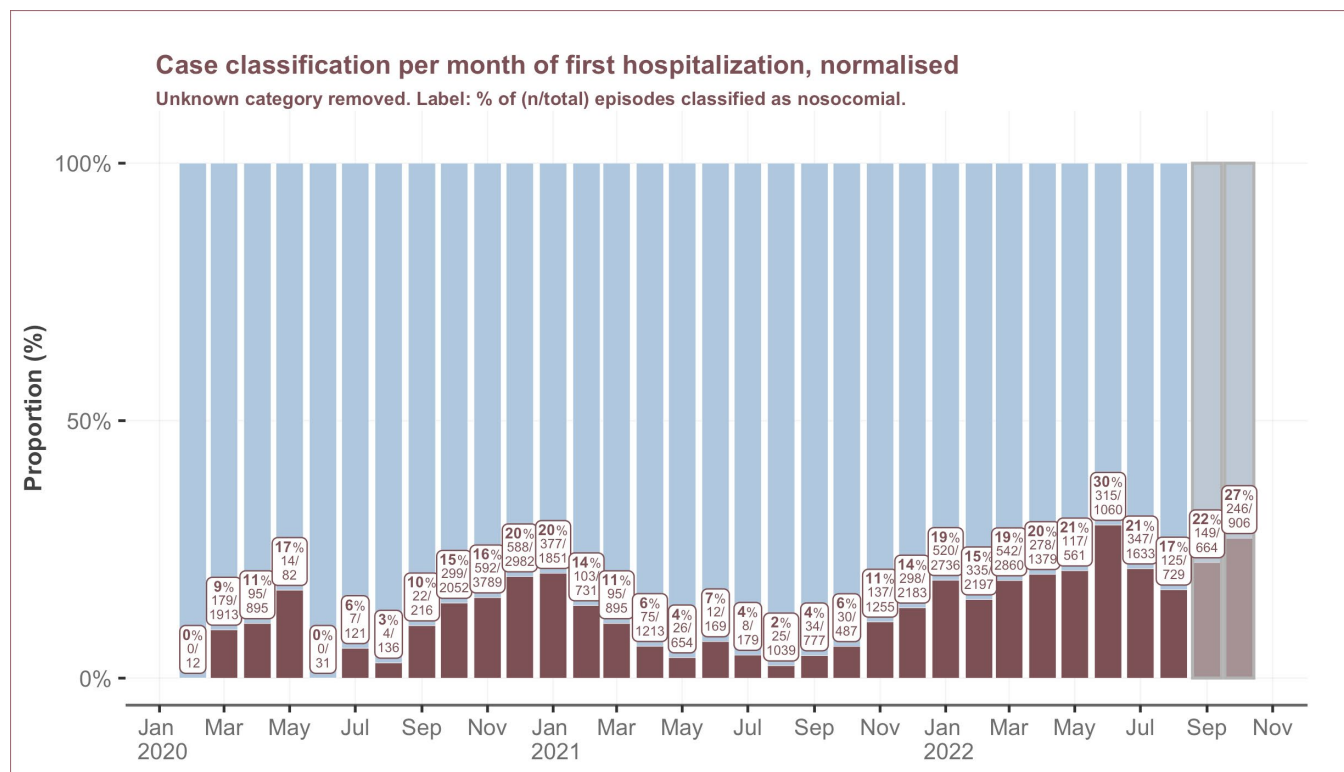


Figure 18: Classification (infection source) of hospitalization episodes over time. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.

Over the full course of the epidemic, the **nosocomial** infections affected principally an elderly population, with patients aged 80 years and above, accounting for 2,826 (47%) of the nosocomial episodes. In comparison, 8,298 (26%) of episodes with **community-acquired** infections corresponded to patients aged 80 years and above.



Community acquired and nosocomial episodes from Feb 2020 to Oct 2022

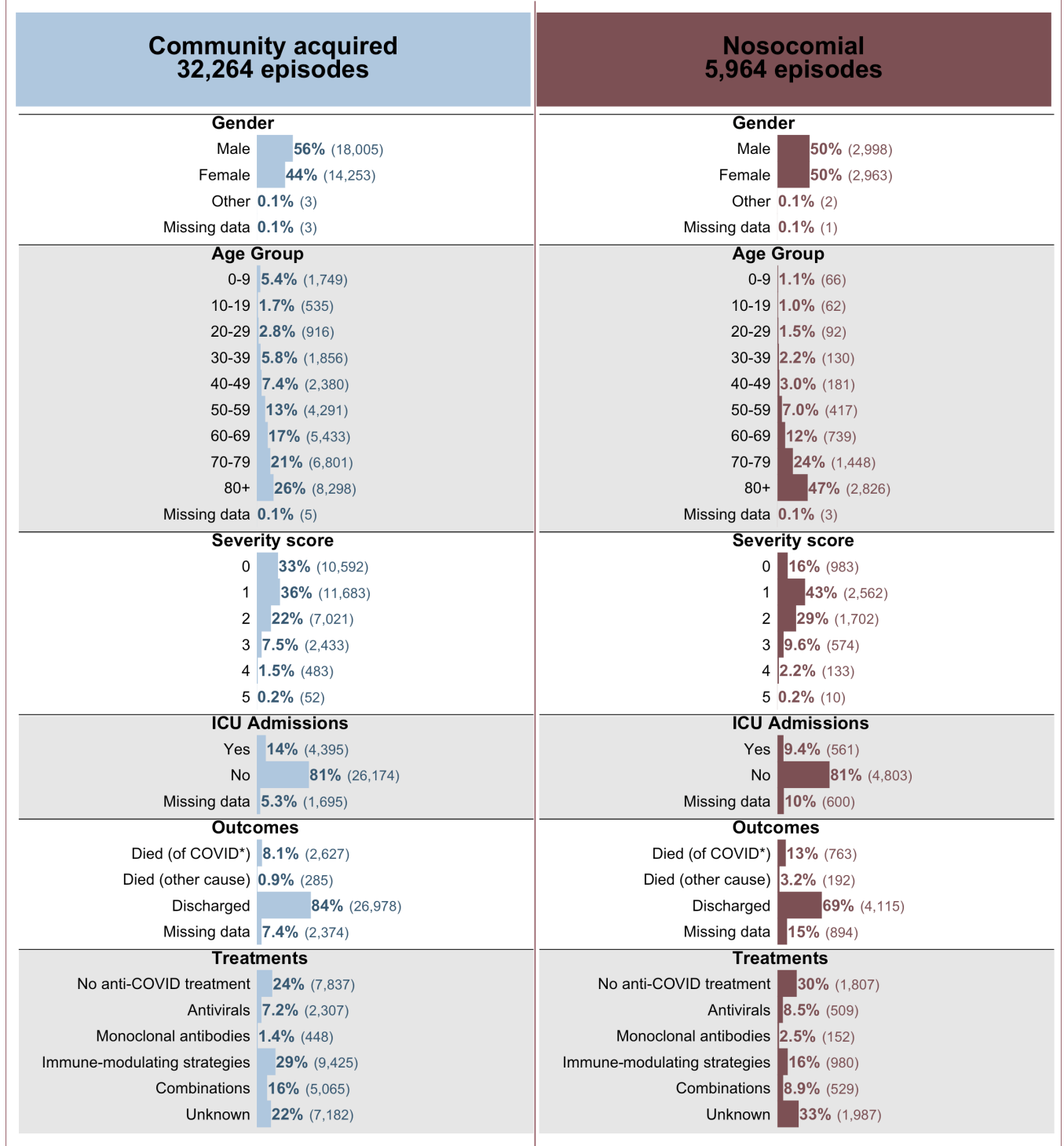


Figure 19: Comparison of community acquired and nosocomial cases by demographics, severity score, ICU, outcomes and treatments.

8. Glossary and supplemental information

Ospedalizzazione / Hospitalization:

Si tratta della più breve unità di analisi dei dati e corrisponde al tempo intercorso tra ricovero e dimissioni da un qualsiasi ospedale partecipante a CH-SUR. L'intervallo deve avere durata superiore alle 24 ore per essere considerato un'ospedalizzazione. È rilevata una nuova ospedalizzazione ogni qualvolta la persona è ricoverata in ospedale. Considerati i frequenti nuovi ricoveri durante il decorso di un'unica malattia (singola infezione), il rapporto basa le proprie analisi sul numero di episodi e non sul numero di ospedalizzazioni.

Episodio / Episode:

È assegnato un numero di episodio a ogni nuovo ricovero in ospedale che ha una durata di almeno 24 ore avvenuto ad almeno 30 giorni di distanza da una precedente ospedalizzazione. Che il paziente sia ricoverato una sola volta o più volte nel corso di 30 giorni, in entrambi i casi è rilevato un solo episodio. Due ospedalizzazioni separate dello stesso paziente che si verificano a distanza di oltre 30 giorni determinano l'assegnazione di due diversi numeri di episodio. Se un paziente è trasferito da un ospedale a un altro (entrambi partecipanti a CH-SUR) entro un periodo di 30 giorni dalle ultime dimissioni, le due ospedalizzazioni contano come un episodio. Un episodio può pertanto comprendere numerose ospedalizzazioni, ciascuna delle quali può richiedere più ricoveri in unità di terapia intensiva.

Motivo dell'ospedalizzazione / Reason for the hospitalization:

- *Ospedalizzazione causata da COVID-19 / Hospitalization because of COVID-19:* sulla base delle informazioni disponibili al momento del ricovero, il paziente è ospedalizzato perché presenta sintomi di COVID-19 o soffre dello scompenso di una patologia cronica evidentemente causato dalla COVID-19.
- *Ospedalizzazione con infezione da SARS-CoV-2 / Hospitalization with a SARS-CoV-2 infection:* sulla base delle informazioni disponibili al momento del ricovero, il paziente è risultato positivo a un test per il SARS-CoV-2 ma viene ricoverato senza sintomi di COVID-19 per un problema che non ha a che vedere con la COVID-19. In altre parole, il problema predominante è una malattia diversa dalla COVID-19 o un infortunio.

Origine dell'infezione / Origin of the infection:

- *Infezione acquisita in comunità / Community acquired infection:* l'infezione da SARS-CoV-2 è stata rilevata prima del ricovero in ospedale o entro i primi 5 giorni dal ricovero.
- *Infezione nosocomiale / Nosocomial infection:* l'episodio è rilevato come «nosocomiale» se l'infezione da SARS-CoV-2 è rilevata 5 giorni dopo il ricovero in ospedale.

Punteggio di gravità al ricovero / Severity score at admission:

Per gli adulti, il punteggio di gravità utilizzato è il CURB-65 che assegna un punto per ciascuno dei seguenti sintomi: confusione (punteggio < 9 sul mental test abbreviato), azotemia nel sangue > 19 mg/dL, frequenza respiratoria > 30 al minuto, bassa pressione arteriosa (diastolica < 60 o sistolica < 95 mmHg), età > 65 anni. Per i bambini, è assegnato un punto per ciascuno dei seguenti sintomi: distress respiratorio, saturazione di ossigeno < 92 %, evidenza di grave disidratazione clinica o shock clinico e stato di coscienza alterato. Il punteggio di gravità corrisponde alla somma dei punti assegnati.

Unità di terapia intermedia / Intermediate care unit (intermediate care or IMC): Unità di terapia che si prende cura di pazienti con insufficienza di una funzione vitale o il cui onere di cura non consente il ritorno a un'unità di ospedalizzazione. Queste unità costituiscono l'anello di collegamento tra le unità di terapia intensiva e i posti letto normali.

Unità di terapia intensiva (UTI) / Intensive care unit (ICU): Unità che si fa carico dei pazienti con un'insufficienza grave di una o più funzioni vitali o che sono a rischio di sviluppare complicazioni gravi.

Stato immunologico / Immune status:

La definizione di stato immunitario si basa sulla considerazione sia della vaccinazione sia di una precedente infezione confermata da SARS-CoV-2. Lo stato di immunizzazione è definito come segue:

a) *Non immunizzati / Not immunized*: pazienti a cui non sono state somministrate dosi di vaccino prima del risultato positivo del test per il SARS-CoV-2 e che non avevano prove di precedenti infezioni con il virus prima dell'episodio di ospedalizzazione in corso.

b) *Parzialmente immunizzati / Partially immunized*:

1. pazienti a cui è stata somministrata una dose dei vaccini di Moderna (Spikevax®), Pfizer/BioNTech (Comirnaty®), AstraZeneca (Vaxzevria®), Sinopharm®, Sinovac (CoronaVac®) o COVAXIN® prima del risultato positivo del test e che non hanno prove di precedenti infezioni da SARS-CoV-2.
2. pazienti con una precedente infezione confermata da SARS CoV 2, che ha causato o meno un ricovero ospedaliero, e pazienti che non sono stati vaccinati con alcuna dose di vaccino; indipendentemente dal tempo trascorso dalla precedente infezione. Nota: molti pazienti guariti non sono identificati come tali nella banca dati (informazione raccolta solo a partire da giugno 2021, infezione non diagnosticata, informazione mancante nella cartella medica).

c) *Con immunizzazione di base / Base immunized*:

1. pazienti a cui è stata somministrata una dose del vaccino di Johnson & Johnson (Janssen®) o due dosi dei vaccini Spikevax®, Comirnaty®, Vaxzevria®, Sinopharm®, CoronaVac® or COVAXIN® (raccomandazione di vaccinazione dell'UFSP / della Commissione federale per le vaccinazioni);
2. pazienti con una precedente infezione o il risultato positivo di un test documentati (con o senza ospedalizzazione) a cui è stata somministrata una dose dei vaccini summenzionati. pazienti a cui è stata somministrata una combinazione dei seguenti vaccini: Comirnaty® e Spikevax®; Vaxzevria® e Comirnaty®; Vaxzevria® e Spikevax®. Sono esclusi i pazienti a cui è stata somministrata una dose di richiamo aggiuntiva (categoria «Completamente immunizzati»).

d) *Completamente immunizzati (un richiamo) / Fully immunized*: pazienti con immunizzazione di base a cui sono state somministrate una dose di vaccino (vaccinazione di richiamo) a distanza di almeno quattro mesi dall'ultima somministrazione per l'immunizzazione di base.

f) *Completamente immunizzati (con richiami aggiuntivi) / Fully immunized (with additional boosters)*: Pazienti completamente immunizzati che hanno ricevuto ulteriori dosi di vaccino (richiamo) con un minimo di 4 mesi dall'ultimo richiamo.

f) *Stato immunologico sconosciuto / Unknown immune status*: pazienti il cui stato immunologico e vaccinale non è disponibile.

Note importanti: Popolazioni speciali

Bambini da 5 e 11 anni: I bambini da 5 e 11 anni necessitano una dose in meno rispetto alle categorie precedentemente menzionate per essere considerati immunizzati di base. L'applicazione del vaccino di richiamo non è raccomandata per i bambini di età inferiore ai 12 anni. Esempio: un paziente da 5 e 11 anni che ha ricevuto una sola dose di Comirnaty® è considerato immunizzato di base.

I pazienti immunosoppressi sono considerati immunizzati di base se hanno ricevuto una dose in più rispetto a quelle considerate nella definizione precedente. Esempio: una persona immunosoppressa viene considerata immunizzata di base se ha ricevuto tre dosi dei vaccini Comirnaty®, Spikevax® o Vaxzevria® (invece di 2 per i pazienti non immunosoppressi) o se ha ricevuto due dosi dei vaccini Comirnaty® e Spikevax® o Vaxzevria® ed è guarita da una precedente infezione da SARS-CoV-2. Se questo numero di dosi non è stato somministrato, il paziente è considerato parzialmente immunizzato.

Per essere immunizzati completamente (con un richiamo o con ulteriori richiami), si applicano le stesse definizioni dei pazienti non immunodepressi.

Dimissioni / Discharge: Quando il paziente lascia l'ospedale da vivo, la sua partenza è categorizzata come dimissioni se il paziente:

1. rientra al proprio domicilio;
2. è ricoverato in una struttura di lungodegenza;
3. è ricoverato in un altro ospedale;

4. è ricoverato in un'altra struttura che non partecipa alla sorveglianza CH-SUR;
5. è ricoverato in una struttura di riabilitazione;
6. si reca presso una destinazione sconosciuta.

Motivo del decesso / Reason of death: I pazienti per i quali la COVID-19 è stata la causa di morte (decesso per COVID-19) sono indicati separatamente dai pazienti di COVID-19 morti per altre cause (decesso con COVID-19 ma non per COVID-19). Per ogni struttura partecipante a CH-SUR è un medico a livello di ospedale ad accertare se un paziente COVID-19 è morto per COVID-19 o per un'altra causa. In presenza di una diagnosi di COVID-19 (conformemente ai criteri di inclusione di CH-SUR), i casi in cui la causa del decesso è incerta sono considerati decessi per COVID-19 effettivi o sospetti.

Gestione dei dati mancanti / Dealing with missing data: Se indicato nel testo, i dati mancanti sono esclusi dall'analisi. In caso contrario, le voci con dati mancanti sono incluse nei totali e analizzate di conseguenza. Questo potrebbe comportare che i denominatori di diverse categorie analizzate non diano, se addizionati, lo stesso totale. Ove indicato, i dati degli ultimi due mesi sono considerati provvisori a causa di ritardi nell'immissione dei dati ed evidenziati in grigio in alcuni grafici.

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