Surveillance sentinelle hospitalière du COVID 19

État des données au : 22.03.2022

1. Résumé introductive

Le système sentinelle de surveillance hospitalière (CH-SUR) a été mis en place en 2018 afin de recenser les hospitalisations liées à la grippe. Le 1er mars 2020 déjà, soit quatre jours après l'annonce du premier cas confirmé de COVID-19 en Suisse, sa version adaptée pour COVID-19 était prête à enregistrer également les séjours hospitaliers e lien avec une infection au SARS-CoV-2, confirmée en laboratoire.

Actuellement, 20 hôpitaux participent activement à ce système de surveillance ; la plupart sont des hôpitaux cantonaux ou universitaires qui couvrent une grande proportion des patients, enfants et adultes, hospitalisés en Suisse. Les statistiques du CH-SUR informent, entre autres, sur le nombre et la durée des hospitalisations ainsi que des séjours en unité de soins intensifs. Un patient peut être hospitalisé à plusieurs reprises ou nécessiter plusieurs admissions en unité de soins intensifs (USI) au cours d'un même épisode d'hospitalisation. Le CH-SUR enregistre également si le patient est décédé du COVID-19 ou avec le COVID-19 pendant l'hospitalisation.

Critères d'inclusion : le CH-SUR recueille les données des patients hospitalisés pendant au moins 24 heures avec une infection au SARS-CoV-2 documentée. Sont considérés comme des confirmations de l'infection un résultat positif à un test PCR (polymerase chain reaction) ou à un test rapide antigénique ainsi qu'un diagnostic clinique pour le COVID-19. Les infections nosocomiales au SARS-CoV-2 sont également enregistrées dans la base de données et sont décrites dans une section spécifique à la fin de ce rapport.

Les données collectées entre le début de l'épidémie et le 21 mars 2022 portent sur 29 125 épisodes d'hospitalisation. Durant cette même période, 48 805 épisodes avec une infection au SARS-CoV-2 confirmée en laboratoire ont été déclarés à l'OFSP dans le cadre du système de déclaration obligatoire pour toute la Suisse (Lien Dashboard OFSP). Le système de surveillance CH-SUR a donc couvert environ 59,7 % de toutes les hospitalisations liées au SARS-CoV-2 déclarées en Suisse.

Depuis mars 2022, ce rapport se concentre sur les épisodes liés aux infections acquises hors de l'hôpital, décrites dans les sections 2 à 6, tandis que les infections nosocomiales sont traitées séparément dans la section 7. Le pourcentage global d'infections nosocomiales parmi tous les épisodes documentés était de 13,2 % (3 838 sur 29 125), tandis que les épisodes liés à des infections acquises hors de l'hôpital représentaient 83,7 % (24 373 sur 29 125) (fig. **1**) ; 3,1 % des épisodes n'ont pu être classés dans aucune des deux catégories.

Sur les 24 373 épisodes liés à une infection acquise hors de l'hôpital, 3514 (15,6 %) comprenaient un traitement dans une unité de soins intensifs (période temporelle des données en USI : entre le 26 février 2020 et le 31 janvier 2022), et 2182 (10,1 %) ont entraîné le décès (décès intervenus entre le 26 février 2020 et le 21 mars 2022).

Au cours de la période allant du 1er décembre 2021 au 31 janvier 2022, la période la plus récente pour laquelle suffisamment de données sont disponibles, 3869 épisodes d'hospitalisation faisant suite à une infection acquise hors de l'hôpital ont été enregistrés. Parmi les patients concernés, 2009 (51,9%) n'étaient pas immunisés et 1146 (29,6%) étaient « complètement immunisés » (vaccination de base avec ou sans rappel) (fig. **2**). Au cours de la même période, 358 épisodes ont comporté un séjour en unité de soins intensifs. Parmi les patients concernés, 242

(67,6 %) n'étaient pas immunisés et 95 (26,5 %) l'étaient complètement. 197 épisodes ont entraîné le décès (5,1 % de tous les épisodes enregistrés dont l'issue est connue), dont 122 chez des patients non immunisés et 62 chez des patients complètement immunisés.

Pour plus de définitions et de détails sur les données, veuillez consulter le glossaire et les informations complémentaires à la fin de ce rapport.

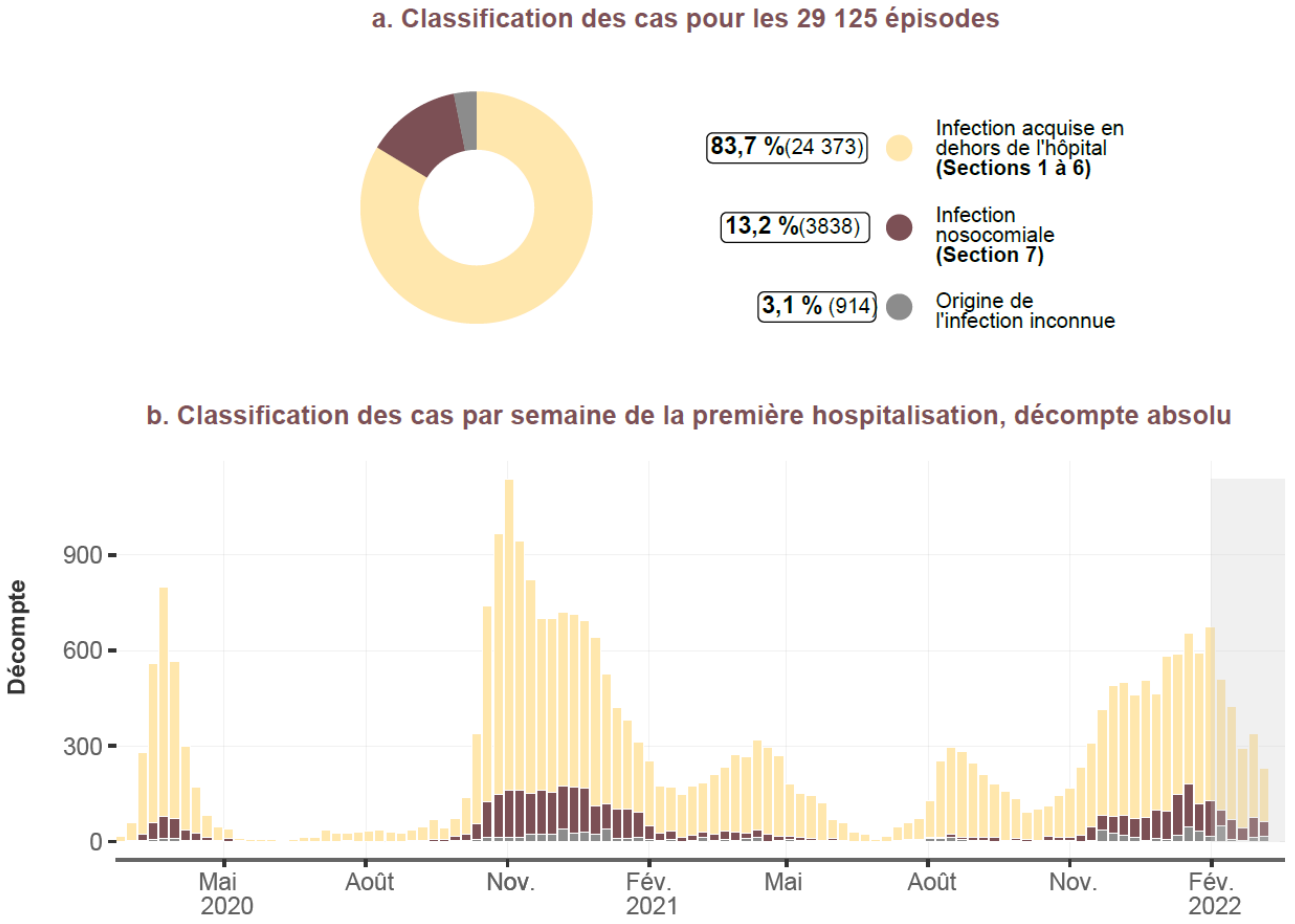

***Figure 1** : Classification des cas (source de l'infection) des épisodes dans le temps. Proportion (normalisée en %) de tous les épisodes ayant entraîné des infections nosocomiales (panneau a) et tendance dans le temps (panneau b). Pour les épisodes entraînant plusieurs hospitalisations, la classification s'est faite sur la base de la première hospitalisation. Les données recueillies au cours des deux derniers mois (surlignées en gris) sont considérées comme provisoires du fait des délais dans la saisie des données.*

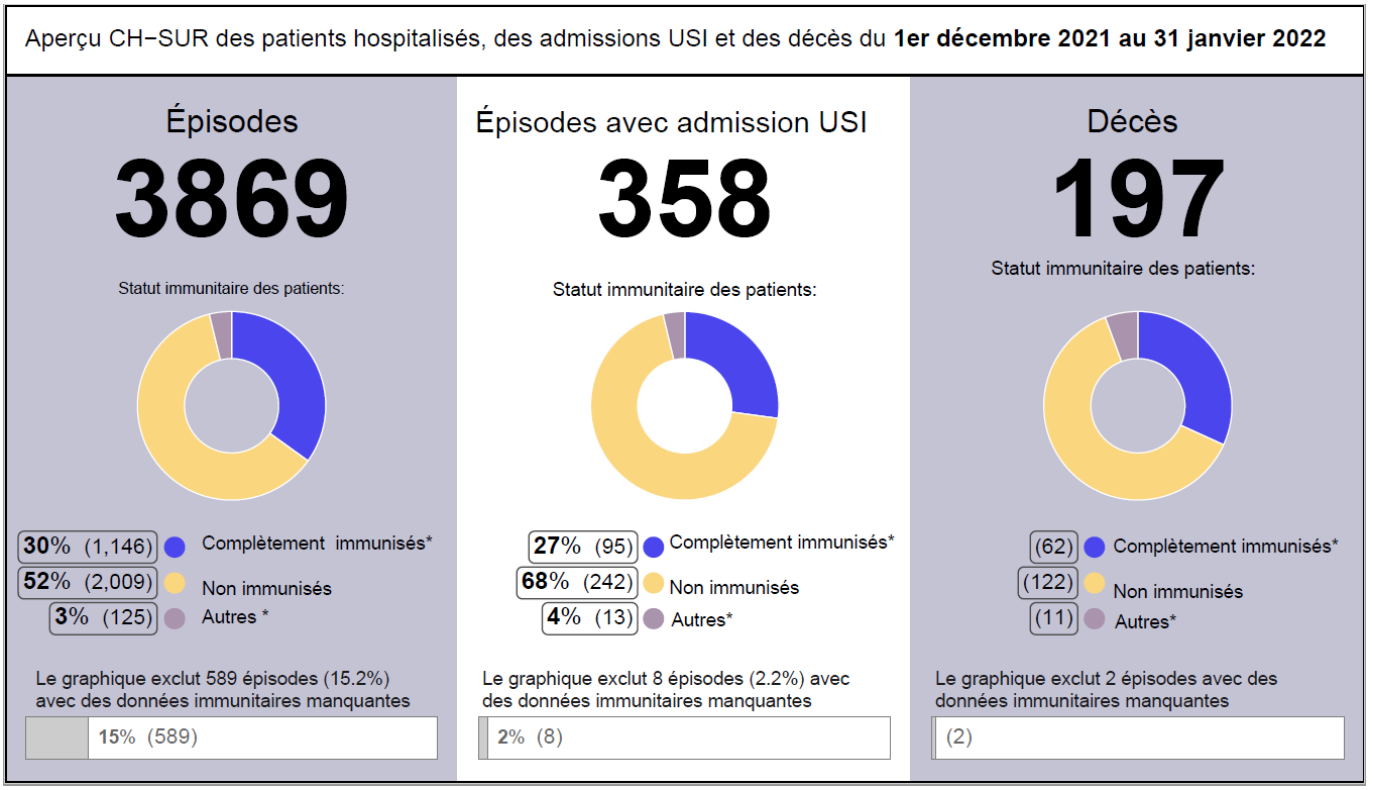

***Figure 2** : Vue d'ensemble des données les plus récentes concernant les épisodes d'hospitalisation liées à des infections acquises hors de l'hôpital. Les données des deux derniers mois sont considérées comme provisoires à cause des délais dans la saisie des données : elles ont donc été omises. (* Complètement immunisés : patients avec immunisation de base, avec ou sans vaccination de rappel. Autres : patients partiellement immunisés et patients ayant guéri d'une infection précédente au SARS-CoV-2)*

2. Hospitalizations and demographic characteristics

Between the start of the epidemic in Switzerland and March 21, 2022 and among the 20 hospitals actively participating in CH-SUR, 24,373 episodes of community acquired infections were registered, accounting for a total of 25,267 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**.

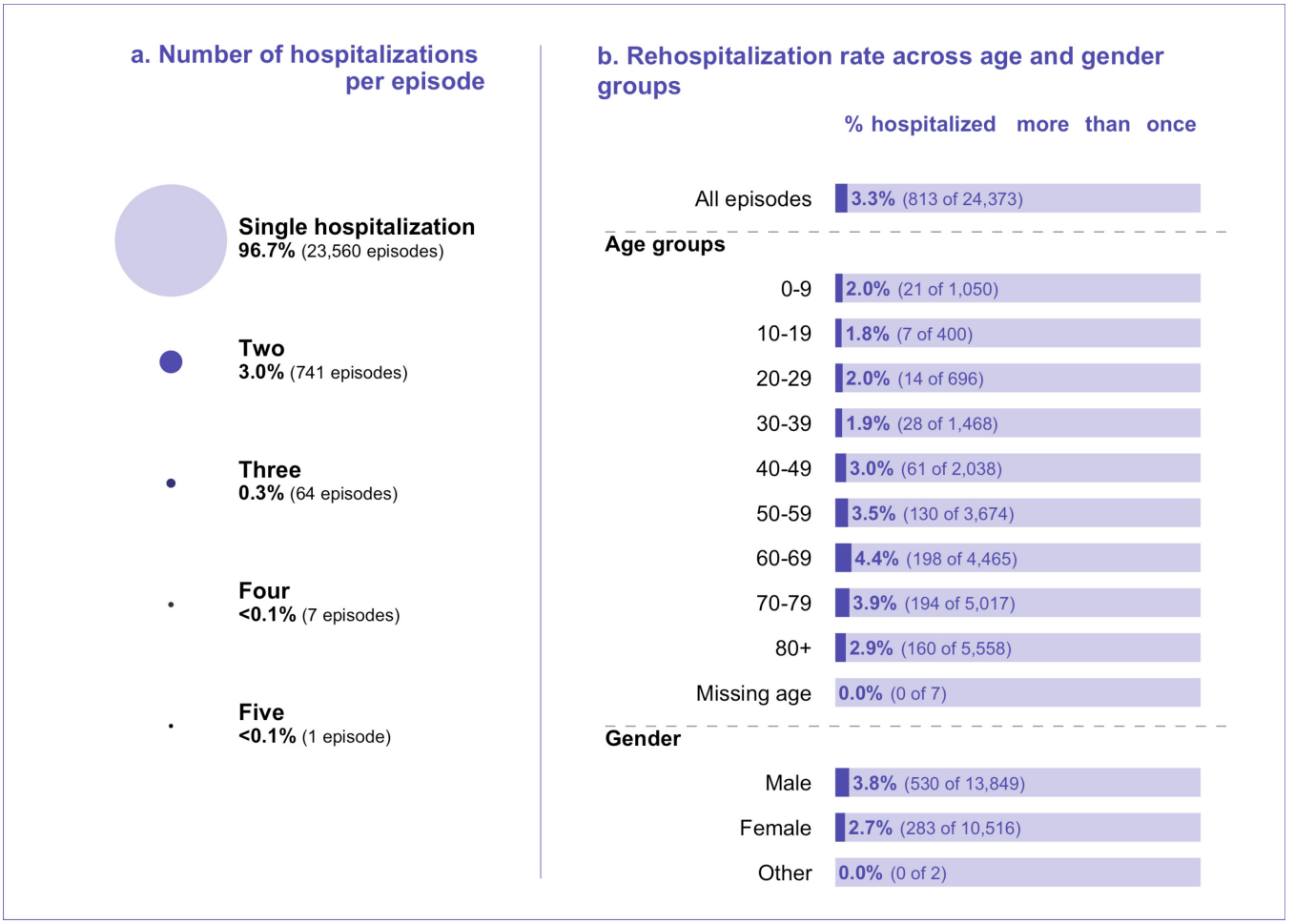

***Figure 2**: Hospitalizations per episode of hospitalization and rehospitalization rate across demographic groups. Includes records between March 2020 and March 21, 2022.*

Most patients (96.7% [23,560 of 24,373]) were hospitalized only once during an episode, while 3% of the registered episodes (812 of 24,373) included two to four hospitalizations. Only one episode included five hospitalizations (Figure **3**b).

The overall rate of rehospitalization within the same episode was 3.3% (813 of 24,373) (Figure **3**c). The 60-69 age group and the 70-79 age group had the highest rate of rehospitalization at respectively 4.4% (198 of 4,465) and 3.9% (194 of 5,017). Men had a higher rehospitalization rate than women, 3.8% (530 of 13,849) vs 2.7% (283 of 10,516) respectively.

Overall, the majority (56.8% [13,849 of 24,373]) of the episodes concerned male patients (Figure **4**a), and the age distribution was skewed towards older persons (Figure **4**b). The largest age category corresponded to patients aged 80 and above (23.0% [5,558]).

Figures **4**c and **4**d show the gender and age distribution ratio over time. Except for January and March 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% (2,813 of 3,186) of the episodes of patients admitted in this month concerned patients 50 years old and above (Figure **4**d). 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% (809 of 1,076) in November 2021.

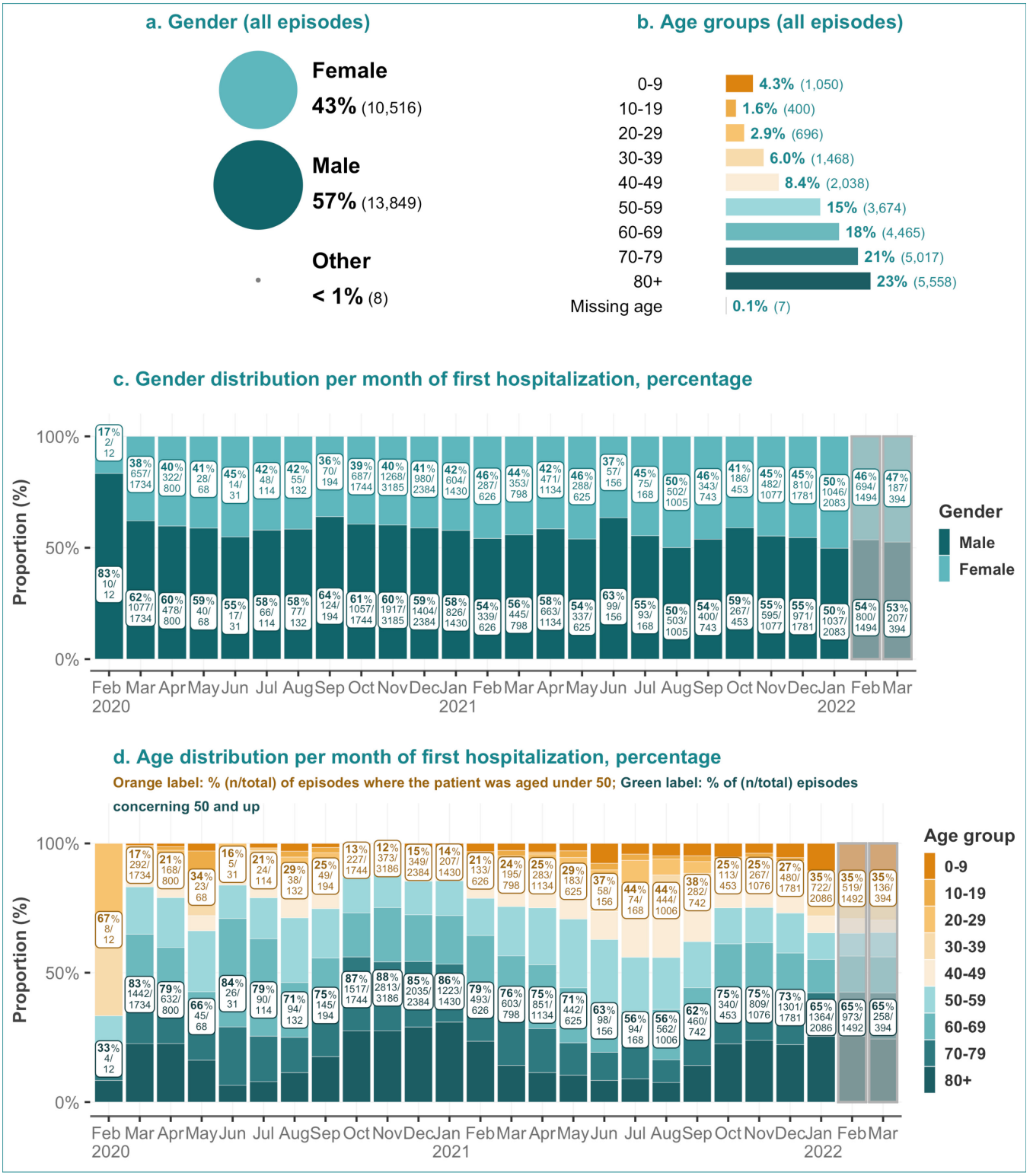

***Figure 3**: Demographic characteristics: gender and age distribution of admitted hospitalized patients, overall and per month. For episodes with multiple hospitalizations, the admission date of the first hospitalization was used. Data from the last two months (highlighted gray) is considered provisional 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 with community acquired infections 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 a different cause of death (died *with* COVID-19, but not of COVID-19). This determination of whether a patient died of COVID or another cause was done by a medical doctor at the hospital for each CH-SUR-participating center. 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.

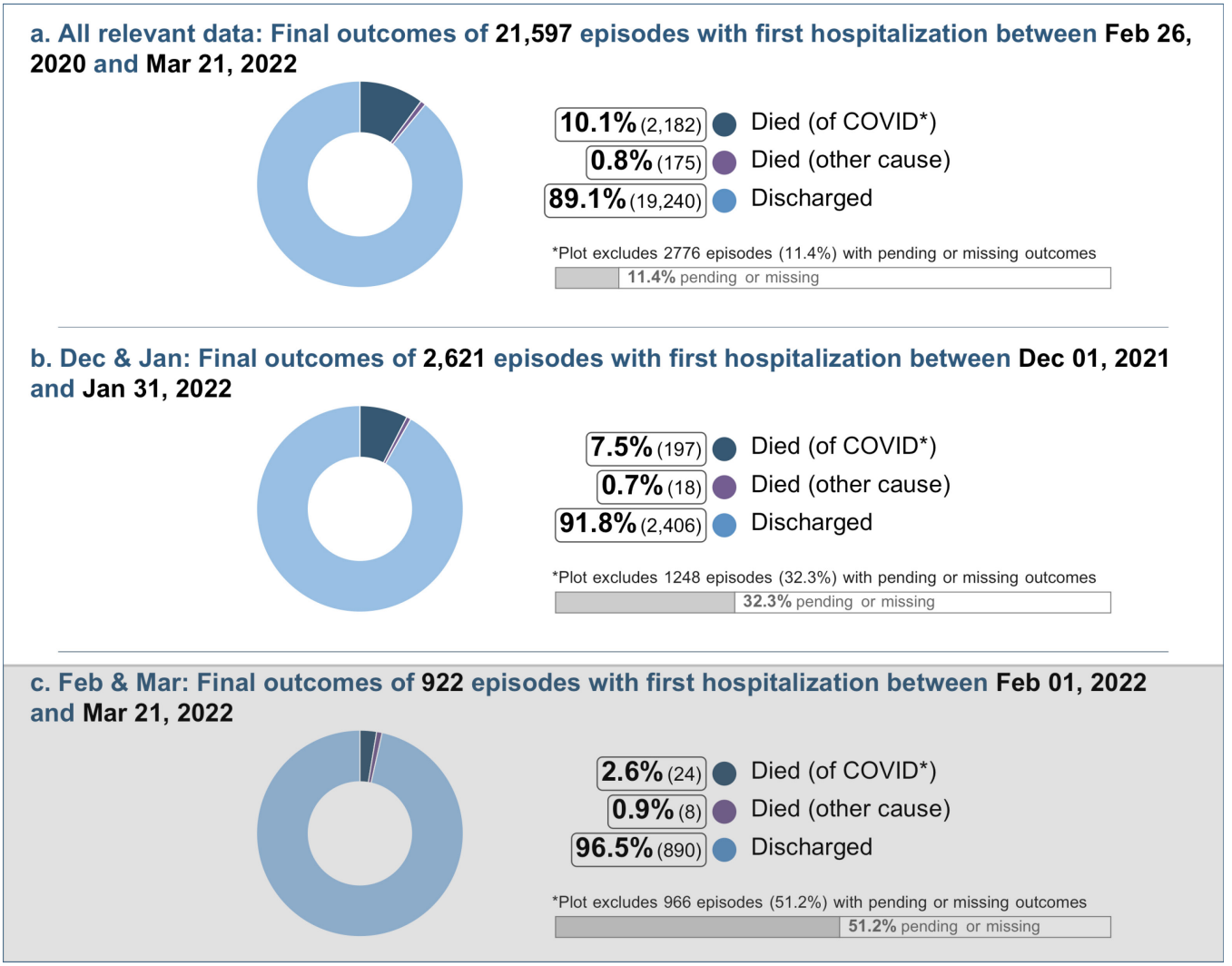

***Figure 4**: Outcomes for COVID-19 related episodes of hospitalization in CH-SUR hospitals. Includes records up to March 21, 2022. For episodes with multiple hospitalizations, only the final outcome is considered. Patients where the cause of death was not certain, but there was a COVID 19 diagnosis (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 linked to community acquired SARS-CoV-2 infections over time (Figure **6**a & **6**b), and the disease severity score at admission as a function of time (Figure **6**c).

The first mortality peak is seen 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. Mortality decreased after March 2020, but rose again between October 2020 and January 2021, with a peak in December 2020: 13.9% (329 of 2,370) of episodes of patients first admitted in December 2020 resulted in death. An additional local peak of mortality was observed during the month October 2021, when 12.2% (49 of 401) of episodes resulted in death of COVID-19.

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 **6**c) and older patients' ages (Figure **4**c) 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% (953 of 2,384) of the admissions in that period.

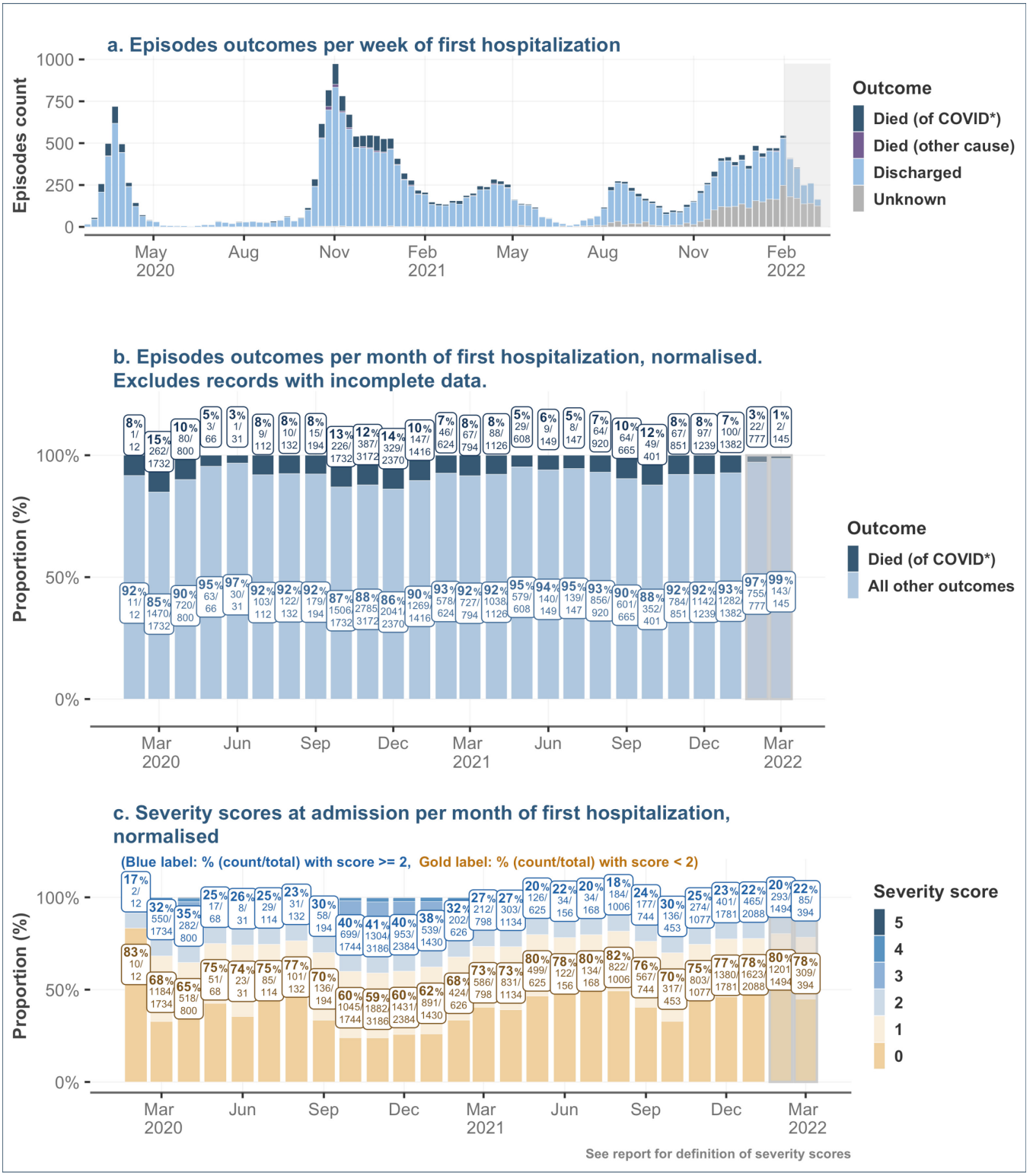

***Figure 5**: Epidemic curve, episodes' outcomes and severity scores at admission for COVID-19 hospitalized episodes over time. Includes records up to March 21, 2022. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. Episodes where the cause of 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 January 31, 2022, the case fatality rate (CFR) for episodes with community acquired infections increased with increasing age, from 0% (0 of 730) in episodes of patients aged 0-9, to 3.1% (102 of 3,242) in episodes of patients aged 50-59, and to 23.8% (1,110 of 4,671) in episodes of patients aged 80+. CFR% was greater in men than in women: 12% (1,427 of 11,901) vs 8.3% (731 of 8,770) respectively. In addition, the CFR% was greater for episodes with higher severity scores at admission: in 1.2% (82 of 6,909) of the episodes with severity score 0 resulted in death of COVID-19, while 53.5% (23 of 43) of the episodes with severity score 5 resulted in death of COVID-19.

The overall CFR% of the most recent period for which enough data is available (months December and January 2021, Figure **7**b) was lower than the CFR% of the whole epidemic period (7.5% vs. 10.4%). 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.

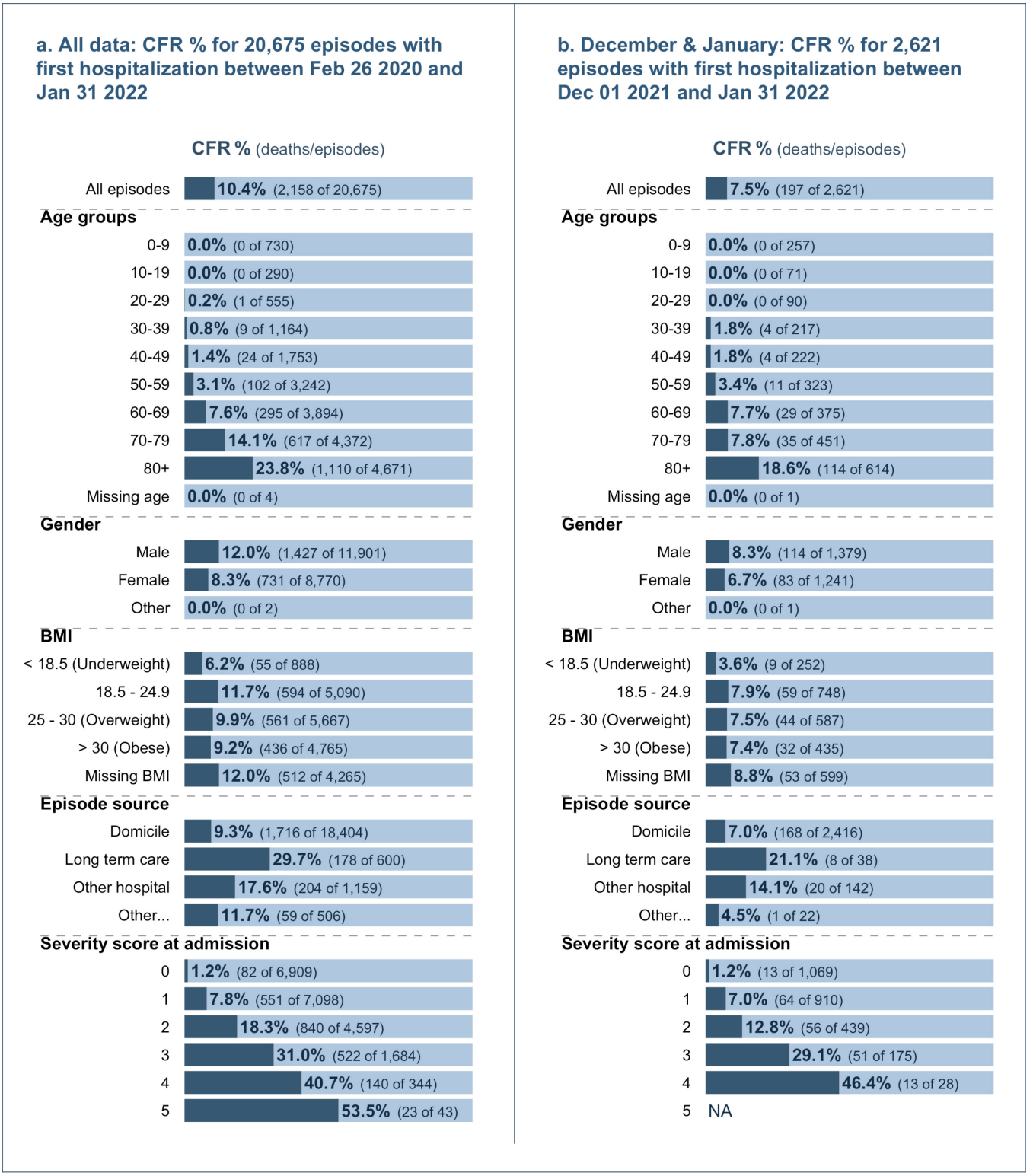

***Figure 6**: Case fatality rate (CFR) % among demographic and risk groups: percentage of hospitalization episodes in different demographic groups, which ended in the death of the patient of COVID-19 in hospital. Both figures include records up to Jan 31 2022 but records with incomplete data (ongoing 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 (combination category of base immunized and boosted) among episodes with community acquired infections rose gradually after January 2021 (Figure **8** b). This is expected, given the rise in the proportion of the whole Swiss population that is fully immunized (Figure**8**c, source: FOPH Dashboard).

During the months of December and January 2022, when between 68.0% and 69.4% of the Swiss population was fully immunized (Figure **8**c), the base immunized and boosted made up only a minority (24.2% and 10.7% respectively) of the episodes recorded in CH-SUR (Figure **8**b), suggesting protection against hospitalization (and, consequently, death) due to COVID-19.

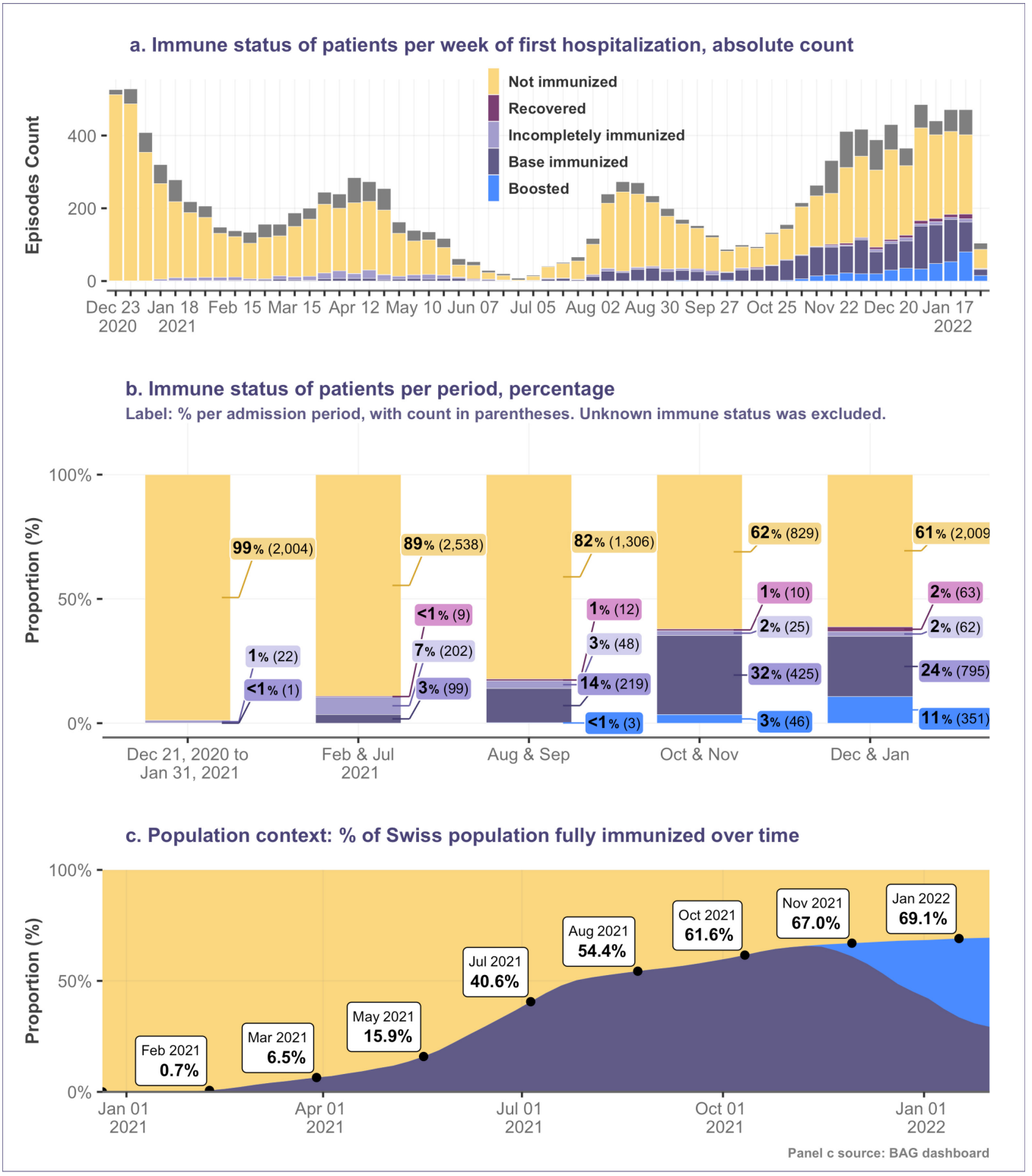

***Figure 7**: Immune status of patients and overall vaccination rate in Switzerland (exported: March 21, 2022). See glossary for definitions of immune status categories. For episodes with multiple hospitalizations, the immune status for the first hospitalization was considered. Panels a. and b. include episodes 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 Jan 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 hospitalized patients were disproportionately older. Since vaccination initiation, 36.6% (710 of 1,940) of the episodes of fully immunized patients corresponded to patients aged 80 and above (Figure **9**a, right panels). In contrast, only 16% (1,400 of 8,522) of the episodes of non-immunized patients corresponded to patients aged 80 and above (Figure **9**a, left panel).

This older-skewed age distribution for breakthrough hospitalizations may be related to the vaccination strategy applied in Switzerland, where the elderly population was vaccinated as a first priority. In addition, even after the opening of vaccination to all ages, vaccination coverage remains higher among older age groups (see FOPH Dashboard). Certain risk factors for hospitalization may also be more prevalent among the elderly.

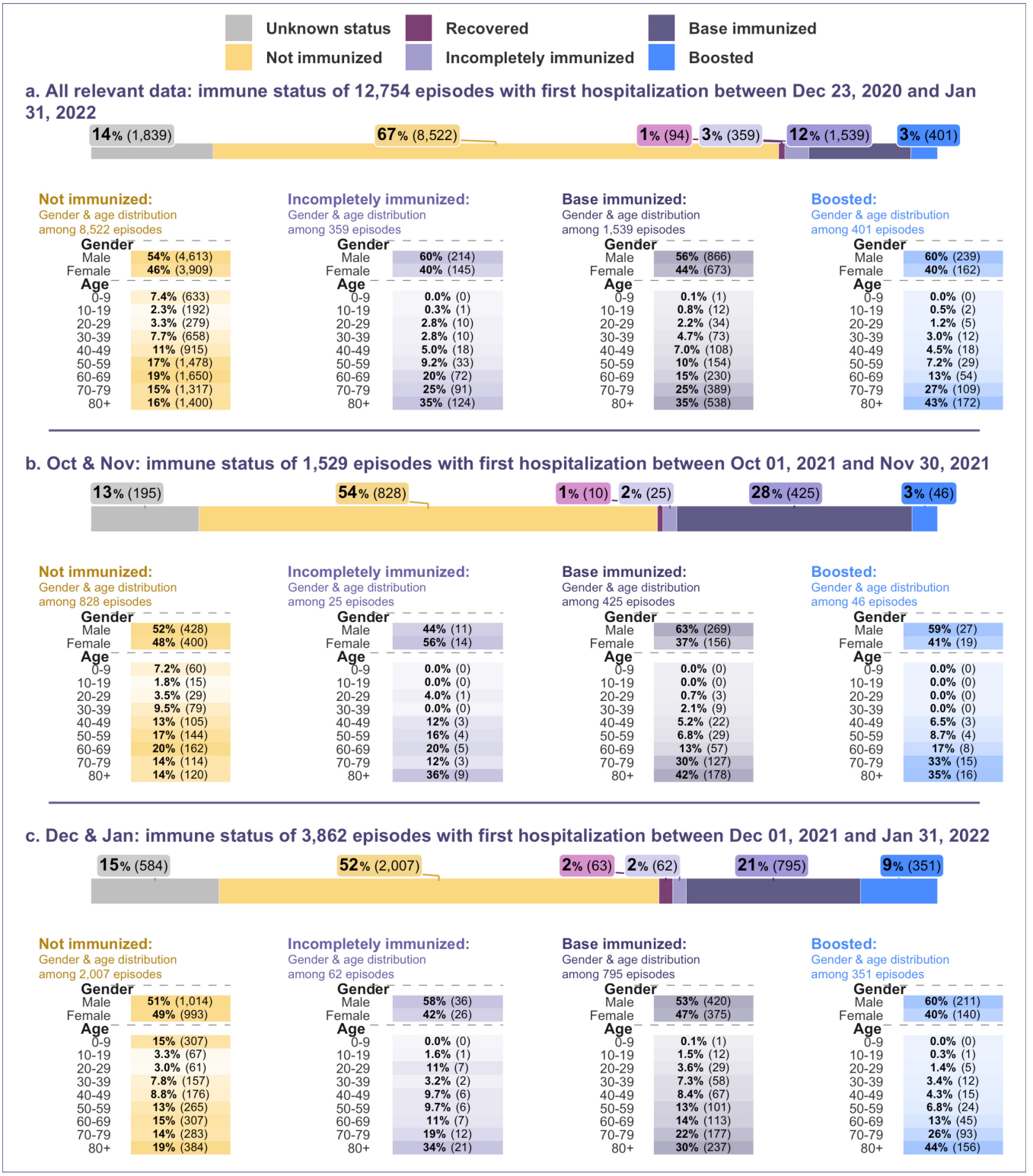

***Figure 8**: Demographic characteristics of hospitalized patients by immune status, over three different periods. Some patients may be counted more than once, as a single patient can have several episodes. Episodes with first admission date after Jan 31 2022 were excluded, as a large proportion of 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 1,605 episodes of fully immunized patients (community acquired infections), CH SUR registered 143 deaths because of COVID-19 (Figure **10**a, right panels: base immunized and boosted). 83 of them corresponded to patients aged 80 years old and above. Over the same period, 611 episodes ended in COVID-caused deaths among non-immunized patients (Figure **10**a, left panel).

During the months of December and January, CH-SUR registered 191 deaths due to COVID-19 of which the immune status was known. Of these, 122 (63.9% of the fatalities occurring in that period) happened among non-immunized patients, 7 deaths (3.7% of deaths occurring in that period) among partially immunized patients, and 62 deaths (32.5% of deaths occurring in that period) among fully immunized patients (Figure **10**). Despite representing a smaller share of the population (32.0% of the whole Swiss population was non immunized at the time of data analysis, see Figure **8**c)), the non-immunized population's death toll represents a larger portion in CH-SUR (Figure **10**c). Figure **10**c excludes 2 deaths of which the immune status was unknown and 4 deaths whose immune status at admission was *recovered*.

CH-SUR data highlights the protective effect of vaccination against hospitalization, and consequently death, due to COVID-19. Nevertheless, the CFR values by age show that the risk of death for the limited number of people who are hospitalized despite full vaccination is in most cases lower but not substantially different to that of unvaccinated hospitalized people (Figure **10**c, left and right panel). This must be balanced by the very positive effect of vaccination on the risk of hospitalization and therefore on the risk of death.

a. All relevant data: 807 deaths among 9,667 episodes with first hospitalization between Dec 23, 2020 and Jan 31, 2022

Not immunized:
Age distribution of **611** deaths in **7,723** episodes

Age	Cases	Deaths	CFR %
0-9	560	0	0%
10-19	161	0	0%
20-29	245	1	0.4%
30-39	584	5	0.9%
40-49	827	12	1.5%
50-59	1358	41	3.0%
60-69	1522	110	7.2%
70-79	1214	158	13.0%
80+	1252	284	22.7%

Incompletely immunized:
Age distribution of **53** deaths in **339** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	9	0	0%
30-39	9	0	0%
40-49	16	0	0%
50-59	29	3	10.3%
60-69	67	9	13.4%
70-79	88	14	15.9%
80+	120	27	22.5%

Base immunized:
Age distribution of **114** deaths in **1,257** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	8	0	0%
20-29	20	0	0%
30-39	62	0	0%
40-49	84	1	1.2%
50-59	128	6	4.7%
60-69	196	15	7.7%
70-79	325	26	8.0%
80+	434	66	15.2%

Boosted:
Age distribution of **29** deaths in **348** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	2	0	0%
20-29	5	0	0%
30-39	11	0	0%
40-49	13	0	0%
50-59	25	0	0%
60-69	46	3	6.5%
70-79	95	9	9.5%
80+	151	17	11.3%

b. Oct & Nov: 107 deaths among 1,174 episodes with first hospitalization between Oct 01, 2021 and Nov 30, 2021

Not immunized:
Age distribution of **59** deaths in **733** episodes

Age	Cases	Deaths	CFR %
0-9	53	0	0%
10-19	11	0	0%
20-29	26	0	0%
30-39	70	0	0%
40-49	89	0	0%
50-59	129	3	2.3%
60-69	147	8	5.4%
70-79	99	15	15.2%
80+	109	33	30.3%

Incompletely immunized:
Age distribution of **2** deaths in **23** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	1	0	0%
30-39	0	0	-
40-49	2	0	0%
50-59	4	0	0%
60-69	4	1	25.0%
70-79	3	0	0%
80+	9	1	11.1%

Base immunized:
Age distribution of **40** deaths in **377** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	3	0	0%
30-39	9	0	0%
40-49	19	0	0%
50-59	25	1	4.0%
60-69	55	1	1.8%
70-79	112	13	11.6%
80+	154	25	16.2%

Boosted:
Age distribution of **6** deaths in **41** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	0	0	-
30-39	0	0	-
40-49	2	0	0%
50-59	4	0	0%
60-69	7	1	14.3%
70-79	14	3	21.4%
80+	14	2	14.3%

c. Dec & Jan: 191 deaths among 2,425 episodes with first hospitalization between Dec 01, 2021 and Jan 31, 2022

Not immunized:
Age distribution of **122** deaths in **1,482** episodes

Age	Cases	Deaths	CFR %
0-9	247	0	0%
10-19	43	0	0%
20-29	41	0	0%
30-39	113	4	3.5%
40-49	135	3	2.2%
50-59	201	7	3.5%
60-69	232	19	8.2%
70-79	208	23	11.1%
80+	262	66	25.2%

Incompletely immunized:
Age distribution of **7** deaths in **51** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	6	0	0%
30-39	2	0	0%
40-49	5	0	0%
50-59	5	0	0%
60-69	5	1	20.0%
70-79	9	1	11.1%
80+	18	5	27.8%

Base immunized:
Age distribution of **39** deaths in **589** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	8	0	0%
20-29	16	0	0%
30-39	47	0	0%
40-49	49	1	2.0%
50-59	80	4	5.0%
60-69	84	6	7.1%
70-79	133	5	3.8%
80+	172	23	13.4%

Boosted:
Age distribution of **23** deaths in **303** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	5	0	0%
30-39	11	0	0%
40-49	11	0	0%
50-59	20	0	0%
60-69	38	2	5.3%
70-79	80	6	7.5%
80+	137	15	10.9%

***Figure 9**: Mortality of CH-SUR hospitalized patients by immune status, age group and hospitalization episode, over three different periods. The total counts of episodes in the subtitles 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 base immunized, boosted, incompletely immunized or not immunized. Episodes with missing age, missing gender, or missing as well as recovered 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 incompletely immunized and boosted categories, should be interpreted with caution due to small sample sizes.*

5. Intensive care unit (ICU) admission

5.1. ICU admission across demographic and risk groups

Over the whole period of observation, for episodes linked to community acquired infections, 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 **11**a). The 60-69 age group had the highest probability of admission to the ICU, with 25% (1,049 of 4,202) 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 5.6% (285 of 5,084) 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 18.7% of the episodes concerning males, compared to 11.5% of the episodes concerning females.

Episodes of patients transferred in from other hospitals had a high probability of ICU admission: 55.8% of such episodes (694 of 1,244) required at least one ICU admission (Figure **11**a)), compared to an overall admission rate of 18.5% for all (community acquired) episodes.

ICU admission probability also increased slightly with increasing BMI and steeply with increasing admission severity scores (Figure **11**a).

Figure **11**b shows the ICU admissions for the most recent period with available data (December 2021 and January 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. 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 December and January than for the full epidemic period (Figure **11**).

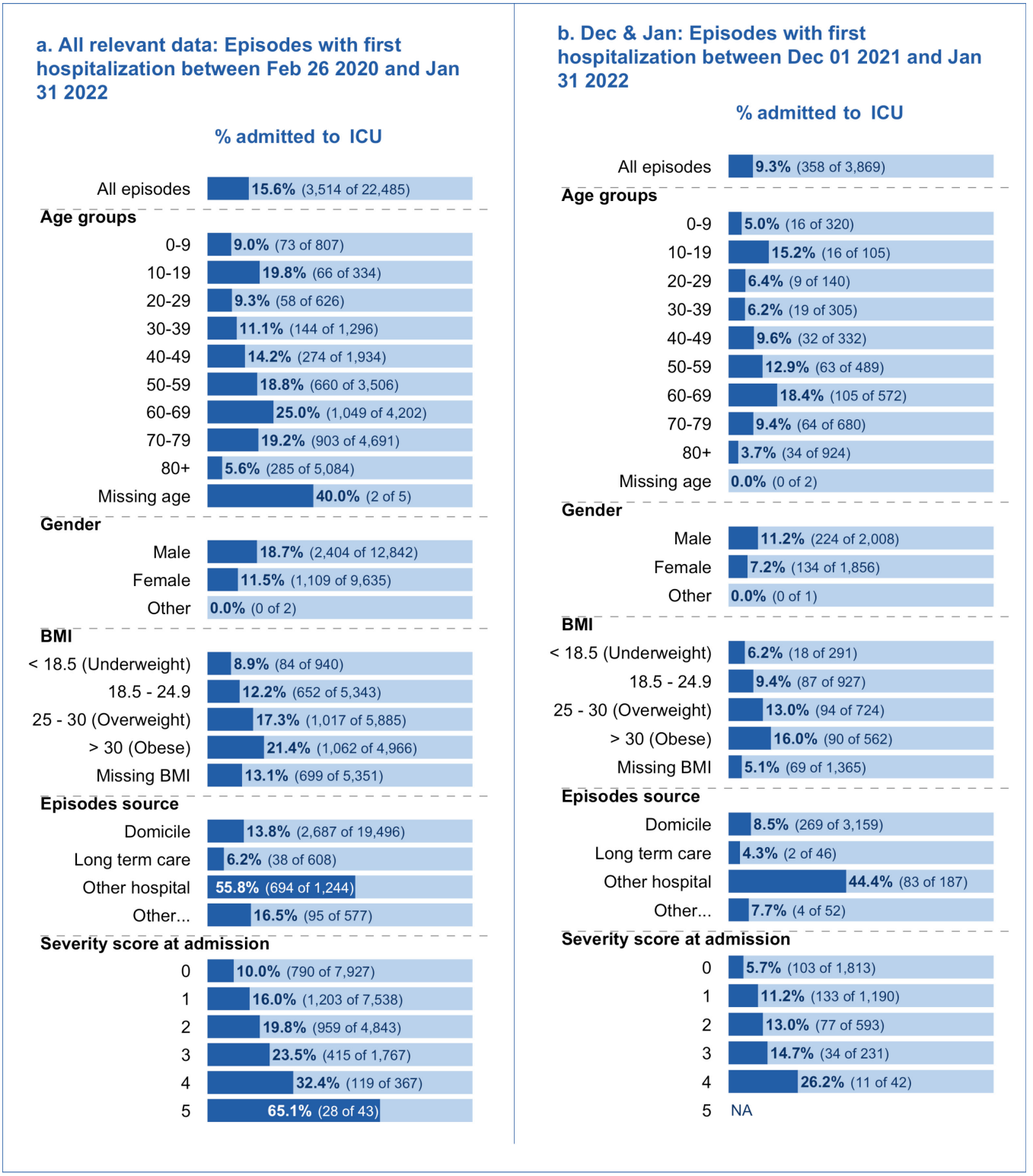

***Figure 10**: Percentage of hospitalization episodes with at least one ICU admission, grouped by demographic and risk factors, over two time intervals. For episodes with multiple hospitalizations, we considered whether they were admitted to the ICU during any of their hospitalizations. Both panels include records up to Jan 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.*

5.2. ICU admission by immune status

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

In both periods considered, the majority of (community acquired) episodes with an ICU admission concerned non immunized patients (73% and 68% 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 **12**).

For episodes of fully immunized patients (base immunized and boosted), there is a skew towards older age groups being admitted to the ICU (Between Oct 2021 and Jan 2022 in around 84% of the episodes patients were 50 years old and older). In comparison, episodes of non immunized patients admitted to the ICU included proportionally more patients from younger age classes, as only 75.5% (Oct, Nov) and 72% (Dec, Jan) of the episodes corresponded to patients aged 50 years old and above.

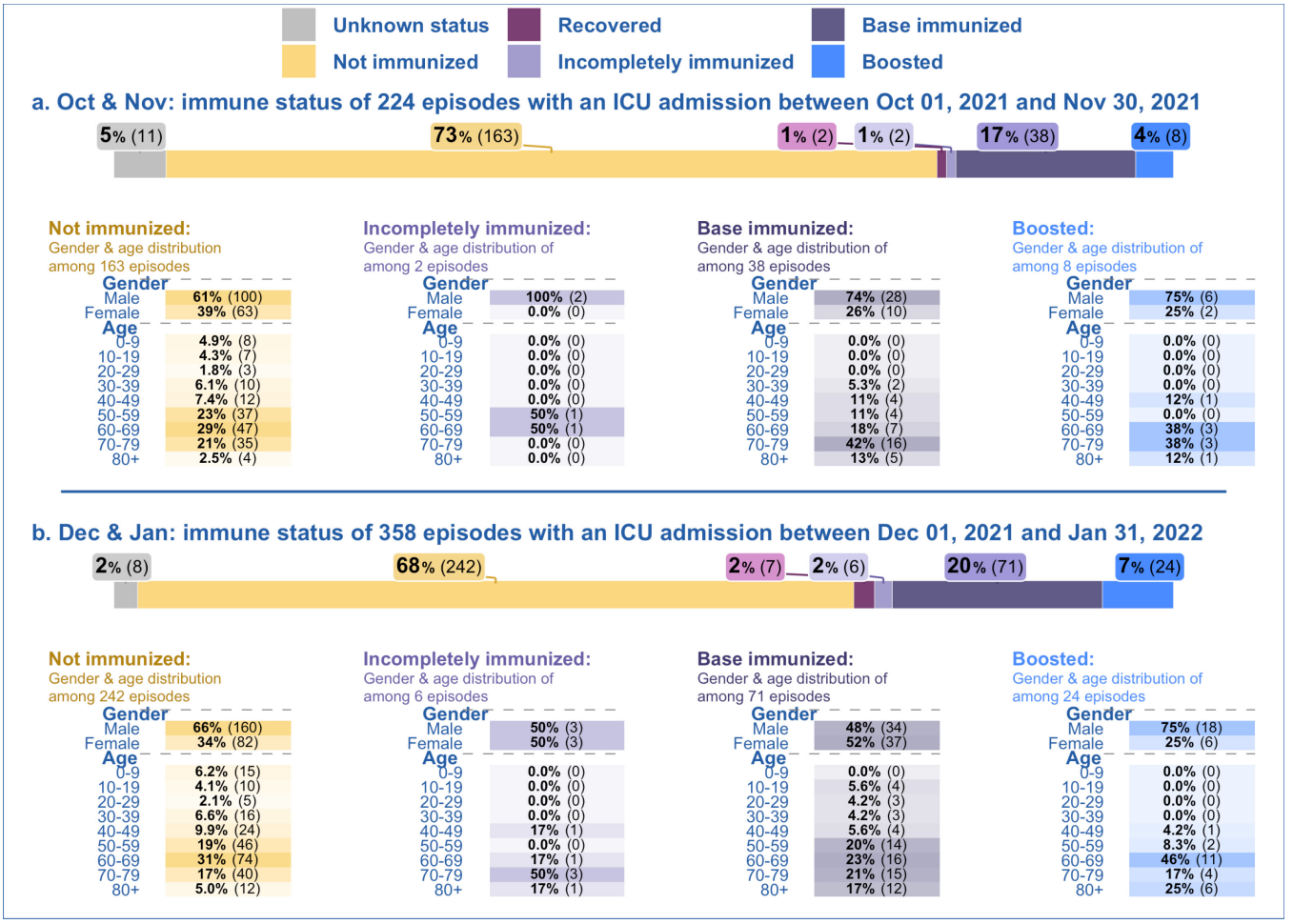

***Figure 11**: Demographic characteristics of patients in ICU by immune status and episode, over two different periods. Episodes with a first admission date after Jan 31, 2022 were excluded, as a large proportion of these records have not been completely filled in the database. Episodes with missing ages or gender marked as 'Other' are not shown. Data (% of share) on ICU admissions for the incompletely immunized and boosted categories should be interpreted with caution due to small sample sizes.*

5.3. ICU admission over time

Figure **13** shows the proportion (in %) of ICU admission over time among episodes with community acquired infections. The proportion of episodes with ICU admissions peaked between May and July 2020. Notably, this was during a period of low overall hospitalizations.

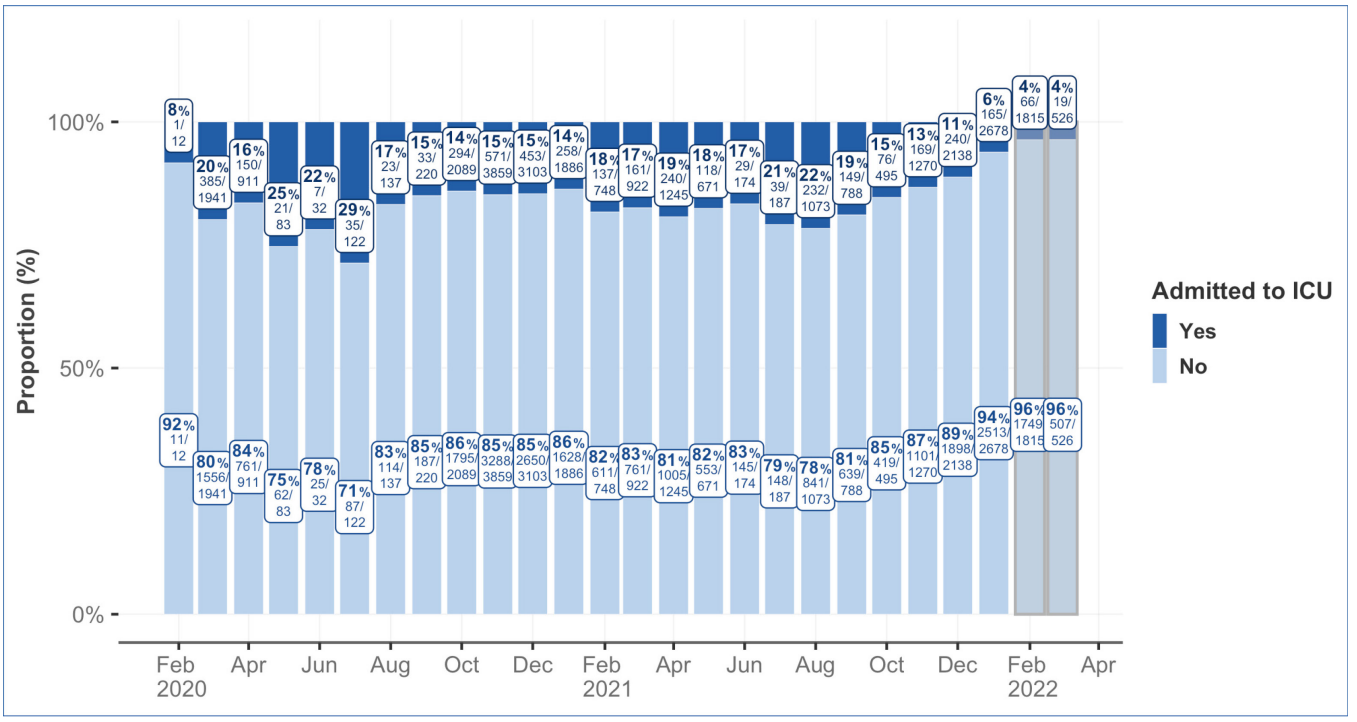

***Figure 12**: Percentage and proportion of episodes with at least one ICU admission over time. Records with incomplete data (ongoing episodes or with a pending outcome in the database) were not included. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

6. Health Complications

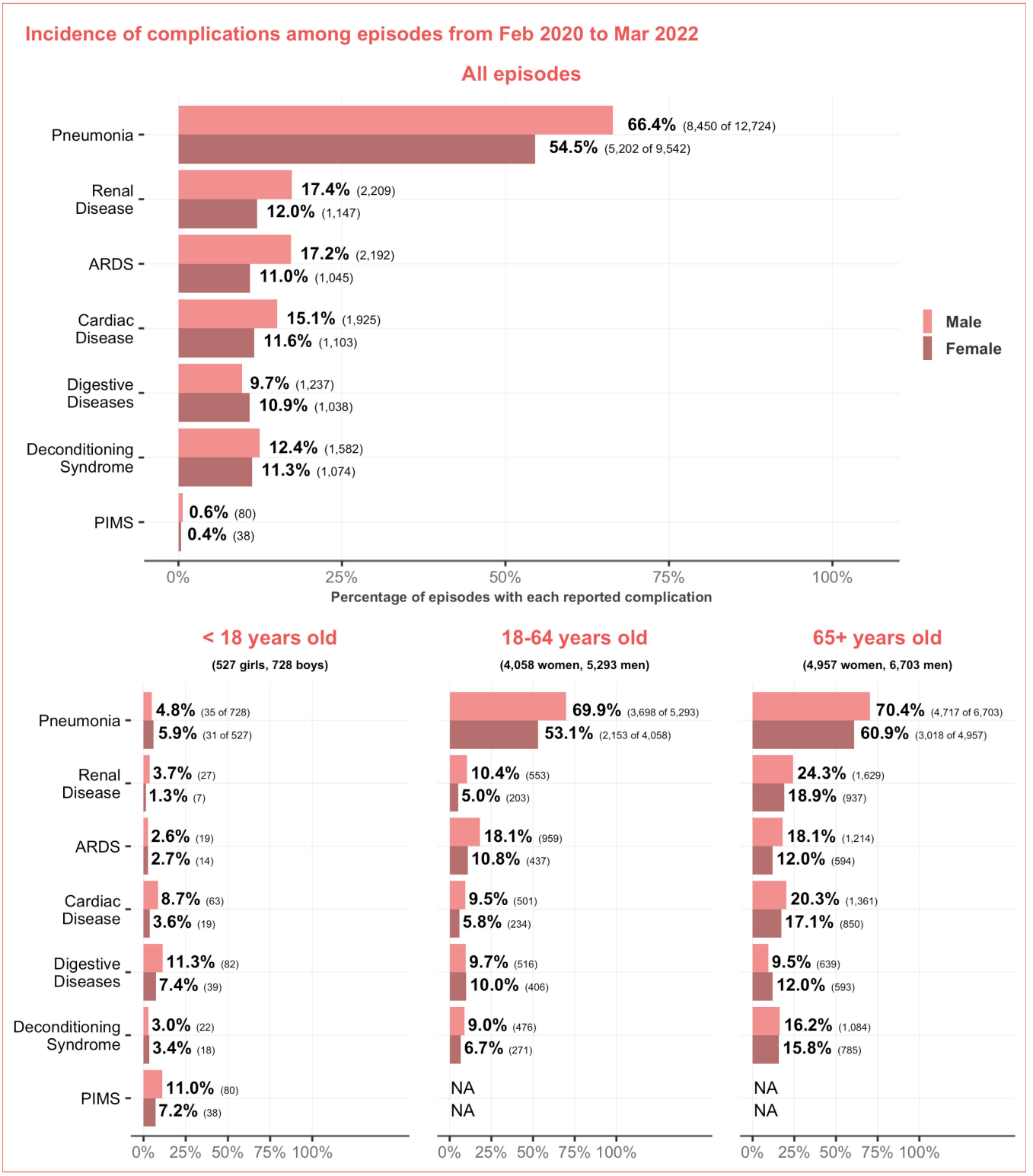

***Figure 13**: Incidence of complications arising during a hospitalization episode with a community acquired SARS-CoV-2 infection. The reported complications are shown overall and per age group and gender. Only the top 6 most prevalent complications, and PIMS, are displayed. Other complications available in the database include: Acute Otitis Media, Encephalitis, Febrile Convulsion, Osteo-articular Disease, ENT, Non Bacterial Infections, Psychiatric Alteration, Other Respiratory Diseases (defined as a hospitalized case having a respiratory disease complication which was neither pneumonia nor ARDS).*

Overall, CH-SUR registered, 22,266 episodes linked to community acquired infections with complete complications data record and known age and gender (9,542 women and 12,724 men) hospitalized between February 2020 and March 21, 2022. For 17,877 (80.3%) of these episodes, at least one complication was registered. Complications were more common among males: among the episodes with at least one complication, 59.4% of patients were male and 40.6% were female.

Pneumonia was the most common complication observed and was more common among men than women (described in 66.4% of the male episodes and 54.5% of the female episodes, Figure **14**). Children and adolescents had pneumonia less frequently than patients aged 18 years old and above. Pneumonia was recorded in 4.8% of the episodes concerning male and 5.9% of the episodes concerning female aged under 18. In contrast, pneumonia was documented in more than 53% male and female episodes of patients aged 18 years old and above. Among patients younger than 18, PIMS is a relevant complication. PIMS was more common in boys than girls, being registered in respectively 11.0% and 7.2% of the boys' and girls' episodes (Figure **14**).

Despite being the most common complication, pneumonia ranked low between the complications with the highest associated mortality among episodes of patients aged 65 and above (Figure **15**). Acute respiratory distress syndrome (ARDS), especially for the older age group (65+), was the complication with the highest associated mortality. 44.2% of male and 40.1% of female episodes of patients aged 65 years old and older affected by ARDS as a complication of COVID-19 resulted in death. (Figure **15**).

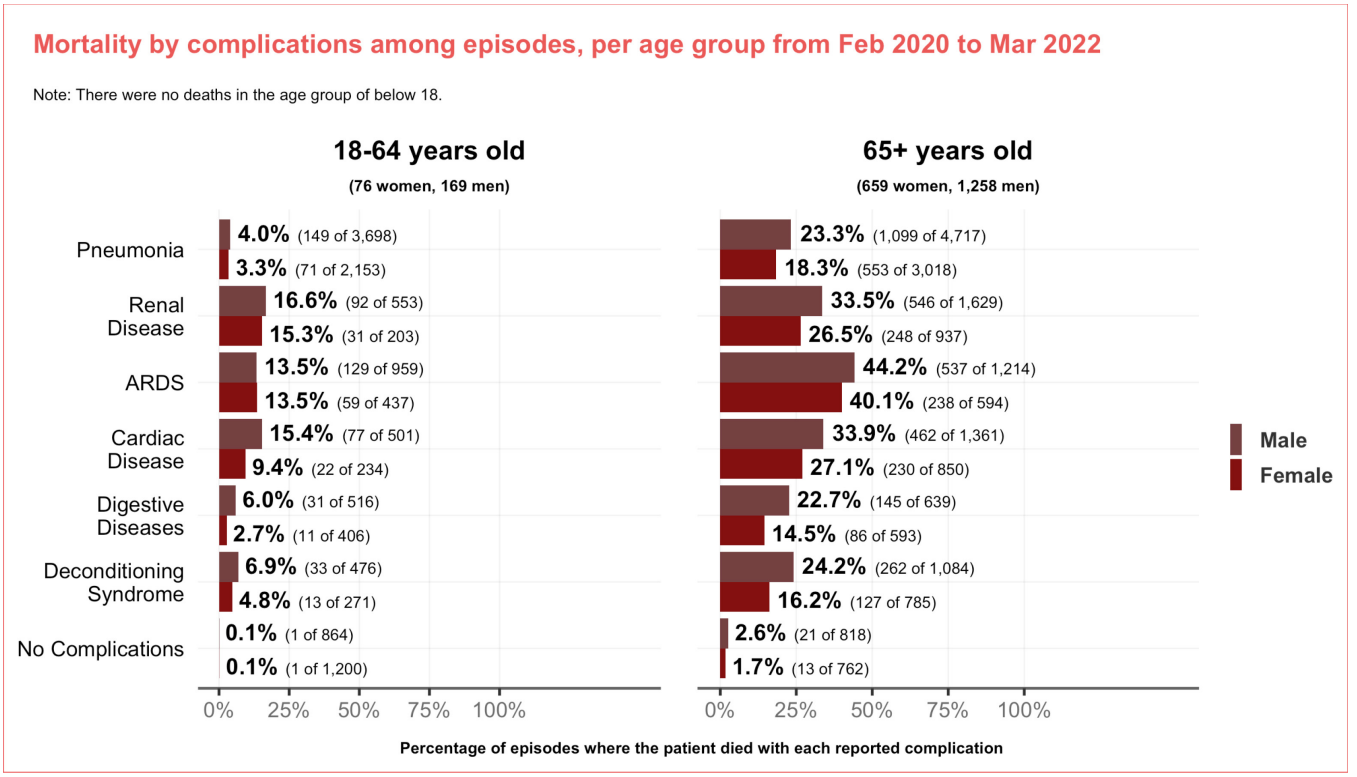

***Figure 14**: Mortality is depicted for each complication: showing the percentage of episodes where the patient with the complication died.*

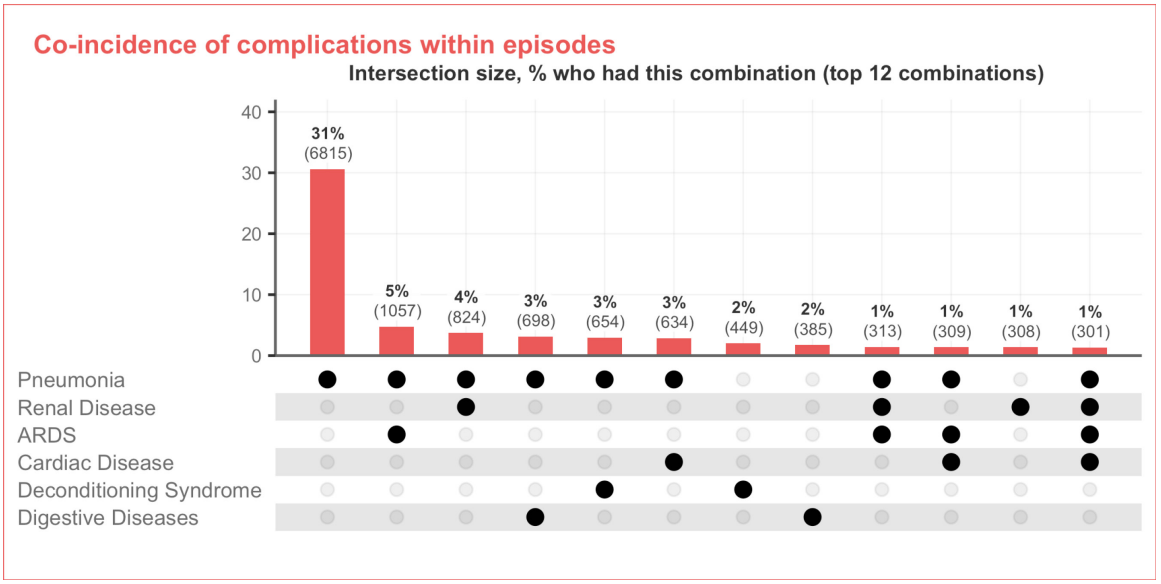

***Figure 15**: Complications are represented by their combinations (co-occurences). The top 12 combinations are represented.*

7. Nosocomial cases

The proportion of episodes with nosocomial infections peaked in January 2021 and again in March 2022: around 20% of the episodes in these periods were linked to infections of nosocomial origin (Figure **17**c). In recent months, this proportion rose since August 2021, accounting for 14.3% and 18.9% of the episodes registered in CH-SUR over the months of December 2021 and January 2022 respectively. This observation might be partially explained by an increase in nosocomial systematic testing in some hospitals and periods of higher virus circulation.

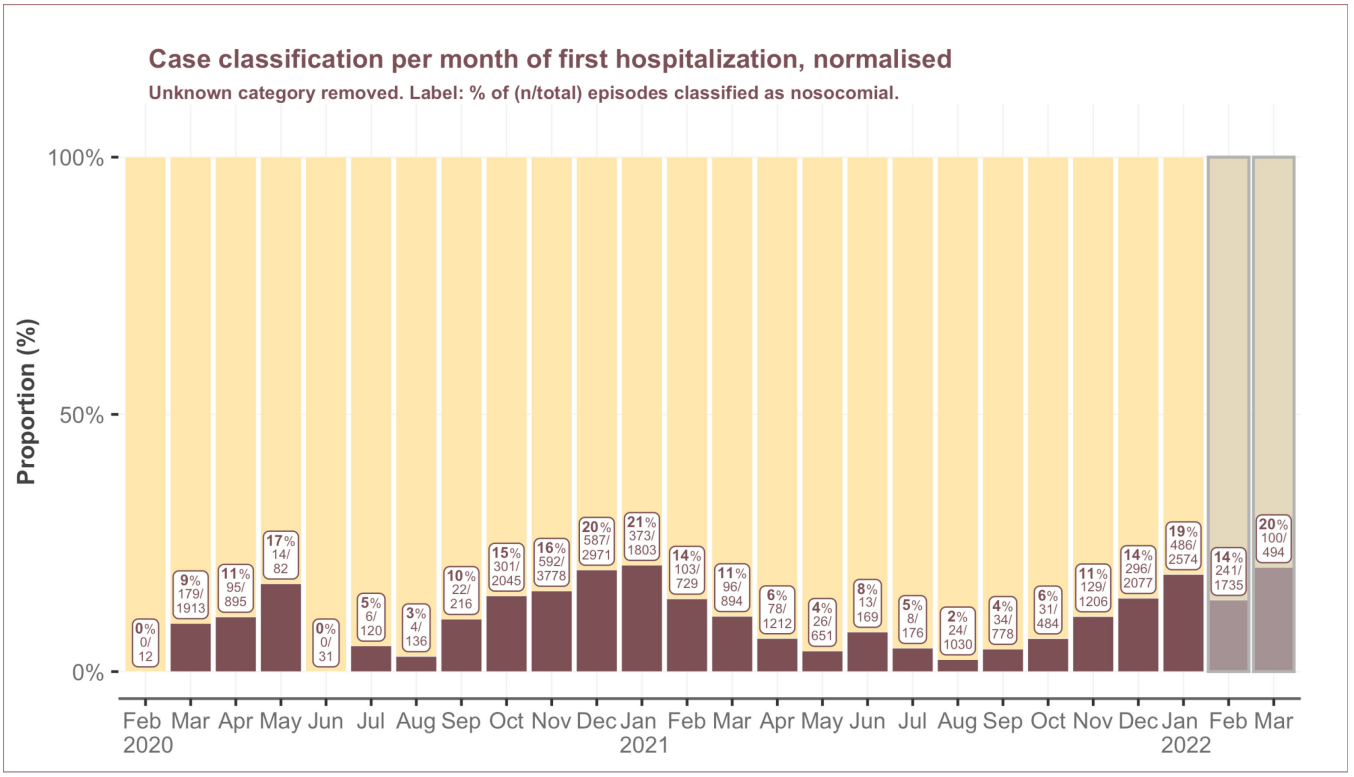

***Figure 16**: Classification (infection source) of hospitalized episodes over time. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

Over the full course of the epidemic, the nosocomial infections affected principally an elderly population, with patients aged over 80 years old, accounting for 1,807 (47%) of the nosocomial episodes. In comparison, 5,558 (23%) of episodes with community acquired infections corresponded to patients aged 80 years and above. Possibly linked to this demographic characteristic, there were proportionally more deaths among the nosocomial episodes compared to the community acquired: 608 (16%) vs 2,182 (9.0%). (Figure **18**)

ICU admissions were slightly less common among episodes of patients with nosocomial infections, when compared to community-acquired infections (Figure **18**). Another noteworthy difference lies in the treatments administered. During community acquired episodes a corticosteroid treatment was administered more frequently than during nosocomial episodes: the treatment was administered in 9,570 (39%) episodes with community acquired infection and in 887 (23%) nosocomial episodes.

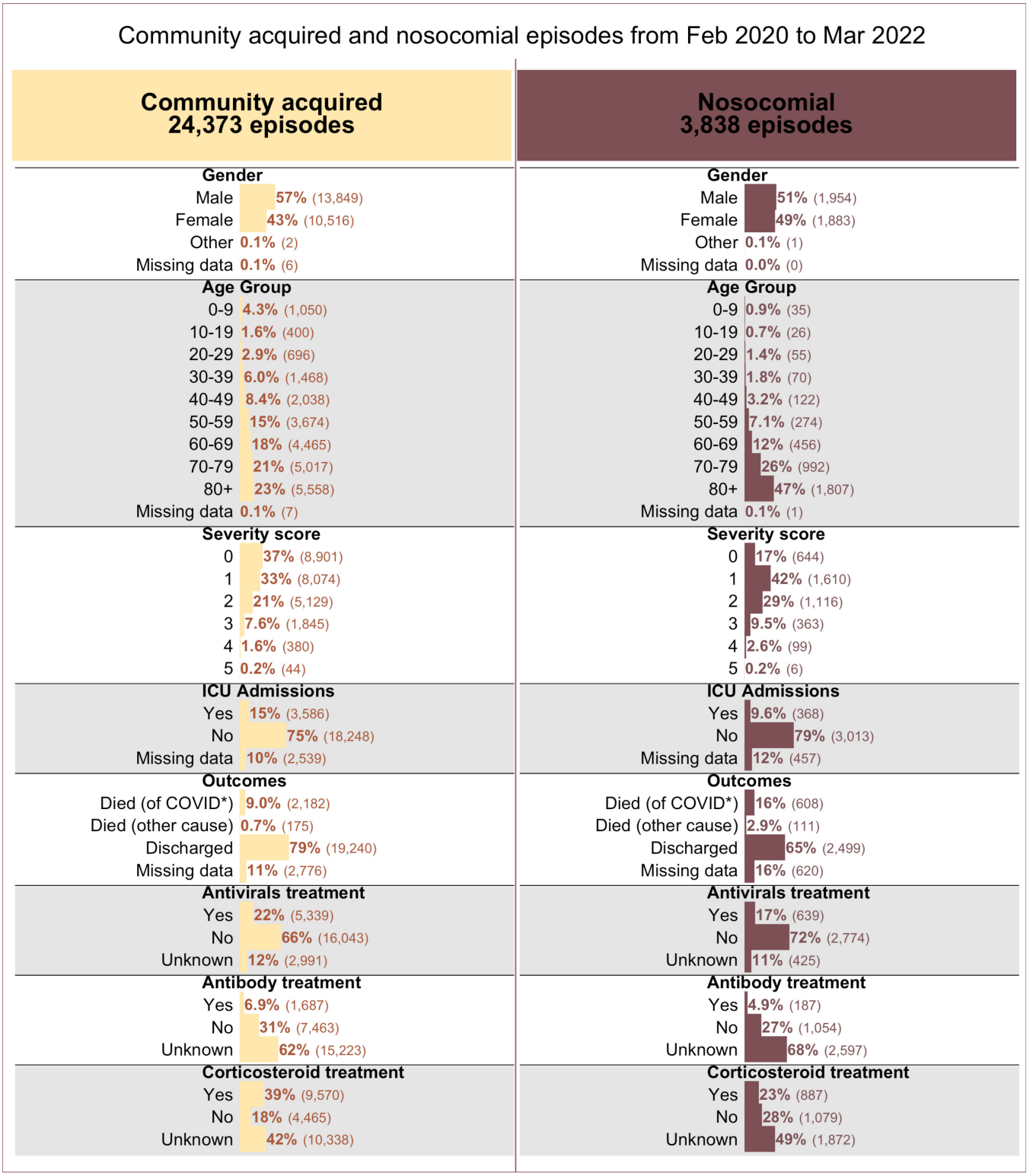

***Figure 17**: Case classification (infection source) of hospitalized episodes Comparison of community acquired and nosocomial cases by demographics, severity score, ICU, outcomes and treatments.*

8. Glossaire et informations complémentaires

Hospitalization / Hospitalisation :

Il s'agit de l'unité d'analyse la plus petite ; elle équivaut à la période écoulée entre l'admission et la sortie de l'un des hôpitaux participant au CH-SUR, cet intervalle de temps doit être supérieur à 24 heures pour être pris en compte. Une nouvelle hospitalisation est enregistrée chaque fois qu'une personne est admise à l'hôpital. Étant donné la fréquence des réadmissions au cours d'un même épisode de la maladie (due à une seule infection), ce rapport fonde son analyse sur le nombre d'épisodes et non sur le nombre d'hospitalisations.

Episode / Épisode :

Un numéro d'épisode est attribué à chaque nouvelle admission à l'hôpital de plus de 24 heures, qui est séparée d'au moins 30 jours d'une hospitalisation antérieure, que le patient soit hospitalisé une seule fois ou plusieurs fois pendant une période de 30 jours. Deux hospitalisations différentes du même patient, séparées par 30 jours, donnent lieu à deux numéros d'épisodes différents. Si un patient est transféré entre deux hôpitaux participant au CH-SUR dans la période de 30 jours suivant sa dernière sortie, alors ces hospitalisations comptent pour le même épisode. Un épisode peut donc inclure plusieurs hospitalisations et chaque hospitalisation peut inclure plusieurs admissions en unité de soins intensifs.

Reason for the hospitalization / Raison de l'hospitalisation :

- *Hospitalisation en raison du COVID-19 :* sur la base des informations disponibles au moment de l'admission, le patient est hospitalisé parce qu'il présente des symptômes dus au COVID-19 ou qu'il souffre de la décompensation d'une maladie chronique manifestement causée par le COVID-19.
- *Hospitalisation avec une infection au SARS-CoV-2 :* sur la base des informations disponibles au moment de l'admission, le patient a un test positif pour le SARS-CoV-2 mais est hospitalisé sans symptômes de COVID-19 pour un problème autre que le COVID-19. En d'autres termes, le problème prédominant est un accident ou une maladie autre que le COVID-19.

Origin of the infection / Origine de l'infection :

- *Infection acquise dans la communauté :* le COVID-19 a été détecté avant l'admission à l'hôpital ou dans les 5 premiers jours suivant l'admission.
- *Infection nosocomiale :* l'épisode est considéré comme « nosocomial » si le COVID-19 est détecté 5 jours après l'admission à l'hôpital.

Severity score at admission / Score de gravité à l'admission :

Pour les adultes, le score de gravité utilisé est le score CURB-65. Un point est attribué pour chacun des symptômes suivants : confusion (score abrégé du test mental < 9), urémie > 19 mg/dl, fréquence respiratoire > 30/mn, pression artérielle basse (diastolique < 60 ou systolique < 90 mmHg), âge > 65 ans. Pour les enfants, un point est attribué pour chacun des éléments suivants : détresse respiratoire, saturation en oxygène < 92 %, évidence clinique d'une déshydratation grave ou d'un choc, altération de l'état de conscience. Le score de gravité correspond à la somme des points donnés.

Intermediate care unit (intermediate care or IMC) / Unité de soins intermédiaires (U-IMC) : unité de soins prenant en charge des patients qui présentent une défaillance d'une fonction vitale ou dont la charge en soins ne permet pas un retour dans une unité d'hospitalisation normale. Ces unités constituent le lien entre une unité de soins intensifs et une unité de soins normale.

Intensive care unit (ICU) / Unité de soins intensifs (USI) : unité de soins prenant en charge des patients présentant une défaillance grave d'une ou plusieurs fonctions vitales ou risquant de développer des complications sévères.

Immune status / Statut immunitaire/vaccinal :

a) *Non immunisés :* patients n'ayant reçu aucune dose d'un quelconque vaccin contre SARS-CoV-2 au moment du test positif et n'ayant aucune preuve d'une infection au virus SARS-CoV-2, antérieure à cette hospitalisation.

b) *Partiellement immunisés* : patients ayant reçu une dose des vaccins de Moderna (Spikevax®), Pfizer/BioNTech (Comirnaty®), AstraZeneca (Vaxzevria®), Sinopharm®, Sinovac (CoronaVac®) ou COVAXIN® avant le test positif et n'ayant aucune preuve d'une infection antérieure au SARS-CoV-2.

c) *Avec vaccination de base* :

1. Patients ayant reçu une dose du vaccin de Johnson & Johnson (Janssen®) ou deux doses des vaccins Spikevax®, Comirnaty®, Vaxzevria®, Sinopharm®, CoronaVac® ou COVAXIN® (recommandations pour la vaccination OFSP-Commission fédérale pour les vaccinations).

2. Patients ayant une infection antérieure documentée ou un test positif (nécessitant ou non une hospitalisation) et ayant reçu une dose d'un des vaccins énumérés ci-dessus, indépendamment du délai entre la guérison de l'infection antérieure et la date de la vaccination.

3. Patients ayant reçu une combinaison des vaccins suivants : Comirnaty® et Spikevax®, Vaxzevria® et Comirnaty®, Vaxzevria® et Spikevax®. Sont exclus les patients ayant reçu une vaccination de rappel supplémentaire (Voir catégorie « Avec vaccination de rappel »).

d) *Avec vaccination de rappel :* patients ayant reçu la vaccination de base et une ou plusieurs doses supplémentaires de vaccins (rappel), avec un minimum de 4 mois depuis la dernière injection pour la vaccination de base.

e) *Guéris d'une infection au SARS-CoV-2 :* patients chez qui une infection antérieure au SARS-CoV-2 a été confirmée, qu'elle ait nécessité ou non une hospitalisation dans le passé, et n'ayant reçu aucune dose de vaccin, indépendamment du temps écoulé depuis l'infection précédente. ATTENTION : de nombreux patients guéris ne sont pas identifiés comme tels dans la base de données (informations recueillies uniquement depuis juin 2021, infection non diagnostiquée, informations manquantes dans le dossier médical).

f) *Statut immunitaire inconnu :* patients pour lesquels aucune information vaccinale et immunitaire n'est disponible.

e) *Complètement immunisés* : cette catégorie résulte de la combinaison des catégories « avec vaccination de base » et « avec vaccination de rappel ».

Discharge / Sortie : lorsque le patient quitte l'hôpital vivant, le départ est qualifié de « sortie » si le patient se rend :

4. à son domicile,

5. dans un établissement de soins de longue durée,

6. dans un autre hôpital,

7. dans une autre institution ne participant pas à la surveillance du CH-SUR,

8. dans un établissement de réadaptation, ou

9. vers une destination inconnue.

Reason of death / Raison du décès : les patients pour lesquels le COVID-19 était la cause du décès (décédés du COVID-19) sont présentés séparément des patients ayant le COVID-19 qui sont morts d'autres causes (décédés avec le COVID-19, non du COVID-19). Cette détermination de la cause du décès d'un patient, du COVID ou d'une autre cause, est faite par un médecin de l'hôpital concerné pour chaque centre participant au CH-SUR. Les cas, où la cause du décès n'est pas certaine mais où il y a eu un diagnostic de COVID-19 (en conformité avec les critères d'inclusion du CH-SUR) sont comptés comme des décès du COVID ou des décès suspectés du COVID.

Dealing with missing data / Traitement des données manquantes : lorsque cela est mentionné dans le texte, les données manquantes sont exclues de l'analyse. Sinon, les enregistrements avec des données manquantes sont inclus dans les nombres totaux et analysés en conséquence. Cela peut conduire à la situation où les dénominateurs des différentes catégories analysées ne donnent pas le même total. Lorsque cela est indiqué, les données des deux derniers mois sont considérées comme provisoires en raison des délais de saisie et sont mises en évidence en gris dans certaines illustrations.

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