Surveillance sentinelle hospitalière du COVID-19

État des données au: 23 mai 2022

1. Résumé introductif

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 en 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 22 mai 2022 portent sur 33 466 épisodes d'hospitalisation. Durant cette même période, 52 976 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 63,2% 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 13,8% (4 631 sur 33 466), tandis que les épisodes liés à des infections acquises hors de l'hôpital représentaient 82,6% (27 655 sur 33 466) (fig. **1**) ; 3,5% des épisodes n'ont pu être classés dans aucune des deux catégories.

Sur les épisodes liés à une infection acquise hors de l'hôpital, pour ceux ayant des données complètes, 14,6% comprenaient un traitement dans une unité de soins intensifs (3 862 de 24 585 épisodes, du 26 Février 2020 au mars 31, 2022) et 9,5% ont résulté en un décès (2 339 de 24 585 épisodes, 26 Février 2020 au May 22, 2022).

Au cours de la période allant du 01 février 2022 au 31 mars 2022, la période la plus récente pour laquelle suffisamment de données sont disponibles, 3 805 épisodes d'hospitalisation faisant suite à une infection acquise hors de l'hôpital ont été enregistrés. Parmi les patients concernés, 1 337 (35,1%) n'étaient pas immunisés et 1 498 (39,4%) étaient « complètement immunisés » (vaccination de base avec ou sans rappel) (fig. **2**). Au cours de la même période, 231 épisodes ont comporté un séjour en unité de soins intensifs. Parmi les patients concernés, 100 (43,3%) n'étaient pas immunisés et 93 (40,3%) l'étaient complètement. 96 épisodes ont entraîné le décès (2,5% de tous les épisodes enregistrés dont l'issue est connue), dont 45 chez des patients non immunisés et 33 chez des patients complètement immunisés.

Le 1er Avril 2022, la Suisse est revenue à une situation épidemiologique normale. Depuis lors, la stratégie de dépistage dans les hôpitaux consiste à ne tester que les patients qui sont symptomatiques pour une infection au SARS-CoV-2. Ce changement dans la stratégie de dépistage pourrait engendrer une réduction du nombre total de cas détectés, ne permettant d'identifier que les patients infectés démontrant des symptômes typiques du COVID-19. Pour plus de définitions et de détails sur les données, veuillez consulter le glossaire et les informations complémentaires à la fin de ce rapport.

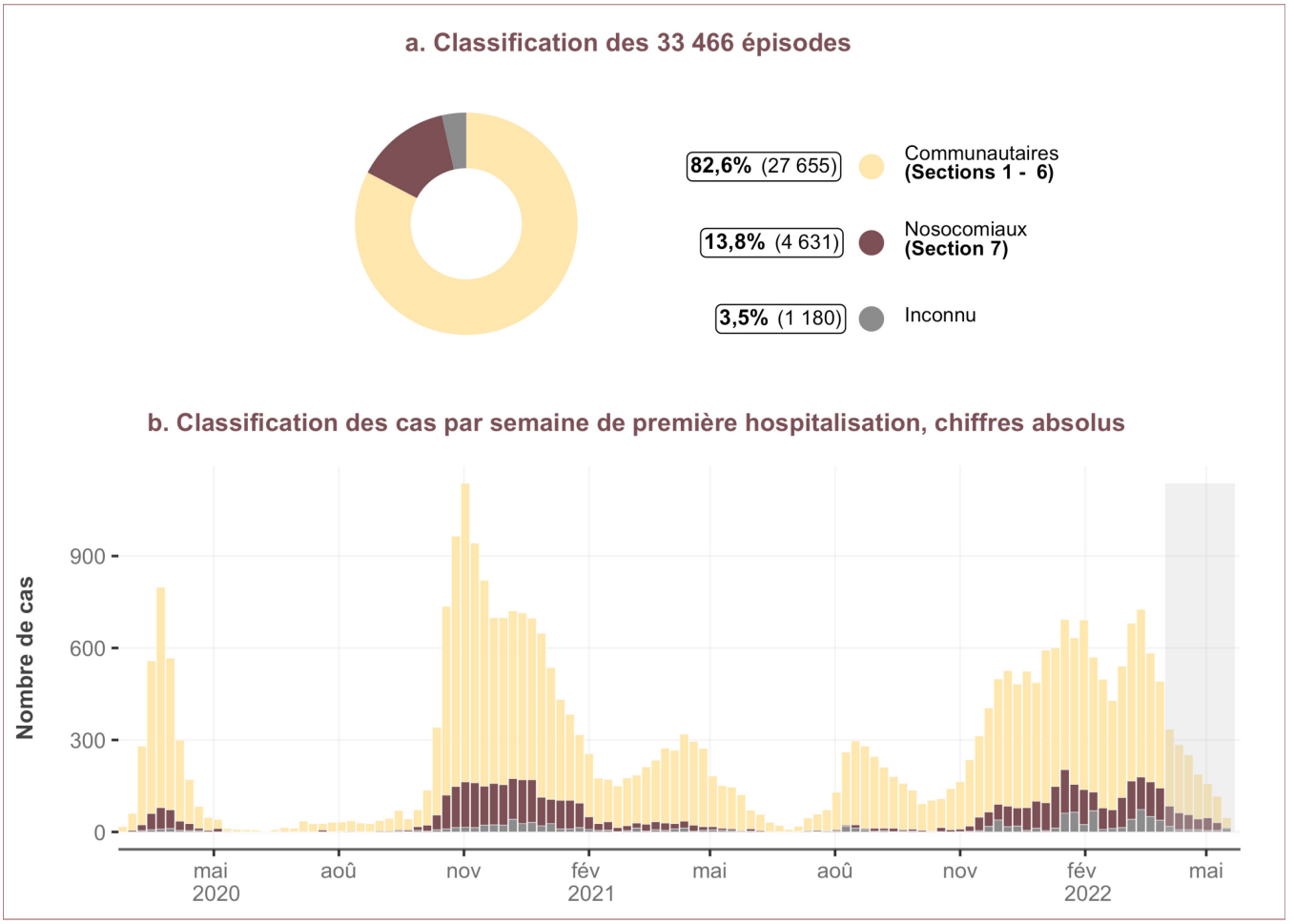

***Figure 1**: Classification des cas (source de l'infection) des épisodes dans le temps. Proportion (normalisée en %) de tous les épisodes ayant entraîné des infections nosocomiales (panneau a) et tendance dans le temps (panneau b). Pour les épisodes entraînant plusieurs hospitalisations, la classification 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.*

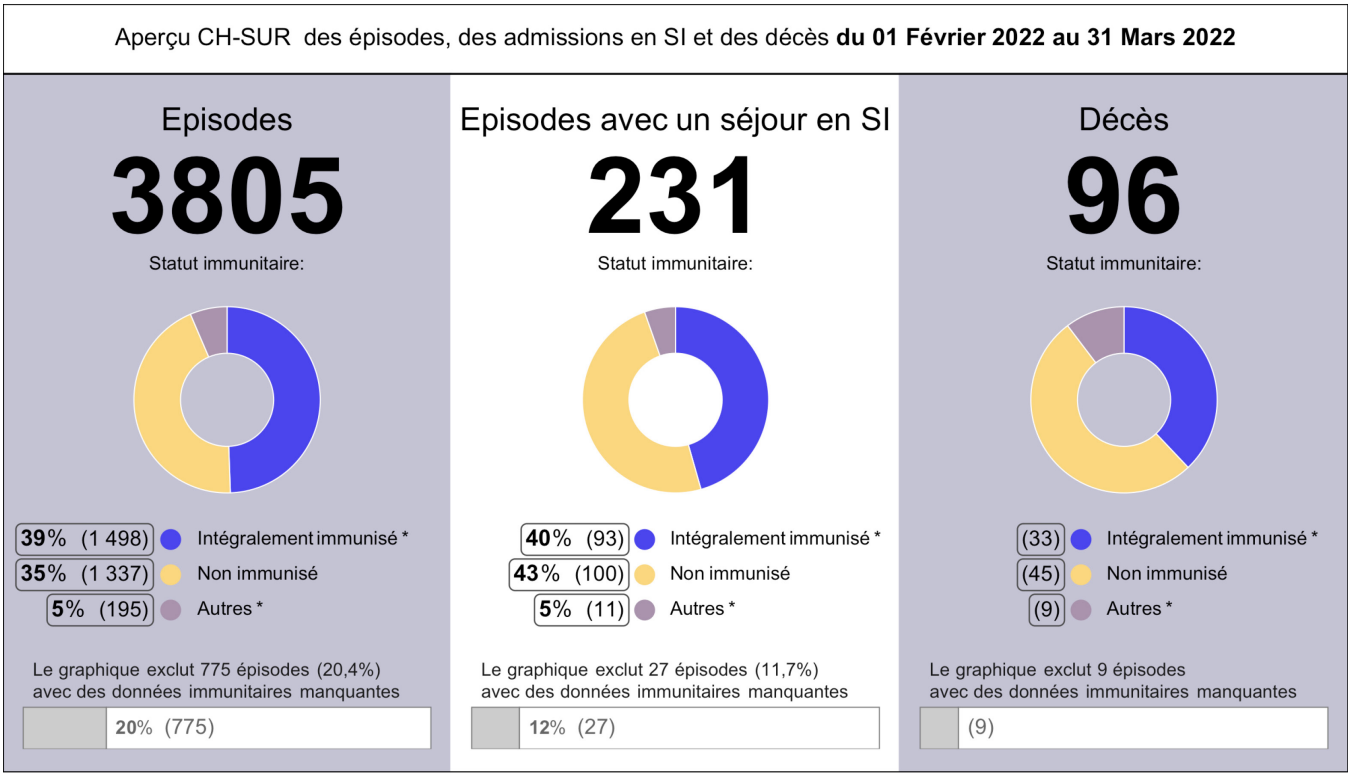

***Figure 2**: Vue d'ensemble des données les plus récentes concernant les épisodes d'hospitalisation liées à des infections acquises hors de l'hôpital. Les données des deux derniers mois sont considérées comme provisoires à cause des délais dans la saisie des données : elles ont donc été omises. (* 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 May 22, 2022 and among the 20 hospitals actively participating in CH-SUR, 27,655 episodes of community acquired infections were registered, accounting for a total of 28,685 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**.

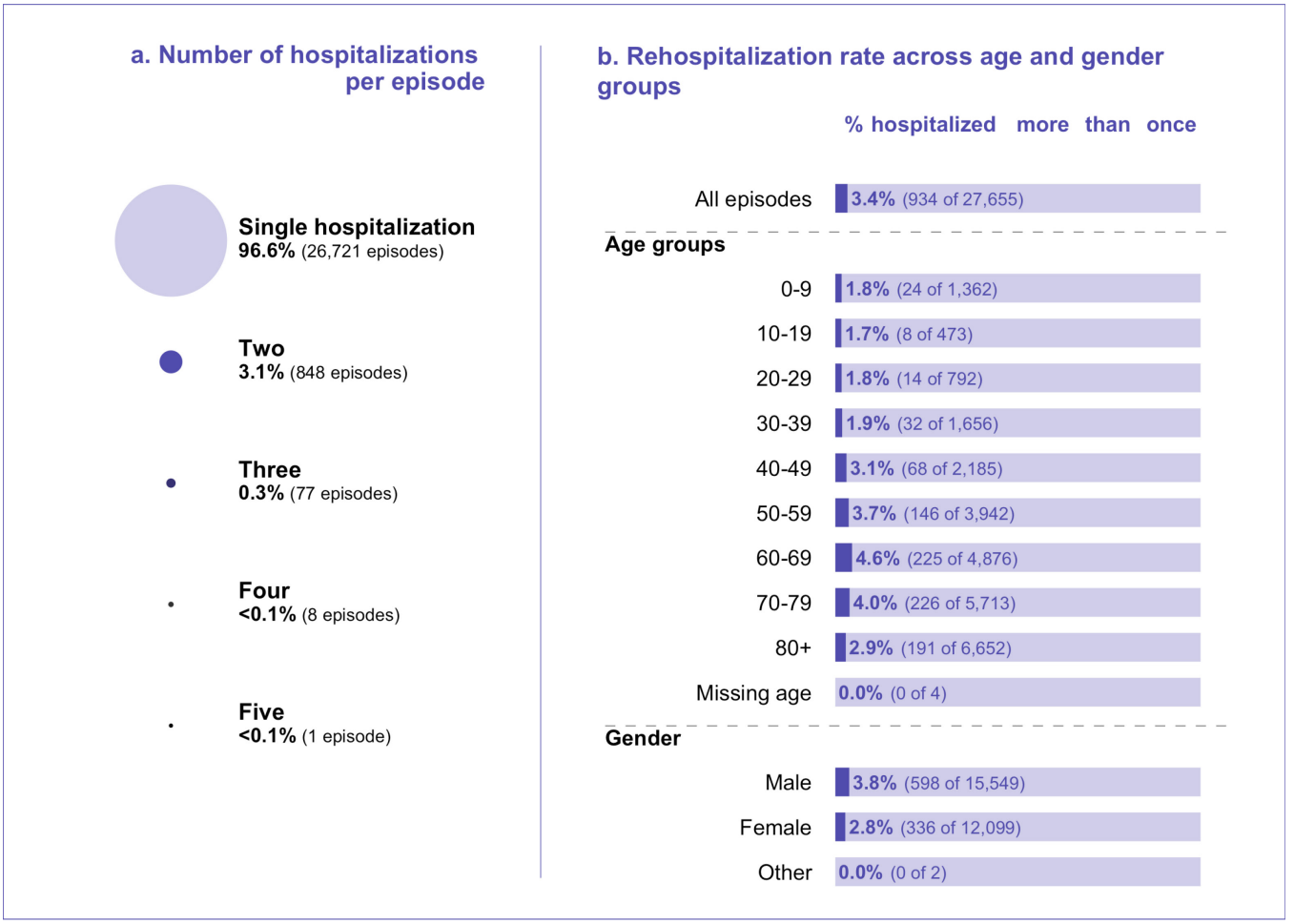

***Figure 3**: Hospitalizations per episode of hospitalization and rehospitalization rate across demographic groups. Includes records between March 2020 and May 22, 2022.*

Most patients (96.6% [26,721 of 27,655]) were hospitalized only once during an episode, while 3% of the registered episodes (933 of 27,655) included two to four hospitalizations. Only one episode included five hospitalizations (Figure **3**b).

The overall rate of rehospitalization within the same episode was 3.4% (934 of 27,655) (Figure **3**c). The 60-69 age group and the 70-79 age group had the highest rate of rehospitalization at respectively 4.6% (225 of 4,876) and 4.0% (226 of 5,713). Men had a higher rehospitalization rate than women, 3.8% (598 of 15,549) vs 2.8% (336 of 12,099) respectively.

Among all episodes with community acquired infections, the majority (56.2% [15,549 of 27,655]) 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 (24.0% [6,652]).

Figures **4**c and **4**d 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% (2,813 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 75.3% (816 of 1,084) in November 2021.

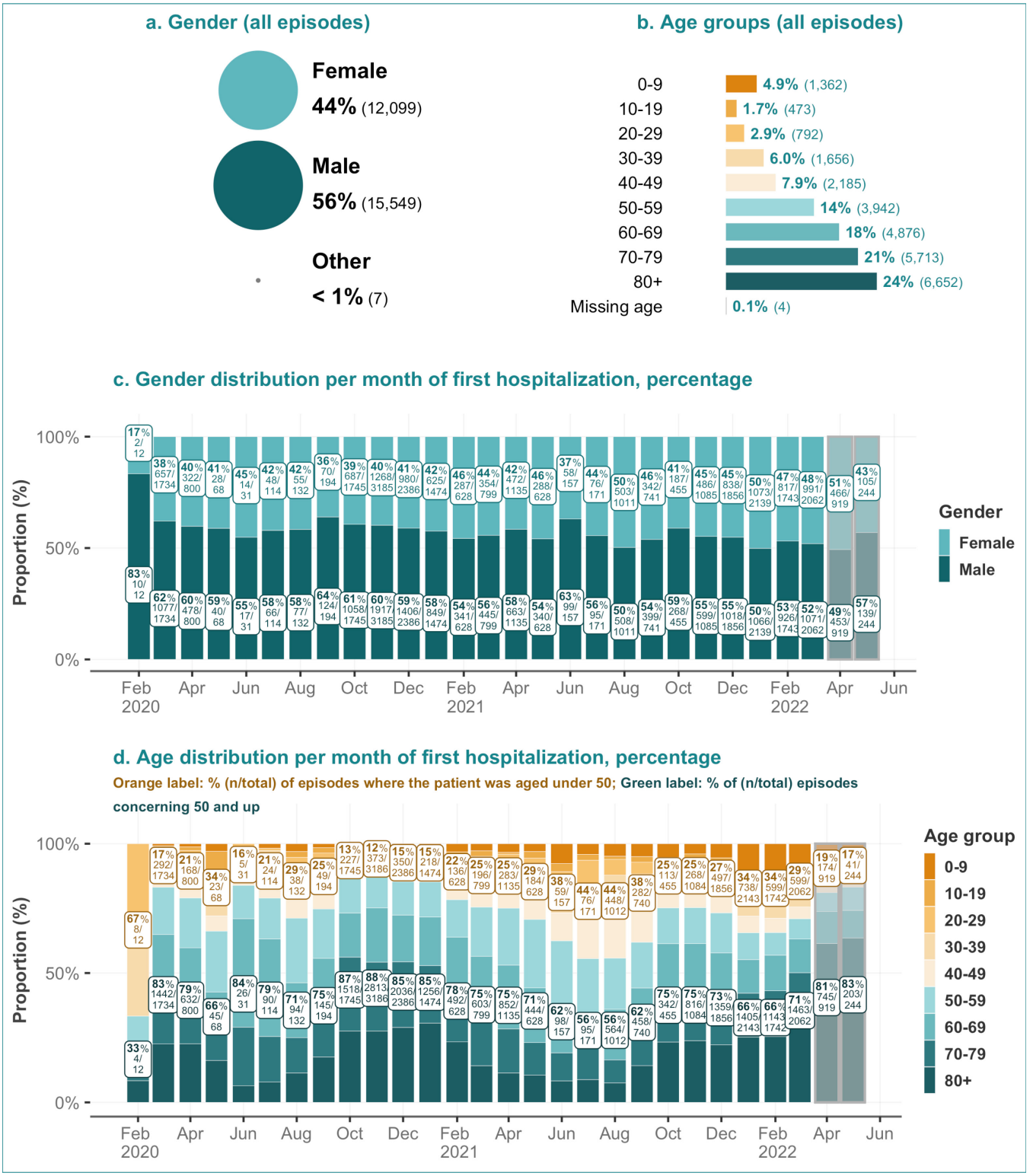

***Figure 4**: Demographic characteristics: gender and age distribution of admitted hospitalized patients, overall and per month. For episodes with multiple hospitalizations, the admission date of the first hospitalization was used. Data from the last two months (highlighted gray) is considered provisional 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 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.

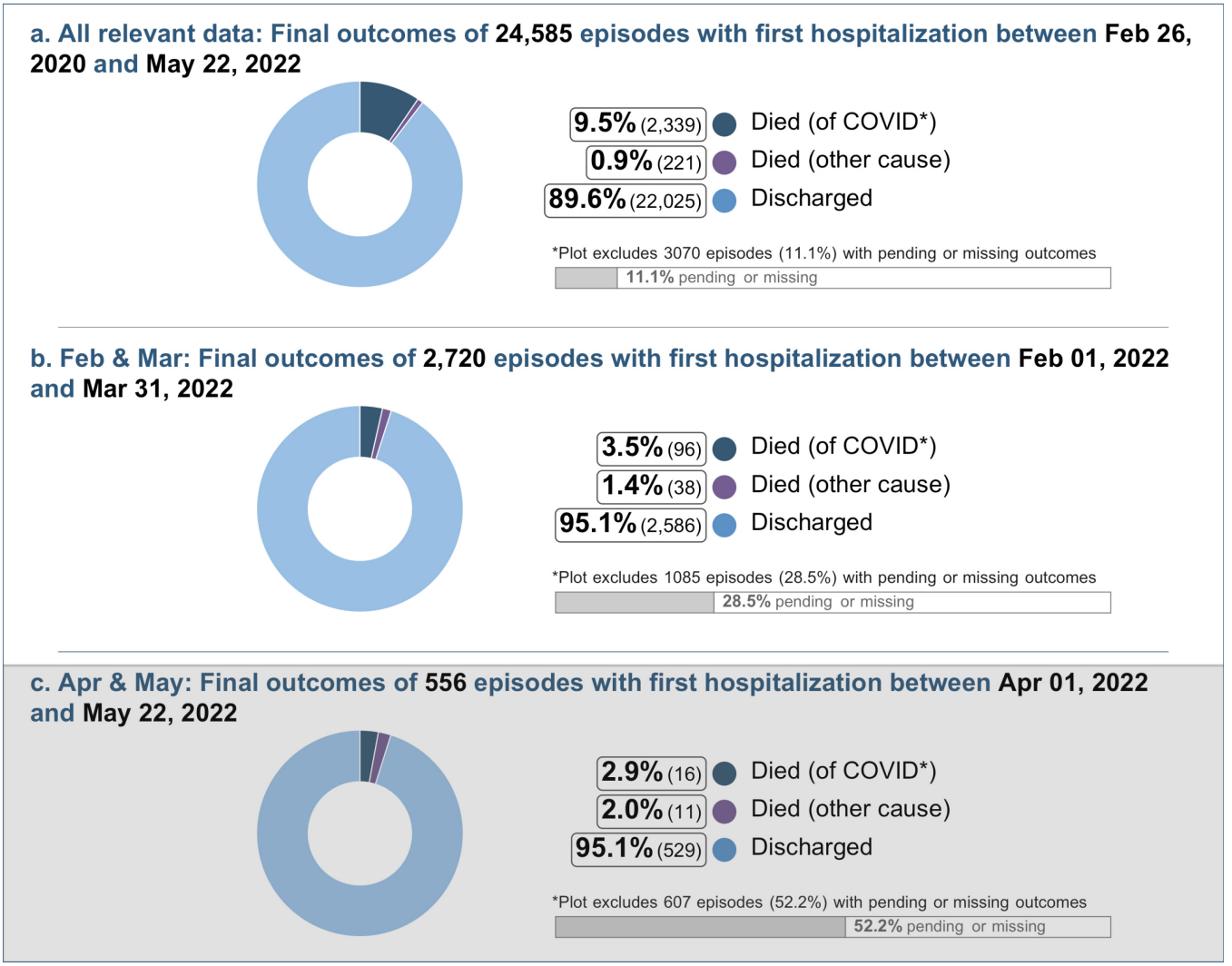

***Figure 5**: Outcomes for COVID-19 related episodes of hospitalization in CH-SUR hospitals. Includes records up to May 22, 2022. For episodes with multiple hospitalizations, only the final outcome is considered. Patients where the cause of death was not certain, but there was a COVID-19 diagnosis (in 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 2,372) 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 12.4% (53 of 429) 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% (955 of 2,386) of the admissions in that period.

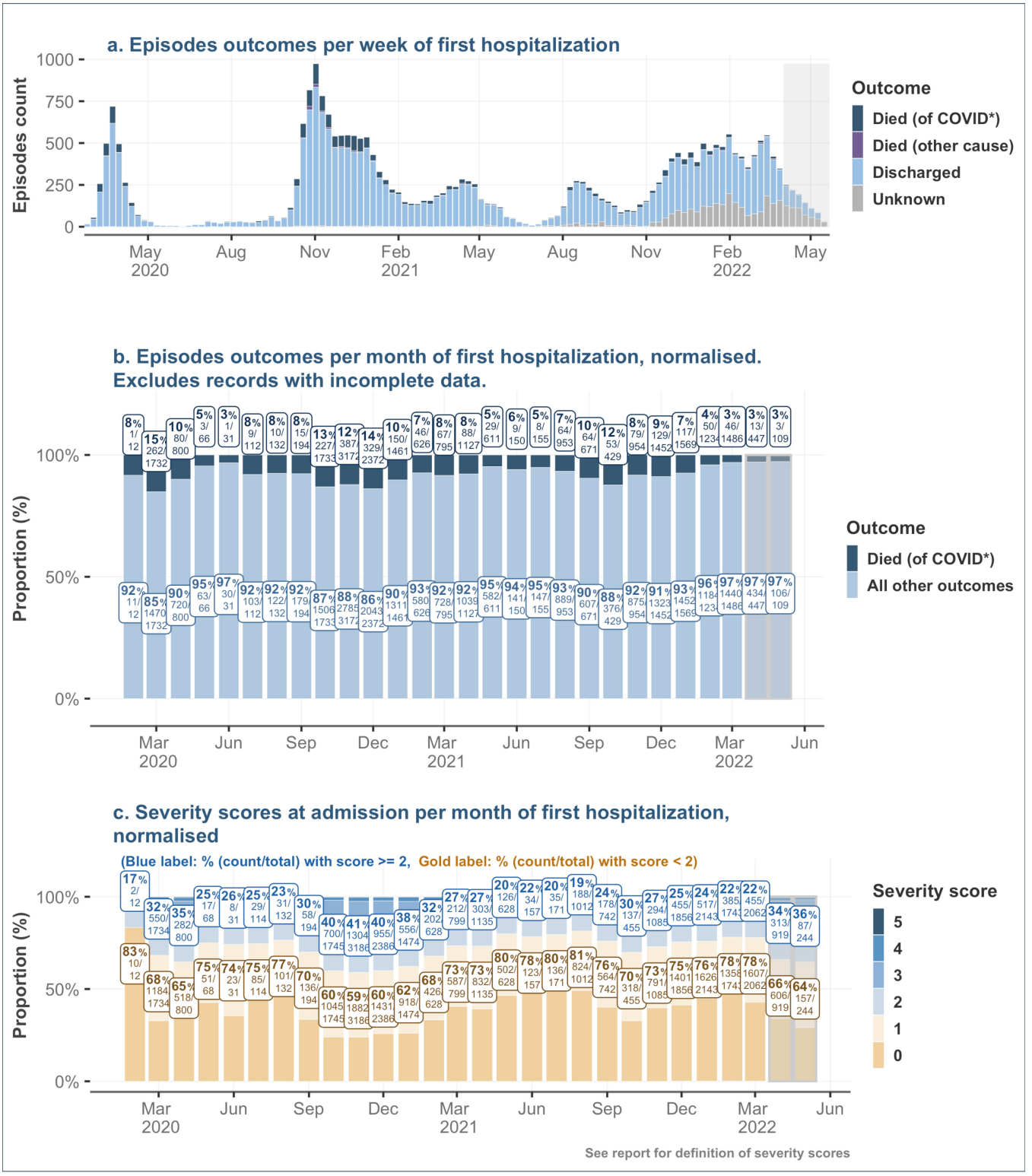

***Figure 6**: Epidemic curve, episodes' outcomes and severity scores at admission for COVID-19 hospitalizations over time. Includes records up to May 22, 2022. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. Episodes where the cause of death was 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 March 31, 2022, the case fatality rate (CFR) for episodes with community acquired infections increased with increasing age, from 0% (0 of 1,187) in episodes of patients aged 0-9, to 3.3% (116 of 3,551) in episodes of patients aged 50-59, and to 21.5% (1,189 of 5,518) in episodes of patients aged 80+. CFR% was greater in men than in women: 11.2% (1,530 of 13,685) vs 7.7% (793 of 10,340) respectively. In addition, the CFR% was greater for episodes with higher severity scores at admission: 1.1% (89 of 8,277) of the episodes with severity score 0 resulted in death of COVID-19, while 47.9% (23 of 48) 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 February and March 2022, Figure **7**b) was lower than the CFR% of the whole epidemic period (3.5% vs. 9.7%). 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.

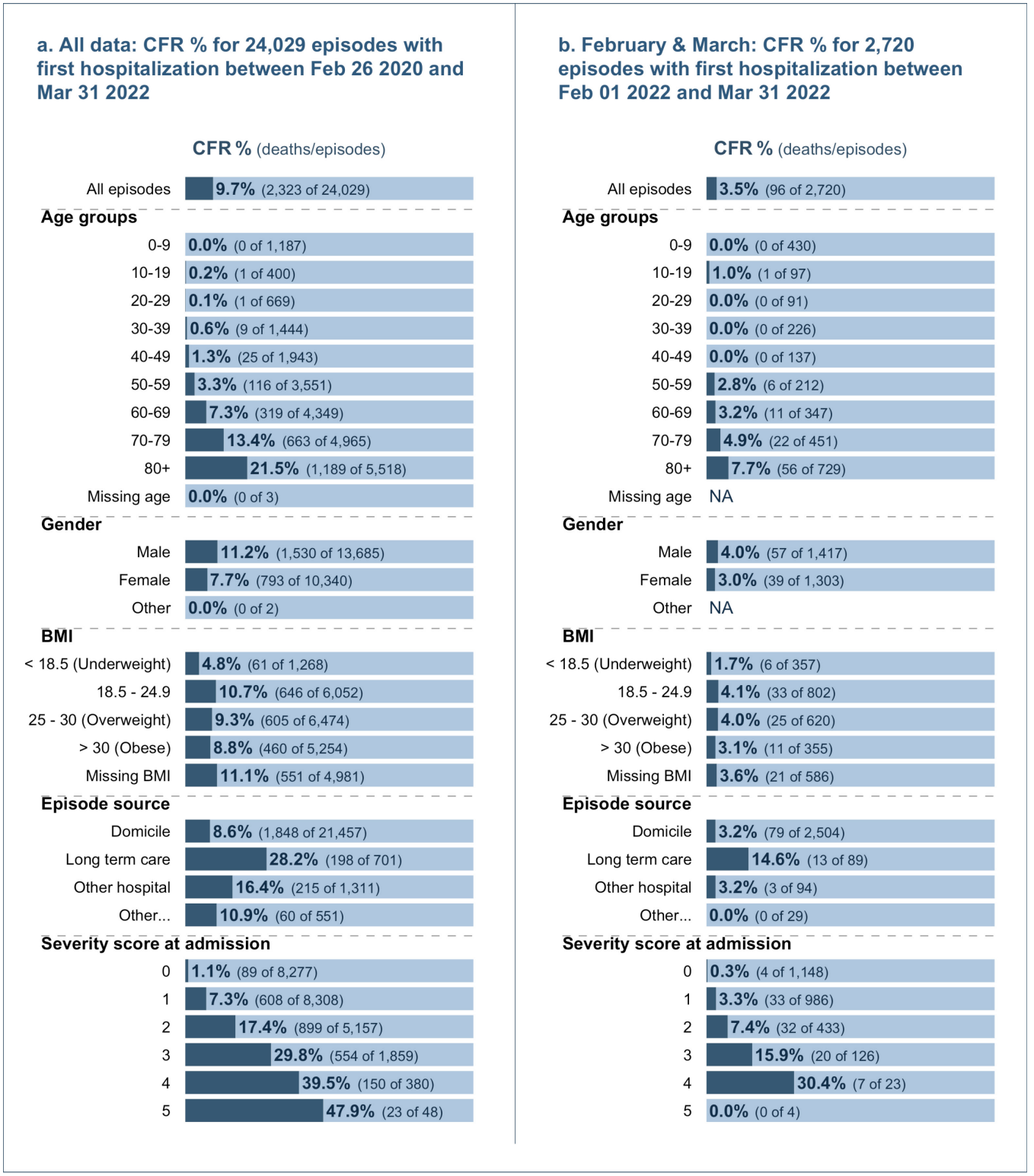

***Figure 7**: Case fatality rate (CFR) % among demographic and risk groups: percentage of hospitalization episodes in different demographic groups, which ended in the death of the patient of COVID-19 in hospital. Both figures include records up to Mar 31 2022 but records with incomplete data (ongoing 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 vaccinated (Figure**8**c, source: FOPH Dashboard).

During the months of February and March 2022, when between 69.8% and 70.2% of the Swiss population was fully vaccinated (Figure **8**c), the base immunized and boosted made up only a minority (18.8% and 30.6% respectively) of the episodes recorded in CH-SUR (Figure **8**b), suggesting protection against hospitalization (and, consequently, death) due to COVID-19.

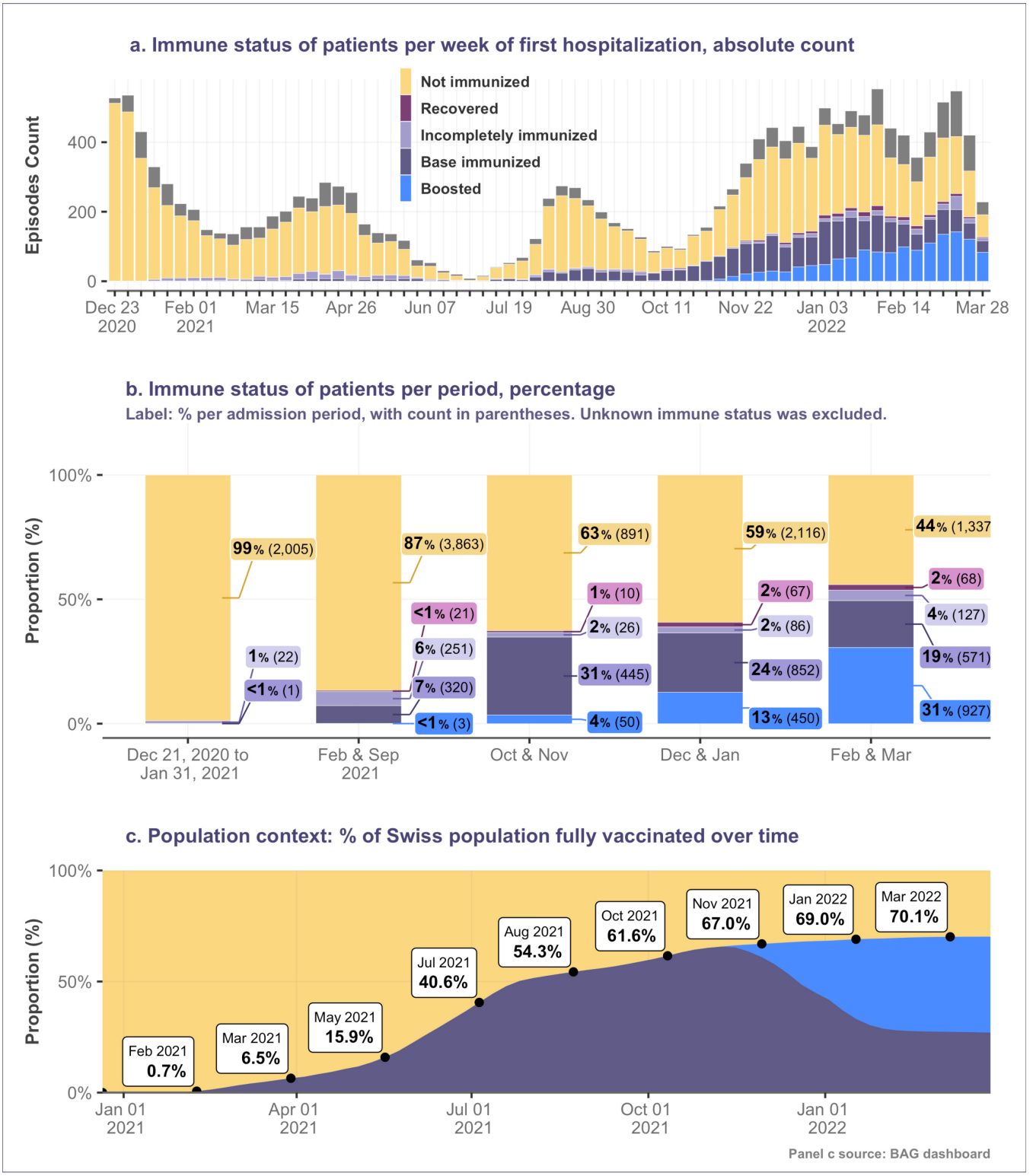

***Figure 8**: Immune status of patients and overall vaccination rate in Switzerland (exported: May 22, 2022). See glossary for definitions of immune status categories. For episodes with multiple hospitalizations, the immune status for the first hospitalization was considered. Panels a. and b. include 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 Mar 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, 35.9% (1,301 of 3,620) of the episodes of fully immunized patients corresponded to patients aged 80 and above (Figure **9**a, right panels). In contrast, only 17% (1,712 of 10,041) 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.

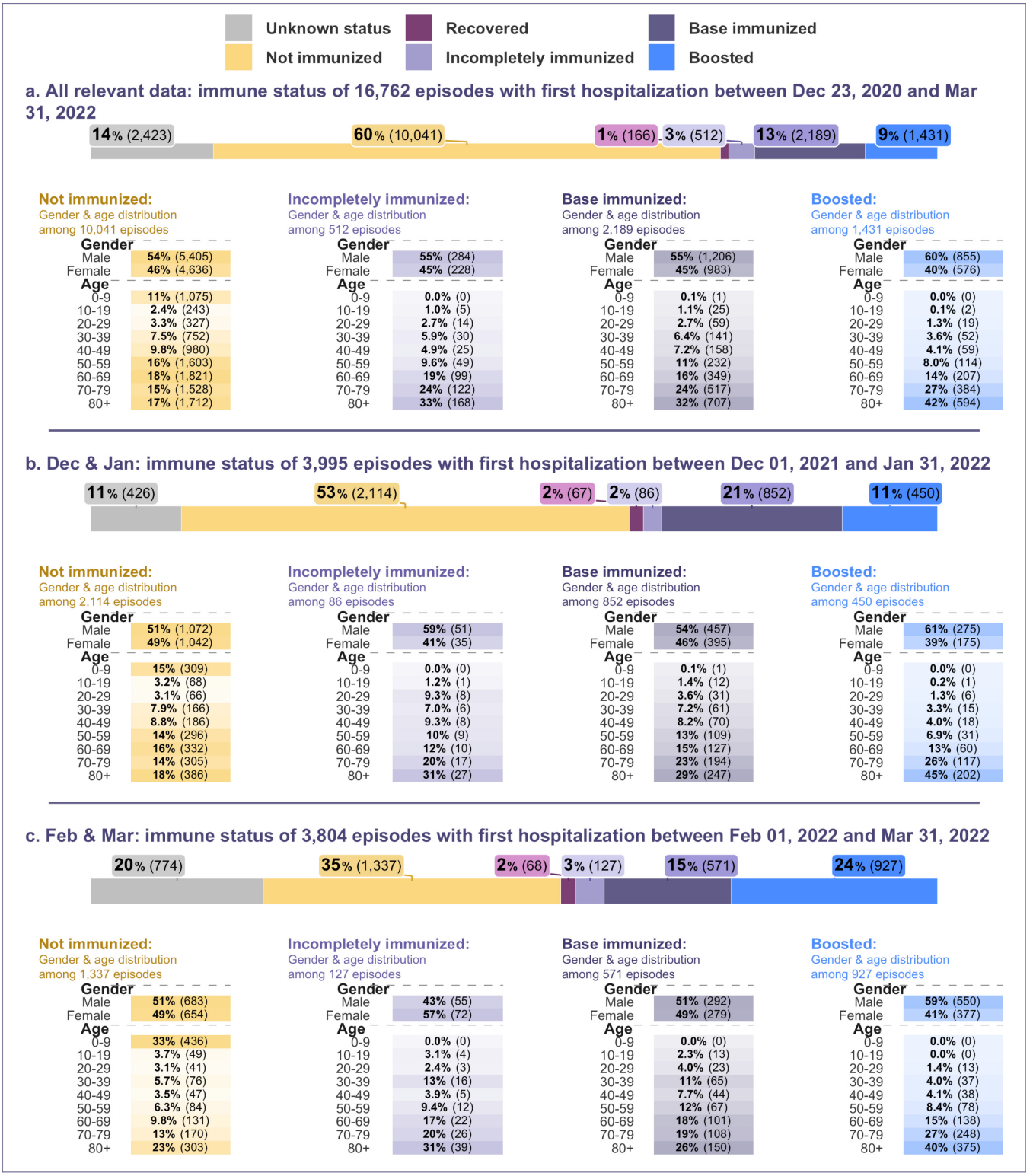

***Figure 9**: Demographic characteristics of hospitalized patients by immune status, over three different periods. Some patients may be counted more than once, as a single patient can have several episodes. Episodes with first admission date after Mar 31 2022 were excluded, as a large proportion of 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 2,881 episodes of fully immunized patients (community acquired infections), CH SUR registered 200 deaths because of COVID-19 (Figure **10**a, right panels: base immunized and boosted). 115 of them corresponded to patients aged 80 years old and above. Over the same period, 695 episodes ended in COVID-caused deaths among non-immunized patients (Figure **10**a, left panel).

During the months of February and March, CH-SUR registered 84 deaths due to COVID-19 of which the immune status was known. Of these, 45 (53.6%) happened among non-immunized patients, 6 deaths (7.1%) among partially immunized patients, and 33 deaths (39.3%) among fully immunized patients (Figure **10**). Despite representing a smaller share of the population (Figure **8**c), the non-immunized population's death toll represents a larger portion in CH-SUR (Figure **10**c). Figure **10**c excludes 9 deaths of which the immune status was unknown and 3 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. Moreover, in the latest period, boosted patients have a substantially lower CFR across all age groups.

a. All relevant data: 956 deaths among 12,482 episodes with first hospitalization between Dec 23, 2020 and Mar 31, 2022

Not immunized:
Age distribution of **695** deaths in **9,118** episodes

Age	Cases	Deaths	CFR %
0-9	980	0	0%
10-19	209	1	0.5%
20-29	285	1	0.4%
30-39	685	5	0.7%
40-49	897	13	1.4%
50-59	1475	49	3.3%
60-69	1679	124	7.4%
70-79	1390	181	13.0%
80+	1518	321	21.1%

Incompletely immunized:
Age distribution of **61** deaths in **483** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	4	0	0%
20-29	13	0	0%
30-39	26	0	0%
40-49	22	0	0%
50-59	43	3	7.0%
60-69	96	10	10.4%
70-79	118	17	14.4%
80+	161	31	19.3%

Base immunized:
Age distribution of **139** deaths in **1,787** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	18	0	0%
20-29	40	0	0%
30-39	114	0	0%
40-49	123	1	0.8%
50-59	193	8	4.1%
60-69	287	20	7.0%
70-79	433	32	7.4%
80+	579	78	13.5%

Boosted:
Age distribution of **61** deaths in **1,094** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	2	0	0%
20-29	15	0	0%
30-39	38	0	0%
40-49	47	0	0%
50-59	85	1	1.2%
60-69	158	6	3.8%
70-79	293	17	5.8%
80+	456	37	8.1%

b. Dec & Jan: 240 deaths among 2,793 episodes with first hospitalization between Dec 01, 2021 and Jan 31, 2022

Not immunized:
Age distribution of **153** deaths in **1,688** episodes

Age	Cases	Deaths	CFR %
0-9	260	0	0%
10-19	48	0	0%
20-29	46	0	0%
30-39	130	4	3.1%
40-49	151	3	2.0%
50-59	243	13	5.3%
60-69	270	28	10.4%
70-79	241	32	13.3%
80+	299	73	24.4%

Incompletely immunized:
Age distribution of **9** deaths in **78** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	7	0	0%
30-39	6	0	0%
40-49	8	0	0%
50-59	8	0	0%
60-69	9	1	11.1%
70-79	16	3	18.8%
80+	23	5	21.7%

Base immunized:
Age distribution of **47** deaths in **665** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	8	0	0%
20-29	20	0	0%
30-39	50	0	0%
40-49	52	1	1.9%
50-59	92	5	5.4%
60-69	99	8	8.1%
70-79	159	8	5.0%
80+	185	25	13.5%

Boosted:
Age distribution of **31** deaths in **362** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	6	0	0%
30-39	11	0	0%
40-49	15	0	0%
50-59	22	1	4.5%
60-69	47	2	4.3%
70-79	101	10	9.9%
80+	159	18	11.3%

c. Feb & Mar: 84 deaths among 2,264 episodes with first hospitalization between Feb 01, 2022 and Mar 31, 2022

Not immunized:
Age distribution of **45** deaths in **1,050** episodes

Age	Cases	Deaths	CFR %
0-9	400	0	0%
10-19	40	1	2.5%
20-29	29	0	0%
30-39	65	0	0%
40-49	37	0	0%
50-59	56	2	3.6%
60-69	92	4	4.3%
70-79	114	11	9.6%
80+	217	27	12.4%

Incompletely immunized:
Age distribution of **6** deaths in **113** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	3	0	0%
20-29	3	0	0%
30-39	13	0	0%
40-49	3	0	0%
50-59	10	0	0%
60-69	21	1	4.8%
70-79	23	1	4.3%
80+	37	4	10.8%

Base immunized:
Age distribution of **9** deaths in **418** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	10	0	0%
20-29	16	0	0%
30-39	49	0	0%
40-49	33	0	0%
50-59	49	1	2.0%
60-69	72	2	2.8%
70-79	74	3	4.1%
80+	115	3	2.6%

Boosted:
Age distribution of **24** deaths in **683** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	9	0	0%
30-39	27	0	0%
40-49	30	0	0%
50-59	58	0	0%
60-69	103	3	2.9%
70-79	174	4	2.3%
80+	282	17	6.0%

***Figure 10**: 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 23.9% (1,131 of 4,736) 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% (322 of 6,201) 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 17.6% of the episodes concerning males, compared to 10.7% of the episodes concerning females.

Episodes of patients transferred from other hospitals had a high probability of ICU admission: 52.6% of such episodes (757 of 1,438) required at least one ICU admission (Figure **11**a), compared to an overall admission rate of 17.1% 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 (February 2022 and March 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 February and March than for the full epidemic period (Figure **11**).

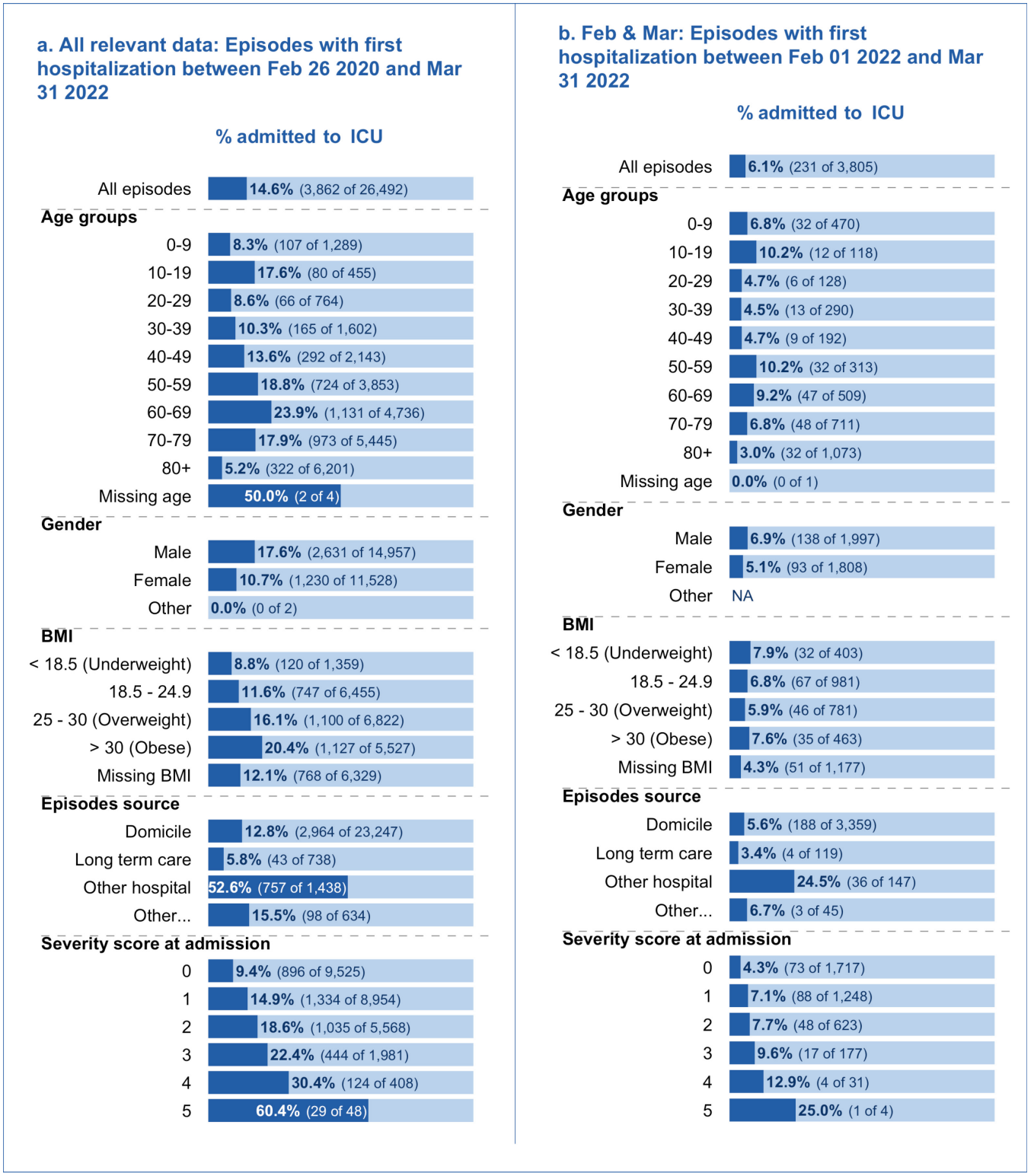

***Figure 11**: Percentage of hospitalization episodes with at least one ICU admission, grouped by demographic and risk factors, over two time intervals. For episodes with multiple hospitalizations, we considered whether they were admitted to the ICU during any of their hospitalizations. Both panels include records up to Mar 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 April and May 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 (69% and 43% 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 Dec 2021 and Mar 2022 around 86% 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 classes, as only 73.9% (Dec, Jan) and 55% (Feb, Mar) of the episodes corresponded to patients aged 50 years and above.

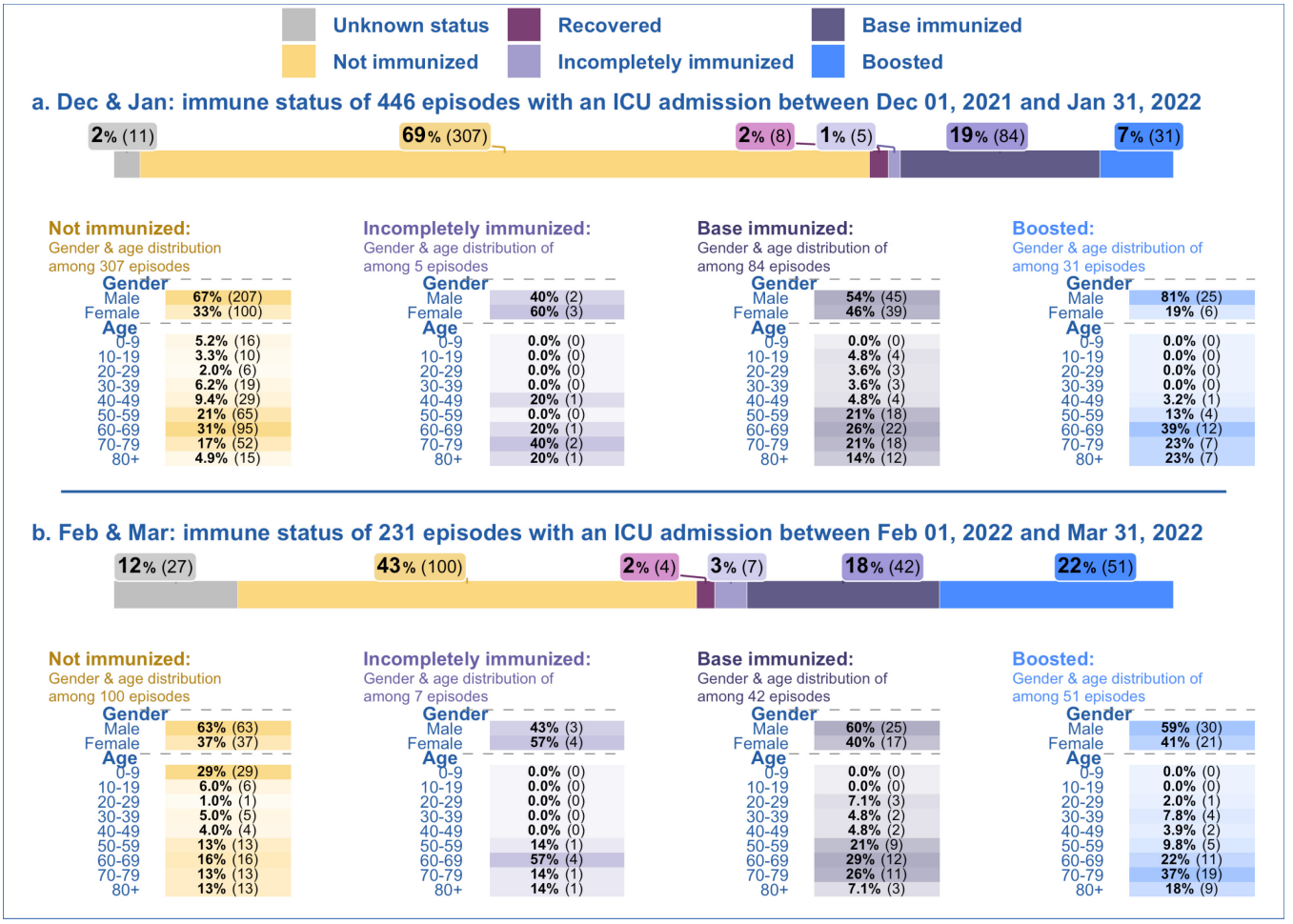

***Figure 12**: Demographic characteristics of patients in ICU by immune status and episode, over two different periods. Episodes with a first admission date after Mar 31, 2022 were excluded, as a large proportion of these records have not been completely filled in the database. Episodes with missing ages or gender marked as 'Other' are not shown. Data on ICU admissions for the 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. In contrast, the lowest proportion was observed in most recent months since January 2022.

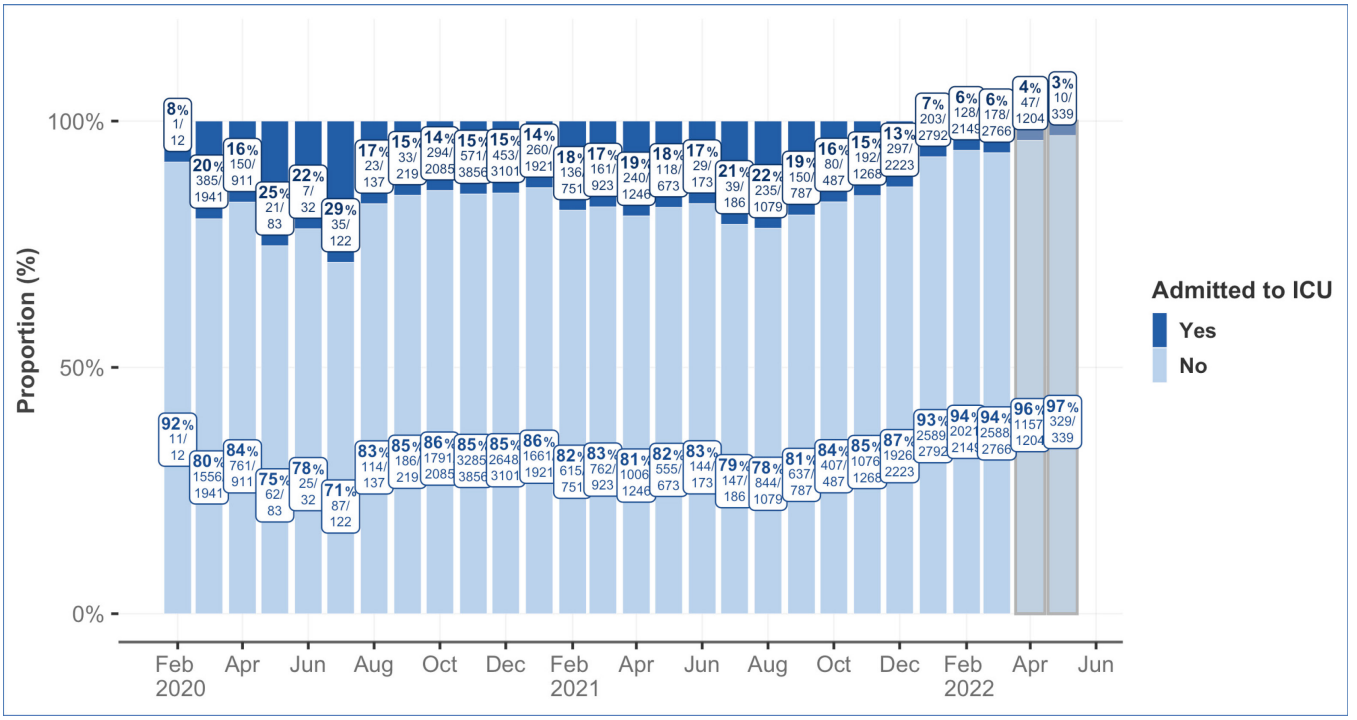

***Figure 13**: Percentage and proportion of episodes with at least one ICU admission over time. Records with incomplete data (ongoing episodes or with a pending outcome in the database) were not included. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

6. Health Complications

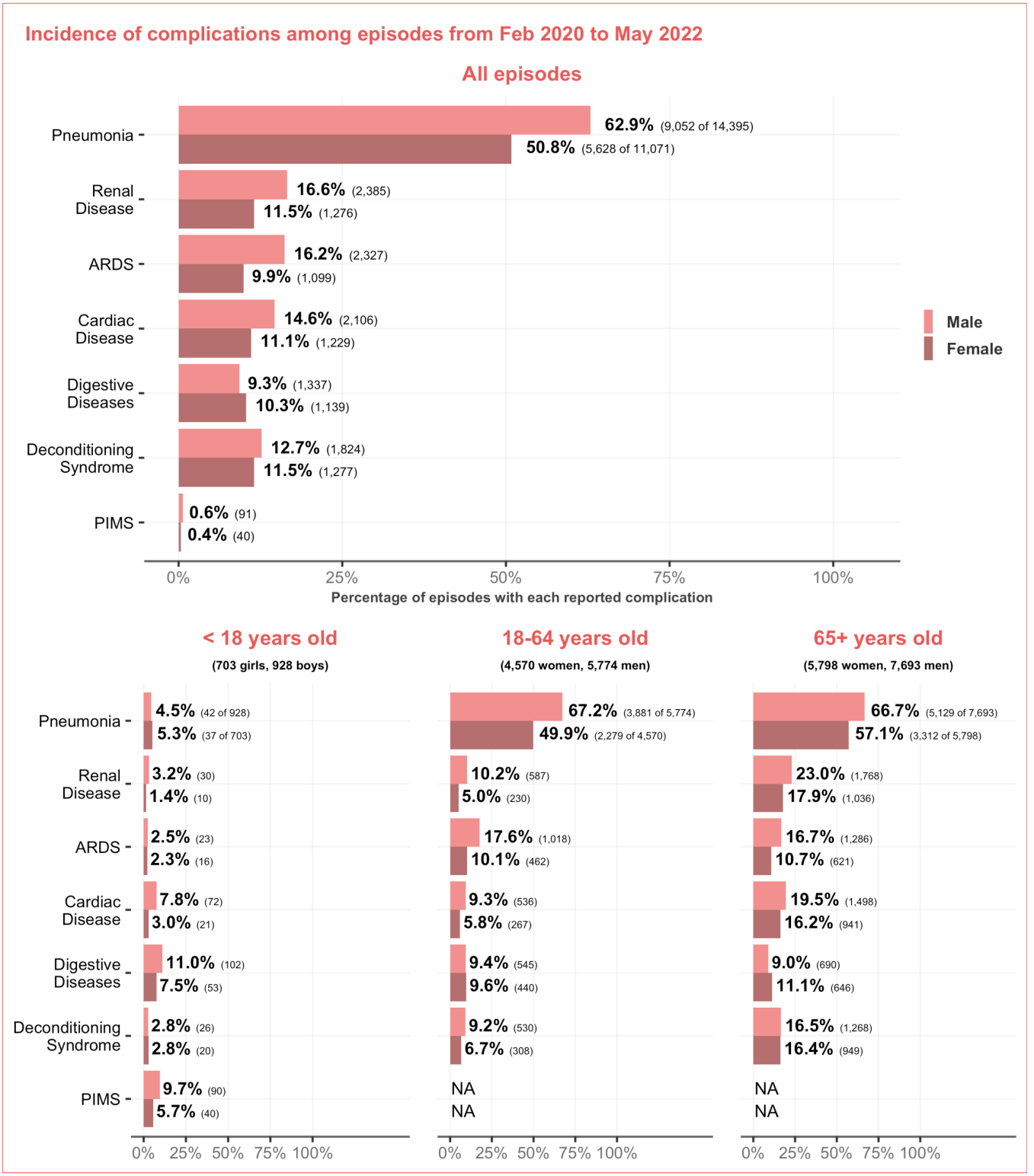

***Figure 14**: Incidence of complications arising during a hospitalization episode with a community acquired SARS-CoV-2 infection. The reported complications are shown overall and per age group and gender. Only the top 6 most prevalent complications, and PIMS, are displayed. Other complications available 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).*

CH-SUR registered, 25,466 episodes linked to community acquired infections with complete complications data record and known age and gender (11,071 women and 14,395 men) hospitalized between February 2020 and May 22, 2022. For 19,803 (77.8%) of these episodes, at least one complication was registered. Complications were more common among males: among the episodes with at least one complication, 59.0% of patients were male and 41.0% were female.

Pneumonia was the most common complication observed and was more common among men than women (described in 62.9% of the male episodes and 50.8% of the female episodes, Figure **14**). Children and adolescents had pneumonia less frequently than patients aged 18 years and above. This complication was recorded in 4.5% and 5.3% of the episodes concerning respectively boys and girls. In contrast, pneumonia was documented in more than 49% male and female episodes of patients aged 18 years old and above. Among children and adolescents, PIMS is a relevant complication. PIMS was more common in boys than girls, being registered in respectively 9.7% and 5.7% 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. Among patients aged 65 and older who were affected by ARDS as a complication of COVID-19, 44.6% of male and 40.3% of female episodes resulted in death. (Figure **15**).

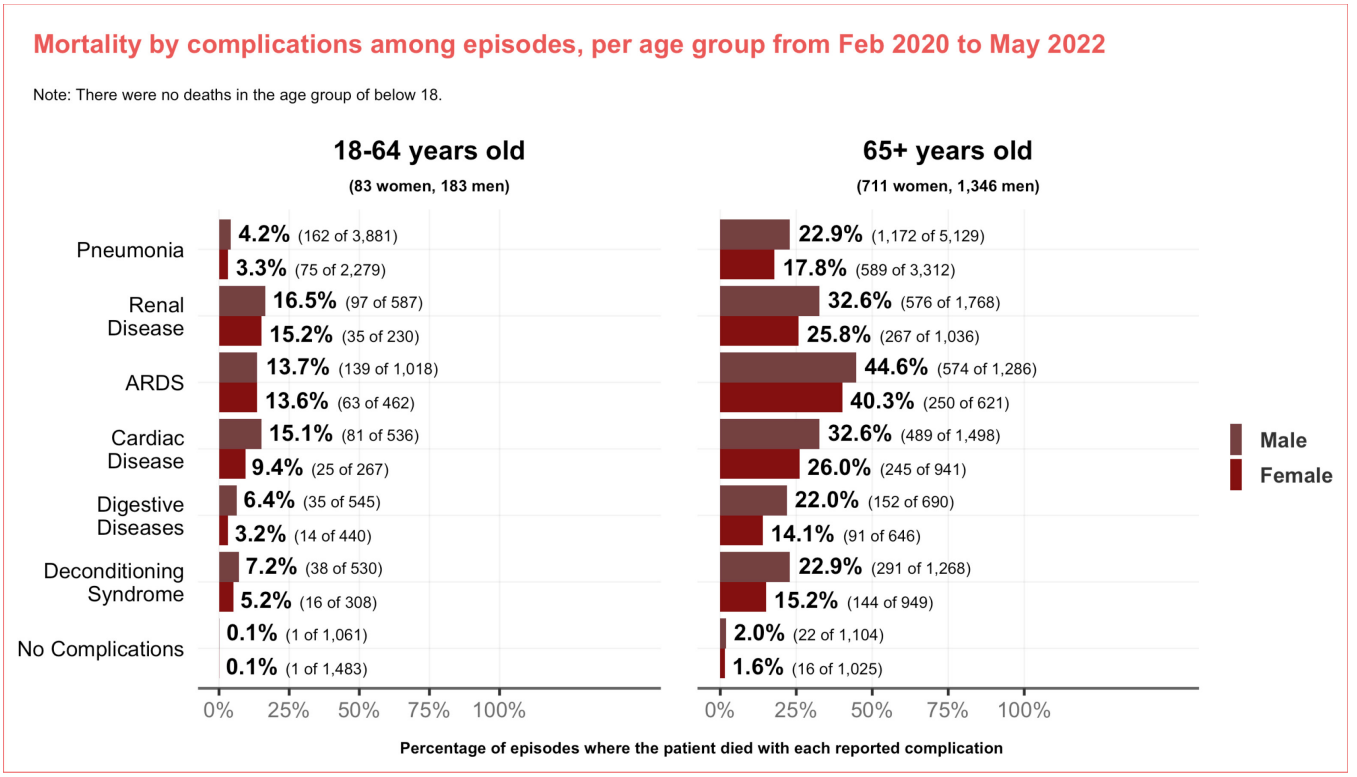

***Figure 15**: Mortality is depicted for each complication: showing the percentage of episodes where the patient with the complication died.*

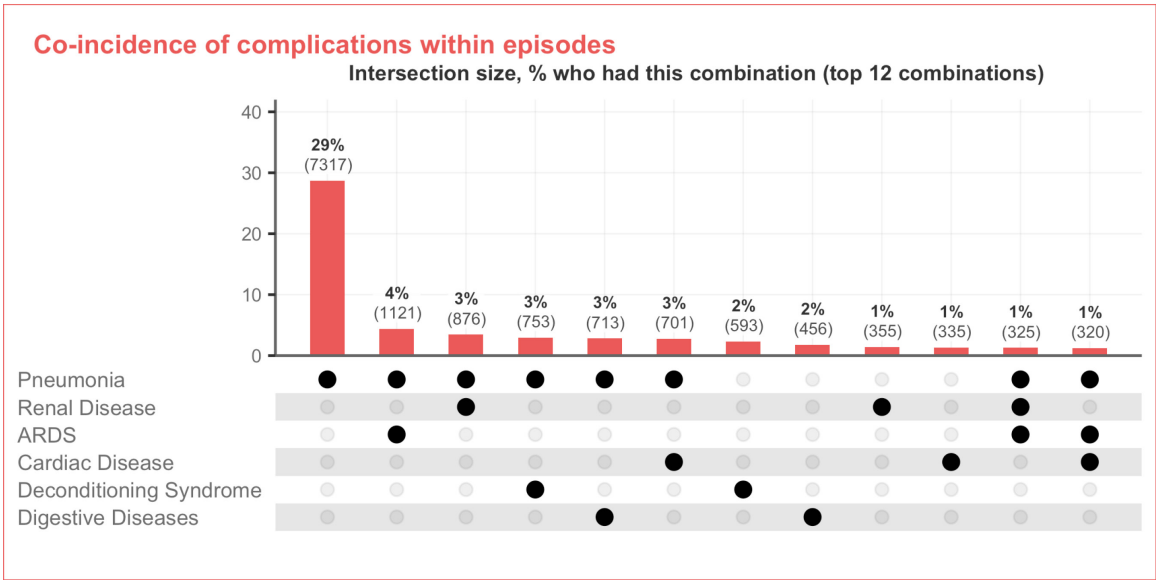

***Figure 16**: Complications are represented by their combinations (co-occurences). The top 12 combinations are represented.*

7. Nosocomial cases

The proportion of episodes with nosocomial infections peaked in January 2021 and again in March and April 2022: 20% or more 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 14.0% of the pisodes registered in CH-SUR over the month of December 2021, 19.0% in January 2022, 19.5% in March 2022 and 20.2% in April 2022. This observation might be partially explained by an increase in nosocomial systematic testing in some hospitals and periods of higher virus circulation. However, changes in the testing strategy among hospitals are expected for the coming period, therefore, these data should be interpreted with caution.

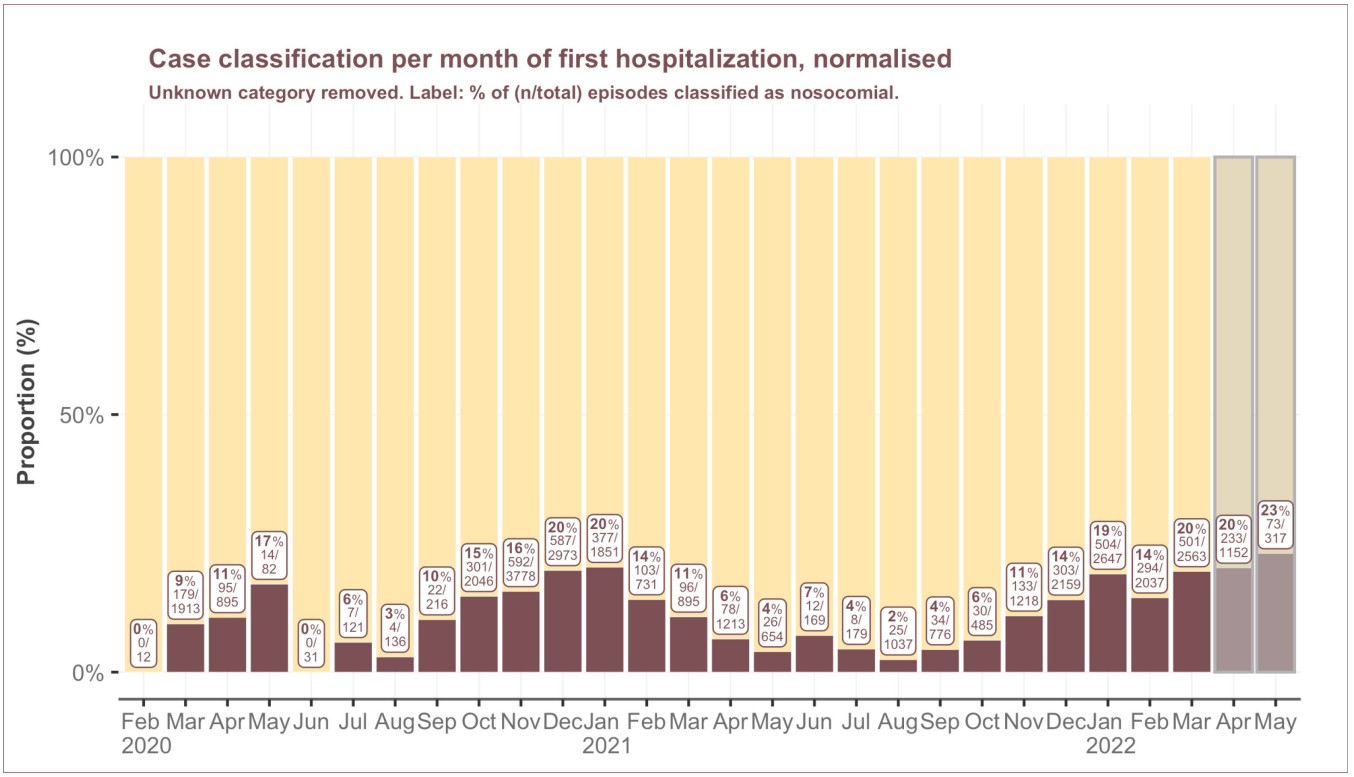

***Figure 17**: Classification (infection source) of hospitalization episodes over time. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

Over the full course of the epidemic, the nosocomial infections affected principally an elderly population, with patients aged 80 years and above, accounting for 2,195 (47%) of the nosocomial episodes. In comparison, 6,652 (24%) 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 compared to the community acquired episodes: 656 (14%) vs 2,339 (8.5%). (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 10,514 (38%) episodes with community acquired infection and in 1,007 (22%) nosocomial episodes.

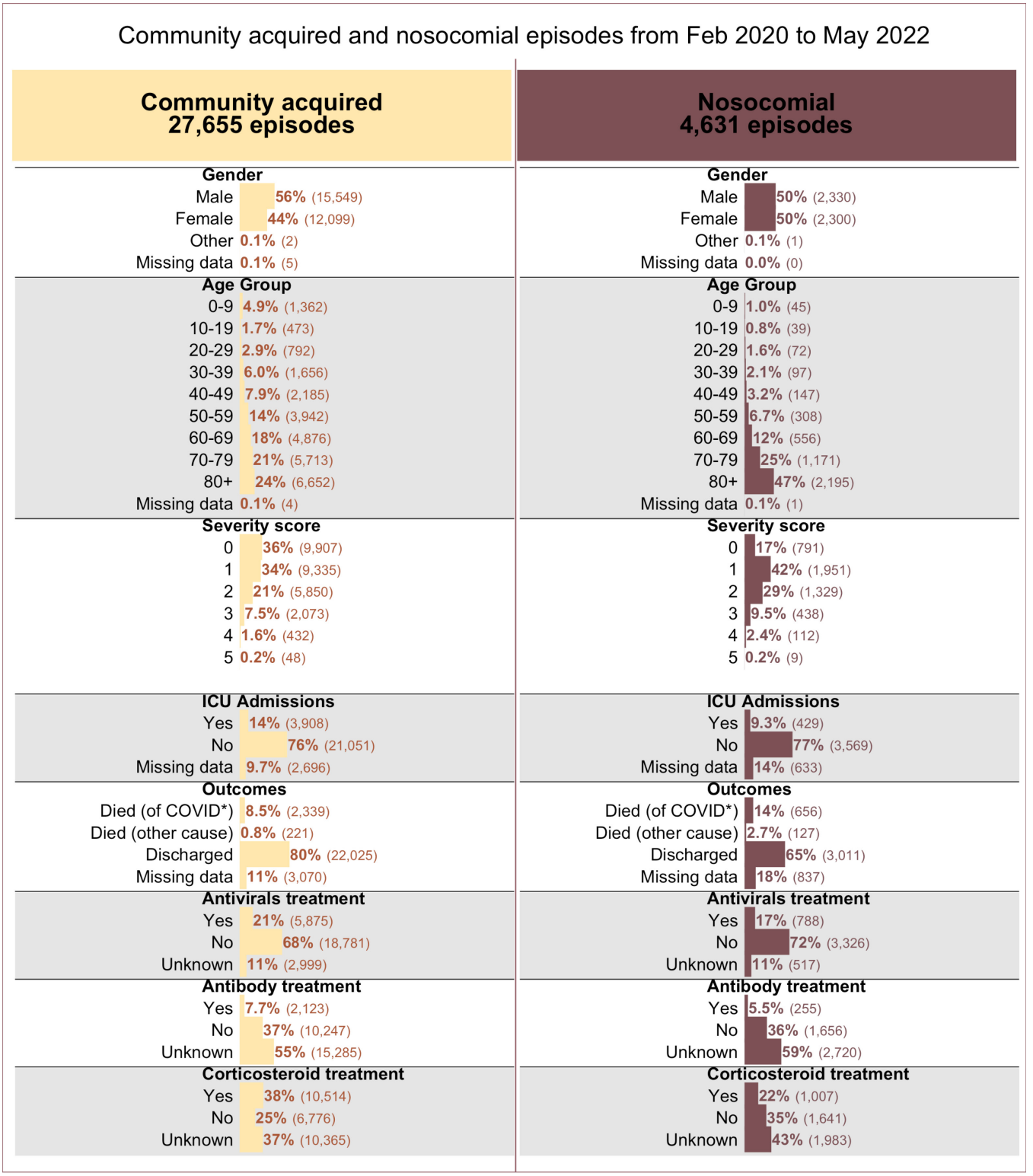

***Figure 18**: Case classification (infection source) of hospitalization episodes Comparison of community acquired and nosocomial cases by demographics, severity score, ICU, outcomes and treatments.*

8. Glossary and supplemental information

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 à 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 (dû 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 pour 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 d'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 clinique, 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 / Status immunitaire ou 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) *Status immunitaire inconnu*: Patients pour lesquels aucune information vaccinale et immunitaire n'est disponible.

e) *Complètment 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 :

1. à son domicile,
2. dans un établissement de soins de longue durée,
3. dans un autre hôpital,
4. dans une autre institution ne participant pas à la surveillance du CH-SUR,
5. dans un établissement de réadaptation, ou
6. 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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