Surveillance sentinelle hospitalière du COVID-19

État des données au: 25 juillet 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 24 juillet 2022 portent sur 35 922 épisodes d'hospitalisation. Durant cette même période, 56 027 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 64,1% 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 14,6% (5 248 sur 35 922), tandis que les épisodes liés à des infections acquises hors de l'hôpital représentaient 82,1% (29 484 sur 35 922) (fig. **1**) ; 3,3% 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, 14,5% comprenaient un traitement dans une unité de soins intensifs (4 074 de 26 709 épisodes, du 26 Février 2020 au mai 31, 2022) et 9,1% ont résulté en un décès (2 442 de 26 709 épisodes, 26 Février 2020 au July 24, 2022).

Au cours de la période allant du 01 avril 2022 au 31 mai 2022, la période la plus récente pour laquelle suffisamment de données sont disponibles, 1 412 épisodes d'hospitalisation faisant suite à une infection acquise hors de l'hôpital ont été enregistrés. Parmi les patients concernés, 360 (25,5%) n'étaient pas immunisés et 415 (29,4%) étaient complètment immunisés (fig. **2**). Au cours de la même période, 103 épisodes ont comporté un séjour en unité de soins intensifs. Parmi les patients concernés, 28 (27,2%) n'étaient pas immunisés et 25 (24,3%) l'étaient complètement. 31 épisodes ont entraîné le décès (2,2% de tous les épisodes enregistrés dont l'issue est connue), dont 10 chez des patients non immunisés et 12 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.

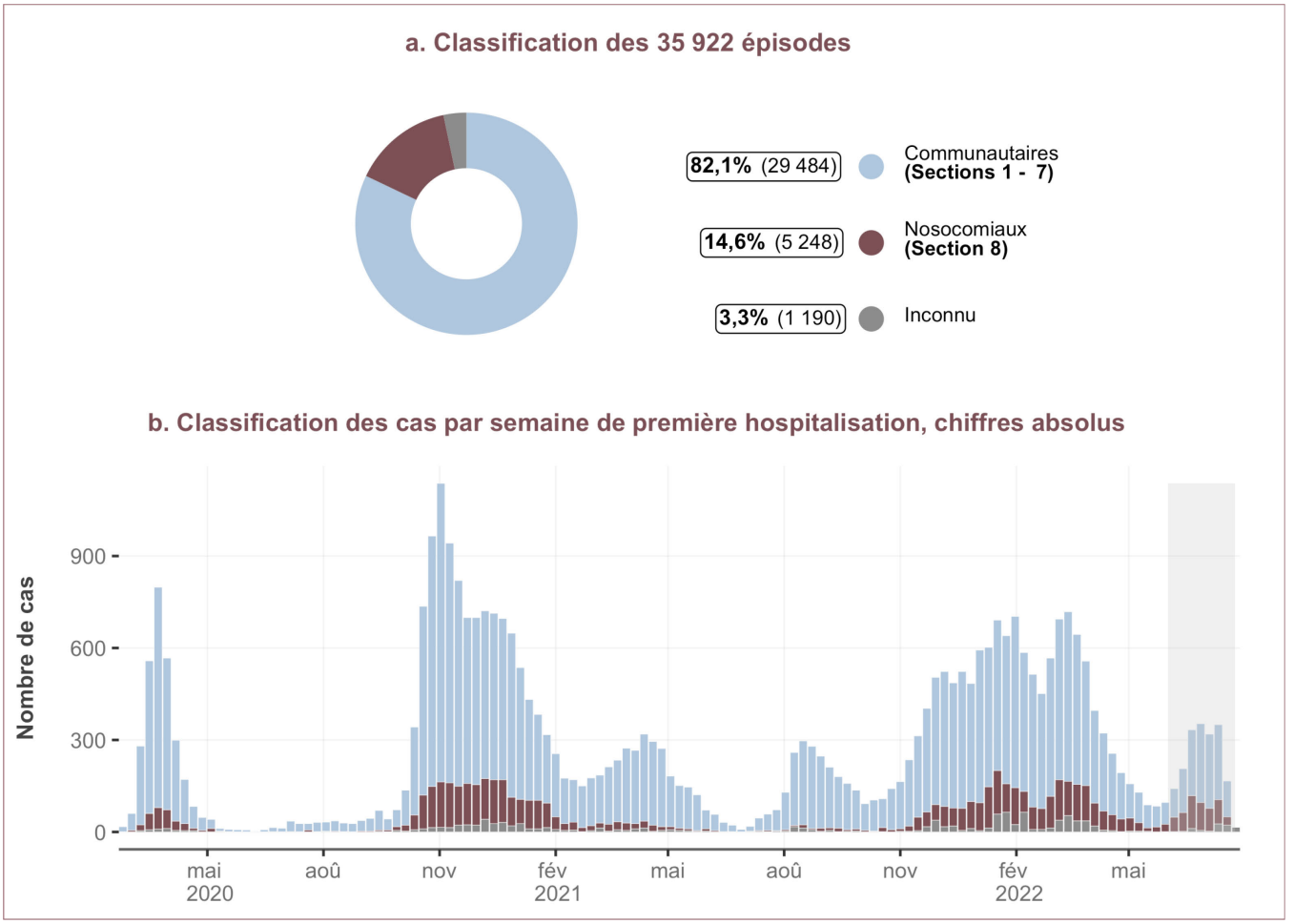

***Figure 1**: Classification des cas (source de l'infection) des épisodes dans le temps. Proportion (normalisée en %) de tous les épisodes ayant entraîné des infections nosocomiales (panneau a) et tendance dans le temps (panneau b). Pour les épisodes entraînant plusieurs hospitalisations, la classification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

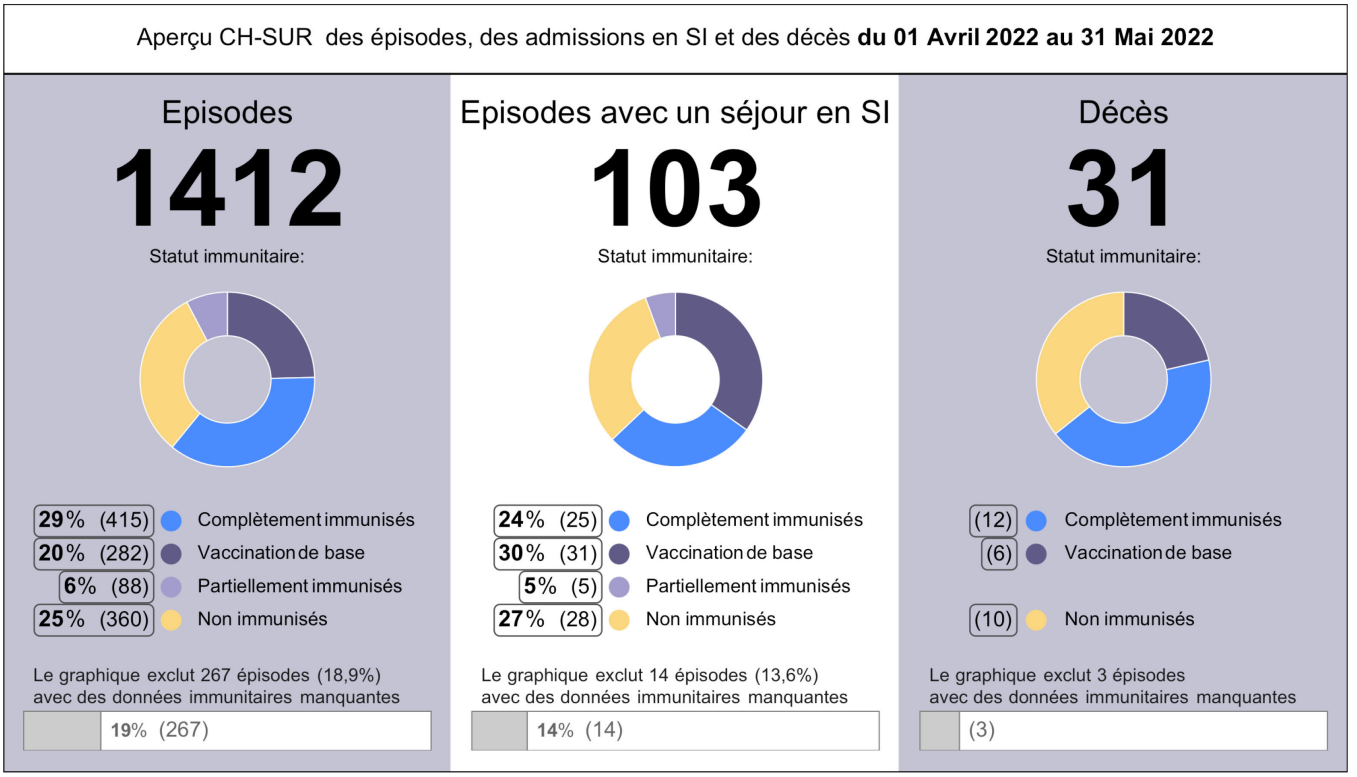

***Figure 2**: Vue d'ensemble des données les plus récentes concernant les épisodes d'hospitalisation liées à des infections acquises hors de l'hôpital. Les données des deux derniers mois sont considérées comme provisoires à cause des délais dans la saisie des données : elles ont donc été omises.*

2. Hospitalizations and demographic characteristics

Between the start of the epidemic in Switzerland and July 24, 2022 and among the 19 hospitals actively participating in CH-SUR, 29,484 episodes of community acquired infections were registered, accounting for a total of 30,568 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**.

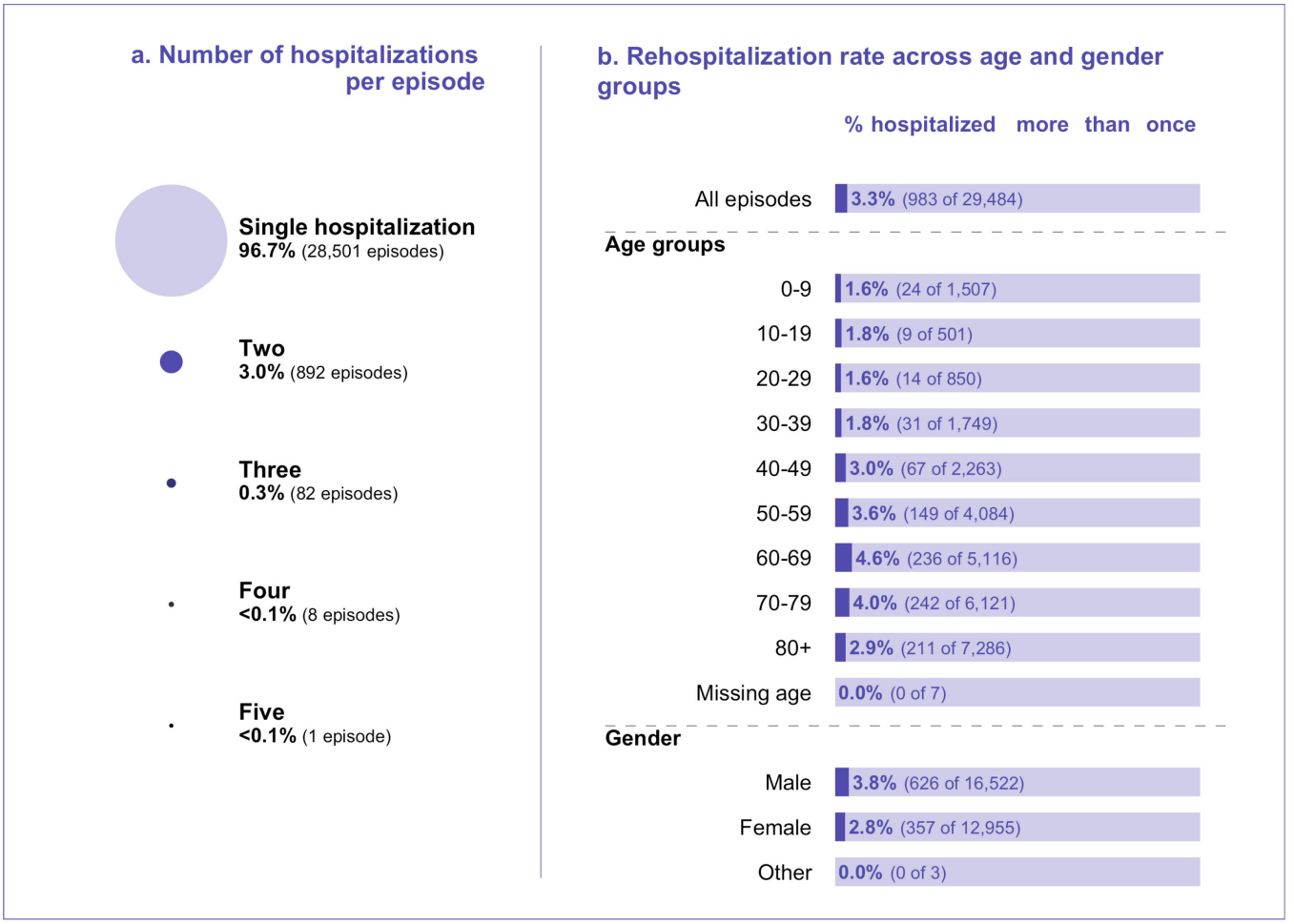

***Figure 3**: Hospitalizations per episode of hospitalization and rehospitalization rate across demographic groups. Includes records between March 2020 and July 24, 2022.*

Most patients (96.7% [28,501 of 29,484]) were hospitalized only once during an episode, while 3% of the registered episodes (982 of 29,484) 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% (983 of 29,484) (Figure **3**c). The 60-69 age group and the 70-79 age group had the highest rate of rehospitalization at respectively 4.6% (236 of 5,116) and 4.0% (242 of 6,121). Men had a higher rehospitalization rate than women, 3.8% (626 of 16,522) vs 2.8% (357 of 12,955) respectively.

Among all episodes with community acquired infections, the majority (56% [16,522 of 29,484]) 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 (25.0% [7,286]).

Figures **4**c and **4**d show the gender and age distribution ratio over time. Except for January and April 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 1,083) in November 2021. Over the month of May 2022, 80.6% (312 of 387) of episodes concerned patients aged 50 and above. Notably, in this last period, we are seeing an increase in the elderly population being admitted with 27.1% [105 of 387] of episodes pertaining to patients aged between 70 and 80 years old and 37.2% [381 of 1,025] of episodes pertaining to patients over 80 years old.

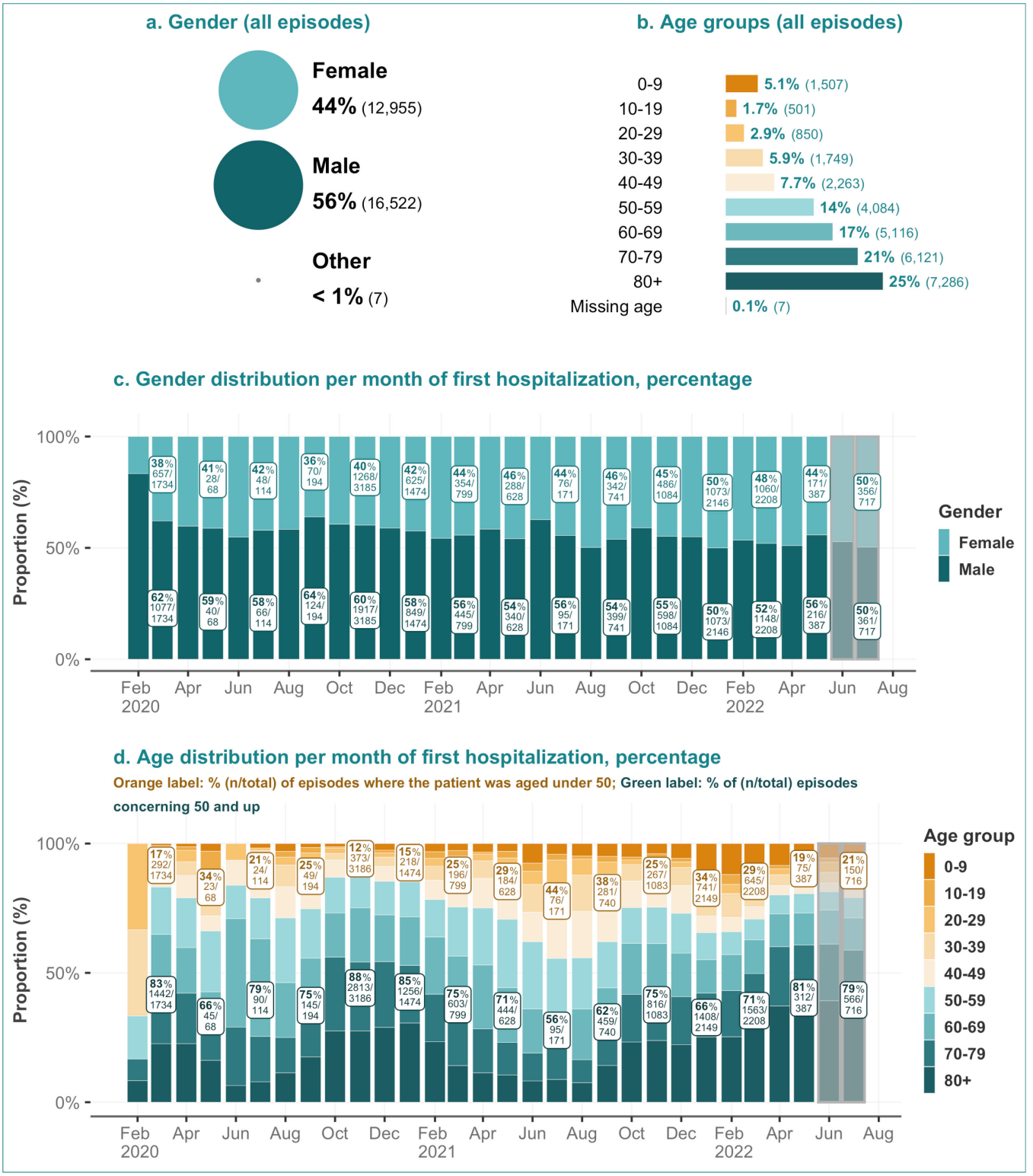

***Figure 4**: Demographic characteristics: gender and age distribution of admitted hospitalized patients, overall and per month. For episodes with multiple hospitalizations, the admission date of the first hospitalization was used. Data*

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). A medical doctor at the hospital for each CH-SUR-participating center determined of 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.

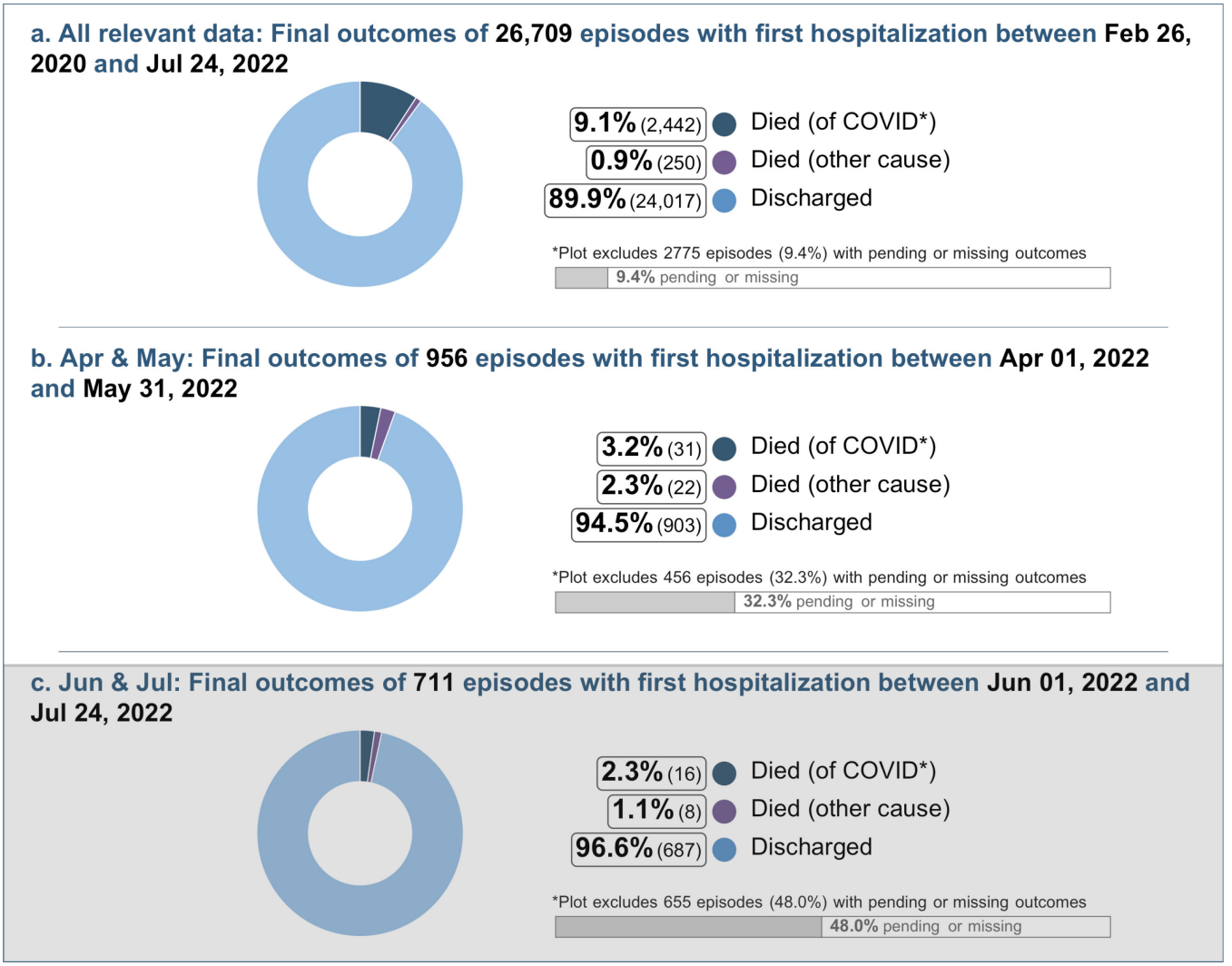

***Figure 5**: Outcomes for COVID-19 related episodes of hospitalization in CH-SUR hospitals. Includes records up to July 24, 2022. For episodes with multiple hospitalizations, only the final outcome is considered. Patients where the cause of death was not certain, but there was a COVID-19 diagnosis (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: 13.8% (328 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% (53 of 433) 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% (954 of 2,384) of the admissions in that period. Most recently, during May 2022, 36.2% (140 of 387) of the episodes had a severity score above 2, but this is not mirrored by higher case fatality rates (Figure **5**)

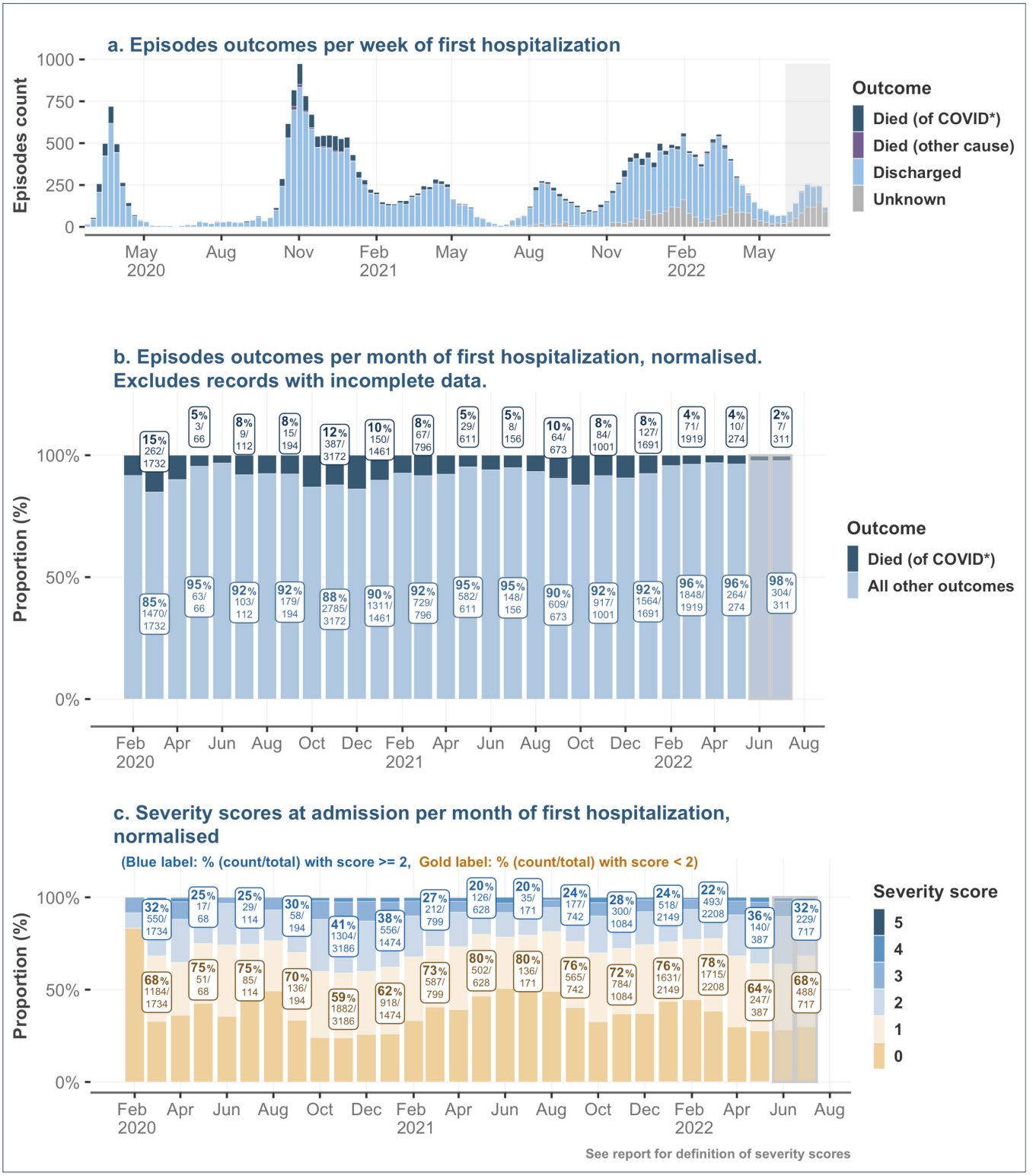

***Figure 6**: Epidemic curve, episodes' outcomes and severity scores at admission for COVID-19 hospitalizations over time. Includes records up to July 24, 2022. Data from the two last months (highlighted in gray) are considered provisional due to data entry delays. Episodes where the cause of death 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 May 31, 2022, the case fatality rate (CFR) for episodes with community acquired infections increased with increasing age, from 0% (0 of 1,362) in episodes of patients aged 0-9, to 3.2% (121 of 3,748) in episodes of patients aged 50-59, and to 20.7% (1,256 of 6,081) in episodes of patients aged 80+. CFR% was greater in men than in women: 10.8% (1,597 of 14,740) vs 7.4% (829 of 11,254) respectively. In addition, the CFR% was greater for episodes with higher severity scores at admission: 1% (90 of 8,936) 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 April and May 2022, Figure **7**b) was lower than the CFR% of the whole epidemic period (3.2% vs. 9.3%). 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.

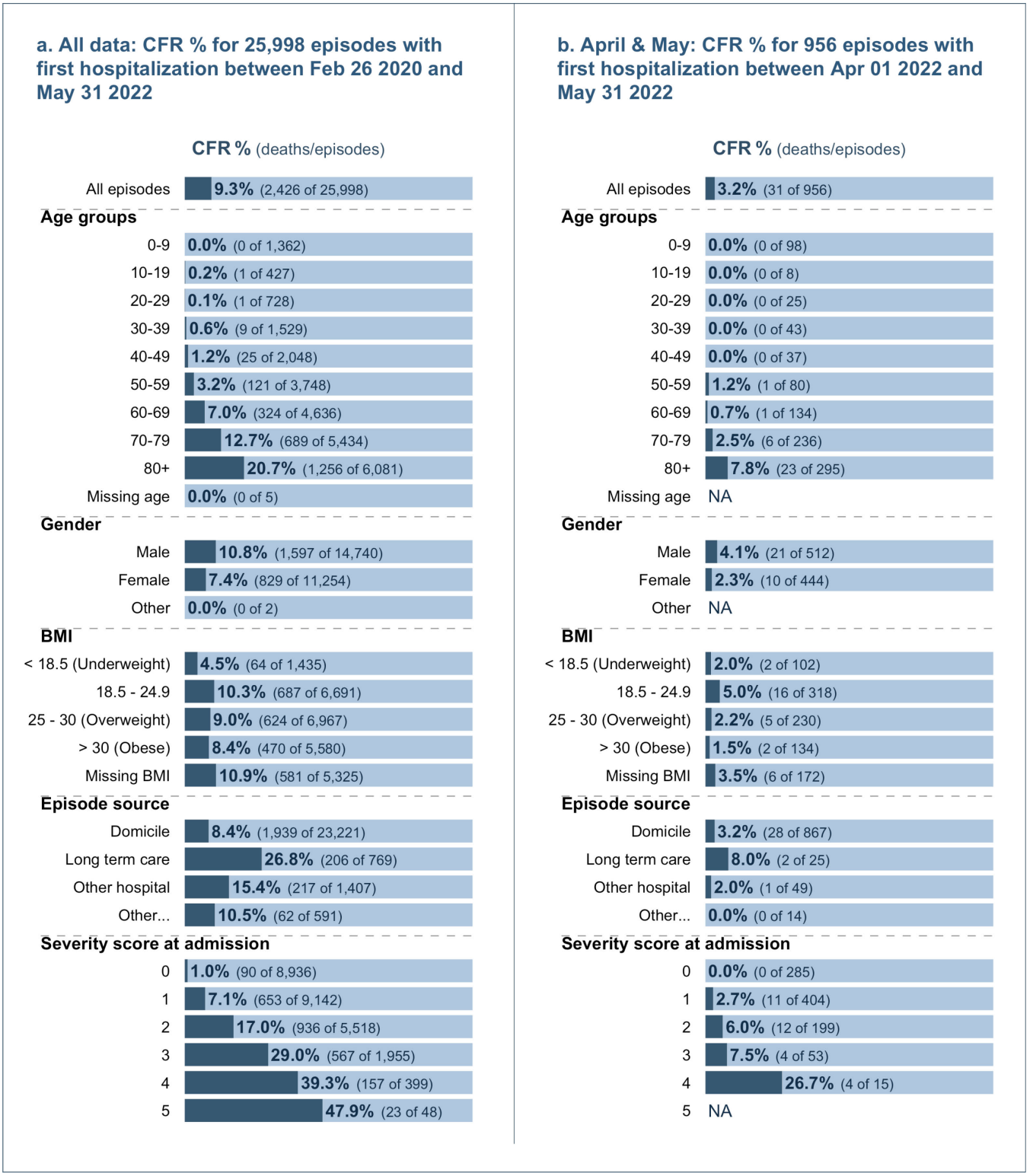

***Figure 7**: Case fatality rate (CFR) % among demographic and risk groups: percentage of hospitalization episodes in different demographic groups, which ended in the death of the patient of COVID-19 in hospital. Both figures include records up to May 31 2022 but records with incomplete data (ongoing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

During the months of May 2022, 70.3% of the Swiss population was fully vaccinated (Figure **8**c). 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 and fully immunized of recent months (24.6% and 36.2% respectively) within the episodes recorded in CH-SUR (Figure **8**b), may therefore be partly linked to the decreasing number of non-immunized persons in the population.

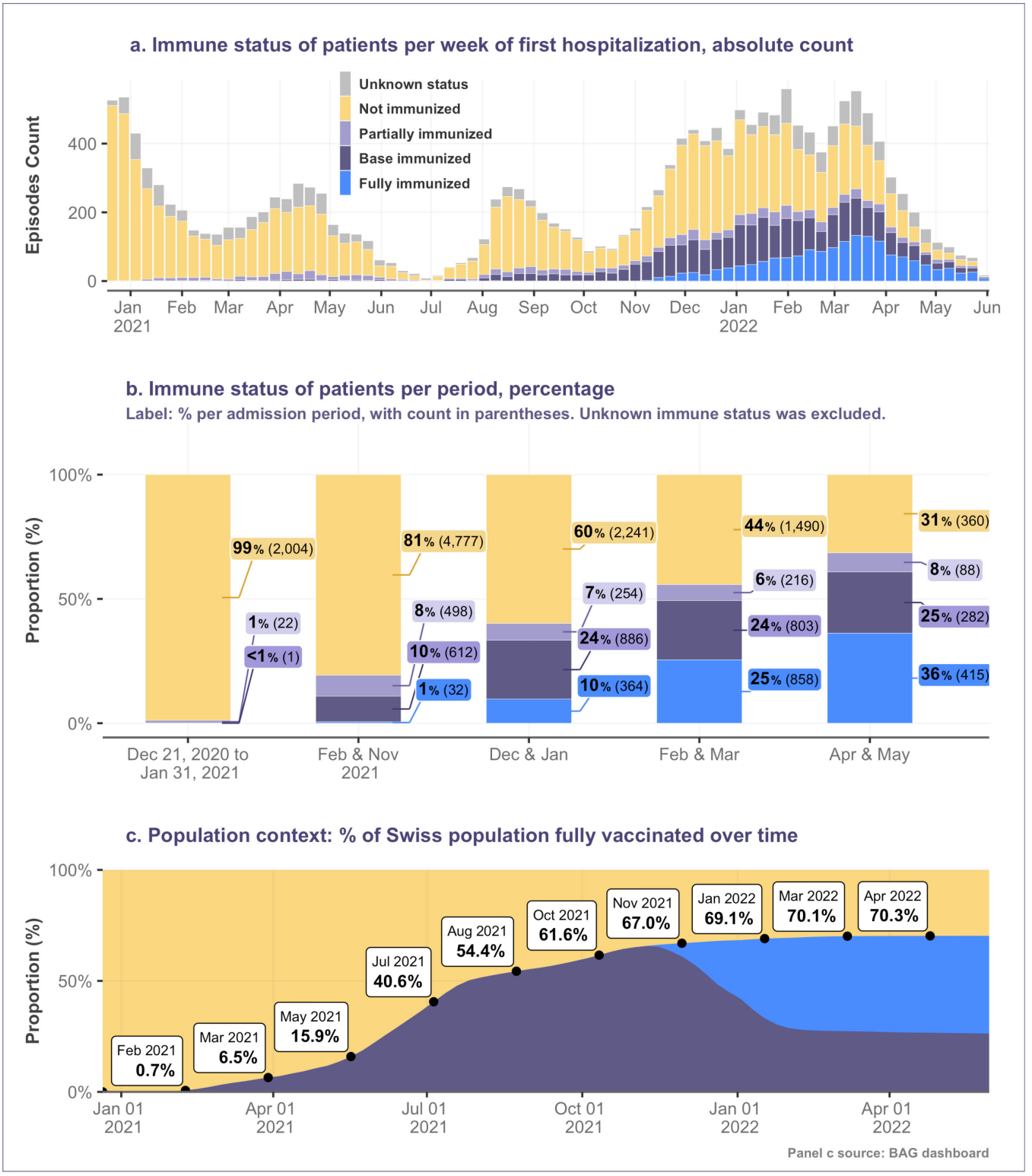

***Figure 8**: Immune status of patients and overall vaccination rate in Switzerland (exported: July 24, 2022). See glossary for definitions of immune status categories. For episodes with multiple hospitalizations, the immune status for the first hospitalization was considered. Panels a. and b. include 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 May 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, 47% of the episodes of fully immunized patients corresponded to patients aged 80 and above (Figure **9**a, right panels). In contrast, only 18% (1,890 of 10,704) of the episodes of non-immunized patients corresponded to patients aged 80 and above (Figure **9**a, left panel).

However, in more recent data, we see an augmentation in the proportion of older (aged 80+) as well as younger patients (0 to 9 years old) among the non-immunized episodes. From February 2022 to March 2022, among the episodes of non-immunized patients aged 0 to 9 years old, 32% (470 of 1,490) concerned patients aged 0 to 9 years old and 23% (342 of 1,490) concerned patients aged 80 and above. In the most recent data, from April 2022 to May 2022, 28% (99 of 360) of non-immunized episodes involved patients aged 0 to 9 years and 32% (115 of 360) involved patients aged 80 years and above.

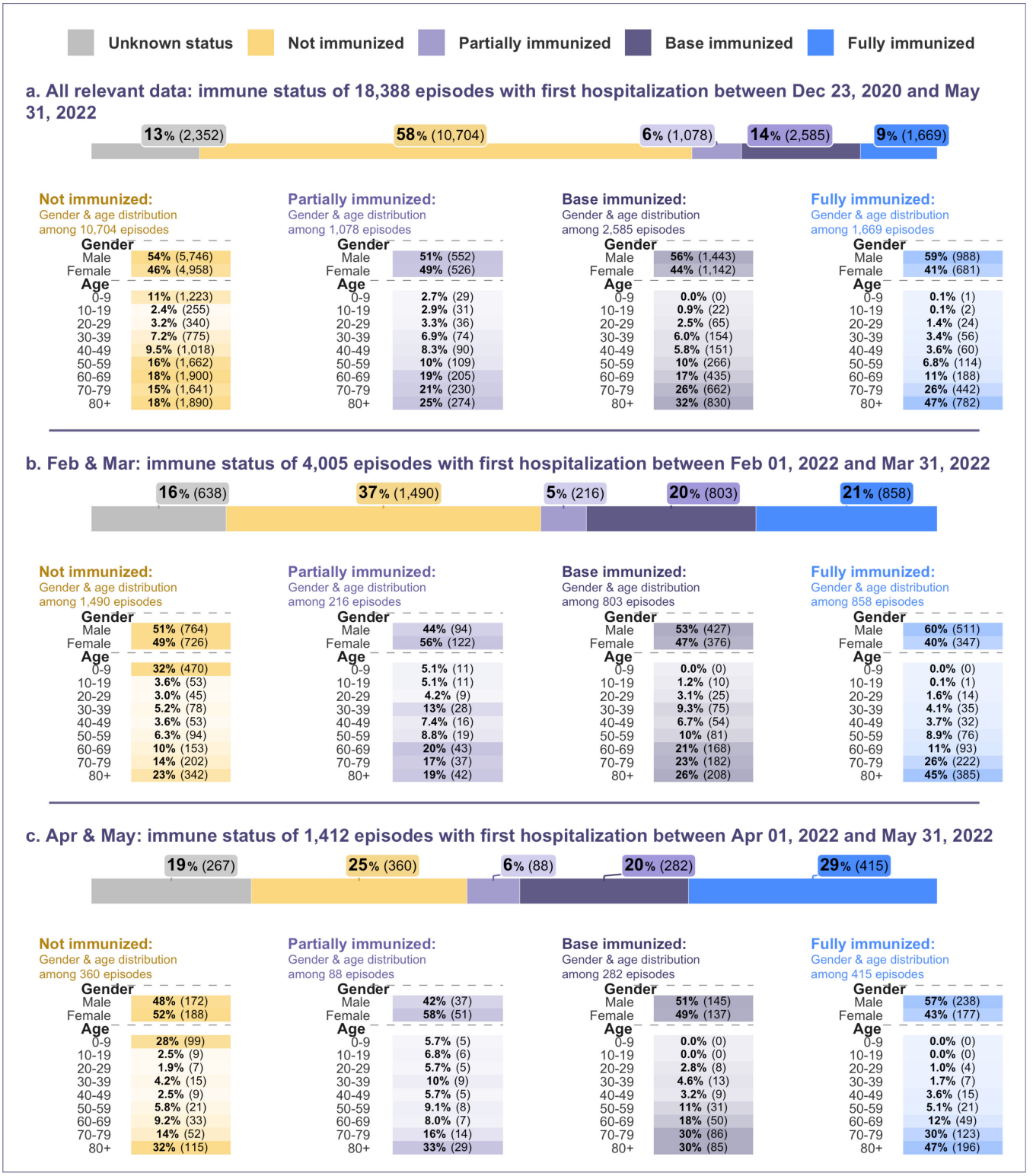

***Figure 9**: Demographic characteristics of hospitalized patients by immune status, over three different periods. Some patients may be counted more than once, as a single patient can have several episodes. Episodes with first admission date after May 31 2022 were excluded, as a large proportion of 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 1,368 episodes of fully immunized patients (community acquired infections), CH SUR registered 63 deaths because of COVID-19 (Figure **10**a, right panels: fully immunized). 44 of them corresponded to patients aged 80 years old and above. Over the same period, 745 episodes ended in COVID-caused deaths among non-immunized patients (Figure **10**a, left panel).

During the months of April and May, CH-SUR registered 28 deaths due to COVID-19 of which the immune status was known. Of these, 10 (35.7%) happened among non-immunized patients, 0 deaths (0%) among partially immunized patients, 6 deaths (21.4%) among base immunized patients, and 12 deaths (42.9%) among fully immunized patients (Figure **10**). This may be linked to the increasingly low number of non-immunized patients 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 vaccination is lower than that of unvaccinated hospitalized people across all age groups. This is specifically true for episodes concerning patients aged over 80 (20.9% CFR for non-immunized episodes compared to 7.0% for fully immunized episodes) (Figure **10**c, left and right panel). This reflects the protective effect of vaccination on the risk of death.

a. All relevant data: 1,057 deaths among 14,283 episodes with first hospitalization between Dec 23, 2020 and May 31, 2022

Not immunized:
Age distribution of **745** deaths in **9,825** episodes

Age	Cases	Deaths	CFR %
0-9	1155	0	0%
10-19	221	1	0.5%
20-29	298	1	0.3%
30-39	710	5	0.7%
40-49	936	13	1.4%
50-59	1542	52	3.4%
60-69	1770	126	7.1%
70-79	1512	196	13.0%
80+	1681	351	20.9%

Partially immunized:
Age distribution of **98** deaths in **970** episodes

Age	Cases	Deaths	CFR %
0-9	29	0	0%
10-19	26	0	0%
20-29	31	0	0%
30-39	66	0	0%
40-49	74	0	0%
50-59	97	6	6.2%
60-69	189	21	11.1%
70-79	214	22	10.3%
80+	244	49	20.1%

Base immunized:
Age distribution of **151** deaths in **2,120** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	17	0	0%
20-29	47	0	0%
30-39	120	0	0%
40-49	123	1	0.8%
50-59	225	7	3.1%
60-69	367	17	4.6%
70-79	559	39	7.0%
80+	662	87	13.1%

Fully immunized:
Age distribution of **63** deaths in **1,368** episodes

Age	Cases	Deaths	CFR %
0-9	1	0	0%
10-19	2	0	0%
20-29	22	0	0%
30-39	46	0	0%
40-49	48	0	0%
50-59	101	0	0%
60-69	153	2	1.3%
70-79	367	17	4.6%
80+	628	44	7.0%

b. Feb & Mar: 122 deaths among 2,914 episodes with first hospitalization between Feb 01, 2022 and Mar 31, 2022

Not immunized:
Age distribution of **67** deaths in **1,294** episodes

Age	Cases	Deaths	CFR %
0-9	448	0	0%
10-19	46	1	2.2%
20-29	35	0	0%
30-39	69	0	0%
40-49	46	0	0%
50-59	72	4	5.6%
60-69	128	5	3.9%
70-79	164	18	11.0%
80+	286	39	13.6%

Partially immunized:
Age distribution of **5** deaths in **187** episodes

Age	Cases	Deaths	CFR %
0-9	11	0	0%
10-19	11	0	0%
20-29	9	0	0%
30-39	23	0	0%
40-49	11	0	0%
50-59	16	0	0%
60-69	36	1	2.8%
70-79	33	1	3.0%
80+	37	3	8.1%

Base immunized:
Age distribution of **24** deaths in **676** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	8	0	0%
20-29	20	0	0%
30-39	60	0	0%
40-49	44	0	0%
50-59	72	1	1.4%
60-69	145	5	3.4%
70-79	154	5	3.2%
80+	173	13	7.5%

Fully immunized:
Age distribution of **26** deaths in **757** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	1	0	0%
20-29	13	0	0%
30-39	30	0	0%
40-49	30	0	0%
50-59	70	0	0%
60-69	75	1	1.3%
70-79	199	6	3.0%
80+	339	19	5.6%

c. Apr & May: 28 deaths among 765 episodes with first hospitalization between Apr 01, 2022 and May 31, 2022

Not immunized:
Age distribution of **10** deaths in **252** episodes

Age	Cases	Deaths	CFR %
0-9	88	0	0%
10-19	3	0	0%
20-29	4	0	0%
30-39	12	0	0%
40-49	4	0	0%
50-59	17	0	0%
60-69	24	0	0%
70-79	37	2	5.4%
80+	63	8	12.7%

Partially immunized:
Age distribution of **0** deaths in **60** episodes

Age	Cases	Deaths	CFR %
0-9	5	0	0%
10-19	2	0	0%
20-29	4	0	0%
30-39	7	0	0%
40-49	3	0	0%
50-59	7	0	0%
60-69	4	0	0%
70-79	12	0	0%
80+	16	0	0%

Base immunized:
Age distribution of **6** deaths in **175** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	4	0	0%
30-39	6	0	0%
40-49	8	0	0%
50-59	19	1	5.3%
60-69	38	1	2.6%
70-79	56	1	1.8%
80+	44	3	6.8%

Fully immunized:
Age distribution of **12** deaths in **278** episodes

Age	Cases	Deaths	CFR %
0-9	0	0	-
10-19	0	0	-
20-29	3	0	0%
30-39	4	0	0%
40-49	9	0	0%
50-59	19	0	0%
60-69	39	0	0%
70-79	82	3	3.7%
80+	122	9	7.4%

***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, fully immunized, partially immunized or not immunized. Episodes with missing age, missing gender, or missing 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 partially immunized and fully immunized categories, 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 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.

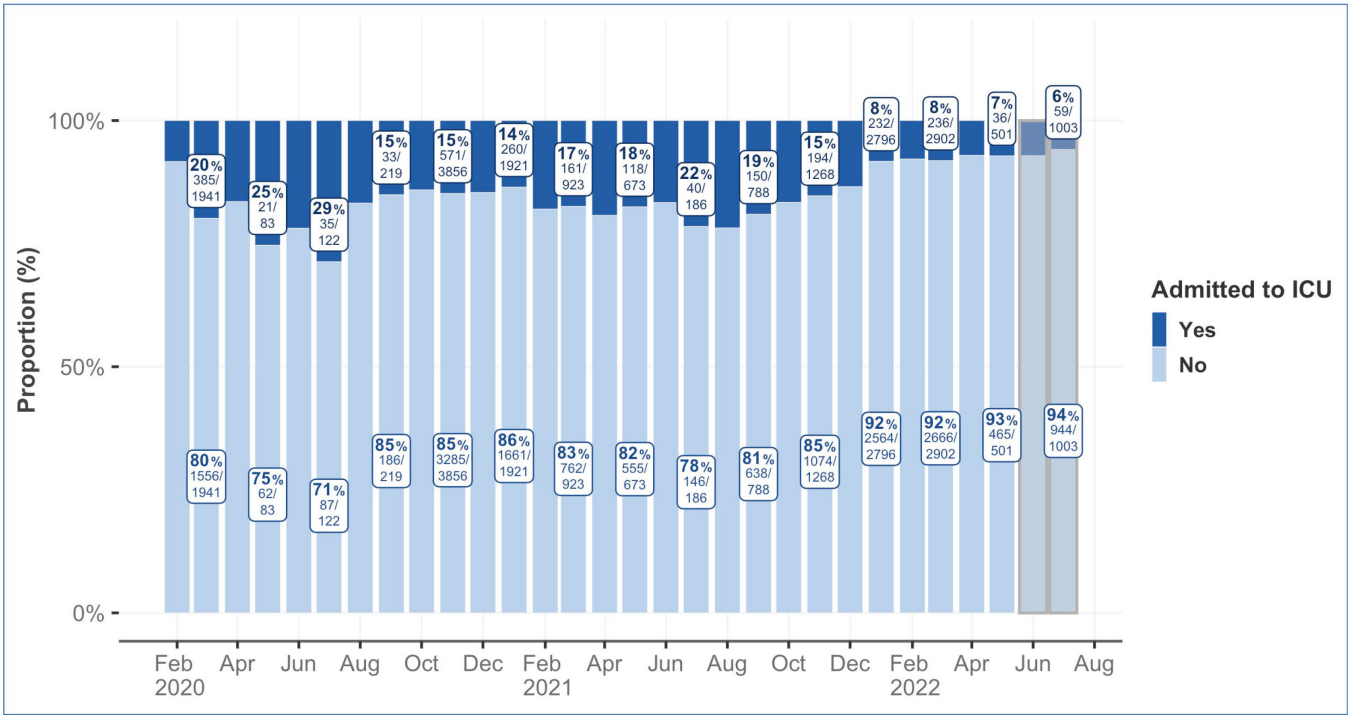

***Figure 11**: Percentage and proportion of episodes with at least one ICU admission over time. Records with incomplete data (ongoing episodes or with a pending outcome in the database) were not included. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

5.2. ICU admission across demographic and risk groups

Over the whole period of observation, 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 **12**a). The 60-69 age group had the highest probability of admission to the ICU, with 23.9% (1,179 of 4,942) 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 5.3% (357 of 6,760) 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 17.5% of the episodes concerning males, compared to 10.6% of the episodes concerning females.

Episodes of patients transferred from other hospitals had a high probability of ICU admission: 51.8% of such episodes (791 of 1,528) required at least one ICU admission (Figure **12**a), compared to an overall admission rate of 16.9% for all (community acquired) episodes.

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

Figure **12**b shows the ICU admissions for the most recent period with available data (April 2022 and May 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 April and May than for the full epidemic period (Figure **12**).

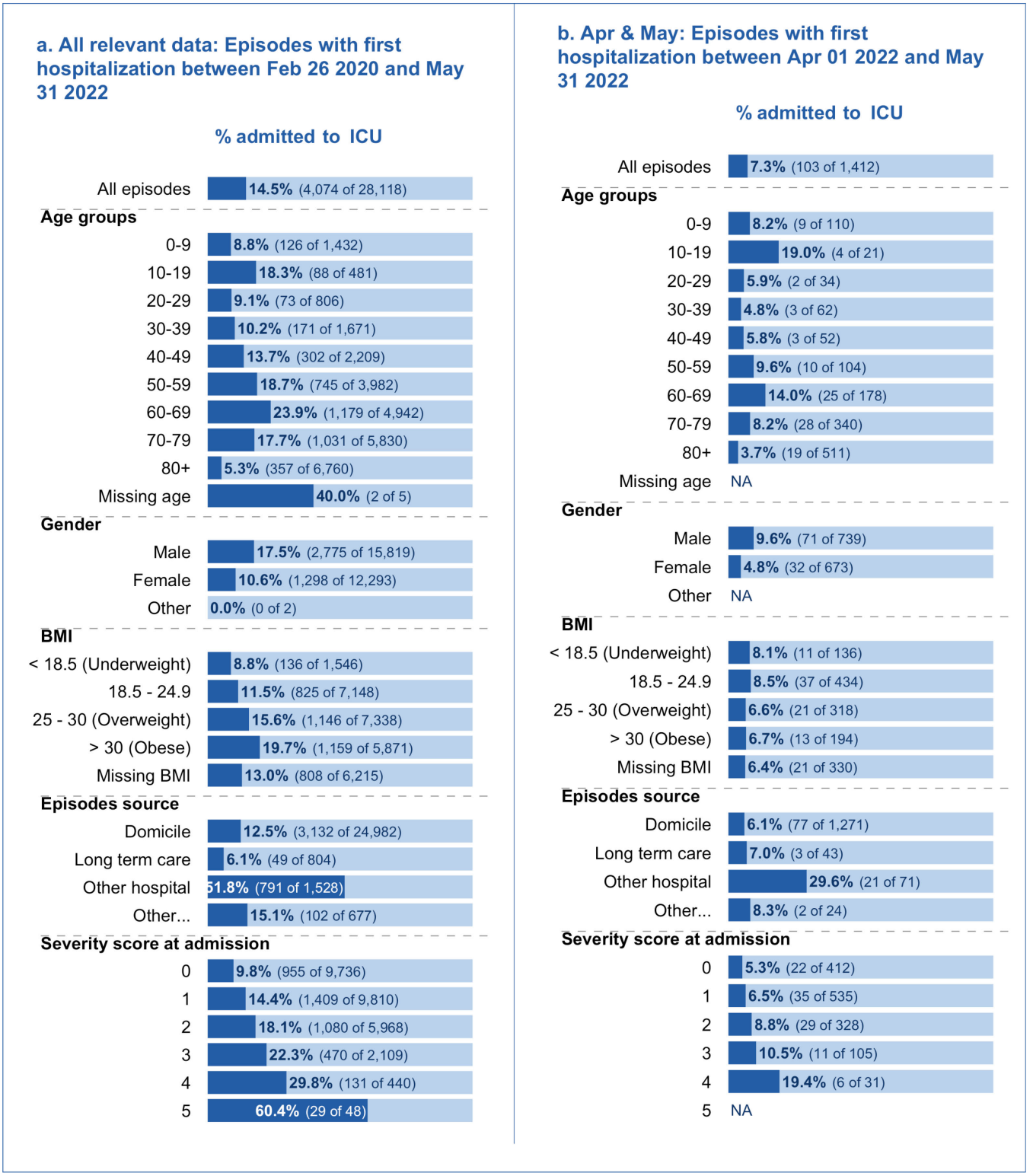

***Figure 12**: Percentage of hospitalization episodes with at least one ICU admission, grouped by demographic and risk factors, over two time intervals. For episodes with multiple hospitalizations, we considered whether they were admitted to the ICU during any of their hospitalizations. Both panels include records up to May 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

This figure (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 April and May, although episodes include 36.2% of people aged over 80 years old, these episodes did not have a high ICU rate (i.e. not many included an ICU stay).

a. All relevant data: 2,195 ICU admissions among 14,719 episodes with first hospitalization between Dec 23, 2020 and May 31, 2022

Not immunized:
Age distribution of **1,695**
ICU admissions in **10,076** episodes

Age	Episodes	ICU	ICU %
0-9	1176	105	8.9%
10-19	241	51	21.2%
20-29	308	32	10.4%
30-39	734	101	13.8%
40-49	960	158	16.5%
50-59	1573	331	21.0%
60-69	1807	517	28.6%
70-79	1549	301	19.4%
80+	1728	99	5.7%

Partially immunized:
Age distribution of **139**
ICU admissions in **995** episodes

Age	Episodes	ICU	ICU %
0-9	29	5	17.2%
10-19	26	2	7.7%
20-29	31	2	6.5%
30-39	69	5	7.2%
40-49	78	9	11.5%
50-59	102	15	14.7%
60-69	197	49	24.9%
70-79	215	38	17.7%
80+	248	14	5.6%

Base immunized:
Age distribution of **248**
ICU admissions in **2,228** episodes

Age	Episodes	ICU	ICU %
0-9	0	0	-
10-19	18	4	22.2%
20-29	56	9	16.1%
30-39	139	10	7.2%
40-49	129	13	10.1%
50-59	237	42	17.7%
60-69	385	58	15.1%
70-79	569	76	13.4%
80+	695	36	5.2%

Fully immunized:
Age distribution of **113**
ICU admissions in **1,420** episodes

Age	Episodes	ICU	ICU %
0-9	1	0	0%
10-19	2	0	0%
20-29	22	3	13.6%
30-39	49	3	6.1%
40-49	51	3	5.9%
50-59	103	12	11.7%
60-69	158	30	19.0%
70-79	380	34	8.9%
80+	654	28	4.3%

b. Feb & Mar: 282 ICU admissions among 3,042 episodes with first hospitalization between Feb 01, 2022 and Mar 31, 2022

Not immunized:
Age distribution of **133**
ICU admissions in **1,348** episodes

Age	Episodes	ICU	ICU %
0-9	455	37	8.1%
10-19	50	7	14.0%
20-29	38	1	2.6%
30-39	73	6	8.2%
40-49	50	7	14.0%
50-59	76	14	18.4%
60-69	131	24	18.3%
70-79	175	20	11.4%
80+	300	17	5.7%

Partially immunized:
Age distribution of **21**
ICU admissions in **193** episodes

Age	Episodes	ICU	ICU %
0-9	11	2	18.2%
10-19	10	1	10.0%
20-29	9	1	11.1%
30-39	25	0	0%
40-49	13	2	15.4%
50-59	17	1	5.9%
60-69	38	8	21.1%
70-79	33	4	12.1%
80+	37	2	5.4%

Base immunized:
Age distribution of **66**
ICU admissions in **720** episodes

Age	Episodes	ICU	ICU %
0-9	0	0	-
10-19	9	1	11.1%
20-29	23	5	21.7%
30-39	70	4	5.7%
40-49	49	5	10.2%
50-59	76	9	11.8%
60-69	152	17	11.2%
70-79	161	16	9.9%
80+	180	9	5.0%

Fully immunized:
Age distribution of **62**
ICU admissions in **781** episodes

Age	Episodes	ICU	ICU %
0-9	0	0	-
10-19	1	0	0%
20-29	13	3	23.1%
30-39	32	3	9.4%
40-49	30	1	3.3%
50-59	74	9	12.2%
60-69	78	11	14.1%
70-79	206	25	12.1%
80+	347	10	2.9%

c. Apr & May: 89 ICU admissions among 839 episodes with first hospitalization between Apr 01, 2022 and May 31, 2022

Not immunized:
Age distribution of **28**
ICU admissions in **276** episodes

Age	Episodes	ICU	ICU %
0-9	88	9	10.2%
10-19	6	3	50.0%
20-29	4	0	0%
30-39	14	1	7.1%
40-49	5	0	0%
50-59	17	1	5.9%
60-69	28	6	21.4%
70-79	40	6	15.0%
80+	74	2	2.7%

Partially immunized:
Age distribution of **5**
ICU admissions in **68** episodes

Age	Episodes	ICU	ICU %
0-9	5	0	0%
10-19	2	0	0%
20-29	4	0	0%
30-39	8	1	12.5%
40-49	4	0	0%
50-59	8	1	12.5%
60-69	6	1	16.7%
70-79	12	1	8.3%
80+	19	1	5.3%

Base immunized:
Age distribution of **31**
ICU admissions in **201** episodes

Age	Episodes	ICU	ICU %
0-9	0	0	-
10-19	0	0	-
20-29	7	1	14.3%
30-39	8	1	12.5%
40-49	8	1	12.5%
50-59	21	5	23.8%
60-69	44	7	15.9%
70-79	58	11	19.0%
80+	55	5	9.1%

Fully immunized:
Age distribution of **25**
ICU admissions in **294** episodes

Age	Episodes	ICU	ICU %
0-9	0	0	-
10-19	0	0	-
20-29	3	0	0%
30-39	4	0	0%
40-49	11	1	9.1%
50-59	17	2	11.8%
60-69	38	7	18.4%
70-79	86	5	5.8%
80+	135	10	7.4%

***Figure 13**: ICU admission over all episodes of CH-SUR hospitalized patients by immune status and age group over three different periods. Episodes with missing age, missing gender, or missing were not included in the analysis. ICU*

admission rates (ICU%), especially for the partially immunized and fully immunized categories, 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 June and July 2022 are not meaningful due to their incompleteness and are therefore not yet shown.

In both periods considered, the largest group of (community acquired) episodes with an ICU admission concerned non-immunized patients (42% and 27% 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, there is a skew towards older age groups being admitted to the ICU (between Feb 2022 and May 2022 around 91% 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 57% (Feb, Mar) and 52.7% (Apr, May) of the episodes corresponded to patients aged 50 years and above.

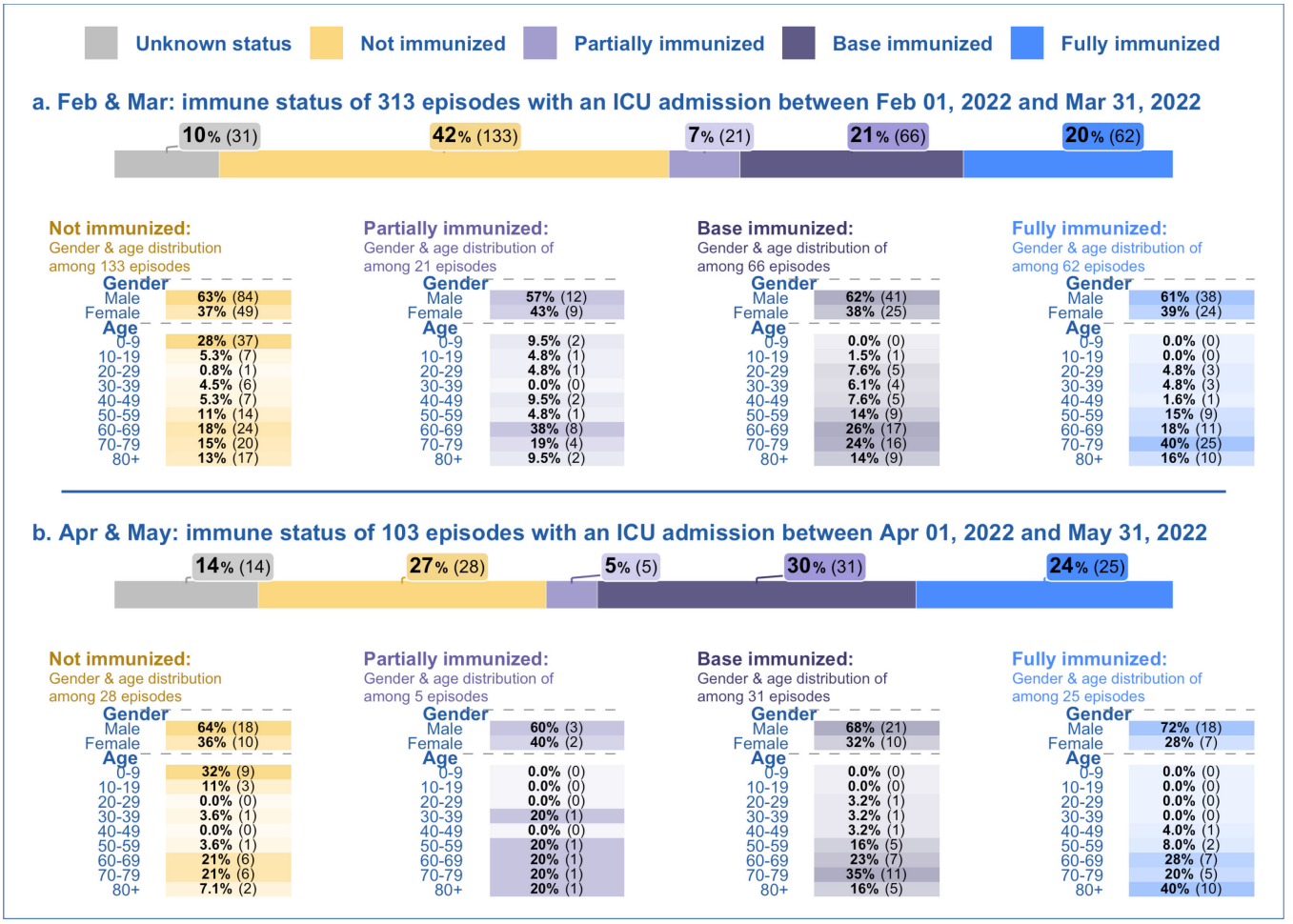

***Figure 14**: Demographic characteristics of patients in ICU by immune status and episode, over two different periods. Episodes with a first admission date after May 31, 2022 were excluded, as a large proportion of these records have not been completely filled in the database. Episodes with missing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

6. Comorbidities

Chronic cardiovascular disease, hypertension, chronic renal disease, diabetes, chronic respiratory disease, and immunosupression [1] were chosen out of all comorbidities registered in CH-SUR [2], to explore the risk factors tied to SARS-COV-2 hospitalization.

Most notably, episodes feature a predominance of males having a chronic cardiovascular disease comorbidity.

[1] Immunosuppression was defined as a patient having one or more of the following comorbidities: a hematological pathology with immuno-suppression, a rheumatological and auto-immune pathology with immuno-suppression, receiving a transplant (solid organs), and/or receiving an immuno-suppressive treatment.

[2] Chronic respiratory disease, Asthma, Diabetes, Hypertension, Chronic cardiovascular disease, Chronic renal disease, Chronic liver disease, Chronic neurological impairment, Hematological pathology with immuno-suppression, Oncological pathologies, Rheumatological and auto-immune pathology with immuno-suppression, Dementia, Transplant (solid organs), HIV-positive, Immuno-suppressive treatment, History of prematurity, Tuberculosis, Smoking, Obesity

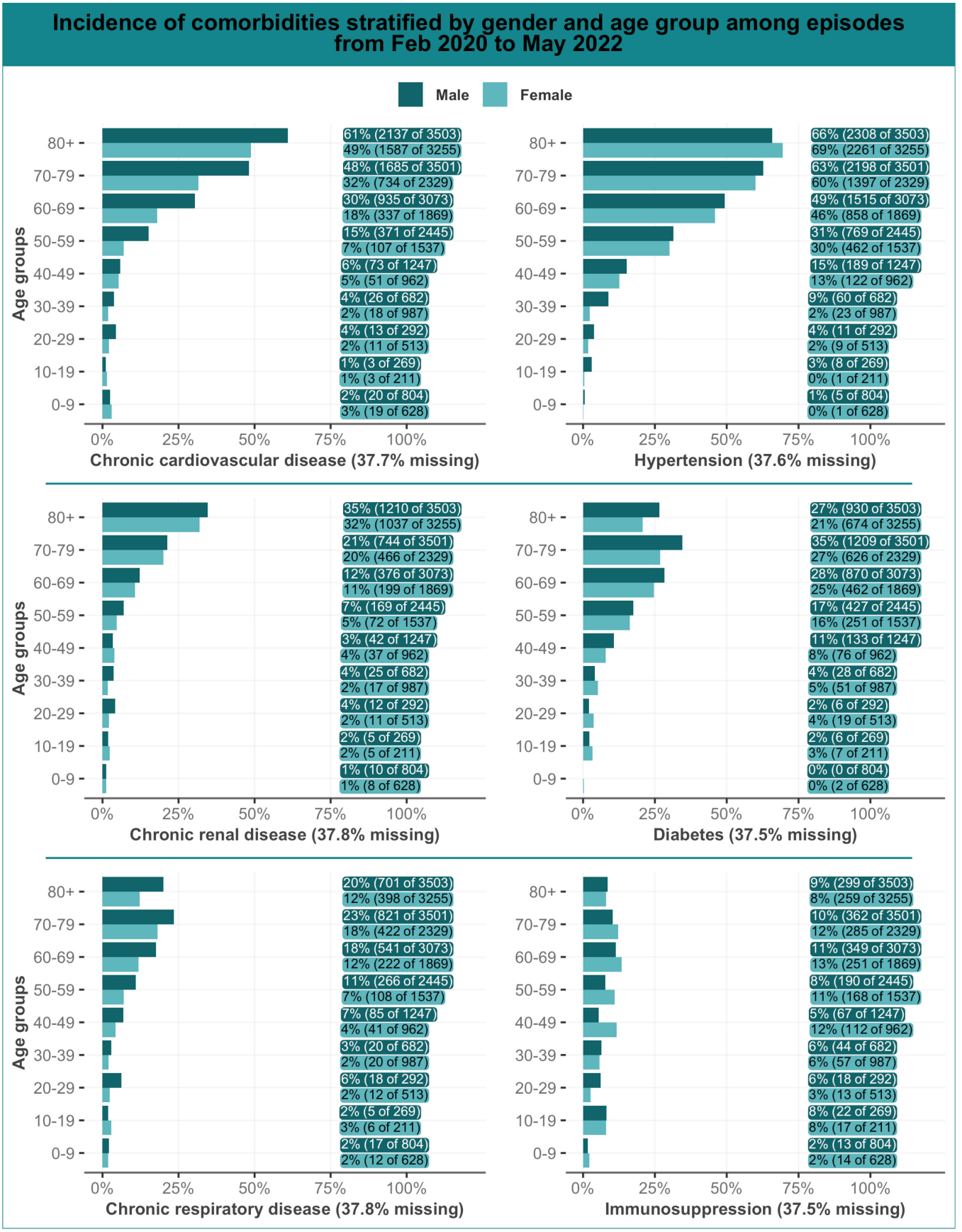

***Figure 15**: Comorbidities incidence stratified by age group and by gender.Records with incomplete data for age or gender were not included. Data from the last two months was excluded due to potential data delay.*

7. Comparison of Influenza and COVID-19

For their similarities and divergences, this section aims to put in comparison and contrast the hospitalizations of patients diagnosed with influenza and COVID-19. This section aims to compare the omicron variant of COVID characteristics to the most recent influenza season's characteristics. This section of the report focuses on community acquired infections (the investigation of nosocomial cases can be found in the subsequent section 7).

Figure **16** shows the episodes registered in CH SUR during the most recent influenza season (from week 44 2021 to week 22 2022), superimposed on the simultaneously registered COVID-19 episodes. Figure **17** explores the case fatality ratios of both diseases considering different demographic characteristics and hospitalization attributes of the patients hospitalized. Due to the differences in sample sizes, the outcomes should be compared with caution. During the period considered and in the hospitals included in this surveillance system, influenza had a lesser CFR than COVID-19 (1.7% compared to 4.3%), and was more lethal for women than for men (contrary to COVID-19). Similar to COVID-19, the CFR is higher for the older population (above 60 years old).

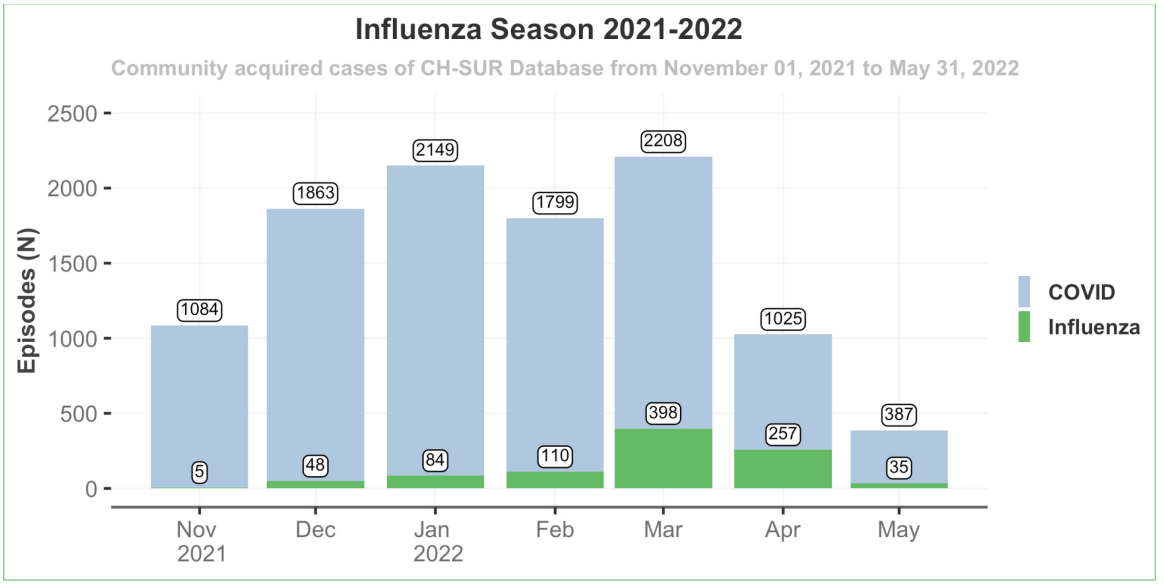

***Figure 16**: Influenza and COVID-19 episode counts per month over the most recent influenza season of 2021-2022.*

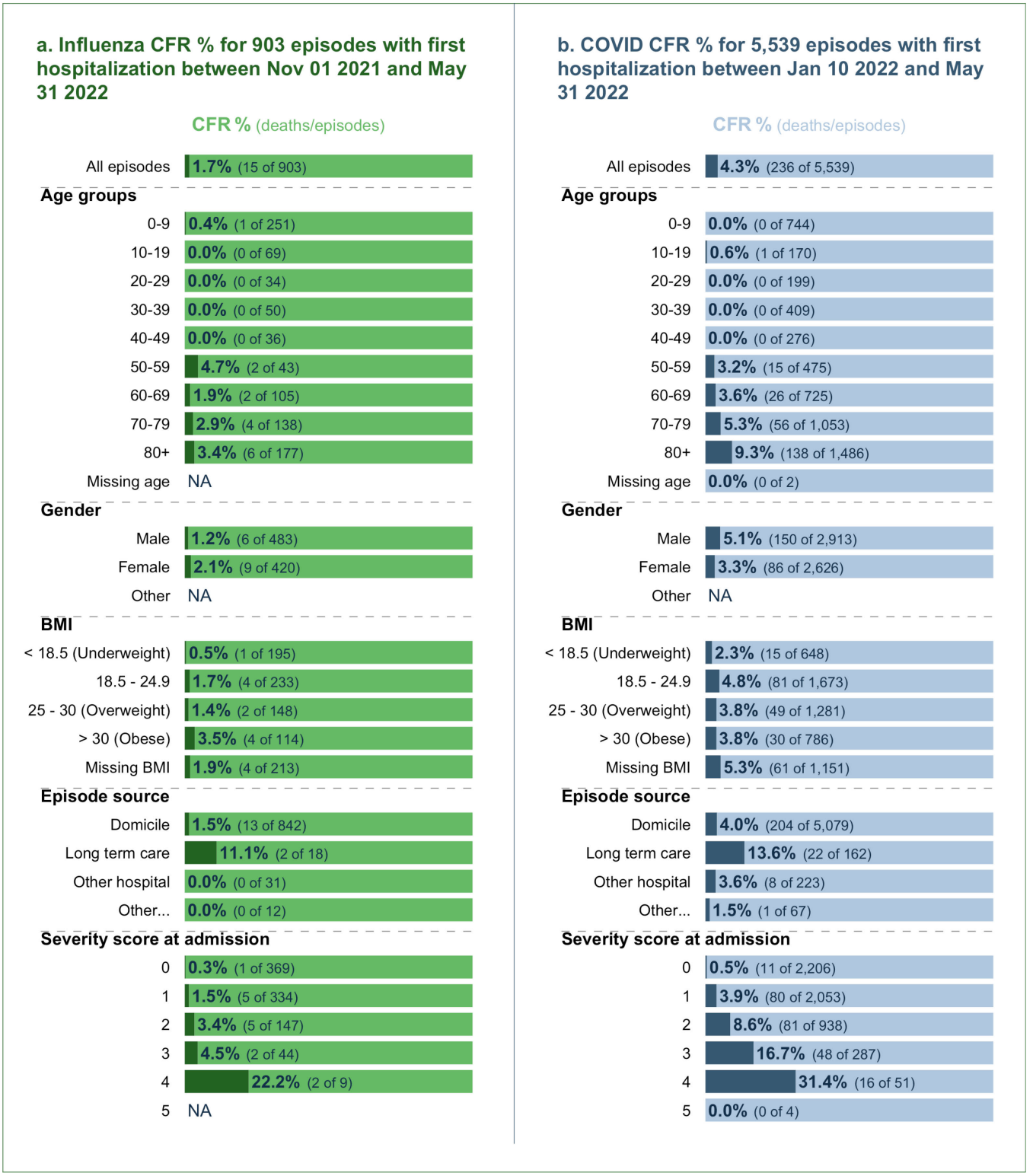

***Figure 17**: Comparison of demographics and hospitalization attributes for influenza (season 2021-2022) and COVID-19 (the beginning of the omicron-dominated time period up to recent data) for community acquired cases.*

8. 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 **18**c). In recent months, this proportion rose since August 2021, accounting for 13.9% of the pisodes registered in CH-SUR over the month of December 2021, 19.0% in January 2022, 19.3% in March 2022 and 20.4% in April 2022. This observation might be partially explained by periods of higher virus circulation and an increase in nosocomial systematic testing in some hospitals. However, changes in the testing strategy among hospitals are expected for the coming period, therefore, these data should be interpreted with caution.

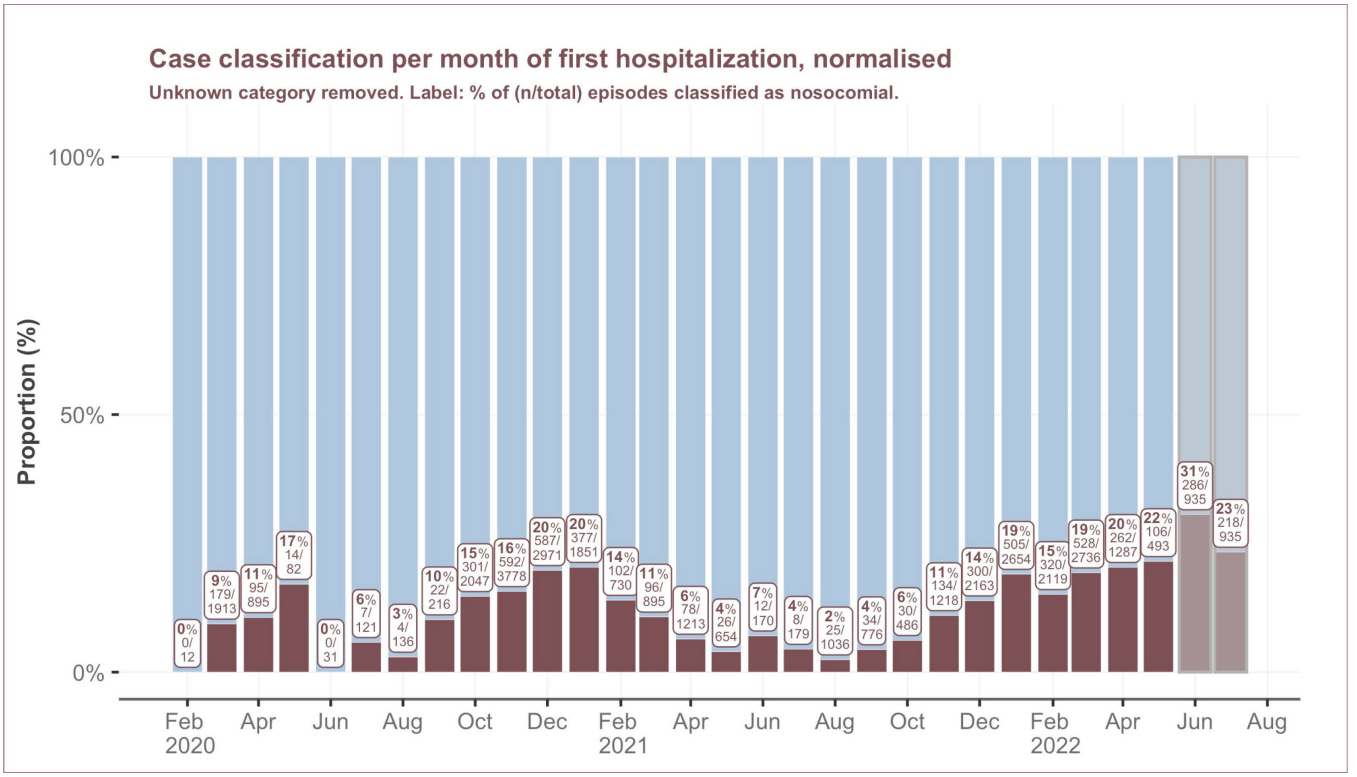

***Figure 18**: Classification (infection source) of hospitalization episodes over time. Data from the last two months (highlighted gray) are considered provisional due to data entry delays.*

Over the full course of the epidemic, the nosocomial infections affected principally an elderly population, with patients aged 80 years and above, accounting for 2,471 (47%) of the nosocomial episodes. In comparison, 7,286 (25%) 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: 690 (13%) vs 2,442 (8.3%). (Figure **19**)

ICU admissions were slightly less common among episodes of patients with nosocomial infections, when compared to community-acquired infections (Figure **19**). 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 11,039 (37%) episodes with community acquired infection and in 1,108 (21%) nosocomial episodes.

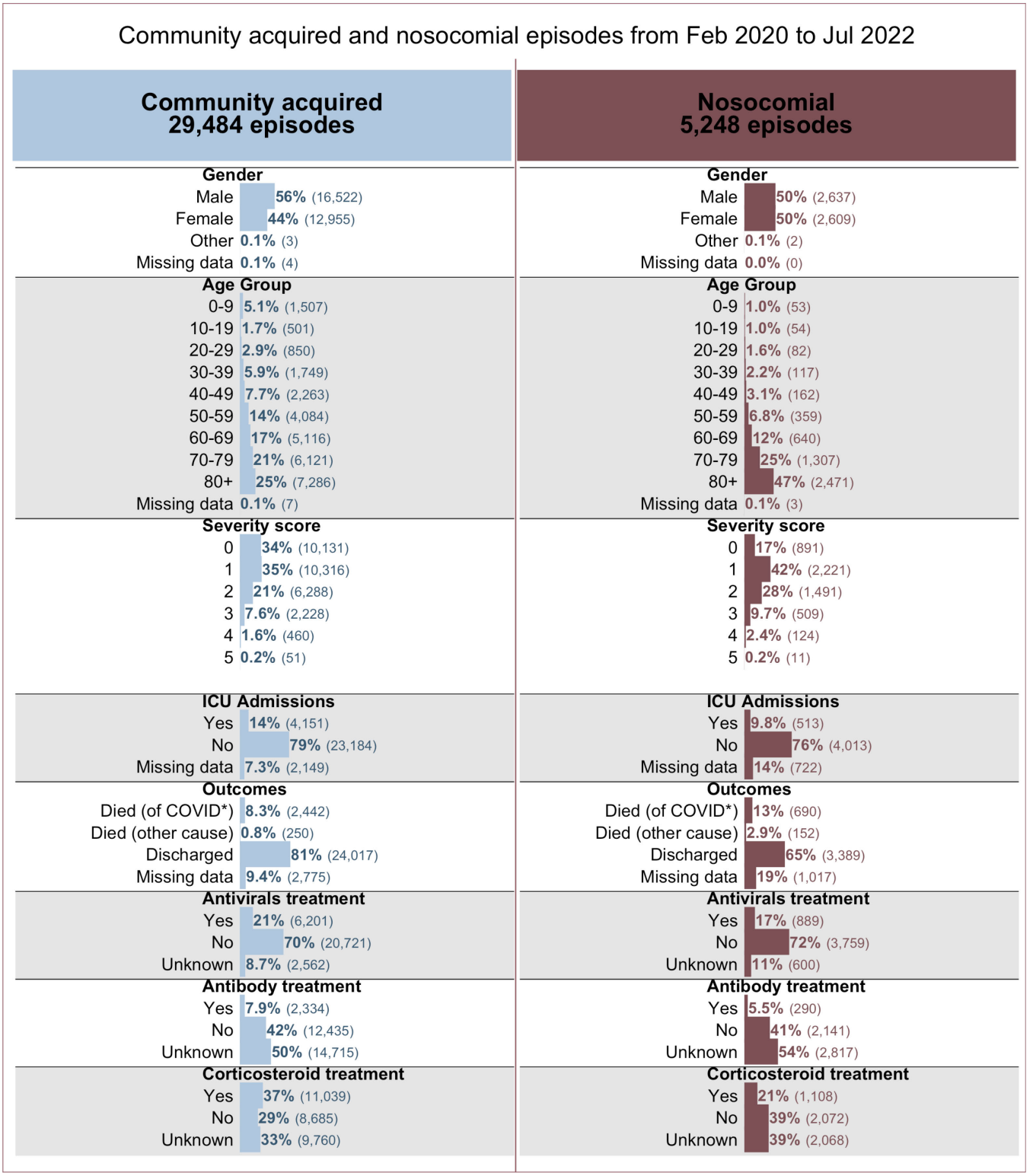

***Figure 19**: Case classification (infection source) of hospitalization episodes Comparison of community acquired and nosocomial cases by demographics, severity score, ICU, outcomes and treatments.*

Figure **20** displays the characteristics and CFR of nosocomial episodes for influenza compared to the characteristics of nosocomial episodes for COVID-19: the small number of nosocomial cases for influenza occur in an elderly population (70 and above). Similar to the comparison for community acquired episodes in Figure **17**, here the focus is on nosocomial episodes.

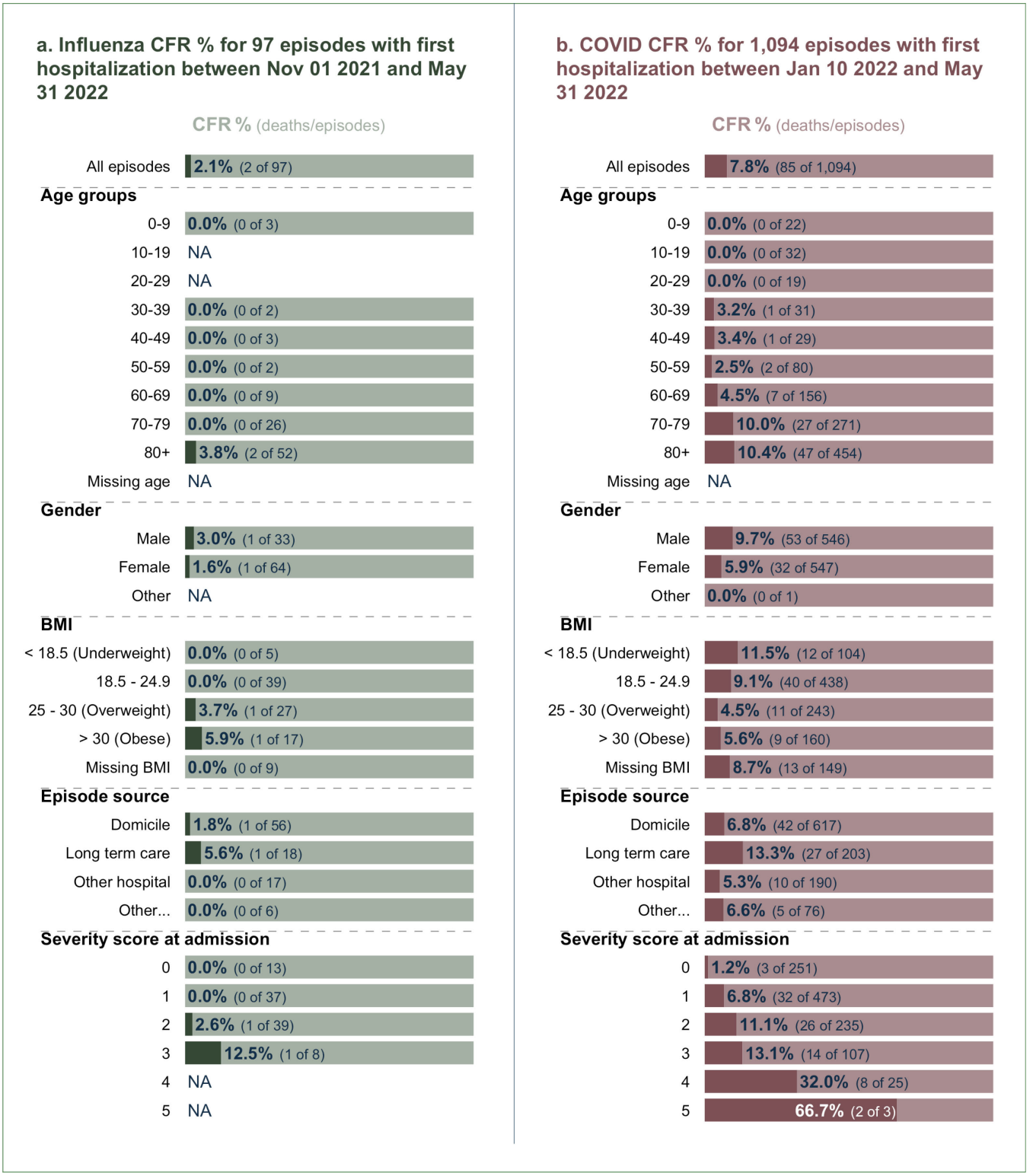

***Figure 20**: Comparison of demographics and hospitalization attributes for influenza (season 2021-2022) and COVID-19 (the beginning of the omicron-dominated time period up to recent data) for nosocomial cases. Due to very small sample sizes, these data should be handled with caution.*

9. 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:

La définition du statut immunitaire prend en considération à la fois la vaccination et les infections antécédentes, confirmées de SARS-CoV-2. Le statut immunitaire est défini comme suit:

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*:

1. 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.

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. 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).

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. 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 « Complètement immunisés »).

d) *Complètment immunisés*: 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) *Status immunitaire inconnu*: Patients pour lesquels aucune information vaccinale et immunitaire n'est disponible.

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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