

COVID-19 outbreaks in long-term care facilities in the EU/EEA in the context of current vaccination coverage

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Summary

Coronavirus disease (COVID-19) outbreaks in long-term care facilities (LTCFs) in European Union and European Economic Area (EU/EEA) countries have caused significant morbidity and mortality since the beginning of the COVID-19 pandemic. Hence, COVID-19 vaccination programmes prioritised residents of LTCFs as one of the main target groups for vaccination. Although morbidity and mortality in this population has dramatically declined with the progressive increase of vaccine uptake, several outbreaks continued to occur during 2021, coinciding with high levels of community transmission and incomplete vaccination of LTCF residents and staff.

The emergence of significantly more transmissible SARS-CoV-2 variants such as the B.1.617.2 (Delta) is causing an upsurge of COVID-19 cases in several EU/EEA countries. This is likely to continue until a larger proportion of the general population is fully vaccinated, unless more stringent non-pharmaceutical interventions (NPIs) are implemented. High levels of SARS-CoV-2 community transmission increase the risk of outbreaks in LTCFs and the risk of infection for unvaccinated or partially vaccinated vulnerable individuals. Furthermore, the population residing in LTCFs may also have altered (i.e. lower and shorter) vaccine protection due to their age and underlying conditions, albeit direct vaccine effectiveness data in this population is limited and data on vaccine effectiveness against the Delta variant of concern (VOC) specifically is missing. In addition, vaccine effectiveness against the Delta VOC in the general population is reduced compared to that against other variants, particularly following the administration of only one vaccine dose (for vaccines requiring a two-dose schedule).

Risk assessed in this update

The assessment of the risk that SARS-CoV-2 currently poses to LTCF residents takes into account the epidemiological situations in the various EU/EEA countries and the vaccination status of LTCF residents (fully vaccinated versus partially vaccinated or unvaccinated). Due to the lack of reliable data on vaccination coverage among LTCF staff, we have assumed – based on the limited data available – that over 20% of LTCF staff are unvaccinated.

In countries with an epidemiological situation categorised as of very low or low concern, the risk posed by SARS-CoV-2 is assessed as low for fully vaccinated LTCF residents and moderate-to-high for partially vaccinated or unvaccinated LTCF residents.

In countries with an epidemiological situation classified as of moderate or high concern, the risk posed by SARS-CoV-2 is assessed as low-to-moderate for fully vaccinated LTCF residents and high-to-very high for partially vaccinated or unvaccinated LTCF residents.

Options for response

The overall level of SARS-CoV-2 transmission in the general population has a direct impact on the risk to LTCF residents; therefore, continued measures to maintain or reduce transmission in the general population will reduce the risk to this vulnerable group. More specific measures to reduce the impact of COVID-19 on individuals residing in LTCFs include:

- Rapidly ensuring full vaccination coverage of LTCF residents and all people in contact with them. COVID-19 vaccine uptake among LTCF residents (partially or not yet vaccinated), as well as healthcare personnel and other staff working in LTCFs, needs to be promoted further through specific activities targeting vaccine acceptance and barriers to uptake.
- Putting in place countermeasures to reduce the risk of virus introduction into LTCF communities.
- Ensuring early identification of COVID-19 cases in LTCFs, which is essential for the introduction of control measures and the prevention of further outbreak spread. Testing, contact tracing and investigation of COVID-19 cases and outbreaks in LTCFs (including whole genome sequencing (WGS)) should remain a priority for public health authorities.
- Maintaining meticulous compliance with NPIs for residents, staff and visitors in LTCFs, irrespective of vaccination coverage, while ensuring that the mental health needs of residents are taken into consideration.

Event background

LTCF residents and staff have been prioritised for COVID-19 vaccination in the majority of EU/EEA countries. According to the ECDC COVID-19 implementation reports, 24 out of 26 reporting countries prioritised LTCF residents and staff in February 2021. By 31 May 2021, 11 out of 19 responding countries reported that they had fully vaccinated all LTCF residents [1,2]. However, several outbreaks have occurred in these populations in the past six months in several EU/EEA countries, resulting in some cases of severe disease and deaths, even among fully vaccinated individuals.

Although the effectiveness of COVID-19 vaccines authorised in the EU/EEA is very high, SARS-CoV-2 infections among fully vaccinated individuals (i.e. 'breakthrough infections') are expected. VOCs associated with higher transmissibility have been implicated in most of the recent outbreaks in LTCFs.

Epidemiological situation

Overall situation in the EU/EEA (week 27 2021)

As of week 27 (ending 11 July 2021), the overall 14-day COVID-19 case notification rate in the EU/EEA was 89.6 per 100 000 population and had increased compared to the previous week (51.6 as of week 26). The death notification rate was 6.8 per million population and has been decreasing since week 15 (77.9 per million as of week 15).

Notification rates among individuals aged 65 years and older were lower than those among the general population (21.1 per 100 000 population), but also increased compared to the previous week (17.0 as of week 26). Notification rates among this age group were ≥ 50 per 100 000 population in four countries (Croatia, Cyprus, Portugal and Spain) and were increasing in seven countries (Belgium, Greece, Iceland, Luxembourg, the Netherlands, Portugal and Spain). The mortality rate among this age group was 9.0 per million, continuing the decreasing trend observed since week 13 (241.9 per million as of week 13).

The epidemiological situation in the EU/EEA during week 27 was categorised overall as of low concern (the same as the previous week). Two countries were categorised as of high concern (Portugal and Spain), four as of moderate concern (Cyprus, Luxembourg, Malta and the Netherlands), eight as of low concern and 16 as of very low concern [3].

Situation in LTCFs in the EU/EEA (week 27 2021)

ECDC collects aggregated surveillance data from LTCFs in EU/EEA countries through The European Surveillance System (TESSy) on a weekly basis. The primary aims of this activity are to monitor national trends in the number and proportion of LTCFs affected by COVID-19 and to monitor trends in the incidence of COVID-19 cases and COVID-19-related deaths among LTCF residents [4].

Seven countries (Austria, Belgium, France, Lithuania, Luxembourg, the Netherlands and Slovenia) reported data for week 27. Among these countries, the pooled incidence of COVID-19 cases among LTCF residents was 9.1 per 100 000 LTCF beds, the pooled incidence of fatal COVID-19 cases was 0.5 per 100 000 LTCF beds, and 1.3% of reporting LTCFs reported one or more new COVID-19 case among their residents.

Comparing week 27 to weeks 23–26:

- Trends in the incidence of confirmed COVID-19 cases in LTCFs decreased in six out of seven countries that reported data (Austria, Belgium, France, Luxembourg, the Netherlands and Slovenia) and increased in one country (Lithuania).

- Trends in fatal COVID-19 cases decreased in all six countries that reported data for this indicator (Austria, Belgium, Lithuania, Luxembourg, the Netherlands and Slovenia).
- Two countries (Lithuania and the Netherlands) reported an increase in the proportion of LTCFs with one or more new COVID-19 case in week 27 and two countries (Belgium and Slovenia) reported a decrease.

Variants of concern (VOCs) in the EU/EEA

During weeks 25 to 26 (21 June to 4 July 2021), 16 countries reported an adequate average weekly sequencing volume of cases and a valid denominator. Among these countries, the median (range) of the top three VOCs reported in all samples sequenced was: B.1.1.7 (Alpha), 42.5% (2.1-95.8%); B.1.617.2 (Delta), 39.1% (0.7-87.3%); and B.1351 (Beta), 0.4% (0.0-11.1%). There has been a rapid increase in the prevalence of the Delta VOC in sequenced samples in the majority of reporting countries. Among the countries with adequate weekly reported sequencing volume, the Delta VOC was dominant in Portugal (87%), Ireland (76%), Germany (58%), Belgium (55%), Estonia (53%), Denmark (52%) and France (50%), and was close to dominant in Sweden (46%) and Greece (33%). Sequencing volumes may be underestimated in some countries due to reporting delays; therefore, some countries may not be included in this list even though they may sequence enough samples. In addition, the prevalence of variants might vary significantly at the subnational level; however, ECDC refers to the country overview.

The increasing spread of the Delta VOC will likely lead to an increase in COVID-19 incidence in the EU/EEA in the coming weeks and months due to increased transmissibility and reduced vaccine effectiveness against infection and symptomatic COVID-19 [5]. However, due to the high vaccine uptake in vulnerable populations and the high vaccine effectiveness against severe illness, it is expected that the impact on hospitalisations and mortality will be relatively lower than in earlier pandemic waves [6]. For detailed scenarios, refer to the ECDC Threat Assessment Brief 'Implications for the EU/EEA on the spread of the SARS-CoV-2 Delta (B.1.617.2) variant of concern' [7].

Vaccination coverage in the EU/EEA overall and in LTCFs

The scope of COVID-19 vaccination campaigns is unprecedented, with target groups that are rapidly extending to include nearly all age groups. Originally, the populations prioritised for COVID-19 vaccination in the EU/EEA included older adults – albeit with slightly different age cut-offs from country to country – residents and staff in LTCFs, healthcare workers, social care personnel and people with health conditions that made them vulnerable to severe disease. Consequently, the cumulative vaccine uptake is currently higher in these target groups that were prioritised since the beginning of the vaccine rollout.

As of week 27 (ending 11 July 2021), the estimated COVID-19 vaccine uptake (full vaccination) among adults (aged 18 years and older) varied from 15.6% to 82.6% (median 47.8%) in the 30 EU/EEA countries. The estimated uptake among adults aged 80 years and older varied from 15.5% to 100% (median 78.7%) in 27 reporting countries. Full vaccination is defined according to the manufacturer's instructions for each vaccine product [8].

Twelve EU/EEA countries (Bulgaria, Czechia, Denmark, Estonia, Greece, Hungary, Iceland, Ireland, Latvia, Luxembourg, Spain and Sweden) reported data on COVID-19 vaccine uptake in LTCF residents. As of week 27, the median vaccine uptake among LTCF residents in the 12 reporting EU/EEA countries was 80.6% (country range: 37.7-100%) for at least one dose and 75.2% (country range: 33.3-100%) for full vaccination. Only four countries (Denmark, Luxembourg, Spain and Sweden) reported full vaccination coverage of more than 80% in this population.

Seventeen EU/EEA countries (Belgium, Bulgaria, Croatia, Czechia, Denmark, Estonia, Greece, Hungary, Iceland, Ireland, Latvia, Luxembourg, Malta, Romania, Slovenia, Spain and Sweden) reported data on COVID-19 vaccine uptake in healthcare workers. Overall, the median vaccine uptake is 83.9% (country range: 22.2-100%) for at least one dose and 77% (country range: 21.2-100%) for full vaccination. Eight countries (Czechia, Hungary, Iceland, Ireland, Latvia, Malta, Romania and Spain) reported full vaccination coverage of more than 80% in this population.

Data on COVID-19 vaccine uptake among healthcare workers has several limitations. Firstly, there is significant variability in the definition of 'healthcare worker' between countries, which may or may not include all staff working in LTCFs, and there isn't a specific category for LTCF staff. It is therefore not possible to infer that the same high vaccine uptake reported for healthcare workers applies to all LTCF staff. Secondly, staff working in LTCFs usually includes a limited number of healthcare workers and a larger number of auxiliary staff, for whom there are limited data on vaccination coverage. For example, while Greece reports full vaccination coverage of 73.6% in healthcare workers, the Greek Ministry of Labour and Social Care announced on 13 July that COVID-19 vaccination coverage in staff of private and state-owned LTCFs is only 65% and 45%, respectively [9].

Detailed information on COVID-19 vaccine uptake in LTCF residents and healthcare workers can be found on the ECDC COVID-19 Vaccine Tracker [10].

Outbreaks in LTCFs by vaccination status

Six countries (Belgium, Finland, Germany, Luxembourg, Norway and Portugal) reported data to ECDC on 18 outbreaks of SARS-CoV-2 in LTCFs. The attack rates among residents and staff by variant and vaccination status are shown in Table 1. Table 2 and Table 3 show the proportion of hospitalised COVID-19 cases and the proportion of COVID-19-related deaths among cases in LTCF residents, stratified by VOC and vaccination status, respectively. For fully vaccinated residents, the attack rate was higher in Delta VOC outbreaks compared to outbreaks caused by other variants, but there was no difference in the proportions of hospitalised cases and deaths. Annex 1 shows the number of cases, hospitalisations and

deaths among LTCF residents for each outbreak, stratified by vaccination status, and the number of cases among LTCF staff, stratified by vaccination status. Two additional countries (Austria and Spain) reported outbreaks in LTCFs, including cases among vaccinated individuals, but detailed data is currently not available to ECDC.

Table 1. COVID-19 attack rate among staff and residents of LTCFs, by VOC (Delta, other VOCs and unknown) and vaccination status

	Delta VOC (two outbreaks)		Other VOCs (12 outbreaks)		Unknown variant† (four outbreaks)	
	Residents	Staff	Residents	Staff	Residents	Staff
Non-stratified attack rate* (%, 95% CI)	36/75 (48.0, 36.3-59.8)	16/46 (34.8, 21.4-50.2)	272/854 (31.9, 28.7-35.1)	104/1079 (9.6, 7.9-11.6)	76/135 (52.3, 47.5-64.8)	34/125 (27.2, 19.6-35.9)
Attack rate among the fully vaccinated (%, 95% CI)	31/63 (49.2, 36.4-62.1)	6/24 (25.0, 9.8-46.7)	167/625 (26.7, 23.3-30.4)	29/596 (4.9, 3.3-6.9)	72/130 (55.4, 46.4-64.1)	24/112 (21.4, 14.2-30.2)
Attack rate among the partially vaccinated and unvaccinated (%, 95% CI)	5/12 (41.7, 15.2-72.3)	10/22 (45.5, 24.4-67.8)	32/110 (29.1, 20.8-38.5)	61/456 (13.4, 10.4-16.8)	3/3 (100, 29.2-100.0)	10/12 (83.3, 51.6-97.9)

* Number of cases/total number of residents and staff.

† Outbreaks are ongoing and sequencing data are not yet available.

Table 2. Proportion of hospitalised COVID-19 cases among LTCF residents, by VOC (Delta, other VOCs and unknown) and vaccination status

	Delta VOC (two outbreaks)	Other VOCs (12 outbreaks)	Unknown variant† (four outbreaks)
Non-stratified hospitalisations* among LTCF residents (%, 95% CI)	6/36 (16.7, 6.4-32.8)	40/272 (14.7, 10.7-19.5)	5/76 (6.6, 2.2-14.7)
Hospitalisations among fully vaccinated LTCF residents (%, 95% CI)	5/31 (16.1, 5.5-33.7)	18/167 (10.8, 6.5-16.5)	5/72 (6.9, 2.3-15.5)
Hospitalisations among partially vaccinated and unvaccinated LTCF residents (%, 95% CI)	1/5 (20.0, 0.5-71.6)	8/32 (25, 11.5-43.4)	0/3 (0.0, 0.0-70.8)

* Number of hospitalisations/total number of cases among LTCF residents.

† Outbreaks are ongoing and sequencing data are not yet available.

Table 3. Proportion of hospitalised COVID-19 cases and proportion of COVID-19-related deaths among cases in LTCF residents, by VOC (Delta, other VOCs and unknown) and vaccination status

	Delta VOC (two outbreaks)	Other VOCs (12 outbreaks)	Unknown variant† (four outbreaks)
Non-stratified deaths* among LTCF residents (%, 95% CI)	5/36 (13.9, 4.7-29.5)	52/272 (19.1, 14.6-24.3)	2/76 (2.6, 0.3-9.2)
Deaths among fully vaccinated LTCF residents (%, 95% CI)	4/31 (12.9, 3.6-29.8)	27/167 (16.2, 10.9-22.6)	2/72 (2.8, 0.3-9.7)
Deaths among partially vaccinated and unvaccinated LTCF residents (%, 95% CI)	1/5 (20.0, 0.5-71.6)	11/32 (34.4, 18.6-53.2)	0/3 (0.0, 0.0-70.8)

* Number of deaths/total number of cases among LTCF residents.

† Outbreaks are ongoing and sequencing data are not yet available.

Out of these 18 outbreaks, 17 included cases among both LTCF residents and staff. Data on the vaccination status of LTCF residents at the time of the outbreak was available for all outbreaks. In one outbreak, all LTCF residents had only received one dose of a two-dose vaccination schedule. In the remaining 17 outbreaks, full vaccination coverage ranged from 70.7% to 100%. In 16 outbreaks, COVID-19 cases were detected among fully vaccinated LTCF residents. Across all outbreaks, where this information was available, the percentage of fully vaccinated residents that acquired the infection ranged from 7.9% (three cases) to 93.3% (14 cases). The percentage of partially vaccinated or unvaccinated residents that acquired the infection ranged from 9.5% (two cases) to 66.7% (two cases). Hospitalisation of LTCF residents following SARS-CoV-2 infection was recorded in 15 outbreaks, with hospitalisation among fully vaccinated LTCF residents recorded in 11 of these outbreaks. The percentage of fully vaccinated cases that were hospitalised ranged from 6.7% (one hospitalisation) to 28.6% (two hospitalisations), while the percentage of partially vaccinated or unvaccinated cases that were hospitalised ranged from 16.7% (one hospitalisation) to 50% (three hospitalisations). Deaths of LTCF residents

following SARS-CoV-2 infection were reported in 16 outbreaks, with deaths among fully vaccinated LTCF residents reported in 12 of these. The percentage of fully vaccinated LTCF residents with SARS-CoV-2 infection that died ranged from 4.9% (two deaths) to 38.9% (seven deaths), while the percentage of partially vaccinated or unvaccinated cases that died ranged from 20% (one death) to 100% (two deaths).

In the 16 outbreaks for which the vaccination status of LTCF staff at the time of the outbreak is known, full COVID-19 vaccination coverage ranged from 16.7% to 100%. Out of these 16 outbreaks, 13 (81%) occurred in LTCFs with <80% full vaccination coverage among staff, while four (25%) occurred in LTCFs with <50% full vaccination coverage among staff. Across all outbreaks, where this information was available, the percentage of fully vaccinated LTCF staff that became infected with SARS-CoV-2 in the same outbreak ranged from 1% to 50%. The percentage of partially vaccinated or unvaccinated staff that became infected ranged from 2.4% to 100%.

The Alpha VOC was detected in five outbreaks, the Beta VOC was detected in three outbreaks, the Gamma VOC was detected in one outbreak, the Delta VOC was detected in two outbreaks, and a combination of VOCs was detected in three outbreaks. Sequencing data were not available or are currently underway for the remaining four outbreaks. Given that the four outbreaks missing variant data were all reported in Portugal, where the Delta VOC is predominant, it is likely that these outbreaks are going to be linked to this variant [11].

In outbreaks linked to the Delta VOC, the attack rate was 48% among LTCF residents and 34.8% among staff, whereas the attack rate in outbreaks linked to other VOCs was 31.9% among residents and 9.6% among staff. Attack rates among fully vaccinated LTCF residents were significantly higher in outbreaks where the Delta VOC was detected (49.2%, 95% confidence interval (CI): 36.4-62.1 vs 26.7%, 95% CI: 23.3-30.4). The same was true for attack rates among fully vaccinated LTCF staff (25.5%, 95% CI: 9.8-46.7 vs 4.9%, 95% CI: 3.3-6.9). The proportion of hospitalised COVID-19 cases among LTCF residents was highest in outbreaks where the Delta VOC was detected, but did not differ significantly from other VOCs (16.7% of cases vs 14.7% for other VOCs) (Table 2). The proportion of COVID-19-related deaths among LTCF residents was lower in outbreaks where the Delta VOC was detected (13.9%), compared to outbreaks where other VOCs were detected (19.1%), without statistical significance (Table 3).

The observation that most infections occurred among fully vaccinated individuals should not be interpreted as an indication of vaccine ineffectiveness. Cases among unvaccinated or partially vaccinated residents are deceptively few, owing to the fact that a significant percentage of LTCF residents are fully vaccinated against COVID-19. However, hospitalisations and deaths are fewer among fully vaccinated residents (10.4% and 12.2%, respectively) versus among partially vaccinated or unvaccinated residents (22.5% and 30%, respectively) (see Annex 1).

Disease background

For information on the latest scientific evidence relating to COVID-19, SARS-CoV-2, virus transmission, diagnostic testing, infection, clinical characteristics, risk factors and risk groups, immunity, treatment and vaccines, please visit ECDC's website: <https://www.ecdc.europa.eu/en/covid-19/latest-evidence>.

COVID-19 in LTCFs

Please refer to the latest ECDC Rapid Risk Assessment 'Assessing SARS-CoV-2 circulation variants of concern, non-pharmaceutical interventions and vaccine rollout in the EU/EEA - 15th update' [12] for the ECDC assessment of the epidemiological situation in the EU/EEA and the Threat Assessment Brief 'Implications for the EU/EEA on the spread of the SARS-CoV-2 Delta (B.1.617.2) variant of concern' [7] for the assessment of disease severity and the potential for immune escape for this particular VOC.

LTCF residents have been disproportionately impacted by COVID-19, experiencing high morbidity and mortality during the earlier waves of the pandemic [13]. A review of LTCF outbreaks in the first two waves of the pandemic in Ireland (March and November 2020) showed that factors associated with the occurrence of an outbreak included: the size of a care home (adjusted odds ratio (aOR): 1.14 per 10 beds; 95% CI: 1.02-1.25; $p=0.012$), local community incidence of COVID-19 (aOR: 1.03 per 10 cases per 100 000 population; 95% CI: 1.02-1.04; $p < 0.001$), and being in close proximity (within 5 km) of another LTCF (aOR: 1.05; 95% CI: 1.00-1.10; $p=0.038$) [14]. A similar review of risk factors for mortality among 167 LTCFs in Catalonia, Spain identified that the risk of COVID-19-related death was higher in LTCFs providing care to individuals with higher numbers of complex comorbidities (incidence rate ratio (IRR): 1.07; 95% CI: 1.04-1.11) and in areas with high COVID-19 incidence (IRR: 2.39; 95% CI: 1.95-2.93 per 100 unit increase of COVID-19 14-day incidence rate per 100 000 population) [15].

Vaccine effectiveness in LTCF residents

There is limited direct evidence on COVID-19 vaccine effectiveness in LTCF residents. A cohort study conducted in the United Kingdom showed a vaccine effectiveness against SARS-CoV-2 infection of 56% (95% CI: 19-76) at 28 to 34 days since the administration of one dose of Comirnaty (BNT162b2) and of 62% (95% CI: 23-81) at 35 to 48 days since the administration of one dose of Vaxzevria (AZD1222) [16]. A Danish cohort study estimated a vaccine effectiveness, after two doses of Comirnaty, of 64% (95% CI: 14-84) against SARS-CoV-2 infection among LTCF residents and of 90% (95% CI: 82-95) among healthcare workers [17]. Another Danish study with Comirnaty vaccine showed a vaccine effectiveness

of 75% (95% CI: 46-89) against COVID-19-related hospitalisation and of 89% (95% CI: 81-93) against COVID-19-related death, among LTCF residents [18]. Estimates from a Spanish study in LTCF residents fully vaccinated with Comirnaty or Spikevax (mRNA-1273) (previously named 'COVID-19 Vaccine Moderna'), showed a vaccine effectiveness of 71% (95% CI: 56-82) against symptomatic and asymptomatic SARS-CoV-2 infection, of 88% (95% CI: 75-95) against COVID-19-related hospitalisation and of 97% (95% CI: 92-99) against COVID-19-related death [19]. Similarly, another Spanish study found a vaccine effectiveness among LTCF residents of 81% (95% CI: 80-82) against SARS-CoV-2 infection after full vaccination with Comirnaty or Spikevax [20]. In two outbreaks in LTCFs in the United States (US), vaccine effectiveness against SARS-CoV-2 infection was 63% (95% CI: -33-79) after one dose of Comirnaty [21] and 66% (95% CI: 41-81) after full vaccination. In the same study, vaccine effectiveness was 87% (95% CI: 66-95) against symptomatic illness, 94% (95% CI: 74-99) against COVID-19-related hospitalisation and 94% (95% CI: 45-99) against COVID-19-related death [22]. Among healthcare workers who received two doses of Comirnaty, a vaccine effectiveness of 76% (95% CI: 33-91) against SARS-CoV-2 infection and 87% (95% CI: 46-97) against symptomatic illness was reported [22].

Vaccine effectiveness against SARS-CoV-2 VOCs

There are limited data on the effectiveness of COVID-19 vaccines against SARS-CoV-2 VOCs and no data on vaccine effectiveness against the Delta VOC in the LTCF resident population. In the general population, vaccine effectiveness against infection with the Delta VOC was significantly lower after the first dose of vaccines with a two-dose schedule and slightly lower after the second dose, compared with vaccine effectiveness against the Alpha VOC [23], but all investigated vaccines remained equally effective against severe disease and death [6].

Evidence from the studies conducted so far shows that although full vaccination is highly effective against symptomatic and severe SARS-CoV-2 infections, breakthrough infections can occur and can lead to hospitalisations and deaths among vulnerable individuals, particularly if SARS-CoV-2 is introduced in healthcare settings. People with multiple comorbidities and/or immunosuppression are at highest risk of breakthrough infection and subsequent severe illness [24].

ECDC risk assessment for the EU/EEA

This assessment is based on information available to ECDC at the time of writing and, unless otherwise stated, the assessment of risk refers to the risk that existed at the time of writing. It follows the ECDC rapid risk assessment methodology, with the overall risk determined by a combination of the probability of an event occurring and its consequences (impact) for individuals or the population [25].

Risk assessment question

Based on current vaccine uptake and the rise of the Delta VOC in the EU/EEA, what risk does SARS-CoV-2 pose to LTCF residents?

LTCFs have been identified as particularly high-risk settings for COVID-19-associated morbidity and mortality. The risk posed by COVID-19 in LTCF residents is considered as a combination of the probability and the impact of SARS-CoV-2 infection in that population. The probability of infection, in turn, is a function of the SARS-CoV-2 circulation in the community and of the vaccine uptake in LTCF residents, healthcare workers and other staff working in the LTCF, assuming the continuous application of NPIs in LTCFs.

Based on the data reported by EU/EEA countries on SARS-CoV-2 circulation and other indicators, ECDC classifies the epidemiological situation in EU/EEA countries into four categories according to the level of concern (very low, low, moderate and high). For this assessment, we grouped countries with very low and low levels of concern in one category and the ones with moderate and high levels of concern in a second category [3].

Information on full vaccine uptake of healthcare workers is available for only 17 EU/EEA countries and specific data for LTCF staff are not available [10]. Due to the incompleteness of the information, we did not stratify the risk for LTCF residents by level of full-course vaccine uptake among staff and assumed that this uptake was <80%. In regions and countries where LTCF staff has full-course vaccine uptake ≥80%, the probability of SARS-CoV-2 infection in LTCF residents should be assessed as lower than in our assessment (Table 2).

Based on the protection that a full course of COVID-19 vaccination offers against severe disease and death, the impact of SARS-CoV-2 infection is stratified by vaccinated and partially vaccinated or unvaccinated LTCF residents [23]. The Delta VOC demonstrates the potential for vaccine escape in individuals with an incomplete course of vaccination [6]; thus, partially vaccinated or unvaccinated LTCF residents are grouped together and face a higher probability of infection and a higher risk of severe disease or death than fully vaccinated LTCF residents.

Considering all points above and, as mentioned, assuming the continuous application of NPIs in LTCFs, the different levels of risk for different groups of LTCF residents are presented in Table 4.

Table 4. Probability, impact and overall risk of SARS-CoV-2 infection for LTCF residents, by national epidemiological situation and vaccination status

Epidemiological situation and vaccination status	Probability of SARS-CoV-2 infection*	Impact of SARS-CoV-2 infection	Overall risk of SARS-CoV-2 infection
Very low or low concern countries			
Fully vaccinated LTCF residents	Low	Moderate	Low
Partially vaccinated or unvaccinated LTCF residents	Moderate	Very high	Moderate-to-high
Moderate or high concern countries			
Fully vaccinated LTCF residents	Moderate	Moderate	Low-to-moderate
Partially vaccinated or unvaccinated LTCF residents	High	Very high	High-to-very high

* Assuming that full COVID-19 vaccination coverage of LTCF staff is <80%. In countries where full COVID-19 vaccination coverage of LTCF staff is ≥80%, the probability of SARS-CoV-2 infection in LTCF residents should be assessed as lower than presented in the table.

Options for response

The data provided on LTCF outbreaks in this RRA, although limited both in number of outbreaks and in geographic coverage of EU/EEA countries, shows the overall low COVID-19 vaccine uptake of LTCF staff (median full COVID-19 vaccination coverage in the reported outbreaks 64%; range: 16.7-100%), as well as the continued vulnerability of LTCF residents to SARS-CoV-2 infection, even if fully vaccinated. As explained previously, the latter is to be expected due to the aging of the immune system and the coexistence of multiple comorbidities, including immunosuppression, which may hamper the extent and duration of vaccine protection. However, in a small cohort study from Belgium previous infection with SARS-CoV-2 was a more important determinant of the antibody response (including neutralising effect) to Comirnaty vaccine than age [26].

To minimise the risk of SARS-CoV-2 introduction and spread in LTCFs, it is important to ensure not only full vaccination of all residents, but also full vaccination of individuals who come in contact with LTCF residents, either directly (through providing medical care) or indirectly (through providing services in facilities), and to maintain strict adherence to infection prevention and control practices and other NPIs that have been recommended throughout the COVID-19 pandemic [27].

Vaccination of LTCF residents

SARS-CoV-2 can be introduced into a LTCF by any visitor, caretaker or employee. To limit the emergence and spread of the Delta VOC in these settings, it is essential to continue the rapid rollout of COVID-19 vaccines to populations that are at high-risk of severe disease. This is particularly relevant for LTCF residents, especially if they are not yet fully vaccinated.

COVID-19 vaccines should be made easily accessible to LTCF residents and vaccination should be encouraged, with the goal of achieving the highest possible vaccination coverage among residents. Any concerns expressed by residents or their relatives and caretakers should be addressed.

Healthcare workers are recognised as the most trusted source of information regarding vaccination. A recent Flash Eurobarometer survey confirms that EU citizens see health professionals, doctors, nurses and pharmacists as the most trusted source of reliable information on COVID-19 vaccines [28]. The World Health Organization identifies five key strategies to empower health workers to help ensure successful public response to COVID-19 vaccination [29]:

- Understand health worker barriers and drivers of vaccination
- Engage health workers as active partners in shaping vaccination efforts
- Motivate, support and acknowledge health workers
- Build health workers' knowledge, skills and confidence on COVID-19 vaccination and its communication
- Value health workers as a target group and partners, engaging with them regarding safety events both before and during any eventual crisis

Vaccination of LTCF staff

Vaccine uptake should also be strongly encouraged for all persons in contact with LTCF residents, including healthcare workers, auxiliary staff, caretakers, visiting health professionals and visitors.

Strengthening vaccine acceptance among healthcare workers in general is important. Unvaccinated healthcare workers put themselves, their families and their colleagues at risk of SARS-CoV-2 infection and can also increase the risk of SARS-CoV-2 infection among the LTCF residents that they are caring for.

Addressing vaccination acceptance among healthcare workers and auxiliary staff

An important first step to develop tailored interventions to promote vaccine uptake among healthcare workers and auxiliary staff working in LTCFs is to understand the drivers of vaccine hesitancy. In early 2021, a rapid systematic review synthesising evidence on healthcare workers' attitudes towards COVID-19 vaccination [30] found that COVID-19 vaccination acceptance rates varied widely. Some common issues were recurrent in the studies and related to concerns about the safety, efficacy and effectiveness of COVID-19 vaccines, as well as lack of trust in governments. However, previous influenza vaccination acceptance and self-perceived risk from SARS-CoV-2 infection were facilitators of COVID-19 vaccine uptake.

Staff working in LTCFs make up a heterogeneous group of people and differs from staff working in other healthcare settings. A report published by the US Centers for Disease Control and Prevention in early 2021 [31] described lower influenza vaccination coverage among staff working in LTCFs than in other healthcare settings. The report also mentioned a survey among LTCF staff in November 2020 that identified concerns around vaccine safety as the key reason for hesitancy towards COVID-19 vaccination, once available. The report further highlighted that high staff turnover, staff members working in multiple facilities and limited resources for staff outreach and education were additional potential barriers to COVID-19 vaccination of LTCF staff.

Given the variety of factors behind vaccine hesitancy, efforts to increase vaccine uptake are most effective when they include multi-component interventions. Providing information on its own has been shown to have a limited impact on facilitating vaccine uptake; therefore, the inclusion of other strategies is needed [32]. Literature on understanding the psychology of vaccination [33] highlights that interventions can facilitate vaccination directly by leveraging positive attitudes and beliefs, but not trying to change what people think and feel. These types of interventions are by far the most plentiful and effective in the literature. This can be achieved by facilitating action (reminders, prompts or primes that build on favourable intentions to get vaccinated), reducing barriers (making the vaccine easily accessible (e.g. at the workplace and during working hours) and establishing default options) and shaping behaviour (through incentives, sanctions and requirements). One-on-one conversations between trusted peers and those who may be vaccine hesitant are also advised, as evidence from primary care suggests that these may result in a 60-70% conversion from hesitancy to uptake of a vaccine [34]. Additional important recommendations include avoiding use of hard-to-understand terminology, reframing messages that stress the protective effects of vaccines and discussing possible side effects openly, using easy-to-understand risk ratios.

Some countries have implemented or are considering implementing mandatory vaccination for specific groups, such as healthcare workers and staff working in LTCFs and care homes, to increase uptake of COVID-19 vaccines. This is a topic that raises differing perspectives and sparks debate globally [35]. Italy was the first country to implement such a rule in Europe [36], with other countries following suit, such as Greece's announcement on 12 July 2021 of compulsory COVID-19 vaccination of health personnel, which includes unpaid leave if vaccination is refused and fines for healthcare facilities if unvaccinated staff continue working. On the same day, France also announced that COVID-19 vaccination would be made mandatory for all staff working in French hospitals, care homes and clinics [37,38].

Even though mandatory requirements can be highly effective, researchers caution that depending on the reasons for under-vaccination, other strategies may be sufficient or more advisable [33]. Potential negative effects need to be carefully considered by policymakers and these include rejection by those who are ambivalent or unfavourable, anger from those that feel their freedom to act is being curtailed (making them even more susceptible to anti-vaccination messages) and motivation for people to seek ways to opt out. Practical, legal and ethical issues also need to be considered.

Non-pharmaceutical interventions

Controlling transmission of SARS-CoV-2 in the community will reduce the risk of introducing SARS-CoV-2 into LTCFs, as well as the occurrence of outbreaks in these settings. NPIs such as physical distancing, hand and respiratory hygiene, environmental cleaning and disinfection, and wearing face masks remain essential elements of the public health response to COVID-19 [7]. National guidelines have set individual targets for COVID-19 vaccination coverage among LTCF residents and staff, which could allow communal activities or relaxation of some NPI measures in the facility. However, in light of the high rates of incomplete vaccination coverage in LTCFs, particularly among staff, and the rapid spread of the Delta VOC, NPIs need to be meticulously implemented in these settings. The use of face masks is advised for all LTCF staff whenever they are in contact with residents, particularly indoors [39]. Onward transmission of SARS-CoV-2 from fully vaccinated individuals can take place, especially when the Delta VOC is concerned, with potentially serious impact on fully vaccinated vulnerable individuals. However, taking into consideration the wellbeing and mental health needs of residents, a partial lifting of NPIs in one-on-one interactions between fully vaccinated staff and fully vaccinated residents could be considered. Use of NPIs among fully vaccinated staff members can follow existing ECDC guidance depending on their vulnerability status [39].

NPIs may also include minimising personal contact to prevent SARS-CoV-2 transmission within LTCFs, especially by ensuring that occupancy rates for common areas allow for appropriate physical distancing at all times and that such areas have proper ventilation [40,41].

For external visitors to LTCFs, the use of medical face masks should be strongly recommended [40], and both residents and visitors should practice appropriate hand hygiene. If required to fulfil mental health needs of LTCF residents, a partial lifting of NPIs in interactions between fully vaccinated family members and fully vaccinated residents could be considered. When possible, visits should take place outdoors or in areas with appropriate ventilation that, ideally, can be accessed without

traversing common areas. Physical distancing should also be practiced. Individuals with COVID-19-compatible symptoms should not visit LTCFs [13]. It should be noted that the implementation of horizontal NPIs, such as external visitor bans and no community activities, can have severe detrimental effects on the mental health of LTCF residents. Therefore, such measures should only be implemented as a last resort when all other measures have been ineffective in reducing community transmission and, if implemented, they should be carefully tailored to the needs of LTCF residents and the type of LTCF setting [42].

Infection prevention and control measures are essential and should be implemented following the indications provided by specific ECDC guidance [27]. LTCF staff in all facilities should have continued access to guidance and procedures on the prevention and control of COVID-19, as well as access to appropriate personal protective equipment, and each LTCF should have a designated lead for COVID-19 preparedness and response [13].

Use of rapid antigen detection tests, including self-tests, for screening asymptomatic individuals at the workplace has been adopted by several EU/EEA countries. This can be applied in LTCFs as a complementary measure to decrease the risk of introduction of SARS-CoV-2 by asymptomatic or pre-symptomatic LTCF staff and visitors. Positive results should be confirmed by reverse transcriptase-polymerase chain reaction (RT-PCR) and, in low-incidence regions, a sample of negative results should also be verified by RT-PCR to rule out false negatives [43,44]. ECDC, in collaboration with the European Agency for Safety and Health at Work (EU-OSHA), has published a technical report outlining considerations on the use of rapid antigen detection (including self-tests) for SARS-CoV-2 in occupational settings [43].

Control of outbreaks in LTCFs

Timely testing of LTCF residents and staff with COVID-19-compatible symptoms, through accessible testing and encouraging testing as soon as possible after symptom onset, remain important to enable rapid identification of cases and clusters of SARS-CoV-2 infection and initiation of contact tracing [12]. In LTCFs, testing, identification, managing and isolating COVID-19 positive cases [13], as well as contact tracing and quarantine of contacts according to current ECDC guidance, are essential to control outbreaks [45]. Investigation of clusters and outbreaks in LTCFs should continue to be a priority for EU/EEA countries.

Screening of LTCF residents and staff should be considered after the identification of one or more COVID-19 case to ensure the early detection and isolation or cohorting of additional asymptomatic and pre-symptomatic cases.

Sequencing of SARS-CoV-2 samples from outbreaks in LTCFs should be a priority, and should occur in parallel to the implementation of regular outbreak control measures. Sequencing facilitates more accurate risk assessments and is essential for monitoring the impact of various variants and vaccines' protective effect against them. If circulation of variants associated with significant reduction in vaccine effectiveness (especially against severe disease) is detected, stronger NPIs may be needed to complement full vaccination of LTCF residents and staff. This information can also be used to inform whether a booster vaccine dose should be recommended for LTCF residents and other vulnerable populations in the future.

EU/EEA countries are encouraged to continue reporting data on outbreaks in LTCFs to EpiPulse to facilitate more accurate conclusions. To this purpose, ECDC has developed a specific protocol, including a shortened version that can be used when there are resource constraints [46].

Limitations

This assessment is undertaken based on information known to ECDC at the time of publication and has several key limitations.

The epidemiological data used in this assessment was made available through surveillance reporting or publicly available websites. However, disease incidence and trends are dependent on local testing strategies and the sensitivity and specificity of surveillance systems.

Data on the outbreaks in LTCFs included in this RRA likely represent just a small proportion of the COVID-19 outbreaks in LTCFs in the EU/EEA. Detection, investigation and reporting of this type of outbreak is also dependent on local testing strategies and quality of surveillance systems. Currently, ECDC lacks sufficient data to identify a complete list of risk factors for SARS-CoV-2 infections and breakthrough infections in LTCFs.

COVID-19 vaccine uptake data for LTCF residents is reported consistently by only a limited number of EU/EEA countries and shows significant variability, while coverage data from some of the countries included in this report is missing. In addition, data on the vaccination coverage of LTCF staff is also missing at the EU/EEA level and the COVID-19 vaccine uptake data for healthcare workers cannot be used as a proxy for the vaccination coverage of all LTCF staff.

It is also important to consider the lag time between infection, symptoms, diagnosis, case notification, outbreak investigation and reporting of LTCF outbreaks at the European level. This assessment is based on the outbreaks reported at the time of writing, although it is expected that many more outbreaks in LTCF settings may have occurred during its preparation.

Source and date of request

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All experts have submitted declarations of interest, and a review of these declarations did not reveal any conflicts of interest.

Disclaimer

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Annex 1. COVID-19 cases among LTCF staff and residents, by VOC, vaccination status, severity and outbreak onset, in seven EU/EEA countries

Country (ISO - progressive number)		FI - 1	FI - 2	LU - 1	LU - 2	NO - 1	DE - 1	NO - 2	LU - 3	LU - 4
VOCs detected		Alpha	Beta	Alpha, Beta	Alpha, Beta	Beta	Alpha	Beta	Alpha	Alpha
First case detected (2021) (dd/mm)		08/02	27/02	05/03	09/03	26/03	27/03	03/04	16/04	02/05
Residents										
Total residents	N	22	19	92	276	16	45	19	94	70
Vaccination status¹										
Fully vaccinated	N (%)	0	17 (89.5)	65 (70.7)	255 (92.4)	16 (100)	40 (88.9)	18 (94.7)	87 (92.6)	63 (90)
Partially vaccinated or unvaccinated	N (%)	22 (100)	2 (10.5)	27 (29.3)	21 (7.6)	0	5 (11.1)	1 (5.3)	7 (7.4)	7 (10)
Cases²		6	9	28	43	7	19	8	22	5
Among fully vaccinated residents	N (%)	0	9 (52.9)	19 (29.2)	41 (16.1)	7 (43.6)	18 (45)	8 (44.4)	18 (20.7)	3 (7.9)
Among partially vaccinated and unvaccinated residents	N (%)	6 (27.3)	0	9 (39.1)	2 (9.5)	0	1 (20)	0	4 (57.1)	2 (28.6)
Hospitalisations³										
Among fully vaccinated cases	N (%)	0	0	0	3 (7.3)	1 (14.3)	4 (22.2)	2 (25)	0	0
Among partially vaccinated and unvaccinated cases	N (%)	1 (16.7)	0	2 (22.2)	1 (50)	0	0	0	0	1 (50)
Deaths³										
Among fully vaccinated cases	N (%)	0	2 (22.2)	2 (10.5)	2 (4.9)	2 (28.6)	7 (38.9)	1 (12.5)	2 (11.1)	0
Among partially vaccinated and unvaccinated cases	N (%)	2 (33.3)	0	3 (33.3)	2 (100)	0	0	0	0	1 (50)
Staff										
Total staff	N	31⁴	34	120	340	NA	54	>20	166	119
Vaccination status¹										
Fully vaccinated	N (%)	4 (16.7)	16 (47.1)	80 (66.7) ⁵	194 (57.1) ⁵	NA	40 (74.1)	NA	40 (24.1) ⁵	77 (64.7) ⁵
Partially vaccinated or unvaccinated	N (%)	20 (83.3)	18 (52.9)	40 (33.3) ⁵	146 (42.9) ⁵	NA	14 (25.9)	NA	126 (76) ⁵	42 (35.3) ⁵
Cases²		7⁴	6	11	13	5	7	9	12	1
Among fully vaccinated staff	N (%)	0	1 (6.3)	0	2 (1)	0	4 (10)	4	2 (5)	0
Among partially vaccinated and unvaccinated staff	N (%)	2 (10.0)	5 (27.8)	11 (27.5)	11 (7.5)	5	3 (21.4)	5	10 (7.9)	1 (2.4)

BE: Belgium; DE: Germany; FI: Finland; LU: Luxembourg; NA: not available; NO: Norway; PT: Portugal (PT).

¹ Percentages are calculated by dividing the number of vaccinated residents and staff by the total number of residents and staff with known vaccination status, or by dividing the number of partially vaccinated or unvaccinated residents and staff by the total number of residents and staff with known vaccination status.

² Percentages are calculated by dividing the number of cases among vaccinated residents and staff by the number of vaccinated residents and staff, or by dividing the number of cases among partially vaccinated or unvaccinated residents and staff by the number of partially vaccinated or unvaccinated residents and staff.

³ Percentages are calculated by dividing the number of hospitalisations and deaths among vaccinated residents by the number of cases among vaccinated residents, or by dividing the number of hospitalisations and deaths among partially vaccinated or unvaccinated residents by the number of cases among partially vaccinated or unvaccinated residents.

⁴ In the FI 1 outbreak, the vaccination status of staff is only known for 24 out of 31 staff members. There were a total of seven cases among staff, but vaccination status is only known for two staff members.

⁵ In the LU 1-4 outbreaks, the staff vaccination figures are an estimate, as LTCFs do not have the right to ask about the vaccination status of their staff due to data protection reasons.

Annex 1. (continued) COVID-19 cases among LTCF staff and residents, by VOC, vaccination status, severity and outbreak onset, in seven EU/EEA countries

Country (ISO - progressive number)		DE - 2	BE - 1	BE - 2	PT - 1	PT - 2	PT - 3 ⁶	PT - 4 ⁶	PT - 5 ⁶	PT - 6 ⁶	Cumulative
VOCs detected		Alpha	Alpha, Delta	Gamma	Delta	Delta	NA	NA	NA	NA	NA
First case detected (2021) (dd/mm)		08/05	17/05	20/05	09/06	12/06	28/06	02/07	02/07	07/07	NA
Residents											
Total residents	N	53	119	29	21	54	47	13	60	15	1 064
Vaccination status¹											
Fully vaccinated	N (%)	38 (71.7)	115 (96.6)	26 (89.7)	20 (95.2)	43 (79.6)	47 (100)	8 (72.7)	60 (100)	15 (100)	933 (87.9)
Partially vaccinated or unvaccinated	N (%)	15 (28.3)	4 (3.4)	3 (10.3)	1 (4.8)	11 (20.4)	0	3 (27.2)	0	0	129 (12.1)
Cases²		29	73	23	16	20	24	11	27	14	384
Among fully vaccinated residents	N (%)	23 (60.5)	NA	21 (80.8)	16 (80)	15 (34.9)	24 (51.1)	7 (70)	27 (45)	14 (93.3)	270 (28.9)
Among partially vaccinated and unvaccinated residents	N (%)	6 (40)	NA	2 (66.7)	0	5 (45.5)	0	3 (30)	0	0	40 (31)
Hospitalisations³		8	14	3	4	2	2	2	0	1	51
Among fully vaccinated cases	N (%)	5 (21.7)	NA	3 (14.3)	4 (25)	1 (6.7)	2 (8.3)	2 (28.6)	0	1 (7.1)	28 (10.4)
Among partially vaccinated and unvaccinated cases	N (%)	3 (50)	NA	0	0	1 (20)	0	0	0	0	9 (22.5)
Deaths³		5	14	7	4	1	0	1	0	1	59
Among fully vaccinated cases	N (%)	2 (8.7)	NA	7 (33.3)	4 (25)	0	0	1 (14.3)	0	1 (7.1)	33 (12.2)
Among partially vaccinated and unvaccinated cases	N (%)	3 (50)	NA	0	0	1 (20)	0	0	0	0	12 (30)
Staff											
Total staff	N	40	138	17	13	33	37	5	75	8	1 250
Vaccination status¹											
Fully vaccinated	N (%)	28 (70)	107 (77.5)	10 (58.8)	4 (30.8)	20 (60.6)	28 (75.7)	4 (100)	72 (96)	8 (100)	732 (59.9)
Partially vaccinated or unvaccinated	N (%)	12 (30)	31 (22.5)	7 (41.2)	9 (69.2)	13 (39.4)	9 (24.3)	0	3 (4)	0	490 (40.1)
Cases²		11	27	0	6	10	15	1	14	4	159
Among fully vaccinated staff	N (%)	4 (14.3)	16 (15)	0	2 (50)	4 (20)	8 (28.6)	1 (25)	11 (15.3)	4 (50)	63 (8.6)
Among partially vaccinated and unvaccinated staff	N (%)	7 (58.3)	11 (35.5)	0	4 (44.4)	6 (46.2)	7 (77.8)	0	3 (100)	0	91 (18.6)

BE: Belgium; DE: Germany; FI: Finland; LU: Luxembourg; NO: Norway; PT: Portugal (PT); NA: not available

¹ Percentages are calculated by dividing the number of vaccinated residents and staff by the total number of residents and staff with known vaccination status, or by dividing the number of partially vaccinated or unvaccinated residents and staff by the total number of residents and staff with known vaccination status.

² Percentages are calculated by dividing the number of cases among vaccinated residents and staff by the number of vaccinated residents and staff, or by dividing the number of cases among partially vaccinated or unvaccinated residents and staff by the number of partially vaccinated or unvaccinated residents and staff.

³ Percentages are calculated by dividing the number of hospitalisations and deaths among vaccinated residents by the number of cases among vaccinated residents, or by dividing the number of hospitalisations and deaths among partially vaccinated or unvaccinated residents by the number of cases among partially vaccinated or unvaccinated residents.

⁴ In the FI 1 outbreak, the vaccination status of staff is only known for 24 out of 31 staff members. There were a total of seven cases among staff, but vaccination status is only known for two staff members.

⁵ In the LU 1-4 outbreaks, the staff vaccination figures are an estimate, as LTCFs do not have the right to ask about the vaccination status of their staff due to data protection reasons.

⁶ The PT 4, PT 5 and PT 6 outbreaks are ongoing. For the PT 4 outbreak, data on the vaccination status of LTCF residents and staff are incomplete.