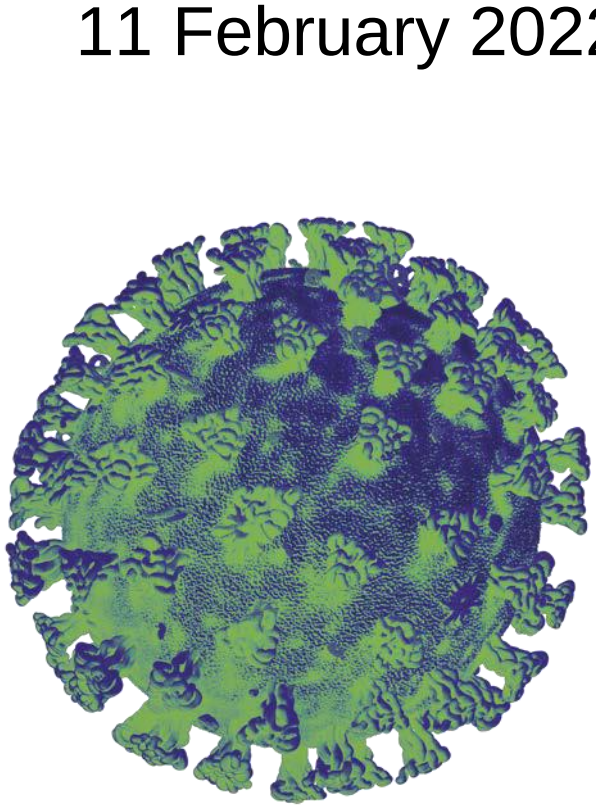
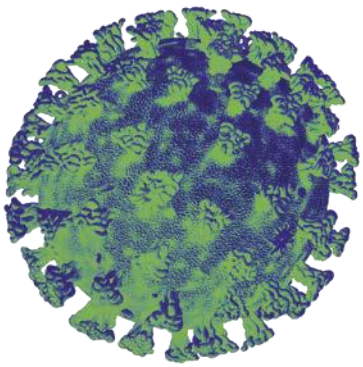
Llywodraeth Cymru
Welsh Government

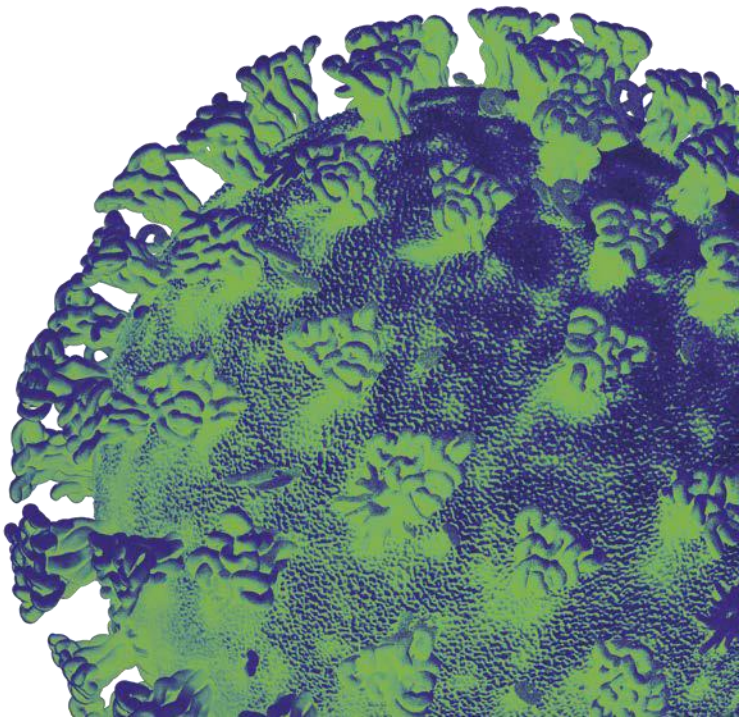
Technical Advisory Group

Policy modelling update

11 February 2022







Policy modelling update 11 February 2022

Welsh Government COVID-19 TAG Policy Modelling Subgroup

- This is the latest in a series of papers on modelling the pandemic in Wales. The previous COVID-19 modelling update published in January used modelling that was run in January 2022. Since then, the Swansea University models have been re-run using updated data and assumptions based on the Omicron Variant. For additional information on the previous modelling run please see the previous paper.[1] Further information on the model assumptions are listed in the annex.

- The latest scenarios are based on Wales being at Alert level 2 for 4 weeks from 26th December before moving to Alert level 0.[2] Contact rates have been lower than expected at Alert level 2, and may have been further reduced by substantial numbers being in isolation (**likely**). More recent contact rates were closer to expected (including those observed during Alert level 0), as is reflected in a sharp decline in the New Year with a following small rebound in prevalence. Case rates have been high in school aged children with some resonance in cases in age groups that are likely to be parents of these children (**likely**).

- Each scenario was run for varying levels of vaccine effectiveness, from 60% to 80% vaccine effectiveness against infections.

- This paper also includes an analysis of staff absence due to COVID-19 and considers how it compares with the ONS COVID-19 infection survey estimates. The Swansea University models are included in this paper to estimate the future trajectory of future NHS absence levels.

- Rates of NHS staff absence due to COVID-19 and due to self-isolation each have closely followed COVID-19 prevalence estimates for Wales since November 2020 (as measured by the ONS COVID-19 Infection Survey[3]. Prevalence estimates for Wales are not available prior to that date).

- The modelled scenarios in this paper estimate that NHS staff absence levels due to COVID-19, due to self-isolation, and due to all reasons, will reduce until the end of March 2022 (**highly likely**). There are too many uncertainties to reliably estimate what may happen after this date.

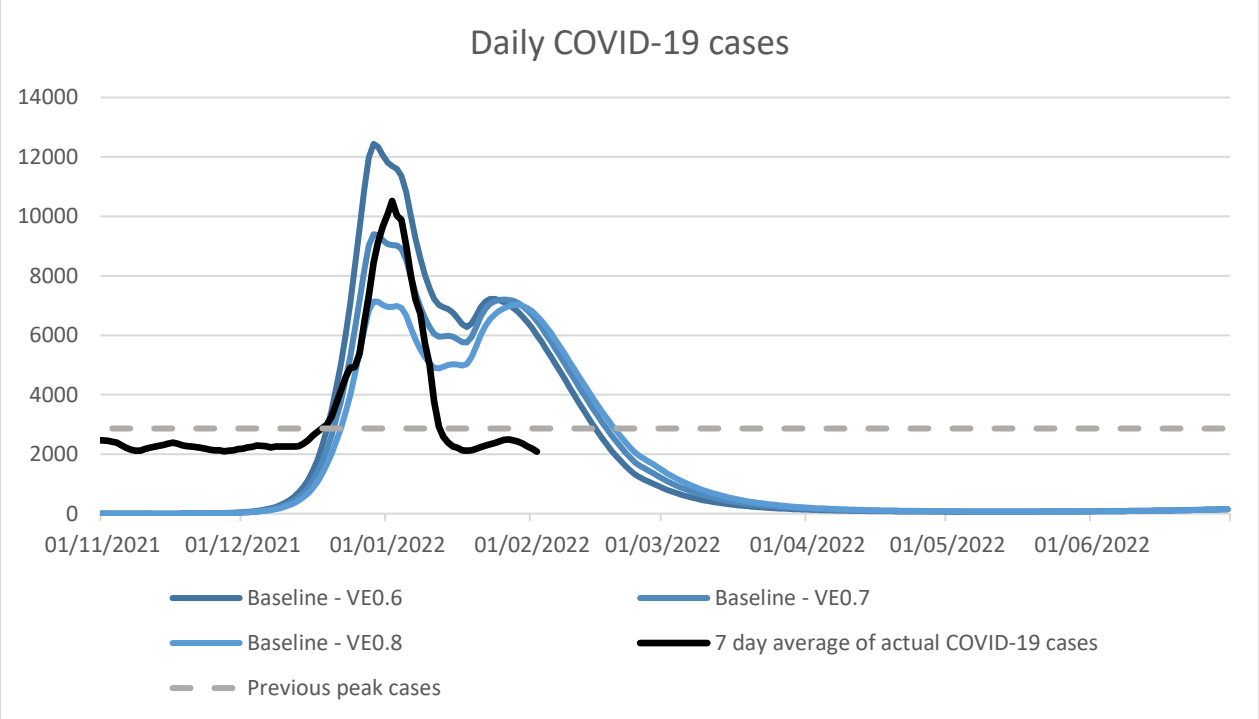
- The impact of long COVID may have caused an increase in long term sickness absence (**likely**). [4]

Modelling Scenarios

[1] Technical Advisory Group: policy modelling update 11 January 2022 | GOV.WALES
[2] Wales completes move to alert level zero (gov.wales)
[3] Coronavirus (COVID-19) Infection Survey: Wales - Office for National Statistics
[4] https://phw.nhs.wales/services-and-teams/healthy-working-wales/covid-19-information-and-advice-to-support-employers-and-employees/health-wellbeing/long-covid-post-covid-19-syndrome/

- The following scenarios were produced to assist with planning. They are not intended to predict what will happen but provide scenarios of what could happen. They are intended to be short-term scenarios with the aim of updating them regularly as the picture changes in light of new data, information, assumptions or variants. These scenarios are still uncertain and should only be used for predicting the next 3 weeks. Longer term scenarios are determined by characteristics of waning immunity and variant evolution.
- Note that the model scenarios shown here are for Omicron wave only; the cases start from zero and go back to low levels. In reality we may see new variants with different profiles of immune escape, transmissibility and severity.
- A rapid decline in prevalence in early January was observed. This was followed by a small rebound, which was estimated under all vaccine efficacy scenarios; this reflects the move to Alert level 0.
- The following charts show the scenarios for COVID-19 cases, hospital admissions, hospital bed occupancy and deaths. The scenarios use the “baseline” assumptions of contact rates, infection rates, admissions and deaths detailed in the annex. In the following charts, ‘VE’ refers to the vaccine effectiveness and 0.6, 0.7 and 0.8 refers to a baseline vaccine effectiveness of 60%, 70%, and 80% against COVID-19 infection respectively, which is lower with the Omicron variant.

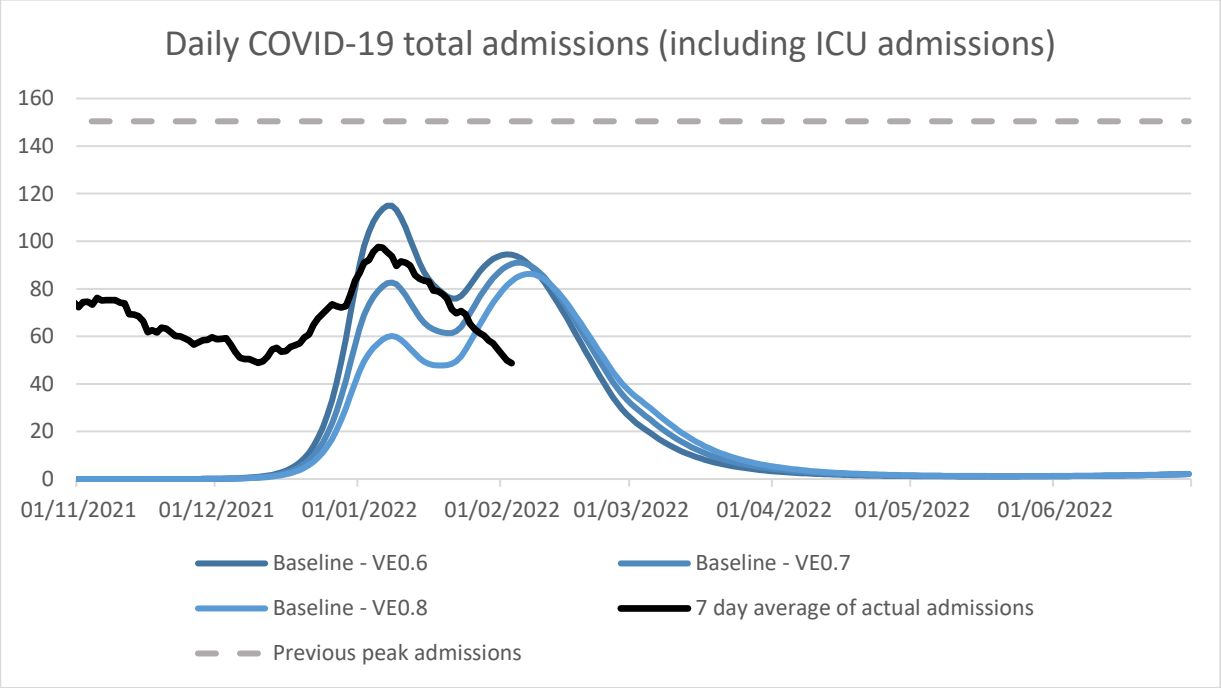
Figure 1: Estimated and actual daily COVID-19 cases in Wales



Source: Swansea University modelling

- The modelled scenarios show a continuing decline in cases although this may be impacted by lower levels of actual infection (lower underlying immunity in the population) and waning in immunity over time.

Figure 2: Estimated and actual daily confirmed COVID-19 admissions in Wales due to the Omicron variant

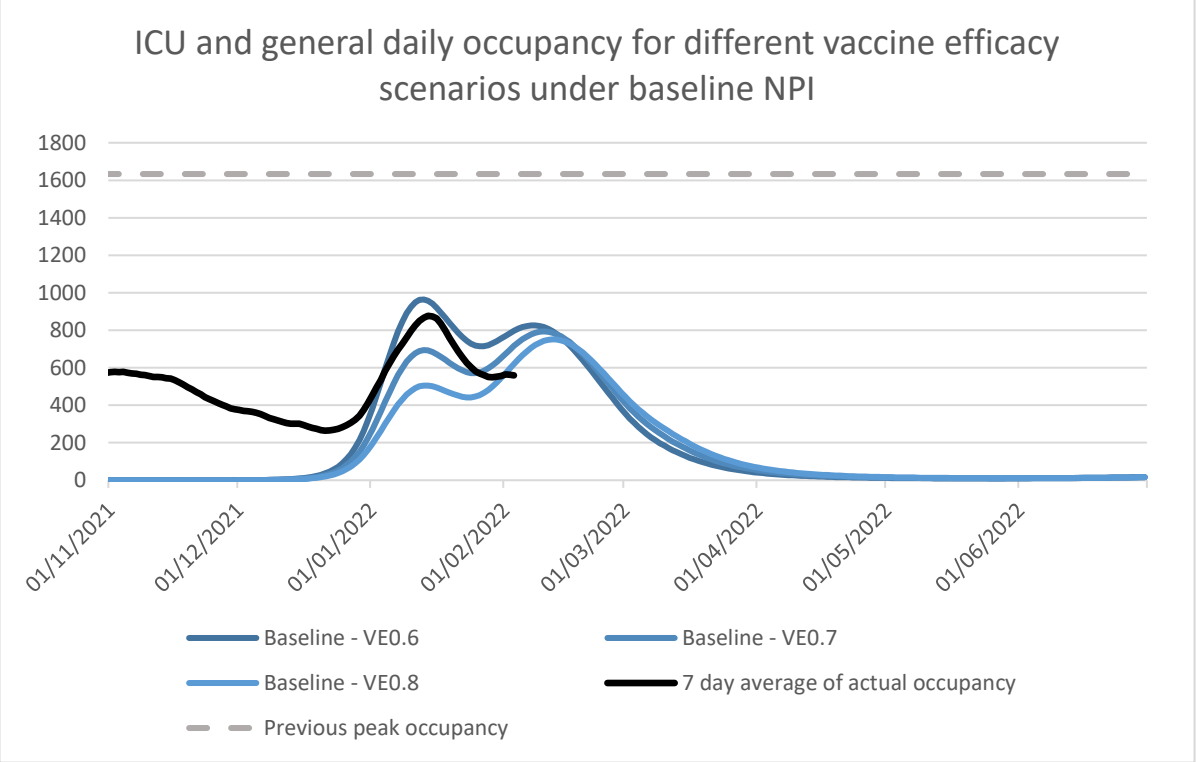


Source: Swansea University modelling

- Hospital admissions for COVID-19 patients have remained below the previous peak and have been declining since the beginning of January (as at 03/02/22). This is due to underlying population immunity and the lower inherent severity of omicron when compared with other variants (**high confidence**). [5]
- The modelled scenarios show an increase in admissions in the short term although this is dependent on an increase in cases which may not occur.
- The long term admissions scenarios show a declining rate of hospital admissions.

[5] https://www.cdc.gov/coronavirus/2019-ncov/variants/omicron-variant.html

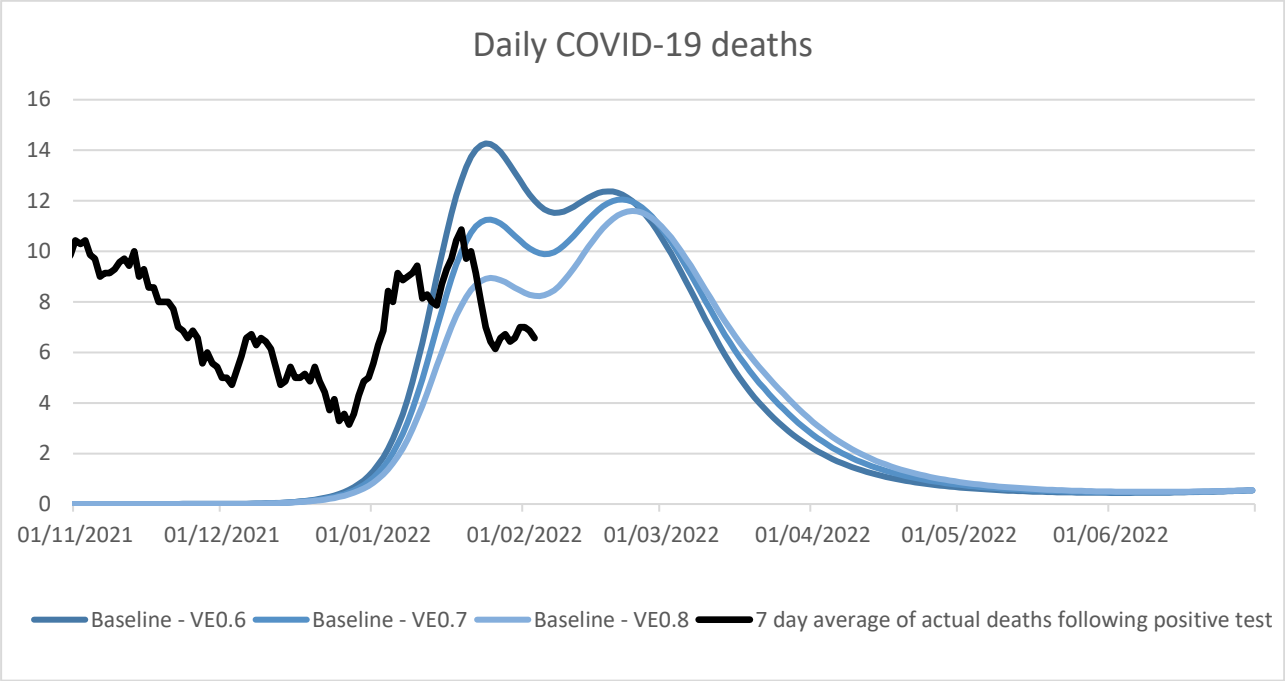
Figure 3: Estimated daily total COVID-19 hospital bed occupancy in Wales due to the Omicron variant



Source: Swansea University modelling

- Hospital occupancy of COVID-19 patients has remained significantly below the previous peak although has remained high (as at 03/02/22). Occupancy has been lower than in previous peaks of the pandemic which mainly reflects the rate of hospital cases. Occupancy may also reflect shorter lengths of stay for covid community acquired cases, but this may be counterweighted by more nosocomial cases who may have who may have longer length of stay (**low confidence**).
- The modelled scenarios show occupancy declining although this is dependent on declining cases and admissions.
- There are significant strains on hospital resources in the COVID-19 pandemic; for more information on this please see NHS activity and capacity during the coronavirus (COVID-19) pandemic.

Figure 4: Estimated daily total COVID-19 deaths in Wales due to the Omicron variant



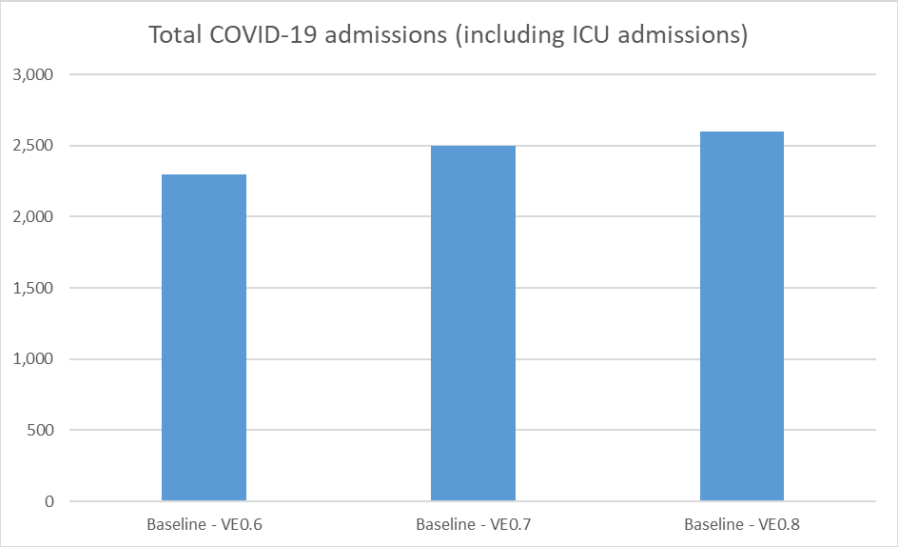
Source: Swansea University modelling

- Deaths have remained below the peak reached last winter of 48 deaths a day, however there are still a significant number of daily deaths related to COVID-19 in Wales.
- The modelled scenarios show the level of deaths remaining high until early March, after which they decline.
- Actual deaths and occupancy levels are currently (as at 03/02/22) below the modelled scenarios; if this continues then the future number of deaths may be lower than the modelled totals for the time period.

Totals and daily peaks (Between 1 February 2022 and 30 June 2022)

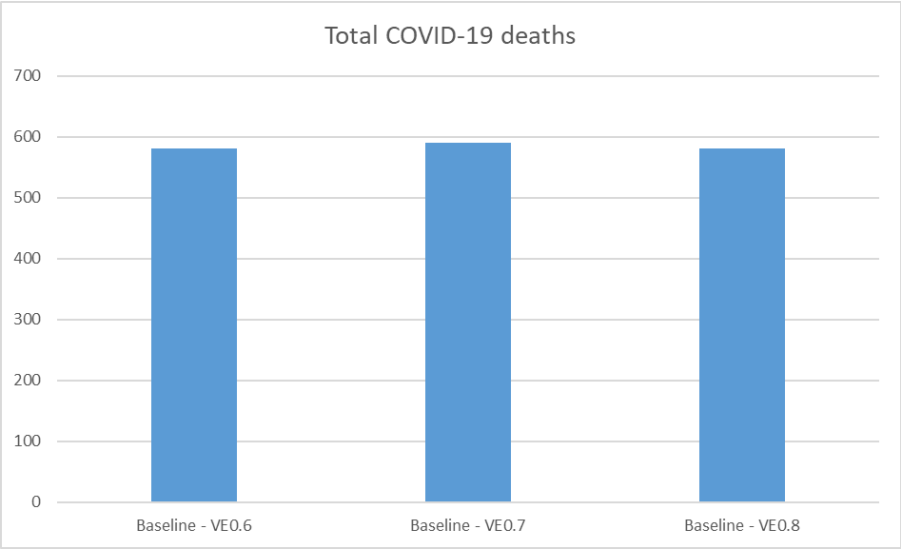
- The number of COVID-19 hospital admissions estimated per day is a key metric for planning to ensure the NHS in Wales can meet demand. The peak number of daily COVID-19 admissions was estimated to reach 91 on 5 February 2022 assuming 70% vaccine efficacy.
- Between 1 February 2022 and 30 June 2022, there are an estimated 2,300 to 2,600 COVID-19 admissions and 580-590 COVID-19 deaths.

Figure 4: The estimated total number of confirmed COVID-19 hospital admissions between 1 February 2022 and 30 June 2022, Wales



Source: Swansea University modelling

Figure 5: The estimated total number of confirmed COVID-19 hospital admissions between 1 February 2022 and 30 June 2022, Wales



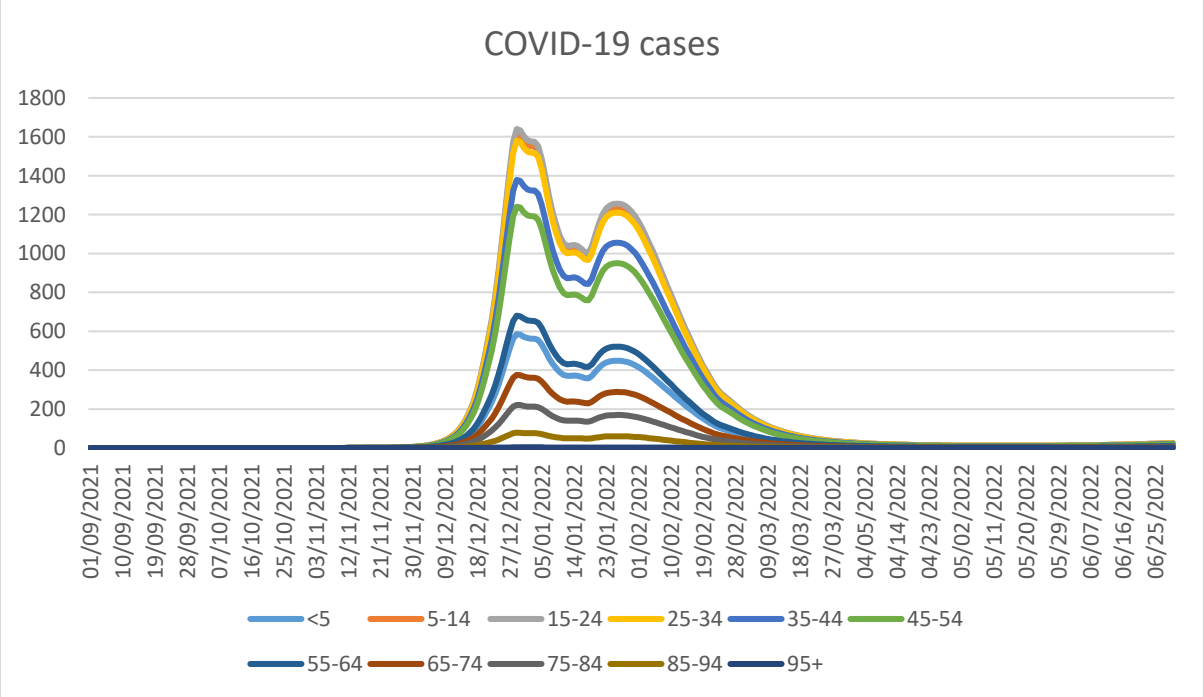
Source: Swansea University modelling

Modelling by age band

- The modelled scenarios for Wales have been grouped by age band. The outputs per age group was approximated by apportioning the Wales level modelling outputs using the actual age band splits of COVID-19 cases, hospital admissions, ICU admissions and deaths data from Public Health Wales.
- Note that increased numbers of cases in younger age bands is likely to be due to the testing requirements of the school-aged children, whereas hospital and ICU admissions and deaths occur more in older age groups.

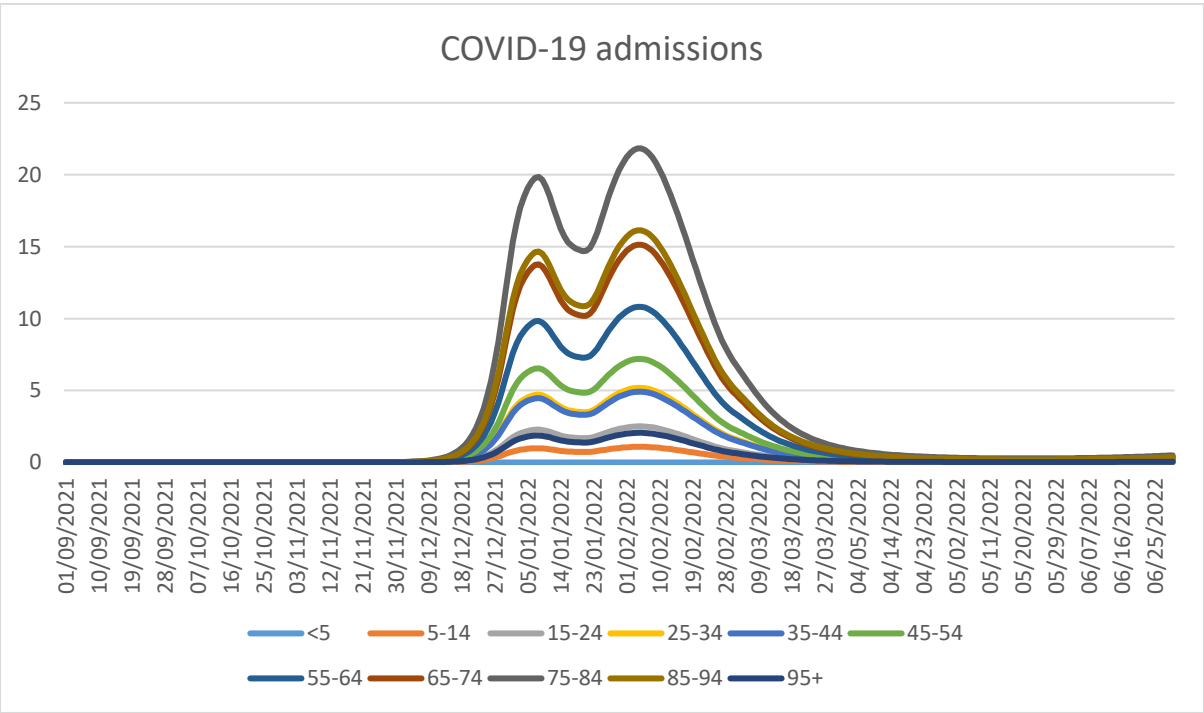
- The charts shown below (by age bands) consider only the 70% vaccine efficacy scenario.

Figure 6: Modelled COVID-19 case numbers by age groupings (in years)



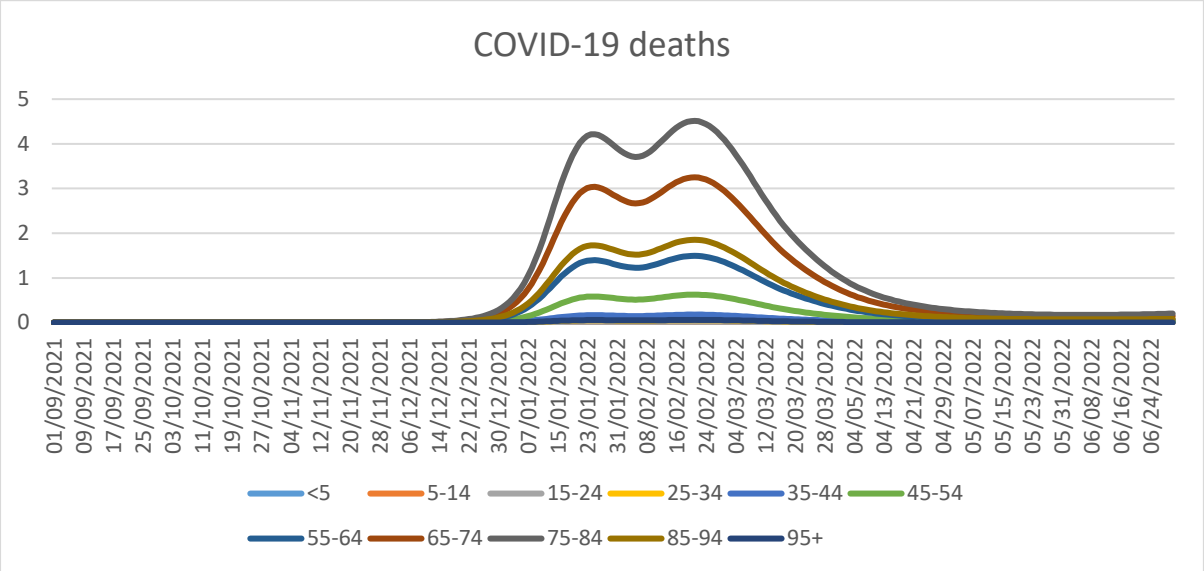
Source: Swansea University modelling and PHW

Figure 7: Modelled COVID-19 hospital admissions numbers by age groupings



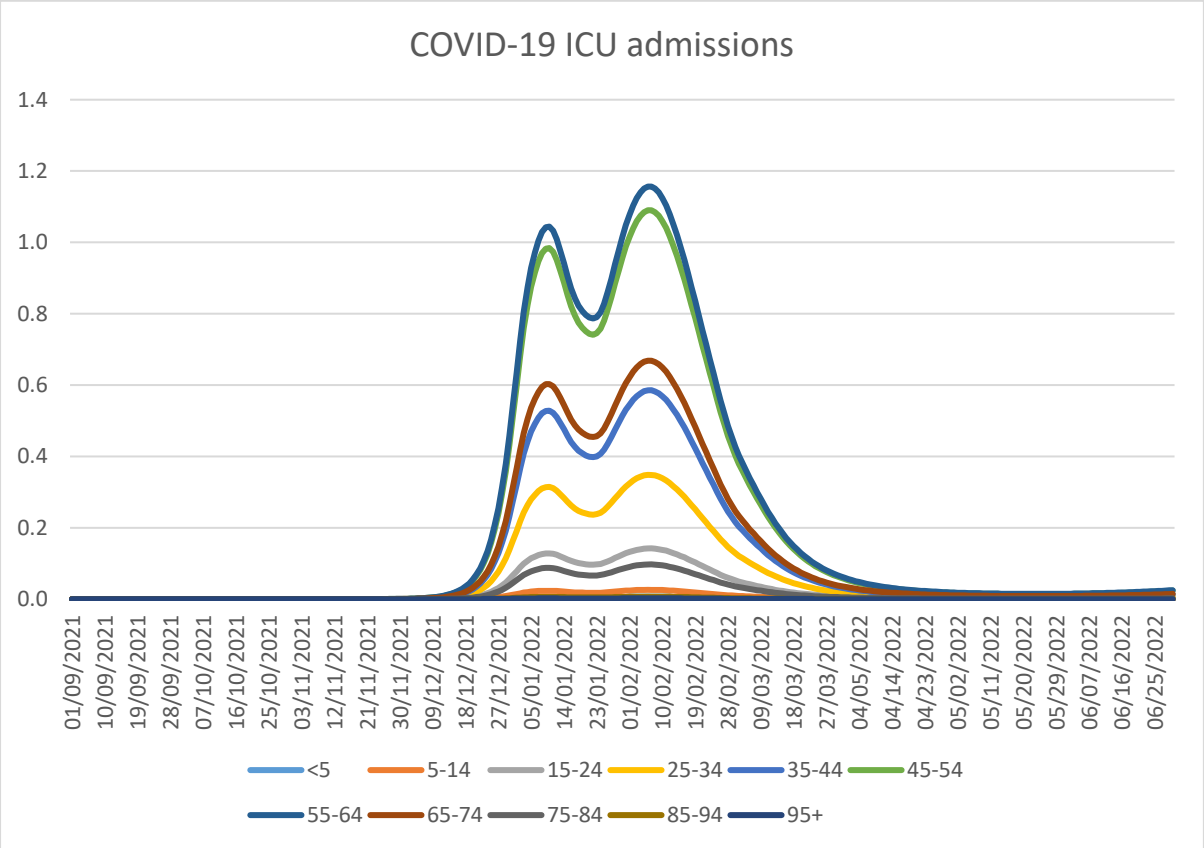
Source: Swansea University modelling and PHW

Figure 8: Modelled COVID-19 deaths by age groupings



Source: Swansea University modelling and PHW

Figure 9: Modelled COVID-19 ICU admissions by age groupings

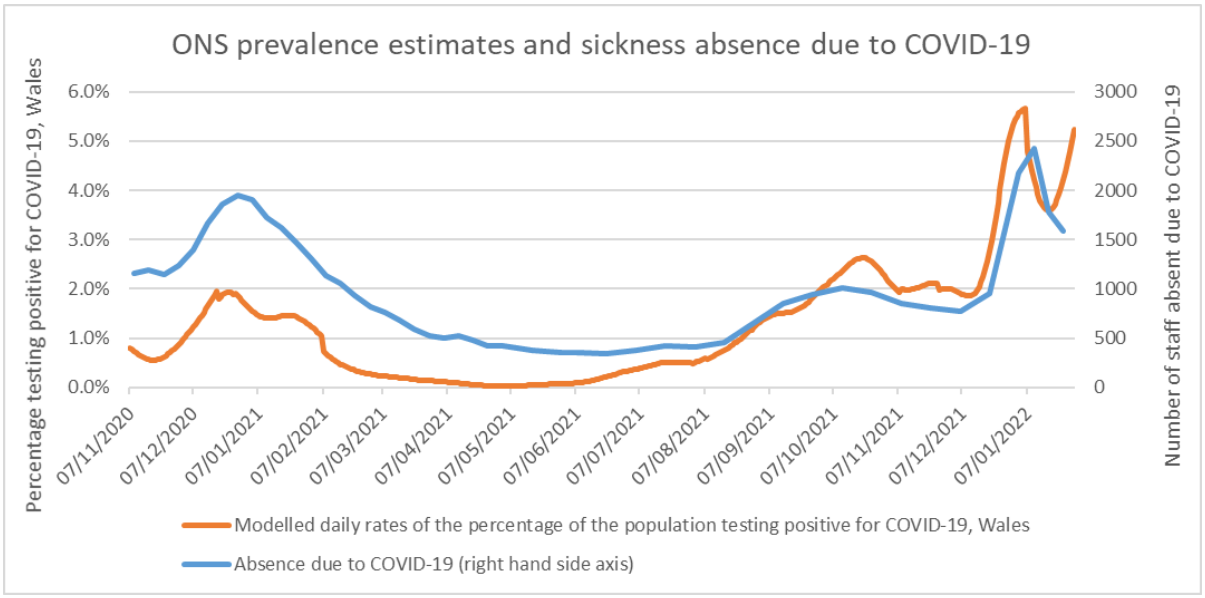


Source: Swansea University modelling and PHW

Community prevalence compared with NHS staff absence

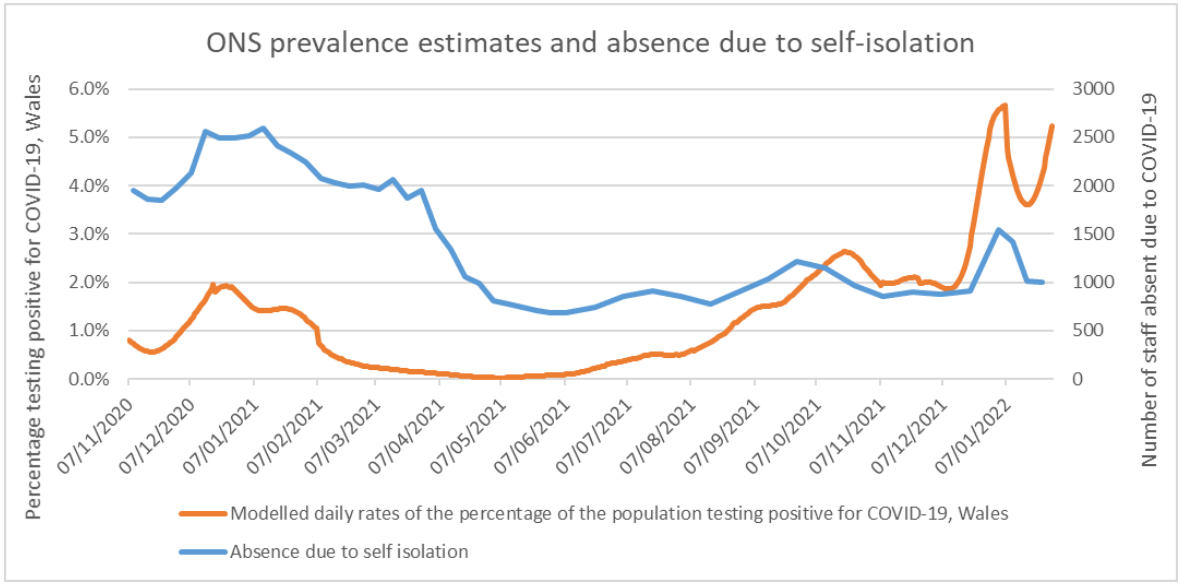
The following charts show the estimated percentage of the population testing positive for COVID-19 in Wales from the ONS COVID-19 Infection Survey (CIS) compared with various types of NHS staff absence from November 2021 to February 2022

Figure 1: Comparison of ONS prevalence data and NHS staff COVID-19 sickness absence



- The comparison of current rates of the overall population testing positive for COVID-19 from ONS (prevalence) and the numbers of NHS staff absences due to COVID-19 demonstrate that both show a similar pattern, with a recent peak in both in January of this year.

Figure 2: Comparison of ONS prevalence data and NHS staff self-isolation absence



- The recent peak in numbers of NHS staff absent due to self-isolation is lower than that observed during the peak in late 2020 to early 2021. This is likely to be due,

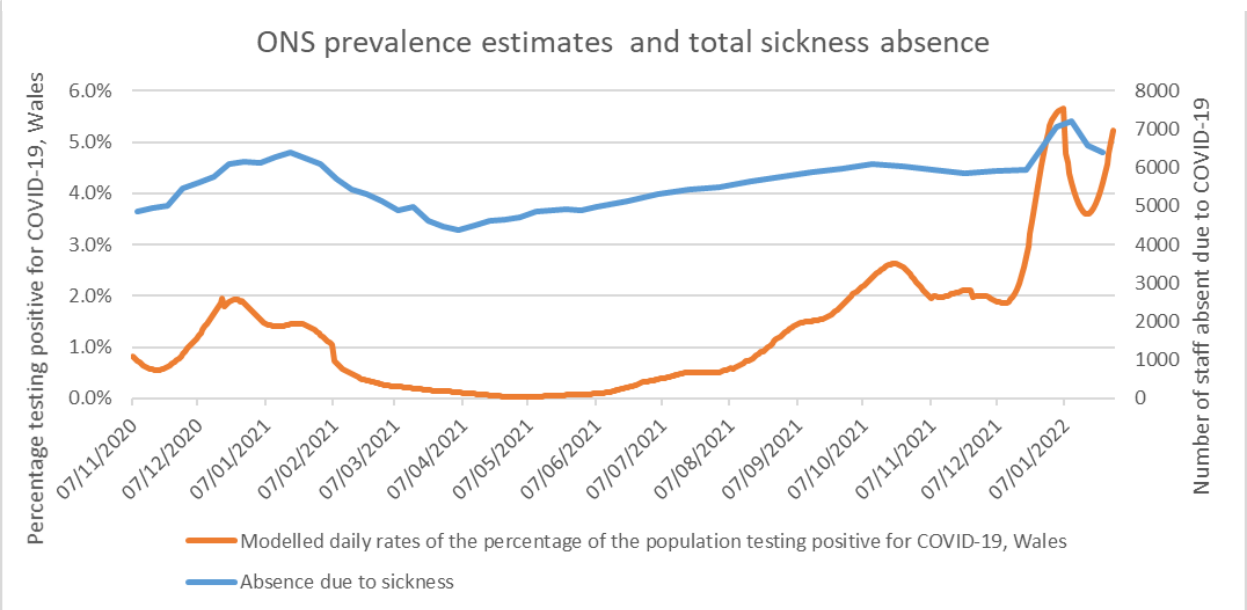
in part, to the reduction in the self-isolation period from 14 days to 10 days on 10 December 2020, and then reduced further to 7 days on 31 December 2021, and then to 5 days following negative lateral flow tests on 28 January 2022. This is likely to explain why a higher number of NHS staff were absent due to COVID-19 in the recent wave even though those absent due to self-isolation is lower in this recent wave compared to the last.

- The trend in numbers of staff absent due to all types of sickness is less sensitive to sharp changes in prevalence than absence due to COVID-19 and self-isolation only.

Modelling scenarios – Estimated NHS staff absence

- The following scenarios are based on the latest COVID-19 models produced by Swansea University[6]. The scenarios for future staff absences use actual NHS staff absence data to the 7 February 2022 from organisations within NHS Wales, then estimate future staff absence based on the patterns of modelled COVID-19 cases.
- As the COVID-19 (symptomatic) cases increased steeply throughout December 2021, so did the number of NHS staff absent from work due to COVID-19 and due to self-isolation. However, the increases in NHS staff absence due to COVID-19 was less steep and began about a week after COVID-19 cases began to increase.

Figure 3: Comparison of ONS prevalence data and total NHS staff absence

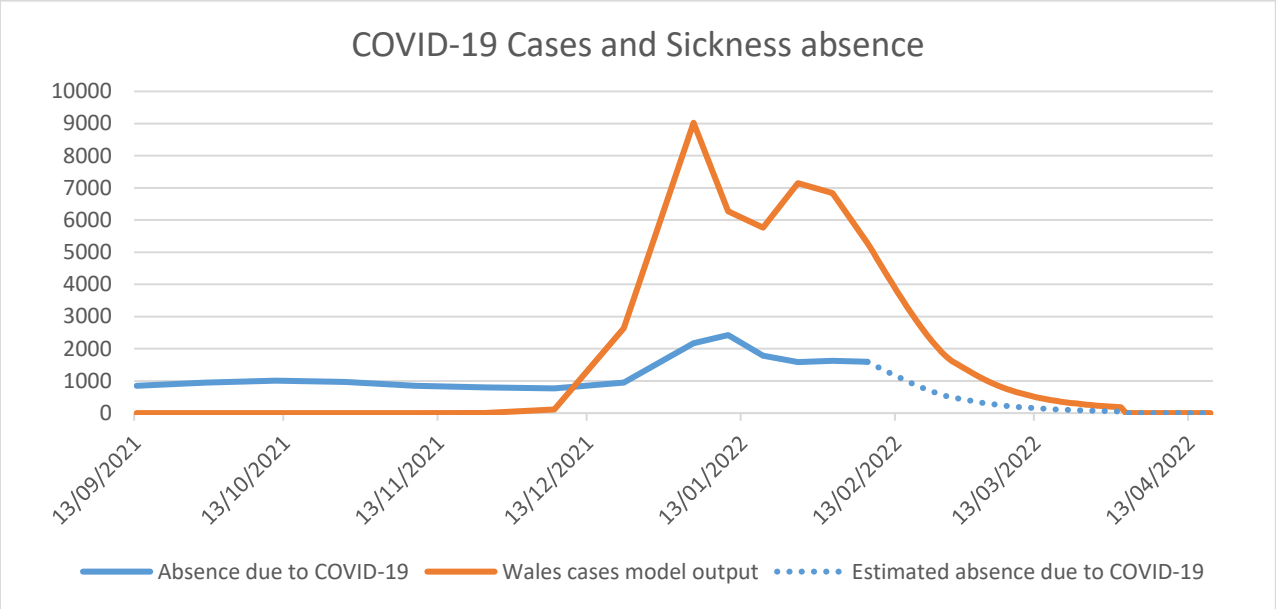


- Also, the peak number of NHS staff absences observed occurred a week after the peak COVID-19 (symptomatic) cases was estimated to occur on 3 January 2022. Similarly, the decrease in estimated COVID-19 (symptomatic) cases was followed by a decrease in staff absences about a week later.

[6] The most recent COVID-19 policy modelling paper published in January 2022 can be found here.

- The impact of long COVID will also have affected staff absences, and will especially have caused an increase in long term sickness absence. [7]
- The modelled scenario estimated a rebound in COVID-19 cases, partly due to the increase in contact rates due to the move to Alert level 0. This trend is not yet observed in the staff absence data (see figure 4) i.e. there was no rebound in sickness absences but rather slight levelling off of COVID-19 sickness absence.
- It should be noted that the models currently only consider prevalence based on modelling of the omicron variant and end at zero; in reality we expect some level of continued prevalence (whether due to omicron, delta or some other variant) and therefore continued low level of staff absence due to COVID-19 sickness. Additionally, any future variants could lead to high levels of prevalence and therefore perhaps further staff absences in future.

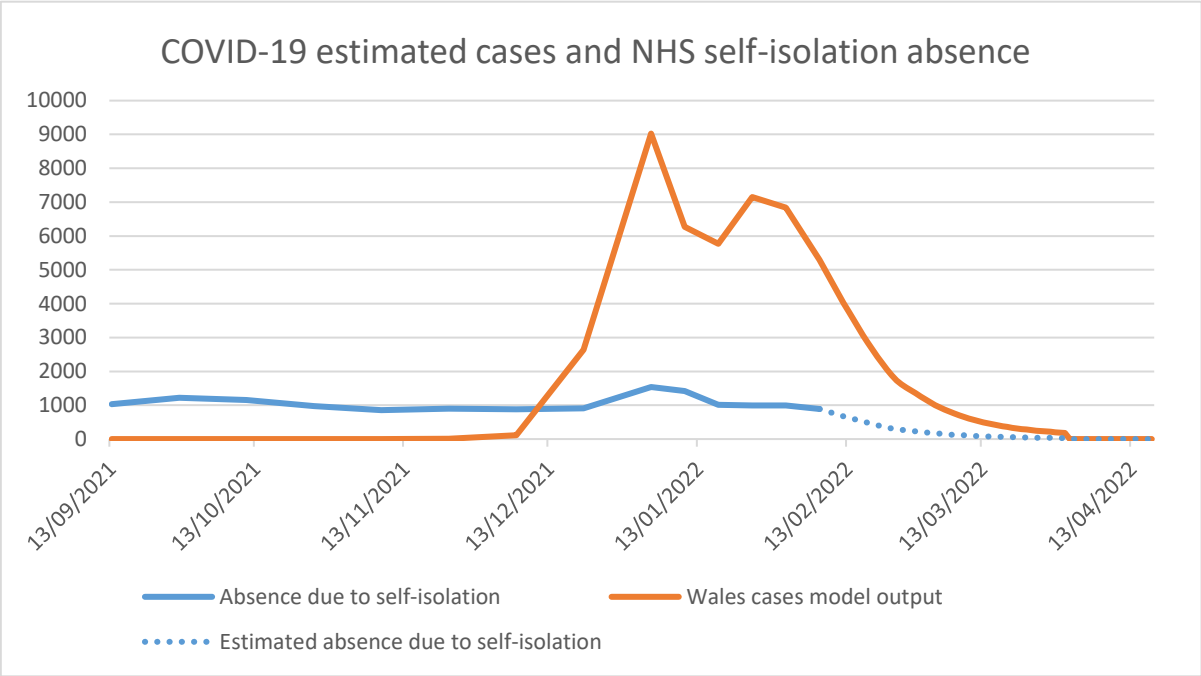
Figure 4: Estimated daily total COVID-19 cases and NHS staff absences



[7] https://phw.nhs.wales/services-and-teams/healthy-working-wales/covid-19-information-and-advice-to-support-employers-and-employees/health-wellbeing/long-covid-post-covid-19-syndrome/

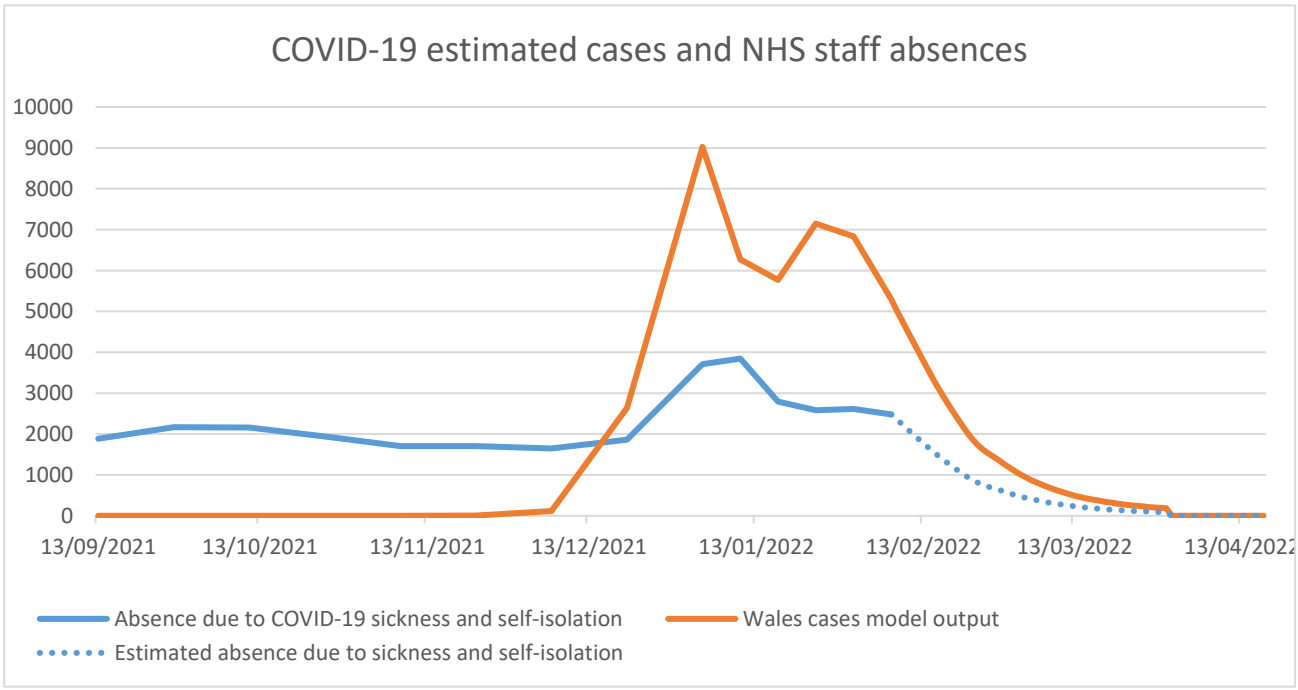
- The following chart shows estimated daily total COVID-19 (symptomatic) cases in orange with numbers of NHS staff off sick due to COVID-19 in blue.

Figure 5: Estimated daily total COVID-19 cases and NHS absence due to isolation



- The following chart shows estimated daily total COVID-19 cases in orange with numbers of staff isolated in blue.

Figure 6: Estimated daily total COVID-19 cases and NHS staff absence due to COVID-19 sickness and self- isolation



Annex

Further model assumptions and information

The Swansea University epidemiological model uses a SEIR model to estimate levels of infection, hospitalisation and death

To calibrate the Swansea University epidemiological models to the Omicron variant, the following updates were made:

- An R_0 of 6.75 was assumed. This was based on the doubling time of three days observed by mid-December. An additional seeding in late November was added to generate the date where the majority of cases were Omicron.
- To take account of the possibility of increased reinfection rates due to immune evasion which may occur due to the Omicron variant, an immune evasion parameter of 40% is set. This is accomplished by setting a starting condition where a percentage of those who have had previous exposure to COVID-19 and/or a vaccination retain their immunity.
- The case to hospitalisation ratios (CHR) of 1% (which represents the lower of the scenarios in previous model runs where the higher CHR was set at 2.5%). An increase in asymptomatic infections compared to Delta was assumed (+25%). The ICU parameter was un-calibrated and set at an additional protection of 20%. The death parameter was also un-calibrated and assumed an additional 10% reduction in COVID-19 ICU hospitalisations which later died.
- The vaccination booster roll out uses data to 8 December 2021 and assumes 45,000 per day thereafter.
- The vaccine efficacy against infection was assumed to be 60-80% in the modelling scenarios shown in this paper with 85-95% vaccine efficacy assumption against severe events.

Probabilistic language

ICJU uses the PHIA probability yardstick when making an assessment to provide clarity on the associated levels of uncertainty. The terms used correspond to the following ranges: