

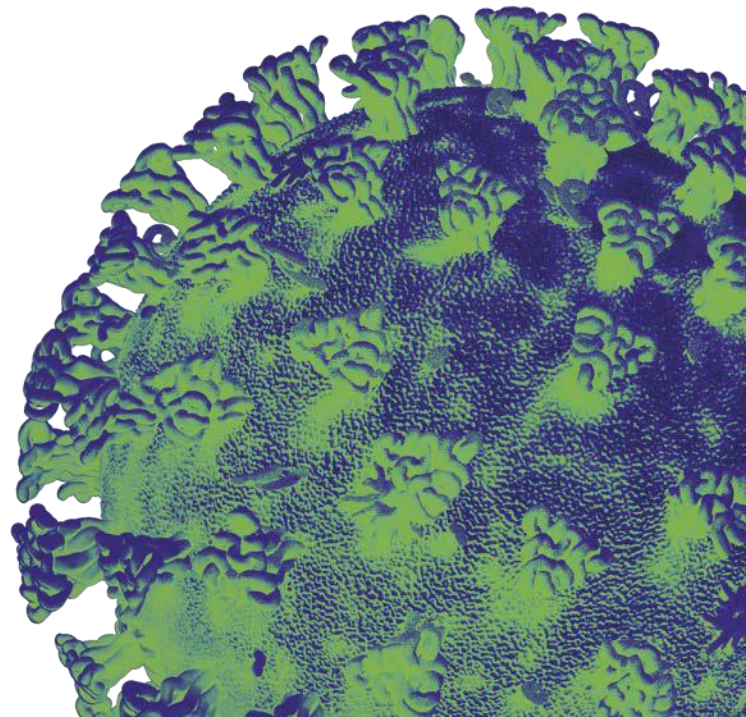
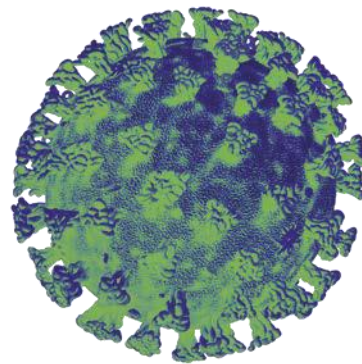
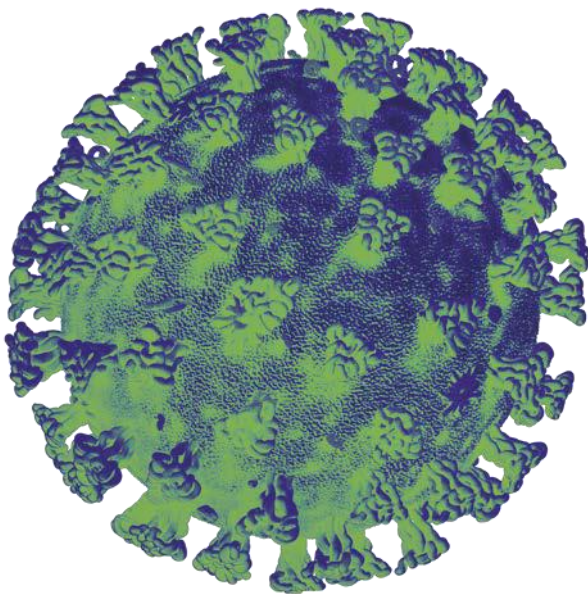


Llywodraeth Cymru
Welsh Government

Technical Advisory Group

Policy modelling update

17 December 2021



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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 earlier in December used modelling that was run in November 2021 before the identification of the Omicron variant. Since then, the Swansea University models have been re-run on using updated data and updated assumptions based on the Omicron Variant.¹
- By mid-December, Omicron was the dominant variant of COVID-19 in most of England with Wales expected to follow days later. There are a rising number cases of Omicron in Wales. This has led to debate on whether measures need to be taken to bring the spread of COVID-19 under control. This paper looks at modelling scenarios based on different sets of population protections being applied for set periods of time. In particular, the scenarios consider a move on 26 December 2021 to Alert level 2 for two or four weeks, and a move to Alert level 4 ('lockdown') for two or four weeks.² An unmitigated scenario where no population protections are introduced is also included.
- Although data is emerging, there are still many unknowns relating to the Omicron variants such as the degree of immune/vaccine escape, the transmissibility and the severity of disease. The scenarios included in this paper are still significantly uncertain and are currently being updated as new information on Omicron is being learnt. For current modelling assumptions, please see the [Annex](#). For future modelling scenarios, it will be important to adjust inputs as more data on the variant becomes available, particularly as Omicron becomes the dominant variant in Wales. A more transmissible variant that does not cause more severe disease, relative to Delta, may still cause a significant wave of pressure on the NHS because it infects all of the remaining susceptible population very quickly.
- This paper includes two assumptions for severity based on a low and high COVID-19 case hospitalisation ratio (CHR) of 1% and 2.5% respectively. Early evidence does not show a reduction in disease severity for the Omicron variant compared to the Delta variant. The Delta variant in Wales had produced a CHR of around 2%.³ This would put Omicron closer to the high severity scenarios if the severity of disease was similar for both variants. Although a preliminary analysis from South Africa suggests that this wave may be less severe than previous waves, a comparison of SGTF (mainly Omicron) and SGTP (non-Omicron) cases within this wave suggests less difference between variants.

¹ [Technical Advisory Group: policy modelling update 30 November | GOV.WALES](#)

² Alert levels are set out in the [coronavirus control plan](#) for Wales.

³ [Technical Advisory Group: policy modelling update 30 November | GOV.WALES. See the Annex for a time series of the CHR in Wales from early November to early December 2021.](#)

However, it is still too early to reliably assess the severity of disease caused by Omicron compared to previous variants.⁴

- Booster vaccinations up to 8 December 2021 were included in the modelling with an assumption of 20,000 vaccines being administered per day in Wales. In light of Omicron, the booster vaccination programme was ramped up in mid-December. All eligible adults in Wales were offered and encouraged to receive a booster vaccination by the end of the year.⁵ Future modelling will take the increase in booster vaccinations into account.

Modelling Scenarios

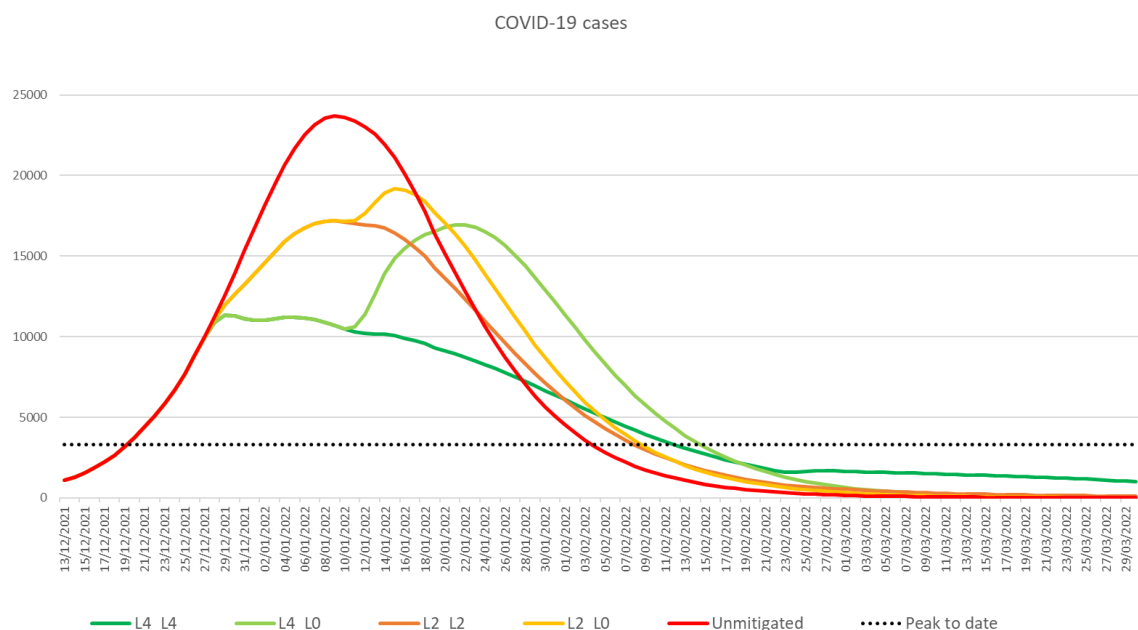
- The following scenarios were produced to assist with planning. They are not intended to predict what will happen but provide scenarios of what could happen. They are intended to be short-term scenarios with the aim of updating them every couple of months or as the picture changes in light of new data, information, assumptions or variants. These scenarios are still uncertain. We will know more in the next few weeks if we see a surge in admissions in places like London.
- All scenarios estimate that peak cases will far exceed previous peaks regardless of population protections implemented. There are a maximum 11,000 to 24,000 estimated daily cases estimated (41,000 to 65,000 infections). This is highly likely to put pressure on the system in terms of high prevalence and sickness absence.
- However, the hospital admissions can be controlled/reduced to an extent by bringing in coronavirus control plan measures. The impact of the measures on admissions will also depend on the case hospitalisation ratio (CHR). In the following scenarios for hospitalisations and hospital bed occupancy, a low and high CHR (of 1% and 2.5% respectively) are included.
- Under the high severity assumption, previous peaks are exceeded for COVID-19 cases, hospitalisations and bed occupancy regardless of measures taken to reduce the spread. However, if the severity of the Omicron variant were closer to the low severity assumption, it may be possible to keep hospitalisations and bed occupancy at lower or similar levels to previous peaks observed in Wales.
- Under the assumptions that Wales moves to Alert level 2 or Alert level 4 (for maximum of two weeks) from 26 December 2021, the size of the peaks are similar, the difference being the timing of the peaks. Being in Alert level 4 may delay the peak hospitalisations from mid-late January to early February 2022.

⁴ [SAGE 99 minutes: Coronavirus \(COVID-19\) response, 16 December 2021 - GOV.UK \(www.gov.uk\)](#)

⁵ [First Minister outlines ambitious aim to offer all eligible adults a booster appointment by end of year | GOV.WALES](#)

- However, the length of time the alert level population protections are maintained for does make a noticeable difference to the size of the peaks, especially under alert level 4 protections.
- Therefore if alert level measures are going to be applied for two weeks only, there may be negligible benefit and a high cost of moving to alert level 4, but if introducing the protections for four weeks, alert level 4 could have a significant impact.
- The following charts show the scenarios for COVID-19 cases, hospital admissions, and hospital bed occupancy. It's too early to know the severity of Omicron in terms of deaths and ICU admissions/occupancy currently. More data is needed

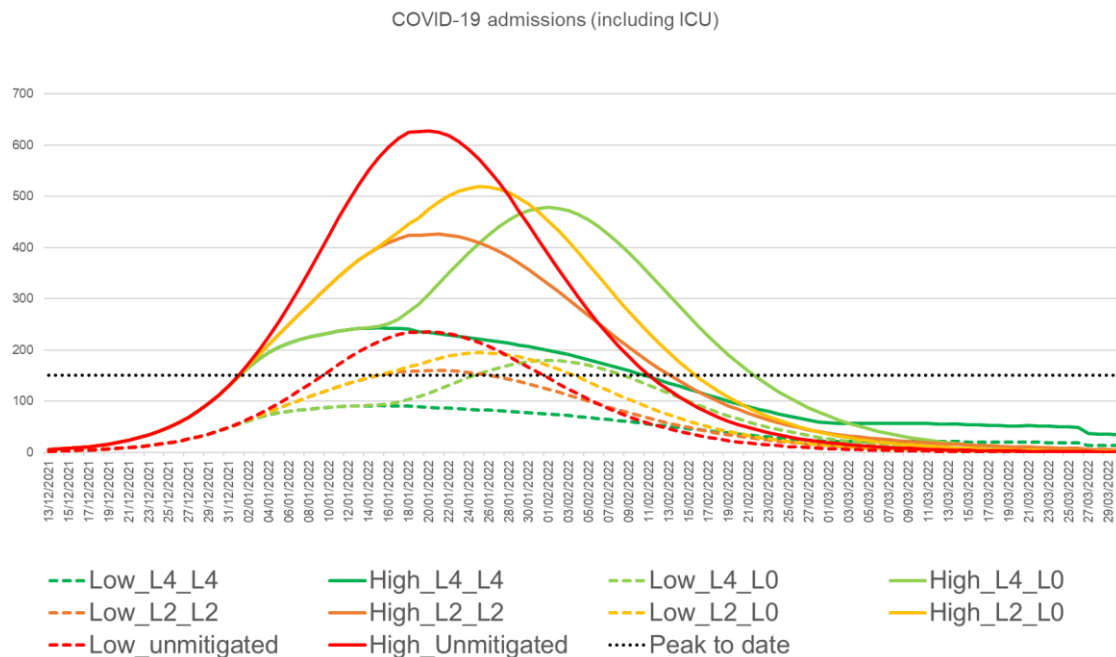
Figure 1: Estimated daily COVID-19 cases in Wales due to the Omicron variant under various coronavirus control plan measures



Source: Swansea University modelling

L4_L4 means Alert Level 4 in Wales for 2 weeks (from 26 December 2021) followed by Alert Level 4 for the subsequent 2 weeks. Similar for the other scenarios.

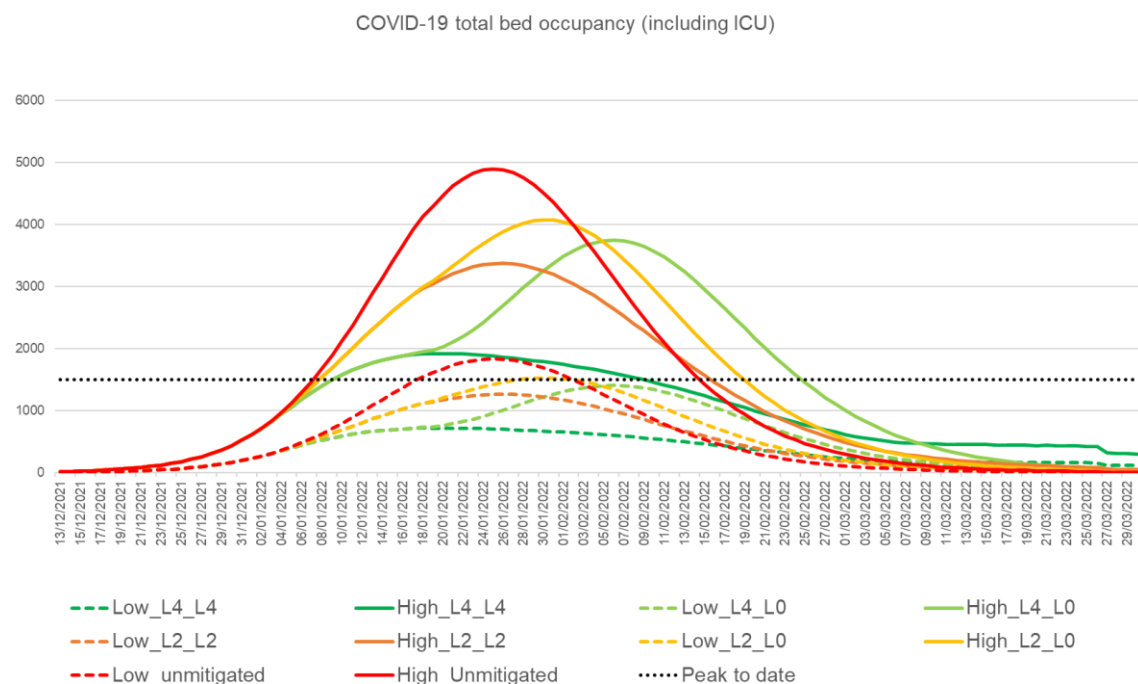
Figure 2: Estimated daily confirmed COVID-19 admissions in Wales due to the Omicron variant (2 differing severities included) under various coronavirus control plan measures



Source: Swansea University modelling

Low/High: Refers to Omicron severity. Assumes CHR of 1% and 2.5% respectively.
L4_L4 means Alert Level 4 in Wales for 2 weeks (from 26 December 2021) followed by Alert Level 4 for the subsequent 2 weeks. Similar for the other scenarios.

Figure 3: Estimated daily total COVID-19 hospital bed occupancy in Wales due to the Omicron variant (2 differing severities included) under various coronavirus control plan measures



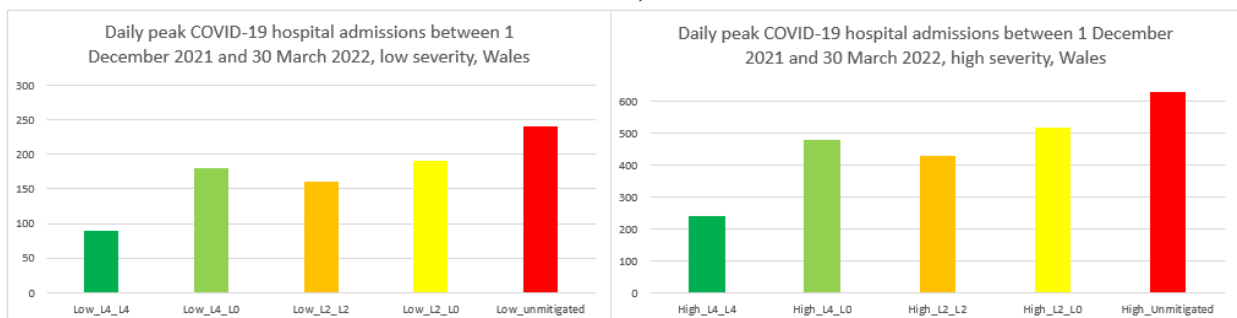
Source: Swansea University modelling

Low/High: Refers to Omicron severity. Assumes CHR of 1% and 2.5% respectively.
L4_L4 means Alert Level 4 in Wales for 2 weeks (from 26 December 2021) followed by Alert Level 4 for the subsequent 2 weeks. Similar for the other scenarios.

Daily peaks (Between 1 December 2021 and 30 March 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. In Wales, a maximum of 187 confirmed COVID-19 patients were admitted in one day (on 29 December 2020).
- Current modelling scenarios estimate that if Omicron causes the same proportion of severe cases of disease as the Delta variant, then we may experience an even higher peak during this new wave of infections. There are significant differences in the maximum numbers of confirmed COVID-19 admissions per day under the low and high disease severity assumptions. Under the high severity assumption, the peaks all exceed 200 admissions per day. Under the low severity assumption, all scenarios where a protection is introduced leads to peaks of below 200.
- To significantly reduce the projected future peak to below levels estimated by the scenario with no mitigations, Alert level 4 ('lockdown') may need to be introduced for 4 weeks from 26 December 2021. Introducing Alert Level 2 or Alert Level 4 for two weeks produces similar peaks to each other. If Alert level 2 were extended to four weeks, this is estimated to bring down the daily COVID-19 admissions further. Similar findings are observed with the total COVID-19 bed occupancy peaks.

Figure 4: The estimated peak number of confirmed COVID-19 hospital admissions per day between 1 December 2021 and 30 March 2022, Wales



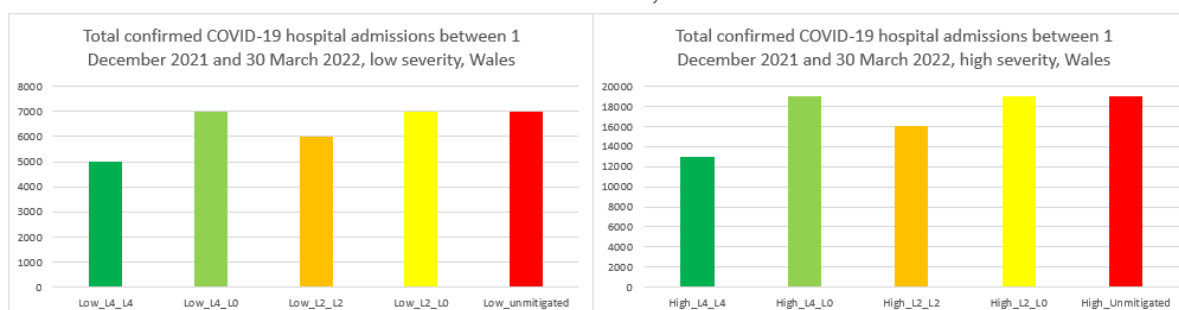
Source: Swansea University modelling

- If the disease severity of Omicron is closer to the low severity assumption, there is an estimated range of between 5,000 and 7,000 COVID-19 admissions over the period between 1 December 2021 and 30 March 2022. If Omicron causes more severe disease, closer to the high severity scenario, the estimated

total number of COVID-19 admissions over the same period ranges from 13,000 to 19,000.

- However, regardless as to the severity of the Omicron variant, these scenarios estimate that entering alert level 2 or alert level 4 for two weeks will produce the same total COVID-19 admissions over the period as each other (as well as similar peaks), and in addition will produce the same total number of COVID-19 admissions as remaining in alert level 0 (no mitigations). Introducing alert level 2 in Wales for four weeks is estimated to reduce the total and moving to alert level 4 for four weeks has the greatest impact in reducing the total admissions over the same period.

Figure 5: The estimated total number of confirmed COVID-19 hospital admissions between 1 December 2021 and 30 March 2022, Wales



Source: Swansea University modelling

- Therefore, protective measures, regardless of what they are, need to be implemented for a minimum of 4 weeks to be worthwhile in terms of total COVID-19 hospital admissions. However, introducing protections for at least 2 weeks does have an impact on reducing the daily peak number of hospital admissions, making the total admissions more manageable.
- For further charts and for the table of (rounded) totals and peaks between 1 December 2021 and 30 March 2022, see the [Annex](#).

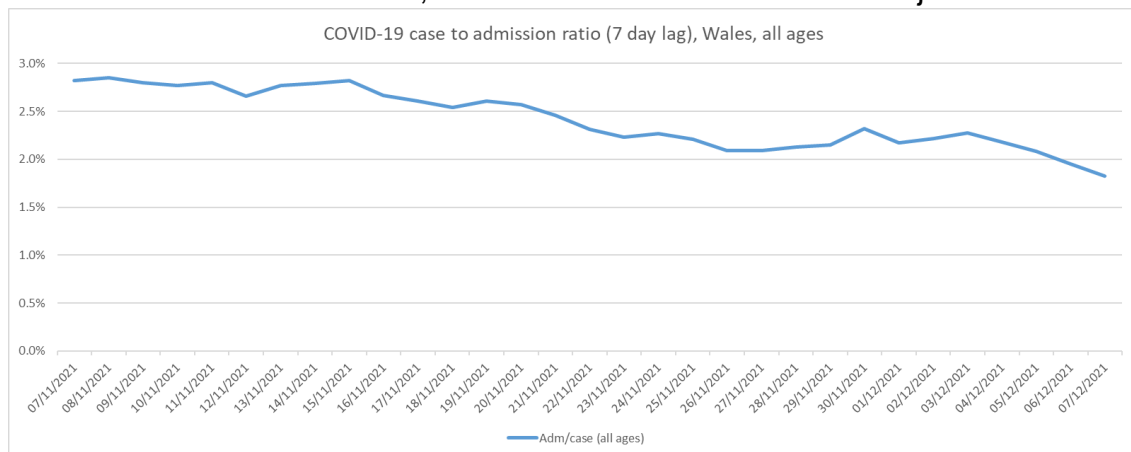
Annex

Further model assumptions

- To calibrate the Swansea University epidemiological models to the Omicron variant, the following updates were made on 13 December 2021:
- An R_0 of 5.1 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 60% is set. This is accomplished by setting a starting condition where 40% of those who have had previous exposure to COVID-19 and/or a vaccination retain their immunity.
- The case to hospitalisation ratios (CHR) with a low and high CHR of 1% and 2.5% respectively fell below and above the recent Delta wave CHR. 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 vaccine efficacy against infection was assumed to be 70% in the modelling scenarios shown in this paper with a 90% vaccine efficacy assumption against severe events.
- For Alert levels 2 and 4 assumed in the modelling scenarios, schools were assumed to remain open and contacts were assumed to be higher than previous waves.

Case to Hospitalisation ratio, Wales

- Looking at the most recent data for the CHR up to early December where Delta was still the dominant variant, the CHR decreased from 2.8% to just under 2%.



Source: PHW ICNet

Daily peaks and cumulative totals of COVID-19 cases, Wales

- The following tables show the total and peak estimated COVID-19 cases, hospitalisations and hospital bed occupancy that may occur between 1 December 2021 and 30 March 2022 due to the Omicron variant. Separate tables are used to denote the scenarios with the lower and higher severity assumptions of Omicron.

Totals (Between 1 December 2021 and 30 March 2022)

| | Low severity | | | | |
|---------------------|--------------|-----------|-----------|-----------|-----------------|
| | Low_L4_L4 | Low_L4_L0 | Low_L2_L2 | Low_L2_L0 | Low_unmitigated |
| Infections | 1,541,000 | 1,806,000 | 1,707,000 | 1,811,000 | 1,828,000 |
| Cases | 538,000 | 664,000 | 618,000 | 668,000 | 677,000 |
| Hospital admissions | 5,000 | 7,000 | 6,000 | 7,000 | 7,000 |

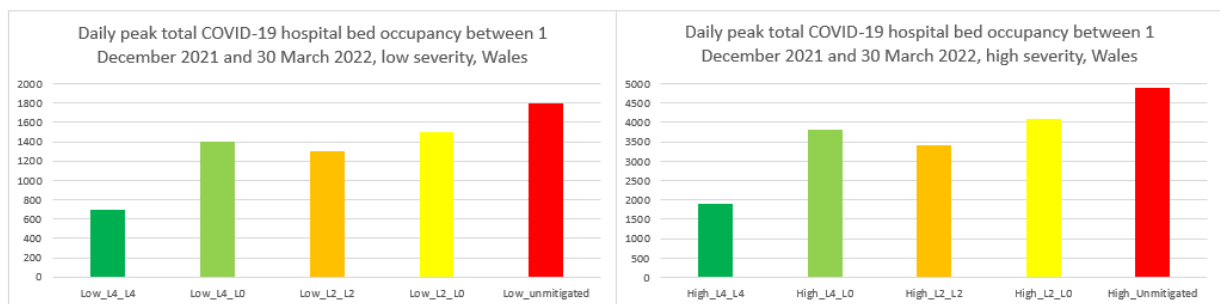
| | High severity | | | | |
|---------------------|---------------|------------|------------|------------|------------------|
| | High_L4_L4 | High_L4_L0 | High_L2_L2 | High_L2_L0 | High_Unmitigated |
| Infections | 1,541,000 | 1,806,000 | 1,707,000 | 1,811,000 | 1,828,000 |
| Cases | 538,000 | 664,000 | 618,000 | 668,000 | 677,000 |
| Hospital admissions | 13,000 | 19,000 | 16,000 | 19,000 | 19,000 |

Daily peaks (Between 1 December 2021 and 30 March 2022)

| | Low severity | | | | |
|---------------------|--------------|-----------|-----------|-----------|-----------------|
| | Low_L4_L4 | Low_L4_L0 | Low_L2_L2 | Low_L2_L0 | Low_unmitigated |
| Infections | 41,000 | 53,000 | 52,000 | 63,000 | 65,000 |
| Cases | 11,000 | 17,000 | 17,000 | 19,000 | 24,000 |
| Hospital admissions | 90 | 180 | 160 | 190 | 240 |
| Total bed occupancy | 700 | 1,400 | 1,300 | 1,500 | 1,800 |

| | High severity | | | | |
|---------------------|---------------|------------|------------|------------|------------------|
| | High_L4_L4 | High_L4_L0 | High_L2_L2 | High_L2_L0 | High_Unmitigated |
| Infections | 41,000 | 53,000 | 52,000 | 63,000 | 65,000 |
| Cases | 11,000 | 17,000 | 17,000 | 19,000 | 24,000 |
| Hospital admissions | 240 | 480 | 430 | 520 | 630 |
| Total bed occupancy | 1,900 | 3,800 | 3,400 | 4100 | 4,900 |

Figure 6: The estimated peak number of total COVID-19 hospital beds occupied per day between 1 December 2021 and 30 March 2022, Wales



Source: Swansea University modelling