

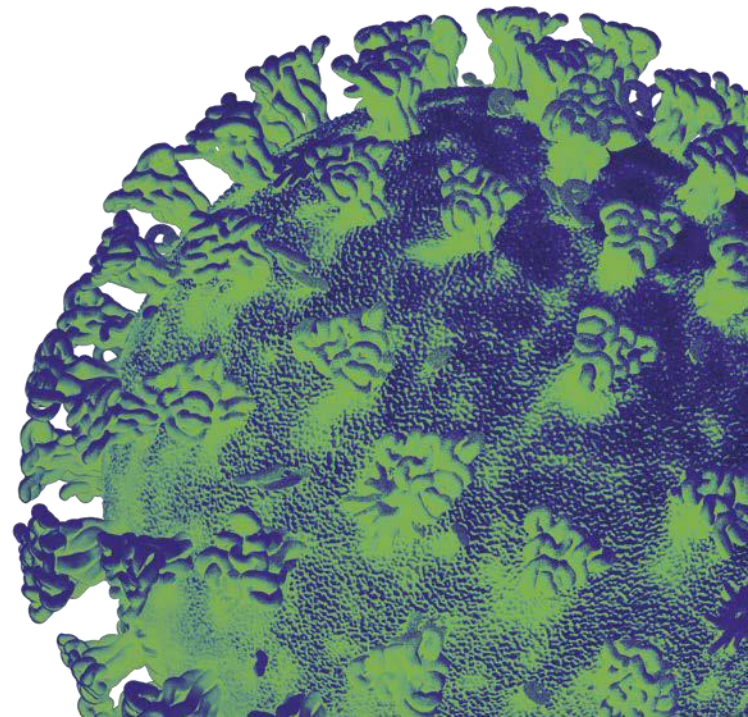
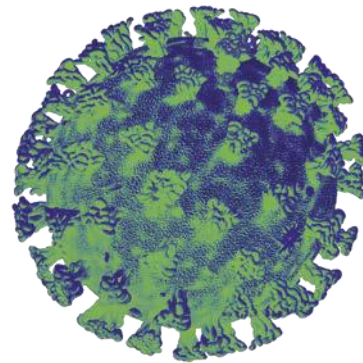
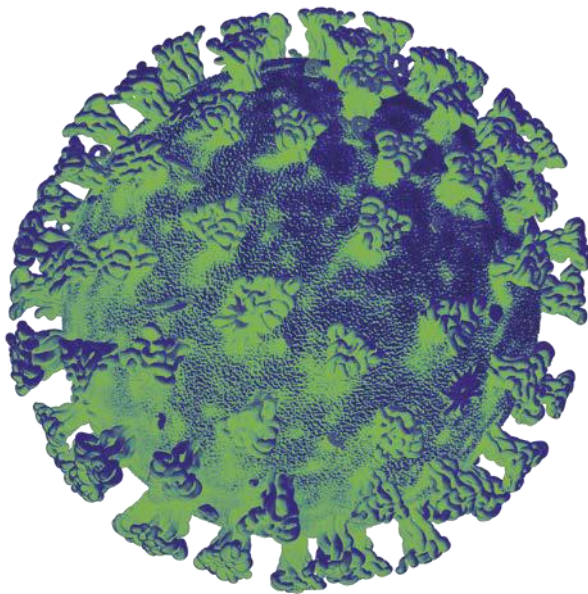


Llywodraeth Cymru
Welsh Government

Technical Advisory Cell

Summary of Advice

7 January 2022



Technical Advisory Cell: Internal Brief

07 January 2022

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Top line summary

Wales sit-rep summary

- Overall cases of COVID-19 and test positivity has increased rapidly in Wales following the emergence of the Omicron variant. As at 6 January (most recent data has a lag of 4 days) the 7-day incidence in Wales is 2,325 cases per 100,000 population, an increase of 1,131 compared to the previous 7 days. The highest rate is in Blaenau Gwent, which has 3,085 cases per 100,000.
- In the week ending 2 January the highest incidence by age group was 5,085 cases per 100,000 in the 20-29 age group. The highest testing rate was 8,407 tests per 100,000 in the 20-29 age group. The highest positivity was 60% in the 20-29 year old age group.
- For the week 25 to 31 December 2021, ONS estimates that 5.20% of the community population in Wales had COVID-19. This equates to approximately 1 person in every 20 or 157,900 people during this time.
- As at 7 January the number of COVID related patients in Welsh hospital beds was 1,030, 300 (41%) higher than the same day last week. There were 786 confirmed COVID patients in hospital, 242 higher than last week. The number of occupied surge and normal beds in the critical care environment was 170, 18 higher than the pre-COVID baseline of 152 for critical care beds. This is 18 higher than the same day last week. There are 42 COVID related patients in critical care, 9 higher than the same day last week (31 December).
- The total number of weekly COVID-19 deaths has increased during the most recent 7-day period ending 2 January from 25 to 42 according to PHW data but remains low in comparison to previous waves during periods of similar incidence. PHW death data is limited to reports of deaths of hospitalised patients in Welsh hospitals or care homes where COVID-19 has been confirmed with a positive laboratory test and the clinician suspects COVID-19 was a causative factor.
- The UKHSA consensus estimate of the reproduction number for Wales is between 1.3 and 1.6 and a doubling time of 7 to 10 days (as at 7 January 2022), while PHW's estimate is 1.6 with a doubling time of 6.2 days (as at 5 January 2022). Note the UKHSA estimate is typically lagged by 2-3 weeks while PHW, which uses a different methodology, is lagged by around 1 week. These estimates should be interpreted with caution and the confidence intervals taken into account. Estimates will be effected by changes in testing patterns over the festive period.
- As at 22:00 06 January 2022, a total of 6,556,469 doses of COVID-19 vaccine were given in Wales and recorded in the COVID-19 Welsh Immunisation System. 2,494,287 were first doses. 2,314,745 were second doses, 1,695,590 were booster doses and 51,847 were third dose primary course recommended for severely immunosuppressed individuals. Source: [PHW](#).
- The most recent PHW [weekly Influenza and Acute Respiratory Infection report](#) dated 5 January 2022 suggests although influenza is not yet circulating widely, confirmed case numbers have increased in recent weeks. Confirmed cases of Respiratory Syncytial Virus (RSV) in children aged under 5 years continued to decrease and remain at low intensity levels.

COVID-19 evidence top line summary

Variants and vaccination

- UKHSA has released an updated [risk assessment](#) for Omicron, with risk of infection severity updated to a Green RAG rating, following early data showing a 50-70% reduced risk of hospital admission with Omicron compared to Delta. Available data on severity of illness for those hospitalised suggests a reduction in risk of severe disease, but it is uncertain to what extent this is an intrinsic reduction in severity for Omicron or protection provided by prior infection/ vaccination.
- An [updated analysis](#) of vaccine effectiveness against symptomatic COVID-19 infection with the Omicron variant compared to the Delta variant shows mRNA boosters following a primary dose of AstraZeneca or Pfizer beginning to wane from one month (week 5-9) for Omicron, and as low as 30-50% effective from 10 weeks post-booster (this is not seen for Delta). See below for vaccine effectiveness against hospitalisation, published separately.
- An increase in reinfections is also noted, with 9.5% of Omicron infections linked to previous confirmed infection more than 90 days previously, although the true number may be 2-3 times greater.
- Subsequently [published](#) UKHSA estimates of vaccine effectiveness against hospitalisation suggest protection of 88% 2+ weeks after a booster dose. Further data is also needed to investigate the duration of protection; however, previous experience suggests this will likely last considerably longer than protection against symptomatic disease.
- A [preprint](#) has been published following reports of a new variant named B.1.640.2 in south-eastern France with a large number of spike mutations; however there is no evidence of severe disease from available data and little evidence of growth, although this will continue to be monitored.

Clinical

- An [Imperial College study](#) assessing differences in the risk of hospitalisation between the Omicron variant of concern and the Delta variant suggests a reduction in the risk of hospitalisation for Omicron infections relative to Delta infections. A previous infection reduces the risk of any hospitalisation by approximately 50% and the risk of a hospital stay of one or more days (i.e. formal admission) by 61% (95%CI:55-65%) (before adjustments for under ascertainment of reinfections). Using a hospital stay of 1+ days as the endpoint, the adjusted estimate of the relative risk of reinfections versus primary cases is 0.31, a 69% reduction in hospitalisation risk. Stratifying hospitalisation risk by vaccination status reveals a more complex overall picture, with hazard ratios for hospital attendance with Omicron for those who received Pfizer/Moderna being similar to those seen for Delta, while Omicron hazard ratios for those who received AstraZeneca are generally lower than for Delta. The author's caution over-interpreting these trends, but suggest that while protection afforded against mild infection from AstraZeneca was substantially reduced, protection against more severe outcomes was sustained.

- A [preprint](#) assessment of the clinical severity of the Omicron variant in South Africa suggests after controlling for factors associated with severe disease, SGTF-infected individuals (likely Omicron) had a lower odds of severe disease (0.3, 95% CI 0.2-0.5). Once hospitalised, risk of severe disease was similar for non-SGTF infected individuals, while SGTF-infected individuals had a reduced risk of severe disease when compared to earlier Delta-infected individuals. The authors note it is likely some of this reduction can be attributed to higher population immunity (due to natural infection and/or vaccination).
- An [assessment](#) of hospitalised patients in South Africa following the emergence of Omicron compared to previous waves suggests a different pattern of characteristics and outcomes in patients hospitalised with COVID-19. Patients were younger, with a lower number admitted to hospital compared to previous waves and a lower proportion presenting with acute respiratory conditions. There was a significant reduction in the proportion of patients requiring oxygen therapy or admission to intensive care and length of stay decreased from 7-8 days to 3 days in the fourth wave. It should be noted this analysis did not differentiate between those admitted primarily for COVID and those with an incidental positive test result.
- A [study](#) estimating the impact of the COVID-19 pandemic on cardiovascular disease (CVD) and CVD management in England, Scotland and Wales suggests almost 500k fewer individuals initiated high blood pressure treatment between March 2020 and May 2021 than would have been expected. As a result methods to identify and treat individuals who have missed treatment is urgently recommended in order to avoid large numbers of future CVD events adding to the indirect cost of the COVID-19 pandemic.

Behavioural insights and mental health

- A [report](#) from the CORSAIR (COVID-19 Rapid Survey of Adherence to Interventions and Responses) study suggests public worry, perceived risk to self and perceived risk to people increased slightly around the time of the announcement about Omicron, then returning to pre-Omicron levels. Understanding of the new rules was low, with people over-estimating the new rules. There were few changes in behaviour over time, with only rates of wearing a face covering increasing.
- A different preprint qualitative [study](#) exploring public attitudes to COVID-19 during the emergence of Omicron suggests there may be 'variant fatigue' regarding the risk posed by COVID-19, despite the increased risk posed by the new variant Omicron. However, findings also suggest that most people intend to adhere (albeit reluctantly) with policy measures (as opposed to 'advice') - including stringent measures such as lockdown - if they were required in future.

Epidemiology

- A [study](#) of secondary attack rates (SAR) in Danish households for the Delta and Omicron wave suggests a SAR of 31% and 21% in households with the Omicron and Delta variant, respectively. There was little significant difference between the SAR of Omicron versus Delta among unvaccinated individuals, suggesting that the increased transmissibility of Omicron can be primarily ascribed to immune evasion rather than an inherent increase in the basic transmissibility. The results suggest that Omicron is generally 2.7-3.7 times more infectious than the Delta VOC among vaccinated individuals.

- [Evidence](#) from multiple studies suggests the Omicron variant replicates less readily in lung tissue compared to other variants, resulting in reduced severity, instead establishing a very local infection in the upper airways. However such factors can make upper respiratory conditions more serious for young children who have relatively small nasal passages and babies who breathe only through their noses.
- An [analysis](#) of the contribution of different non-household activities to COVID-19 transmission during two periods of varying restrictions suggests shopping accounted for the highest proportion of infections acquired outside the home. Going to Work and Public transport use were also important predictors of infection. Intense restrictions largely prevented transmission in hospitality, entertainment, beauty services and sports during the second wave of the pandemic. During a period of no restrictions parties and hospitality were associated with increased risk indoors but not outdoors.

Non-pharmaceutical interventions

- A [note](#) from the UK Government Social Care Working Group (SCWG) on the role of shielding for the coming wave emphasises that the lived experience of previous waves is that shielding is challenging. Daily contact testing for workers around the shielded, works well with a critical mass of participation but quickly becomes ineffective when participation is low.
- A [paper](#) brought to SAGE on the impact of shielding in Wave 2 suggests reducing only within-care home infection rates (e.g., through improved testing or staffing) has a limited effect on mortality. Ultimately, the most effective way to reduce the deaths in care homes remains to limit prevalence in the general population.

Wales Sit-Rep

- The latest fortnightly COVID-19 Situational Report, containing the most recent data on epidemiological surveillance, NHS status, wastewater monitoring, education and children, international travel, mobility, vaccination and population immunity and forward projections for Wales is available here. **Note: reduced reporting for the CSR was implemented during the festive period; full reporting is planned to resume for the next 21 day review.**
- Overall cases of COVID-19 and test positivity has increased rapidly in Wales following the emergency of the Omicron variant. As at 6 January (most recent data has a lag of 4 days) the 7-day incidence in Wales was 2,325 cases per 100,000 population, an increase of 1,131 compared to the previous 7 days. The highest rate was in Blaenau Gwent, which has 3,085 cases per 100,000. This is 30% higher than the Wales average and 3% higher than the next highest, Rhondda Cynon Taf. The largest increase was Blaenau Gwent, where incidence increased by 2,150 cases in the most recent 7 days.
- The highest 7-day positivity was in Swansea at 54%, while the largest increase was Powys, where 7-day positivity increased by 19.8% compared to the previous 7 days.

A Summary of all Confirmed COVID-19 between 27/12/2021 and 02/01/2022, by Local Authority

As at 9am 06/01/2022

For the 7 day period ending at 23:59 on 02-01-2022	All Confirmed Episodes								
	n	% of All Wales Total (location known)	7-day incidence	Incidence threshold reached	Change from previous week	Test positivity	Positivity threshold reached	Change from previous week	Testing Incidence per 100,000
Blaenau Gwent	2155	3.0%	3084.7	50 or higher	2150.0	52.1%	5% or higher	15.5%	5980.1
Casertilly	4539	6.2%	2506.7	50 or higher	1406.6	53.7%	5% or higher	15.0%	4668.9
Monmouthshire	1373	1.9%	1451.5	50 or higher	544.5	40.9%	5% or higher	9.0%	3550.1
Newport	3774	5.2%	2439.9	50 or higher	1163.7	49.9%	5% or higher	10.9%	4885.1
Tonfaen	2503	3.4%	2663.0	50 or higher	1409.1	49.7%	5% or higher	11.8%	5356.5
Amawth Newn	14344	19.7%	7414.1	50 or higher	1259.0	50.1%	5% or higher	12.8%	4803.3
Conwy	2907	4.0%	2480.3	50 or higher	1232.9	52.8%	5% or higher	14.8%	4658.7
Denbighshire	2031	2.8%	2122.3	50 or higher	825.5	50.6%	5% or higher	14.3%	4150.4
Fflintshire	8654	5.0%	2340.8	50 or higher	1142.2	53.6%	5% or higher	14.9%	4370.9
Gwynedd	2423	3.3%	1545.2	50 or higher	655.1	49.9%	5% or higher	11.7%	3900.1
Isle of Anglesey	1395	1.9%	1991.6	50 or higher	806.6	52.9%	5% or higher	14.9%	3763.4
Wrexham	2967	4.1%	2182.1	50 or higher	1085.6	51.8%	5% or higher	12.3%	4210.2
Betsi Cadwaladr	15377	21.1%	2198.1	50 or higher	82.8	52.0%	5% or higher	13.8%	4225.5
Cardiff	7879	10.8%	2147.4	50 or higher	738.9	51.1%	5% or higher	12.2%	4200.8
Valley of Glamorgan	2916	4.0%	2184.1	50 or higher	863.1	49.1%	5% or higher	11.6%	4851.0
Cardiff and Vale	10787	14.8%	2157.3	50 or higher	772.0	50.6%	5% or higher	12.5%	4267.8
Bedford	3776	5.1%	2533.8	50 or higher	1233.6	52.7%	5% or higher	13.1%	4810.6
Merthyr Tydfil	1769	2.4%	2932.4	50 or higher	1478.6	53.2%	5% or higher	11.7%	5051.9
Rhondda Cynon Taf	2792	3.9%	2531.0	50 or higher	1594.9	53.6%	5% or higher	11.3%	5040.7
Cwm Taf Morgannwg	12587	17.4%	2227.9	50 or higher	1448.9	52.3%	5% or higher	12.9%	5307.7
Cardiff and Vale	3831	5.3%	2029.4	50 or higher	1163.3	47.2%	5% or higher	15.1%	4303.1
Ceredigion	1214	1.6%	1807.6	50 or higher	321.4	48.5%	5% or higher	13.8%	3725.2
Pembrokeshire	2170	3.0%	1724.7	50 or higher	714.5	45.9%	5% or higher	12.2%	3757.8
Hywel Dda	7215	10.0%	1888.8	50 or higher	1077.0	47.0%	5% or higher	13.5%	4017.5
Powys	2399	3.3%	1511.5	50 or higher	1008.8	50.2%	5% or higher	18.9%	2630.1
Powys	1288	1.7%	1811.5	50 or higher	1008.8	50.2%	5% or higher	18.9%	3630.1
Health Port Talbot	2850	3.9%	2692.0	50 or higher	1663.5	51.9%	5% or higher	15.6%	5282.4
Swansea	6103	8.4%	2470.8	50 or higher	1338.1	54.2%	5% or higher	17.0%	4562.5
Swansea Bay	9961	13.7%	2352.1	50 or higher	1457.6	53.3%	5% or higher	16.4%	4780.1
Total	72880	100.0%	2311.5	50 or higher	1325.3	51.2%	5% or higher	13.8%	4513.7
Unknown	411			N/A			N/A		
Total (including location unknown)	73291	N/A	2311.5	50 or higher	1325.3	51.2%	5% or higher	13.8%	4513.7

Source: [Latest PHW COVID Rapid Surveillance - LA Summary Trends Report - final.pdf \(wales.nhs.uk\)](#)

- In the week ending 2 January the highest incidence by age group was 5,085 cases per 100,000 in the 20-29 age group. The highest testing rate was 8,407 tests per 100,000 in the 20-29 age group. The highest positivity was 60% in the 20-29 year old age group.
- For the week 25 to 31 December 2021, ONS estimates that 5.20% of the community population in Wales had COVID-19 (95% credible interval: 4.57% to 5.91%). This equates to approximately 1 person in every 20 or 157,900 people during this time. This compares to around 1 in 15 people in England, around 1 in 25 in Northern Ireland and around 1 in 20 people in Scotland.

- As at 7 January the number of COVID related patients in Welsh hospital beds is 1,030, 300 (41%) higher than the same day last week. There are 786 confirmed COVID patients in hospital, 242 higher than last week. The number of occupied surge and normal beds in a critical care environment is 170, 18 higher than the pre-COVID baseline of 152 for critical care beds. This is 18 higher than the same day last week. There are 42 COVID related patients in critical care today, 9 higher than the same day last week.
- The total number of weekly COVID-19 deaths has increased during the most recent 7-day period ending 2 January from 25 to 42 according to PHW data but remains low in comparison to previous waves during periods of similar incidence. PHW death data is limited to reports of deaths of hospitalised patients in Welsh hospitals or care homes where COVID-19 has been confirmed with a positive laboratory test and the clinician suspects COVID-19 was a causative factor. It does not include patients who may have died from COVID-19 but who were not confirmed by laboratory testing, those who died in other settings, or Welsh residents who died outside of Wales. As a result the true number of deaths will be higher.
- [ONS](#) reports the number of deaths registered in Wales in the week ending 24 December 2021 (Week 51) was 828; this was 70 more deaths than the previous week (Week 50) and 15.3% above the five-year average (110 more deaths).
- The UKHSA consensus estimate of the reproduction number for Wales is between 1.3 and 1.6 and a doubling time of 7 to 10 days (as at 7 January 2022), while PHW's estimate is 1.57 with a doubling time of 6.2 days (as at 5 January 2021). Note the UKHSA estimate is typically lagged by 2-3 weeks while PHW, which uses a different methodology, is lagged by around 1 week. These estimates should be interpreted with caution and the confidence intervals taken into account. Estimates will be effected by changes in testing patterns over the festive period.
- As at 22:00 06 January 2022, a total of 6,556,469 doses of COVID-19 vaccine were given in Wales and recorded in the COVID-19 Welsh Immunisation System. 2,494,287 were first doses. 2,314,745 were second doses, 1,695,590 were booster doses and 51,847 were third dose primary course recommended for severely immunosuppressed individuals. Source: [PHW](#).
- The most recent PHW [weekly Influenza and Acute Respiratory Infection report](#) dated 5 January suggests although influenza is not yet circulating widely, confirmed case numbers have increased in recent weeks. Confirmed cases of Respiratory Syncytial Virus (RSV) in children aged under 5 years continued to decrease and remain at low intensity levels. COVID-19 cases continue to be detected in symptomatic patients in hospital and in the community. Rhinovirus and human metapneumovirus are the most commonly detected cause of non-COVID-19 Acute Respiratory Infection (ARI).

COVID-19 evidence - round-up

This section aims to highlight a selection of the recent COVID-19 papers, reports and articles that are relevant to a Welsh context or contain new data, insights or emerging evidence relating to COVID-19. It may contain pre-print papers, which should be interpreted with caution as they are often not yet peer-reviewed and may be subject to change when published. The exclusion of any publication in this section should not be viewed as a rejection by the Technical Advisory Cell.

Variants

UKHSA Variant Technical Briefing 33 and Risk Assessment, 23 December, 2021

Updated Risk Assessment

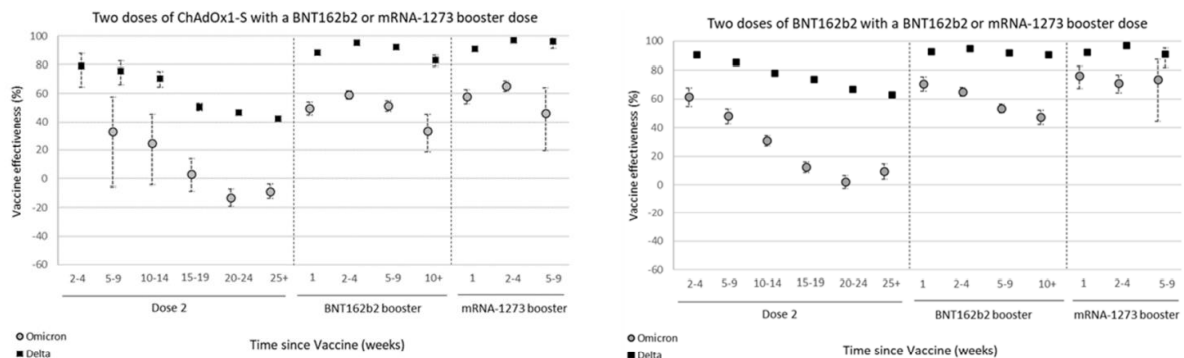
- The UKHSA Risk Assessment has been updated, with Infection Severity changed to GREEN (previously insufficient data). This reflects new data showing lower risk of hospitalisation with Omicron compared to Delta, although this is with low confidence as a result of early available data being limited by small numbers, short follow-up time, minimal adjustment for previous infection and limited spread of Omicron into more vulnerable older age groups to date.
- There continues to be insufficient data to confidently comment on severity of illness for those hospitalised. Available data suggests a reduction in risk, but it is uncertain to what extent this is an intrinsic reduction in severity for Omicron or protection provided by prior infection/ vaccination. As stated elsewhere, even with a reduced hospitalisation risk a large number of cases could lead to high numbers of hospital admissions and pressure on the NHS. Other sections are unchanged from the previous variant risk assessment.

22 December 2021		Risk assessment for SARS-CoV-2 variant: Omicron VOC-21NOV-01 (B.1.1.529)		UK Health Security Agency
Indicator	Red, amber or green status*	Confidence level	Assessment and rationale	
Growth advantage	Red	High	Omicron is displaying a growth advantage over Delta This assessment is based on analysis of UK data showing increased household transmission risk, increased secondary attack rates and substantially increased growth rates compared to Delta. Omicron continues to increase as a proportion of UK cases and is now dominant in England. This growth advantage is also apparent in other countries with equivalent surveillance. The observed growth advantage may be due to immune evasion or transmissibility. Although we now have high confidence in a substantial component of immune evasion, the very high growth rate and laboratory findings suggest that an increase in transmissibility may also be contributing.	
Transmissibility	Amber	Low	Omicron is at least as transmissible as Delta Increased transmissibility compared to Delta is biologically plausible with the presence of furin cleavage site and nucleocapsid changes associated in vitro with advantages for replication. There are extensive changes to the receptor binding domain, although the predicted very high receptor binding affinity has not been borne out in laboratory assessments. Early data suggests changes in cell entry and increased replication in upper airway cells in vitro. However, there is no clear epidemiological demonstration of transmissibility as distinct from other contributors to growth advantage.	
Immune evasion (including natural and vaccine derived immunity)	Red	High	Omicron displays a reduction in immune protection against infection Neutralisation data, real world vaccine effectiveness against symptomatic disease, and reinfection rate all confirm substantial immune evasion properties. There is insufficient data to make an assessment of vaccine effectiveness against severe disease for Omicron compared to Delta. There is preliminary evidence that the waning of vaccine effectiveness against symptomatic infection occurs more rapidly with Omicron than Delta. This is visible, as expected, with increasing time after dose 2 and can also be seen after the booster dose from 10 weeks onwards. However, vaccine effectiveness against severe disease is more likely to be sustained, especially after a booster dose.	
Infection severity	Green	Low	Reduction in the relative risk of hospitalisation but NO data on severity in hospital or death Three UK analyses support a moderate reduction in the relative risk of hospitalisation for a person detected as a case of Omicron, compared to Delta. This is also consistent with data from South Africa. These analyses are preliminary because of the small numbers of Omicron cases currently in hospital and the limited spread of Omicron into older age groups as yet. There is insufficient data to comment on severity of illness once in hospital or mortality. Available data suggests that the observed reduction in risk in the UK is likely to be partly a reduction in intrinsic severity of the virus and partly to protection provided by prior infection. We cannot confidently quantify the relative contributions of these 2 factors at present. Even at the reduced hospitalisation risk observed, the combined growth advantage and immune evasion properties of Omicron have the potential to lead to very high numbers of admissions to hospital.	

- The underlying data for this risk assessment is available in an [updated hospitalisation and vaccine effectiveness analysis](#).

Technical Briefing

- The UKHSA epidemiological analysis of risk of hospitalisation in England shows a 50-70% reduced risk of hospital admission with Omicron compared to Delta (Hazard Ratio: 0.38, 95% Confidence Interval: 0.3-0.5) based on 70 hospital admissions with Omicron and 3,884 Delta. These analyses were stratified on week of specimen and area of residence and adjusted for age, exact calendar date, sex, ethnicity, local area deprivation, international travel and vaccination status.
- It is noted this does not necessarily mean hospitalised Omicron cases see milder disease, but that the risk of severe disease is reduced. These lower risks also do not necessarily imply reduced hospital burden over the epidemic wave, given the higher growth rate and immune evasion observed with Omicron. The number of Omicron cases in older age groups has also been limited to date, although this is increasing.
- This is similar to the Imperial College analysis ([see further below](#)), which attempts to adjust for the effect of prior infection and estimates the intrinsic risk difference between Delta and Omicron as between 0 to 30% and the reduced risk of hospitalisation in those previously infected estimated as 55 to 70%.
- An updated analysis of vaccine effectiveness against symptomatic COVID-19 with the Omicron variant compared to the Delta variant shows mRNA boosters following a primary dose of AstraZeneca or Pfizer beginning to wane from one month (week 5-9) for Omicron, and as low as 30-50% effective from 10 weeks post-booster. This effect is not seen with Delta. Numbers were too low to estimate booster vaccine effectiveness amongst recipients of a primary course of the Moderna vaccine.



- An increase in reinfections is also noted, with 9.5% of Omicron infections linked to previous confirmed infection more than 90 days previously. The case ages ranged from infants to people in their 90s (median 27 years) and the interval to reinfection from previous SARS-CoV-2 infection ranged from 90 to 650 days (median 343 days), occurring during periods of different of Alpha, Delta and wild-type variant dominance. There were 69 individuals for whom the Omicron infection was their third episode of infection (>=90 days between each episode). There were 290 individuals with a possible reinfection between a 60 to 89 day interval after an earlier confirmed infection but in those with an interval of <90 days between episodes it can be difficult to distinguish reinfection from persistent detection of virus.
- This is likely to be a substantial underestimate, as it does not include infections that were never tested or reported (including asymptomatic infections), particularly in the first wave.

- Growth rates for Omicron in England continue to increase exponentially with a growth rate of 37% per day, with a slightly over 2 day doubling time for Omicron cases. This is not reflected in a doubling of overall cases as a result of the Delta variant, which is declining but continues to circulate in in many areas.
- Full paper: [Investigation of SARS-CoV-2 variants of concern: variant risk assessments - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/publications/investigation-of-sars-cov-2-variants-of-concern-variant-risk-assessments)
- [SARS-CoV-2 variants of concern and variants under investigation \(publishing.service.gov.uk\)](https://publishing.service.gov.uk/government/publications/sars-cov-2-variants-of-concern-and-variants-under-investigation)

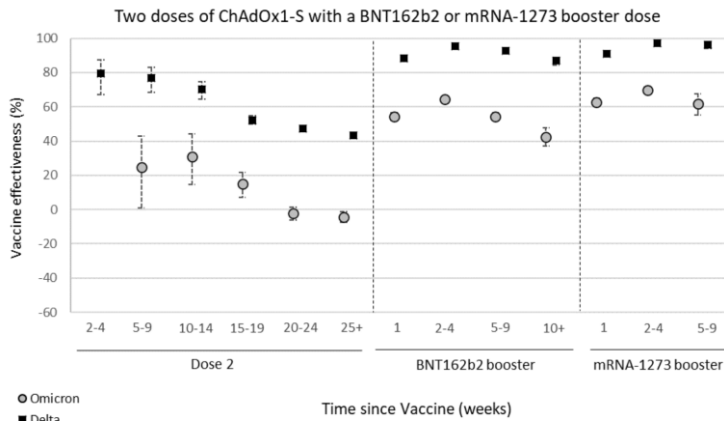
UKHSA Variant Technical Briefing: Technical briefing: Update on hospitalisation and vaccine effectiveness for Omicron

- UKHSA has published a detailed variant surveillance analyses which contributed to the Omicron risk assessment. This specialist technical briefing contains early data and analysis on emerging variants and findings have a high level of uncertainty.
- The most recent hazard ratios for hospital admission show an around 60-70% reduced risk of hospitalisation with Omicron vs Delta. Regardless of variant, a booster/3rd dose significantly reduces the risk of hospitalisation (85-90% vs unvaccinated)

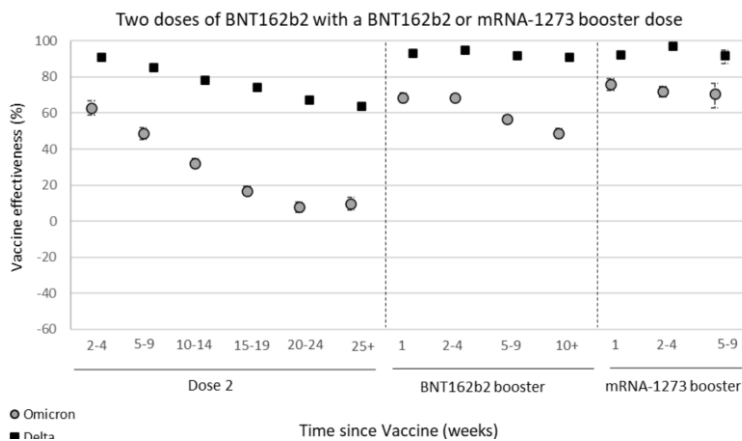
Table 4: Adjusted hazard ratios (HR) for hospital admission within 14 days of positive test for a given variant (CI=Confidence interval)

Vaccination status	Omicron HR (95% CI)	Delta HR (95% CI)
Unvaccinated/<28 days since first vaccine dose	1.00 (ref)	1.00 (ref)
≥28 days since first vaccine dose	1.02 (0.72-1.44)	0.42 (0.36-0.48)
≥14 days since second vaccine dose	0.35 (0.29-0.43)	0.18 (0.17-0.19)
≥14 days since third vaccine dose	0.19 (0.15-0.23)	0.15 (0.13-0.16)

- An updated Vaccine Effectiveness (VE) analysis shows that while protection against infection starts to wane from 4-9 weeks post-booster for Omicron, protection from hospitalisation is high 88% and T-cell studies suggest it is unlikely to wane as quickly.
- Amongst those who received two doses of AZ (ChAdOx1-3), VE against symptomatic disease dropped to ~40% 10 weeks after a Pfizer (BNT162b2) booster and ~60% 5-9 weeks after a Moderna (mRNA-1273) booster.



- Amongst those who received two doses of Pfizer (BNT162b2), VE against symptomatic disease dropped to ~50% 10 weeks after a Pfizer (BNT162b2) booster and ~70% 5-9 weeks after a Moderna (mRNA-1273) booster.



- New estimates for VE against hospitalisation have also been included for the first time, suggesting that a VE against hospitalisation of 88% 2+ weeks after a booster dose. This analysis included tests between 27th November and 24th December, and included 169,888 Delta cases and 204,036 Omicron cases.

Table 6: Vaccine effectiveness against hospitalisation for Omicron (all vaccine brands combined). OR = odds ratio, HR = hazard ratio, VE = vaccine effectiveness (CI=Confidence interval)

Dose	Interval after dose	OR against symptomatic disease (95% CI)	HR against hospitalisation (95% CI)	VE against hospitalisation (95% CI)
1	4+ weeks	0.74 (0.70-0.77)	0.65 (0.30-1.42)	52% (-5-78)
2	2-24 weeks	0.82 (0.80-0.84)	0.33 (0.21-0.55)	72% (55-83)
2	25+ weeks	0.98 (0.95-1.00)	0.49 (0.30-0.81)	52% (21-71)
3	2+ weeks	0.37 (0.36-0.38)	0.32 (0.18-0.58)	88% (78-93)

- Further data is also needed to investigate the duration of protection against severe disease with Omicron conferred by boosters. However, experience with previous variants suggests this will last longer than protection against symptomatic disease. Vaccination remains the best & most effective protection against infection & transmission (short-term) and severe disease (both short and long-term)

- Full paper: [SARS-CoV-2 variants of concern and variants under investigation \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/102421/sars-cov-2-variants-of-concern-and-variants-under-investigation.pdf)

PREPRINT: Emergence in Southern France of a new SARS-CoV-2 variant of probably Cameroonian origin harbouring both substitutions N501Y and E484K in the spike protein – B.1.640.2

- This preprint describes the emergence of a new variant which resulted in twelve SARS-CoV-positive patients in south-eastern France, likely originating in West Africa. Analysis revealed a large number of spike mutations including ones previously observed such as N501Y and E484K. This genotype pattern led to the creation of a new Pangolin lineage named B.1.640.2, which is a phylogenetic sister group to the old B.1.640 lineage renamed B.1.640.1.
- There was no evidence of severe disease from available data, although there have been some media reports suggesting a hospital outbreak or increase in hospitalisation. There is no confirmed link with this variant currently.
- These data are another example of the unpredictability of the emergence of SARS-CoV-2 variants, and of their introduction in a given geographical area from abroad. Overall there is little evidence of growth, although this will continue to be monitored.
- Full paper: [Emergence in Southern France of a new SARS-CoV-2 variant of probably Cameroonian origin harbouring both substitutions N501Y and E484K in the spike protein | medRxiv](https://www.medrxiv.org/content/10.1101/2021.12.22.21270000v1)

Clinical

Imperial College London: COVID-19 Report 50, Hospitalisation risk for Omicron cases in England, 22 December 2021

- To assess differences in the risk of hospitalisation between the Omicron variant of concern and the Delta variant, the authors analysed data from all PCR-confirmed SARS-CoV-2 cases in England with last test specimen dates between 1st and 14th December.
- Overall, the authors find evidence of a reduction in the risk of hospitalisation for Omicron relative to Delta infections, averaging over all cases in the study period. The extent of reduction is sensitive to the inclusion criteria used for cases and hospitalisation, being in the range 20-25% when using any attendance at hospital as the endpoint, and 40-45% when using hospitalisation lasting 1 day or longer or hospitalisations with the ECDS discharge field recorded as “admitted” as the endpoint (Table 1). These reductions must be balanced against the larger risk of infection with Omicron, due to the reduction in protection provided by both vaccination and natural infection. A previous infection reduces the risk of any hospitalisation by approximately 50% and the risk of a hospital stay of 1+ days by 61% (95%CI:55-65%) (before adjustments for under ascertainment of reinfections).
- Updated adjustments to previous hazard ratios in light of Omicron are moderate (typically less than an increase of 0.2 in the hazard ratio for Omicron vs Delta and a reduction of approximately 0.1 in the hazard ratio for reinfections vs primary infections) but significant for evaluating severity overall. Using a hospital stay of 1+

days as the endpoint, the adjusted estimate of the relative risk of reinfections versus primary cases is 0.31, a 69% reduction in hospitalisation risk.

- Stratifying hospitalisation risk by vaccination state reveals a more complex overall picture, albeit consistent with the unstratified analysis. This showed an apparent difference between those who received AstraZenca (AZ) vaccine versus Pfizer or Moderna (PF/MD) for their primary series (doses 1 and 2). Hazard ratios for hospital attendance with Omicron for PF/MD are similar to those seen for Delta in those vaccination categories, while Omicron hazard ratios are generally lower than for Delta for the AZ vaccination categories. Given the limited samples sizes to date, we caution about over-interpreting these trends, but they are compatible with previous findings that while protection afforded against mild infection from AZ was substantially reduced with the emergency of Delta, protection against more severe outcomes was sustained. It is emphasised that these are estimates which condition upon infection; net vaccine effectiveness against hospital attendance may not vary between the vaccines, given that PF/MD maintain higher effectiveness against symptomatic infection with Omicron than AZ.
- These estimates will assist in refining mathematical models of potential healthcare demand associated with the unfolding European Omicron wave. The hazard ratios provided in Table 3 (see full paper) can be translated into estimates of vaccine effectiveness (VE) against hospitalisation, given estimates of VE against infection. In broad terms, our estimates suggest that individuals who have received at least 2 vaccine doses remain substantially protected against hospitalisation,
- Full paper: [Report 50 - Hospitalisation risk for Omicron cases in England | Faculty of Medicine | Imperial College London](#)

PREPRINT: Early assessment of the clinical severity of the SARS-CoV-2 Omicron variant in South Africa

- The SARS-CoV-2 Omicron variant of concern (VOC) almost completely replaced other variants in South Africa during November 2021, and was associated with a rapid increase in COVID-19 cases. We aimed to assess clinical severity of individuals infected with Omicron, using S Gene Target Failure (SGTF) on the Thermo Fisher Scientific TaqPath COVID-19 PCR test as a proxy.
- From 1 October through 6 December 2021, 161,328 COVID-19 cases were reported nationally; 38,282 were tested using TaqPath PCR and 29,721 SGTF infections were identified. The proportion of SGTF infections increased from 3% in early October (week 39) to 98% in early December (week 48). On multivariable analysis, after controlling for factors associated with hospitalisation, individuals with SGTF infection had lower odds of being admitted to hospital compared to non-SGTF infections (adjusted odds ratio (aOR) 0.2, 95% confidence interval (CI) 0.1-0.3).
- Among hospitalised individuals, after controlling for factors associated with severe disease, the odds of severe disease did not differ between SGTF-infected individuals compared to non-SGTF individuals diagnosed during the same time period (aOR 0.7, 95% CI 0.3-1.4). Compared to earlier Delta infections, after controlling for factors associated with severe disease, SGTF-infected individuals had a lower odds of severe disease (aOR 0.3, 95% CI 0.2-0.5).

- Early analyses suggest a reduced risk of hospitalisation among SGTF-infected individuals when compared to non-SGTF infected individuals in the same time period. Once hospitalised, risk of severe disease was similar for non-SGTF infected individuals, while SGTF-infected individuals had a reduced risk of severe disease when compared to earlier Delta-infected individuals. The authors note it is likely some of this reduction can be attributed to higher population immunity (due to natural infection and/or vaccination).
- Full paper: [Early assessment of the clinical severity of the SARS-CoV-2 Omicron variant in South Africa | medRxiv](#)

PREPRINT: The adverse impact of COVID-19 pandemic on cardiovascular disease prevention and management in England, Scotland and Wales: A population-scale descriptive analysis of trends in medication data | medRxiv

- This preprint paper attempted to estimate the impact of the COVID pandemic on cardiovascular disease (CVD) and CVD management using anonymised data for 1.32 billion records of dispensed CVD medications across 15.8 million individuals in England, Scotland and Wales.
- Findings suggest notable uplift of CVD medication ahead of first lockdown (+11.8% March 2020) but not observed before subsequent lockdowns.
- It is estimated some 490,000 fewer individuals initiated antihypertensive treatment (high blood pressure) across England, Scotland and Wales during the period March 2020 to end May 2021 than would have been expected compared to 2019. This could result in some 13,500 additional CVD events missed, including some 2,300 additional myocardial infarctions and 3,500 potential strokes. In contrast, the use of treatments for type-2 diabetes increased by approximately 1,642 patients per month.
- The study concludes that management of key COVID-19 risk factors has not returned to pre-pandemic levels in the UK. As a result methods to identify and treat individuals who have missed treatment is urgently recommended in order to avoid large numbers of future CVD events adding to the indirect cost of the COVID-19 pandemic.
- Full paper: [The adverse impact of COVID-19 pandemic on cardiovascular disease prevention and management in England, Scotland and Wales: A population-scale descriptive analysis of trends in medication data | medRxiv](#)

Characteristics and Outcomes of Hospitalized Patients in South Africa During the COVID-19 Omicron Wave Compared With Previous Waves | Global Health | JAMA | JAMA Network

- Hospitalized patients in South Africa with a positive SARS-CoV-2 result were assessed in the wake of the Omicron variant (wave 4) and compared to previous waves. Overall a different pattern of characteristics and outcomes in patients hospitalized with COVID-19 was observed in the early phase of the fourth wave compared with earlier waves in South Africa, with younger patients having fewer comorbidities, fewer hospitalizations and respiratory diagnoses, and a decrease in severity and mortality.

- 69% of patients presenting to the emergency department with a positive COVID-19 result were admitted to the hospital in the first 3 waves, vs 41% in wave 4. Patients hospitalized during wave 4 were younger (median age 36 years vs maximum 59 years in wave 3), with a higher proportion of females.
- Significantly fewer patients with comorbidities were admitted in wave 4, and the proportion presenting with an acute respiratory condition was lower (31.6% in wave 4 vs maximum 91.2% in wave 3).
- Of 971 patients admitted in wave 4, 24.2% were vaccinated, 66.4% were unvaccinated, and vaccination status was unknown for 9.4%.
- The proportion of patients requiring oxygen therapy significantly decreased (17.6% in wave 4 vs 74% in wave 3) as did the percentage receiving mechanical ventilation. Admission to intensive care was 18.5% in wave 4 vs 29.9% in wave 3.
- The median length of stay (between 7 and 8 days in previous waves) decreased to 3 days in wave 4. The death rate was between 19.7% in wave 1 and 29.1% in wave 3 and decreased to 2.7% in wave 4.
- The study has several limitations. First, patients' virus genotyping was not available, although the Omicron variant was estimated to be 81% of the variants isolated by November and 95% isolated by December 2021. Second, 7% of the patients were still hospitalized as of December 20 when the study ended. Third, patients' behaviour and the profile of admissions could have differed between waves as different national restrictions and lockdowns were implemented. These factors should not have affected urgent admissions. Fourth, patients admitted for COVID-19 could not be differentiated from asymptomatic patients admitted for other diagnoses with an incidental positive test result, and this likely differed between waves, suggested by the lower proportion admitted with respiratory diagnoses in wave 4.
- Full paper: [Characteristics and Outcomes of Hospitalized Patients in South Africa During the COVID-19 Omicron Wave Compared With Previous Waves | Global Health | JAMA | JAMA Network](#)

Behavioural Insights and mental health

PREPRINT: CORSAIR study- How has the emergence of the Omicron SARS-CoV-2 variant of concern influenced worry, perceived risk, and behaviour in the UK?

- The aim of this study was to investigate changes in people's beliefs and behaviours following news of the Omicron variant and associated guidance, understanding this guidance and factors associated with engaging with protective behaviours through a series of online cross-sectional surveys conducted in England between 1 November and 8 December 2021.
- Beliefs about worry and perceived risk of COVID-19 fluctuated over time, with worry, perceived risk to self and perceived risk to people increasing slightly around the time of the announcement about Omicron, then returning to pre-Omicron levels. In data collected 6 to 8 December 2021, 32% had not heard anything about Omicron; another 48% reported only hearing "a little" about it. 39.0% of people reported being very or extremely worried about Omicron, with 44.9% and 56.7% perceiving a major or significant risk of Omicron to themselves and people in the UK respectively.

- Understanding of the new rules was low, with people over-estimating the new rules. There were few changes in behaviour over time; only rates of wearing a face covering increased. There was no evidence for significant associations between out-of-home activity and worry or perceived risk (COVID-19 generally or Omicron-specific). Engaging in highest risk social mixing and always wearing a face covering in hospitality venues were associated with worry and perceived risk about COVID-19. Always wearing a face covering in shops was associated with having heard more about Omicron.
- Almost two years into the COVID-19 outbreak, the emergence of a novel variant of concern slightly influenced worry and perceived risk, and engagement with a protective behaviour (wearing a face covering). There was no change in engagement with other behaviours that were not legislated. This may be reflective of the early stage of the Omicron outbreak in England.
- Full paper: [OSF | How has the emergence of the Omicron SARS-CoV-2 variant of concern influenced worry, perceived risk, and behaviour in the UK? The COVID-19 Rapid Survey of Adherence to Interventions and Responses \(CORSAIR\) study](#)

PREPRINT: 'Variant fatigue'? Public attitudes to COVID-19 18 months into the pandemic: A qualitative study.

- This preprint qualitative study explores public attitudes to COVID-19 18 months into the pandemic, specifically focused on adherence to infection-reducing behaviours and policy measures during a period of the emergence of a new variant (Omicron). Focus groups were conducted with a diverse sample of 22 adults in the United Kingdom to explore their views.
- Findings suggest that 18 months into the pandemic, there may be fatigue regarding the risk posed by COVID-19, despite the increased risk posed by the new variant Omicron. Due to this risk habituation and general decline in engagement with news related to COVID-19, many people may not be, or might be reluctant to, voluntarily adopt additional caution and infection-reducing behaviours. This poses a challenge for public health communication, since a sense of being 'relaxed' about, or 'living with' COVID-19 may undermine efforts to encourage voluntary adherence to infection-reducing behaviours. However, findings suggest that most people intend to adhere (albeit reluctantly) with policy measures (as opposed to 'advice') - including stringent measures such as lockdown - if they were required in future.
- Full paper: [PsyArXiv Preprints | 'Variant fatigue'? Public attitudes to COVID-19 18 months into the pandemic: A qualitative study](#)

Epidemiology

SARS-CoV-2 Omicron VOC Transmission in Danish Households

- This study estimated the household secondary attack rate (SAR) following the spread of Omicron VOC in Denmark to understand transmission dynamics during December 2021. Findings suggest the rapid spread of the Omicron VOC can be primarily ascribed to the increased immune evasiveness rather than an inherent increase in the basic transmissibility. An increased transmission for unvaccinated individuals was

found, and reduced transmission for booster-vaccinated individuals compared to fully vaccinated individuals.

- Among 11,937 households, 6,397 secondary infections were identified during a 1-7 day follow-up period. The SAR was 31% and 21% in households with the Omicron and Delta variant, respectively.
- There was little significant difference between the SAR of Omicron versus Delta among unvaccinated individuals, indicating the increased transmissibility of the Omicron VOC primarily can be ascribed to immune evasion rather than an inherent increase in the basic transmissibility.
- Comparing households infected with the Omicron to Delta VOC, a 1.17 times higher SAR for unvaccinated individuals was found, 2.61 higher for fully vaccinated and 3.66 times higher for booster-vaccinated individuals, demonstrating strong evidence of immune evasiveness of the Omicron VOC. For Omicron Booster-vaccinated individuals generally had a reduced transmissibility (OR: 0.72, CI: 0.56-0.92), and unvaccinated individuals had a higher transmissibility (OR: 1.41, CI: 1.27-1.57), compared to fully vaccinated individuals.
- The results show that the Omicron VOC is generally 2.7-3.7 times more infectious than the Delta VOC among vaccinated individuals. This observation is in line with data from the UK, which estimated that 19% of Omicron VOC primary cases in households resulted in at least one other infection within the household, compared to only 8.3% of those associated with the Delta VOC.
- There are some potential biases in this study, such as the early phase of the Omicron wave being characterised by spreading events rather than community transmission, a younger age distribution of cases compared to the Delta wave and the use of self-testing kits that are not nationally registered. The use of registry data means information on underlying risk conditions and behavioural drivers for those unvaccinated were also not available, which may impact both transmission and susceptibility to infection.
- Full paper: [SARS-CoV-2 Omicron VOC Transmission in Danish Households](#)

News article: Biological studies around reduced Omicron variant's virulence in the lungs and implications for young children

- A news article in *Nature* brings together evidence from multiple studies suggesting the Omicron variant replicates less readily in lung tissue compare to other variants, resulting in reduced severity.
- In Missouri, US, mice and hamsters were infected with Omicron and other variants to track disease progression. After a few days, the concentration of virus in the lungs of animals infected with Omicron was at least ten times lower than that in rodents infected with other variants¹. Other teams have also noted that compared

¹ [The SARS-CoV-2 B.1.1.529 Omicron virus causes attenuated infection and disease in mice and hamsters | Research Square](#)

with previous variants, Omicron is found at reduced levels in lung tissue²³. This could mean that the virus establishes a very local infection in the upper airways and has less chance to damage the lungs.

- These findings could also have implications for young children who have relatively small nasal passages and babies, who breathe only through their noses. Such factors can make upper respiratory conditions more serious for children than for adults, resulting in an uptick in the numbers of young children hospitalized for croup and other conditions that could indicate a severe infection of the upper respiratory tract.
- Full article: [Omicron's feeble attack on the lungs could make it less dangerous \(nature.com\)](https://www.nature.com/articles/d41586-021-01000-0)

Relative importance of different non household activities for COVID-19 transmission during period of intense restrictions compared to period of no restrictions. Findings from the Virus Watch Community Cohort Study.

- Analyses of how the risk of COVID-19 infections in adults aged > 16 was associated with various non-household activities during the second wave of the pandemic (October 2020-April 2021) when there were intense control measures in place) and during September-November of 2021 (when no restrictions were in place).
- Infections measured were based on self-reported lateral flow or PCR tests or positive antibody tests. Where possible the authors excluded infections that were thought to have been acquired in the household.
- Both during periods of intense restrictions and no restrictions, shopping accounted for the highest proportion of infections acquired outside the home. Going to Work and Public transport use were also important predictors of infection. Intense restrictions largely prevented transmission in hospitality, entertainment, beauty services and sports during the second wave of the pandemic. During a period of no restrictions parties and hospitality were associated with increased risk indoors but not outdoors. Participating in sports indoors or outdoors was associated with increased risk (although this may relate to associated social activities). There was no good evidence of increased risk from attending cinemas, theatres, concerts or indoor sports events or for beauty services.
- Limitations: Analyses from September – October are preliminary and have not been peer reviewed. Virus Watch cohort has an underrepresentation of younger adults.
- Full paper: [Virus Watch Study: Non-household activities COVID risk, 20 December 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/1014212/virus_watch_study_non-household_activities_covid_risk_20_december_2021.pdf)

² [Reduced Pathogenicity of the SARS-CoV-2 Omicron Variant in Hamsters | bioRxiv](https://doi.org/10.1101/2021.11.18.463444)

³ [SARS-CoV-2 Omicron-B.1.1.529 Variant leads to less severe disease than Pango B and Delta variants strains in a mouse model of severe COVID-19 | bioRxiv](https://doi.org/10.1101/2021.11.18.463444)

Non-pharmaceutical interventions**Social Care Working Group (SCWG) chairs summary of role of shielding**

- *[For details see the full note, linked below.]*
- Following a question from SAGE around the extent to which interventions targeted towards protecting the more vulnerable individuals could be effective in this wave and whether that would mean fewer measures affecting the whole of society might be needed the UK Government Social Care Working Group drafted a note.
- Overall the lived experience of previous waves is that shielding is challenging and there is no magic bullet. Impact assessment of Omicron is highly dependent on vaccine effectiveness after the booster programme and evaluating specific interventions is challenging due to the responsive nature of the pandemic; however the below interventions were considered:
 - [In England] vaccine (staff and resident) 2nd doses are high (95%+ coverage), whoever booster programme has reached 82% of residents and 39% directly employed staff. Only 11% agency staff boosted.
 - Testing (both PCR and LFD) can be simulated in isolation to other interventions. More frequent testing could be worse if adherence drops with frequency. So monitoring adherence is a critical part of policy effectiveness.
 - PPE and other interventions are hard to measure/model and there has been a lack of trials, so any simulation would be predicated on assumptions. It is noteworthy the evidence shows infection risk is greater at home than at work for healthcare staff. Also there is evidence that staff-staff transmission occurs during breaks when PPE is not worn.
 - Ventilation is likely effective but likely challenging to implement given a) season and b) variety of housing stock used for care homes.
 - Limiting visitors and visiting out reduces ingress but has a large impact on general wellbeing and visitors are a relatively small fraction compared to staff (daily contact with staff but weekly contact with visitors, though essential care providers visit as often as staff in many situations).
 - Pod visiting clearly safer but impact on wellbeing should be monitored.
 - The hierarchy of control model suggests that the impact of a range of interventions will not be additive but instead support each other. Modelling theory suggests that due to the non-linearity the total impact of interventions is often greater than the sum of the parts .
- Full paper: [S1453 SCWG chairs summary of role of shielding.pdf \(publishing.service.gov.uk\)](https://www.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/101453/scwg_chairs_summary_of_role_of_shielding.pdf)

SAGE: Impact of shielding on care homes during wave 2: Considerations for Omicron

- An age-stratified transmission model to UK hospital data streams and deaths in and out of hospital, distinguishing care home residents and not, suggests reducing only within-care home infection rates (e.g., through improved testing or staffing) has limited effect on mortality. To achieve a visible effect, additionally shielding care

homes from the rest of the population (by reducing in-and-out care home contacts) is needed.

- Reducing in-and-out care home infection rates by 60% results in a ~25% reduction in care home deaths (both in and out of hospital), against a <7% reduction if only within-care homes contacts are reduced. While these do not amount to a full shielding of the vulnerable, in the context of an Omicron wave where the primary aim is to reduce impact, such benefits may be worth the short-term costs of implementation (and indeed may already be partially instantiated in improved testing since Wave 2). Note however that hospitalisation and death rates are from wave 2, and might differ substantially for Omicron.
- Ultimately, the most effective way to reduce the deaths in care homes remains to limit prevalence in the general population.
- Full paper: [University of Manchester: Impact of shielding on care homes during wave 2: Considerations for Omicron, 21 December 2021 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/102422/University_of_Manchester_Impact_of_shielding_on_care_homes_during_wave_2_Considerations_for_Omicron_21_December_2021.pdf)