



**Health  
Information  
and Quality  
Authority**

An tÚdarás Um Fhaisnéis  
agus Cáilíocht Sláinte

# **Update on international public health agency assessments of the evidence in relation to the Omicron (B.1.1.529) variant**

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## About the Health Information and Quality Authority

The Health Information and Quality Authority (HIQA) is an independent statutory authority established to promote safety and quality in the provision of health and social care services for the benefit of the health and welfare of the public.

HIQA's mandate to date extends across a wide range of public, private and voluntary sector services. Reporting to the Minister for Health and engaging with the Minister for Children, Equality, Disability, Integration and Youth, HIQA has responsibility for the following:

- **Setting standards for health and social care services** — Developing person-centred standards and guidance, based on evidence and international best practice, for health and social care services in Ireland.
- **Regulating social care services** — The Chief Inspector within HIQA is responsible for registering and inspecting residential services for older people and people with a disability, and children's special care units.
- **Regulating health services** — Regulating medical exposure to ionising radiation.
- **Monitoring services** — Monitoring the safety and quality of health services and children's social services, and investigating as necessary serious concerns about the health and welfare of people who use these services.
- **Health technology assessment** — Evaluating the clinical and cost-effectiveness of health programmes, policies, medicines, medical equipment, diagnostic and surgical techniques, health promotion and protection activities, and providing advice to enable the best use of resources and the best outcomes for people who use our health service.
- **Health information** — Advising on the efficient and secure collection and sharing of health information, setting standards, evaluating information resources and publishing information on the delivery and performance of Ireland's health and social care services.
- **National Care Experience Programme** — Carrying out national service-user experience surveys across a range of health services, in conjunction with the Department of Health and the HSE.

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## Summary of agency assessments

### Key points

- On 15 December 2021, HIQA submitted to NPHET a rolling summary of the scientific evidence on Omicron, which was commenced on 6 December 2021. This report, which is available [here](#), included scientific information published as of 14 December 2021, as well as a rapid risk assessment update published by ECDC on 15 December 2021. An update to the information presented in the 15 December report was requested ahead of the NPHET meeting due to take place on 6 January 2022.
- For the present report, information was collated on 4 January 2022 for submission to NPHET on 5 January 2022. Due to time constraints, the approach taken was limited to identifying and summarising assessments of the scientific evidence as published by public health agencies and authorities between 15 December 2021 and 4 January 2022. The following summarises the key points of this report, by topic.

### Transmissibility and Transmission:

- UK government agencies have estimated the R value for Omicron as being between 1.0 and 1.2 in England, as of data available to 23 December 2021, with a growth rate of 0.4 per day, consistent with a doubling time of 2 days. The **UKHSA** will publish the next update on R and growth rate estimates on 7 January 2022. A more recent (28 December 2021) calculation of R in Northern Ireland has been higher than that reported for England on 23 December 2021 (1.4 to 1.8 for new positive tests).
- On 23 December 2021, the World Health Organization (**WHO**) updated their technical brief on the Omicron variant. The WHO stated that there is consistent evidence that Omicron has a substantial growth advantage over Delta, with an estimated doubling time of 2-3 days. At that time, it remained uncertain to what extent the observed rapid growth rate could be attributed to immune evasion or to inherent increased transmissibility. The WHO concluded that, based on several preprint studies, the observed growth advantage was likely due to a combination of both factors.
- On 22 December 2021, the Norwegian Institute of Public Health (**NIPH**) published an updated risk assessment on the impact of the Omicron variant in Norway. The report noted that the number of detected cases of SARS-CoV-2

infection and the number of hospital admissions in Norway were at a high level, but there were signs of flattening.

- Non peer-reviewed research on household transmission of Omicron by authors from the **Statens Serum Institut** in Denmark indicated a higher secondary attack rate (31% versus 21% for Omicron versus Delta). Also, compared to Delta, there was significantly higher transmission observed among fully vaccinated and booster-vaccinated individuals. The authors concluded that the rapid spread of Omicron is primarily related to immune evasiveness rather than an inherent increase in transmissibility of the virus.

#### **Virulence:**

- Early data on Omicron hospitalisations in Denmark are published on a daily basis. Based on data to 28 December 2021, 0.9% of Omicron cases (526 of 55,691) had been hospitalised, of which 72 were classified as hospital-acquired infections. The number of cases currently hospitalised as of 2 January 2022 was 112, with fewer than five patients with Omicron in ICU. As of 2 January 2022, there were **18 Omicron-related deaths in Denmark, out of 57,125 cases of Omicron.**
- As of 30 December 2021, there were **981 Omicron case hospitalisations in England** (confirmed and SGTF), representing an additional 166 hospitalisations from the report the previous day. There were **75 deaths in England relating to Omicron** (based on deaths occurring with 28 days of testing), representing an additional 21 from the report the previous day. More detailed hospitalisation data from 29 December 2021 showed that the median **age** of hospitalised cases was **45.5 years**, with 60.9% aged 40 years or more and **30.8% aged 70 years or more**. The **median time from Omicron specimen date to death was 5 days** (range 0 to 14) and the age of those who died ranged from **41 to 99** years.
- In their technical brief published on 23 December 2021, the **WHO** stated that data on the clinical severity of patients infected with Omicron was growing but still limited, with early data from UK, Denmark and South Africa indicating a reduced risk of hospitalisation for Omicron compared with Delta. However, there was noted uncertainty as to what extent the observed reduction in risk of hospitalisation could be attributed to immunity from previous infections or vaccination, and to what extent Omicron may be inherently less virulent.
  - On 4 January 2022, comments from a WHO official on the severity of Omicron were widely reported; these comments were to the effect that

more evidence is emerging to suggest that Omicron is affecting the upper respiratory tract to a greater extent than the lung, in comparison with Delta or previous variants. The WHO official noted that more studies would be required to confirm this finding.

- In their consensus statement on 22 December 2021, the **UK SPI-M-O** groups noted that the interrelationship between age, vaccine status, infection history and variants (as well as the small numbers of hospitalised cases in the older population at that time), against the background of a rapidly changing and heavily lagged system, made it extremely difficult to produce precise, robust estimates of the severity of Omicron, based on epidemiological data, at this time.
  - Estimates for the reduction in risk of hospital admission with Omicron ranged from 15% to 80% lower than that with Delta. However, SPI-M-O expressed low confidence in any specific figure; also, a 20% reduction in risk of hospital admission was noted to result in four times as many hospitalisations as an 80% reduction, and would therefore require a very different policy response than that associated with an 80% reduction, in order to achieve the same outcome.
- The **UKHSA** risk assessment of Omicron, published on 22 December 2021, classified the risk associated with infection severity as 'green', that is, there is evidence of a less severe clinical picture or lower infection fatality in comparison with Delta. This assessment is associated with low confidence, however, as it is based on preliminary data; three UK studies suggested an observed reduction in the relative risk of hospitalisation, versus Delta, and were consistent with data from South Africa, though no data were available on severity in hospital or on death.

#### **Immune escape and vaccine effectiveness:**

- In their risk assessment published on 22 December 2021, the **NIPH** concluded that vaccination is likely to provide good protection against severe disease due to the Omicron variant, however protection against infection is likely reduced compared with previous variants. Should the reason for the increased growth advantage of Omicron over Delta be due to immune evasion, the NIPH stated that even in a country with high vaccination uptake, it is likely that there would be a large population susceptible to infection with Omicron and subsequent onward transmission.

- In their technical brief published on 23 December 2021, the **WHO** noted that preliminary data from several lab-based studies suggested that there is a reduction in neutralising activity against Omicron in the sera of individuals who had received a primary vaccination schedule or in those who had prior infection. It was also noted that there were reports of an increased risk of reinfection and reductions in vaccine effectiveness in several countries, which could potentially be attributed to immune evasion by the Omicron variant.
- On 31 December 2021, the **UKHSA** published a technical briefing with an update on hospitalisation and vaccine effectiveness associated with Omicron. Two studies were described, one of which found an overall reduced risk of hospitalisation with Omicron versus Delta, and both of which found a substantial reduction in risk of hospitalisation for Omicron cases after three doses of vaccine compared to those who are unvaccinated. Despite the estimated reduction in hospitalisation risk and preserved vaccine effectiveness against hospitalisation, the UKHSA noted that a very high number of Omicron cases would still likely result in large numbers of admissions to hospital.

#### **Treatment efficacy:**

- As detailed in terms of primary research evidence in HIQA's 15 December 2021 report on this topic, the 23 December 2021 **WHO** update noted that some of the monoclonal antibodies developed against SARS-CoV-2 (for example, casirivimab and imdevimab) display reduced neutralisation against Omicron. The antibody treatment sotrovimab has been found to retain activity against Omicron but with a 3-fold lower potency of neutralisation.

#### **Test accuracy:**

- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant. Similar statements were made to those in the previous version of the brief with respect to the reliability of routinely used PCR and rapid antigen detection tests in relation to Omicron. However, it was noted that one preprint study suggested that the analytical sensitivity of seven rapid antigen detection tests trended slightly lower for detection of Omicron compared to the ancestral virus or other variants of concern. It was noted that further studies would be required to better understand the impact of Omicron on the performance of rapid antigen detection tests.

#### **Overall assessments of risk and impact:**

- No updated risk assessment has been published by ECDC since the rapid risk assessment on further emergence of Omicron published on 15 December 2021.
- In their risk assessment published on 22 December 2021, the **NIPH** concluded that the Omicron variant is likely to cause a new wave of the epidemic in Norway from January. The size of this wave is uncertain; with upper estimates of 100,000 cases and 1,000 hospital admissions per day. The NIPH stated that the size of the wave will depend on the characteristics of the variant, the prevalence and effect of vaccination, the effect of infection control measures and the effect of the population's self-selected behavioural changes.
- In their technical brief published on 23 December 2021, the **WHO** maintained that the overall risk related to Omicron was very high due to:
  - the global risk of COVID-19 more broadly, which remained very high
  - the faster spread of Omicron in communities compared with Delta, which may lead to further surges in cases with severe consequences (for example, increased hospitalisations and healthcare system burden).
- In a 28 December 2021 modelling report, the **Northern Ireland** Department of Health expected a peak of case numbers in early or mid-January, with hospital admissions and occupancy peaking in late January or early February.
  - It was considered that if the severity of Omicron were substantially reduced compared with Delta (close to an 80% reduction in severity) it was possible that current measures or modest further restrictions would be sufficient to maintain peak overall hospital numbers at a lower level than those which occurred in January 2021. However, if Omicron was associated with disease severity close to that of Delta, significant intervention would be required as soon as possible to provide a reasonable chance of keeping hospital inpatient numbers at less than 1,000.
- The most recent **UKHSA** Omicron risk assessment was published on 22 December 2021; the next update is due to be published on **7 January 2022**. The 22 December 2021 assessment classified the risk associated with infection severity as 'green' (less severe clinical picture, or lower infection fatality), though this assessment was made with low confidence. The risk assessments for 'growth advantage' and 'immune evasion' remained classified as 'red' and both with high confidence, while 'transmissibility' remained classified as 'amber' with low confidence.

- The UK **SAGE** group met on 23 December 2021 and were presented with a several research papers related to scenario modelling. The situation update noted the following points, amongst others:
  - As of 23 December, there remained several sources of uncertainty about the scale of the anticipated wave of hospitalisations, aside from uncertainty about severity. These included the impact of behaviour change (for example mixing patterns and use of testing), especially over the festive period, the waning of immunity, and the generation time of Omicron. There was considerable uncertainty as to how mixing patterns might change during and after the festive period.
  - It was stated that interventions to reduce transmission would make a significant difference to the size of the overall peak in hospitalisations if they were started well before the wave of infections in older people was underway. Interventions after this point would be too late to make a significant difference to the number of infections, hospitalisations, or deaths. Also, measures would be most effective in local areas where the number of infections in older age groups has not yet begun to increase significantly.

## **Background**

On request of the Department of Health, HIQA commenced, on 6 December 2021, a rolling summary of scientific evidence in relation to the SARS-CoV-2 'Omicron' variant. Emerging evidence published internationally in relation to Omicron was identified by searching a variety of sources at regular intervals throughout each day from 6 December until 14 December 2021. Reports were submitted to the Department of Health on 9 December, 14 December and 15 December 2021. The report submitted to NPHET on 15 December 2021, which is available [here](#), included scientific information published as of 11.59pm, 14 December 2021, as well as a rapid risk assessment update published by ECDC on 15 December 2021. An update to the information presented in the 15 December report was requested ahead of the NPHET meeting due to take place on 6 January 2022.

## **Approach to summarising the evidence**

For the present report, information was collated on 4 January 2022 for submission to NPHET on 5 January 2022. Due to time constraints, the approach taken was limited to identifying and summarising assessments of the scientific evidence as published by public health agencies and authorities since 15 December 2021.

Information was collected from the following agencies and or authorities:

- European Centre for Disease Prevention and Control (ECDC)
- Norwegian Institute of Public Health (NIPH)
- Statens Serum Institut (Denmark)
- South African National Institute for Communicable Diseases
- UK agency websites, including UK Health Security Agency (UKHSA)
- US Centers for Disease Control and Prevention (CDC)
- World Health Organization (WHO)

Information was included in the present report if it was not included in the previous report submitted to NPHET on 15 December 2021 (see above) and was published since that date. Information is presented according to the following major headings:

- Transmissibility and transmission
- Virulence

- Immune escape and vaccine effectiveness
- Treatment efficacy and effectiveness
- Test accuracy
- Overall assessments of risk and impact.

## Transmissibility and Transmission

- The **ECDC** published their most recent 'weekly epidemiological update' in relation to Omicron on 20 December 2021.<sup>(1)</sup> This report included data as of 19 December 2021.
  - At this time, there was an overall total of 4,691 confirmed cases of Omicron in the EU/EEA. Countries and territories outside of the EU/EEA had, at this time, reported 30,220 confirmed cases.
  - Confirmed cases had been reported by 28 countries within the EU/EEA.
  - Although cases reported initially had been linked to travel, this update noted an increasing number of cases reported to be acquired within the EU/EEA, including as parts of clusters and outbreaks, with cases also detected in representative surveillance systems. Several EU/EEA countries reported cases without an epidemiological link to travel. This indicated that community-associated spread of Omicron was occurring, as of 19 December 2021, within the EU/EEA.
- On 22 December 2021, the **NIPH** published an updated risk assessment on the impact of the Omicron variant in Norway.<sup>(2)</sup> As of 21 December, the NIPH noted that the number of detected cases of SARS-CoV-2 infection (>30,000 per week) and the number of hospital admissions (242 admissions per week) in Norway were at a high level, but there were signs of flattening. The Omicron variant was in the process of becoming the dominant strain in Norway at the time of the report. The NIPH stated that the Omicron variant had a greater transmissibility than the Delta variant, which may be due to its inherently increased infectivity, its greater ability to circumvent the population's immunity, or a combination of these factors.
  - Since week 47 of 2021, there has been a total of 18,352 confirmed or probable cases of Omicron in Norway. As of 2 January 2022, Omicron accounted for 82% of all cases that were screened for variants in the previous 14 days.<sup>(3)</sup>
- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> As of 22 December 2021, the Omicron variant had been identified in 110 countries across all six WHO Regions. The WHO stated that there is consistent evidence that Omicron has a substantial growth advantage over Delta, with an estimated doubling time of 2-3 days. At this time, it remained uncertain to what extent the observed rapid growth rate could be attributed to immune evasion or to inherent increased transmissibility, though the WHO

concluded that, based on several preprint studies, the observed growth advantage was likely due to a combination of both factors. The WHO noted that there was, at this time, still limited data to inform generation time estimates (that is, the time between infection events in an infector–infectee pair) for Omicron; these data are important for understanding of the observed dynamics.

- Authors from the Danish **Statens Serum Institut** published a preprint article on 27 December 2021 on Omicron transmission, examining 11,937 Danish households (2,225 with Omicron infections).<sup>(5)</sup> Secondary attack rates for each of Omicron and Delta infected households were estimated at 31% and 21%, respectively. Increased transmission was observed for unvaccinated individuals and reduced transmission was observed for booster-vaccinated individuals, compared with fully vaccinated individuals. Considering Omicron versus Delta, significantly higher transmission was observed for Omicron among fully vaccinated and booster-vaccinated individuals:
  - Omicron versus Delta, odds ratio (OR) for transmission:
    - Unvaccinated, OR = 1.17 (95% CI: 0.99 to 1.38)
    - Fully vaccinated, OR = 2.61 (95% CI: 2.34 to 2.90)
    - Booster-vaccinated, OR = 3.66 (95% CI: 2.65 to 5.05)

The authors concluded that these findings confirmed that the rapid spread of Omicron is primarily related to immune evasiveness rather than an inherent increase in transmissibility of the virus.

#### *UK data – R and growth rate*

- The **UKHSA Epidemiology Modelling Review Group** published on 15 December 2021 their most recent consensus statement on COVID-19.<sup>(6)</sup> The following parameter estimates were noted, based on models fit to data available to 13 December 2021:
  - The UKHSA’s best estimate for R (overall, as opposed to Omicron-specific) was, as of 15 December 2021, between 1.0 and 1.2 for England and between 0.9 and 1.1 for Wales, Scotland and Northern Ireland. These estimates were not expected to fully reflect the rapid growth of Omicron at that time, as R lags changes in transmission by two to three weeks, due to the time required to see changes in data

streams. As such, these estimates were considered to represent the epidemic situation as at 30 November 2021.

- The consensus estimate for the growth rate in England was estimated as between 0% to 2% per day, while lower estimates were calculated for the other UK nations. The UKHSA noted that, for Omicron specifically, the UKHSA modelling was consistent with modelling by SPI-M-O (Scientific Pandemic Influenza Group on Modelling, Operational sub-group) groups, who had estimated a doubling time of around two days.
- The UK **SPI-M-O** groups published a consensus statement on COVID-19 on 18 December 2021.<sup>(7)</sup> The growth rate for Omicron was estimated as at around 0.4 per day at this time, consistent with a doubling time of 2 days. A subsequent consensus statement relating to the severity of Omicron was published on 22 December 2021 (see section below on Virulence).<sup>(8)</sup>
- On 23 December 2021, the **UKHSA** published their most recent estimate of the R value and growth rates overall. The R range for England was estimated at between 1.0 and 1.2, while the growth rate was estimated at between 0% and +3% per day.<sup>(9)</sup> These estimates represented the transmission of COVID-19 overall in England two to three weeks prior to the time of publication (during early December), due to the time delay between infection, symptom development, and seeking of healthcare. **A subsequent update on R and growth rate estimates is due to be published on 7 January 2022 at 3pm.**
- The **Northern Ireland** Department of Health published on 28 December 2021 a report on the reproduction number and other indicators.<sup>(10)</sup>
  - The estimate of R for new positive tests range from 1.4 to 1.8, which was increased from the estimate from the previous 7 days (1.1 to 1.4).

#### *UK data – case numbers and rates*

- The **Northern Ireland** Department of Health report on 28 December 2021<sup>(10)</sup> stated the following regarding case numbers and transmission by age-group:
  - The number of new positive cases increased dramatically over the week leading to publication, in the context of increased testing and a marked increase in test positivity.
  - COVID-19 transmission in the community was noted to be likely at its highest ever level in the community. There had been dramatic

increases in cases in those aged 18 to 30, followed by those in the 30 to 59 age-groups. Significant increases in older age groups had also been identified, which was likely a result of within family/household spread. Cases were noted to have remained stable in the 0 to 15 age-groups following the closure of schools.

- The **UKHSA** published on 31 December 2021 their final daily overview specifically of Omicron cases in the UK, which included data up to 30 December 2021.<sup>(11)</sup> The overview noted that, as Omicron was the dominant strain within England, separate statistics for Omicron would no longer be reported from 1 January 2022, though daily overall COVID-19 statistics would continue to be made available. Considering the overview specific to Omicron, the total numbers of confirmed (by sequencing or genotyping) Omicron cases for each of England, Northern Ireland, Scotland and Wales were as represented in Table 1, for data as of 30 December 2021. In England, among all samples with known S-gene status, **95.7% of samples had SGTF** on this date.

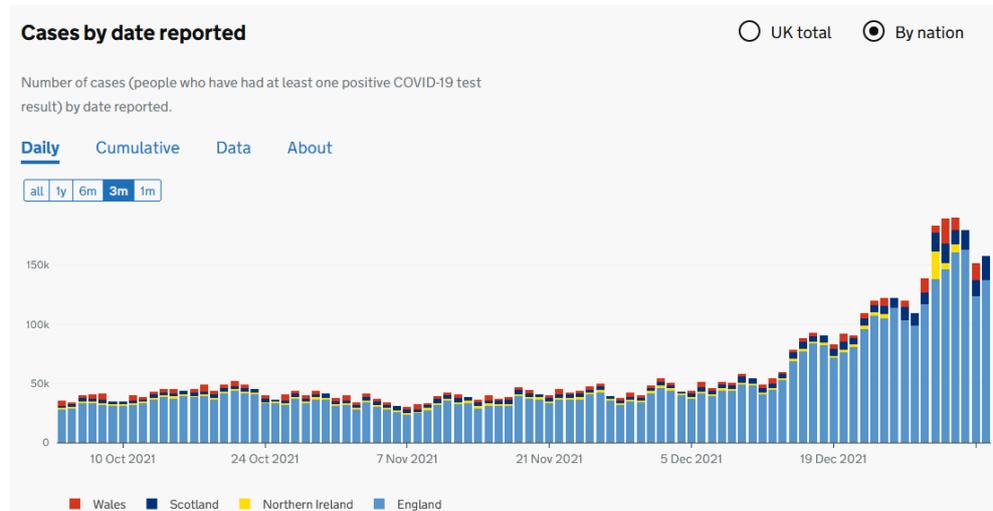
**Table 1: UK total Omicron case numbers as of 30 December 2021**

	<b>Confirmed (sequencing or genotyping) Omicron cases</b>	<b>SGTF cases (excluding those ruled out as other variants)</b>
England	212,019	492,543
Northern Ireland	12,772	N/A
Scotland	13,649	97,480
Wales	8,340	10,018
<b>Cumulative total</b>	246,780	600,041 (excluding Northern Ireland)

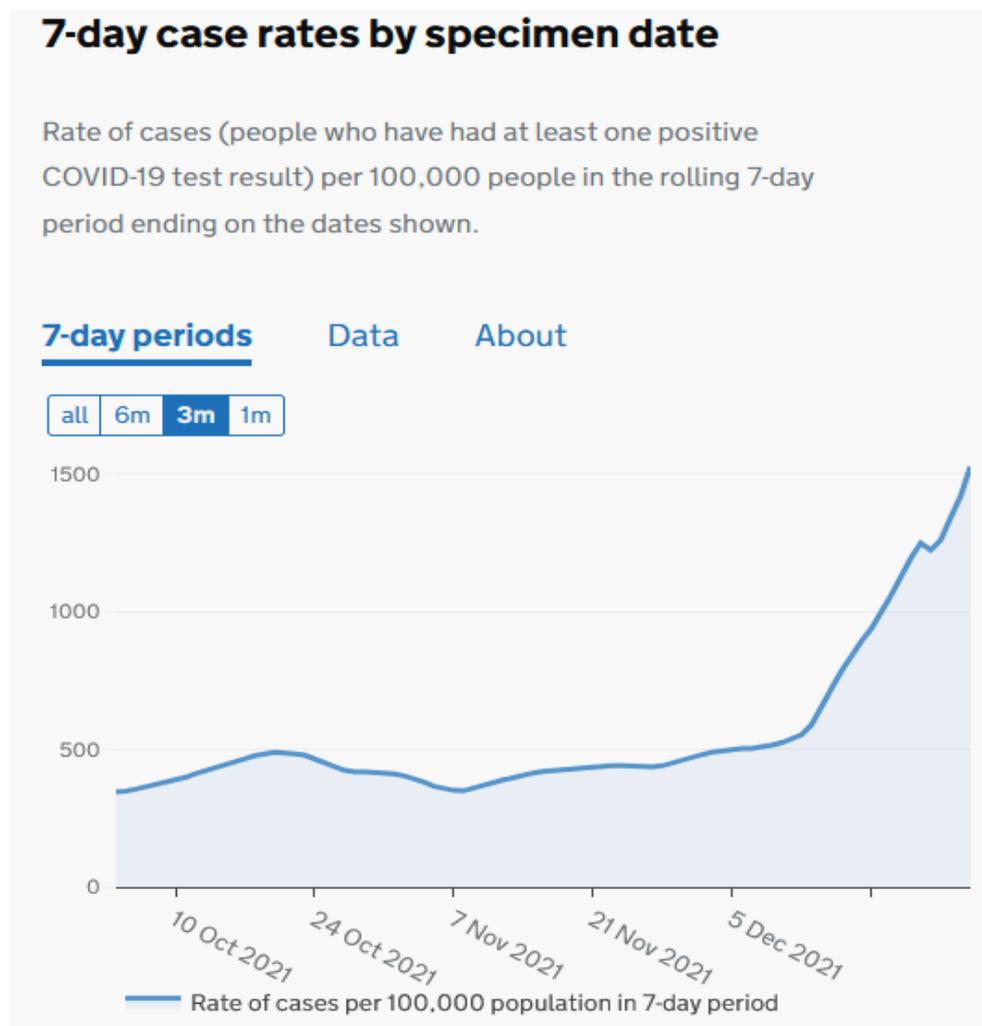
SGTF: S-gene target failure (proxy for Omicron detection in absence of sequencing or genotyping availability)

- Based on 3 January 2022 UK reports (containing data to 2 January 2022), which referred to COVID-19 overall due to the dominance of Omicron, there were 137,541 new cases of COVID-19 in England on 2 January 2021.<sup>(12)</sup> Figures 1 and 2 depict the growth in cases in the UK in the past three months.<sup>(12)</sup>

**Figure 1: UK COVID-19 cases by date reported – data to 3 January 2022, by nation**



**Figure 2: UK COVID-19 case rates by specimen data – data to 3 January 2022, UK overall**



## Virulence

### *Epidemiological data; early patient experience*

- The **ECDC** published their most recent 'weekly epidemiological update' in relation to Omicron on 20 December 2021.<sup>(1)</sup> This report included data as of 19 December 2021.
  - At the time of reporting, most cases for which information was available on severity were reported to be either asymptomatic or mild. The ECDC noted that at this time, the number of confirmed cases was too low to understand if the clinical disease spectrum of Omicron differed from that of previously detected variants.
- The **Northern Ireland** Department of Health report published on 28 December 2021<sup>(10)</sup> noted that hospital admissions and COVID-19 bed occupancy both rose modestly in the week prior to publication. Limited evidence suggested that hospital admissions included a mixture of Delta and Omicron, and that a higher proportion of admissions were 'with COVID' rather than 'because of COVID', as would be expected given very high levels of community transmission. It was noted that the frequency of severe illness requiring hospital admission after Omicron infection remained uncertain. ICU occupancy and hospital deaths remained stable in the week to 28 December 2021.
- The **UKHSA** technical briefing published on 31 December 2021 provided an update on hospitalisation data and vaccine effectiveness for Omicron.<sup>(13)</sup> Considering data to 29 December 2021, a total of 815 individuals in England with laboratory-confirmed Omicron (sequencing, genotyping, or SGTF confirmed) had been admitted or transferred from emergency departments.
  - Among these, 31.9% were in London.
  - The median age range was 45.5 years, 60.9% were aged 40 years or more, and 30.8% were aged 70 years or more.
  - As of 29 December 2021, 57 people (of the 815 laboratory-confirmed cases) had been reported to have died (including only those who died within 28 days of a positive test). The median time from Omicron specimen date to death was **5 days (range 0 to 14)** and the **age of those who died ranged from 41 to 99** years.
- The **UKHSA** published on 31 December 2021 their final daily overview specifically of Omicron cases in the UK, which included data up to 30

December 2021.<sup>(11)</sup> Due to the dominance of Omicron, from 1 January 2022, daily statistics were no longer provided separately for Omicron.

- As of data available on 30 December 2021 (for dates up to 29 December 2021) and reported by UKHSA:
  - There were **981 Omicron case hospitalisations** in **England** (confirmed and SGTF), **representing an additional 166 hospitalisations from the report the previous day.**
  - There were **75 deaths** in England relating to Omicron (based on deaths occurring with 28 days of testing), **representing an additional 21 from the report the previous day.**
  - **39.3% of hospitalised cases in London were unvaccinated.** As London was at this time the largest and most robust data set of the regions presented, the report authors stated that this finding reflected the importance of vaccine uptake.
  - It is important to note that these data are lagged (by up to 48 hours) and require hospital staff to submit emergency care data sets for analysis and linkage with testing data.
- Statistics from the **NIPH** showed that, during week 52 of 2021, 29 patients with confirmed or probable Omicron infection were admitted to hospitals in Norway, accounting for 23% of all COVID-19 patients screened for variants. Of these 29 patients, 18 were admitted with COVID-19 as the main cause. Since week 49, the total number of COVID-19 patients admitted to hospital per week has decreased from 314 to 241 in week 52.<sup>(3)</sup>
- The **Statens Serum Institut** publishes daily statistics on the cases of Omicron in Denmark.<sup>(14)</sup>
  - On 2 January 2022, 112 patients were hospitalised in Denmark with Omicron, with fewer than five of these patients admitted to ICU. Overall between 21 November and 28 December 2021, of the 55,691 Omicron cases analysed, **526 (0.9%) were admitted to hospital.** Of these, **72 cases tested positive 48 hours or more after admission (and were therefore classified as hospital-acquired cases),** while 454 cases tested positive prior to or within 48 hours of admission. Across all other known variants between 21 November and 28 December 2021, 1,530 of 127,246 cases (1.2%) were hospitalised.

As of 2 January 2022, there were 18 Omicron-related deaths in Denmark, out of 57,125 cases of Omicron.

### *Assessments by authorities*

- On 21 December 2021, the **South African** National Institute for Communicable Diseases published, as a preprint, an early assessment of the clinical severity of Omicron in South Africa.<sup>(15)</sup>
  - Early analyses suggested a reduced risk of hospitalisation among Omicron cases versus non-Omicron cases in the same time period. Once hospitalised, the risk of severe disease was found to be similar between the groups, though Omicron cases appeared to have a reduced risk of severe disease when compared to individuals who had been infected with Delta at an earlier time. It was considered that high population immunity (due to prior infection and/or vaccination) may have provided protection against severe disease in this population.
- On 22 December 2021, the **NIPH** published an updated risk assessment on the impact of the Omicron variant in Norway.<sup>(2)</sup> The NIPH stated that, at this time, it was too early to conclude whether the Omicron variant caused comparable or less severe illness than Delta. However, it was noted that early data suggested that Omicron was not associated with a more severe disease course than Delta.
- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> The WHO stated that, at the time of writing, data on the clinical severity of patients infected with Omicron was growing but still limited. Early data from South Africa, the UK and Denmark suggested a reduced risk of hospitalisation for Omicron compared with Delta. However, the WHO noted that the risk of hospitalisation is only one aspect of severity, which may be affected by admission practices. The WHO stated that more data from different countries was needed to understand how clinical markers of severity, such as the use of oxygen, mechanical ventilation and deaths, were associated with Omicron. The WHO concluded that, at the time of the report, it was unclear to what extent the observed reduction in risk of hospitalisation could be attributed to immunity from previous infections or vaccination, and to what extent Omicron may be inherently less virulent. However, it was expected that hospitalisations would increase as a result of significant increases in transmission due to the Omicron variant.

- On 4 January, the WHO Incident Manager Abdi Mahamud, stated that evidence is emerging that the Omicron variant is affecting the upper respiratory tract, rather than the lungs, resulting in milder symptoms than those associated with previous variants, which were more likely to cause pneumonia.<sup>(16)</sup> However, it was noted that more studies would be required to confirm this finding. It was also noted that the high transmissibility of Omicron still poses a threat, particularly to countries where a high proportion of the population remain unvaccinated.

*Note:* While specific studies were not mentioned in the comments by Abdi Mahamud, a number of preprint studies were identified by the HIQA team which may have contributed to this viewpoint. It is important to note that this does not necessarily represent a complete list of studies relevant to this topic as a specific search was not conducted, and these studies are preprints and have not been peer-reviewed, or reviewed by HIQA:

- Study by researchers from the University of Hong Kong (15 December 2021), which suggested that Omicron can infect human bronchus cells more efficiently than Delta, but with less severe infection in lung tissue.<sup>(17)</sup>
- Meng et al. study (22 December 2021) finding of reduced efficiency of infection by Omicron of lower airway cells, as opposed to upper airway cells.<sup>(18)</sup>
- Abdelnabi et al. study (26 December 2021) finding that Omicron did not readily infect the lungs of Syrian hamsters.<sup>(19)</sup>
- Diamond et al. study (29 December 2021) finding that Omicron resulted in attenuated lower respiratory tract infection and disease in mice and hamsters.<sup>(20)</sup>
- Bentley et al. study (30 December 2021) finding that Omicron led to less severe disease than Delta in a mouse model.<sup>(21)</sup>
- McMahan et al. study (3 January 2022) finding of reduced pathogenicity of Omicron in hamsters, specifically less severe lower respiratory tract clinical disease compared with prior SARS-CoV-2 variants.<sup>(22)</sup>
- The most recent **UKHSA** Omicron risk assessment was published on **22 December 2021**,<sup>(23)</sup> and is due to be updated on **7 January 2022**. The 22

December risk assessment differed from those published on 9 December 2021 and 15 December 2021, wherein there was no information available to assess infection severity; the most recent risk assessment has classified the risk associated with infection severity as 'green', that is, *'there is evidence of a less severe clinical picture or lower infection fatality than from wild type SARS-CoV-2 infections'* (in this case in comparison with Delta). This assessment is associated with low confidence, however. The infection severity assessment was based on an observed reduction in the relative risk of hospitalisation, though no data were available on severity in hospital or on death:

- Three UK analyses were found to support a moderate reduction in the relative risk of hospitalisation for a person detected as a case of Omicron, compared to Delta. This was also found to be consistent with data from South Africa.
  - These analyses were considered by UKHSA to be preliminary due to the small numbers of Omicron cases in hospital at the time of the assessment, and the limited spread of Omicron in older age groups at that time. There were insufficient data to comment on severity of illness once in hospital, or on mortality.
  - It was considered that available data suggested that the observed reduction in risk in the UK was likely to be partly due to a reduction in the inherent severity of the virus and partly due to protection provided by prior infection. The UKHSA stated that they could not confidently quantify the relative contributions of these two factors at the time of assessment.
  - The UKHSA noted that, even given the reduced hospitalisation risk observed, the combined growth advantage and immune evasion properties of Omicron could potentially lead to very high numbers of hospital admissions.
- The UK **SPI-M-O** consensus statement on COVID-19, 22 December 2021, examined the severity of COVID-19, and considered estimates of the risk of hospitalisation from South Africa, Scotland and England.<sup>(8)</sup> The following points were noted:
- The interrelationship between age, vaccine status, infection history and variants (as well as the small numbers of hospitalised cases in the older population at that time), against the background of a rapidly changing and heavily lagged system, made it extremely difficult to

produce precise, robust estimates of severity at the time of reporting. Estimates were noted to be particularly sensitive to the methodology used to adjust for reinfections, many of which will not have been detected.

- Based on the evidence available at the time of reporting, it was considered likely that the inherent hospitalisation rate of Omicron is lower than that of Delta, and that reinfections are less severe than previous infections. As such, the realised hospitalisation rate was expected to be almost certainly lower than in an entirely susceptible population.
- Estimates for the reduction in risk of hospital admission with Omicron ranged from 15% to 80% lower than that with Delta. However, SPI-M-O expressed low confidence in any specific figure; also, a 20% reduction was noted to result in four times as many hospitalisations as an 80% reduction, and would therefore require a very different policy response than that associated with an 80% reduction, in order to achieve the same outcome.

## Immune escape, and vaccine efficacy and effectiveness

- On 22 December 2021, the **NIPH** published an updated risk assessment on the impact of the Omicron variant in Norway.<sup>(2)</sup> The NIPH concluded that vaccination is likely to provide good protection against severe disease due to the Omicron variant, however protection against infection is likely reduced compared with previous variants. Should the reason for the increased growth advantage of Omicron over Delta be due to immune evasion, the NIPH stated that even in a country with high vaccination uptake like Norway, it is likely that there would be a large population susceptible to infection with Omicron and subsequent onward transmission. However, the NIPH noted that vaccination will still likely provide good protection against severe disease in this scenario.
- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> The WHO noted that preliminary data from several lab-based studies suggested that there is a reduction in neutralising activity against Omicron in the sera of individuals who had received a primary vaccination schedule or in those who had prior SARS-CoV-2 infection. It was considered that the reported increased risk of reinfections in UK, along with a growing trend of reinfection cases in Denmark and Israel, could be potentially attributed to immune evasion by the Omicron variant. At the time of writing, the WHO noted that preliminary findings of vaccine effectiveness studies from

Denmark, South Africa and the UK indicated a reduction in vaccine effectiveness for Omicron against infection, symptomatic disease and hospitalisation compared with earlier variants.

- On 31 December 2021, the **UKHSA** published a technical briefing with an update on hospitalisation and vaccine effectiveness associated with Omicron.<sup>(13)</sup> The data cut-off for analyses informing this briefing was 29 December 2021. As of this date, 815 individuals with laboratory-confirmed (sequencing, genotyping, or SGTF) Omicron had been admitted or transferred from emergency departments in England. It was highlighted that this briefing contained early data and analysis on emerging variants and that findings carried a high level of uncertainty.
  - Two studies were described, one of which found an overall reduced risk of hospitalisation with Omicron versus Delta, and both of which found a substantial reduction in risk of hospitalisation for Omicron cases after three doses of vaccine compared to those who are unvaccinated, though with overlapping estimate ranges. Despite the estimated reduction in hospitalisation risk and preserved vaccine effectiveness against hospitalisation, the UKHSA noted that a very high number of Omicron cases would still likely result in large numbers of admissions to hospital. As reported by UKHSA:
    - Study 1 (University of Cambridge, in collaboration with UKHSA) found that the **risk of presentation to emergency care, or hospital admission**, with Omicron was approximately half of that for Delta (**Hazard Ratio 0.53, 95% CI: 0.50 to 0.57**). The risk of hospital admission from emergency departments with Omicron was approximately one-third of that for Delta (Hazard Ratio 0.33, 95% CI: 0.30 to 0.37). These analyses were stratified on date of specimen and area of residence and further adjusted for age, sex, ethnicity, local area deprivation, international travel, and vaccination status. They were also adjusted for whether the current infection is a known reinfection, although as reinfections are substantially under-ascertained, the adjustment may not have fully accounted for the effect of reinfections. In this analysis, the risk of hospitalisation was lower for Omicron cases after 2 and 3 doses of vaccine, with an **81% (77 to 85%) reduction in the risk of hospitalisation after 3 doses**, compared to unvaccinated Omicron cases.

- Study 2 (UKHSA) found that, after three doses of vaccine, the risk of hospitalisation for a symptomatic case (identified with Omicron through community testing) was **estimated to be reduced by 68%** (42% to 82%) when compared to similar individuals with Omicron who were not vaccinated (after adjusting for age, gender, previous positive test, region, ethnicity, clinically extremely vulnerable status, risk group status and period). UKHSA noted that, combined with the protection against becoming a symptomatic case, this would yield a vaccine effectiveness against hospitalisation of 88% (78 to 93%) for Omicron after three doses of vaccine.

## Treatment efficacy and effectiveness

- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> While the 10 December 2021 brief, which was included in the HIQA 15 December 2021 report, included information on this topic, few updates to this topic were noted in the 23 December 2021 version.
  - As detailed in terms of primary research evidence in HIQA's 15 December 2021 report on this topic, the 23 December 2021 WHO update noted that some of the monoclonal antibodies developed against SARS-CoV-2 (for example, casirivimab and imdevimab) display reduced neutralisation against Omicron. The antibody treatment sotrovimab has been found to retain activity against Omicron but with a 3-fold lower potency of neutralisation, as measured by EC50 (half maximal effective concentration).

## Test accuracy

- On 17 December 2021, the **UKHSA** published a technical briefing, which included the results of an initial laboratory evaluation of the lateral flow devices (rapid antigen detection tests) in use within the UK.<sup>(24)</sup> Initial data suggested that these tests were as likely to detect Omicron as other variants, including Delta.
- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> Similar statements were made to those in the previous version of the brief with respect to the reliability of routinely used PCR and rapid antigen detection tests in relation to Omicron.

- The 23 December 2021 update noted that preliminary laboratory data were emerging which demonstrated that dilutions of viral culture of Omicron were detected by several rapid antigen detection tests (RADTs) as SARS-CoV-2 in a similar manner to the detection of ancestral virus or other variants. However, one report had suggested that the analytical sensitivity of seven RADTs trended slightly lower for detection of Omicron compared to the ancestral virus or other variants.<sup>(25)</sup> The WHO stated that more data were needed to better understand if there were any differences in antigen-based detection of Omicron.

## Overall assessments of risk and impact

- As detailed in the report on this topic submitted to NPHET on 15 December 2021, the **ECDC** published, on this date, a rapid risk assessment on the further emergence of the Omicron variant. No further risk assessment has been published as of 4 January 2021.
- As noted in the report on this topic submitted to NPHET on 15 December 2021, the **US CDC** published a science brief on the Omicron variant on 2 December 2021. No update to this science brief has been published as of 4 January 2021.
- On 22 December 2021, the **NIPH** published an updated risk assessment on the impact of the Omicron variant in Norway.<sup>(2)</sup> The NIPH concluded that the Omicron variant is likely to bring a new wave of the epidemic from January. The size of this wave is uncertain; with upper estimates of 100,000 cases and 1,000 hospital admissions per day. The NIPH stated that the size of the wave will depend on the characteristics of the variant, the prevalence and effect of vaccination, the effect of infection control measures and the effect of the population's self-selected behavioural changes.
  - The NIPH advised that should current public health measures be insufficient to control the Omicron wave, then further measures may be necessary. It was noted that simultaneous epidemics of influenza and respiratory syncytial virus (RSV) in Norway may worsen the situation.
- On 23 December 2021, the **WHO** updated their technical brief on the Omicron variant.<sup>(4)</sup> At this time, the WHO maintained that the overall risk related to Omicron was **very high** due to:
  - the global risk of COVID-19 more broadly, which remained very high

- the faster spread of Omicron in communities compared with Delta, which may lead to further surges in cases with severe consequences (for example, increased hospitalisations and healthcare system burden).
- On 28 December 2021, the **Northern Ireland** Department of Health published an updated report on modelling the COVID-19 epidemic.<sup>(10)</sup> The following points were noted regarding risk and impact:
  - It was considered likely that a peak in case numbers would occur in early or mid-January, with hospital admissions and occupancy peaking in late January or early February. It was noted that the extent of the hospital peak would depend on the severity of Omicron-related illness and that the emerging data would be monitored closely; further data on illness severity would emerge from experience in England and Scotland in the early January, allowing Northern Ireland estimates to be refined.
  - It was considered that if Omicron was associated with disease severity close to that of Delta, significant intervention would be required as soon as possible to provide a reasonable chance of keeping hospital inpatient numbers at less than 1,000. If severity was to be substantially reduced compared with Delta (closer to 80% reduction than 20%) it was considered possible that current measures or modest further restrictions would be sufficient to maintain peak overall hospital numbers at a lower level than those which occurred in January 2021.
- The most recent **UKHSA** Omicron risk assessment was published on **22 December 2021**,<sup>(23)</sup> and is summarised in tabular form below. This risk assessment differed from those published on 9 and 15 December 2021, wherein there was no information available to assess infection severity; the most recent risk assessment has classified the risk associated with infection severity as 'green', that is, *'there is evidence of a less severe clinical picture or lower infection fatality than from wild type SARS-CoV-2 infections'*. This assessment is associated with low confidence, however. Further detail on this specific assessment is included in the 'Virulence' section. The next update of the risk assessment is due to be published on **7 January 2022**.

Indicator	Red, amber or green status (red = highest risk)	Confidence level	Assessment
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Growth advantage	Red	High	Omicron is displaying a growth advantage over Delta
Transmissibility	Amber	Low	Omicron is at least as transmissible as Delta
Immune evasion (from natural and vaccine-derived immunity)	Red	High	Omicron displays a reduction in immune protection against infection (though NO data regarding severe disease)
Infection severity	Green	Low	There has been a reduction in the relative risk of hospitalisation but NO data on severity in hospital, or on death

- The UK Scientific Advisory Group for Emergencies (**SAGE**) met on 23 December 2021.<sup>(26)</sup>
  - Several documents were made available for the meeting, including:
    - [22 December 2021 SPI-M-O Consensus Statement on COVID-19](#)
    - [22 December 2021 report from Imperial College London on the hospitalisation risk for Omicron cases in England.](#)
    - [University of Edinburgh, Public Health Scotland and EAVE II study report on SARS-CoV-2 vaccine protection in Scotland against Omicron.](#)
    - [20 December 2021 University of Manchester paper on non-pharmaceutical interventions.](#)
    - [22 December 2021 LSHTM paper on Omicron epidemiological scenarios, based on possible restrictions that could be introduced on 28 December 2021.](#)
    - [22 December 2021 University of Warwick paper on results of Omicron scenario modelling.](#)
  - The following points were noted in the situation update:
    - The number of people in hospital with Omicron infection was continuing to increase at this time, with a doubling time of

around 4 to 5 days. Some of this increase was due to nosocomial transmission, including in mental health hospitals. Infections had been concentrated in younger age groups to date but hospitalisation rates were expected to increase as older age groups are infected. It was noted that, as infections move into older age groups, a large wave of hospital admissions could be expected.

- Altered testing and hospital admission patterns during the festive period would make it difficult to interpret any apparent trends in the days following 23 December. As such, it was considered that the UK ONS infection survey would remain the best source of unbiased data in the following weeks.
- There remained several sources of uncertainty about the scale of the anticipated wave of hospitalisations, aside from uncertainty about severity. These included the impact of behavioural changes (for example mixing patterns and use of testing), especially over the festive period, the waning of immunity, and the generation time of Omicron. There was considerable uncertainty as to how mixing patterns might change during and after the festive period. Continued availability of lateral flow tests would be important to enable people to reduce risk of transmission.
- The timing of the wave of hospitalisations would depend primarily on the timing of the wave of infections in older age groups and it was not considered possible to predict when this would be, particularly given changes to mixing patterns over the festive period. However, such a wave was to be expected soon after the 23 December, given that infections were increasing rapidly in all age groups and regions, and earlier in London.
- It was stated that interventions to reduce transmission would make a significant difference to the size of the overall peak in hospitalisations if they were started well before the wave of infections in older people was underway. Interventions after this point would be too late to make a significant difference to the number of infections, hospitalisations, or deaths. Also, measures would be most effective in local areas where the number of infections in older age groups has not yet begun to increase significantly.

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