Tues 28 December 2021

Modelling the COVID-19 epidemic; the Reproduction Number and other indicators

Current estimate of Rt (new positive tests): 1.40 – 1.80 (7 days previous 1.10 – 1.40)

Current estimate of Rt (hospital admissions): 1.10 – 1.30 (7 days previous 0.80 – 1.00)

7 day incidence based on new positive tests: 1380 / 100k (7 days previous 741)

14 day incidence based on new positive tests: 2165 / 100k (7 days previous 1385)

7 day average of total positive individuals (pillar 1/2): 7.7% (7 days previous 5.8%)

7 day average Pillar 2 test positivity: 20.2% (7 days previously 13.7%)

7 day daily average tests completed: 38,056 (7 days previous 36,157)

Number of new positive tests in over 60s in last 7 days: 2005 (7 days previous 661)

Proportion of total positive tests occurring in over 60s: 6.5% (7 days previous 4.5%)

COVID-19 +ve hospital admission in last week: 196 (7 days previous 153)

Number of COVID-19 inpatients: 303 (7 days previous 275)

COVID-19 +ve ICU patients: 32 (7 days previous 34)

The number of new positive cases increased dramatically in the last week, in the context of increased testing and a marked increase in test positivity. COVID transmission in the community is now likely to be at its highest ever level in the community, by some distance. There has been a dramatic increase in cases in 18-30s, followed by 30 – 50s. However, there are also significant increases in older age groups which is likely to be a result of within family/household spread given the increased transmissibility of the omicron variant. Cases have remained stable in 0-15s following the closure of schools. The overall pattern is likely to be a consequence of the counterplay between increased vaccination, including boosters, and changes in contact patterns in different age groups in the context of rapid increase in the prevalence of the omicron which is now around 90% of new cases.

Hospital admissions and COVID bed occupancy both rose modestly in the last week. Limited evidence suggests that hospital admissions include a mixture of delta and omicron, and that a higher proportion of admissions are "with COVID"

rather than "because of COVID" as would be expected given very high levels of community transmission. The frequency of severe illness requiring hospital admission after omicron infection remains uncertain. Though is likely to be reduced by 20 – 80% compared with delta.

We will continue to monitor emerging evidence and hospital data closely and advise accordingly on potential hospital pressures which may result from a large number of omicron cases. Booster vaccination will continue to offer protection against severe disease with omicron, and rapid uptake of booster doses remains a key priority.

ICU occupancy and hospital deaths are oscillating and remained stable in the last week.

The omicron variant in NI accounts for around 90% of cases currently and is by far the dominant variant. It is likely that delta will gradually decline, though it remains possible that a more modest delta epidemic will persist in parallel with a larger omicron epidemic.

It is likely that a peak in case numbers will occur in early / mid January, with hospital admissions and occupancy peaking in late January / early February. The extent of the hospital peak will depend on the severity of omicron illness and we will continue to monitor emerging data closely. Further data on illness severity will emerge from experience in England and Scotland in the next 1-2 weeks and will allow NI estimates to be refined. If omicron is associated with disease severity close to that of delta, significant intervention would be required as soon as possible to have a reasonable chance of keeping hospital inpatient numbers at less than 1000. If omicron severity is substantially reduced compared with delta (closer to 80% reduction than 20%) it is possible that current measures or modest further restrictions would be sufficient to maintain peak hospital numbers at a lower level than last January.

Very high levels of community transmission may result in significant staff absences with the potential to reduce capacity in Health and Social Care as well as in other areas.

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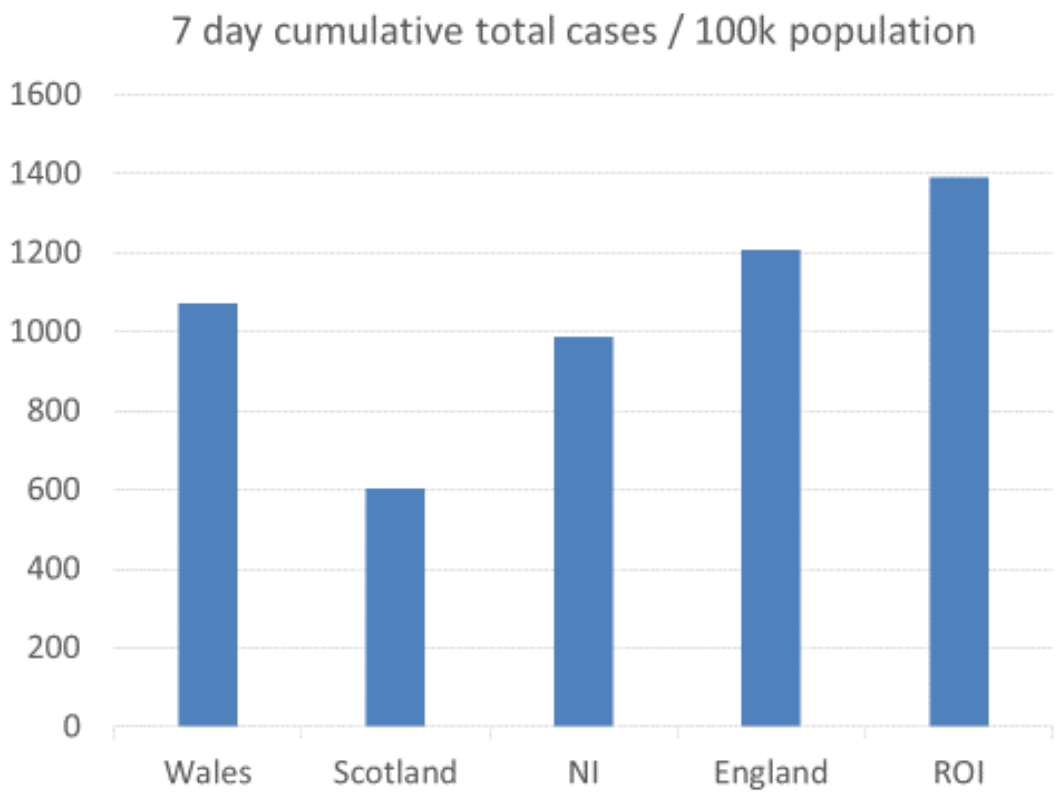
SAGE advice remains that the earlier measures to reduce transmission are introduced, the more stringent they are, and the wider their geographic coverage, the more effective they will be. Past SAGE advice on measures to reduce transmission remains highly relevant, including but not limited to advice around ventilation, face coverings, hand hygiene, reducing contacts (e.g. by working from home), vaccination certification, and the importance of effective testing, contact tracing and isolation.

NI, UK and Republic of Ireland comparison

COVID prevalence has increased substantially across the common travel area in the last week. Northern Ireland currently lags behind Wales, England and ROI. There is variation in testing throughout the CTA and data should be interpreted with this in mind.



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Regional variation in cases-

Variation in cases in LGDs is shown below with incidence increasing dramatically in all LGDs in the last wek..

7-day total cases / 100,000 population by LGD

21st Dec	22nd Dec	23rd Dec	24th Dec	25th Dec	26th Dec	27th Dec	28th Dec	LGD
860	913	995					1665	Antrim and Newtownabbey
947	970	1021					1558	Ards and North Down
819	842	883					1281	Armagh City, Banbridge and Craigavon
908	1004	1123					1718	Belfast
650	680	768					1279	Causeway Coast and Glens
960	1040	1111					2266	Derry City and Strabane
755	843	898					1827	Fermanagh and Omagh
911	1016	1097					1653	Lisburn and Castlereagh
654	697	719					1132	Mid and East Antrim
739	782	856					1466	Mid Ulster
759	817	903					1526	Newry, Mourne and Down

Determining the value of Rt

The most common approach to determining Rt during an epidemic is to use mathematical modelling, in particular a compartmental model using a SIR (susceptible-infectious-recovered) approach or a variation of it. Dozens of such models have been published and are in use throughout the world; there is no single standard model which everyone uses.

In addition to the impact of the mathematical model used, the calculated value of Rt is also influenced by the choice of input variable. Rt calculated for new COVID-19 cases will not be the same as Rt calculated for hospital admissions, or ICU occupancy, or

deaths. There may be a significant lag (2-3 weeks) before a fall in Rt is apparent depending on the input variable(s) used.

The modelling group determines Rt each day using a bespoke Northern Ireland SIR model. As its primary input the group uses hospital in-patient admissions with community-acquired COVID-19, but also uses a range of other inputs. We therefore have several different values for Rt each day, each of which has a midpoint value and a lower and upper boundary (95% confidence intervals). In addition a number of academic groups, both in the UK and ROI, model the COVID-19 epidemic and we have access to their estimates of Rt for Northern Ireland. Rt can also be determined based on a contact matrix survey, and this approach may be more reliable when levels of community transmission are very low.

Trends for Northern Ireland

The value of Rt for cases is in the range 1.4 – 1.8 and for admissions 1.10 – 1.30. The graphs below show trends in cases and test positivity.

The number of new positive cases increased substantially in the last week, in the context of increased testing, and the percentage positivity decreased. Overall, it is likely that there is very high community transmission and that this may have increased modestly in recent days, with more cases being detected as a result of increased testing. There has been a dramatic increase in cases in 18-30s, and to a lesser extent in 30 – 50s. However, we are also beginning to see an increase in cases in older age groups which is likely to be a result of within family/household spread given the increased transmissibility of the omicron variant. The overall pattern is likely to be a consequence of the counterplay between increased vaccination, including boosters, and changes in contact patterns in different age groups in the context of rapid increase in the prevalence of the omicron which is now over 40% of new cases. .

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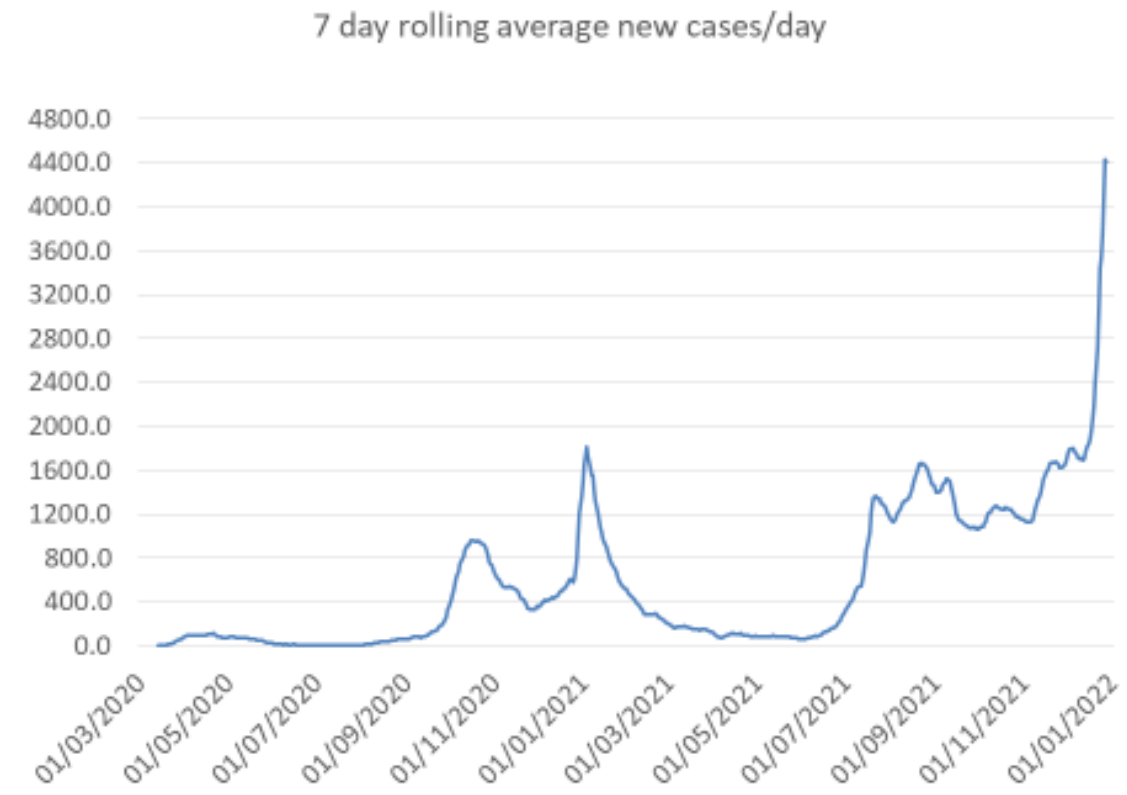

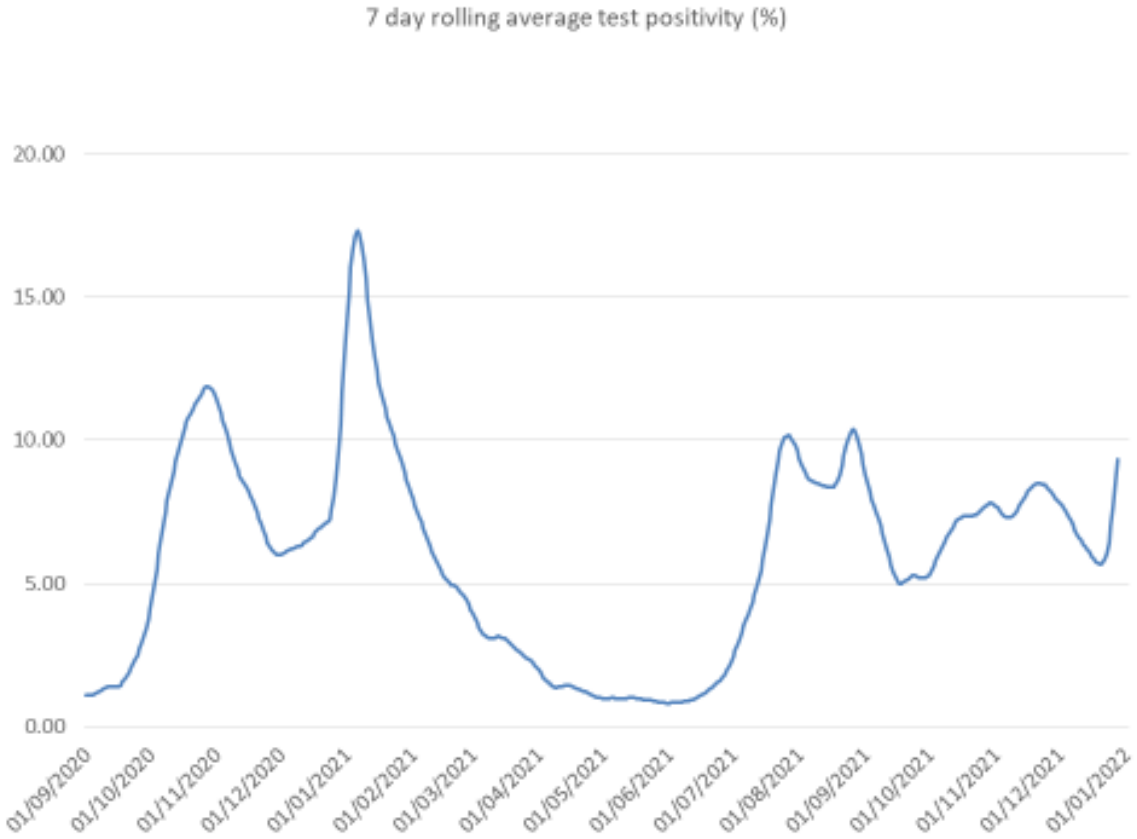

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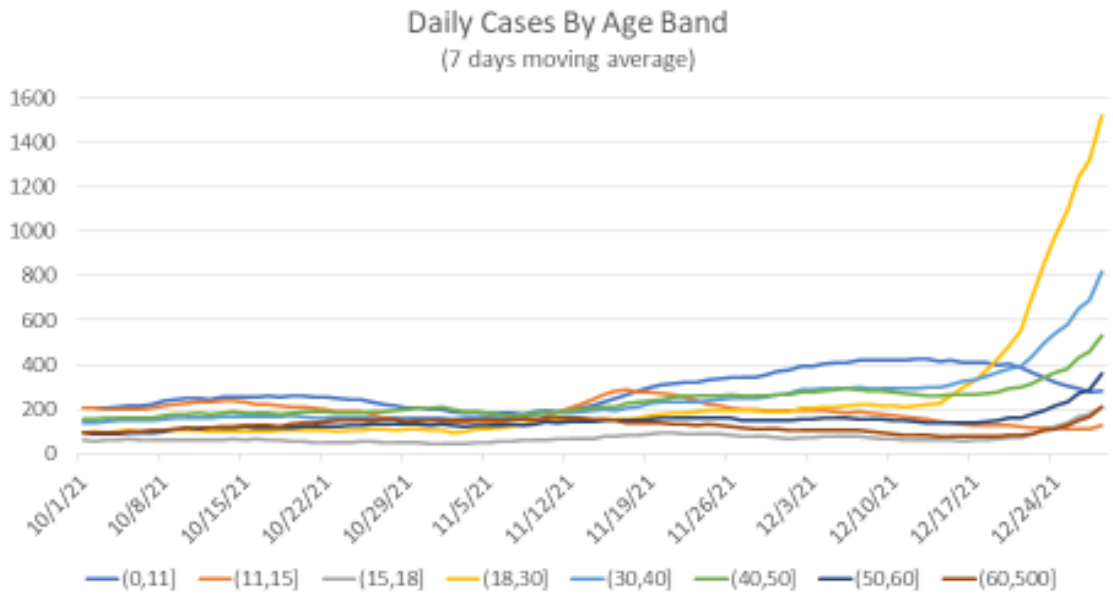

The following graphs show hospital admissions of COVID positive patients over a rolling 7-day period and the number of hospital inpatients. Hospital admissions and COVID bed occupancy both rose modestly in the last week. Limited evidence suggests that hospital admissions include a mixture of delta and omicron, and that a higher proportion of admissions are “with COVID” rather than “because of COVID” as would be expected given very high levels of community transmission. The frequency of severe illness requiring hospital admission after omicron infection remains uncertain. Though is likely to be reduced by 20 – 80% compared with delta.

We will continue to monitor emerging evidence and hospital data closely and advise accordingly on potential hospital pressures which may result from a large number of omicron cases. Booster vaccination will continue to offer protection against severe disease with omicron, and rapid uptake of booster doses remains a key priority.

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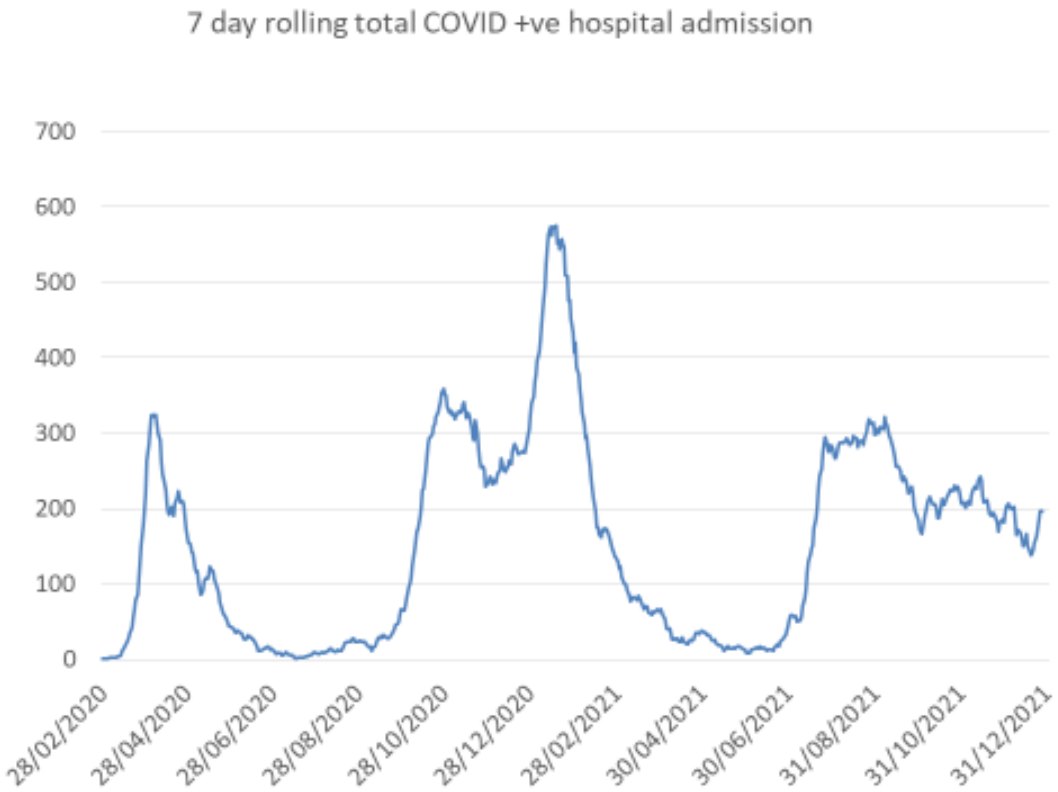

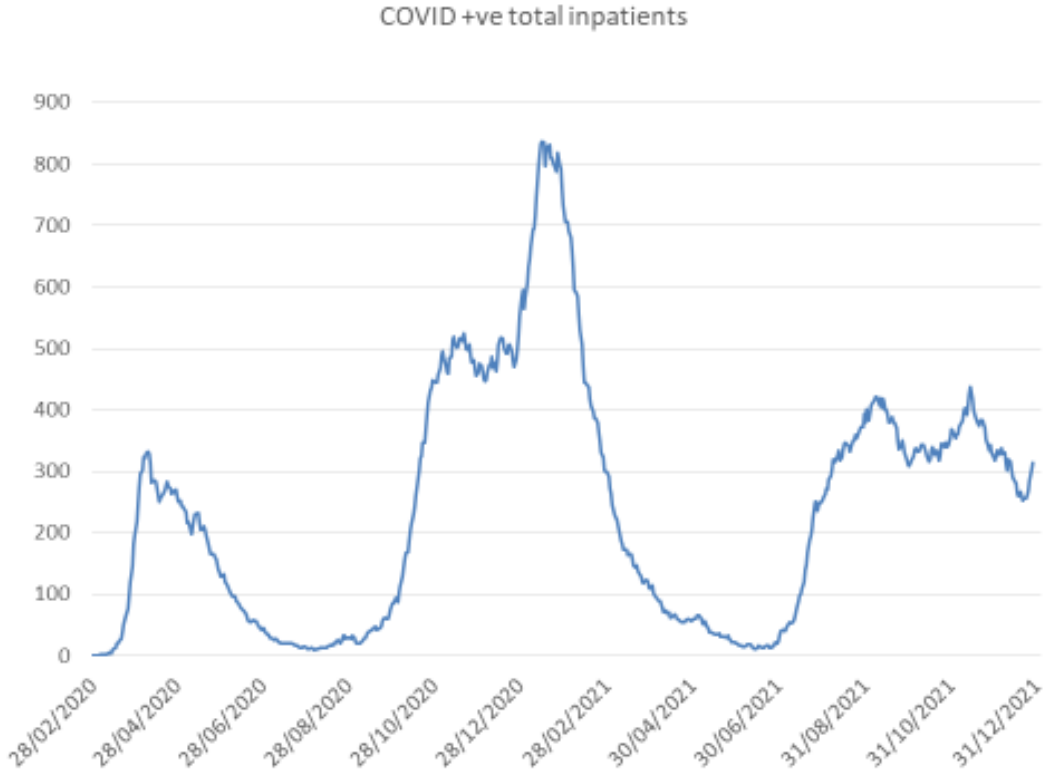

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