

Tues 25 January 2022

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

Current estimate of Rt (new positive tests): 1.05 – 1.25 (7 days previous 0.70-0.90)
Current estimate of Rt (hospital admissions): 0.90 – 1.10 (7 days previous 0.95-1.15)
7 day incidence based on new positive tests: 1509 / 100k (7 days previous 1214)
14 day incidence based on new positive tests: 2700 / 100k (7 days previous 3389)
7 day average of total positive individuals (pillar 1/2): 11.2% (7 days previous 11.0%)
7 day average Pillar 2 test positivity: 33.3% (7 days previously 19.1%)
7 day daily average tests completed: 33,445 (7 days previous 32,085)
Number of new positive tests in over 60s in last 7 days: 1844 (7 days previous 1858)
Proportion of total positive tests occurring in over 60s: 6.2% (7 days previous 7.9%)
COVID-19 +ve hospital admission in last week: 374 (7 days previous 364)
Number of COVID-19 inpatients: 440 (7 days previous 448)
COVID-19 +ve ICU patients: 23 (7 days previous 28)

Case numbers reached a new baseline about ten days ago after the testing policy change and have been rising steadily since then, with an increase of around 24% in the last week. Percentage positivity has also risen slightly in the last week in the context of roughly steady testing, suggesting that there is an increase in community transmission driven by spread primarily in school age children. There is also an increase in cases in the 30-50 age groups which is likely to reflect mainly secondary household spread. Numbers in older individuals are steady. Previous modelling indicates that we are likely to be beyond the initial peak of case numbers for the omicron wave, and current data remains compatible with this. However, we are on the upslope of a secondary wave at present following the return of schools, and this has yet to peak.

The ONS survey results (summarised below) suggest that between 1 in 15 and 1 in 20 of the NI population tested positive for the virus in the week up to 15th January, which remains around peak levels. Assuming an infectious period of 7 days this indicates around 15000 - 18000 cases per day, between the central and pessimistic scenarios presented in mid-December.

While omicron is mainly BA-1 lineage, a growing percentage are the BA-2 strain; in the most recent week 7.7% of omicron cases were BA-2. Early evidence suggests that BA-

Tues 25 January 2022

2 may be more transmissible than the dominant BA-1 lineage and therefore may in due course become dominant. There is still some delta virus (<5% cases) which is likely to decline slowly and which is contributing disproportionately to the number of severely ill patients in hospital.

Hospital admissions have fluctuated in the last week and remain roughly steady. COVID bed occupancy as a result of community acquired infection has decreased modestly, while nosocomial cases have risen meaning that overall occupancy remains steady. ICU occupancy and hospital deaths continue to fall slowly. ICU occupancy is still predominantly a result of delta infection.

Omicron severity appears to be substantially reduced compared with delta (closer to 80% reduction than 20%) and current measures will be sufficient to maintain peak hospital numbers at a significantly lower level than last January. We do not anticipate much rise in either ICU occupancy or deaths from current levels based on available data.

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.

During the most recent period of the ONS survey (09th to 15th January), it was estimated that 104,300 people had COVID-19 (95% credible interval: 89,300 to 120,600). This equates to 5.68% (95% credible interval: 4.87% to 6.57%) of the population in Northern Ireland or around 1 in 20 people (95% credible interval: 1 in 15 to 1 in 20).

Tues 25 January 2022

ONS COVID-19 Infection Survey Week up to 15th January

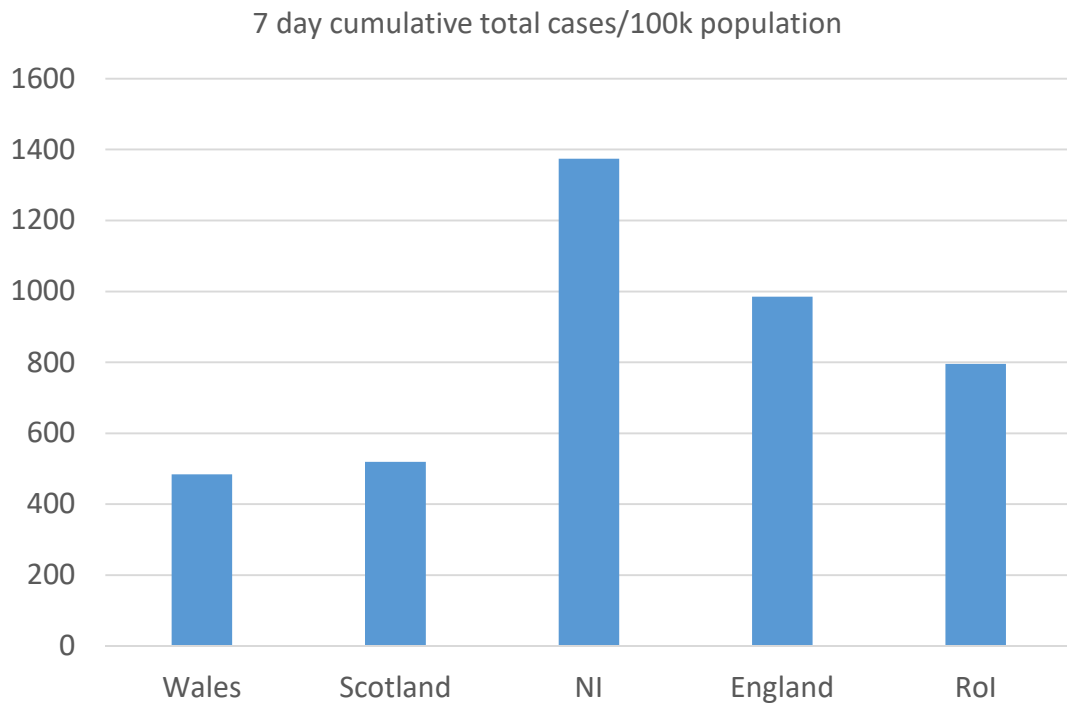
Country	Estimated average % of the population that had COVID-19		Estimated average number of people testing positive for COVID-19			Estimated average ratio of the population that had COVID-19			
	95% credible interval	Lower	Upper	95% credible interval	Lower	Upper	95% credible interval	Lower	Upper
England	5.47	5.29	5.64	2,984,200	2,886,900	3,077,300	1 in 20	1 in 20	1 in 20
Wales	3.69	3.13	4.23	112,100	95,200	128,700	1 in 25	1 in 30	1 in 25
Northern Ireland	5.68	4.87	6.57	104,300	89,300	120,600	1 in 20	1 in 20	1 in 15
Scotland	4.49	4.03	5.00	236,600	212,000	263,100	1 in 20	1 in 25	1 in 20

Source: Office for National Statistics – Coronavirus (COVID-19) Infection Survey

NI, UK and Republic of Ireland comparison

COVID prevalence decreased across most of the common travel area (CTA) with the exception of Northern Ireland which has now the highest reported incidence in the CTA. There is variation in testing throughout the CTA and data should be interpreted with this in mind.

Tues 25 January 2022



Regional variation in cases-

Prevalence has risen in almost all LGDs in the last week, driven primarily by increases in school age children. The current increase in cases has not yet peaked.

Tues 25 January 2022

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

17th Jan	18th Jan	19th Jan	20th Jan	21st Jan	22nd Jan	23rd Jan	24th Jan	LGD
1357	1452	1516	1573	1616	1675	1740	1792	Antrim and Newtownabbey
1172	1254	1321	1421	1511	1576	1661	1741	Ards and North Down
1472	1586	1661	1743	1840	1897	1985	2060	Armagh City, Banbridge and Craigavon
1240	1296	1328	1352	1412	1421	1483	1526	Belfast
969	1009	1039	1065	1075	1060	1041	1021	Causeway Coast and Glens
1081	1074	1077	1065	1037	1038	1040	1027	Derry City and Strabane
923	952	991	1015	1013	1008	1018	1025	Fermanagh and Omagh
1265	1386	1466	1562	1643	1711	1812	1910	Lisburn and Castlereagh
1286	1401	1463	1506	1570	1584	1608	1701	Mid and East Antrim
1429	1523	1536	1596	1621	1592	1594	1630	Mid Ulster
1626	1742	1843	1909	1989	2009	1994	2033	Newry, Mourne and Down

Determining the value of R_t

The most common approach to determining R_t 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 R_t is also influenced by the choice of input variable. R_t calculated for new COVID-19 cases will not be the same as R_t calculated for hospital admissions, or ICU occupancy, or deaths. There may be a significant lag (2-3 weeks) before a fall in R_t is apparent depending on the input variable(s) used.

Tues 25 January 2022

The modelling group determines R_t 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 R_t 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 R_t for Northern Ireland. R_t 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.

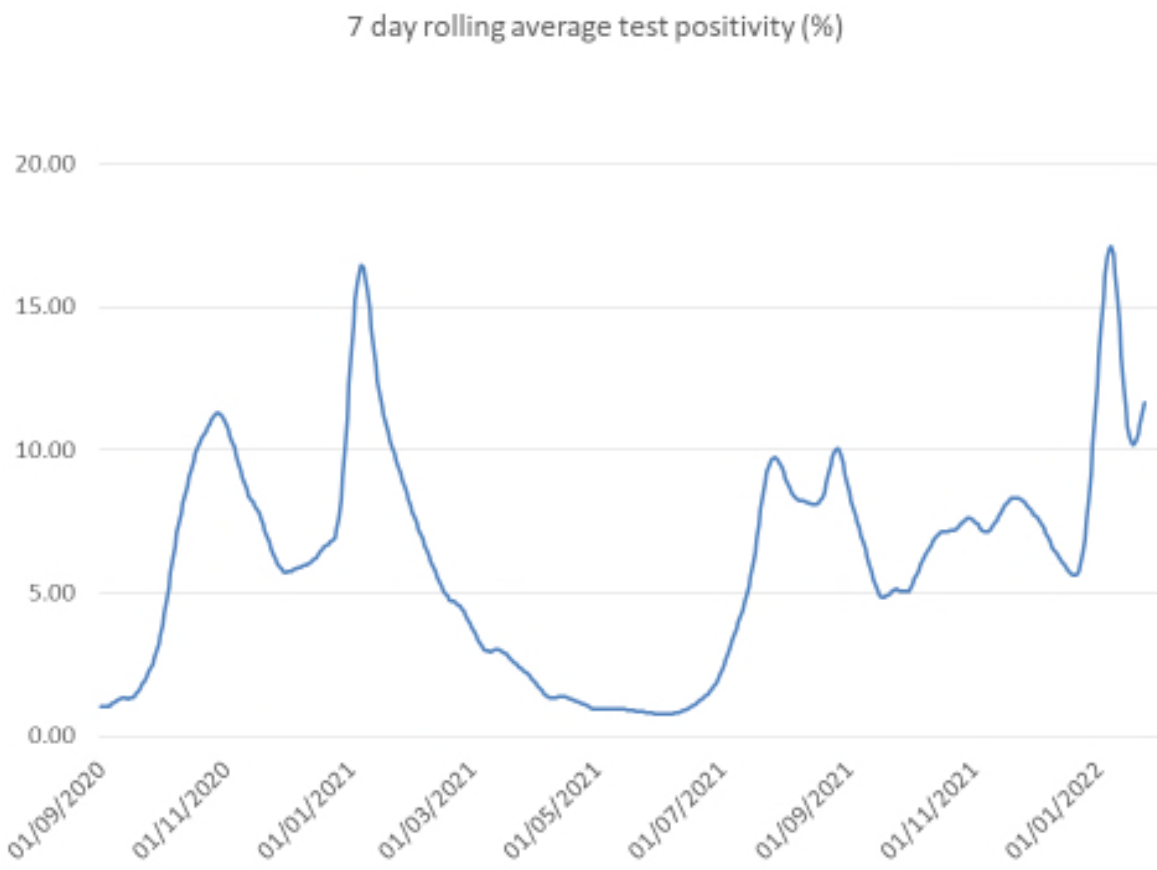
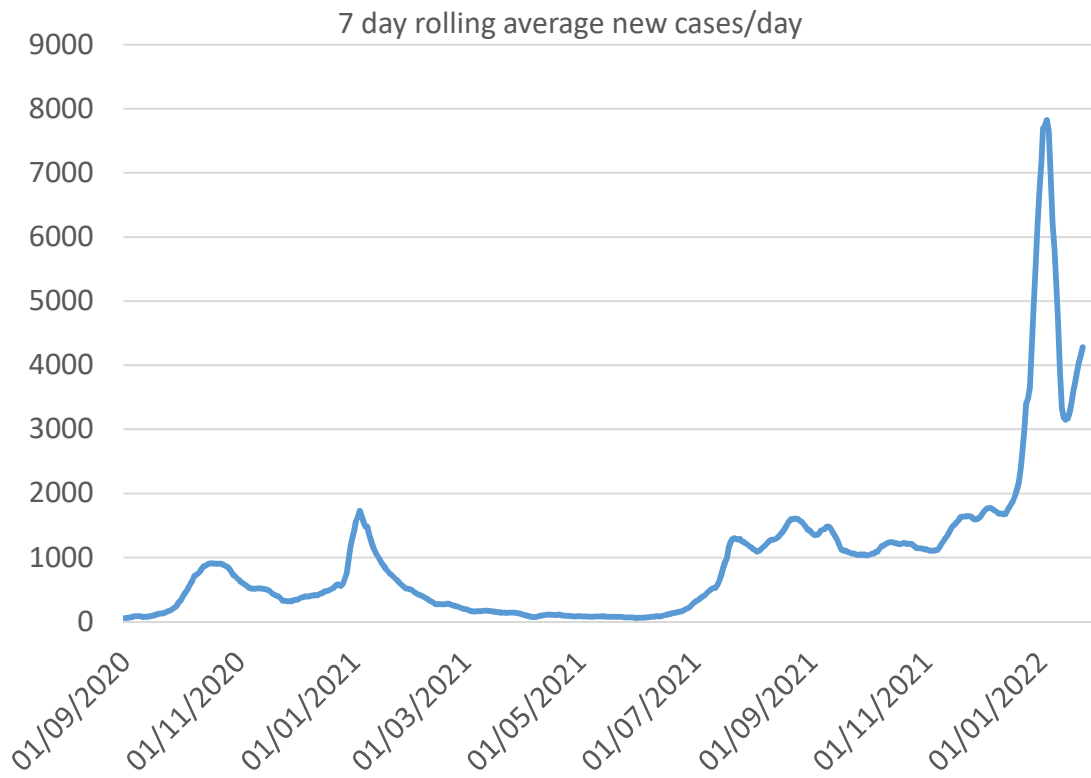
The value of R_t for cases is in the range 1.05-1.25 and for admissions 0.90-1.10.

Trends for Northern Ireland:

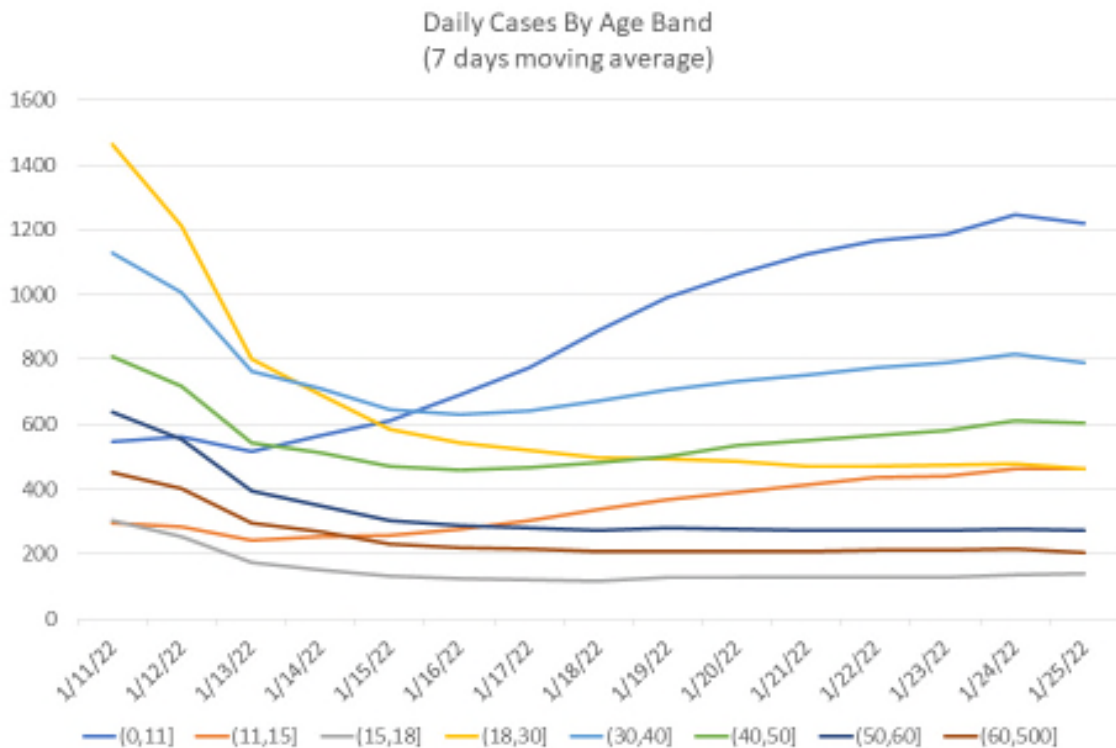
The graphs below show trends in cases and test positivity. Case numbers reached a new baseline about ten days ago after the testing policy change and have been rising steadily since then, with an increase of around 24% in the last week. Percentage positivity has also risen in the last week in the context of roughly steady testing, suggesting that there is an increase in community transmission driven by spread primarily in school age children. There is also an increase in cases in the 30-50 age groups which is likely to reflect mainly secondary household spread. Numbers in older individuals are steady. Previous modelling indicates that we are likely to be beyond the initial peak of case numbers for the omicron wave at present, and current data remains compatible with this. However, we are on the upslope of a secondary wave following the return of schools, and this has yet to peak.

Omicron is the dominant variant at present. While omicron is mainly BA-1 lineage, a growing percentage are the BA-2 strain; in the most recent week 7.7% of omicron cases were BA-2. Early evidence suggests that BA-2 may be more transmissible than the dominant BA-1 lineage and therefore may in due course become dominant. There is still some delta virus (<5% cases) which is likely to decline slowly and which is contributing disproportionately to the number of severely ill patients in hospital.

Tues 25 January 2022



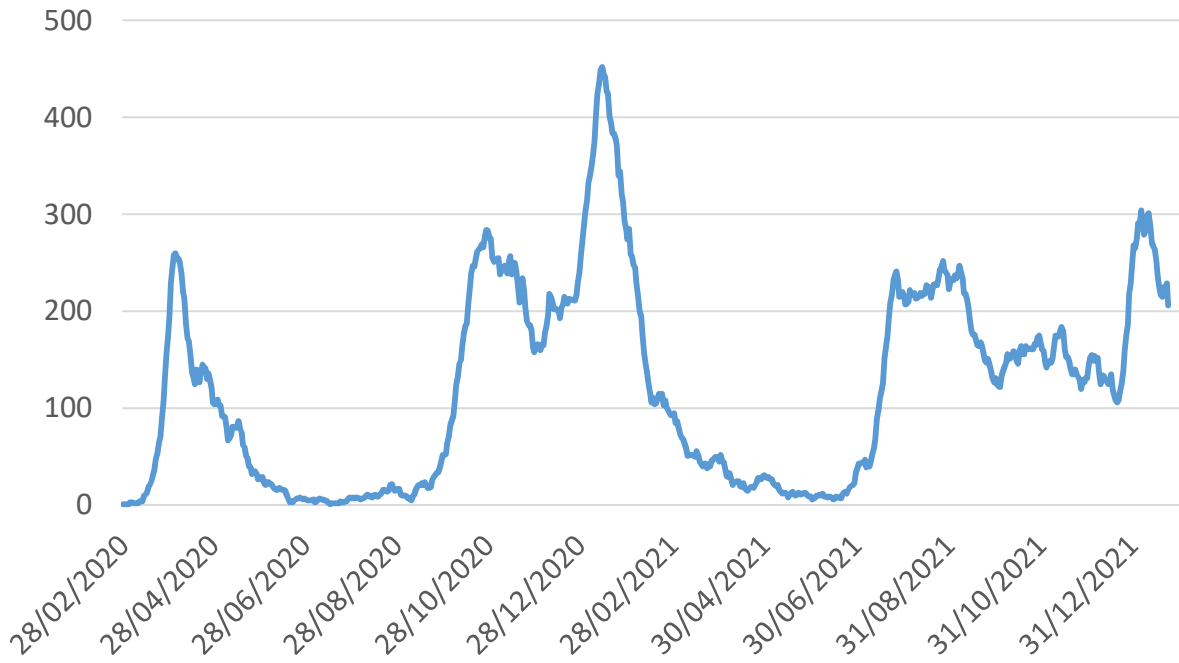
Tues 25 January 2022



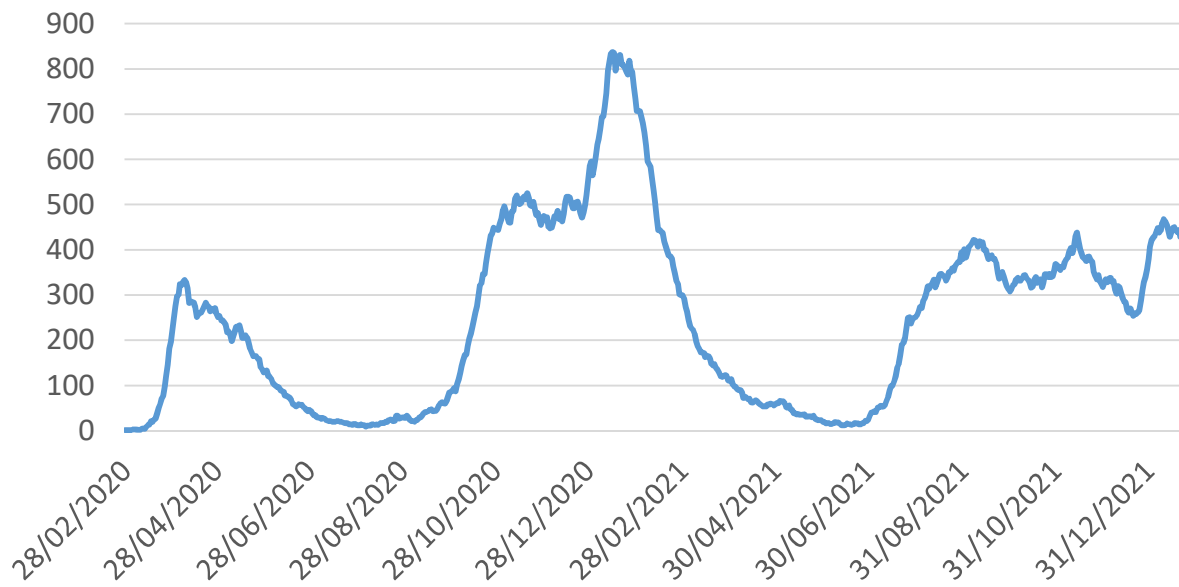
The following graphs show hospital admissions of COVID positive patients over a rolling 7-day period and the number of hospital inpatients. Hospital admissions have fluctuated in the last week and remain roughly steady. COVID bed occupancy as a result of community acquired infection has decreased modestly, while nosocomial cases have risen meaning that overall occupancy remains steady. ICU occupancy and hospital deaths continue to fall slowly. ICU occupancy is still predominantly a result of delta infection.

Tues 25 January 2022

7 day rolling total first COVID +ve hospital admission



COVID +ve total inpatients



Tues 25 January 2022

