

Tues 15 February 2022

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

Current estimate of Rt (new positive tests): 0.75 – 0.95 (7 days previous 0.80 – 1.00)

Current estimate of Rt (hospital admissions): 0.80 – 1.00 (7 days previous 0.95-1.15)

7 day incidence based on new positive tests: 1 166 / 100k (7 days previous 1448)

14 day incidence based on new positive tests: 2614/ 100k (7 days previous 3020)

7 day average of total positive individuals (pillar 1/2): 12.8%(7 days previous 13.4%)

7 day daily average tests / 1000 population: 92.6 (7 days previous 108.1)

Number of new positive tests in over 60s in last 7 days: 2253 (7 days previous 2103)

Proportion of total positive tests occurring in over 60s: 10.7%(7 days previous 8.1%)

COVID-19 +ve hospital admission in last week: 388 (7 days previous 408)

7 day average COVID-19 inpatients: 516 (7 days previous 440)

COVID-19 +ve ICU patients: 13 (7 days previous 23)

Case numbers are dropping in the context of a reduction in testing, with positivity declining more slowly. This is mainly due to a decline in the number of cases in school aged children. Most other age groups are either on the decline or have remained reasonably stable with the exception of the over 50s which increased slightly in the last week.

We are likely to be beyond the secondary peak of case numbers for the omicron wave, driven by the return of schools, and current data remains compatible with this. Cases are likely to remain relatively high for the foreseeable future with an overall pattern of decline, as a result of increasing population exposure to omicron, waning immunity, increased interactions following relaxation of restrictions and alterations in testing behaviour. School half term this week may also act as a brake on transmission.

The ONS survey results (summarised below) suggest that between 1 in 11 and 1 in 14 of the NI population tested positive for the virus in the week up to 05th February, which is the highest level yet recorded in NI. Assuming an infectious period of 7 days this indicates around 20,000 cases per day, of which we are detecting less than one quarter.

Omicron is now mainly the BA.2 strain; in the week commencing 31st January 64% of sequenced samples were omicron BA.2, significantly higher than elsewhere in the UK. Evidence suggests that BA-2 may be more transmissible than the previously dominant

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BA-1 lineage, although at present there is no evidence of increased severity or immune escape for BA-2 compared with BA-1. We are now detecting very little delta or alpha variant.

Hospital admissions have fallen slightly in the last week, while total numbers of COVID inpatients have risen significantly as a result of community acquired infection and nosocomial cases. Nosocomial infections have increased substantially in the last week as BA.2 has become dominant. ICU occupancy and hospital deaths fluctuate but remain at a relatively low level.

It is likely that hospital numbers as a result of community infection will fall slowly over the next number of weeks, with some day to day variation as a consequence mainly of alterations in patient flow. Total numbers may rise further as a result of nosocomial spread. We do not anticipate much rise in either ICU occupancy or deaths from current levels based on available data.

The decision to remove restrictions from regulation and to replace them with guidance is likely to result in reduced adherence to good behaviours, which may increase both cases and hospital pressures or result in a slower decline in both than would otherwise be the case. The extent of this is difficult to predict and will depend on the extent to which there is adherence to guidance.

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 (30th January to 05th February), it was estimated that 145,600 people had COVID-19 (95% credible interval: 126,800 to 165,200). This equates to 7.93% (95% credible interval: 6.91% to 9.01%) of the population in Northern Ireland or around 1 in 13 people (95% credible interval: 1 in 11 to 1 in 14).

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ONS COVID-19 Infection Survey

Week up to 05th February

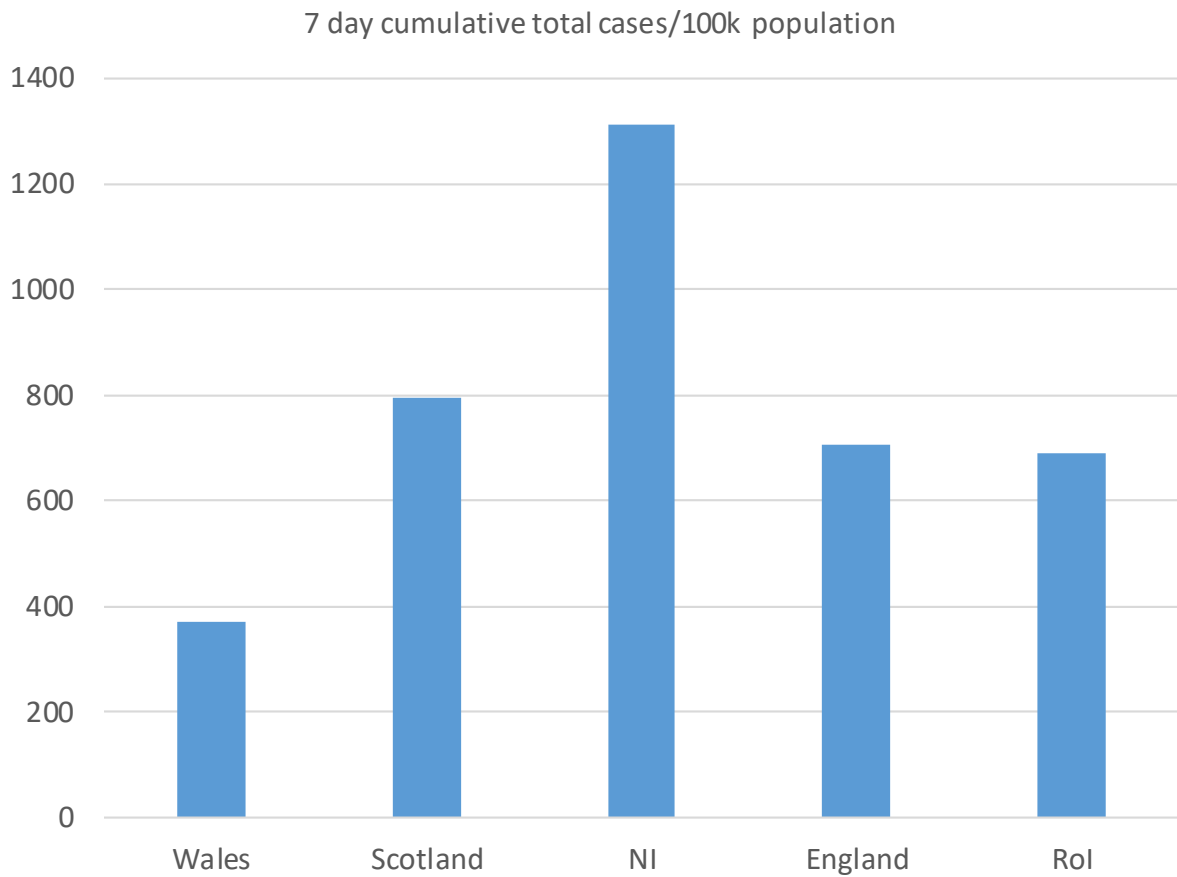
Country	Estimated average % of the population that had COVID-19	95% credible interval		Estimated average number of people testing positive for COVID-19	95% credible interval		Estimated average ratio of the population that had COVID-19	95% credible interval	
		Lower	Upper		Lower	Upper		Lower	Upper
England	5.18	5.03	5.34	2,824,700	2,740,300	2,910,300	1 in 19	1 in 20	1 in 19
Wales	3.99	3.42	4.60	121,200	104,000	139,900	1 in 25	1 in 30	1 in 20
Northern Ireland	7.93	6.91	9.01	145,600	126,800	165,200	1 in 13	1 in 14	1 in 11
Scotland	4.01	3.60	4.47	211,300	189,500	235,100	1 in 25	1 in 30	1 in 20

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

NI, UK and Republic of Ireland comparison

Northern Ireland has the highest reported incidence across the common travel area (CTA). Incidence of the virus decreased marginally across most of the CTA nations with the exception of Scotland where incidence increased compared with the previous week. There is variation in testing and reporting throughout the CTA and data should be interpreted with this in mind.

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Regional variation in cases-

Cases are falling in almost all LGDs in the last week, driven mainly by the fall in the age-groups discussed above.

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

7th Feb	8th Feb	9th Feb	10th Feb	11th Feb	12th Feb	13th Feb	14th Feb	LGD
1412	1377	1294	1248	1233	1229	1200	1144	Antrim and Newtownabbey
1488	1452	1395	1351	1319	1277	1232	1158	Ards and North Down
1607	1501	1433	1380	1332	1285	1235	1172	Armagh City, Banbridge and Craigavon
1427	1406	1400	1340	1308	1278	1216	1130	Belfast
881	867	890	880	880	876	885	859	Causeway Coast and Glens
770	788	797	821	825	836	829	816	Derry City and Strabane
926	891	861	863	847	824	772	732	Fermanagh and Omagh
1699	1653	1622	1565	1542	1471	1420	1370	Lisburn and Castlereagh
1295	1250	1221	1226	1231	1211	1146	1114	Mid and East Antrim
1172	1143	1098	1040	999	988	969	912	Mid Ulster
1247	1182	1120	1034	1001	948	922	835	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.

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

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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 0.75 – 0.95 and for admissions 0.80 – 1.00.

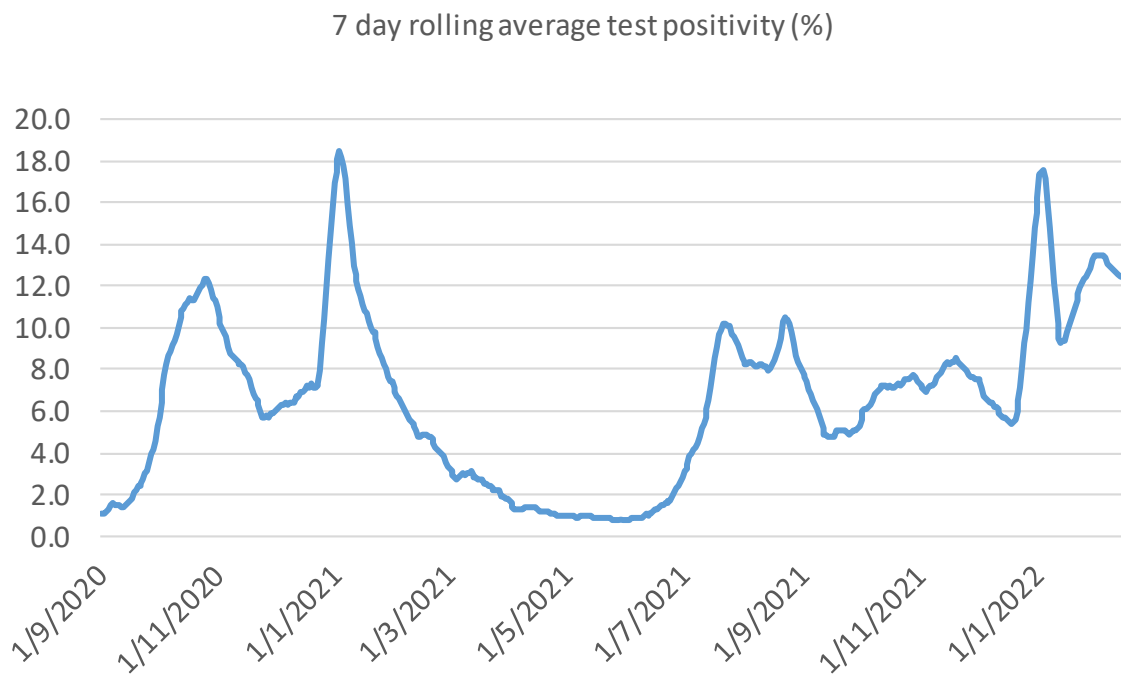
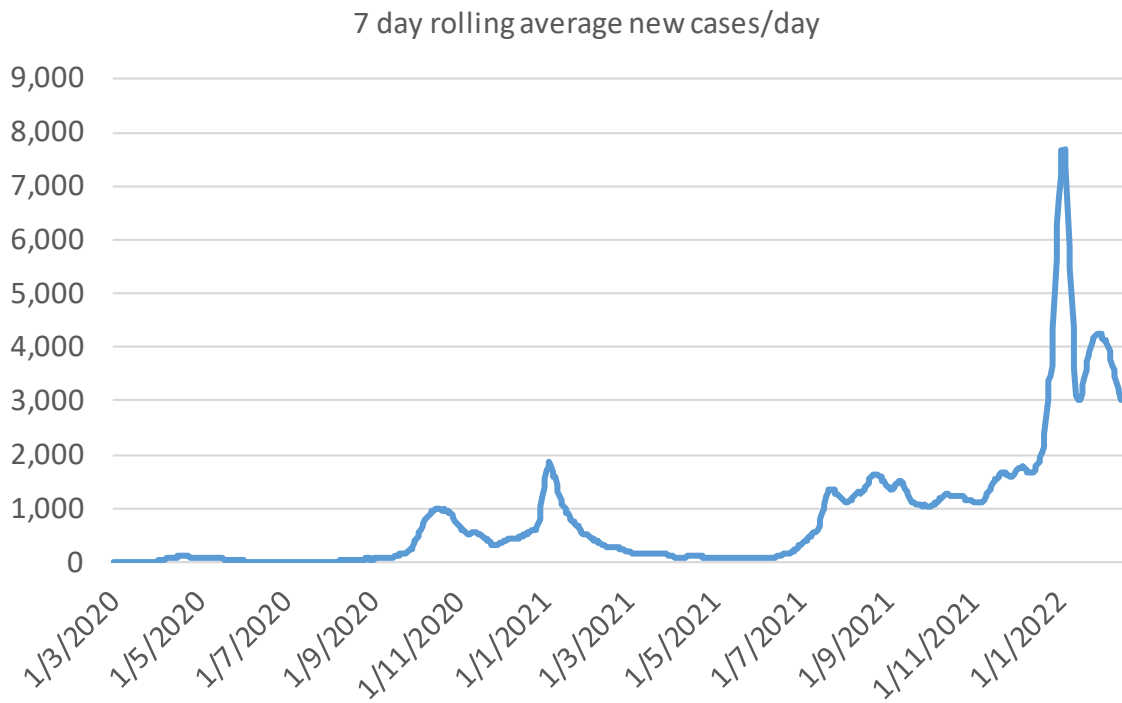
Trends for Northern Ireland:

The graphs below show trends in cases and test positivity. Case numbers are dropping in the context of a reduction in testing, with positivity declining more slowly. This is mainly due to a decline in the number of cases in school aged children. Most other age groups are either on the decline or have remained reasonably stable with the exception of the over 50s which increased slightly in the last week.

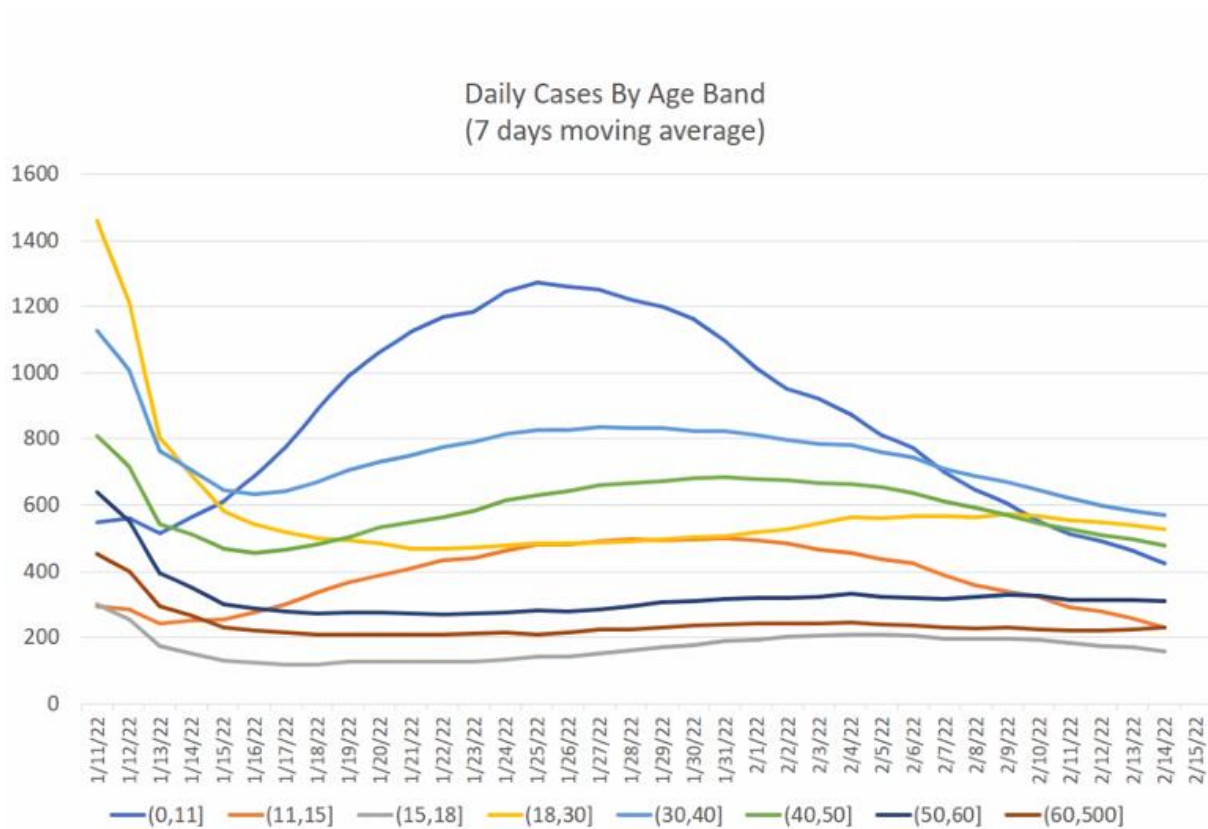
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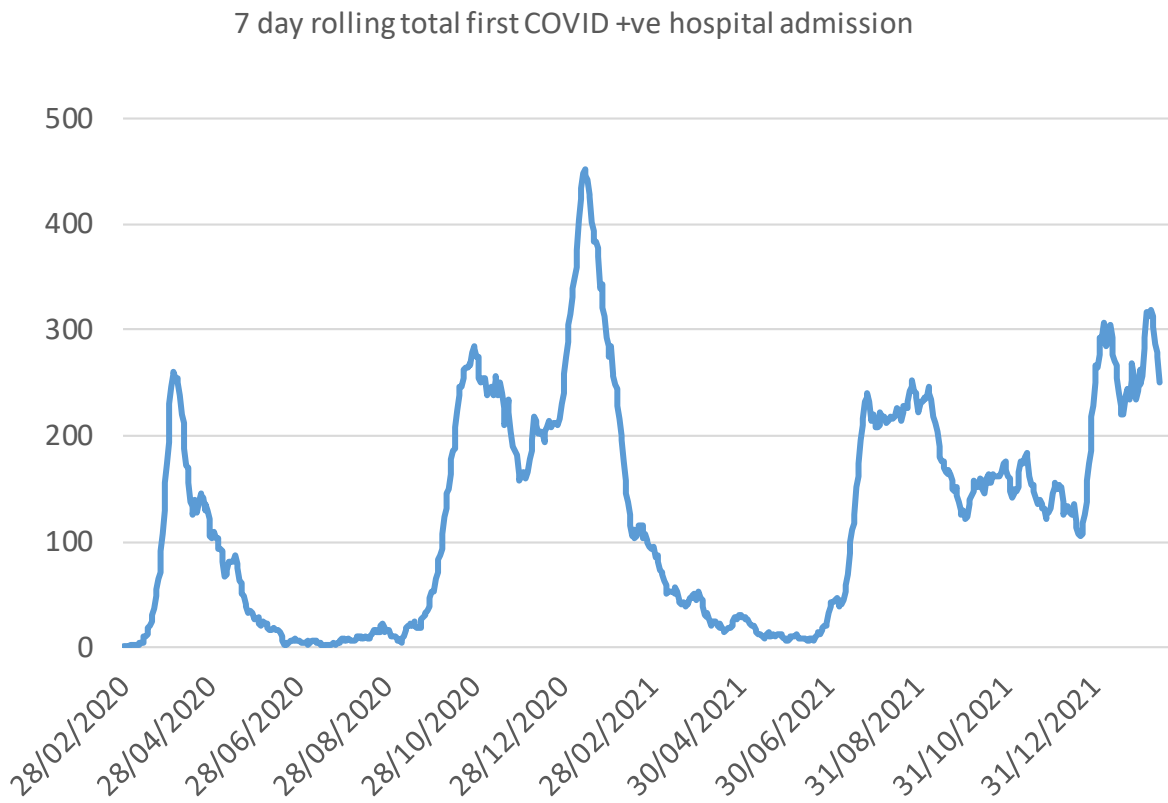
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The following graphs show hospital admissions of COVID positive patients over a rolling 7-day period and the number of hospital inpatients. Hospital admissions have fallen slightly in the last week, while total numbers of COVID inpatients have risen significantly as a result of community acquired infection and nosocomial cases. Nosocomial infections have increased substantially in the last week as BA.2 has become dominant. ICU occupancy and hospital deaths fluctuate but remain at a relatively low level.

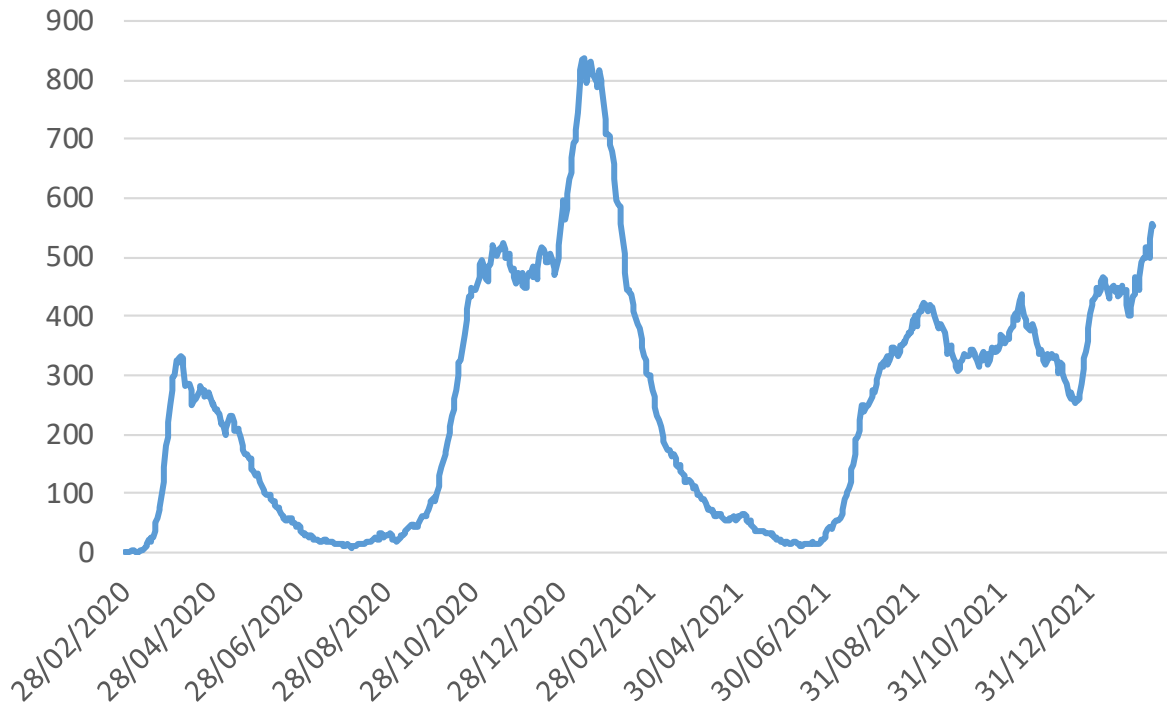
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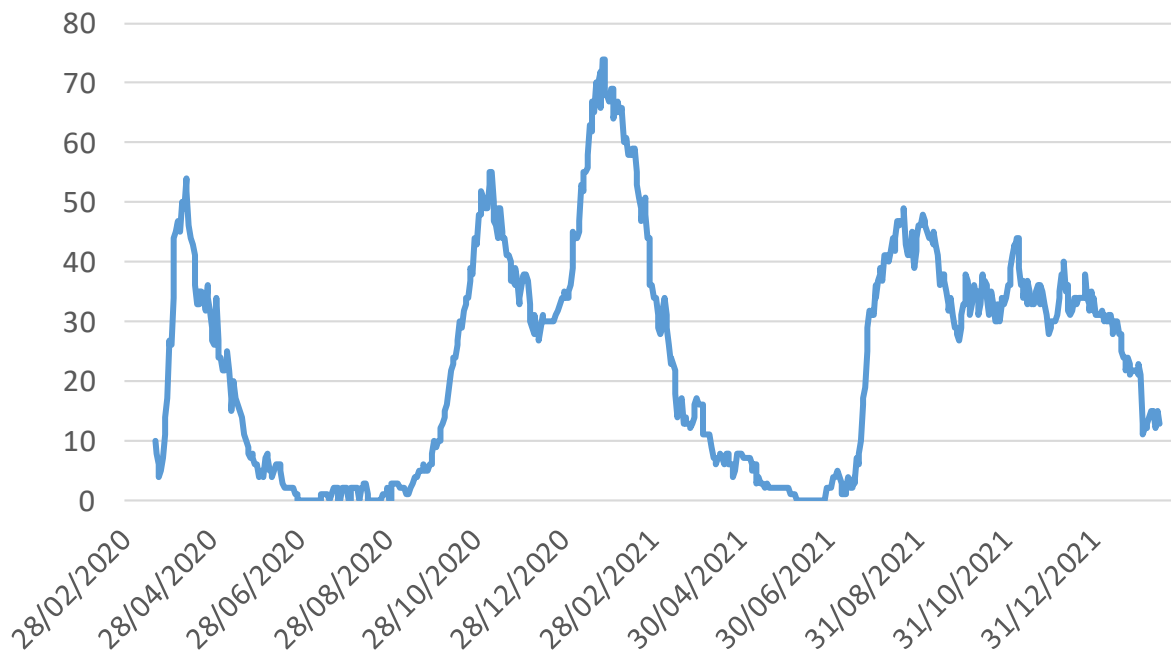


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COVID +ve total inpatients

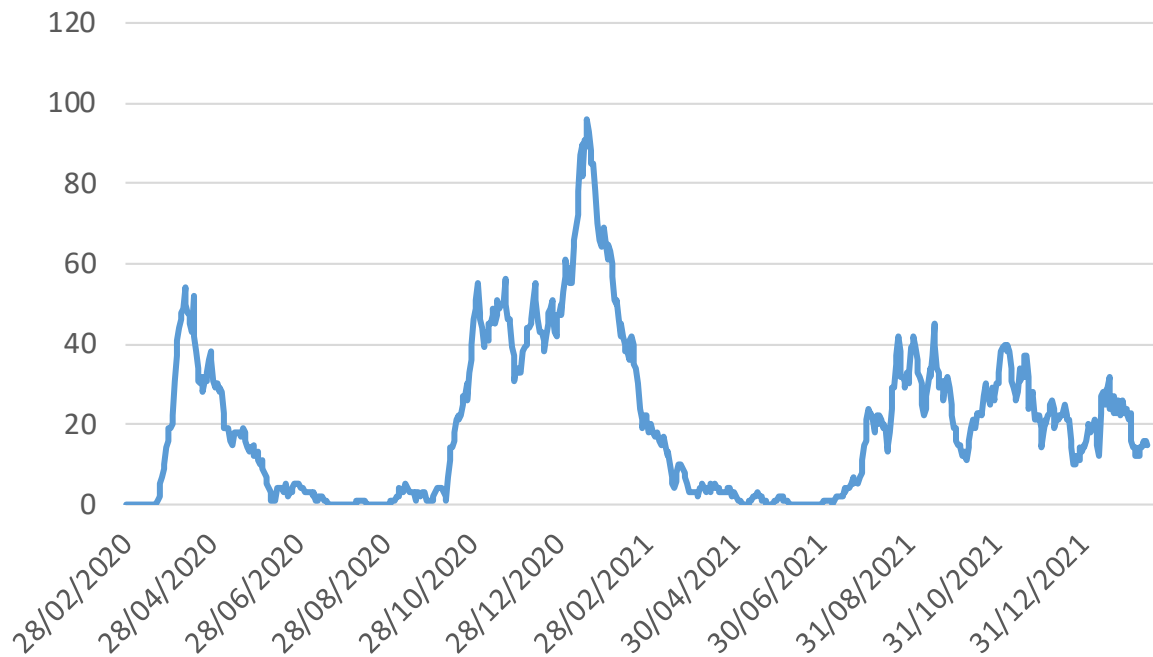


COVID +ve patients in ICU



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Covid-19 7 day total hospital deaths



Update on modelling and variants of concern

The omicron variant in NI accounts for over 95% of cases currently and is by far the dominant variant. Hospital admissions are beyond peak, and inpatient numbers as a result of community acquired infection are around peak, with some day to day variation as a result of alterations in patient flow. As discussed above, BA,2 is the dominant omicron variant and will increase the risk of nosocomial transmission.

There is still the possibility of an increase in hospital pressures as a result of nosocomial spread or staff shortages. We will not update modelling unless there is a significant change in epidemiology of the epidemic.

Both cases and hospital pressures are likely to remain relatively high for the foreseeable future, as a result of increasing population exposure to omicron, waning immunity, increased interactions following relaxation of restrictions and alterations in testing behaviour. Changes in case numbers will be an unreliable indicator of disease status if there are further changes in testing strategy or behaviours.

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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.

Vaccine uptake

88.4% of the NI population aged 12 or over have received a first dose of a vaccine, including 72.6% of 16-17 year olds and 53.2% of 12-15s. 60.2% of the population aged 12 and over have received a booster or third dose to date. Uptake of boosters is increasing slowly, but remains important.

Mobility report:

The mobility report up to 11th February indicates that there were decreases in activity compared with normal patterns for a range of areas, including public transport (29% below normal), workplace (22% below normal) and retail / recreation (11% below normal). This is likely to reflect a degree of adherence to guidance and voluntary reduction in contact patterns as a result of high levels of virus transmission.