Tues 14 December 2021

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

Current estimate of Rt (new positive tests): 0.90 – 1.10 (7 days previous 1.00-1.20)

Current estimate of Rt (hospital admissions): 0.90 – 1.10 (7 days previous 0.90-1.10)

Average number of new positive tests per day last 7 days: 1737 (7 days previous 1828)

7 day incidence based on new positive tests: 640 / 100k (7 days previous 673)

14 day incidence based on new positive tests: 1316/ 100k (7 days previous 1284)

7 day average of total positive individuals (pillar 1/2): 6.6% (7 days previous 7.6%)

7 day daily average tests completed: 27,520 (7 days previous 26,029)

Number of new positive tests in over 60s in last 7 days: 667 (8 days previous 891)

Proportion of total positive tests occurring in over 60s: 5.5% (9 days previous 6.2%)

COVID-19 +ve hospital admission in last week: 164 (7 days previous 188)

Number of COVID-19 inpatients: 319 (7 days previous 324)

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

The number of new positive cases and the percentage positivity decreased slightly in the last week, in the context of increased testing. Overall, it is likely that there is very high but stable community transmission, with more cases being detected as a result of increased testing. The largest number of cases is in the 0-11 year age-group. Cases in 18 - 50s have increased, with declines in the over 50s. This is likely to be a consequence of the counterplay between increased vaccination, including boosters, and changes in contact patterns in different age groups.

Hospital admissions and COVID bed occupancy declined modestly in the last week, although occupancy remains at a relatively high level. The majority of hospital admissions continue to be in the over 50s. Hospital admissions in over 50s have declined by around one third since the beginning of November, while admissions in under 50s have increased by around 40% in the same period. ICU occupancy and hospital deaths are oscillating and decreased modestly in the last week.

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The delta variant in NI accounts for the vast majority of cases and is the dominant variant. However, the picture is likely to change rapidly as omicron case numbers increase with a doubling time of a little over 2 days. This will result in omicron becoming dominant around the final week of December, potentially with very large numbers of cases.

There will be additional risks associated with movement into NI from elsewhere in the CTA in the pre-Christmas period. Omicron appears to be more transmissible than delta and existing immunity to COVID (via previous COVID infection or vaccination) offers reduced protection against development of symptomatic infection with omicron.

The frequency of severe illness requiring hospital admission after omicron infection remains uncertain. We will continue to monitor this closely and advise accordingly on potential hospital pressures which may result from a large number of omicron cases. It is likely that booster vaccination will continue to offer protection against severe disease with omicron, and rapid uptake of booster doses remains a key priority.

It is likely that a peak in case numbers will occur in the middle third of 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, but without further measures is likely to exceed numbers observed earlier in the epidemic, potentially by several fold. 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. However, if omicron is associated with disease severity close to that of delta, significant intervention would be required immediately after Christmas at the latest to have a reasonable chance of keeping hospital inpatient numbers at less than 1000.

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.

In the ONS survey, the percentage of people testing positive for coronavirus (COVID-19) increased over the last two weeks for Northern Ireland, but the trend was uncertain during the most recent period of the ONS Survey (week up to 2nd December). For Northern Ireland the survey estimated that 39,300 people had COVID-19 (95% credible interval: 30,600 to 49,000). This equates to 2.14% (95% credible interval: 1.67% to 2.67%) of the population in Northern Ireland or around 1 in 45 people (95% credible interval: 1 in 35 to 1 in 60). This is compared to the other countries of the UK below.

ONS COVID-19 Infection Survey

Week up to 2nd December

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	1.64	1.54	1.73	891,500	842,000	941,200	1 in 60	1 in 65	1 in 60
Wales	1.98	1.62	2.34	60,300	49,400	71,200	1 in 50	1 in 60	1 in 45
Northern Ireland	2.14	1.67	2.67	39,300	30,600	49,000	1 in 45	1 in 60	1 in 35
Scotland	1.24	1.01	1.50	65,200	53,200	79,100	1 in 80	1 in 100	1 in 65

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. Incidence increased in all UK nations and has decreased in the Republic of Ireland, in the last week. There is variation in testing throughout the CTA and data should be interpreted with this in mind.

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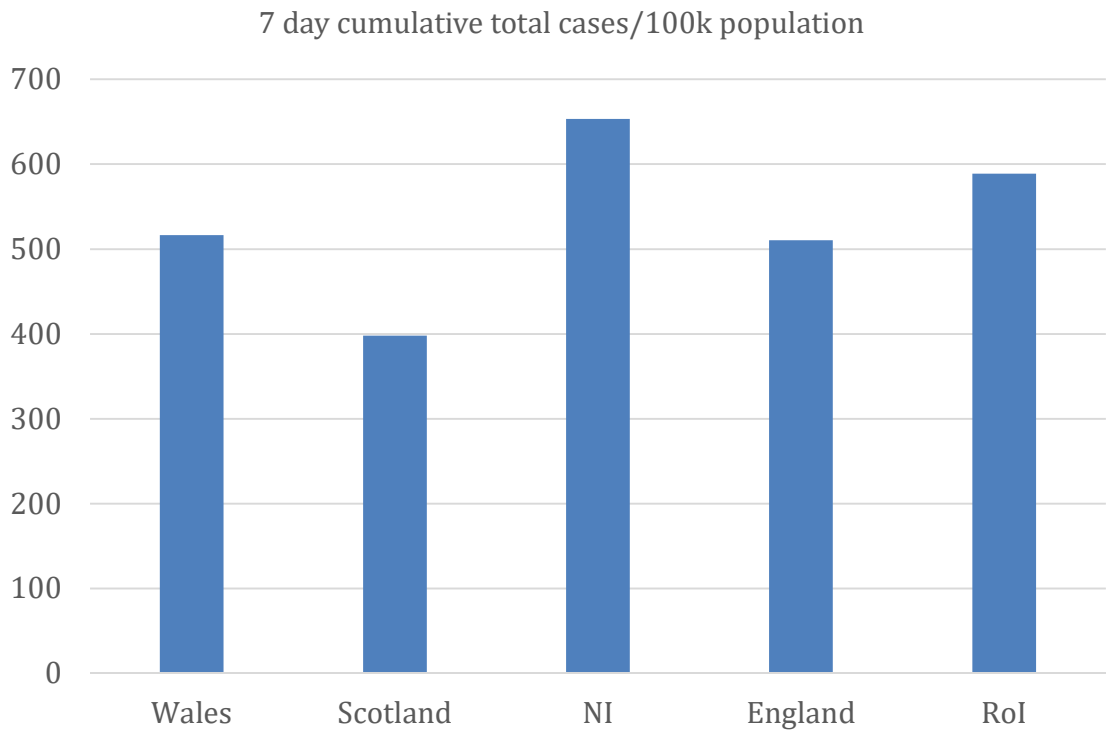

Regional variation in cases-

Variation in cases in LGDs is shown below with incidence high but reasonably steady in most LGDs.

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

6th Dec	7th Dec	8th Dec	9th Dec	10th Dec	11th Dec	12th Dec	13th Dec	LGD
771	784	774	781	773	765	763	741	Antrim and Newtownabbey
659	677	710	709	720	730	745	741	Ards and North Dow
644	638	622	599	594	625	620	636	Armagh City, Banbridge and Craigavon
594	578	560	555	547	564	568	563	Belfast
590	588	574	562	550	565	552	539	Causeway Coast and Glens
554	572	574	573	599	595	603	595	Derry City and Strabane
552	546	551	521	538	549	546	537	Fermanagh and Omagh
724	711	682	686	658	669	664	645	Lisburn and Castlereagh
651	653	674	644	626	625	615	587	Mid and East Antrim
640	632	589	574	562	531	524	505	Mid Ulster
857	849	829	854	816	828	791	705	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.

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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 and admissions is around 1 (0.90- 1.00). The graphs below show trends in cases and test positivity.

The number of new positive cases and the percentage positivity decreased slightly in the last week, in the context of increased testing. Overall, it is likely that there is very high but stable community transmission, with more cases being detected as a result of increased testing. The largest number of cases is in the 0-11 year age-group. Cases in 18 - 50s have increased, with declines in the over 50s. This is likely to be a consequence of the counterplay between increased vaccination, including boosters, and changes in contact patterns in different age groups.

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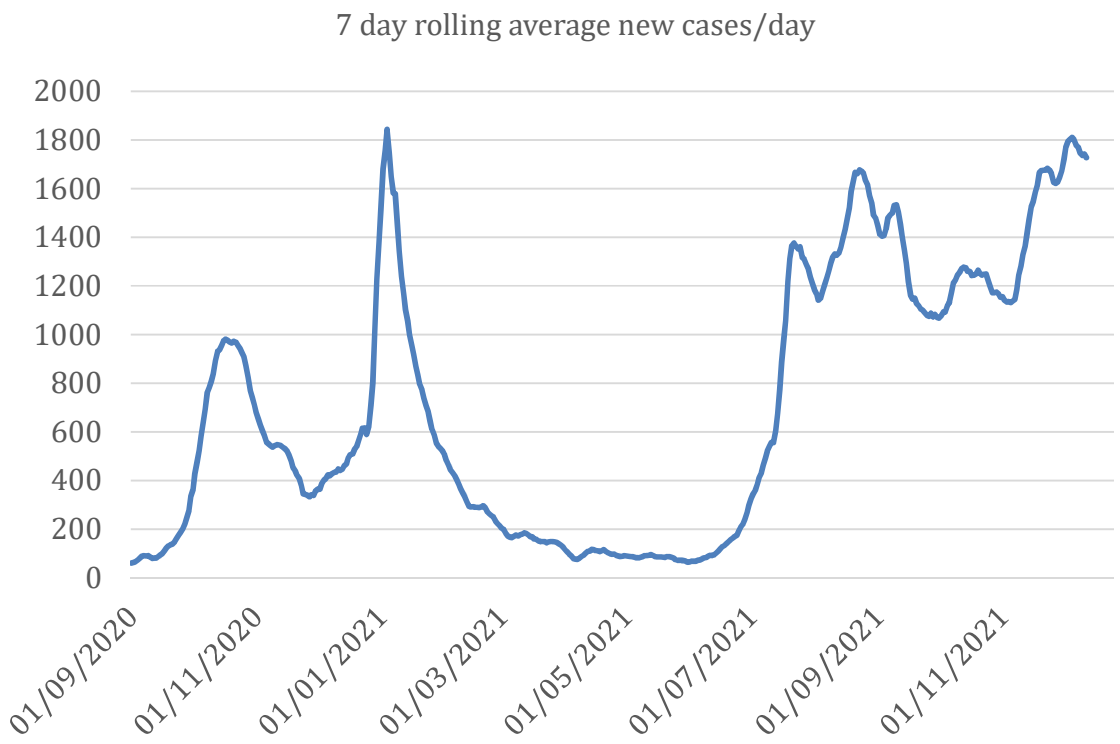

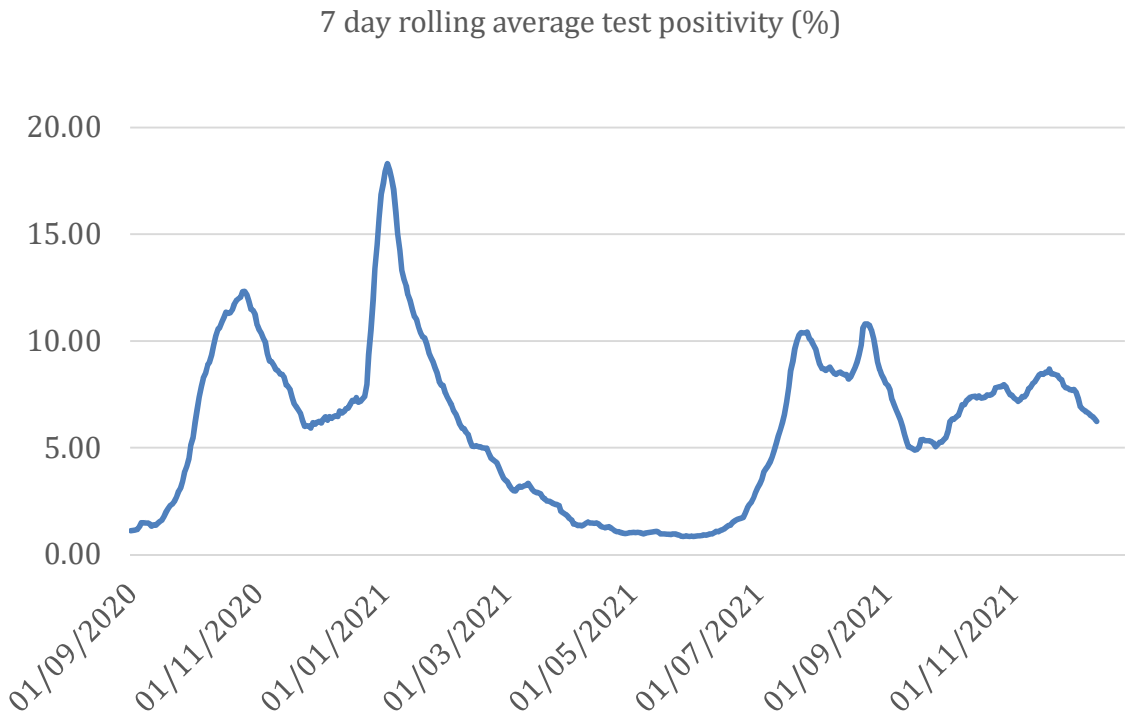

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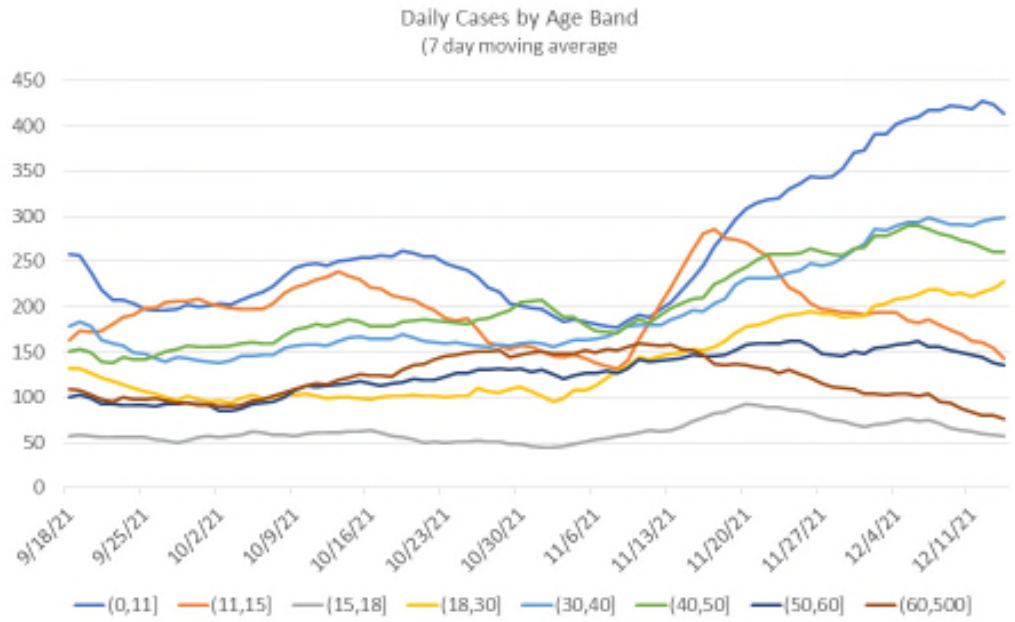

The following graphs show hospital admissions of COVID positive patients over a rolling 7-day period and the number of hospital inpatients. Hospital admissions and COVID bed occupancy declined modestly in the last week, although occupancy remains at a relatively high level. The majority of hospital admissions continue to be in the over 50s. Hospital admissions in over 50s have declined by around one third since the beginning of November, while admissions in under 50s have increased by around 40% in the same period. ICU occupancy and hospital deaths are oscillating and decreased modestly in the last week.

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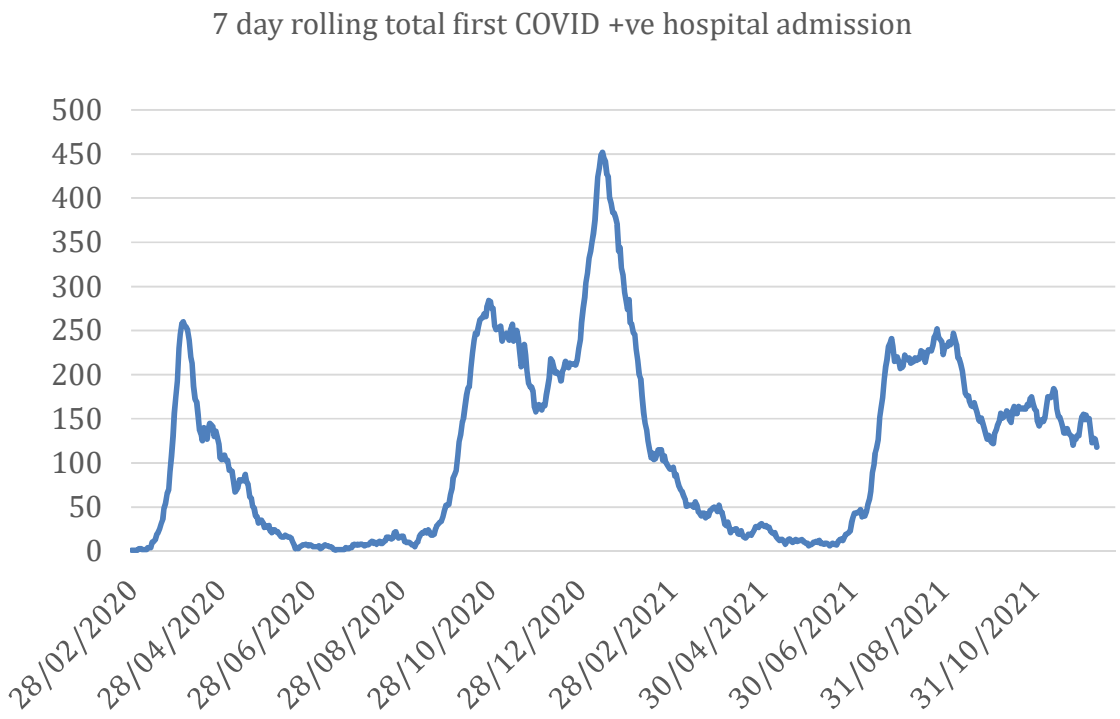

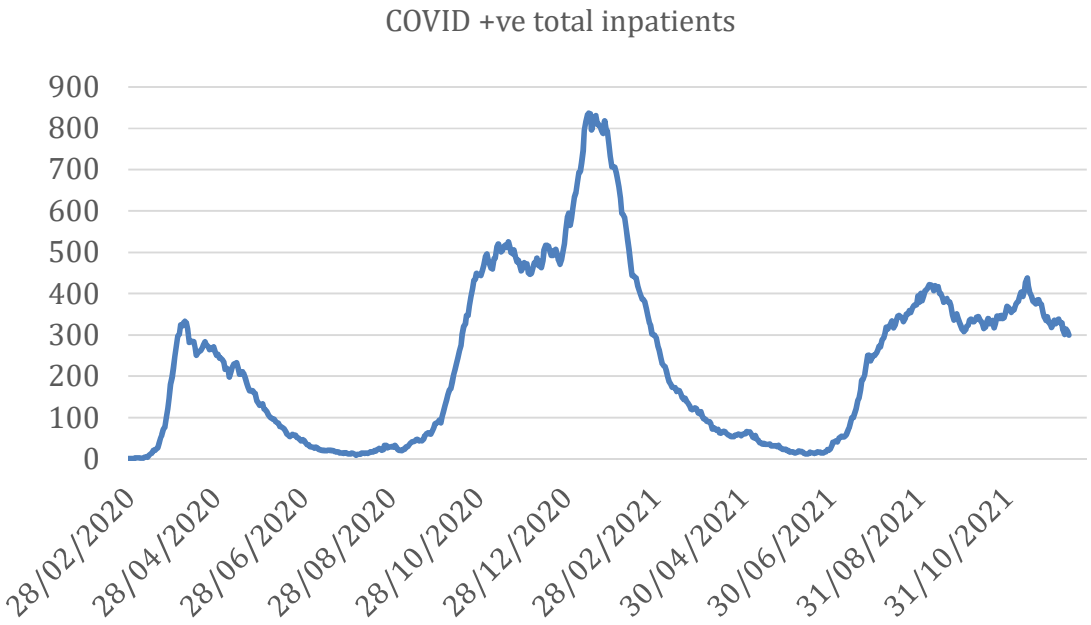

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