Tues 05th October 2021

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

Current estimate of Rt (new positive tests): 0.95 – 1.05 (7 days previous 0.80-1.00)

Current estimate of Rt (hospital admissions): 0.70 – 0.90 (7 days previous 0.75-0.95)

Average number of new positive tests per day last 7 days: 1117 (7 days previous 1114)

7 day incidence based on new positive tests: 412 / 100k (7 days previous 410)

14 day incidence based on new positive tests: 819 / 100k (7 days previous 844)

7 day average of total positive individuals (pillar 1/2): 5.8% (7 days previous 5.4%)

7 day daily average tests completed: 17,945 (7 days previous 21,423)

Number of new positive tests in over 60s in last 7 days: 773 (8 days previous 838)

Proportion of total positive tests occurring in over 60s: 9.8% (9 days previous 10.8%)

COVID-19 +ve hospital admission in last week: 157 (7 days previous 217)

Number of COVID-19 inpatients: 316 (7 days previous 351)

COVID-19 +ve ICU patients: 37 (7 days previous 29)

The number of positive cases has plateaued at a relatively high level in the last week, while the percentage of positive tests increased slightly in the context of a drop in testing numbers. Cases remain highest in 0 – 15s, and are stable or rising slightly in all age groups. Hospital admissions and inpatient occupancy have decreased in the last week, but have begun to plateau in the last few days. ICU occupancy has increased in the last week, while deaths have begun to decline.

It is likely that overall transmission is at a steady state as a result of the success of the vaccination programme vs. relaxations, altered behaviours and waning immunity. In terms of modelling, cases have moved toward a central scenario while occupancy remains closest to the less severe scenario.

The delta variant in NI accounts for over 95% of all cases and is the dominant variant. The remaining cases are almost all alpha variant. There is no evidence that other significant variants are established in NI at present.

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During the most recent period of the ONS Survey (19th to 25th September), it was estimated that 28,000 people had COVID-19 (95% credible interval: 20,300 to 37,200). This equates to 1.53% (95% credible interval: 1.11% to 2.03%) of the population in Northern Ireland or around 1 in 65 people (95% credible interval: 1 in 50 to 1 in 90). This is compared to the other countries of the UK below.

ONS COVID-19 Infection Survey

Week up to 25th Sept

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	1.21	1.13	1.28	658,800	617,900	700,600	1 in 85	1 in 90	1 in 80
Wales	1.76	1.41	2.15	53,300	42,700	65,300	1 in 55	1 in 70	1 in 45
Northern Ireland	1.53	1.11	2.03	28,000	20,300	37,200	1 in 65	1 in 90	1 in 50
Scotland	1.85	1.56	2.17	97,700	82,300	114,200	1 in 55	1 in 65	1 in 45

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

NI, UK and Republic of Ireland comparison

Wales has the highest reported incidence across the common travel area, based on dashboard figures published by respective Governments. There has been a slight rise in incidence in England, while the trajectory of cases in the other nations is downwards. COVID testing is significantly lower in RoI than NI, and testing strategy is different, so a direct comparison with NI and other parts of the UK may be misleading.

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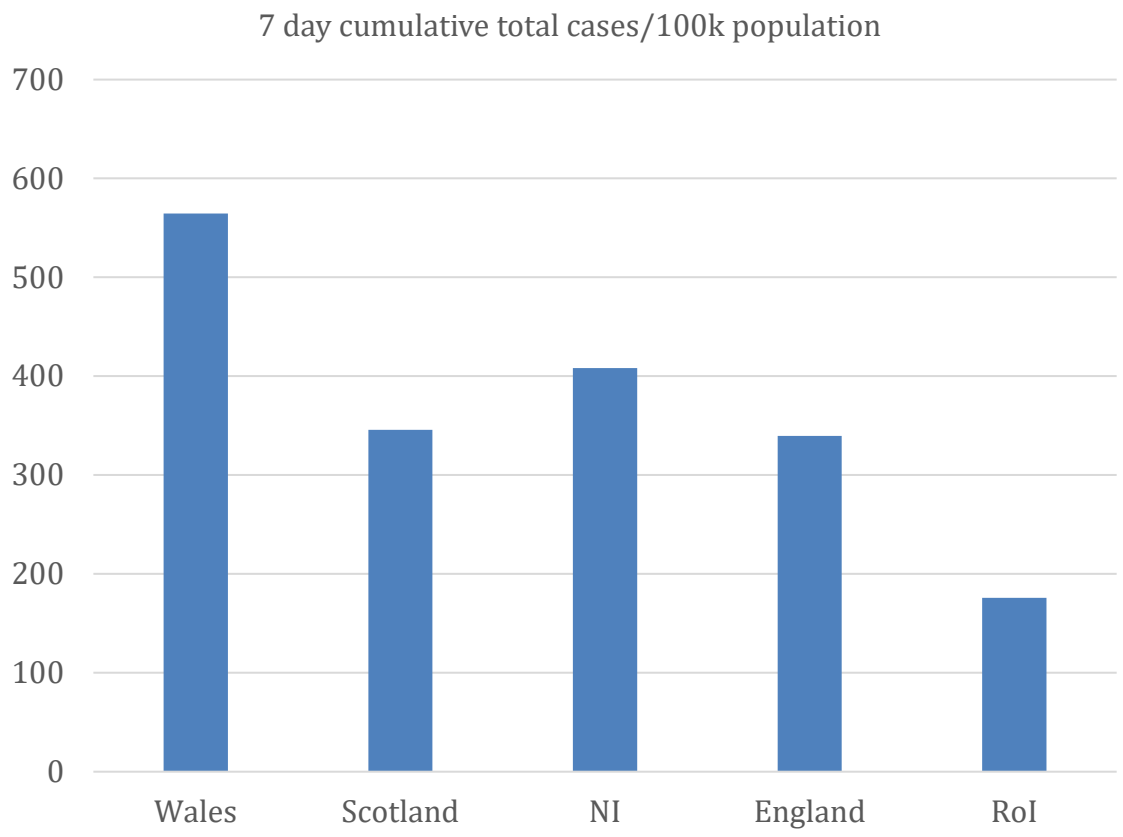

Regional variation in cases

Incidence per LGD over the last week is shown in the table below, and at present is reasonably uniform across NI. Eight of eleven LGDs show an increase in cases in the last week.

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

27th Sept	28th Sept	29th Sept	30th Sept	1st Oct	2nd Oct	3rd Oct	4th Oct	LGD
433	452	454	459	473	482	485	466	Antrim and Newtownabbey
392	405	406	398	384	378	381	362	Ards and North Down
408	400	393	383	396	408	434	428	Armagh City, Banbridge and Craigavon
375	392	396	395	397	406	414	401	Belfast
436	445	456	456	463	45	455	448	Causeway Coast and Glens
374	382	382	390	387	397	392	380	Derry City and Strabane
393	386	386	398	396	395	412	420	Fermanagh and Omagh
409	412	406	390	375	384	384	364	Lisburn and Castlereagh
363	384	391	379	360	356	363	368	Mid and East Antrim
515	474	493	483	478	462	461	451	Mid Ulster
284	290	288	293	317	320	349	359	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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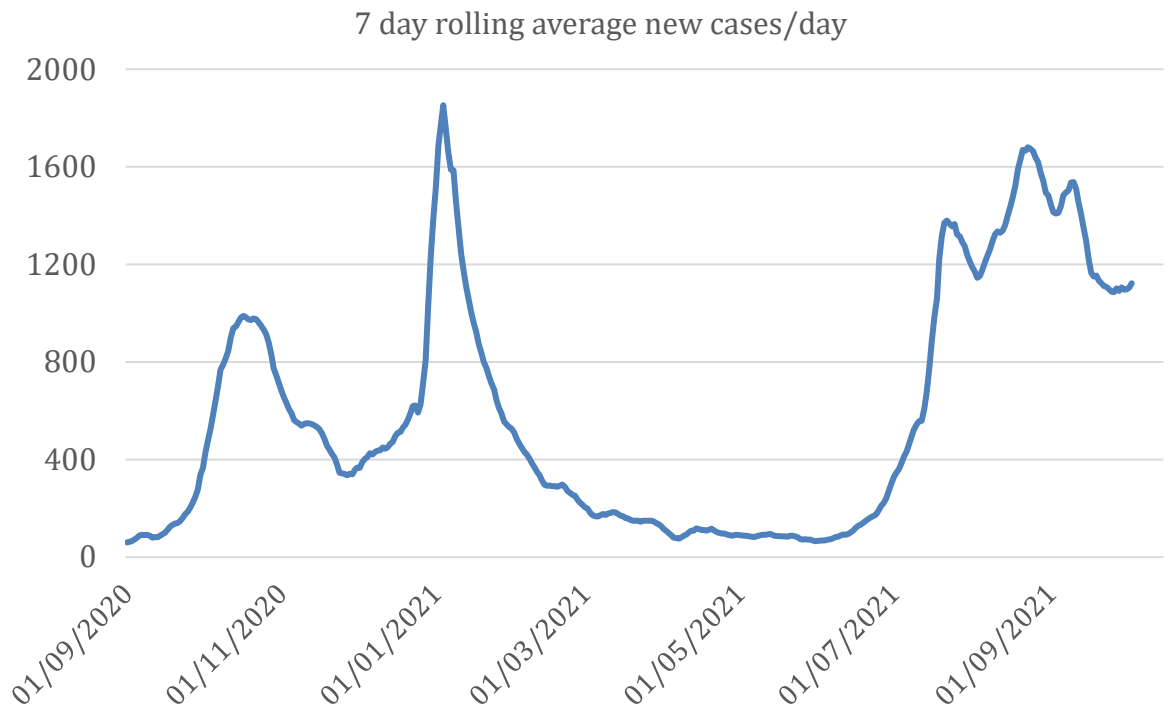
The modelling group determines Rt each day using a bespoke Northern Ireland SIR model. As its primary input the group uses hospital in-patient admissions with community-acquired COVID-19, but also uses a range of other inputs. We therefore have several different values for Rt each day, each of which 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 is around 1 (0.95 – 1.05) and for admissions is below 1 (0.70 - 0.90).



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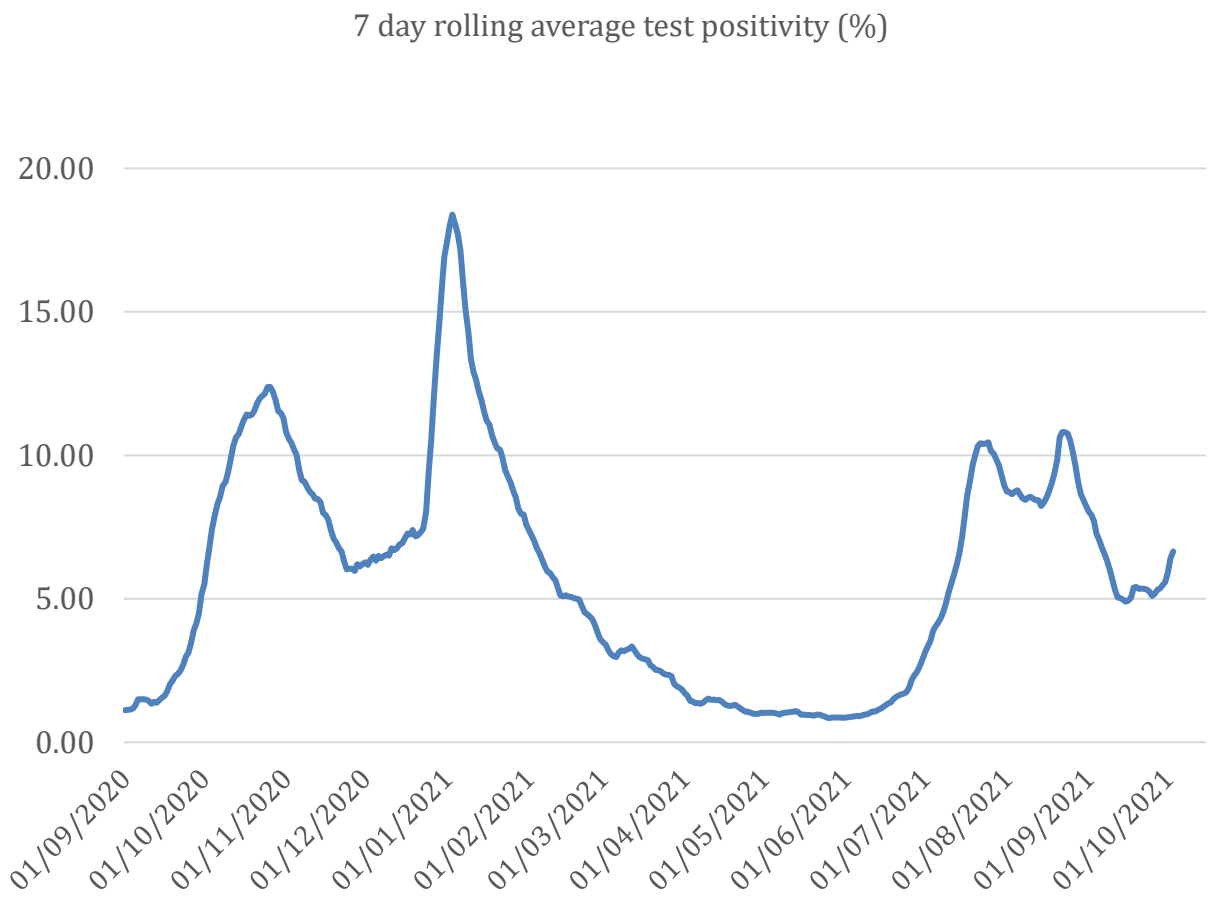

Cases remain highest in 0 -15 year olds, and are stable or rising slowly in all age groups.

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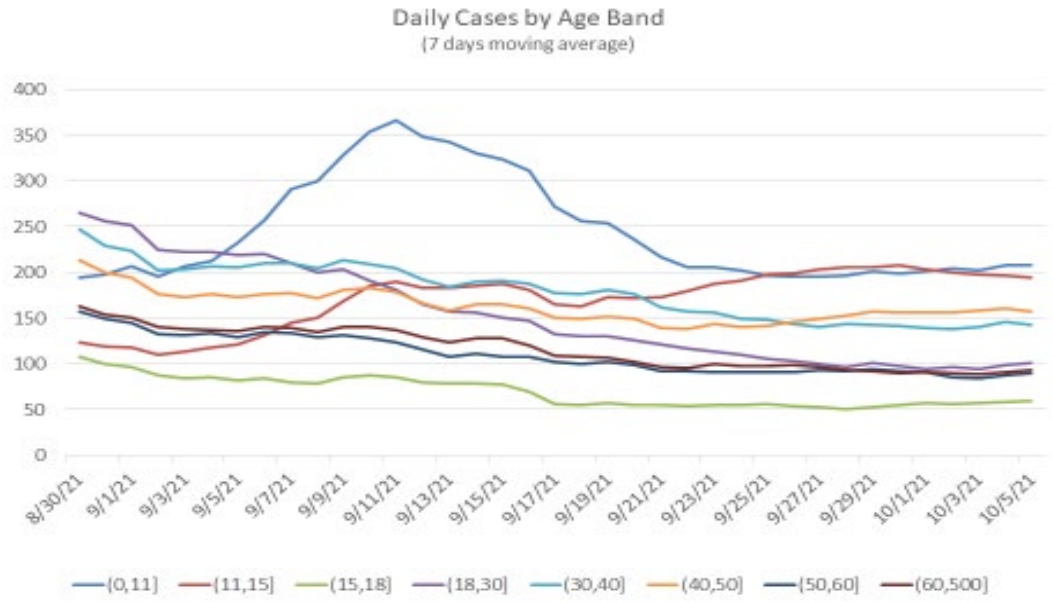

The following graphs show hospital admissions of COVID positive patients over a rolling 7-day period and the number of hospital inpatients. Admissions and inpatients are dropping but have begun to plateau in the last few days.

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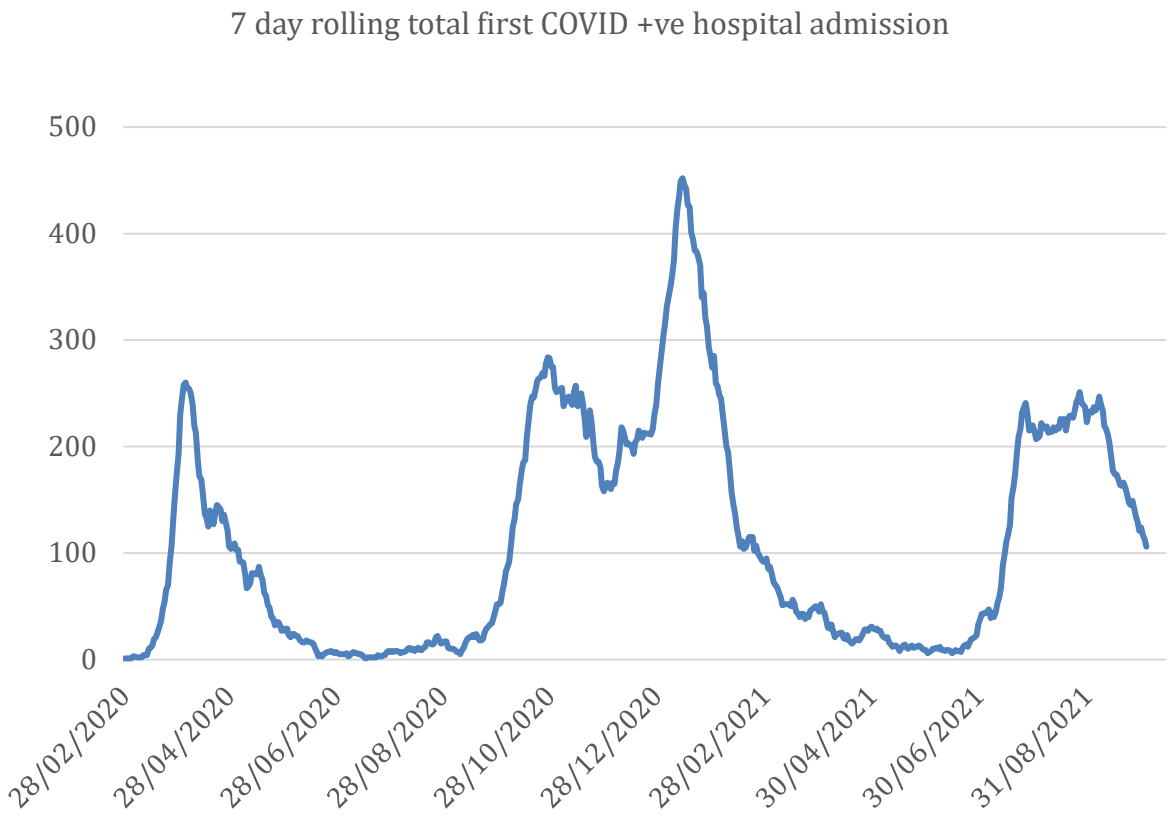

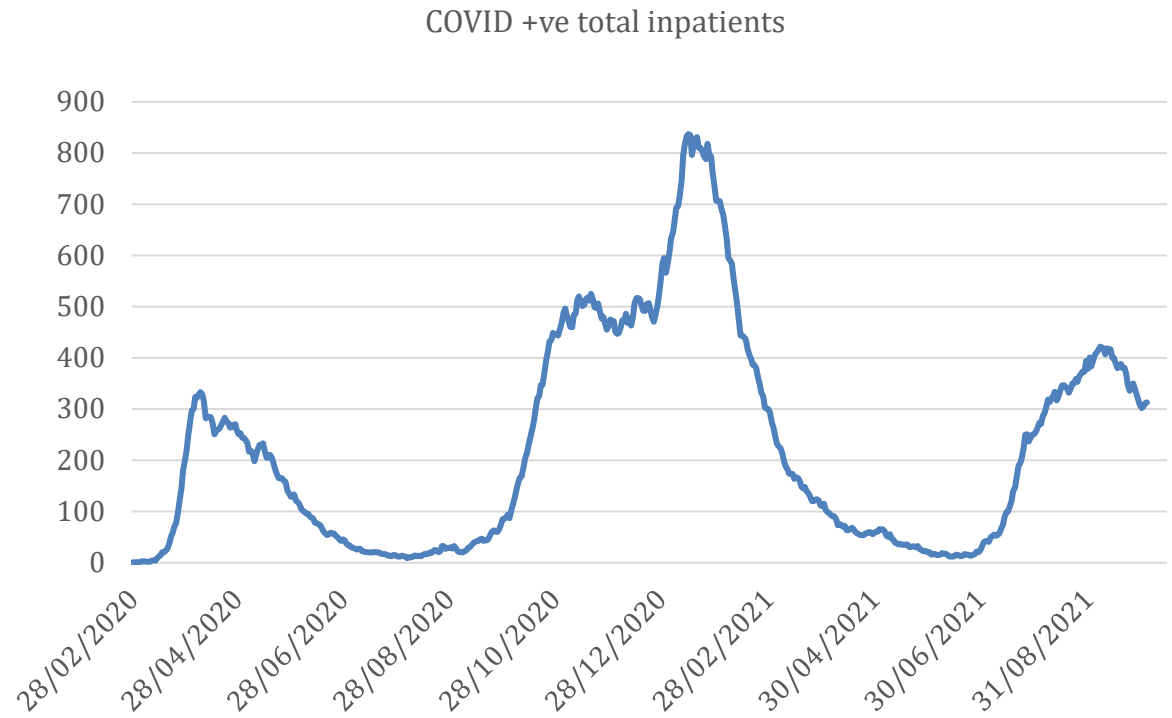

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ICU occupancy is increasing while deaths in hospital are dropping.