Title: Comparative analysis of European COVID-19 epidemiological situation across infection waves 1 and 2 with a focus on severe health outcomes (hospitalisations, critical care, and mortality)

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Background

Most countries in the European region continue to experience a situation of serious epidemiological concern. As of 24th November 2020, 29 European Union (EU)/European Economic Area (EEA) Member States and the United Kingdom (UK) reported 14-day incidence/100,000 population greater than 100, and of these, 15 reported rates higher than 500. Ireland currently has a 14-day incidence rate of 103 which is the third lowest in the region. The 14-day death notification rates were above 10 per 100,000 population in 13 out of 31 countries with the highest rates reported in the Czech Republic (21.5) and Belgium (20.2).

During wave 2 all European countries reached a disease level greater than that observed during the first infection wave with the recent higher rates most likely related to more extensive testing but nonetheless indicating the presence of significant transmission. Notably, age-specific notification rates since July 2020 display a different profile compared to spring/early summer 2020 (March-May 2020). In the spring/early summer, the age-specific incidence rates were highest in older people. Since July 2020, incidence has been highest among younger age groups, particularly 15-24-year-olds and 25-49-year-olds, with the increases in younger age groups occurring prior to those observed in people aged 65 years and older. According to the European Centre for Disease Prevention and Control (ECDC), these changing trends are also likely to be influenced by changes in testing practices over time. During the spring, few European countries had capacity for extensive testing of mild or asymptomatic cases, and thus testing was concentrated in hospitals and among more severe cases, which tended to be among older age groups.

According to data reported to ECDC, the case fatality rate in several EU/EEA countries is currently lower than that observed in March and April 2020. As mentioned previously, this is likely influenced by increased case finding, as more younger and asymptomatic cases are identified. However, the ECDC has also noted reduction in case fatality among older cases, hospitalised patients and patients admitted to critical care. The ECDC cite logistic regression analysis of the European Surveillance System (TESSy) data in relation to case fatality in patients with COVID-19 admitted to intensive care (N=25,094), which indicate that case fatality remained substantially lower during the second wave (August – November) after adjustment for age, gender, country and the number of comorbidities (adjusted Odds Ratio Aug-Nov 0.23 [0.22-.25]). Improved clinical management of cases may be contributory (e.g. use of corticosteroids, management of Acute Respiratory Distress Syndrome (ARDS), recognition of the role of hypercoagulability in the severely unwell).

Cases by outbreak type in Ireland

Differences in outbreak profile in Ireland are noted when comparing waves 1 and 2 with a preponderance of notified outbreaks and associated cases occurring in long-term residential care facilities in wave 1 compared with wave 2 where outbreaks and associated cases have been predominantly located in households/families (Figure 1). This has significance for the difference in morbidity and mortality observed between the two waves with long-term care facility outbreaks representing impact on a subgroup of the population that is particularly vulnerable to the severe outcomes associated with COVID-19. Increased testing and surveillance capacity/processes are factors that should be acknowledged in making comparisons between the two waves.
Incidence trends in the EU/UK, March – November 2020

In spring 2020 Ireland observed a more pronounced increase in 14-day incidence compared with the EU/UK average with likely contributory factors including the rapid increase in testing capacity in this country over short months leading to comparatively greater case finding to some other countries (Figure 2). Following the introduction of significant restrictive non-pharmaceutical interventions across the EU/UK (including Ireland) in response to wave 1, the region achieved substantial viral suppression and low incidence over the summer months. From August 2020, incidence increased across most of the EU/UK with Ireland tracking a similar 14-day incidence trajectory to the EU/UK average. In late October 2020, divergence was observed between the 14-day incidence trend in Ireland compared with the EU/UK average, with Ireland seeing a 66% decrease from 330 (27th October 2020) to 103 (24th November) while the EU/UK average reached a peak of 613 (13th November), reducing only slightly over recent weeks (578 on 24th November).
Figure 2. Trends in 14-day incidence/100,000 in EU/UK, March-November 2020 (data reported to ECDC as of 23rd November 2020)

Figure 3 illustrates 14-day incidence/100,000 population trends across a selection of EU countries (Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden and the UK) compared with Ireland. All included countries experienced an increase in incidence during the spring followed by a period of low disease levels over the summer. Since late summer/early autumn, all displayed countries experienced a second surge of infection, with rapid increases to high levels of incidence in absolute terms in countries such as Belgium, France, the Netherlands, and Italy. In contrast, although a second surge has been observed in Ireland since the summer, the country interrupted the upward trend seen up to late October and has since achieved substantial reduction in disease incidence over the last five weeks.
Hospitalisation and critical care trends in EU/UK, March – November 2020

During the first wave Ireland experienced a surge in weekly hospitalisations of patients with COVID-19 which was lower than the EU/UK average where data were available (Figure 4). Ireland has observed increasing weekly hospitalisations/100,000 since August with that trajectory first stabilising (peak 4.45, week 43) and then slowly reducing over recent weeks (1.88, week 46). This is in marked contrast to growth in average weekly hospitalisations per 100,000 people in the EU/UK over the same period (peak 18.8, week 44) which has only recently appeared to stabilise (18.0, week 46). Of the selected countries, Belgium and France have experienced rapidly increasing and high absolute levels of weekly hospitalisations/100,000 compared with other countries such as Germany and Ireland (Figure 5).
Figure 4. Weekly COVID-19 hospitalisations per 100,000 population in the EU/UK and Ireland, March-November 2020 (data reported to ECDC as of 23rd November 2020)

Figure 5. Weekly COVID-19 hospitalisations per 100,000 population across selected EU countries, March-November 2020 (data reported to ECDC as of 23rd November 2020)

In the first wave Ireland experienced a surge in weekly COVID-19 Intensive Care Unit (ICU) admissions which ran lower than the EU/UK average (Figure 6), noting that data were only available for eleven countries including Ireland. Ireland has observed increasing ICU admissions since
August/September (peak 0.39, week 45) with that trajectory having stabilised over recent weeks (0.33, week 46). This is in marked contrast to the rapid growth in average weekly ICU admissions per 100,000 people in the EU countries where data were available (peak 3.06 in week 45, reduced to 2.96 in week 46).

Figure 6. Weekly COVID-19 ICU admissions per 100,000 population across selected EU countries, March–November 2020 (data reported to ECDC as of 23rd November 2020)

Note: EU ICU data were only available for the following countries:
"Cyprus","Czechia","Estonia","France","Greece","Ireland","Latvia","Malta","Netherlands","Spain","Sweden"

Mortality trends in EU/UK, March – November 2020

In spring 2020 Ireland experienced a first wave of deaths associated with COVID-19 with a large proportion of mortality occurring in residential care facilities. Substantial mortality associated with COVID-19 was also observed in other countries across the EU/UK. However, in comparing Ireland with other countries it should be noted that individual jurisdictions employ differing methodologies for the reporting of COVID-19 deaths. From the outset Ireland reported deaths that occurred in both hospital and the community as well as associated with both probable and confirmed cases of COVID-19. This was not the case in some other countries, particularly earlier in the pandemic. Moreover, Ireland rapidly increased testing in the spring leading to increased case finding, and therefore the likely identification of more deaths associated with COVID-19, in comparison with some other countries.
Ireland has seen increased reporting of COVID-19 related deaths since August 2020 with subsequent stabilisation of this trend (1.51 as of 24th November) (Figure 7). This stands in contrast to the EU/UK average 14-day mortality/100,000 which has been rapidly increasing since August/September (10.7 as of 24th November).

Some countries such as Belgium, Italy and France have experienced very elevated mortality during wave 2 when compared with other countries such as Ireland and Denmark (Figure 8).

Figure 7. COVID-19 mortality/100,000 in Ireland and EU/UK, March-November 2020 (data reported to ECDC as of 23rd November 2020)

Figure 8. 14-day mortality/100,000 trends for Ireland and selected countries in EU/UK, March–November 2020 (data reported to ECDC as of 23rd November 2020)
Comparison of excess mortality in Europe between waves 1 and 2

The first wave of COVID-19 in the spring, both in Ireland and across Europe, impacted older people. This contributed to all-cause mortality rates that exceeded those of previous years, particularly in older age groups. As noted by ECDC in its recently published rapid risk assessment on mortality in long-term care facility residents, data reported to the European monitoring of excess mortality for public health actions (EuroMOMO) network by 22 participant European countries demonstrated significant all-cause excess death in pooled estimates, particularly in Belgium, France, Ireland, Italy, the Netherlands, Spain, Sweden, Switzerland and the UK.2

During the second wave, as of week 45, excess mortality was observed in Belgium, France, Italy, the Netherlands, Slovenia, Spain and Switzerland, with Austria, Portugal and the UK reporting increasing excess death at already moderate or low levels. This recent excess all-cause mortality was attributed mainly to people aged 65 and older but has also been noted in younger age groups (15-64 years), with the greatest excess seen in those aged 75-84 years and 85 years and older.2

There has been no excess mortality observed in Ireland during the second wave (sources: Central Statistics Office (CSO)3 and Health Protection Surveillance Centre (HPSC) Weekly Mortality Report – Week 47), noting that CSO data only extend to September, and in respect of the HPSC data, there are limitations in terms of delayed registration of deaths associated with COVID-19.

Conclusion

In summary, as with many countries across Europe during wave 1 in spring 2020, Ireland experienced substantial COVID-19 transmission with consequent morbidity, mortality, and impact on acute hospital and critical care. Following the introduction of significant population level restrictions in response to wave 1, Ireland followed a similar disease trajectory to many other European countries during the summer with low case numbers growing consistently from August to significantly elevated levels of community transmission in late October, particularly in younger age groups. This was followed by increased incidence in older age groups, hospitalisations, critical care admissions, and sadly, deaths. However, after the introduction of Level 5 measures, Ireland diverged from European neighbours in terms of disease trajectory. Since then we have seen a substantial reduction in disease incidence commensurate with a stabilisation or reduction in terms of hospitalisations, critical care admissions and deaths. It is reasonable to conclude, given the disease trajectory/modelling prior to the application of level 5 measures along with the trends seen in many other European countries in recent months, that Ireland averted substantial disease transmission and its associated morbidity, mortality and pressure on healthcare capacity and delivery. In addition to the implementation of population-level restrictions, other contributory protective factors may include, but are not exclusive to, the enhanced behavioural changes in vulnerable population groups (e.g. older persons) and the various infection, prevention and control measures implemented across a range of vulnerable settings since the onset of the pandemic and which have been continuously strengthened over recent months.

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