# A brief summary of peer-reviewed international evidence and official statistics on the role of vaccines against SARS-CoV-2 on reopening

Dr Andrew Kunzmann and Prof Gerry Killeen on behalf of the Independent Scientific Advocacy Group.

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Vaccines have been shown to reduce the incidence of severe COVID-19 disease and also mild infections[1,2,3,4], which offers the hope of using vaccinations to save lives and eliminate COVID-19.

Deaths attributable to COVID-19 are strongly-age related[5], with over 90% of deaths in Ireland to date occurring in adults aged over 65 years[6]. Individuals with health conditions are also at an increased risk of death and hospitalisation due to COVID-19[7,8]. Vaccinating these cohorts first could very quickly reduce mortality attributable to COVID-19 [9], particularly if complementary non-pharmaceutical interventions are used to bring case numbers down.

It is tempting to suggest that once all over 65 year-olds and clinically vulnerable adults have been offered vaccinations, that substantial reopening could occur. Unfortunately this would have considerable risks for a number of reasons:

Firstly, whilst risk of death is lower in adults aged <65 years, the infection fatality rate for SARS-CoV2 in adults aged 45[5] is similar to the IFR from influenza in adults aged 65-70 years who are eligible for flu vaccines[10]. Therefore, risks we deem unacceptable for flu should also be deemed unacceptable for COVID-19 now that both are vaccine preventable.

Secondly, under 65 year olds accounted for over half of hospitalisations and ICU admission due to COVID-19 in Ireland in 2020[6] and risk of hospitalisation in children and younger adults is >1% in confirmed cases[11]. Therefore, a considerable increase in cases among under 65s could put considerable strain on hospitals which may increase the IFR in younger adults, simply because they wouldn't all receive the care they need from an overwhelmed health service. Such a surge amongst unvaccinated cohorts would risk further prolonged lockdowns and cause further delays to the full restoration of cancer services[12].

Thirdly, uptake of the vaccine is unlikely to be complete, and some immunocompromised individuals will remain vulnerable even after they have been vaccinated [13], which can leave a considerable number of people at risk. For instance, if 10% of adults at a high risk of severe disease do not take the vaccine, for various reasons, then reopening would put them at considerable risk as cocooning indefinitely is unfeasible and vaccines alone are unlikely to fully end the pandemic [14].

The latest authoritative modelling suggests that relaxation of restrictions in the UK after over 65s receive their second dose and most younger adults receive their first dose would still have considerable risks [13]. Even assuming 85% transmission blocking by the vaccines and a partial release of restrictions in June, the model predicted a further 50,000 deaths in the UK [14]. Earlier relaxation of

restrictions, before younger adults get vaccines, was predicted to lead to over 100,000 deaths across the UK [14]. Non-pharmaceutical measures to reach elimination will be needed to avoid this. Similarly, modelling by NPHET indicates that any meaningful reopening in Ireland (which would likely bring R>2) over the next month or two could result in another wave with between 180-500 individuals admitted to ICU per week, which far exceeds the recent surge seen after Christmas [15].

Additionally, the newer variants present even bigger risks in the event of premature reopening or slow burn endemicity persisting because vaccines alone are insufficient to eliminate transmission[14]. Under such conditions where the virus persists at appreciable levels, the risks new variants emerging are exacerbated. Indeed the P1 variant currently ravaging Brazil arose under similar conditions in the Amazonian city of Manaus where three quarters the population may have already had COVID some months previously [16,17]. Like P1[16], the B.1.1.7 variant that dominates the UK and Ireland is considerably more transmissible [18] and is associated with a higher risk of hospitalisation [19] and death, even in younger people[20]. Fortunately, the vaccines still seem effective against the B.1.1.7 variant [21]. However, there are concerns that some vaccines may be less effective against infection from the B.1.3.5.1 variant, sometimes dubbed the South African variant [21]. A trial of the Astra Zeneca vaccine in South Africa was halted because interim results showed it would be unlikely to achieve sufficient protection against infection [22]. Whilst the impact on severe disease could theoretically be stronger, preventing the importation and spread of B.1.3.5.1 should be prioritised until we have better evidence to gauge what vaccines may be most effective against it and whether booster doses will be required. More worrying, the virus continues to evolve, apparently on an upward trajectory of virulence and transmissibility, so there are real risks of further variants emerging which may send us back to square one or worse.

Instead of using vaccinations just for reducing deaths among the vulnerable at the expense of the young, we should combine these two complementary (pharmaceutical and non-pharmaceutical) approaches to accelerate our progress towards elimination of existing COVID variants. In doing so, we would put ourselves in a much more robust position to deal with any new variants that could arise anywhere on the planet, which will have epidemiological and immunological characteristics that remain to be seen and may be even more difficult to tackle with either approach alone.


1. Polack et al. New England Journal of Medicine. 2020 Dec 31;383(27):2603-15. doi/full/10.1056/NEJMoa2034577
2. Dagan et al. BNT162b2 mRNA Covid-19 Vaccine in a Nationwide Mass Vaccination Setting. N Engl J Med. 2021 Feb 24:NEJMoa2101765. doi/full/10.1056/NEJMoa2101765
3. Tande et al., Impact of the COVID-19 Vaccine on Asymptomatic Infection Among Patients Undergoing Pre-Procedural COVID-19 Molecular Screening. Clinical Infectious Diseases https://doi.org/10.1093/cid/ciab229
4. Voysey et al. Safety and efficacy of the ChAdOx1 nCoV-19 vaccine (AZD1222) against SARS-CoV-2: an interim analysis of four randomised controlled trials in Brazil, South Africa, and the UK. The Lancet. 2021 Jan 9;397(10269):99-111. https://www.sciencedirect.com/science/article/pii/S0140673620326611
5. Levin et al. Assessing the age specificity of infection fatality rates for COVID-19: systematic review, meta-analysis, and public policy implications.Eur J Epidemiol 35,1123–1138. doi.org/10.1007/s10654-020-00698-1
6. Central Statistics Office: COVID-19 Deaths and Cases, Series 25 https://www.cso.ie/en/releasesandpublications/br/b-cdc/covid-19deathsandcasesseries25/
7. Clift et al. Living risk prediction algorithm (QCOVID) for risk of hospital admission and mortality from coronavirus 19 in adults: national derivation and validation cohort study BMJ 2020; 371 :m3731 https://www.bmj.com/content/371/bmj.m3731
8. Williamson et al. Factors associated with COVID-19-related death using OpenSAFELY. Nature 584, 430–436 (2020). https://doi.org/10.1038/s41586-020-2521-4

9. Rinott et al. Reduction in COVID-19 Patients Requiring Mechanical Ventilation Following Implementation of a National COVID-19 Vaccination Program - Israel, December 2020-February 2021. MMWR Morb Mortal Wkly Rep. 2021 Mar 5;70(9):326-328. doi: 10.15585/mmwr.mm7009e3
10. https://www.cdc.gov/flu/about/burden/2018-2019.html
11. Health Protection Surveillance Centre: Weekly Epidemiological Report https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/surveillance/covid-1914-dayepidemiologyreports/COVID-19_14_day_epidemiology_report_report_WEB_20210330.pdf
12. Richards, M., Anderson, M., Carter, P. *et al.* The impact of the COVID-19 pandemic on cancer care. *Nat Cancer* **1,** 565–567 (2020). https://doi.org/10.1038/s43018-020-0074-y
13. https://blogs.bmj.com/bmj/2021/03/30/vaccinated-yet-still-clinically-extremely-vulnerable/
14. Moore et al. Vaccination and non-pharmaceutical interventions for COVID-19: a mathematical modelling study. The Lancet Infectious Diseases. 2021 Mar 18. article/pii/S1473309921001432
15. https://www.gov.ie/en/collection/ba4aa0-letters-from-the-cmo-to-the-minister-for-health/
16. Sabino et al. Resurgence of COVID-19 in Manaus, Brazil, despite high seroprevalence. The Lancet. 2021 Feb 6;397(10273):452-5.https://www.thelancet.com/article/S0140-6736(21)00183-5/fulltext
17. Buss et al. Three-quarters attack rate of SARS-CoV-2 in the Brazilian Amazon during a largely unmitigated epidemic. Science. 2020; 371: 288-292 https://science.sciencemag.org/content/371/6526/288
18. Davies et al Estimated transmissibility and impact of SARS-CoV-2 lineage B.1.1.7 in England. Science 03 MAR 2021 DOI: 10.1126/science.abg3055.
19. Bager et al Increased Risk of Hospitalisation Associated with Infection with SARS-CoV-2 Lineage B.1.1.7 in Denmark. doi.org/10.2139/ssrn.3792894
20. Davies et al. Increased mortality in community-tested cases of SARS-CoV-2 lineage B.1.1.7. Nature 2021. https://doi.org/10.1038/s41586-021-03426-1
21. Liu et al. Neutralizing activity of BNT162b2-elicited serum. New England Journal of Medicine. 2021 Mar 8.
22. https://www.sciencemag.org/news/2021/02/south-africa-suspends-use-astrazenecas-covid-19-vaccine-after-it-fails-clearly-stop