

NOTES ON VACCINE EFFECTIVENESS

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Studies to date that showed COVID-19 vaccines reduce asymptomatic infection (transmission)		
Setting	Finding of xx% reduction in asymptomatic	Reference
Healthcare workers in England	86%	Hall SSRN , February 22, 2021
Healthcare workers in Israel	75%	Amit, Lancet , March 6, 2021
Patients in Mayo Clinic health system	88.7%	Pawlowski medRxiv , February 27, 2021
Israel Ministry of Health (nationwide)	94%	Pfizer press release , March 11, 2021
Israel general population (Pfizer)	90%	Dagan NEJM , February 24, 2021
Pre-surgical patients in Mayo Clinic system swabbed asymptotically	80%	Tande Clin Inf Dis , March 10, 2021
Healthcare workers in Cambridge University Hospitals	75%	Weekes Authorea , February 24, 2021
Israel population (>16) with children unvaccinated	For every 20-point increase in adult vaccination, rates of kids testing positive halves	Milman O. Medrxiv , March 31, 2021
First-line responders and HCWs in US	90%	Thompson A. MMWR , March 30, 2021
Nasal viral load values are most important determinant of transmissibility (Lancet study); Nasal viral loads from post-vaccination exposures are low and likely noninfectious per CT values (use rapid antigen tests after vaccination if want to test symptomatic)		

Table 1b. Effectiveness of COVID-19 Vaccination Against Asymptomatic SARS-CoV-2 Infection

Country	Population	Vaccine	Outcome	Vaccine effectiveness
United States ⁴⁹	General adult population	Pfizer-BioNTech or Moderna	Asymptomatic infection	80% ¹
United States ¹⁸	Healthcare workers	Pfizer-BioNTech	Asymptomatic infection	90% ²
Israel ³²	General adult population	Pfizer-BioNTech	Asymptomatic infection	92% ²
Israel ³³	Healthcare workers	Pfizer-BioNTech or AstraZeneca	Asymptomatic infection	86% ²
Israel ³⁴	Healthcare workers	Pfizer-BioNTech	Asymptomatic infection	65% ³

¹≥0 days after second dose²≥7 days after second dose³≥11 days after second dose

- Table 1b from: <https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html>

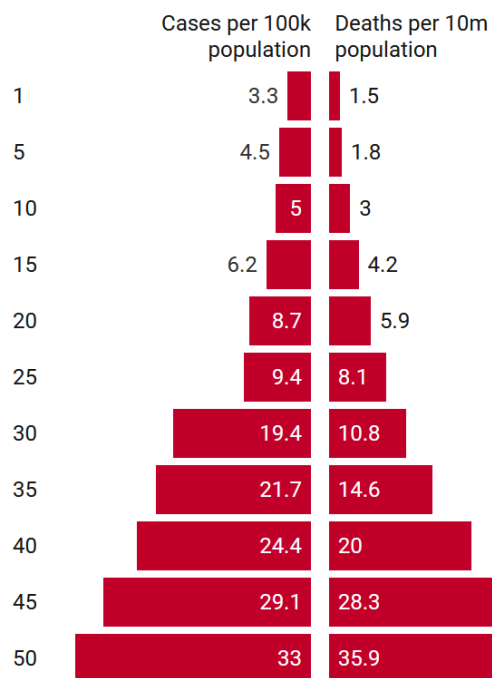
- And some more references
 - Benenson S, Oster Y, Cohen MJ, Nir-Paz R. BNT162b2 mRNA Covid-19 Vaccine Effectiveness among Health Care Workers. N Engl J Med. 2021.
 - Daniel W, Nivet M, Warner J, Podolsky DK. Early Evidence of the Effect of SARS-CoV-2 Vaccine at One Medical Center. N Engl J Med. 2021.
 - Keehner J, Horton LE, Pfeffer MA, Longhurst CA, Schooley RT, Currier JS, et al. SARS-CoV-2 Infection after Vaccination in Health Care Workers in California. N Engl J Med. 2021.
- People that are fully vaccinated can indeed be infected. However they are:
 - Less likely to get symptomatic disease
 - This the vaccine efficacy rate we hear so much about so probably around 80 to 90%
 - Most importantly almost 100% less likely to get severe disease and die
 - The reduction in intensive care requirement is a very important metric as one key secondary issue that we were very concerned about and was the main reason we went so hard with aggressive suppression was that our ICU capacity is a very limited resource and if this was full or overwhelmed then not only our ability to look after the multitude of Covid 19 patients is limited but we could also lose capacity to look after the usual case mix that require intensive care support all the time. This means that the death rate from other things like motor vehicle accidents and heart attacks could also rise
- When comparing cases in vaccinated versus unvaccinated, we also have to consider that there are likely differences in the other mitigation strategies and behaviours in many countries
 - Vaccinated people may well be less likely to use masks, social distance, avoid travel etc as they have a perception (rightly) that they have reduced their risk from the virus by being vaccinated
 - Vaccinated people may be able to enjoy more freedoms and therefore move around more hence actually increasing their risk of infection higher
 - People who are vaccinated in Israel are given a Green pass. This gives exclusive access to gyms, hotels, theatres, and concerts, albeit with some limits. Indoor dining in restaurants and bars is also included in the green pass scheme. Hence they are increasing their risks.
- An important paradox to consider, and one that is often used by anti-vaxers to support their argument as they don't understand this, is that if we look at proportions incorrectly, we can get a very skewed perspective on how well the vaccines work
 - That is if we have the majority of people in a population vaccinated then we will see more cases in people vaccinated than in people that aren't
 - This is not a failure of the vaccine
 - What is likely is that the rate of infection is still much less in the vaccinated group than the non-vaccinated, it's just the denominator has been changed
 - And because we don't have a control group its hard to prove in that population that not only the rate of infection is reduced but so is the severity of the disease, but we know this to be the case
 - But this still means the number of people infected is less than it would have been had the vaccine not been used, the number of people getting sick is

reduced and the number of people getting really sick and dying is dramatically reduced, clearly something that is still beneficial

How the UK's vaccine rollout has dramatically reduced Covid-19 deaths

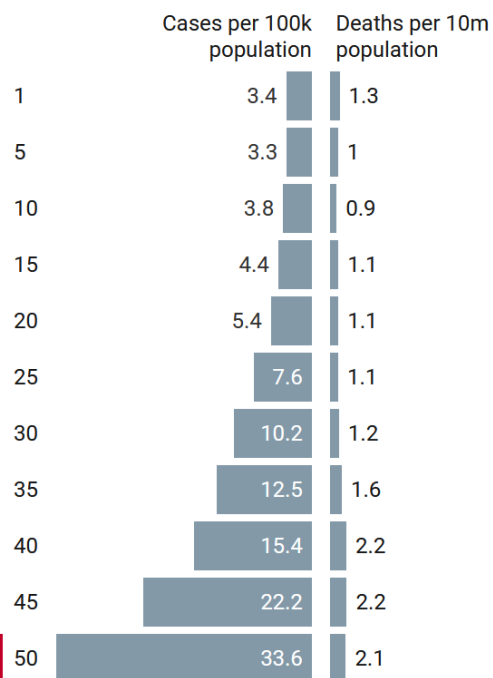
Cases versus deaths over days 1–50 of the UK's second and third Covid waves

Second Wave



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Third wave



[Get the data](#) • Created with [Datawrapper](#)

Calculations based on a seven-day rolling average of daily recorded cases and deaths. Second wave is recorded from 8/9/20, third wave is recorded from 14/5/21.

Source: UK Government, ONS

NewStatesman

- The other piece of commentary that is significant at the moment is relating to delta and the vaccine effectiveness, a good study was published in the NEJM just last week
 - Lopez Bernal, J., et al. (2021). "Effectiveness of Covid-19 Vaccines against the B.1.617.2 (Delta) Variant." N Engl J Med. two doses among vulnerable populations. (Funded by Public Health England.).
 - Effectiveness after one dose of vaccine (BNT162b2 or ChAdOx1 nCoV-19) was notably lower among persons with the delta variant (30.7%; 95% confidence interval [CI], 25.2 to 35.7) than among those with the alpha variant (48.7%; 95% CI, 45.5 to 51.7); the results were similar for both vaccines. With the BNT162b2 vaccine, the effectiveness of two doses was 93.7% (95% CI, 91.6 to 95.3) among persons with the alpha variant and 88.0% (95% CI, 85.3 to 90.1) among those with the delta variant.

With the ChAdOx1 nCoV-19 vaccine, the effectiveness of two doses was 74.5% (95% CI, 68.4 to 79.4) among persons with the alpha variant and 67.0% (95% CI, 61.3 to 71.8) among those with the delta variant.

- Basically both vaccines do have reduced efficacy versus delta, but its relatively subtle