

About Efficacy, Propaganda and Logic.

The statement “the vaccines are safe and effective” has been the most popular political proclamation of 2021. The number related to this proclamation is the 90-95% “Efficacy” of some of the different Covid-19 vaccine trials. This number has been the target of many studies and analysis to support the narrative that the vaccines are the silver bullet solution against our pandemic vexation.

As many governments have heavily invested in mass vaccination as the answer to the Covid-19 pandemic, the political narratives are about high “efficacies”, high vaccination rates and high number of unvaccinated victims. The propaganda often defies the pure mathematical relationship between these different epidemiological parameters.

A clear example is the typical political statement such as: “Pandemic of the Unvaccinated”, claiming that a major majority of hospitalisations and deaths are amongst the unvaccinated. The truth of the matter is that when politicians and health bureaucrats claim this, whilst also pride themselves on high vaccination rates, this can only be achieved with very high efficacies. These suggested efficacies are not realistic as can be derived from public health data from the UK, which has a very high vaccination rate.

The relation between “Efficacy”, Vaccination Rate and Percentage of Vaccinated amongst Cases.

An interesting aspect to look at when comparing data about vaccinated and unvaccinated populations is the comparison between the Vaccination Rate (V%) and the Percentage of Vaccinated amongst Cases (Cv%). Where Cases can be differently defined, such as a person Tested Positive, Hospitalised or Died due to Covid-19. A way to indicate this relation is through the Relative Breakthrough Ratio (RBR). RBR is Cv% divided by V%. If the vaccines would be perfectly sterilising, you would not see any vaccinated case (RBR = 0%). On the other hand, when the vaccines wouldn't have any effect at all, these percentages would be equal and RBR would be 100%.

See appendix 1 for the explanation of the relationship between several epidemiological parameters.

In table 1 you can see that with a Vaccination Rate greater than 90%, which is now the case in most western countries in the age groups above 60, that you need an RRR of at least 90% to achieve that the majority of victims are unvaccinated (Cv% < 50%). This is unrealistic based on the UK and Israeli data, despite the massive vaccination effort with booster shots that started in the elderly age groups. This clearly proves that statements like “Pandemic of the Unvaccinated” is pure political spin.

What is in a number?

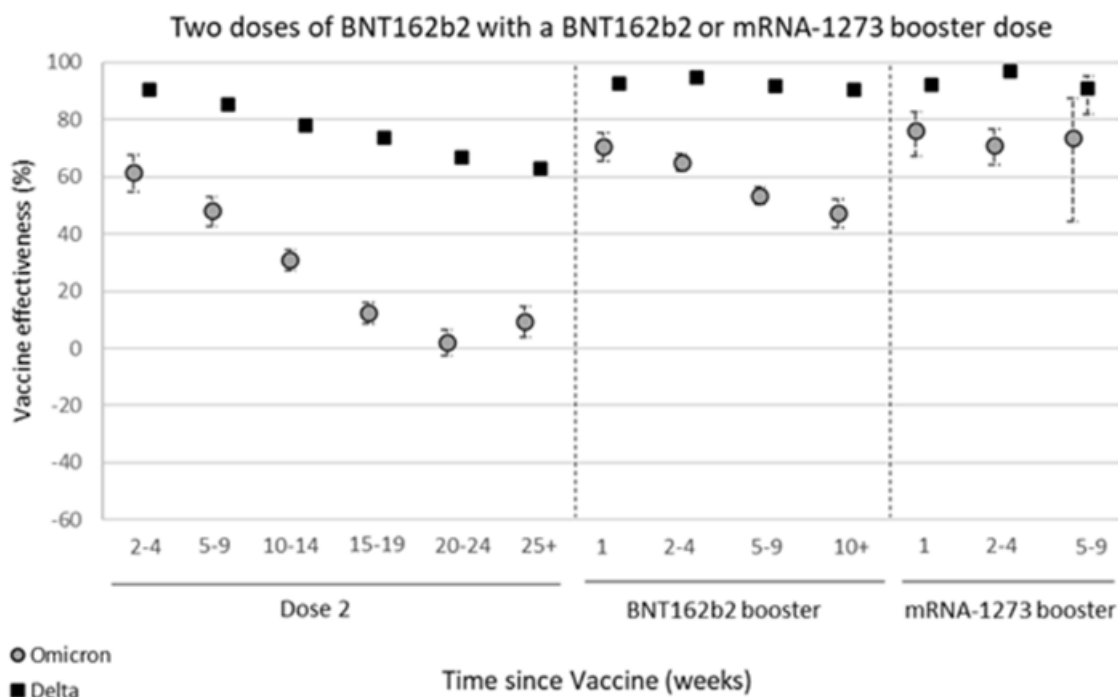
In the political propaganda the “Efficacy” or Relative Risk Reduction (RRR) is used to claim vaccine success. This success claim is often based on the Trial results. There are many factors why these claims are misleading.

From real world data it is evident that RRR is dependant on many factors such as:

- Variant of Covid-19
- Time since vaccination
- Age (Co-morbidities)
- Number of doses

Whilst the trial data and vaccine design were based on the mother (Wuhan) strain, we now experience the outbreak of a third dominant variant (Omicron). The vaccines are less effective with every emergence of a new variant that differs more and more from the mother strain for which the vaccines were designed. Based on real world data from the UK and Israel, this trend is already established with the emergence of the Delta variant in comparison to the Alpha variant. For the new Omicron variant this is also anticipated. In the Technical briefing 33ⁱ (SARS-CoV-2 variants of concern and variants under investigation in England), the RRR of the vaccines for this new variant will be significantly lower than initially established.

UKHSA Technical briefing 33 figure 10:



Whilst most vaccines, as per design are most effective 2 weeks after second dose, the RRR starts dropping from that moment on and this is evidently worse with every new variant. This significant loss in RRR is also seen in Israel with the initial outbreak of the Delta variant. Booster programs only improve the dropped efficacy modestly. Technical briefing 33 (figure

10) indicates that for Omicron it is to be expected that the RRR will wane below 50% within 10 weeks and become ineffective within 20 weeks after 2nd Dose vaccination. Also the effect of the booster shots are expected to wane below 50% within 10 weeks.

Israeli and UK data indicate that RRR's are very age dependant and the best in age groups 50-70 but drops significantly with ages above 70. This is unfortunate because it is for these age groups that the risk of the disease increases exponentially. After all the average age of Covid-19 victims is above the average age of the population.

To use "Efficacy" (RRR) as a generic term does not distinguish between these factors and therefor the use of a generic Efficacy number is misleading and a pure propaganda trick. It also depends on the case. With the emergence of the Delta variant it is clear that the RRR's differ greatly depending on the definition of the case.

It is becoming more evident that the RRR in avoiding infections with the Delta variant (case = positive test) is very low. The latest data from the Delta outbreak in the UK show the RRR for this case is actually highly negative (see Appendix 1, Table 2). This indicates that Covid-19 is spread more between the vaccinated than between the unvaccinated. Despite this fact the propaganda supporting vaccination mandates is still hinging much on the assumption that the vaccines reduce the spread of Covid-19. There is absolutely no basis for this argument.

As the realisation is growing that the transmission argument is no longer tenable, the focus on justifying mandates is shifting to 'avoiding overwhelming of the Health System', because there is still 'good' RRR for avoiding Hospitalisation and Death.

The impression of effectivity. What is 'good'?

Is a RRR of 70% good? The impression that a term as "efficacy" gives with 70% is rather good, but with a Vaccination rate of 85% this means a RBR of 74%. This gives a rather different impression. The fact is that with these parameters 63% of cases are vaccinated. What kind of impression does that give?

Given this fact, consider that the RRR against Death for the most vulnerable age group of 80+ is about 60% and only improves temporarily to 73% after a booster shot.

The early indications for Omicron give an all ages RRR against Hospitalisation of 56%. Mind that this is in a time of a very fresh booster vaccination program for the vulnerable elderly age groups. This predicts rather high Cv% for the elderly and most victims producing age groups over time (due to rapidly waning efficacy). The question remains if the alleged overwhelming of the health system can be avoided with this trend on RRR for the most victim producing age groups and the fact that these age groups have already a vaccination rate of well above 90%.

Conclusion

Considering these facts, it makes no sense at all to mandate vaccinations for working age groups (< 60). These vaccines appear to stimulate transmission amongst the vaccinated in the working age groups. As indicated by the high number needing treatment (NNT) to avoid 1 case (See Appendix 1 table 2), the risk of these age groups for Covid-19 is very low. There is not much to gain from coercing these age groups to be vaccinated in relation to the 'avoiding overwhelming of the health system' argument.

In fact, disregarding the ethical aspects of coercion and disregarding the unestablished age-correlated vaccination risks, it would be twice as effective to coerce the elderly from a 91-95% to 100% vaccination rate than coercing working age groups from 54-86% to a 100% vaccination rate (based on UK real world data about the Delta outbreak).

Even introducing unethical mandates are done in a non-logical ineffective manner.

Appendices

| | | |
|------------|-----|--|
| Appendix 1 | 1-3 | Mathematical relations epidemiological parameters and examples |
| Appendix 2 | 1-7 | UK Data from COVID-19 vaccine surveillance reports ⁱⁱ |
| Appendix 3 | | Initial Omicron Hospitalisations UK (Until 20 Dec 21) |

J. Steen MBA, December 2021

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043807/technical-briefing-33.pdf

ii

<https://www.gov.uk/government/publications/covid-19-vaccine-weekly-surveillance-reports>

Mathematical relations:

Generic parameters:

| | |
|------------------|---|
| P | Population size (per Age group) |
| P _v | Vaccinated Population size (per Age group) |
| P _u | Unvaccinated Population size (per Age group) |
| V% | Vaccination rate (per Age group) |
| S | Size of Sample of Population |
| S _v | Number of Vaccinated amongst Sample |
| S _u | Number of Unvaccinated amongst Sample |
| S _x | Number of unknown vaccination status amongst Sample |
| S _v % | Vaccination rate amongst Sample |
| C | Total number of Cases *1 |
| C _v | Number of Vaccinated amongst Cases |
| C _u | Number of Unvaccinated amongst Cases |
| C _x | Number of unknown vaccination status amongst Cases |
| C _v % | Rate of Vaccinated amongst cases |

$$P = P_v + P_u$$
$$P_v = V\% \times P$$
$$P_u = (1 - V\%) \times P$$

$$S = S_v + S_u$$

$$S_v\% = S_v / S$$

$$C = C_v + C_u$$

$$C_v\% = C_v / C$$

Risk parameters:

| | |
|-----------------|---|
| AR _v | Attack rate of Absolute Risk amongst vaccinated |
| AR _u | Attack rate of Absolute Risk amongst Unvaccinated |
| RRR | Relative Risk Reduction (often referred to as 'Efficacy') |
| ARR | Absolute Risk Reduction |
| NNT | Number needing Treatment to avoid 1 case |

$$AR_v = C_v / S_v$$

$$AR_u = C_u / S_u$$

$$RRR = 1 - AR_v / AR_u$$

$$AR_v = (1 - RRR) / AR_u$$

$$ARR = AR_u - AR_v$$

$$NNT = 1 / ARR$$

Indicators for Sterilising effect:

| | |
|-----|---|
| VER | Vaccine Escape Ratio = ratio amongst Vaccinated where vaccine is not working to avoid case |
| RBR | Relative Breakthrough Ratio = Ratio of Vaccinated breakthroughs in relation to Vaccination rate |

$$VER = 1 - RRR$$

$$RBR = C_v\% / V\%$$

Indicators for Virulence

| | |
|------------------|---|
| CFR | Case Fatality Ratio = Deaths amongst Cases (tested Positive) |
| CFR _v | Case Fatality Ratio Vaccinated = Deaths amongst Vaccinated cases (Pos test) |
| CFR _u | Case Fatality Ratio Unvaccinated = Deaths amongst Unvaccinated cases (Pos test) |
| CMR | Covid Mortality Rate = Deaths amongst total Population *2 |
| CMR _v | Covid Mortality Rate vaccinated = Deaths amongst Vaccinated Population |
| CMR _u | Covid Mortality Rate Unvaccinated = Deaths amongst Unvaccinated Population |

$$CFR = D / C \quad \text{with } C = \text{tested Positive}$$

$$CFR_v = D_v / C_v$$

$$CFR_u = D_u / C_u$$

$$CMR = D / P$$

$$CMR_v = D_v / P_v$$

$$CMR_u = D_u / P_u$$

*1) Case: a specified case, such as: Tested Positive, Hospitalisation or Death

*2) D = specified case as Death

From these definitions the following direct mathematical relationship functions can be derived:

RRR = f{Cv%, V%} = 'Efficacy' as function of Rate of Vaccinated amongst Cases and Vaccination Rate:

$$RRR = 1 - (Cv\% \times (1 - V\%)) / (V\% \times (1 - Cv\%))$$

RRR = f{RBR, V%} = 'Efficacy' as function of Relative Breaththrough Ratio and Vaccination Rate:

$$RRR = 1 - (RBR \times (1 - V\%)) / (1 - RBR \times V\%)$$

Cv% = f{RRR, V%} = Percentage of Vaccinated amongst Cases as function of 'Efficacy' and Vaccination Rate

$$Cv\% = V\% \times (1 - RRR) / (1 - RRR \times V\%)$$

RBR = f{RRR, V%} = Relative Breakthrough Ratio as a function of 'Efficacy' and Vaccination Rate

$$RBR = (1 - RRR) / (1 - RRR \times V\%)$$

Table 1: Mathematical relations between V%, RRR, Cv% and RBR

| Known: V% and RRR | | with P = 1,000,000 | | with S = 10% of Population | | with ARu = Cu/Su = ARv x Sv = Cu + Cv Arv = (1 - RRR)/ARu = Cv/C | | | | | = Cv%/V% = ARu-ARv = 1-RRR | | | | benchmark: 50% 25% 50% 50% | | | |
|----------------------|-----|-----------------------|---------|-------------------------------|--------|--|-------|-------|-------|-------|----------------------------|-------|-------|-------|-------------------------------|-------|-------|-------|
| V% | RRR | Pv | Pu | Sv | Su | Cu | ARv | Cv | C | Cv% | RBR | RRR | VER | ARR | RRR | VER | Cv% | RBR |
| 60.0% | 90% | 600,000 | 400,000 | 60,000 | 40,000 | 4,000 | 1.00% | 600 | 4,600 | 13.0% | 21.7% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 13.0% | 21.7% |
| 60.0% | 60% | 600,000 | 400,000 | 60,000 | 40,000 | 4,000 | 4.00% | 2,400 | 6,400 | 37.5% | 62.5% | 60.0% | 40.0% | 6.00% | 60.0% | 40.0% | 37.5% | 62.5% |
| 70.0% | 90% | 700,000 | 300,000 | 70,000 | 30,000 | 3,000 | 1.00% | 700 | 3,700 | 18.9% | 27.0% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 18.9% | 27.0% |
| 70.0% | 60% | 700,000 | 300,000 | 70,000 | 30,000 | 3,000 | 4.00% | 2,800 | 5,800 | 48.3% | 69.0% | 60.0% | 40.0% | 6.00% | 60.0% | 40.0% | 48.3% | 69.0% |
| 80.0% | 90% | 800,000 | 200,000 | 80,000 | 20,000 | 2,000 | 1.00% | 800 | 2,800 | 28.6% | 35.7% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 28.6% | 35.7% |
| 80.0% | 60% | 800,000 | 200,000 | 80,000 | 20,000 | 2,000 | 4.00% | 3,200 | 5,200 | 61.5% | 76.9% | 60.0% | 40.0% | 6.00% | 60.0% | 40.0% | 61.5% | 76.9% |
| 85.0% | 90% | 850,000 | 150,000 | 85,000 | 15,000 | 1,500 | 1.00% | 850 | 2,350 | 36.2% | 42.6% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 36.2% | 42.6% |
| 85.0% | 70% | 850,000 | 150,000 | 85,000 | 15,000 | 1,500 | 3.00% | 2,550 | 4,050 | 63.0% | 74.1% | 70.0% | 30.0% | 7.00% | 70.0% | 30.0% | 63.0% | 74.1% |
| 91.0% | 90% | 910,000 | 90,000 | 91,000 | 9,000 | 900 | 1.00% | 910 | 1,810 | 50.3% | 55.2% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 50.3% | 55.2% |
| 90.0% | 60% | 900,000 | 100,000 | 90,000 | 10,000 | 1,000 | 4.00% | 3,600 | 4,600 | 78.3% | 87.0% | 60.0% | 40.0% | 6.00% | 60.0% | 40.0% | 78.3% | 87.0% |
| 95.0% | 90% | 950,000 | 50,000 | 95,000 | 5,000 | 500 | 1.00% | 950 | 1,450 | 65.5% | 69.0% | 90.0% | 10.0% | 9.00% | 90.0% | 10.0% | 65.5% | 69.0% |
| 95.0% | 60% | 950,000 | 50,000 | 95,000 | 5,000 | 500 | 4.00% | 3,800 | 4,300 | 88.4% | 93.0% | 60.0% | 40.0% | 6.00% | 60.0% | 40.0% | 88.4% | 93.0% |

V-Bias is percentage of shift of Unvaccinated people towards Vaccinated in Sample (100% V-Bias means only Vaccinated will come forward for testing)

Table 2: Real world data from the UK

$$VER = (Cv\% \times (1 - V\%)) / (V\% \times (1 - Cv\%))$$

$$RBR = Cv\% / V\%$$

$$RRR = 1 - VER$$

| V% | Cv% | RBR | VER | RRR | | NNT | |
|-----|-----|------|------|-------|--|--|--------|
| 65% | 65% | 99% | 98% | 2% | Cases (= Pos test) England week 32-47 V% based on 1st Dose Age Groups: | 18-29 | |
| 69% | 73% | 106% | 123% | -23% | | 30-39 | |
| 79% | 88% | 112% | 194% | -94% | | 40-49 | |
| 88% | 93% | 106% | 176% | -76% | | 50-59 | |
| 92% | 95% | 103% | 168% | -68% | | 60-69 | |
| 96% | 96% | 101% | 127% | -27% | | 70-79 | |
| 96% | 95% | 99% | 83% | 17% | | ≥80 | |
| 54% | 27% | 51% | 32% | 68% | | Cases (= Death within 60 days) England week 32-47 V% based on 2nd Dose Age Groups: | 77,746 |
| 65% | 24% | 37% | 17% | 83% | 30-39 | | 18,271 |
| 78% | 38% | 48% | 17% | 83% | 40-49 | | 6,359 |
| 86% | 48% | 56% | 15% | 85% | 50-59 | | 1,804 |
| 91% | 66% | 72% | 19% | 81% | 60-69 | | 844 |
| 95% | 81% | 86% | 24% | 76% | 70-79 | | 378 |
| 94% | 86% | 92% | 40% | 60% | ≥80 | | 269 |
| 60% | 70% | 117% | 158% | -58% | Cases (= Pos test) England week 47-50 V% based on 2nd Dose Age Groups: | | 18-29 |
| 64% | 77% | 120% | 186% | -86% | | 30-39 | |
| 76% | 87% | 115% | 219% | -119% | | 40-49 | |
| 87% | 91% | 105% | 156% | -56% | | 50-59 | |
| 90% | 91% | 101% | 116% | -16% | | 60-69 | |
| 95% | 91% | 97% | 60% | 40% | | 70-79 | |
| 95% | 89% | 95% | 49% | 51% | | ≥80 | |
| 60% | 25% | 42% | 23% | 77% | | Cases (= Death within 60 days) England week 47-50 V% based on 2nd Dose Age Groups: | 18-29 |
| 64% | 24% | 37% | 18% | 82% | 30-39 | | |
| 76% | 44% | 58% | 25% | 75% | 40-49 | | |
| 87% | 50% | 58% | 16% | 84% | 50-59 | | |
| 90% | 70% | 77% | 25% | 75% | 60-69 | | |
| 95% | 77% | 81% | 19% | 81% | 70-79 | | |
| 95% | 82% | 87% | 27% | 73% | ≥80 | | |
| 90% | 79% | 88% | 44% | 56% | Omicron Hospitalisations | | |

RRR trending down to 57% until booster program

Booster shot rate: 49-83%
Booster shot rate: 81-90%
Booster shot rate: 82-88%

Technical briefing 33, Table 4 (see Appendix 3)

based on dose:
2

| Cases reported by week of specimen date between week 32 and week 35 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|---------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 4 | | | | | | | | | | | |
| Under 18 | 167,832 | 15,901 | 141,676 | 8,132 | 1,366 | 757 | 10,255 | | 0.5% | | |
| 18-29 | 176,392 | 19,529 | 53,187 | 4,598 | 66,545 | 32,533 | 103,676 | 46% | 20.7% | 45% | 70% |
| 30-39 | 113,373 | 12,452 | 33,986 | 1,497 | 22,434 | 43,004 | 66,935 | 64% | 42.6% | 66% | 59% |
| 40-49 | 97,881 | 8,930 | 15,106 | 496 | 6,000 | 67,349 | 73,845 | 80% | 75.7% | 95% | 20% |
| 50-59 | 84,488 | 6,868 | 7,552 | 168 | 2,248 | 67,652 | 70,068 | 86% | 87.2% | 101% | -8% |
| 60-69 | 45,252 | 3,657 | 2,650 | 54 | 772 | 38,119 | 38,945 | 92% | 91.6% | 99% | 8% |
| 70-79 | 25,499 | 2,034 | 910 | 12 | 273 | 22,270 | 22,555 | 95% | 94.9% | 100% | 2% |
| ≥80 | 12,011 | 1,124 | 545 | 9 | 246 | 10,087 | 10,342 | 94% | 92.7% | 99% | 20% |

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 32 and week 35 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 6 | | | | | | | | | | | |
| Under 18 | 438 | 25 | 404 | 8 | 1 | - | 9 | | 0.0% | | |
| 18-29 | 584 | 14 | 387 | 17 | 86 | 80 | 183 | 46% | 14.0% | 30% | 81% |
| 30-39 | 733 | 16 | 516 | 16 | 67 | 118 | 201 | 64% | 16.5% | 26% | 89% |
| 40-49 | 783 | 14 | 497 | 17 | 35 | 220 | 272 | 80% | 28.6% | 36% | 90% |
| 50-59 | 877 | 10 | 421 | 11 | 29 | 406 | 446 | 86% | 46.8% | 54% | 86% |
| 60-69 | 946 | 7 | 328 | 7 | 33 | 571 | 611 | 92% | 60.8% | 66% | 87% |
| 70-79 | 1,098 | 3 | 194 | 2 | 26 | 873 | 901 | 95% | 79.7% | 84% | 79% |
| ≥80 | 1,146 | 1 | 144 | 1 | 35 | 965 | 1,001 | 94% | 84.3% | 90% | 66% |

| Death within 28 days of positive COVID-19 test by date of death between week 32 and week 35 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 5 a | | | | | | | | | | | |
| Under 18 | 3 | - | 3 | - | - | - | - | | 0.0% | | |
| 18-29 | 18 | 1 | 13 | - | 1 | 3 | 4 | 46% | 17.6% | 38% | 75% |
| 30-39 | 45 | 2 | 31 | - | 4 | 8 | 12 | 64% | 18.6% | 29% | 87% |
| 40-49 | 93 | 3 | 54 | - | 9 | 27 | 36 | 80% | 30.0% | 38% | 89% |
| 50-59 | 191 | 3 | 100 | - | 17 | 71 | 88 | 86% | 37.8% | 44% | 90% |
| 60-69 | 332 | 7 | 115 | 2 | 14 | 194 | 210 | 92% | 59.7% | 65% | 88% |
| 70-79 | 580 | 2 | 129 | 1 | 20 | 428 | 449 | 95% | 74.0% | 78% | 85% |
| ≥80 | 1,119 | 7 | 155 | 3 | 26 | 928 | 957 | 94% | 83.5% | 89% | 68% |

| Death within 60 days of positive COVID-19 test by date of death between week 32 and week 36 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 5 b | | | | | | | | | | | |
| Under 18 | 3 | - | 3 | - | - | - | - | | 0.0% | | |
| 18-29 | 24 | 1 | 15 | 1 | 3 | 4 | 8 | 46% | 17.4% | 38% | 76% |
| 30-39 | 58 | 2 | 39 | - | 5 | 12 | 17 | 64% | 21.4% | 33% | 85% |
| 40-49 | 119 | 3 | 67 | - | 14 | 35 | 49 | 80% | 30.2% | 38% | 89% |
| 50-59 | 234 | 3 | 122 | - | 19 | 90 | 109 | 86% | 39.0% | 45% | 90% |
| 60-69 | 401 | 8 | 146 | 2 | 18 | 227 | 247 | 92% | 57.8% | 63% | 89% |
| 70-79 | 653 | 3 | 141 | 1 | 22 | 486 | 509 | 95% | 74.8% | 79% | 84% |
| ≥80 | 1,266 | 7 | 165 | 3 | 39 | 1,052 | 1,094 | 94% | 83.6% | 89% | 68% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

based on dose:
2

| Cases reported by specimen date between week 36 and week 39 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|---------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|------|
| Table 2 | Under 18 | 305,428 | 20,967 | 272,981 | 4,973 | 5,898 | 609 | 11,480 | | 0.2% | | |
| | 18-29 | 67,820 | 8,556 | 23,440 | 1,119 | 12,593 | 22,112 | 35,824 | 55% | 37.3% | 68% | 51% |
| | 30-39 | 81,532 | 7,534 | 21,449 | 690 | 7,468 | 44,391 | 52,549 | 67% | 60.0% | 89% | 27% |
| | 40-49 | 101,094 | 6,839 | 11,662 | 297 | 3,653 | 78,643 | 82,593 | 81% | 83.4% | 104% | -22% |
| | 50-59 | 70,731 | 4,668 | 5,144 | 89 | 1,464 | 59,366 | 60,919 | 87% | 89.9% | 103% | -32% |
| | 60-69 | 36,953 | 2,585 | 1,798 | 26 | 546 | 31,998 | 32,570 | 93% | 93.1% | 101% | -9% |
| | 70-79 | 22,142 | 1,367 | 693 | 6 | 207 | 19,869 | 20,082 | 95% | 95.6% | 101% | -15% |
| | ≥80 | 10,581 | 869 | 403 | 4 | 199 | 9,106 | 9,309 | 94% | 93.8% | 100% | 4% |

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 36 and week 39 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 3 | Under 18 | 486 | 20 | 455 | 3 | 7 | 1 | 11 | | 0.2% | | |
| | 18-29 | 348 | 6 | 241 | 6 | 35 | 60 | 101 | 55% | 17.5% | 32% | 83% |
| | 30-39 | 588 | 15 | 396 | 5 | 46 | 126 | 177 | 67% | 22.0% | 33% | 86% |
| | 40-49 | 769 | 15 | 388 | 9 | 46 | 311 | 366 | 81% | 41.2% | 51% | 83% |
| | 50-59 | 870 | 6 | 359 | 3 | 36 | 466 | 505 | 87% | 53.9% | 62% | 83% |
| | 60-69 | 963 | 8 | 274 | 4 | 29 | 648 | 681 | 93% | 67.9% | 73% | 83% |
| | 70-79 | 1,246 | 2 | 173 | 2 | 30 | 1,039 | 1,071 | 95% | 83.5% | 88% | 73% |
| | ≥80 | 1,421 | 2 | 125 | 1 | 34 | 1,259 | 1,294 | 94% | 88.7% | 94% | 50% |

| Death within 28 days of positive COVID-19 test by date of death between week 36 and week 39 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 4 a | Under 18 | 6 | 3 | 2 | 1 | - | - | 1 | | 0.0% | | |
| | 18-29 | 18 | 1 | 12 | - | - | 5 | 5 | 55% | 29.4% | 53% | 66% |
| | 30-39 | 38 | 2 | 29 | - | - | 7 | 7 | 67% | 19.4% | 29% | 88% |
| | 40-49 | 77 | 3 | 46 | - | 5 | 23 | 28 | 81% | 31.1% | 39% | 89% |
| | 50-59 | 238 | 6 | 113 | 1 | 12 | 106 | 119 | 87% | 45.7% | 53% | 87% |
| | 60-69 | 414 | 7 | 114 | - | 22 | 271 | 293 | 93% | 66.6% | 72% | 84% |
| | 70-79 | 786 | 3 | 127 | - | 22 | 634 | 656 | 95% | 81.0% | 85% | 78% |
| | ≥80 | 1,449 | 8 | 168 | 1 | 37 | 1,235 | 1,273 | 94% | 85.7% | 91% | 62% |

| Death within 60 days of positive COVID-19 test by date of death between week 36 and week 39 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-----|
| Table 4 b | Under 18 | 8 | 4 | 3 | 1 | - | - | 1 | | 0.0% | | |
| | 18-29 | 25 | 1 | 16 | - | 1 | 7 | 8 | 55% | 29.2% | 53% | 66% |
| | 30-39 | 49 | 3 | 34 | - | 1 | 11 | 12 | 67% | 23.9% | 36% | 85% |
| | 40-49 | 116 | 3 | 73 | - | 8 | 32 | 40 | 81% | 28.3% | 35% | 90% |
| | 50-59 | 305 | 7 | 146 | 1 | 15 | 136 | 152 | 87% | 45.6% | 52% | 87% |
| | 60-69 | 519 | 9 | 150 | - | 28 | 332 | 360 | 93% | 65.1% | 70% | 85% |
| | 70-79 | 938 | 4 | 147 | - | 29 | 758 | 787 | 95% | 81.2% | 85% | 77% |
| | ≥80 | 1,711 | 8 | 183 | 1 | 45 | 1,474 | 1,520 | 94% | 86.6% | 92% | 59% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

Vaccine Parameters England, week 40-43

COVID-19 vaccine surveillance report – week 44

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1031157/Vaccine-surveillance-report-week-44.pdf

| Cases reported by specimen date between week 40 and week 43 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|---------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-------|
| Table 2 | Under 18 | 397,484 | 23,778 | 336,893 | 20,041 | 15,954 | 818 | 36,813 | | 0.2% | | |
| | 18-29 | 75,211 | 7,955 | 24,097 | 701 | 8,809 | 33,649 | 43,159 | 56% | 50.0% | 90% | 20% |
| | 30-39 | 113,717 | 8,476 | 25,832 | 665 | 7,252 | 71,492 | 79,409 | 63% | 67.9% | 108% | -26% |
| | 40-49 | 159,478 | 8,580 | 15,717 | 291 | 4,204 | 130,686 | 135,181 | 75% | 86.6% | 115% | -113% |
| | 50-59 | 114,282 | 5,853 | 6,701 | 81 | 1,925 | 99,722 | 101,728 | 86% | 92.0% | 107% | -86% |
| | 60-69 | 63,474 | 3,353 | 2,484 | 23 | 835 | 56,779 | 57,637 | 90% | 94.4% | 105% | -94% |
| | 70-79 | 37,535 | 2,037 | 917 | 16 | 260 | 34,305 | 34,581 | 95% | 96.6% | 102% | -67% |
| | ≥80 | 14,043 | 1,002 | 471 | 7 | 224 | 12,339 | 12,570 | 94% | 94.6% | 101% | -12% |

based on dose:
2

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 40 and week 43 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 3 | Under 18 | 581 | 20 | 539 | 12 | 9 | 1 | 22 | | 0.2% | | |
| | 18-29 | 323 | 7 | 212 | 3 | 30 | 71 | 104 | 56% | 22.5% | 40% | 77% |
| | 30-39 | 665 | 9 | 425 | 5 | 37 | 189 | 231 | 63% | 28.8% | 46% | 76% |
| | 40-49 | 1,006 | 16 | 472 | 5 | 45 | 468 | 518 | 75% | 47.3% | 63% | 71% |
| | 50-59 | 1,233 | 18 | 474 | 1 | 51 | 689 | 741 | 86% | 56.7% | 66% | 79% |
| | 60-69 | 1,308 | 7 | 318 | 2 | 29 | 952 | 983 | 90% | 73.2% | 82% | 69% |
| | 70-79 | 1,802 | 5 | 198 | 3 | 32 | 1,564 | 1,599 | 95% | 87.0% | 92% | 61% |
| | ≥80 | 1,804 | 3 | 168 | - | 33 | 1,600 | 1,633 | 94% | 88.8% | 95% | 49% |

| Death within 28 days of positive COVID-19 test by date of death between week 40 and week 43 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 4 a | Under 18 | 6 | - | 6 | - | - | - | - | | 0.0% | | |
| | 18-29 | 9 | - | 7 | - | - | 2 | 2 | 56% | 22.2% | 40% | 77% |
| | 30-39 | 25 | 1 | 17 | - | 2 | 5 | 7 | 63% | 20.8% | 33% | 84% |
| | 40-49 | 73 | 1 | 37 | - | 1 | 34 | 35 | 75% | 47.2% | 63% | 71% |
| | 50-59 | 179 | 4 | 81 | - | 5 | 89 | 94 | 86% | 50.9% | 59% | 83% |
| | 60-69 | 420 | 3 | 118 | - | 14 | 285 | 299 | 90% | 68.3% | 76% | 75% |
| | 70-79 | 809 | 2 | 115 | - | 18 | 674 | 692 | 95% | 83.5% | 88% | 71% |
| | ≥80 | 1,564 | 4 | 157 | - | 45 | 1,358 | 1,403 | 94% | 87.1% | 93% | 57% |

| Death within 60 days of positive COVID-19 test by date of death between week 40 and week 43 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 4 b | Under 18 | 8 | - | 7 | - | 1 | - | 1 | | 0.0% | | |
| | 18-29 | 14 | - | 9 | - | - | 5 | 5 | 56% | 35.7% | 64% | 56% |
| | 30-39 | 38 | 2 | 24 | - | 3 | 9 | 12 | 63% | 25.0% | 40% | 80% |
| | 40-49 | 110 | 2 | 56 | - | 6 | 46 | 52 | 75% | 42.6% | 57% | 76% |
| | 50-59 | 241 | 4 | 104 | - | 7 | 126 | 133 | 86% | 53.2% | 62% | 82% |
| | 60-69 | 535 | 3 | 157 | - | 20 | 355 | 375 | 90% | 66.7% | 74% | 77% |
| | 70-79 | 980 | 4 | 131 | - | 23 | 822 | 845 | 95% | 84.2% | 89% | 69% |
| | ≥80 | 1,897 | 4 | 181 | 1 | 63 | 1,648 | 1,712 | 94% | 87.1% | 93% | 57% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

Vaccine Parameters England, week 43-47

COVID-19 vaccine surveillance report – week 48

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1037987/Vaccine-surveillance-report-week-48.pdf

based on dose:
2

| Cases reported by specimen date between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|---------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-------|
| Table 8 | Under 18 | 321,062 | 19,608 | 259,874 | 14,327 | 26,299 | 954 | 41,580 | | 0.3% | | |
| | 18-29 | 92,077 | 8,975 | 28,565 | 752 | 8,604 | 45,181 | 54,537 | 58% | 54.4% | 94% | 14% |
| | 30-39 | 132,341 | 9,517 | 28,705 | 598 | 7,203 | 86,318 | 94,119 | 64% | 70.3% | 110% | -33% |
| | 40-49 | 153,958 | 8,386 | 15,964 | 254 | 3,830 | 125,524 | 129,608 | 76% | 86.2% | 114% | -100% |
| | 50-59 | 115,113 | 5,584 | 7,335 | 122 | 1,908 | 100,164 | 102,194 | 87% | 91.4% | 106% | -67% |
| | 60-69 | 60,417 | 2,905 | 2,851 | 47 | 796 | 53,818 | 54,661 | 90% | 93.6% | 104% | -62% |
| | 70-79 | 21,911 | 1,306 | 1,059 | 11 | 205 | 19,330 | 19,546 | 95% | 93.8% | 99% | 12% |
| | ≥80 | 8,388 | 555 | 559 | 18 | 141 | 7,115 | 7,274 | 94% | 90.8% | 97% | 37% |

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 9 | Under 18 | 385 | 14 | 351 | 12 | 7 | 1 | 20 | | 0.3% | | |
| | 18-29 | 306 | 3 | 209 | 5 | 14 | 75 | 94 | 58% | 24.8% | 43% | 76% |
| | 30-39 | 577 | 4 | 351 | 4 | 44 | 174 | 222 | 64% | 30.4% | 47% | 75% |
| | 40-49 | 753 | 11 | 367 | 2 | 35 | 338 | 375 | 76% | 45.6% | 60% | 73% |
| | 50-59 | 1,115 | 12 | 408 | 3 | 30 | 662 | 695 | 87% | 60.0% | 69% | 77% |
| | 60-69 | 1,104 | 3 | 283 | 4 | 23 | 791 | 818 | 90% | 71.8% | 80% | 72% |
| | 70-79 | 1,234 | 3 | 223 | 2 | 17 | 989 | 1,008 | 95% | 80.3% | 85% | 76% |
| | ≥80 | 1,165 | 3 | 163 | 1 | 30 | 968 | 999 | 94% | 83.3% | 89% | 68% |

| Death within 28 days of positive COVID-19 test by date of death between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 10 a | Under 18 | 8 | 1 | 7 | - | - | - | - | | 0.0% | | |
| | 18-29 | 13 | - | 8 | - | 3 | 2 | 5 | 58% | 15.4% | 27% | 87% |
| | 30-39 | 35 | 2 | 24 | - | 3 | 6 | 9 | 64% | 18.2% | 28% | 88% |
| | 40-49 | 100 | 3 | 50 | - | 3 | 44 | 47 | 76% | 45.4% | 60% | 73% |
| | 50-59 | 264 | 5 | 107 | - | 12 | 140 | 152 | 87% | 54.1% | 62% | 82% |
| | 60-69 | 531 | 4 | 146 | - | 19 | 362 | 381 | 90% | 68.7% | 76% | 76% |
| | 70-79 | 1,002 | 6 | 164 | 1 | 13 | 818 | 832 | 95% | 82.1% | 87% | 73% |
| | ≥80 | 1,618 | 9 | 189 | 5 | 37 | 1,378 | 1,420 | 94% | 85.6% | 91% | 62% |

| Death within 60 days of positive COVID-19 test by date of death between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 10 b | Under 18 | 8 | 1 | 7 | - | - | - | - | | 0.0% | | |
| | 18-29 | 16 | - | 8 | - | 3 | 5 | 8 | 58% | 31.3% | 54% | 67% |
| | 30-39 | 45 | 2 | 29 | - | 3 | 11 | 14 | 64% | 25.6% | 40% | 81% |
| | 40-49 | 129 | 4 | 60 | - | 4 | 61 | 65 | 76% | 48.8% | 64% | 69% |
| | 50-59 | 325 | 6 | 133 | - | 15 | 171 | 186 | 87% | 53.6% | 62% | 82% |
| | 60-69 | 649 | 6 | 171 | - | 22 | 450 | 472 | 90% | 70.0% | 78% | 74% |
| | 70-79 | 1,172 | 8 | 177 | 1 | 19 | 967 | 987 | 95% | 83.1% | 88% | 71% |
| | ≥80 | 1,978 | 9 | 209 | 5 | 54 | 1,701 | 1,760 | 94% | 86.4% | 92% | 59% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

Vaccination Parameters England, week 32-47

Consolidated COVID-19 vaccine surveillance reports – week 36, 40, 44 and 48

<https://www.gov.uk/government/publications/covid-19-vaccine-weekly-surveillance-reports>

based on dose:

2

| Cases reported by specimen date between week 32 and week 47 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR | Unvax Pop | ARu | ARv | ARR | NNT | |
|--|----------|-----------|----------------|--|--|---|------------|---------|----------------------------|-----------------------------------|------|-----------|-----------|-------|-------|---------|-----|
| Table 8 | Under 18 | 1,191,806 | 80,254 | 1,011,424 | 47,473 | 49,517 | 3,138 | 100,128 | | 0.3% | | | | | | | |
| | 18-29 | 411,500 | 45,015 | 129,289 | 7,170 | 96,551 | 133,475 | 237,196 | 54% | 36.4% | 68% | 51% | 3,955,549 | 3.80% | 1.87% | 3.124% | 32 |
| | 30-39 | 440,963 | 37,979 | 109,972 | 3,450 | 44,357 | 245,205 | 293,012 | 65% | 60.8% | 94% | 15% | 2,673,840 | 4.62% | 3.94% | 1.103% | 91 |
| | 40-49 | 512,411 | 32,735 | 58,449 | 1,338 | 17,687 | 402,202 | 421,227 | 78% | 83.8% | 108% | -49% | 1,605,864 | 4.09% | 6.08% | -3.230% | 31 |
| | 50-59 | 384,614 | 22,973 | 26,732 | 460 | 7,545 | 326,904 | 334,909 | 86% | 90.4% | 105% | -48% | 1,014,388 | 2.94% | 4.34% | -2.279% | 44 |
| | 60-69 | 206,096 | 12,500 | 9,783 | 150 | 2,949 | 180,714 | 183,813 | 91% | 93.3% | 102% | -37% | 548,171 | 1.99% | 2.71% | -1.183% | 85 |
| | 70-79 | 107,087 | 6,744 | 3,579 | 45 | 945 | 95,774 | 96,764 | 95% | 95.4% | 101% | -16% | 252,615 | 1.56% | 1.81% | -0.409% | 245 |
| | ≥80 | 45,023 | 3,550 | 1,978 | 38 | 810 | 38,647 | 39,495 | 94% | 93.2% | 99% | 13% | 181,688 | 1.21% | 1.05% | 0.249% | 402 |

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 32 and week 47 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR | Unvax Pop | ARu | ARv | ARR | NNT | |
|--|----------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|-----------|-----------|-------|-------|--------|-------|
| Table 9 | Under 18 | 1,890 | 79 | 1,749 | 35 | 24 | 3 | 62 | | 0.2% | | | | | | | |
| | 18-29 | 1,561 | 30 | 1,049 | 31 | 165 | 286 | 482 | 54% | 18.7% | 35% | 80% | 3,955,549 | 0.03% | 0.01% | 0.035% | 2,855 |
| | 30-39 | 2,563 | 44 | 1,688 | 30 | 194 | 607 | 831 | 65% | 24.1% | 37% | 83% | 2,673,840 | 0.06% | 0.01% | 0.085% | 1,170 |
| | 40-49 | 3,311 | 56 | 1,724 | 33 | 161 | 1,337 | 1,531 | 78% | 41.1% | 53% | 80% | 1,605,864 | 0.11% | 0.02% | 0.141% | 711 |
| | 50-59 | 4,095 | 46 | 1,662 | 18 | 146 | 2,223 | 2,387 | 86% | 54.9% | 64% | 81% | 1,014,388 | 0.16% | 0.03% | 0.216% | 463 |
| | 60-69 | 4,321 | 25 | 1,203 | 17 | 114 | 2,962 | 3,093 | 91% | 68.9% | 76% | 78% | 548,171 | 0.22% | 0.05% | 0.280% | 357 |
| | 70-79 | 5,380 | 13 | 788 | 9 | 105 | 4,465 | 4,579 | 95% | 83.2% | 88% | 73% | 252,615 | 0.31% | 0.09% | 0.368% | 272 |
| | ≥80 | 5,536 | 9 | 600 | 3 | 132 | 4,792 | 4,927 | 94% | 86.7% | 92% | 58% | 181,688 | 0.33% | 0.14% | 0.314% | 319 |

| Death within 28 days of positive COVID-19 test by date of death between week 32 and week 47 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR | Unvax Pop | ARu | ARv | ARR | NNT | |
|--|----------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|-----------|-----------|-------|-------|-------|--------|
| Table 10 a | Under 18 | 23 | 4 | 18 | 1 | - | 1 | | 0.0% | | | | | | | | |
| | 18-29 | 58 | 2 | 40 | - | 4 | 12 | 16 | 54% | 21.4% | 40% | 77% | 3,955,549 | 0.00% | 0.00% | 0.00% | 77,746 |
| | 30-39 | 143 | 7 | 101 | - | 9 | 26 | 35 | 65% | 19.1% | 30% | 87% | 2,673,840 | 0.00% | 0.00% | 0.01% | 18,271 |
| | 40-49 | 343 | 10 | 187 | - | 18 | 128 | 146 | 78% | 38.4% | 49% | 82% | 1,605,864 | 0.01% | 0.00% | 0.02% | 6,359 |
| | 50-59 | 872 | 18 | 401 | 1 | 46 | 406 | 453 | 86% | 47.5% | 55% | 86% | 1,014,388 | 0.04% | 0.01% | 0.06% | 1,804 |
| | 60-69 | 1,697 | 21 | 493 | 2 | 69 | 1,112 | 1,183 | 91% | 66.3% | 73% | 81% | 548,171 | 0.09% | 0.02% | 0.12% | 844 |
| | 70-79 | 3,177 | 13 | 535 | 2 | 73 | 2,554 | 2,629 | 95% | 80.7% | 85% | 77% | 252,615 | 0.21% | 0.05% | 0.26% | 378 |
| | ≥80 | 5,750 | 28 | 669 | 9 | 145 | 4,899 | 5,053 | 94% | 85.6% | 91% | 62% | 181,688 | 0.37% | 0.14% | 0.37% | 269 |

| Death within 60 days of positive COVID-19 test by date of death between week 32 and week 47 2021 | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR | Unvax Pop | ARu | ARv | ARR | NNT | |
|--|----------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|-----------|-----------|-------|-------|-------|--------|
| Table 10 b | Under 18 | 27 | 5 | 20 | 1 | 1 | 2 | | 0.0% | | | | | | | | |
| | 18-29 | 79 | 2 | 48 | 1 | 7 | 21 | 29 | 54% | 27.3% | 51% | 68% | 3,955,549 | 0.00% | 0.00% | 0.00% | 73,499 |
| | 30-39 | 190 | 9 | 126 | - | 12 | 43 | 55 | 65% | 23.8% | 37% | 83% | 2,673,840 | 0.00% | 0.00% | 0.01% | 15,364 |
| | 40-49 | 474 | 12 | 256 | - | 32 | 174 | 206 | 78% | 37.7% | 48% | 83% | 1,605,864 | 0.02% | 0.00% | 0.02% | 4,619 |
| | 50-59 | 1,105 | 20 | 505 | 1 | 56 | 523 | 580 | 86% | 48.2% | 56% | 85% | 1,014,388 | 0.05% | 0.01% | 0.07% | 1,440 |
| | 60-69 | 2,104 | 26 | 624 | 2 | 88 | 1,364 | 1,454 | 91% | 65.6% | 72% | 81% | 548,171 | 0.11% | 0.02% | 0.15% | 662 |
| | 70-79 | 3,743 | 19 | 596 | 2 | 93 | 3,033 | 3,128 | 95% | 81.4% | 86% | 76% | 252,615 | 0.24% | 0.06% | 0.29% | 344 |
| | ≥80 | 6,852 | 28 | 738 | 10 | 201 | 5,875 | 6,086 | 94% | 86.1% | 92% | 60% | 181,688 | 0.41% | 0.16% | 0.40% | 250 |

Population England *1

| Age Group | 2021 |
|-----------|------------|
| < 18 | 12,018,314 |
| 18 - 29 | 8,546,763 |
| 30-39 | 7,545,227 |
| 40 - 49 | 7,217,366 |
| 50 - 59 | 7,479,359 |
| 60 - 69 | 6,176,575 |
| 70-79 | 4,811,724 |
| 80 + | 3,028,134 |
| | 56,823,462 |

Benefit Vaccination to 100% Vaccination rate (in relation to Death within 28 days)

= ARR x Unvax Population

| | |
|-----|--------------------------|
| 51 | |
| 146 | |
| 253 | |
| 562 | 1,012 for 18 - 59 |
| 650 | |
| 669 | |
| 676 | 1,994 for 60+ |

*2 ARR Factor: **1.625**

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

*1 From: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/january2021>

*2 To adjust the 16 week period to an ARR of an total outbreak period of 6 months

Vaccine Escape Ratios England, week 47-50

COVID-19 vaccine surveillance report – week 51

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043608/Vaccine_surveillance_report_-_week_51.pdf

based on dose:
2

| Cases reported by specimen date between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax Rate (V%) | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|---------|-----------|----------------|--|--|---|------------|---------------|----------------------------|-----------------------------------|-------|
| Table 8 | Under 18 | 395,335 | 25,523 | 312,528 | 8,990 | 46,126 | 2,168 | 57,284 | | 0.6% | | |
| | 18-29 | 257,526 | 23,829 | 51,992 | 1,693 | 16,198 | 163,814 | 181,705 | 60% | 70.1% | 117% | -58% |
| | 30-39 | 254,435 | 18,013 | 42,799 | 1,112 | 10,911 | 181,600 | 193,623 | 65% | 76.8% | 118% | -78% |
| | 40-49 | 230,670 | 12,518 | 22,244 | 471 | 5,117 | 190,320 | 195,908 | 76% | 87.2% | 114% | -113% |
| | 50-59 | 147,033 | 7,548 | 10,045 | 203 | 2,425 | 126,812 | 129,440 | 87% | 90.9% | 105% | -56% |
| | 60-69 | 58,233 | 3,449 | 3,747 | 91 | 948 | 49,998 | 51,037 | 90% | 91.3% | 101% | -13% |
| | 70-79 | 18,858 | 1,327 | 1,268 | 27 | 246 | 15,990 | 16,263 | 95% | 91.2% | 97% | 40% |
| | ≥80 | 9,067 | 695 | 714 | 16 | 160 | 7,482 | 7,658 | 95% | 89.4% | 95% | 51% |

| Cases presenting to emergency care (within 28 days of a positive test) resulting in overnight inpatient admission, by specimen date between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 9 | Under 18 | 648 | 21 | 578 | 8 | 34 | 7 | 49 | | 1.1% | | |
| | 18-29 | 492 | 14 | 272 | 3 | 37 | 166 | 206 | 60% | 34.7% | 58% | 64% |
| | 30-39 | 915 | 18 | 555 | 9 | 46 | 287 | 342 | 65% | 32.0% | 49% | 75% |
| | 40-49 | 1,128 | 10 | 580 | 9 | 38 | 491 | 538 | 76% | 43.9% | 58% | 76% |
| | 50-59 | 1,378 | 19 | 619 | 4 | 49 | 687 | 740 | 87% | 50.6% | 58% | 84% |
| | 60-69 | 1,284 | 19 | 499 | 6 | 47 | 713 | 766 | 90% | 56.4% | 62% | 86% |
| | 70-79 | 1,123 | 6 | 329 | 1 | 42 | 745 | 788 | 95% | 66.7% | 71% | 88% |
| | ≥80 | 1,222 | 2 | 261 | 3 | 25 | 931 | 959 | 95% | 76.3% | 81% | 81% |

| Death within 28 days of positive COVID-19 test by date of death between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 10 a | Under 18 | 4 | - | 3 | - | - | 1 | 1 | | 25.0% | | |
| | 18-29 | 14 | - | 9 | - | 1 | 4 | 5 | 60% | 28.6% | 48% | 73% |
| | 30-39 | 53 | - | 43 | - | 1 | 9 | 10 | 65% | 17.0% | 26% | 89% |
| | 40-49 | 113 | 3 | 60 | - | 4 | 46 | 50 | 76% | 41.8% | 55% | 78% |
| | 50-59 | 244 | 5 | 116 | 1 | 10 | 112 | 123 | 87% | 46.9% | 54% | 86% |
| | 60-69 | 453 | 5 | 141 | - | 9 | 298 | 307 | 90% | 66.5% | 74% | 79% |
| | 70-79 | 725 | 8 | 169 | 1 | 22 | 525 | 548 | 95% | 73.2% | 77% | 84% |
| | ≥80 | 1,350 | 13 | 241 | 4 | 37 | 1,055 | 1,096 | 95% | 78.9% | 84% | 78% |

| Death within 60 days of positive COVID-19 test by date of death between week 44 and week 47 2021 | | Total | Unlinked* | Not vaccinated | Received one dose (1-20 days before specimen date) | Received one dose, ≥21 days before specimen date | Second dose ≥14 days before specimen date | Vaccinated | Vax rate | Vax % of Total Cases (Cv%) | Relative Breakthrough Ratio (RBR) | RRR |
|--|----------|-------|-----------|----------------|--|--|---|------------|----------|----------------------------|-----------------------------------|-----|
| Table 10 b | Under 18 | 5 | - | 4 | - | - | 1 | 1 | | 20.0% | | |
| | 18-29 | 16 | - | 11 | - | 1 | 4 | 5 | 60% | 25.0% | 42% | 77% |
| | 30-39 | 67 | - | 50 | - | 1 | 16 | 17 | 65% | 23.9% | 37% | 83% |
| | 40-49 | 150 | 3 | 78 | - | 4 | 65 | 69 | 76% | 44.2% | 58% | 75% |
| | 50-59 | 314 | 5 | 139 | 1 | 13 | 156 | 170 | 87% | 50.5% | 58% | 84% |
| | 60-69 | 585 | 6 | 161 | - | 15 | 403 | 418 | 90% | 69.6% | 77% | 75% |
| | 70-79 | 951 | 9 | 186 | 1 | 31 | 724 | 756 | 95% | 76.9% | 81% | 81% |
| | ≥80 | 1,750 | 13 | 260 | 4 | 46 | 1,427 | 1,477 | 95% | 82.2% | 87% | 73% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

UK Health Security Agency - SARS-CoV-2 variants of concern and variants under investigation in England - Technical briefing 33

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043807/technical-briefing-33.pdf

Table 4. Number of Omicron cases admitted or transferred to hospital at the end of presentation to emergency care by vaccination status, England. Data to 20 December 2021

| Vaccination status | Count (n) | Percentage (%) |
|---|-----------|----------------|
| Unlinked* | 6 | |
| Not vaccinated | 27 | 21% |
| Received one dose (1 to 20 days before specimen date) | 1 | 1% |
| Received one dose, ≥21 days before specimen date | 7 | 6% |
| Second dose ≥14 days before specimen date | 74 | 59% |
| Third dose or Booster ≥14 days before specimen date | 17 | 13% |
| | | 79% |

* Individuals whose NHS numbers were unavailable to link to the National Immunisation Management System.

| | | | | |
|------------------|------------|----------|----------|--------------------|
| | | 1st Dose | 2nd Dose | 3rd Dose / Booster |
| Vaccination Data | 20/12/2021 | 89.6% | 81.9% | 52.0% |

<https://coronavirus.data.gov.uk/details/vaccinations>