COVID-19 and ethnic minorities: a triple risk?

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Summary

Many ethnic minorities have suffered disproportionately from COVID-19: the spread of infection has been higher, and survival from COVID-19 has been lower per infection. Last year, the impact of COVID-19 on some ethnic minorities in terms of deaths per person in England was around 150% what it was for the White population.

Now with vaccine roll-out under way, that relationship may be exacerbated by a third aspect: lower vaccine take-up in ethnic minorities. The already high 150% differential more than doubles to a differential of over 300% (given our knowledge to date of vaccine take-up rates).

Failure to unlock the full preventative benefits of the vaccine across society represents a considerable lost opportunity: COVID-19 deaths in ethnic minority groups are falling, but they could be falling more.

Introduction

Last year the pandemic presented us with a 'two-stage' problem: how to manage the risk of infection and how to manage the mortality risk for those infected. The infection risk was managed via non-pharmaceutical interventions; the mortality risk for COVID-19 was tackled through continuous learning in (primarily) hospitals, and we saw a significant improvement in treatment success (as we described here).

The arrival of vaccines presents us with hope for some form of return to normality. However, there is now an extra stage to manage to achieve success: the vaccination process itself. We can consider how these three stages combine for ethnic minorities, using data from England[1] (where the vaccination take-up data relates to older age groups).

The original two-stage problem: infection and mortality

It has been clear for some time that many ethnic minorities have suffered disproportionately. Not only has the spread of infection been worse, but the survival rate from COVID-19 has been lower. Clearly these two factors combine to make the overall impact worse: more infections, and more deaths per infection.

Infection

The REACT-1 round 9 report by the Imperial College London team (link) showed infection prevalence of 0.45% for Whites, with minority ethnic groups around twice that (Asian 0.9%, Black 0.8%). (The figures quoted here are weighted to better represent national population mix, given that ethnicity proportions in England vary by age; the unweighted figures show an almost identical relationship.)

Focusing on those infections serious enough to warrant hospitalisation, the statistics released by ICNARC show a broadly similar doubling of risk. Ethnic minorities represented 34% of admissions before 31 August 2020, 28% since then (from Table 1 of the ICNARC 19 March 2021 report), but represent only 14% of the national population (link).

Mortality

A report on disparities in COVID-19 outcomes published by the ONS in August 2020 showed the following, from a multifactor analysis of around 28,000 deaths. The table shows the three non-White ethnic groups suffering the highest number of deaths, compared with the White reference point.

Ethnic group	Mortality odds ratio	Confidence interval
White	1.0 (base level)	n/a
Indian	1.2	1.13 – 1.32
Caribbean	1.1	1.02 – 1.19
Pakistani	1.4	1.31 – 1.58

The analysis underlying the results above allowed for age, sex, deprivation and region. Thus the 'odds ratio' describes the relative probability of death (relative to the White group) for equality of age, sex, deprivation and region – i.e. a broadly 'like for like' comparison .

Overall

The overall (combined infection and post-infection mortality) risk is well quantified in the OpenSafely study, which analysed 17.5 million electronic health records, cross-indexed with known COVID-19 deaths (totalling 15.6 thousand here). This showed the following risk differentials:

Ethnic group	Mortality odds ratio	Confidence interval
White	1.0 (base level)	n/a
South Asian	1.4	1.29 – 1.51
Black	1.5	1.31 – 1.66

The analysis underlying the results above allowed for age, sex, and deprivation.

The above mortality odds ratios should be compared with normal (all-cause, non-COVID-19) mortality. Analyses of all-cause mortality by ethnicity in the UK are surprisingly rare, but the OpenSafely analysis also provides mortality odds ratios for non-COVID-19 mortality. For the ethnic groups shown above, these odds ratios are between 0.7 and 0.8, i.e. a lower risk of mortality. We can be confident, therefore, that the relationship of COVID-19 mortality for these ethnic groups compared with Whites is materially above the equivalent non-COVID-19 mortality relationship.

The third stage: vaccination

We are fortunate to have a third stage to consider: vaccination to prevent infection and death. Initial concerns were around efficacy, the extent to which that would translate into real-world effectiveness, and the extent to which vaccines would also reduce infection and transmission risk. Results in all of those respects are good (albeit with question marks around how the vaccines fare against some of the recent variants). The logistical challenges of production, sourcing and distribution have also been well surmounted in many countries.

However, a new concern has arisen: low take-up rates. The problem is particularly concerning in this context because take-up rates are low in some of the ethnic groups mentioned above. This increases the risk of COVID-19 for these groups relative to the White population: we have greater prevalence of infections, lower survival for those infected, *and* lower take-up of vaccines.

Using the results published regularly by the OpenSafely platform, we can calculate the following summary figures (based on vaccination data up to 24 February 2021) for all ages 70 and above:

Ethnic group	Eligible	Vaccinated	%
BAME	126,448	96,684	76%
White	2,187,857	2,315,845	94%

(These numbers relate to those General Practices which use the TPP electronic health record system, and there are a number of systems in use.)

The 'BAME' grouping above consists of the OpenSafely categories 'Black', 'Mixed', 'Other' and 'South Asian'. Vaccination take-up rates across these groups vary somewhat from the average of 76% above. The overall range is broadly 65% - 80% (with the larger ethnic groups having take-up rates at the top of the range).

Mortality impact of low vaccine take-up

We can estimate the mortality impact of lower vaccine take-up by using the earlier 'Ethnic minority to White' COVID-19 mortality ratio. To keep the numbers simple, we take from the previous sections the following rounded summary figures:

Ethnic group	Mortality odds ratio	Vaccination proportions
BAME	1.5	75%
White	1.0	95%

As we are interested in the relationship between groups, we look at COVID-19 mortality (allowing for both infection and post-infection mortality) in relative terms via the odds ratio rather than in absolute terms.

From these assumptions, we can see how vaccination take-up affects the relationship through the following calculation steps:

- split the two groups into vaccinated and unvaccinated subsets;
- assume vaccine effectiveness of 90% in respect of mortality (in line with much of the research across different vaccines, and assuming this is constant by ethnicity);
- apply the 90% vaccine effectiveness to reduce the mortality impact for vaccinated groups appropriately (i.e. by a factor of 10% – so for instance, the mortality odds ratio of 1.5 becomes 0.15 post-vaccine).

Ethnic group	Vaccine?	Adjusted mortality odds ratio	Vaccination proportions	Average mortality odds ratio
BAME	Yes	0.15	75%	0.488
	No	1.5	25%	
White	Yes	0.1	95%	0.145
	No	1.0	5%	

We see that the different vaccine take-up in the two groups increases the overall mortality differential substantially. What was previously a mortality ratio of 1.5 becomes 'post-vaccine rollout' a ratio of 3.36 (comparing 0.488 with 0.145).

For this calculation we used a starting assumption of 1.5 but in reality this starting position differs by ethnicity (within the BAME category). However, the simple calculation here does indicate the materiality of this 'triple-risk' challenge which more than doubles the previous mortality risk comparison.

It should be noted that we are considering the *relative relationship* between the mortality of distinct groups. The wider context is that COVID-19 mortality for both groups is decreasing rapidly. Much of the decrease is due to the general success of the vaccination program. So while the vaccines are clearly helping us to 'win' overall, we are witnessing a failure to apply the full benefits of the vaccine across all parts of society.

The analysis above looked at disparities in vaccine take-up in older age groups, and we do not know what disparities may emerge at younger ages. Although the young exhibit a much lower mortality risk from COVID-19, they pose a high transmission risk. Evidence that vaccines reduce infection and transmission risk makes it important to reduce disparities in vaccine take-up in younger ages.

Conclusion

Lower vaccine take-up rates in ethnic minorities compound an adverse mortality impact. In round numbers, the already high 150% mortality differential (ethnic minorities compared with Whites) more than doubles to a differential of over 300% based on recent vaccine take-up data. This represents a considerable lost opportunity: COVID-19 deaths in these ethnic minorities are falling, but they could be falling more.

As we have noted in a previous bulletin, vaccine hesitancy is much more than just a question of an individual saying 'no'. There are many dimensions, many of which operate at a societal rather than individual level – for instance, barriers to vaccine access, or the dissemination of misinformation. Low vaccine take-up in any group represents a missed opportunity, but in a group which already exhibits above-average mortality from COVID-19, it is clearly something that requires as much focus now as did the development of vaccines in the first place.

There is an opportunity here not just to further decrease deaths from COVID-19, but also increase trust and confidence across society that the health system works for all. In the preventative context of vaccines, this requires considering and addressing potential health inequalities early.

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[1] *Some of the data sources referenced refer to England only, some to England & Wales. The slight inconsistency does not affect our conclusions.*