

Where's the herd immunity? Our research shows why Covid is still wreaking havoc

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'Living with the virus' is proving much harder than the early vaccine success suggested: this fight is far from over

- Danny Altmann is a professor of immunology at Imperial College London

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We are all so very tired of Covid-19, and there are many other crises to wrestle with. This pandemic has been going on since the beginning of 2020, and a state of hypervigilance can only be maintained for so long. And yet, "just live with it" looks self-evidently too thin a recipe and, currently, not very workable or successful with the [emergence](#) of BA.4 and BA.5 Omicron subvariants.

According to the latest numbers, released today, the UK added more than half a million new Covid infections in the past week, and the estimated number of people with Covid in total was somewhere between 3% and 4% of the population.

Many have been rather unwell and off work or school, with the associated disruptions to education, healthcare and other vital services. These infections will also inevitably add to the toll of long Covid cases. [According to ONS data](#), the supposedly "mild" waves of Omicron during 2022 have brought more than 619,000 new long Covid cases into the clinical caseload, promising an enduring and miserable legacy from this latest phase.

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Rather than a wall of immunity arising from vaccinations and previous infections, we are seeing wave after wave of new cases and a rapidly growing burden of long-term disease. What's going on? The latest scientific research has some answers.

During May and June two new variants, BA.4 and BA.5, progressively displaced the previous Omicron subvariant, BA.2. They are even more transmissible and more immune-evasive. Last week a group of collaborators, including me and a professor of immunology and respiratory medicine, Rosemary Boyton, [published](#) a paper in Science, looking comprehensively at immunity to the Omicron family, both in triple-vaccinated people and also in those who then suffered breakthrough

infections during the Omicron wave. This lets us examine whether Omicron was, as some hoped, a benign natural booster of our Covid immunity. It turns out that isn't the case.

We considered many facets of immunity, including the antibodies most implicated in protection (“neutralising antibodies”), as well as protective “immune memory” in white blood cells. The results tell us it is unsurprising that breakthrough infections were so common. Most people – even when triple-vaccinated – had 20 times *less* neutralising antibody response against Omicron than against the initial “Wuhan” strain. Importantly, Omicron infection was a poor booster of immunity to further Omicron infections. It is a kind of stealth virus that gets in under the radar without doing too much to alert immune defences. Even having had Omicron, we're not well protected from further infections.

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Also, to be added to the now complex mix is “immune imprinting”. This is the finding that our immune response to Covid is shaped very differently, depending on our prior exposures – infection in one wave relative to another, plus vaccination. In our study, those who'd been infected in the first wave and then again with Omicron had particularly poor T-cell responses and no boosting of antibodies. That is, some combinations of exposures may leave us poorly protected relative to others.

Contrary to the myth that we are sliding into a comfortable evolutionary relationship with a common-cold-like, friendly virus, this is more like being trapped on a rollercoaster in a horror film. There's nothing cold-like or friendly about a large part of the workforce needing significant absences from work, feeling awful and sometimes getting reinfected over and over again, just weeks apart. And that's before the risk of long Covid. While we now know that the risk of long Covid is somewhat reduced in those who become infected after vaccination, and also less in those from the Omicron than the Delta wave, the absolute numbers are nevertheless worrying.

Not having got long Covid after a prior infection in the earlier waves offers no guarantee against getting it this time. As an immunologist struggling to decode long Covid mechanisms and potential treatments, it is both perplexing and not a little devastating that this mysterious, lingering disease finds a way to continue wreaking havoc in the face of a largely vaccinated population and a supposedly milder variant. There's an ever-growing cohort of rather desperate long-haulers, many now affected for well over two years, starting to have difficult legal conversations about medical early retirement and personal independence payment support.

They need answers, treatments – and to know that we take the situation sufficiently seriously to stop creating more cases.

Yes, the number of Covid cases in the UK is rising – but that is no cause for alarm

Matt Hancock

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The first generation of vaccines served brilliantly to dig us out of the hole of the first year, but the arms race of boosters versus new variants is no longer going well for us. The UK has only offered a limited group fourth doses, and even then, uptake looks poor. Even if we had good vaccination coverage, we have entered a period of diminishing returns. A study reported in the BMJ last week showed us that the protection gained from a fourth booster dose likely wanes even faster than previous boosters. This leaves us between a rock and a hard place: continue to offer suboptimal boosters to a population who seem to have lost faith or interest in taking them up, or do nothing and cross our fingers that residual immunity might somehow keep a lid on hospitalisations (as happened in South Africa and Portugal).

There is massive activity to develop second-generation vaccine options that might do better – including variant-specific vaccines or “pan-coronavirus” vaccines. While there are promising lab studies on these, we lack the evidence comparable to the huge, first-generation trials that inspired confidence during 2020. Conducting trials has become much harder as we struggle to keep pace with the emergence of new subvariants.

From where I stand, “living with the virus” is proving hard for many. This fight is far from over, and learning how to pull this off is an active process requiring considerable effort, intervention and ingenuity.

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