Covid-19 and immunity: questions answered

1.Will a Covid infection protect me from getting ill with Covid again?

A large percentage of the population has now been infected two or more times with Covid. Mass infection gives the virus plenty of opportunity to mutate. Every time the virus mutates there is the possibility of a new variant emerging which is able to evade our antibodies (whether from prior infection or vaccine). The more the new variant evades antibodies, the faster it spreads. Children are less likely than adults to produce antibodies, and this may put them at greater risk of frequent reinfections.

Covid vaccination offers strong (albeit not 100%) protection from ending up in hospital or dying after a breakthrough infection. The same is not true for Covid infections. Previous Covid infection does not protect us from becoming seriously ill, even dying, if we get a further Covid infection. A large US study of army veterans published in November showed: "*Cumulative risks and burdens of repeat infection increased according to the number of infections…Reinfection further increases risks of death, hospitalization and sequelae in multiple organ systems in the acute and postacute phase*." It also increased the risk of other Long Covid symptoms. After a painstaking analysis of their results, the authors conclude "*Prevention of infection and reinfection with SARS-CoV-2 should continue to be the goal of public health policy*."

Data collected and analysed by Long Covid Support and Long Covid Kids shows that the majority of people already suffering from Long Covid suffer worse symptoms if they get reinfected. And most of those who had previously recovered from Long Covid relapse when infected again.

2.Is it true that by getting fewer infections in 2020 and 2021 as a result of less mixing, adults and especially children have developed an "immunity debt", causing them to get sick more often and worse now than would have been the case otherwise?

The term 'immunity debt' keeps being mentioned in the media as a supposed explanation for the surge in infectious illnesses. Let's untangle this….

The term first appeared in scientific literature in August 2021, when a team of French scientists warned: "*we may witness strong pediatric epidemic*

rebounds once personal protection measures are lifted." The authors hypothesised that children had been exposed to less viruses and bacteria, and would be more prone to illness because of a "*lack of immune stimulation*". The term has been used widely ever since, generally by those who oppose any mitigations against Covid, especially in schools.

Although the term itself is new, the idea stems from what has been called the "hygiene hypothesis", which was first proposed by David Strachan in 1989. Strachan's theory was that the increase in allergies might be due to lower rates of infections in early childhood. However, such a link was never actually proven, and the theory came under growing criticism. According to the authors of a peer-reviewed article from 2016, babies and children acquiring a healthy 'microbiome', i.e. beneficial microorganisms that form part of all of our bodies, may well be vital for reducing risks of allergies, but this is an argument for supporting mothers to breastfeed, for enabling children to spend time outdoors, and for allowing all children to have a healthy diet. It is not an argument for exposing children to infections.

Yet proponents of a so-called "immunity debt", supposedly caused by children having been shielded from infections for several months early on in the Covid pandemic, seem to be reviving this previously debunked idea.

3.Is it true that common respiratory viruses are circulating at higher rates now, compared to pre-Covid years?

Across many countries that abolished all Covid mitigations in 2022, high rates of child hospitalisations are being reported. This has been happening not just in the UK but in many different countries, including in Germany). Anecdotally, many people, especially parents, have been reporting a run of infections in their families worse than anything they have experienced before. Then, in December 2022, hospitals across the UK and other countries became overwhelmed by a simultaneous surge in Covid and flu. Flu rates, including hospitalisations, were higher than during the two years preceding Covid, but still slightly below the peak in 2017/18.

Public Health Scotland and equivalent English data do not suggest that other respiratory viruses have been circulating at unusually high rates.

So why are so many reporting having been ill with respiratory symptoms again and again in recent months? So-called 'anecdotal evidence'

represents people's lived experience, even if it has not been statistically evaluated. It should guide scientists, not be ignored by them.

There is no community testing for any viruses now, and there are no over-the-counter rapid tests for viruses other than Covid. In theory, it is possible that hospital test results (which include testing for common cold viruses for research purposes) do not reflect the spread of different viruses circulating in communities. However, there are two other, more likely reasons:

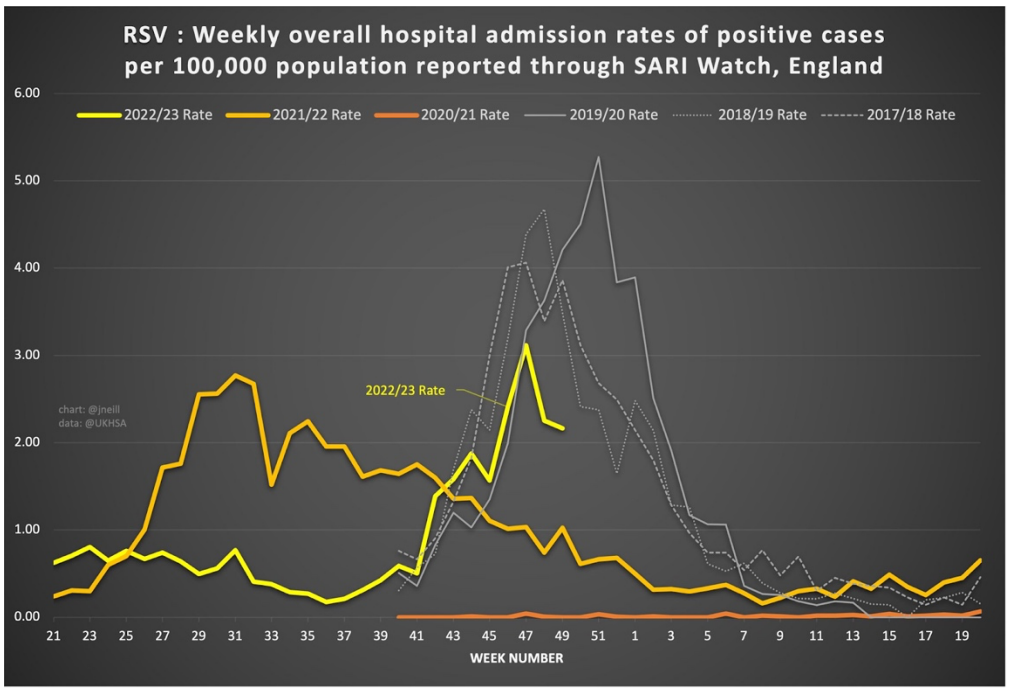
1. Undiagnosed Covid infections, with false negative lateral flow tests, especially if people only swab their noses

2. Suppression of immunity to other viruses by previous Covid infections (see Question 8)

4. What about respiratory virus infections which get admitted to hospitals?

People hospitalised due to respiratory viruses (not including Covid) are generally hospitalised either with RSV (Respiratory Syncytial Virus) or with influenza. RSV causes bronchiolitis mostly in young children but also in elderly people.

In summer 2021, after most Covid mitigations were taken away across the UK, there was alarm about an unprecedented summer and autumn wave of child infections with RSV, a virus that normally spreads during the winter. However, the 2021 wave of RSV subsided before winter set in. Considering 2020 and 2021 together, lockdown and Covid mitigations during the first year resulted in far less children being hospitalised overall. In 2022, the RSV wave once again happened earlier in the year, but once again started falling much sooner than would previously have been the case. The 2022/23 RSV wave in England (similar to that in Scotland) looks set to be smaller than that during any of the three winters prior to the Covid pandemic as far as hospitalisations are concerned.

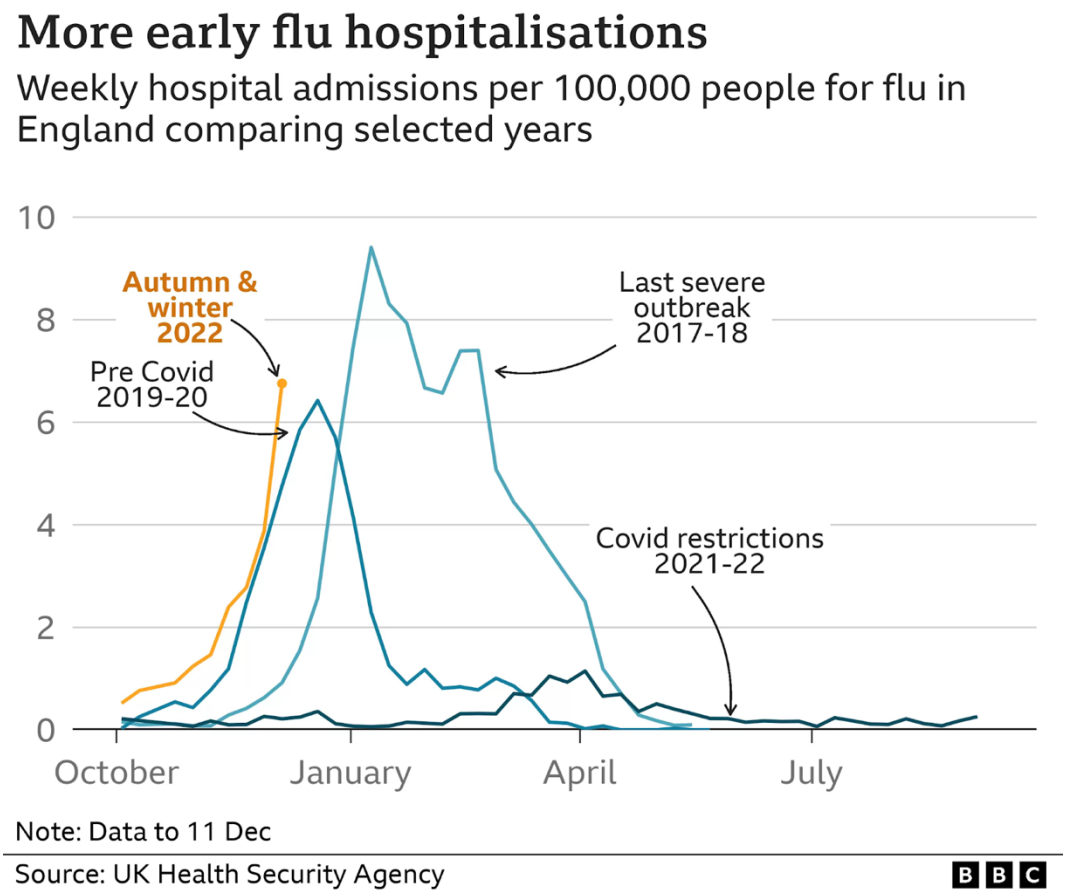


twitter.com/jneill/status/1604480019018878976?cxt=HHwWgMCo7fGEocQsAAAA *(Note: RSV levels have continued to fall since according to UKHSA data)*

The same, that is a different seasonal pattern for RSV infections but no overall rise, was reported in several other states or countries that removed Covid mitigations in 2021 or 2022, such as California. On the other hand, in Denmark there is evidence of an overall increase in hospitalisations from RSV in 2022, but one affecting mostly babies born after mitigations were taken away, or older children, who would likely have had RSV when they were younger. Also, an unusually large number of RSV hospitalisations amongst children is being reported from Sweden. It is not clear how many of those children were hospitalised with simultaneous RSV and Covid infections.

The rate of flu infections remained very low in the winter of 2021/22 due to Zero Covid policies in much of East Asia and in Australia and New Zealand throughout 2021. Australia's 2022 flu wave started and subsided earlier than expected, rather than being unusually severe overall.

In the UK, too, the 2022/23 flu season started earlier than had been the case pre-Covid. As of late December 2022, it is clear that the flu wave is larger than in the two years preceding Covid, but not clear that it will end up equal to or worse than the flu wave of 2017/18.



How severe different flu waves are certainly depends on prior immunity - and specifically on how effective the type and take-up of flu vaccines are. According to a Public Health Scotland spokesperson, there is concern that flu hospitalisations may be linked to a flu strain "*believed to have mutations that could make vaccines less protective*".

Of course, people are now being infected with Covid on top of all the viruses that were circulating previously, and many are contracting Covid several times a year.

There is strong evidence that people fare worse if they are simultaneously infected with flu and Covid. The absence of any mitigations against airborne viruses (Covid, flu, RSV, etc.), and rampant cross-infection in hospital and care settings, make simultaneous infections much more likely, causing more deaths and hospitalisations.

5.Is it true that children were largely protected from viruses during 2020 and 2021?

In Scotland, most children did not attend school between late March 2020 and the end of the summer holidays (August 2020) and from January until March 2021. However, other than advice to open windows more often, no mitigations against airborne transmission of Covid were ever implemented in Scottish primary schools, although secondary school pupils were advised to wear cloth or surgical face masks (less effective than FFP2 masks) in class between October 2020 and February 2022. Except when schools were closed, Covid infection rates were significantly higher in children than in adults during 2021 and early 2022 (after which free Covid tests were withdrawn). Anecdotally, parents reported many children getting colds as soon as they returned to school in summer 2020. As referred to above, RSV infections in children were rampant in 2021. Except for flu not having been widespread in 2020 and 2021, it is simply not true that children overall were not exposed to viruses for a year or longer.

6.Is there any evidence that children exposed to many different viruses early in life have a better immune system?

There is a good bit of data about what happens when young children are not exposed to many viruses early on. Much of this comes from pre-Covid comparisons of children who start nursery as babies or toddlers, and children who are not enrolled in group child care until they are older, if at all. Unsurprisingly, children are particularly prone to infections in the early months after they start mixing with larger groups of children, regardless of their age at the time. Thus, a 3-year-old who goes to the nursery for the first time is likely to get more colds or other bugs at that time than a 3-year-old who has been at nursery for a year or two already.

Moreover, the authors of a Danish study based on data of children born between 1997 and 2014 up until the age of 20, made another discovery: being enrolled in group childcare and thus exposed to infections early on is linked to a “modest increase” in the average number of times a child has to be prescribed antibiotics throughout their childhood.

Also from Denmark, we have good evidence as to what happened to the cohort of children who were babies in 2020/21, the winter with a very low rate of RSV due to Covid protections: they are less likely to have been

hospitalised with RSV since Covid mitigations were removed compared to babies born in 2022.

The short answer to this question appears therefore to be ‘no’.

7.What about scarlet fever?

Scarlet fever is caused by a bacterium called Group A Streptococcus, which causes a range of other illnesses, too. Most worryingly Group A Streptococcal infection can cause (albeit rarely) “invasive Group A Strep” (iGAS), which is life-threatening. Large numbers of children died from scarlet fever before penicillin became available in the UK in 1946.

In England, reported cases of scarlet fever increased gradually between 2014 and 2019. This appears to be due to mutations in the bacterium. Note that scarlet fever is not a notifiable disease in Scotland, though it is in England and Wales. Hence there is little Scottish data.

The number of scarlet fever cases reported in England and Wales during November and December 2022 is far beyond what would have been normal pre-Covid. Wales, for example, reported 35 times more scarlet fever during the second week of December compared to the same week in 2019. Unusually high rates of scarlet fever and iGAS have also been reported in France, Ireland, the Netherlands, and Sweden.

Could those bacterial diseases be spreading more because we had Covid lockdowns and mitigations in the past - or might people be more at risk because they’ve been previously infected with Covid?

Some proponents of “immunity debt” argue that the unusual Group A Streptococcal outbreak is caused by lower immunity in children who were not infected with the bacterium in 2020/21 and/or by unusually high rates of respiratory viruses which make secondary bacterial infections more likely.

The idea of children having missed out on Group A Streptococcal infections during Covid mitigations makes little sense, given that there is no immunity to scarlet fever, - having had it once does not protect children from getting it again.

It’s possible that the apparent current surge of respiratory virus infections in communities could explain the simultaneous surge in scarlet fever. But it’s also possible that mass Covid infections are a significant causal factor. There hasn’t yet been enough research on which to base an answer to these two questions.

It's well known that viral infections make bacterial infections more likely, either because they happen at the same time or because they develop afterwards when the immune system is less able to fight off bacterial infections, especially in young children and elderly people. Thus, the vast majority of deaths from flu are actually deaths from secondary bacterial infections. Interestingly, a common non-SARS coronavirus has been linked to pneumonia caused by streptococcal infection.

Researching a possible link between Covid infections and scarlet fever (as well as other streptococcal infections) should be a priority.

8. Is there evidence that Covid can mess up people’s immune system so that it doesn’t work properly, over and above the fact that all types of viral infections can lead to bacterial infections in some people?

Yes, there is. For example, a 6-months long study of immune responses identified in the blood of 69 people, most of them suffering from Long Covid, showed significant falling away of immune responses throughout that period. These changes were most marked in those with Long Covid.

The US-based Autoimmunity Registry has included Long Covid on its list of autoimmune diseases based on “biomarkers of immune system activity”.

But in addition significant negative changes to people’s immune system following Covid infection, at least temporarily, have also been found in blood taken from people who did not consider themselves to have Long Covid.

Frequent, including recurrent infections, worse than usual symptoms from a common cold virus, and secondary bacterial infections, are typical signs of an immune system that is not functioning as it should. This makes it all the more important to pay attention to the anecdotal evidence of families reporting “almost constant colds” discussed under Question 3.