Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

therefore underestimate the real level of protection, as cellular immunity was not included. In this sense, low antibody concentrations do not necessarily correspond to a lack of protection. However, these are the best data available so far and, if correctly used, could be very useful in the assessment of future public health decisions. Meanwhile, we are waiting for new scientific evidence on the degree of protection via cellular immunity, in people without detectable antibodies.

Data retrieved in this systematic review are from healthy individuals. Thus, it is reasonable to suppose a lower response (such as lower immunogenicity and shorter duration of protection) in individuals with underlying health conditions. Therefore, attention should be paid to identify and protect these target groups.

Standardisation of serological tests for immunity is also desirable. The definition of a gold-standard cutoff level of seropositivity for protection against measles, mumps, and rubella will allow results that are comparable between laboratories and countries to be obtained, and reliable sero-epidemiological profiles of the population to be established,[7] to identify susceptible individuals to whom prevention activities should be addressed.

In the past 10 years, vaccine hesitancy has led to a decrease in the uptake of the MMR vaccine. At present, a further issue to consider is the impact of the current COVID-19 pandemic on vaccination. During this emergency, a general reduction of immunisation coverage is expected worldwide, as shown by preliminary data registered in the USA.[8] In the near future, if these negative trends are confirmed, we can foresee an increase in vaccine-preventable infectious diseases. This concern should be kept in mind when planning future catch-up campaigns to immunise individuals who missed vaccinations during the COVID-19 pandemic.

Because of the aforementioned issues, effective organisation of public health initiatives becomes much more important in each country, to protect susceptible individuals and difficult-to-reach populations. In particular, health-care workers should ensure that they correctly communicate the effectiveness of the MMR vaccine to the general population.[9]

Therefore, in the future, we must reconsider the current MMR immunisation strategies, on the basis of the relevant data on primary and secondary vaccine failure, as reported by Schenk and colleagues.

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Concerns and motivations about COVID-19 vaccination

More than 200 COVID-19 vaccines are in development worldwide, with governments securing deals to access advance doses. But access is only one issue. Willingness to accept a COVID-19 vaccine when it becomes available has varied considerably across countries over the course of the pandemic. In *The Lancet Infectious Diseases*, we presented data collected in Australia in April, 2020,[1] which suggested 86% of people surveyed (3741 of 4362) would be willing to vaccinate against COVID-19 if a vaccine became available. Furthermore, the COCONEL group[2] showed in March, 2020, that 74% of French citizens would vaccinate. Between April and July, 2020, willingness to vaccinate has ranged from 58% in the USA[3] to 64% in the UK[4] and 74% in New Zealand.[5] The New Zealand data showed that the most commonly reported reasons to get vaccinated were to protect

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family and self, with safety being the chief concern about the vaccine. It is important to investigate both motivations and concerns about a future COVID-19 vaccine to help shape communication strategies.

In the latest two surveys from an Australian longitudinal study,[1] participants in June and July, 2020, were asked to respond on a seven-point Likert scale to the statement "If a COVID-19 vaccine becomes available, I will get it" (strongly agree, agree, somewhat agree [yes], neither agree nor disagree (indifferent), and somewhat disagree, disagree, strongly disagree [no]). In June, 2020, 87% (1195 of 1371) of the sample said they would get the COVID-19 vaccine if it became available; in July, 2020, this percentage was 90% (1144 of 1274), a slight increase of 1·91% (95% CI 0·08–3·73; p=0·030, McNemar's test of paired proportions, n=997).

See Online for appendix

The appendix (pp 1–2) presents results of a content analysis[6] showing the most common reasons for willingness or reluctance to get a COVID-19 vaccine, including example free-text responses. The top three reasons across the two surveys for agreeing to vaccinate were "to protect themselves and others" (29% [817 of 2859]), "belief in vaccination and science" (16% [448 of 2859]), and "to help stop the virus spread" (15% [419 of 2859]). Willingness to vaccinate differed by both age (June, p<0·0001; July, p=0·0012) and education (June, p<0·0001; July, p=0·0003; appendix p 3). For those who were indifferent (June, 7% [102 of 1371]; July, 5% [59 of 1274]) or said they would not get the vaccine (June, 5% [74 of 1371]; July, 6% [71 of 1274]), the top reasons across the two surveys were "concern about the safety of the vaccine in its development" (36% [139 of 388]) and "potential side effects" (10% [38 of 388]). Importantly, among people who were willing to vaccinate, some hesitancy was noted regarding safety of the vaccine (11% [311 of 2859]).

These findings are important because they highlight some of the determinants of willingness to accept a COVID-19 vaccine if one becomes available. Concerns are not surprising since vaccine development can take 10–15 years.[7] The vaccine development process must be transparent to increase public trust in safety and effectiveness, even for those who are already willing to vaccinate. Involving vaccine communication experts and the public in developing messaging and long-term vaccine strategy is crucial, and governments worldwide should begin preparing these strategies imminently.[8] A prioritisation framework proposed by health economists might aid with the development of these strategies.[9]

With the Australian Government aiming for 95% uptake of the COVID-19 vaccine, communication formats used to inform members of the public about a vaccine should be suitable for people with low health literacy and education and appropriate for culturally and linguistically diverse groups and Indigenous populations.[1] Primary-care doctors are likely to be at the forefront of education and administration of a COVID-19 vaccine.[10] Since these doctors are a trusted source, it is important that they are supported in delivering recommendations about the COVID-19 vaccine while alleviating concerns, if we are to reach the vaccine uptake target in Australia.

We should not forget about the success of previous novel vaccines and ensure that we build on lessons learned in their implementation, including capitalising on early public enthusiasm shown during a pandemic.[8] We need to understand and address citizen's concerns that can prevent optimal uptake, build motivations into messaging, and prioritise public trust by informing and involving the community in the process. Supporting health-care professionals in their role as educators will ensure people have adequate and accessible information from a trusted source, to optimise vaccine uptake and ultimately reduce community transmission of COVID-19.

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Persistence of IgG response to SARS-CoV-2

Little is known about the duration and protective capacity of the humoral immune response to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In studies from Iceland[1] and the USA,[2] antibodies against SARS-CoV-2 did not decline within 4 months after diagnosis. However, other studies have reported rapid waning of antibodies within 3–4 months.[3–5]

Since April 22, 2020, we have been following up a representative cohort of 850 health-care workers from 17 Belgian hospitals. Participants are tested on a monthly basis for the presence of SARS-CoV-2 with quantitative RT-PCR (RT-qPCR) and for antibodies targeting S1 (spike subunit 1) protein with a commercial semi-quantitative ELISA (Euroimmun IgG; Medizinische Labordiagnostika, Lübeck, Germany), using a stringent manufacturer-defined cut-off for having a positive test result (ratio ≥1·1; NCT04373889).[6] By the end of September, 2020, seven rounds of testing had been done. To assess the longevity of the humoral immune response, we recorded the duration of the presence of detectable IgG in the serum of health-care workers who were seropositive for SARS-CoV-2. At least two consecutive positive samples were needed to classify a participant as seropositive, whereas disappearance of IgG was defined as having at least two negative tests after having been classified as seropositive. Only health-care workers who attended at least four testing points and had at least two positive tests were included in this assessment. Additionally, we did in-vitro neutralisation tests on IgG-positive samples, measuring the serum titre of antibodies needed to neutralise 50% of SARS-CoV-2 (NT_{50}).

By the end of September, 2020, 81 IgG-positive health-care workers had been identified. Of these individuals, five were asymptomatic, 75 had reported mild symptoms, and one needed hospitalisation. Median follow-up was 170 (range 62–199) days. In seven (9%) health-care workers, antibodies became undetectable after intervals ranging from 107 days to 159 days from presumed onset of infection (defined by day of positive RT-qPCR test or [if not available] day of onset of symptoms or [for asymptomatic patients] day of first positive serological test minus 14 days). Among 74 (91%) health-care workers who remained seropositive, median duration of antibody persistence (defined as the time between the day IgGs were last detected and the day of presumed onset of infection) is currently 168·5 (range 62–199) days. 71 (96%) of 74 health-care workers have already had antibodies for 90 days or more and 67 (91%) have had them for 120 days or more (appendix p 1).

Among the 74 seropositive health-care workers, 61 (82%) had neutralising antibodies in their most recent IgG-positive serum sample. Of note, of the 13 individuals with no detectable neutralising antibodies, eight had weak neutralising antibody titres (NT_{50} 55–100) and five had no measurable neutralising antibody titres from the start. Since antibodies specific for SARS-CoV-2 were only assessed for S1 protein, and because S1-specific cross-reactivity of prepandemic serum samples from patients infected with common cold human coronaviruses has been described,[7,8] an explanation could be that these five individuals are false-positive for SARS-CoV-2 antibodies. For as long as correlates of protection are not well defined, measuring anti-S1 IgG is an acceptable biomarker that probably slightly overestimates true seropositivity.

Follow-up of our cohort will continue at least until April, 2021. Based on data currently available, a rapid decline of SARS-CoV-2 IgG seropositivity or neutralising capacity has not been seen. It must be stressed that, compared with other studies, we used a stringent cut-off value for having a positive test result and a conservative definition for seroconversion. Our findings accord

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See **Online** for appendix