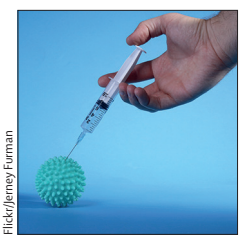
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Implications of COVID-19 vaccine effectiveness waning for public health



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Controlling the COVID-19 pandemic requires massive public health commitment. Efforts should be directed towards the optimisation of vaccination strategies and coverage to prevent severe disease and deaths, maintain functioning health systems, and limit viral spread at the population level. In light of a rapidly changing context, we need new and reliable evidence.

In *The Lancet Infectious Diseases*, Cristina Menni and colleagues[1] report on a large community-based, prospective cohort study in more than 600 000 voluntary users of the ZOE app who self-reported infection and vaccination status and underwent regular SARS-CoV-2 testing. The authors assessed the effectiveness of three COVID-19 vaccines (ChAdOx1 nCov19 [Oxford-AstraZeneca], BNT162b2 [Pfizer-BioNTech], and mRNA-1273 [Moderna]) against infection in the 8 months after receiving two vaccine doses. Menni and colleagues also evaluted vaccine effectiveness and reactogenicity in users who received boosters. Within 5 months after the second dose of the primary vaccination, vaccine effectiveness against infection for both viral vector-based (ChAdOx1 nCov19) and mRNA-based (BNT162b2 and mRNA-1273) vaccines had decreased but remained high overall, above 75%. The observed effectiveness waning was higher in people older than 55 years and in individuals who self-declared to have at least one comorbidity. Effectiveness against both hospitalisation and severe disease remained satisfactory 5–6 months after primary vaccination, at about 79% against severe infection and 84% against hospitalisation. After booster administration, vaccine-induced protection against infection was restored and reported to be higher than 88% for all categories and vaccine types. Additionally, Menni and colleagues' results showed that boosters did not raise major safety concerns: local and systemic adverse events within 8 days after inoculation were minor, and the mix-and-match approach for booster doses was shown to be safe. Side-effects were slightly more relevant in individuals receiving heterologous than homologous boosters. Although asymptomatic infections were probably not captured owing to the self-reported nature of the data,[1] the study adds relevant community-based evidence on vaccine-derived population protection against the ongoing pandemic.

The value of global vaccination strategies is being undermined by the emergence of unresponsive viral variants[2] and findings of vaccine effectiveness waning, including after booster doses.[4] Waning of vaccine effectiveness after booster-dose administration was not observed in Menni and colleagues' study, probably because of the short follow-up and the fact the study preceded the omicron (B.1.1.529) variant. Yet, most studies show that protection against severe disease, hospitalisation, and death is maintained at high levels, even with high infection rates,[3] and waning effectiveness against infection is in line with what has been observed for other vaccines, such as those against influenza, due to declining immunity.[4–6] Therefore, assessing the duration of vaccine protection and determining the ideal timing for boosters or annual vaccination against SARS-CoV-2 is crucial for public health researchers and officials.

When a large proportion of the world's population is still awaiting access to primary immunisation, communication about vaccines should emphasise efficacy against severe outcomes and death rather than against breakthrough infections, to not weaken public trust in them, even more so when non-pharmaceutical interventions (eg, mask wearing and physical distancing) are being lifted. International and national public health authorities should provide evidence-based, transparent, and balanced decisions about vaccine updates, dosing, and timing, based on accurate monitoring and shared values.[7]

We also believe that public health should prioritise new pathways of research. Next to a rigorous safety surveillance system, an international, multicentric efficacy-studying programme should be put in place to provide updated immunosurveillance data. Because evidence on vaccine effectiveness can have multiple sources of bias, results need to be stratified by vaccine type and schedule, demographic group, health status, level of immune response, and—last but not least—viral variants. Given that the potential to collect timely experimental data is limited, real-world vaccine evaluation relies on observational studies[8] measuring

infection, hospitalisation, and mortality outcomes. Both longitudinal cohorts of vaccinated and unvaccinated individuals and case-control studies, comparing the vaccination status of infected cases and controls, should be further promoted. Among case-control studies, the test-negative design, bypassing some of the most common biases (eg, health-care-seeking behaviours and population differences), has been already effective in studying influenza vaccines, and it is being used to accumulate evidence on COVID-19.[9] In these respects, digital health tools, linking electronic immunisation records with other national databases (eg, infections and comorbidities records) and exploiting innovative data collection instruments, as Menni and colleagues[1] reported, could provide a game-changer approach to quickly estimating population-level vaccination effectiveness.[10] Yet, combining large volumes of data to perform comprehensive analyses requires an enhancement of digital tools' interoperability, structured databases, and connected infrastructures.

Looking to the future of COVID-19 vaccines, we propose the establishment of a COVID-19 global surveillance platform promoted by WHO and modelled on the Global Influenza Programme. This network could track worldwide, year-round SARS-CoV-2 and suggest the best-matched vaccine composition against changing dominant variants, or it could promote different strategies,[2] such as the development of a pan-coronavirus vaccine for enduring, robust protection against multiple strains. Since repeated same-composition booster administration seems not to be advisable,[5] efforts should be devoted to comparatively evaluate different immunisation programmes (ie, COVID-19 annual vaccination campaign) to inform decision makers' planning and public health practice in offering the best possible collective health.

We declare no competing interests.

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1 Menni C, May A, Polidori L, et al. COVID-19 vaccine waning and effectiveness and side-effects of boosters: a prospective community study from the ZOE COVID Study. *Lancet Infect Dis* 2022; published online April 8. https://doi.org/10.1016/S1473-3099(22)00146-3.
2 Schubert M, Bertoglio F, Steinke S, et al. Human serum from SARS-CoV-2-vaccinated and COVID-19 patients shows reduced binding to the RBD of SARS-CoV-2 omicron variant. *BMC Med* 2022; **20:** 102.
3 Feikin DR, Higdon MM, Abu-Raddad LJ, et al. Duration of effectiveness of vaccines against SARS-CoV-2 infection and COVID-19 disease: results of a systematic review and meta-regression. *Lancet* 2022; **399:** 924–44.
4 Ferdinands JM, Rao S, Dixon BE, et al. Waning 2-dose and 3-dose effectiveness of mRNA vaccines against COVID-19-associated emergency department and urgent care encounters and hospitalizations among adults during periods of delta and omicron variant predominance—VISION Network, 10 states, August 2021–January 2022. *MMWR Morb Mortal Wkly Rep* 2022; **71:** 255–63.
5 Regev-Yochay G, Gonen T, Gilboa M, et al. Efficacy of a fourth dose of COVID-19 mRNA vaccine against omicron. *N Engl J Med* 2022; published online March 16. https://doi.org/10.1056/NEJMc2202542.
6 Abu-Raddad LJ, Chemaitelly H, Bertollini R. Waning mRNA-1273 vaccine effectiveness against SARS-CoV-2 infection in Qatar. *N Engl J Med* 2022; **386:** 1091–93.
7 WHO. COVID-19, Ukraine & other global health emergencies virtual press conference transcript—16 March 2022. 2022. https://www.who.int/publications/m/item/covid-19-ukraine-other-global-health-emergencies-virtual-press-conference-transcript---16-march-2022 (accessed March 25, 2022).
8 Lipsitch M. Challenges of vaccine effectiveness and waning studies. *Clin Infect Dis* 2019; **68:** 1631–33.
9 De Serres G, Skowronski DM, Wu XW, Ambrose CS. The test-negative design: validity, accuracy and precision of vaccine efficacy estimates compared to the gold standard of randomised placebo-controlled clinical trials. *Euro Surveill* 2013; **18:** 20585.
10 Odone A, Gianfredi V, Sorbello S, et al. The use of digital technologies to support vaccination programmes in Europe: state of the art and best practices from experts' interviews. *Vaccines (Basel)* 2021; **9:** 1126.

Is the end of gonorrhoea in sight?

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Gonorrhoea is a global public health challenge. In 2020, an annual incidence of 82 million gonorrhoea cases among adults was estimated globally.[1] The highest disability-adjusted life-years (DALYs) is reported in sub-Saharan Africa, southeast Asia, and Oceania.[2] Gonorrhoea disproportionately affects subpopulations, including young adults, men who have sex with men (MSM), transgender people, sex workers, people living with HIV, and socioeconomically disadvantaged people. There is urgency in controlling gonorrhoea because of the increasing antimicrobial resistance and potential to become untreatable.[3]

No licensed gonococcal vaccine is available due to roadblocks in understanding its immunity and pathogenesis and covering its genomic variability.[4] However, there was renewed interest in developing a gonorrhoea vaccine when rates of gonorrhoea were reported to be decreased by 31% among individuals vaccinated with a strain-specific outer membrane vesicle meningococcal serogroup B vaccine