THE BEST OF THE WEEK (12 set – 18 set 2022)

O.J. Watson et al.

Global impact of the first year of COVID-19 vaccination: a mathematical modelling study

Lancet Infect Dis, September 2022; doi: 10.1016/S1473-3099(22)00320-6

Abstract

The first COVID-19 vaccine outside a clinical trial setting was administered on Dec 8, 2020. To ensure global vaccine equity, vaccine targets were set by the COVID-19 Vaccines Global Access (COVAX) Facility and WHO. However, due to vaccine shortfalls, these targets were not achieved by the end of 2021. We aimed to quantify the global impact of the first year of COVID-19 vaccination programmes.

A mathematical model of COVID-19 transmission and vaccination was separately fit to reported COVID-19 mortality and all-cause excess mortality in 185 countries and territories. The impact of COVID-19 vaccination programmes was determined by estimating the additional lives lost if no vaccines had been distributed. We also estimated the additional deaths that would have been averted had the vaccination coverage targets of 20% set by COVAX and 40% set by WHO been achieved by the end of 2021.

COVID-19 vaccination has substantially altered the course of the pandemic, saving tens of millions of lives globally. However, inadequate access to vaccines in low-income countries has limited the impact in these settings, reinforcing the need for global vaccine equity and coverage.

C.R. Wells et al.

The global impact of disproportionate vaccination coverage on COVID-19 mortality

Lancet Infect Dis, September 2022; doi: 10.1016/S1473-3099(22)00417-0

Abstract

Over the course of the first year of COVID-19 vaccination, between Dec 8, 2020, and Dec 8, 2021, 8·33 billion doses were administered among 4·36 billion people globally.1 In this study, by fitting a mathematical model to excess mortality, it is estimated that in 185 countries and territories 31·4 million COVID-19- related deaths would have occurred during this timeframe in the absence of COVID-19 vaccination.

D. H. Barouch

Covid-19 Vaccines - Immunity, Variants, Booster

New England J of Medicine, August 2022; doi: 10.1056/NEJMra2206573

Abstract

The coronavirus disease 2019 (Covid-19) pandemic has claimed an estimated 15 million lives, including more than 1 million lives in the United States alone. The rapid development of multiple Covid-19 vaccines has been a triumph of biomedical research, and billions of vaccine doses have

been administered worldwide. Challenges facing the Covid-19 vaccine field include inequitable vaccine distribution, vaccine hesitancy, waning immunity, and the emergence of highly transmissible viral variants that partially escape antibodies. This review summarizes the current state of knowledge about immune responses to Covid-19 vaccines and the importance of both humoral and cellular immunity for durable protection against severe disease.

Z. Qin et al.

Pre-exposure to mRNA-LNP inhibits adaptive immune responses and alters innate immune fitness in an inheritable fashion

bioRxiv, August 2022; doi: 10.1101/2022.03.16.484616

Abstract

Hundreds of millions of SARS-CoV-2 mRNA-LNP vaccine doses have already been administered to humans. The mRNA-LNP-based SARS-CoV-2 vaccine is highly inflammatory, and its synthetic ionizable lipid component responsible for the induction of inflammation has a long in vivo half-life. Since chronic inflammation can lead to immune exhaustion and non-responsiveness, the authors sought to determine the effects of pre-exposure to the mRNA-LNP on adaptive immune responses and innate immune fitness. The pre-exposure to mRNA-LNPs or LNP alone led to long-term inhibition of the adaptive immune responses, which could be overcome using standard adjuvants. In summary, the mRNA-LNP vaccine platform induces long-term unexpected immunological changes affecting both adaptive immune responses and heterologous protection against infections. These studies highlight the need for more research to determine this platform's true impact on human health.