THE BEST OF THE WEEK (13 giu – 19 giu 2022)

S. Monge et al.

Effectiveness of mRNA vaccine boosters against infection with the SARS-CoV-2 omicron (B.1.1.529) variant in Spain: a nationwide cohort study

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Abstract

Background The omicron (B.1.1.529) variant of SARS-CoV-2 has increased capacity to elude immunity and cause breakthrough infections. The aim of this study was to estimate the effectiveness of mRNA-based vaccine boosters (third dose) against infection with the omicron variant by age, sex, time since complete vaccination, type of primary vaccine, and type of booster.

Methods In this nationwide cohort study, we linked data from three nationwide population registries in Spain (Vaccination Registry, Laboratory Results Registry, and National Health System registry) to select community-dwelling individuals aged 40 years or older, who completed their primary vaccine schedule at least 3 months before the start of follow-up, and had not tested positive for SARS-CoV-2 since the start of the pandemic. On each day between Jan 3, and Feb 6, 2022, we matched individuals who received a booster mRNA vaccine and controls of the same sex, age group, postal code, type of vaccine, time since primary vaccination, and number of previous tests. We estimated risk of laboratory-confirmed SARS-CoV-2 infection using the Kaplan-Meier method and compared groups using risk ratios (RR) and risk differences. Vaccine effectiveness was calculated as one minus RR. Findings Between Jan 3, and Feb 6, 2022, 3 111 159 matched pairs were included in our study. Overall, the estimated effectiveness from day 7 to 34 after a booster was 51·3% (95% CI 50·2–52·4). Estimated effectiveness was 52·5% (51·3–53·7) for an mRNA-1273 booster and 46·2% (43·5–48·7) for a BNT162b2 booster. Effectiveness was 58·6% (55·5–61·6) if primary vaccination had been with ChAdOx1 nCoV-19 (Oxford–AstraZeneca), 55·3% (52·3–58·2) with mRNA-1273 (Moderna), 49·7% (48·3–51·1) with BNT162b2 (Pfizer–BioNTech), and 48·0% (42·5–53·7) with Ad26.COV2.S (Janssen). Estimated effectiveness was 43·6% (40·0–47·1) when the booster was administered between 151 days and 180 days after complete vaccination and 52·2% (51·0–53·3) if administered more than 180 days after primary scheduled completion.

Interpretation Booster mRNA vaccine-doses were moderately effective in preventing infection with the omicron variant of SARS-CoV-2 for over a month after administration, which indicates their suitability as a strategy to limit the health effects of COVID-19 in periods of omicron variant domination. Estimated effectiveness was higher for mRNA-1273 compared with BNT162b2 and increased with time between completed primary vaccination and booster.

I. Kimura et al.

Virological characteristics of the novel 1 SARS-CoV-2 Omicron variants including BA.2.12.1, BA.4 and BA.5

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Abstract

After the global spread of SARS-CoV-2 Omicron BA.2 lineage, some BA.2-related variants that acquire mutations in the L452 residue of spike protein, such as BA.2.9.1 and BA.2.13 (L452M), BA.2.12.1 (L452Q), and BA.2.11, BA.4 and BA.5 (L452R), emerged in multiple countries. Our statistical analysis showed that the effective reproduction numbers of these L452R/M/Q-bearing BA.2-related Omicron variants are greater than that of the original BA.2. Neutralization experiments revealed that the immunity induced by BA.1 and BA.2 infections is less effective against BA.4/5. Cell culture experiments showed that BA.2.12.1 and BA.4/5 replicate more efficiently in human alveolar epithelial cells than BA.2, and particularly, BA.4/5 is more fusogenic than BA.2. Furthermore, infection experiments using hamsters indicated that BA.4/5 is more pathogenic than BA.2. Altogether, our multiscale investigations suggest that the risk of L452R/M/Q-bearing BA.2-related Omicron variants, particularly BA.4 and BA.5, to global health is potentially greater than that of original BA.2.