Effectiveness of Booster mRNA Vaccines Against SARS-CoV-2 Infection in an Elderly Population, South Korea, October 2021–January 2022

TO THE EDITOR—We read with great interest the recent article by Drawz et al in which the authors explored the potential role of messenger RNA (mRNA) vaccine’s booster doses against severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)–related hospitalizations [1]. In South Korea, a coronavirus disease 2019 (COVID-19) vaccination campaign was initiated starting on 26 February 2021. The primary series vaccines available for persons aged 60+ years were ChAdOx1 nCoV-19 (AstraZeneca) and BNT162b2 mRNA (Pfizer BioNTech) COVID-19 vaccines, whereas booster vaccinations with mRNA vaccines were recommended starting in October 2021. We evaluate the impact of the booster mRNA vaccines against SARS-CoV-2 in preventing infection, severe disease, and death in all persons aged 60+ years in South Korea.

We conducted a nationwide retrospective cohort study to estimate the impact of booster vaccination in all persons aged 60+ years who received 2 doses of COVID-19 vaccines at least 5 months prior. Our analysis was based on an integrated database from the Korea Disease Control and Prevention Agency, which collects and merges all polymerase chain reaction confirmed SARS-CoV-2 cases and their vaccination status. All suspected COVID-19 cases, regardless of symptoms, were mandated to be tested with polymerase chain reaction. The data included age, sex, primed vaccine type, vaccination dates, and SARS-CoV-2 infection status. The observed period was 12 October 2021–22 January 2022. Delta variant dominated from October through December 2021, whereas Omicron variant has emerged since late November 2021 and reached 80% by the end of observation.

We first compare the rates of SARS-CoV-2 infection, severe disease (requiring high-flow oxygen support, extracorporeal membrane oxygenation, or continuous renal replacement therapy), and death by sex, geographic regions, number of vaccinations, and vaccine types. Nonbooster and booster person-days consisted of follow-up days of those who never received booster vaccines, as well as days before being vaccinated or censored (Supplementary Figure 1). Time-dependent Cox proportional hazard model was used, and hazard ratios with 95% confidence intervals from an adjusted model with covariates were included to compare the rates.

Between 12 October and 23 February 2022, a total of 10 999 292 persons were eligible to be included in the analysis, with 1 118 289 931 observed person-days (Table 1). Among the nonbooster group, the death rate was 0.16 per 100 000, which was higher than that of the booster group (0.02 per 100 000), resulting in a hazard ratio of 0.2% against death. Supplementary Figure 2 shows that at 98 days of the observation period, severe disease (77 vs 1803) and death (40 vs 1080) occurred less in the booster group compared with the nonbooster group.

Table 1. SARS-CoV-2 Infection, Severe Disease, and Deaths in mRNA and Viral Vector Vaccine-Primed and Boostered Persons Aged 60+ Years

| Variables | Total | Person-day | Infection | Severe Disease | Death |
|-----------|-------|------------|-----------|----------------|-------|
|           | N     | Person-day | n Rate*   | n Rate*        | n Rate* |
| Sex       |       |            |           |                |        |
| Male      | 5 017 029 | 510 001 707 | 36 378 | 7.13 | 1316 | 0.25 | 694 | 0.13 |
| Female    | 5 982 263 | 608 288 224 | 39 819 | 6.54 | 771 | 0.12 | 556 | 0.09 |
| Geographic region |       |            |           |                |        |
| Metropolitan area | 5 372 900 | 545 250 909 | 56 381 | 10.34 | 1574 | 0.28 | 914 | 0.16 |
| Nonmetropolitan area | 5 626 392 | 573 039 022 | 19 816 | 3.45 | 513 | 0.08 | 336 | 0.05 |
| Booster vaccination |       |            |           |                |        |
| No booster | 629 464 | 697 146 502 | 58 291 | 8.36 | 1804 | 0.25 | 1082 | 0.15 |
| Booster   | 10 127 057 | 278 003 524 | 7509 | 2.70 | 81 | 0.02 | 42 | 0.01 |
| Primed vaccine type (nonbooster) |       |            |           |                |        |
| mRNA vaccines | 202 688 | 20 387 562 | 5569 | 27.31 | 489 | 2.39 | 406 | 1.99 |
| Viral vector vaccines | 422 319 | 41 997 898 | 23 017 | 54.80 | 1035 | 2.46 | 665 | 1.58 |
| Heterologous | 4457 | 437 891 | 331 | 75.58 | 12 | 2.74 | 10 | 2.28 |
| Primed – booster vaccine type (booster) |       |            |           |                |        |
| mRNA – mRNA vaccines | 3 110 923 | 316 817 301 | 9853 | 3.10 | 186 | 0.06 | 69 | 0.02 |
| Viral vector – mRNA vaccines | 7 055 573 | 717 952 945 | 36 111 | 5.08 | 352 | 0.04 | 95 | 0.01 |
| Heterologous – mRNA vaccines | 203 332 | 2 069 334 | 916 | 4.42 | 13 | 0.06 | 5 | 0.02 |

Abbreviation: mRNA, messenger RNA.

*Incidence rate, per 100 000 person-day.
Our finding of impact in booster vaccine recipients is consistent with other studies. In Israel, the rate of confirmed infection was lower in the booster group than in the no booster group by a factor of 11.3 (95% confidence interval, 10.4–12.3) [2]. Our finding adds that the booster vaccination with mRNA vaccines were effective in ChAdOx01 or BNT162b2 vaccine-primed persons aged 60+ years. Our results demonstrate vaccine effectiveness of booster doses, as in line with previous findings, which may implicate the vaccination strategy in the elderly group.

Supplementary Data
Supplementary materials are available at Clinical Infectious Diseases online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes
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