The epidemiological relevance of the COVID-19-vaccinated population is decreasing after booster vaccination, as shown by incidence rate ratios

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Kampf[1,2] describes an increase in symptomatic COVID-19 cases among fully vaccinated people and raises two central concerns: first, that "many decisionmakers" ignore the vaccinated as a transmission source and, second, that this ignorance leads to "inappropriate stigmatisation of unvaccinated people".

To illustrate this, he presents reports describing a high proportion of breakthrough infections among the vaccinated.[1,2] Moreover, he depicts Robert Koch-Institute (RKI) data (21 July–27 October 2021), demonstrating a constant rise in the proportion of the vaccinated among symptomatic COVID-19 cases, until a maximum of 58.9% was reached.[3] However, omission of some very critical information provides a distorted view.

First, the RKI vaccination breakthrough data were only shown for the elderly (≥ 60 years), whereas the data for the large middle-aged group (18–59 years) were omitted, whose proportion of breakthrough infections amounted to only 37.5% on 27 October 2021 in the weekly report.[3]

Second, since this proportion has to be related to the proportion of population vaccinated to assess vaccination efficacy, incidence rates (IRs) for symptomatic infections by vaccination status would have given a more realistic view.

Third, Kampf omits, that Israeli data available by October 2021 demonstrated that waning immunity (due to a decrease in protective host immunity over time as well as to the rise of the Delta variant) could be counteracted by a booster shot.[4] Hence, several public health institutions worldwide had already recommended booster shots for the elderly, which were extended to the general population shortly thereafter.

Fourth, he focused on the effect of vaccination on symptomatic infections and not on prevention of severe illness and hospitalization. In doing so, he fails to appreciate the true impact that COVID-19 vaccines have had on the burden of disease and that this was the main goal when developing these vaccines.[5]

To paint a more realistic picture of the situation in Germany - including the protection provided by booster shots - we used IR data provided by the RKI for symptomatic infections and hospitalization.[6] Since IR data for the boostered became available by mid-October 2021, we show weekly incidence rate ratios (IRRs) by age group for the fully vaccinated with and without booster vs. unvaccinated individuals from mid-October until the end of 2021 (extension after Kampf's publications, Figure 1).

In week 43 (containing the last data point depicted on 27 October 2021,[2] when 66% of the German population had been fully vaccinated, but only about 2% boostered), derived COVID-19 IRRs for weekly hospitalization (IR of the unvaccinated vs. the fully vaccinated without booster) amounted to 7.4 in 18–59 year olds and to 4.3 in ≥ 60 year olds. The vaccination effect was weaker against symptomatic infections (IR of the unvaccinated vs. the fully vaccinated without booster), amounting to IRR 3.0 for 18–59 year olds and to 2.4 for ≥ 60 year olds.

However, upon introduction of the booster, the IRRs for symptomatic infections and hospitalization increased dramatically in the boostered vaccinees: In week 51 (37% being boostered), the IRR for hospitalization reached maximums of 16.2 in the middle-aged group and of 22.7 in the elderly. The IRR maximums for symptomatic infections were reached in week 50 at 5.9 for the middle-age group and at 11.7 for the elderly. With the rise of the Omicron variant towards the end of 2021 (week 52), IRRs for symptomatic infections and hospitalization dropped also in the boostered groups, but stayed at a much higher level than the fully vaccinated without booster. Towards the end of 2021, the boostered had still a 3.7 – fold (middle-aged group) and 6.8 – fold (the elderly) lower weekly risk of symptomatic infection than the unvaccinated. This clearly underlines the greater epidemiological relevance of the unvaccinated.

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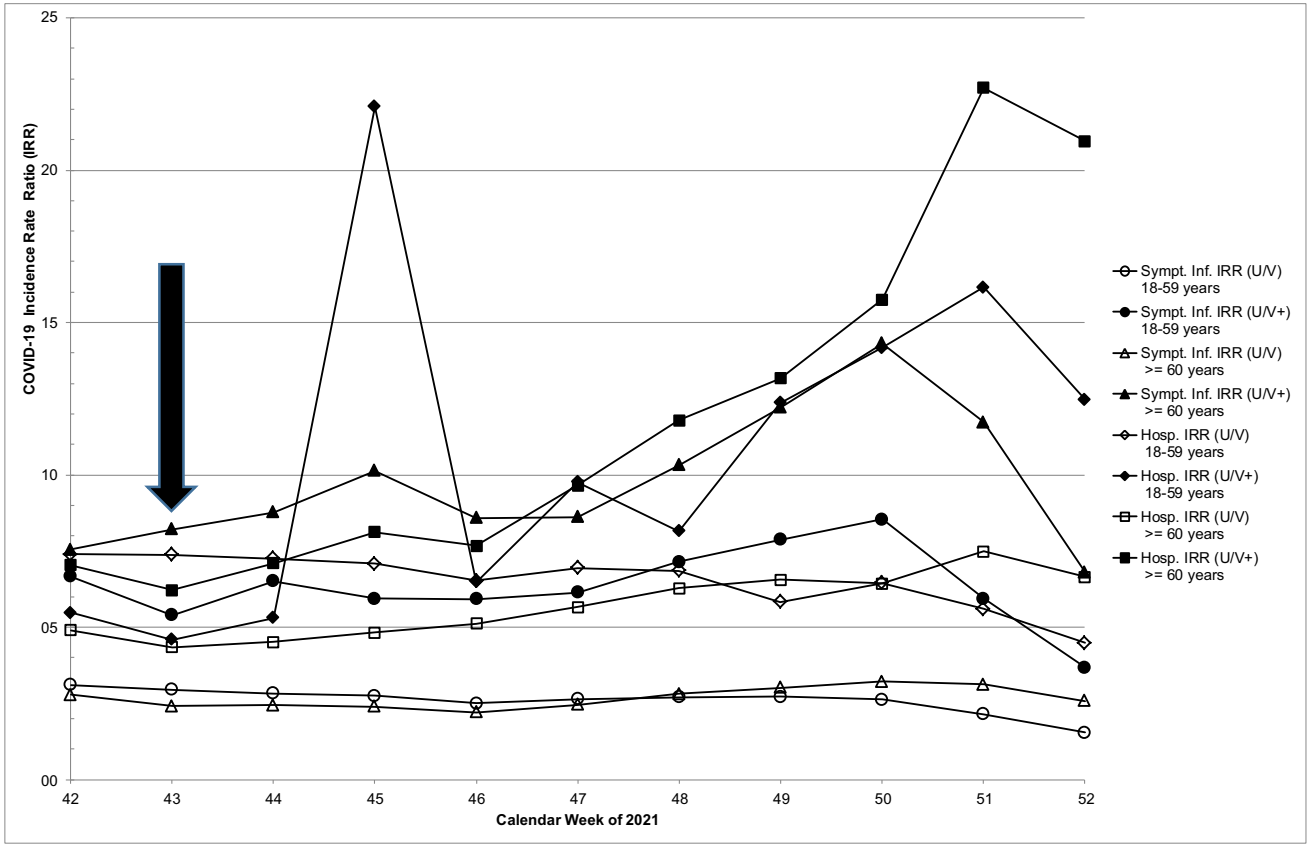

Figure 1. COVID-19 Incidence Rate Ratios (Unvaccinated (U) vs. Fully Vaccinated with (V+) or without (V) booster) for symptomatic infections and hospitalization (based on data from the RKI as of 27 January 2022[6]). The black arrow highlights the last data point (27 October 2021) reported by Kampf.[2] The first two weeks of January 2022 have been omitted because of reporting delays mentioned by the RKI.

It remains to be seen, for how long this protection can be maintained against Omicron infections, but preliminary data suggest that boosters still provide protection against hospitalization and retain more than 55% efficacy against symptomatic infections after 10 weeks.[7]

Finally, we agree with Kampf that "bringing society together" is desirable. However, we disagree with his unwarranted comparison of science-based preventive measures that seek to reduce human suffering with ideologies that caused "negative experiences by stigmatising parts of the population for their skin colour or religion" in the USA and Germany.[1]

Author contribution

AK, JAB, LU and NOH wrote the draft of the manuscript with input from US and KB. JAB imported the RKI incidence rate data and created the incidence rate ratio graph. All authors contributed to and approved the submitted manuscript.

Declaration of interests

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