The right balance against omicron

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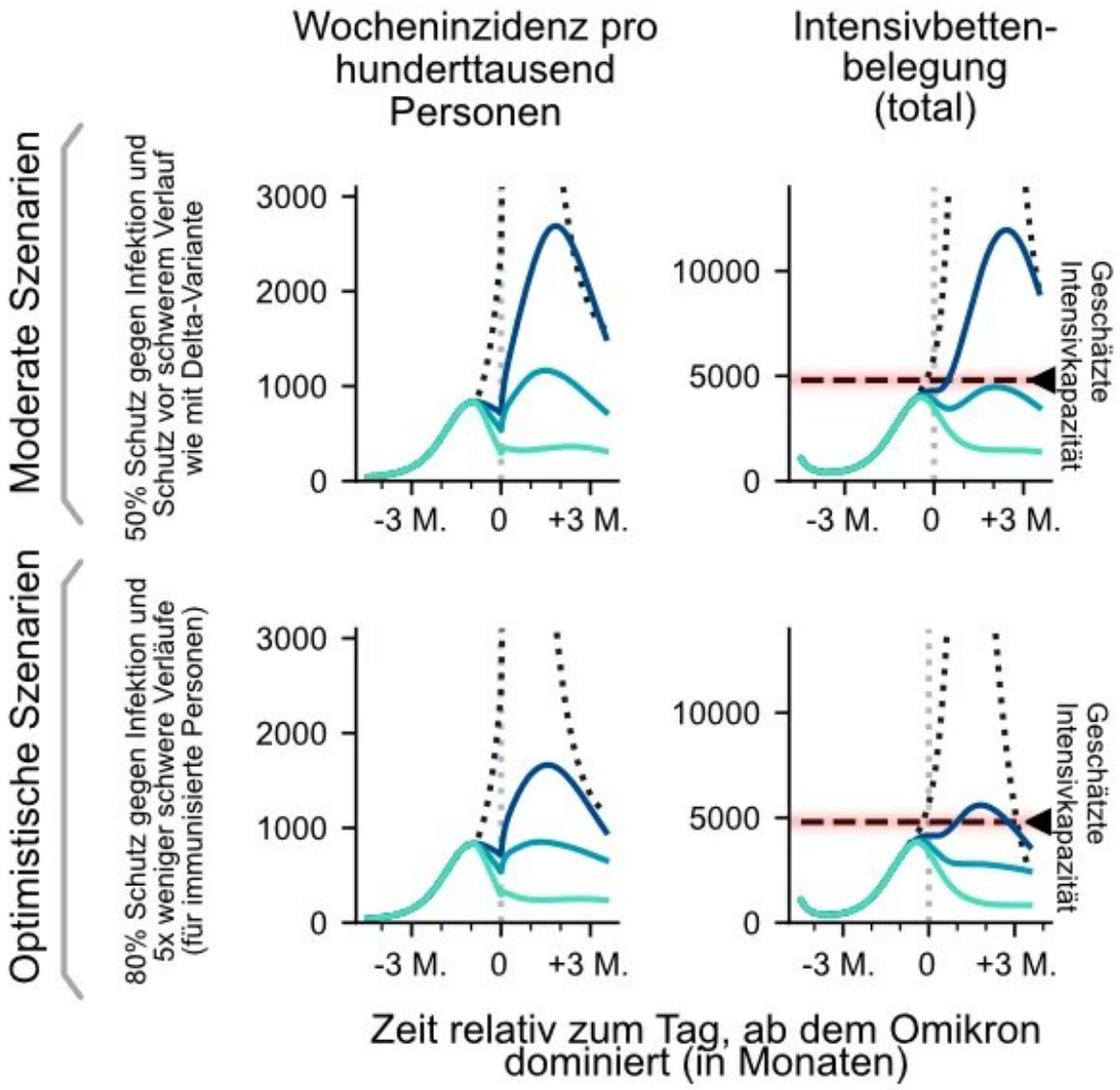

Many uncertainties in the omicron wave: The model calculations show the trends

in incidence and intensive care unit (ICU) occupancy before and after the point at which the omicron variant dominates the spread (vertical light gray dashed line), for a moderate (top) and a more optimistic (bottom) scenario. All scenarios assume that, as in previous waves, most people adapt their behaviour to the epidemic situation beyond the mandatory rules. The moderate course could occur if complete vaccination provides 50 percent protection against infection with the omicron variant and severe courses in immunized individuals are no less common than with the delta variant. Then, measures such as those in effect in most states in early December (blue line) would cause incidence rates to rise to more than 2,500 per 100,000 people (top left) and would result in severe and prolonged burden on ICUs (top right). Tighter measures, up to and including a lockdown (turquoise and green lines), could reduce the burden. In contrast, an uncontrolled spread of omicron (dark gray dashed line) is unrealistic because measures have already been taken against it. A more optimistic scenario assumes that complete vaccination, including boosters, provides 80 percent protection against infection, and there are 80 percent fewer severe courses in immunized individuals than with the delta variant. Then incidence rates rise to more than 1500 per 100,000 people (bottom left) with measures such as those introduced in late November or early December, depending on the state (blue line). However, ICU capacities are exceeded only briefly (bottom right). The turquoise line corresponds to a moderate tightening of measures, the green line to a lockdown. The dark gray dashed line corresponds to the unrealistic scenario of no action against the omicron surge. Credit: modified from arXiv: 2112.12062

The omicron wave could possibly be less devastating than currently predicted by the most pessimistic scenarios. However, this can only succeed if a large part of the population adapts its behavior to the epidemic situation beyond the current rules, as it has been done in previous waves. A team led by Viola Priesemann, a research group leader at the Max Planck Institute for Dynamics and Self-Organization and the University of Göttingen, has for the first time used model calculations to precisely examine the interplay between mandatory and voluntary measures to contain the corona epidemic. This allows them to

understand how the contact restrictions currently in place could break the delta wave. However, it is still unclear what measures will be needed in light of the omicron wave.

Measures to contain the corona epidemic may also be too stringent—at least if vaccinations largely protect particularly vulnerable people from severe courses of COVID-19 disease. Suppression of any spread prevents naturally immunizing or boosting some people through contacts with the virus. Moreover, under such conditions, a wave of infection can build up as soon as stringent measures, such as a complete lockdown, are lifted. Precautions that are somewhat more moderate also give people leeway to voluntarily adjust their behavior depending on one's perception of risk in response to increasing numbers of cases and the burden on intensive care units (ICUs) and medical staff. Thus, during the previous waves of infection, a large proportion of the population voluntarily restricted their contacts further than required by government regulations, wore mouth-nose protection more consistently and, not least, had themselves vaccinated more frequently.

Against the delta variant, regulations of November and December found the right measure

"We have now, for the first time, used empirical data from past waves of infection to determine how the feedback between the incidence of infection, mandatory measures, voluntary behavior, and willingness to vaccinate plays out, and incorporated the empirically quantified effect into model calculations of the course of the epidemic," says Emil Iftekhar, a scientist at the Max Planck Institute for Dynamics and Self-Organization who played a key role in the study. The model calculations of the interdisciplinary team, which in addition to the Max Planck researchers from Göttingen also included André Calero Valdez from RWTH Aachen University, Mirjam Kretzschmar from the University

Medical Center Utrecht, Kai Nagel from the Technical University of Berlin and Michael Mäs from the Karlsruhe Institute of Technology, are already publicly available, but have not yet gone through the usual review process for scientific studies.

For Germany, the accounts confirmed that the federal and state governments found the right way to break the fourth wave of corona, in which the delta variant of the virus still dominated, with the measures that have been in place since late November, early December, while still leaving room for voluntary protection against infection, as well as further closing the vaccination gap. "As long as we didn't have vaccination, it was necessary to keep the case numbers down," says Viola Priesemann. "With the delta variant, there was the prospect of moving from epidemic to endemic infection. For that to happen, it's important that infection control is neither too weak, potentially collapsing the health system, nor too strong, disproportionately burdening society and facilitating a new wave after the measures end."

Different scenarios for the omicron wave

Where the right level of infection control lies, however, is apparently shifting with the omicron variant because it is much more contagious. "Omicron can be a big challenge," says Viola Priesemann. "With the rise we're seeing in many countries, further contact restrictions, up to and including lockdown, are quite likely." Exactly how the omicron wave will develop, however, depends on a number of as-yet unknown factors. It is unclear, for example, how well vaccination, including boosters, protects against infection and how often the omicron variant leads to a severe COVID-19 progression. Therefore, Viola Priesemann's team calculated different scenarios for the omicron wave. In all cases, the researchers assume that protection against severe progression is maintained or perhaps even improved for both vaccinated and recovered individuals. If the triple vaccination also provides 80 percent protection

against infection, sets of measures such as those that have been in effect since late November or early December, depending on the state, should only lead to a short-term overload of intensive care units.

However, the weaker a complete vaccination protects against infection or against a severe course, the higher the omicron wave will pile up, even if most people voluntarily reduce their contacts and get more vaccinations. If, for example, vaccination protects only 50 percent against infection and no better against a severe course than the delta variant, that would mean the November and December measures, respectively, could not prevent ICU capacity from being exceeded by more than 100 percent. "However, we consider such extreme scenarios to be unrealistic, because countermeasures, up to and including lockdown, would certainly be taken when they become apparent," says Viola Priesemann. Her team's study currently takes into account what was known about the omicron variant in mid-December. "But we will update the calculations as soon as we have more information about the omicron variant," the physicist says.

More information: Philipp Dönges et al, Interplay between risk perception, behaviour, and COVID-19 spread. arXiv:2112.12062v1 [q-bio.PE], arxiv.org/abs/2112.12062

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