2021

US State-Level Legal Interventions Related to COVID-19 Vaccine Mandates

Breanna Fernandes

Mark Christopher Navin

Dorit Rubinstein Reiss
UC Hastings College of the Law, reissd@uchastings.edu

Saad B. Omer

Katie Attwell

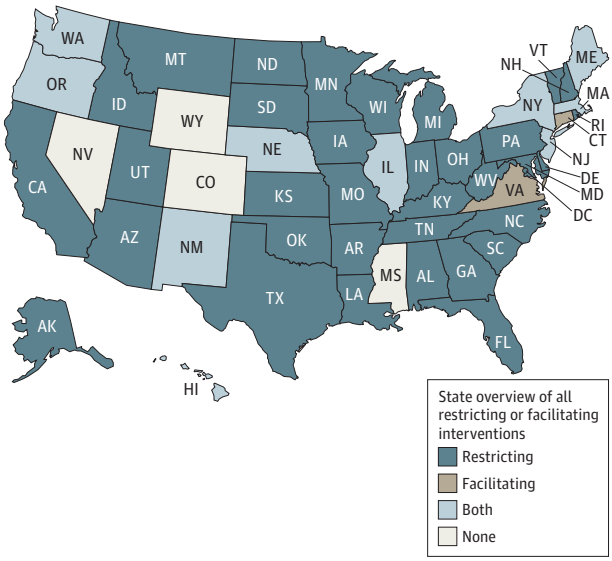
RESEARCH LETTER

US State-Level Legal Interventions Related to COVID-19 Vaccine Mandates

Mandates can increase vaccine uptake,[1] but their effectiveness is associated with who is covered, penalties, and exemptions.[2] The US federal government recently required federal employees to be vaccinated against SARS-CoV-2 and developed standards for large employers.[3] However, individual states traditionally take the lead in regulating public health via vaccine mandates.[4] Some states have attempted to introduce requirements to increase uptake of COVID-19 vaccines.[5] However, others have attempted to impede COVID-19 vaccine mandates. Most efforts have been considered by legislatures; also, some governors and regulatory agencies have issued executive orders. We assessed state-level legal interventions to promote or impede COVID-19 vaccine mandates since the beginning of the pandemic.

Methods | Data were gathered between August 9, 2021, and September 15, 2021, about legal interventions since January 2020. Our unit of analysis, a legal intervention, includes proposed and enacted bills and laws, and enacted executive-level legal instruments. For each state, initial internet searches identified news stories containing *vaccine*, *vaccination*, *COVID-19 vaccination*, *mandates*, *bills*, or *state mandates*. Positive results informed searches via LegiScan and states' online legislative databases. Our content analysis grouped together those legal interventions seeking to impede vaccine mandates and those seeking to facilitate them. We then subcategorized the domain that the intervention sought to regulate: employment, school entry, vaccine passports, and others. The "others" category included attempts that were broad, vague, or did not fit into the other categories. If a single intervention fit in multiple categories (eg, Arizona's HB 2423, which would create vaccination exemptions for both employment and school attendance),[6] it was counted in both categories. In addition, we coded whether the initiated legal intervention had been enacted. Executive orders were counted as always enacted. We then performed qualitative analysis to identify and enumerate (1) the mechanisms by which the legal interventions sought to impede governments or organizations from mandating vaccines (eg, restricting government funds from mandatory vaccination programs) and (2) enforcement tools for transgression.

Figure. State Overview of All Restricting or Facilitating Interventions



Results | As of September 15, 2021, 46 states proposed or enacted 148 legal interventions to impede or facilitate vaccine mandates (**Figure**). Of these interventions, 19 were administrative or executive actions. More interventions were undertaken to impede mandates (88.5% [131/148]) than to facilitate them (11.5% [17/148]) in each category analyzed (**Table**): employment (impede: 81.4% [48/59]; facilitate: 18.6% [11/59]), school entry (impede: 80.0% [28/35]; facilitate: 20.0% [7/35]), vaccine passports (impede: 97.4% [38/39]; facilitate: 2.6% [1/39]), and others (impede: 100.0% [32/32]; facilitate: 0% [0/32]). Even though interventions to impede mandates were more common than those to facilitate them, interventions to facilitate mandates were more likely to be enacted (70.6% [12/17]) than those to impede them (32.8% [43/131]).

Our qualitative analysis identified a variety of mechanisms used to impede mandates, such as ensuring that driver's license renewal was not affected by vaccine status

Table. Legal Interventions Impeding and Facilitating Mandates and Number Enacted

	Impeding mandates		Facilitating mandates	
	Total proposed	Enacted	Total proposed	Enacted
All categories	131	43	17	12
Employer mandates	48	13	11	9
Vaccine passports	38	23	1	1
School mandates	28	15	7	4
Other	32	1	0	0

and preventing government funding of mandates. Enforcement tools included facilitating citizen lawsuits against municipal governments that introduce mandates and firing, fining, or imprisoning violators. Some states proactively created exemptions or rights of refusal for any future mandates or established protections against discrimination based on vaccination status. Legal interventions in 13 states cited lack of US Food and Drug Administration approval as a reason to impede vaccine mandates.

Discussion | Recent US state-level legal interventions to facilitate or impede vaccine mandates have had moderate success. While most interventions aimed to impede mandates, the majority were not enacted. In contrast, most of the interventions proposed to facilitate mandates were enacted. However, given the higher number of interventions aimed at impeding mandates, more were ultimately enacted than interventions to facilitate mandates. Study limitations include that the frequency of interventions that addressed mandates in multiple domains (eg, employment and education) was not analyzed, nor was the consistency of individual states' approaches to mandates. Future work should address these issues and trace the processes by which state-level legal interventions are formulated.

Breanna Fernandes
Mark Christopher Navin, PhD
Dorit Rubinstein Reiss, PhD
Saad B. Omer, MBBS, MPH, PhD
Katie Attwell, PhD

Author Affiliations: University of Western Australia, Perth, Australia (Fernandes, Attwell); Oakland University, Rochester, Michigan (Navin); Hastings College of the Law, University of California, San Francisco (Reiss); Yale Institute for Global Health, New Haven, Connecticut (Omer).

Accepted for Publication: November 22, 2021.

Published Online: December 2, 2021. doi:10.1001/jama.2021.22122

Corresponding Author: Breanna Fernandes, University of Western Australia, Perth, 35 Stirling Hwy, Crawley, WA 6009, Australia (22981317@student.uwa.edu.au).

Author Contributions: Ms Fernandes had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Fernandes, Navin, Omer, Attwell.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Fernandes, Navin, Attwell.
Critical revision of the manuscript for important intellectual content: Fernandes, Navin, Reiss, Omer.
Statistical analysis: Fernandes.
Administrative, technical, or material support: Fernandes, Navin, Attwell.
Supervision: Attwell.

Conflict of Interest Disclosures: Dr Reiss reported owning stock in GlaxoSmithKline and serving as an unpaid member of Moderna's advisory ethics committee. Dr Attwell is a member of the Australian Technical Advisory Group on Immunization COVID-19 working group 2 and is a current recipient of a Discovery Early Career Researcher Award funded by the Australian Research Council of the Australian government (DE19000158). No other disclosures were reported.

1. Delamater PL, Pingali SC, Buttenheim AM, Salmon DA, Klein NP, Omer SB. Elimination of nonmedical immunization exemptions in California and school-entry vaccine status. *Pediatrics*. 2019;143(6):1-9. doi:10.1542/peds.2018-3301

2. Omer SB, Betsch C, Leask J. Mandate vaccination with care. *Nature*. 2019;571(7766):469-472. doi:10.1038/d41586-019-02232-0

3. The White House. Path out of the pandemic: President Biden's COVID-19 action plan. Published 2021. Accessed November 25, 2021. https://www.whitehouse.gov/covidplan/

4. Omer SB, Peterson D, Curran EA, Hinman A, Orenstein WA. Legislative challenges to school immunization mandates, 2009-2012. *JAMA*. 2014;311(6):620-621. doi:10.1001/jama.2013.282869

5. Stephenson J. As employers and colleges introduce COVID-19 vaccine mandates, wider use "remains an open question." *JAMA Health Forum*. 2021;2(4):e210874. doi:10.1001/jamahealthforum.2021.0874

6. Immunizations; Exemption; Requirements, HB 2423, 55th Leg (AZ 2021).

Antibody Response and Variant Cross-Neutralization After SARS-CoV-2 Breakthrough Infection

Breakthrough infections after vaccination against SARS-CoV-2 are increasingly reported, possibly due to waning of vaccine-induced antibody levels.[1] Moreover, emerging variants of concern with diminished susceptibility to vaccine-induced antibodies are responsible for most new cases.[2,3] Studies have focused on determining the rate of vaccine breakthrough based on antibody levels after standard vaccination practices.[4,5] We assessed antibody levels and variant cross-neutralization after breakthrough infection.

Supplemental content

Methods | Fully vaccinated health care workers subsequently diagnosed with SARS-CoV-2 breakthrough infection based on a positive polymerase chain reaction (PCR) test result were sequentially recruited at the Oregon Health & Science University between January 31, 2021, and August 18, 2021. Only those with no history of previous infection whose test results were negative for nucleocapsid antibodies were included. Controls were fully vaccinated individuals without a breakthrough infection matched on sex, age, time between vaccine doses, and time between sample collection and most recent antigen exposure (PCR confirmation for those with breakthrough infection and final vaccine dose for controls). Full-length viral genomic sequencing was used to determine SARS-CoV-2 variant identity. Enzyme-linked immunosorbent assays were used to determine serum dilution titers with a 50% effective concentration (EC_{50}) of IgG, IgA, and IgM antibodies specific to the SARS-CoV-2 spike receptor-binding domain. Live SARS-CoV-2 neutralizing serum dilution titers were determined by 50% focus reduction neutralization tests ($FRNT_{50}$) against isolates of the original SARS-CoV-2 strain (WA1) and variants of concern (Alpha, Beta, Gamma, and Delta). Median breakthrough and control serum values were calculated in GraphPad Prism and compared with the Wilcoxon matched-pairs signed rank test with the Holm-Šídák correction. Delta-neutralizing potency was determined by comparing Delta- and WA1-neutralizing titers for sequence-confirmed Delta variant breakthrough cases, non-Delta breakthrough cases, and controls using the Kruskal-Wallis test with Dunn correction. Statistical significance was defined as a 2-tailed $P < .05$. Additional laboratory methods are provided in the Supplement. The Oregon Health & Science University institutional review board approved this study. Written informed consent was obtained.