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# Vaccine Verification in the COVID-19 World

Daniel A. Salmon,<sup>a,\*#</sup> Jad A. Elharake,<sup>b,c</sup> Noel T. Brewer,<sup>d,e,#</sup> Richard M. Carpiano,<sup>f,#</sup> Renee DiResta,<sup>g</sup> Yvonne A. Maldonado,<sup>h,#</sup> Sema K. Sgaier,<sup>i,j,k</sup> and Saad B. Omer,<sup>a,b,l,m,#</sup> on behalf of The Lancet Commission on Vaccine Refusal, Acceptance, and Demand in the USA

<sup>a</sup>Institute for Vaccine Safety, Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, USA

<sup>b</sup>Yale Institute for Global Health, New Haven, CT, USA

<sup>c</sup>Department of Internal Medicine (Infectious Diseases), Yale School of Medicine, New Haven, CT, USA

<sup>d</sup>Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, NC, USA

<sup>e</sup>Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, NC, USA

<sup>f</sup>School of Public Policy, University of California, Riverside, CA, USA

<sup>g</sup>Stanford Internet Observatory, Stanford University, Stanford, CA, USA

<sup>h</sup>Stanford University School of Medicine, Stanford, CA, USA

<sup>i</sup>Surgo Ventures, Washington DC, USA

<sup>j</sup>Harvard University T H Chan School of Public Health, Boston, Massachusetts, USA

<sup>k</sup>Department of Global Health, University of Washington, Seattle, WA, USA

<sup>l</sup>Department of Epidemiology of Microbial Diseases, Yale School of Public Health, New Haven, CT, USA

<sup>m</sup>Yale School of Nursing, Orange, CT, USA

As the coronavirus disease-2019 (COVID-19) pandemic evolves, strategies to keep businesses and schools open in the United States (U.S.) while sustaining the economy and maintaining public health safety remain paramount. Vaccine verification (also termed *vaccine* or *immunity passport*), a document in either paper or digital format that provides proof of a person's vaccination status against a particular infectious disease, is a strategy to facilitate such goals.<sup>1</sup> Routinely used in many parts of the U.S. and internationally prior to the COVID-19 pandemic, vaccine verification creates safer environments in schools and workplaces, including healthcare settings.<sup>1</sup> Nevertheless, for COVID-19 vaccination, verification has generated substantial controversy, with concerns raised about forgery and the prospects that adopting such passports will lead to discrimination and/or exacerbate existing social and economic inequities.<sup>1</sup> To help address these concerns, we explore the issue of vaccine verification broadly and conclude by offering recommendations for designing, implementing, and maintaining COVID-19 verification systems.

## Who historically has verified vaccination?

Every U.S. state requires vaccination to attend primary and secondary school, and many states have requirements for day care and colleges.<sup>2</sup> Many healthcare systems require vaccination of their employees.<sup>2</sup> In these situations, the entity requiring vaccination (e.g., school,

university, and health system) establishes the method for verification.<sup>2</sup>

## How have institutions historically verified vaccination?

Verifying vaccination often requires a form that an individual's primary care provider (or historically, a parent) completes.<sup>1</sup> Many states or regions allow schools to access immunization information systems, thereby permitting direct access to records by the school officials responsible for ensuring vaccine compliance.<sup>2</sup> Colleges and health systems that require vaccinations also have similar verification processes.<sup>2</sup>

Beyond the U.S., the International Certificate of Vaccination or Prophylaxis (ICVP) or the Yellow Card is a well-established travel document created by the World Health Organization and required by some countries for entry.<sup>3</sup> Notably, several countries, including Nigeria, Zambia, and Zimbabwe, are developing digital certificates that can authenticate an ICVP.<sup>3</sup> As of July 2019, Nigeria requires its citizens to have its digital "e-Yellow Card" for travel outside the country.<sup>3</sup> Like many verification systems in other nations, the card has a quick response (QR) code that can be scanned to verify its validity.<sup>3</sup>

## What are the responsibilities of vaccine providers?

Everyone who chooses to be vaccinated has a right to have that vaccine documented in a manner that is accurate, includes pertinent information (e.g., name of person vaccinated, vaccine type and manufacturer, date[s] of vaccination), and can reasonably be used for vaccine

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\*Corresponding Author. Daniel A. Salmon, PhD, MPH, Mailing Address: 615 N. Wolfe Street, W5035, Baltimore, MD, USA. Phone: 443-803-7754.

E-mail address: [dsalmon1@jhu.edu](mailto:dsalmon1@jhu.edu) (D.A. Salmon).

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Name	Developer(s)	Location	Purpose
Excelsior Pass <sup>5</sup>	New York Government and International Business Machines Corporation	New York, U.S.	Proof of COVID-19 vaccination and COVID-19 test results for domestic travel
Travel-Ready Center <sup>5</sup>	United Airlines	U.S.	Proof of COVID-19 vaccination and COVID-19 test results
Digital COVID-19 Vaccine Record <sup>6</sup>	California Government	California, U.S.	Proof of COVID-19 vaccination for domestic travel
Hawaii Safe Travels <sup>6</sup>	Hawaii Government	Hawaii, U.S.	Proof of COVID-19 vaccination for domestic and international travel
MyIRMobile <sup>6</sup>	MyIRMobile	Arizona, Louisiana, Maryland, Mississippi, North Dakota, Tennessee, Washington, West Virginia, and Washington DC	Proof of COVID-19 vaccination for domestic travel
myColorado App <sup>6</sup>	Colorado Government and myColorado	Colorado	Proof of COVID-19 vaccination and COVID-19 test results.
LA Wallet <sup>6</sup>	Louisiana Government and Envoc	Louisiana	Proof of COVID-19 vaccination.
Green Pass <sup>7</sup>	Government	Israel	Proof of COVID-19 vaccination, and recovery from COVID-19 for domestic travel
My COVID Pass <sup>7</sup>	Africa's Centers for Disease Control and Prevention, PanaBIOS Consortium, and Econet Group	Africa	Proof of COVID-19 vaccination and COVID-19 test results
Digital Green Certificate <sup>5</sup>	European Union Council	European Union Member States	Proof of COVID-19 vaccination, COVID-19 test results, and COVID-19 recovery for international travel
COVID-19 Passport "Coronapas" <sup>8</sup>	Government	Denmark	Proof of COVID-19 vaccination and COVID-19 test results for domestic travel
VaccineGuard <sup>9</sup>	Guardtime	Estonia, Iceland, and Hungary	Proof of COVID-19 vaccination for domestic and international travel
ArriveCan <sup>6</sup>	Government	Canada	Proof of COVID-19 vaccination and COVID-19 test results for international travel
Travel Pass <sup>6</sup>	International Air Transport Association	Global	Proof of COVID-19 vaccination and COVID-19 test results
VeriFLY <sup>6</sup>	VeriFLY	Global	Proof of COVID-19 vaccination and COVID-19 test results
Smart Vaccination Certificate <sup>7</sup>	World Health Organization	Global	Proof of COVID-19 vaccination for domestic (e.g., sporting events or college campuses) or international travel

**Table 1: Examples of U.S. and Global COVID-19 Vaccine Verifications.**

verification.<sup>4</sup> The primary responsibility for providing individuals with this documentation lies with the entity that provided the vaccine. This may include healthcare providers, pharmacies, mass vaccination sites, or any other entity authorized to deliver the vaccine.

### COVID-19 vaccine verification

COVID-19 vaccine verification systems are most justifiable in countries in which vaccines have been approved and recommended by appropriate regulatory bodies as

safe and effective and are widely available and equitably distributed. In the U.S., states and regions use immunization information systems (IIS), confidential and population-based digital databases that track and record individuals' vaccination status, but the U.S. does not have a national IIS.<sup>5</sup> For this reason, many states, including California, New York, and Colorado, and private companies have developed a digital platform to show proof of COVID-19 vaccine status and test results for domestic and international travel, while European nations have adopted similar systems (Table 1).<sup>5-9</sup>

However, these applications vary in quality. Likewise, the existence of different public and private, domestic and international platforms present challenges to ensuring that individuals do not need to sign up for multiple databases for different activities.

Considering existing verification systems and the parameters specific to COVID-19 vaccines, we recommend the following steps to implement effective COVID-19 vaccine verification programs:

1. The U.S. Department of Health and Human Services (HHS) should use its powers to create a national vaccine registry, which should include all vaccines. Under section 361 of the Public Health Service Act (42 U.S. Code § 264), the U.S. Secretary of HHS is authorized to take measures to prevent the entry and spread of infectious diseases from foreign countries into the United States and between states.<sup>10</sup>
2. The Centers for Disease Control and Prevention (CDC) or the HHS Office of the National Coordinator for Health Information Technology should establish standards for certifying COVID-19 vaccination, which states and private companies can then use to develop and maintain reliable, accurate proof of COVID-19 vaccination and eventually boosters.
3. State and regional health departments should validate vaccination status for third parties, at the request of the vaccinee, and develop digital platforms, with a print option (to reduce the potential of exacerbating existing social and economic inequities), to show proof of vaccination.
4. Existing state laws prohibiting fraudulent documentation (e.g., driver's license) should be applied to vaccine verification to reduce fraud and abuse.

Overall, given the importance of vaccine verification programs, especially during the COVID-19 pandemic, clearly formulated protocols offer economic and public health benefits and should be implemented to create safer environments in school, work, and healthcare settings.

#### Declaration of interests

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submitted work. The other authors declare no competing interests.

#### Contributors

All authors contributed to the drafting and editing of the manuscript.

#### Members of *The Lancet* Commission on Vaccine Refusal, Acceptance, and Demand

Saad B. Omer; Rebecca E. Cooney; Regina M. Benjamin; Noel T. Brewer; Alison M. Bittenheim; Timothy Callaghan; Arthur Caplan; Richard M. Carpiano; Chelsea Clinton; Renee DiResta; Jad A. Elharake; Lisa C. Flowers; Alison P. Galvani; Rekha Lakshmanan; Yvonne A. Maldonado; SarahAnn M. McFadden; Michelle M. Mello; Douglas J. Opel; Daniel A. Salmon; Jason L. Schwartz; Sema K. Sgaier; Joshua M. Sharfstein; Peter J. Hotez

**Affiliations:** Yale Institute for Global Health, New Haven, CT, USA (SBO, JAE, SMM); Department of Internal Medicine (Infectious Diseases), Yale School of Medicine, New Haven, CT, USA (SBO, JAE, SMM); Department of Epidemiology of Microbial Diseases, Yale School of Public Health, New Haven, CT 06510, USA (SBO); Yale School of Nursing, Orange, CT, USA (SBO); *The Lancet*, New York, NY, USA (REC); Gulf States Health Policy Center, Bayou La Batre, AL, USA (RMB); Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, NC, USA (NTB); Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, NC, USA (NTB); Department of Family and Community Health, University of Pennsylvania School of Nursing, and Center for Health Incentives and Behavioral Economics, University of Pennsylvania, Philadelphia, PA, USA (AMB); Department of Health Policy and Management, School of Public Health, Texas A&M University, College Station, TX, USA (TC); New York University Langone School of Medicine, New York University, New York, NY, USA (AC); School of Public Policy, University of California, Riverside, CA, USA (RMC); Clinton Foundation, New York, NY, USA (CC); Mailman School of Public Health, Columbia University, New York, NY, USA (CC); Stanford Internet Observatory, Stanford University, Stanford, CA, USA (RD); Department of Obstetrics & Gynecology, Emory University, Atlanta, Georgia, USA (LCF); Center for Infectious Disease Modeling and Analysis, Yale School of Public Health, New Haven, CT, USA (APG); The Immunization Partnership, Houston, TX, USA (RL); Stanford University School of Medicine, Stanford, CA, USA (YAM); Stanford Law School, Stanford, CA, USA (MMM); Center for Health Policy/Primary Care and Outcomes Research, Department of Medicine, Stanford University School of Medicine, Stanford, CA, USA (MMM); Freeman Spogli Institute for International Studies, Stanford University, Stanford, CA, USA

(MMM); Department of Pediatrics, University of Washington School of Medicine, Seattle, WA, USA (DJO); Seattle Children's Research Institute, Seattle, WA, USA (DJO); Institute for Vaccine Safety, Department of International Health, Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD, USA (DAS); Surgo Ventures, Washington DC, USA (SKS); Harvard University T H Chan School of Public Health, Boston, MA, USA (SKS); Department of Global Health University of Washington, Seattle, WA, USA (SKS); Department of Health Policy and Management, Yale School of Public Health, New Haven, CT, USA (JLS); Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA (JMS); Texas Children's Center for Vaccine Development, Departments of Pediatrics and Molecular Virology and Microbiology, National School of Tropical Medicine, Baylor College of Medicine, Houston, TX, USA (PJH); Department of Biology, Baylor University, Waco, TX, USA (PJH); Hagler Institute for Advanced Study at Texas A&M University, College Station, TX, USA (PJH); James A Baker III Institute for Public Policy, Rice University, Houston, TX, USA (PJH); Scowcroft Institute of International Affairs, Bush School of Government and Public Service, Texas A&M University, College Station, TX, USA (PJH).

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