

Human Infections with Highly Pathogenic Avian Influenza A(H5N1) Viruses Clinical Issues and Gaps

Tim Uyeki MD, MPH, MPP

Influenza Division

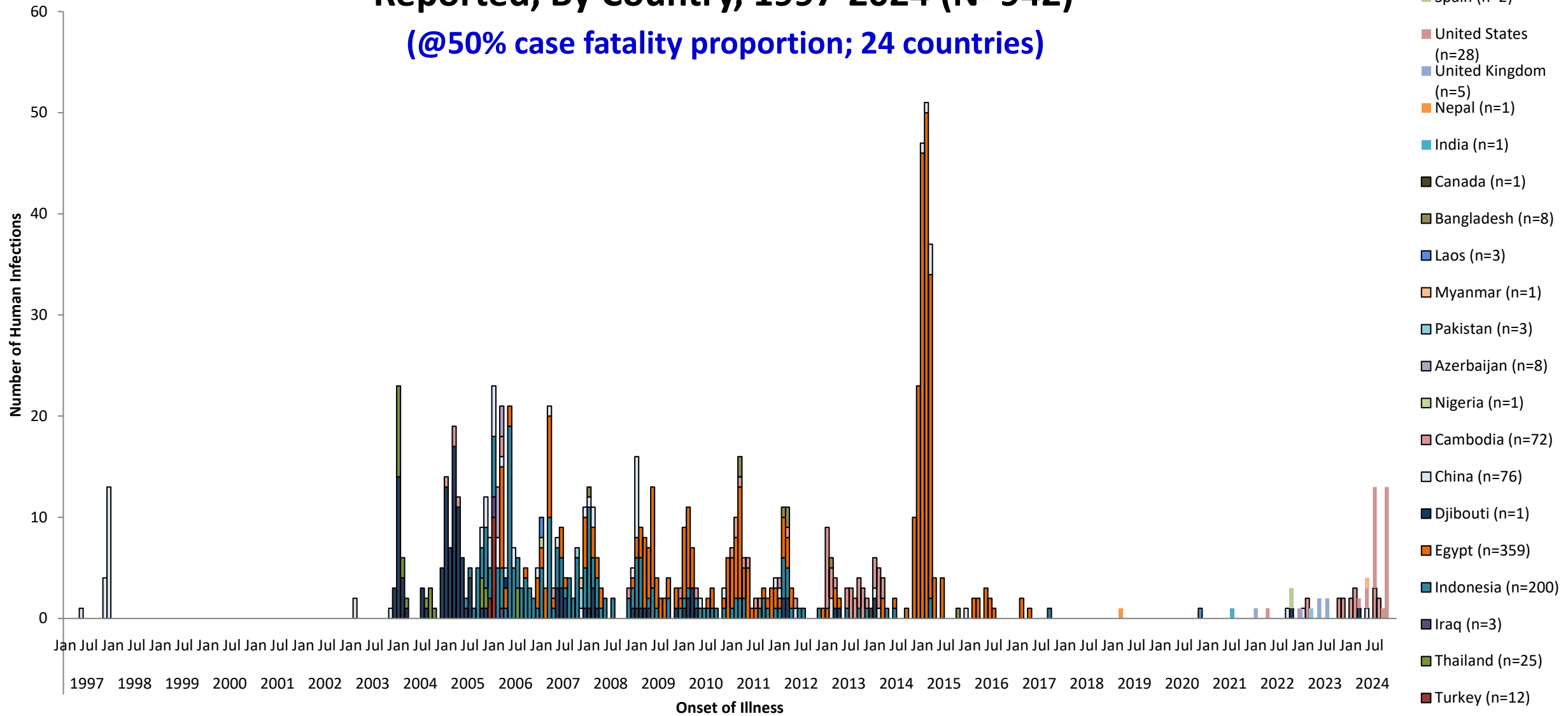
National Center for Immunization and Respiratory Diseases

Centers for Disease Control and Prevention

October 23, 2024

Epidemic Curve of Human Cases of A(H5N1) by Illness Onset Date or Date Reported, By Country, 1997-2024 (N=942)*

(@50% case fatality proportion; 24 countries)



*As of October 22, 2024

U.S. Cases, 2022-2024* (H5N1 clade 2.3.4.4b viruses)

- **28 Human cases (27 in 2024) (no secondary transmission identified)**
 - **Oseltamivir treatment given/offered; Oseltamivir PEP for close contacts**
 - **Associated with poultry exposures: 10**
 - April 2022: 1 case reported “fatigue” while depopulating poultry
 - **July 2024: 9 cases of conjunctivitis in poultry workers depopulating poultry (one state)**
 - **Associated with dairy cattle exposures: 17 (contact transmission)**
 - 332 H5N1+ dairy cattle farms in 14 states (March-October 2024)
 - March - October 2024: 17 cases in dairy farm workers (4 states)
 - **Mild illness (16 with conjunctivitis, 1 with respiratory illness)**
 - **Unknown source: 1**
 - August 2024: 1 case in a person with no exposures to animals or sick persons
 - **Moderate non-respiratory illness in a person with chronic medical conditions (hospitalized)**
 - Hospitalized for 3 days, received Oseltamivir treatment; recovered



Uyeki NEJM 2024

*As of October 22, 2024; Morse NEJM 2024; Uyeki NEJM 2024; Drehoff MMWR 2024

Severe/Critical Illness (H5N1 clade 2.3.4.4b viruses)

■ Ecuador (2022)

- 9-year-old girl hospitalized with pneumonia, respiratory failure, septic shock. History of exposure to backyard poultry that died (rural area)
 - Received Oseltamivir treatment during hospitalization, survived; no secondary transmission

■ Chile (2023)

- Middle-aged man hospitalized with pneumonia, respiratory failure (lived in coastal area with die-offs of seabirds and marine mammals)
 - Received Oseltamivir treatment during hospitalization, survived, no secondary transmission

■ China (2022-2024)

- 1 case of mild illness, 2 cases of critical illness, 1 death

Cambodia Cases (2023-2024) (H5N1 clade 2.3.2.1c viruses)

- **16 cases in rural villagers exposed to sick/dead backyard poultry**
 - **Some clinically mild cases (children, adults)**
 - **10 severe/critical illness cases, 6 deaths**
 - **Oseltamivir treatment started after H5N1 was diagnosed in hospital**
 - **Oseltamivir post-exposure prophylaxis given to close contacts (household members)**

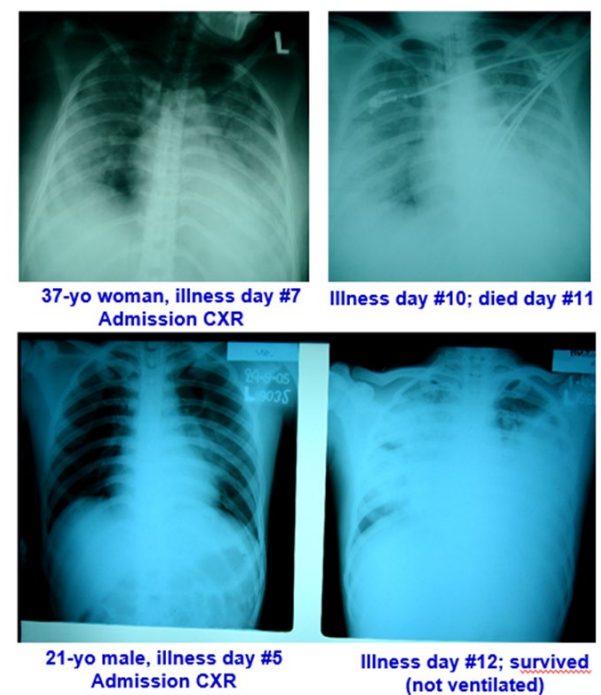
Complications of H5N1 Virus Infection

➤ Pneumonia is the most common complication

- Progression to respiratory failure, ARDS
 - Community-acquired bacterial co-infection is rare

■ Other severe complications

- Acute kidney injury
- Cardiac failure
- Sepsis, shock, DIC, multi-organ failure (respiratory and renal failure)
- Atypical complications
 - Encephalitis with diarrhea and pneumonia; encephalitis with obstructive hydrocephalus; meningoencephalitis with pneumonia
 - Reye syndrome with salicylate exposure
 - Spontaneous miscarriage in a pregnant woman
 - Vertical transmission (mother-to-fetus)



T Uyeki, CDC September 2005

Pathogenesis of Severe Disease

H5N1 virus infection of the respiratory tract (lower respiratory tract) → high viral levels → triggers a dysregulated host inflammatory response

- Proinflammatory cytokines and chemokines can cause diffuse alveolar damage/acute lung injury, and multi-organ tissue injury
- **Extrapulmonary viral dissemination** can occur from viremia
 - H5N1 virus isolated from blood/serum/plasma, rectal swab/feces, CSF

Clinical Management: Antiviral Treatment for H5N1

- No RCTs of antivirals for H5N1 patients
- Limited observational data
 - **Oseltamivir treatment versus no treatment and starting treatment early after symptom onset is associated with lower mortality**

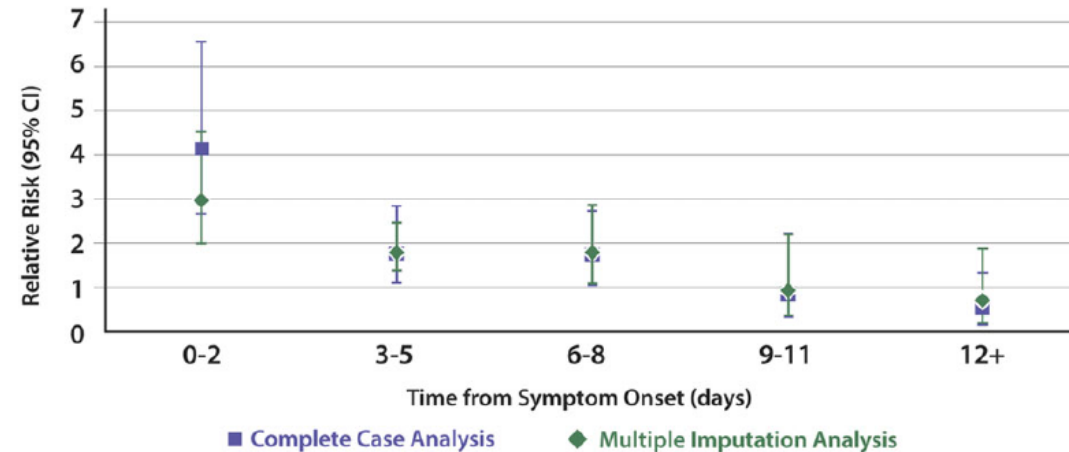
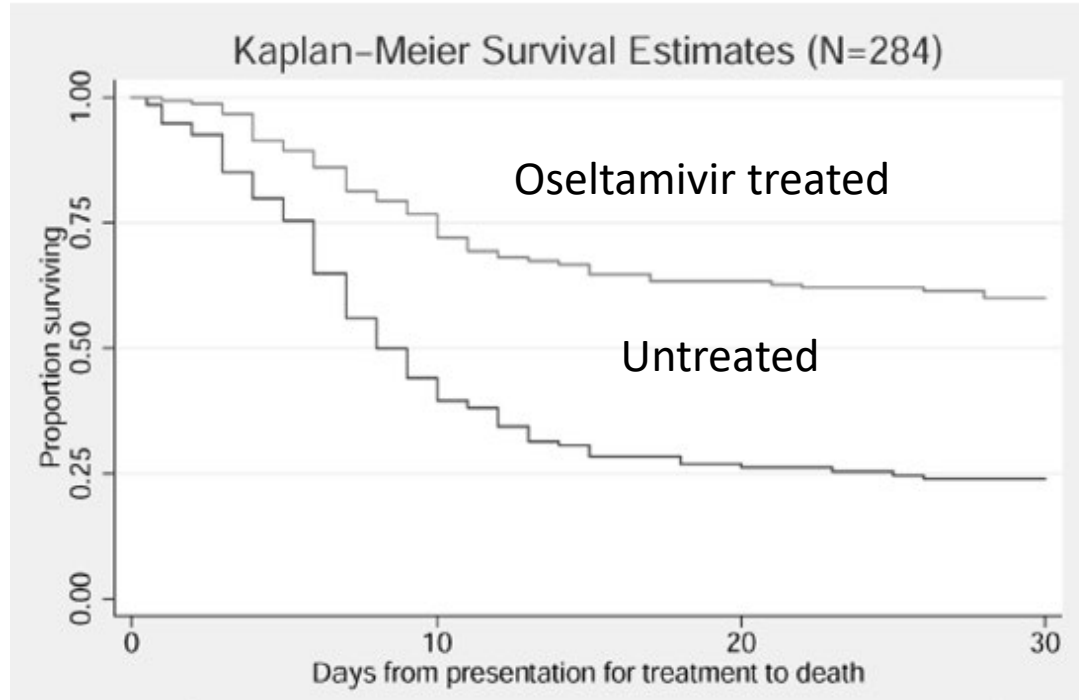


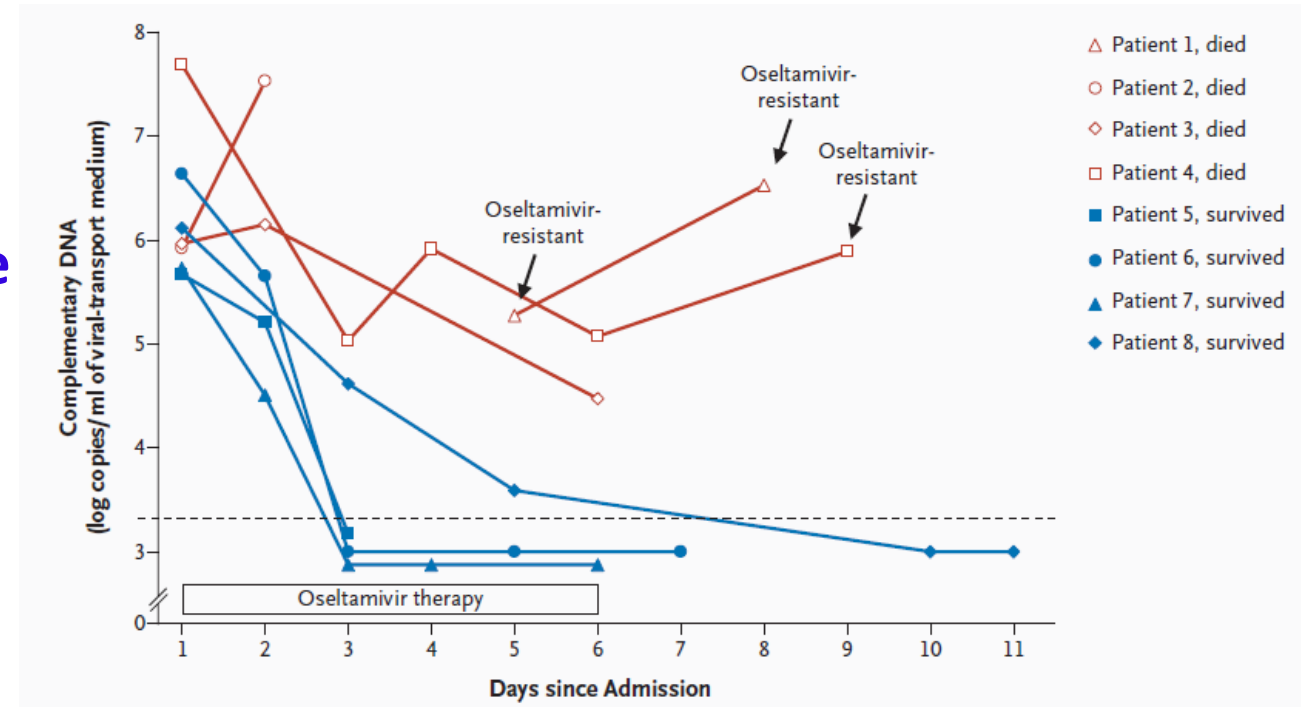
Figure 1. Comparison of relative risk of survival by timing of oseltamivir initiation between complete case and multiple imputation analysis. Squares, complete case analysis; diamonds, multiple imputation analysis. CI, confidence interval.

Clinical Management: Antiviral Treatment

- H5N1 viruses infecting patients in 2024 are susceptible to Oseltamivir
- Start Oseltamivir treatment empirically as soon as possible for suspected H5N1 virus infection (based on history of exposures)
 - Oseltamivir standard dosing: twice daily x 5 days (*no data for Baloxavir*)

■ Lower respiratory tract disease:

- Optimal Oseltamivir dosing/duration unknown; longer treatment for severe disease, prolonged shedding
- Emergence of oseltamivir resistance reported during or after treatment



Clinical Management: Research Gaps

- **What is the duration of H5N1 viral shedding?**
- **Optimal Antiviral post-exposure prophylaxis strategies?**
- **Optimal Antiviral treatment?**
 - **Optimal dosing and duration; benefit of combination treatment?**
 - **Role of immunotherapy?**
- **Optimal Adjunctive therapy**
 - **Clinical benefit of low-dose/moderate-dose corticosteroids?**
 - **Clinical benefit of other immunomodulators (e.g., IL-6 receptor blockers, JAK inhibitors)?**
- **Optimal Supportive care**
 - **Optimal advanced organ support; who can benefit most from ECMO?**
- **Prognostic biomarkers?**

Clinical Management: Research Gaps

■ H5N1 (global research)

- Standardized clinical data collection for cases (observational studies)
- Serial clinical specimen collection and testing
- Integrated analyses of epidemiologic/clinical/laboratory data

■ Seasonal Influenza (need sustained funding commitment)

- Need to optimize early diagnosis and early initiation of antiviral treatment
- Need to develop national clinical research infrastructure capacity to improve clinical management of seasonal influenza patients (before the next pandemic)
 - Clinical trials of interventions (therapeutics, supportive care strategies) for patients with severe seasonal influenza
 - Platforms: adaptive clinical trials; prospective observational studies
 - Can also be an integrated clinical research platform for respiratory virus infections of public health importance (e.g., RSV, SARS-CoV-2, influenza viruses)

H5N1 Avian Influenza Research Priorities

clinical care, preparedness and response

Carlos del Rio, MD

Emory Vaccine and Treatment Evaluation Unit

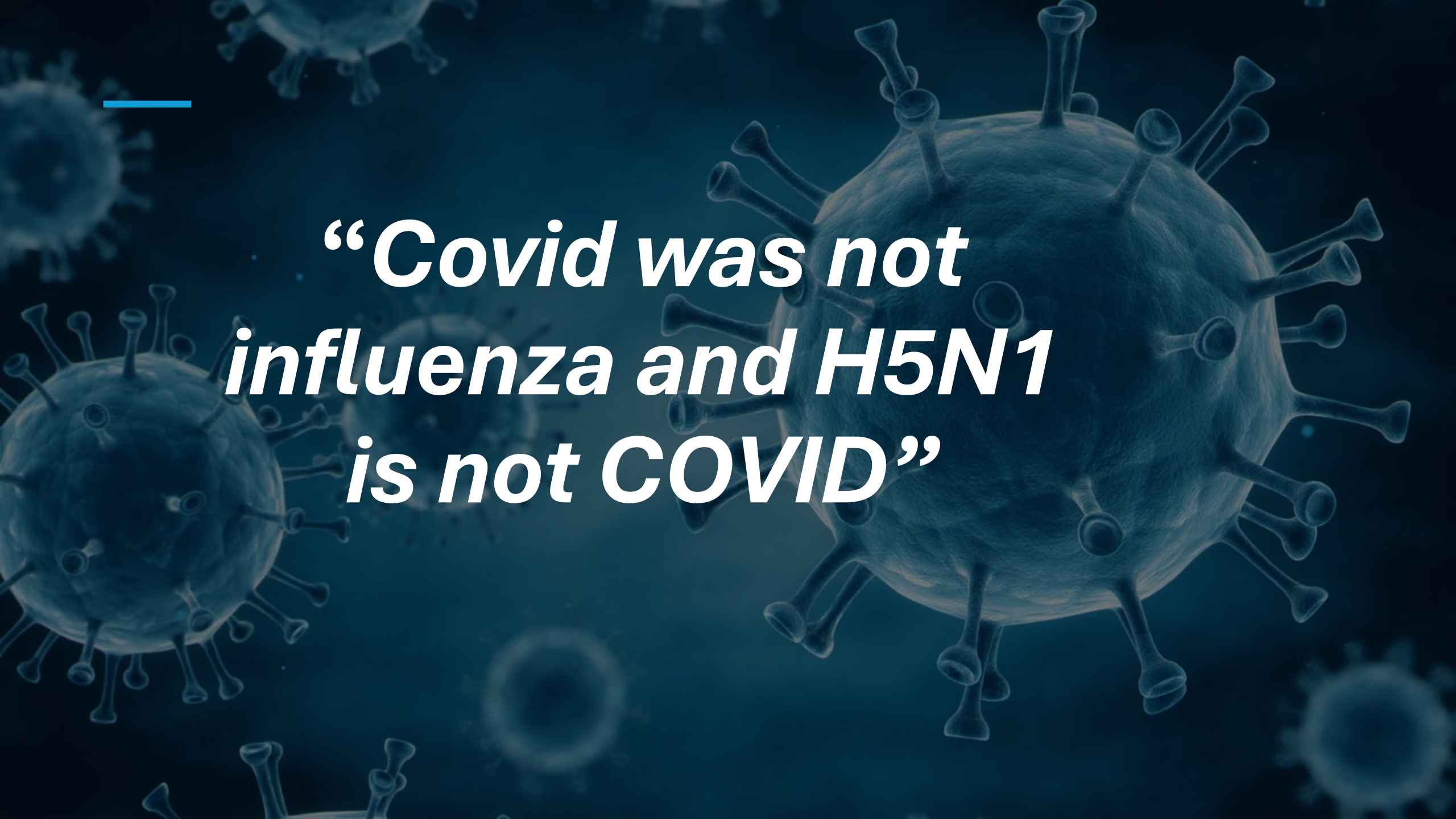


@Carlosdelrio7



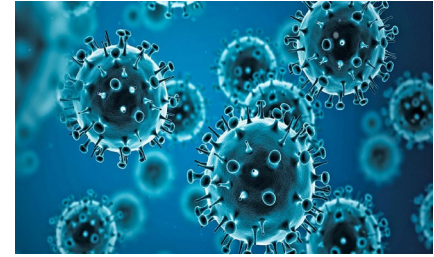
The Hope Clinic
Emory Vaccine Center



The background of the image features several stylized, blue-tinted illustrations of coronavirus particles. These particles are spherical with numerous spike-like protrusions on their surfaces. They are scattered across the frame, with some appearing more prominent than others. The overall color scheme is a dark, muted blue.

***“Covid was not
influenza and H5N1
is not COVID”***

Identification



Testing is critical and needs to be rapid accurate and accessible for case identification

Need for testing in healthcare facilities rather than public health labs (the recent FDA ruling on LDTs is an additional impediment to getting this done)

Testing must quickly be deployed to hospitals and clinics

Point of care testing can enable rapid treatment



Research priorities include:

Who to screen and test, and how extensively, should this be dependent on epidemiology and individual risk factors?

What is the best test to use in clinical testing?

Can rapid testing impact clinical care?



Isolation



Isolation precautions are designed to achieve containment, as that is the phase of the outbreak we are in. PPE shortages could occur if we have a larger outbreak

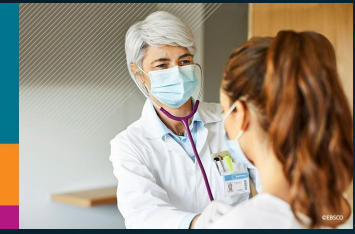


Research priorities include:

We need a better understanding of how PPE functions in a variety of settings

We need to really understand airborne transmission of influenza better and to really understand what constitutes aerosol generation procedures in health care and probably in the milking parlor as well

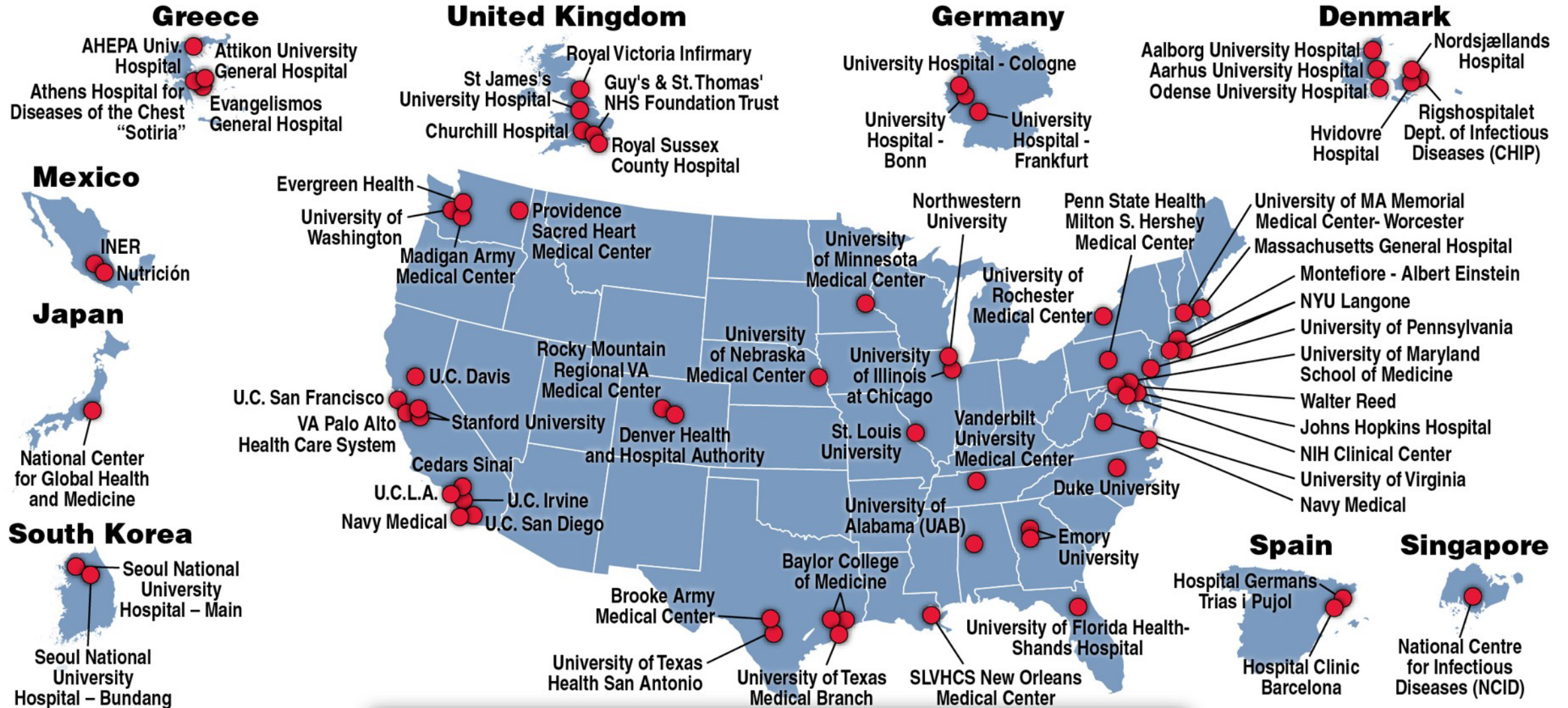
High temperatures outside of healthcare have made compliant use of some PPE especially face masks challenging, what is the right PPE that people will use and be comfortable and protected



Clinical management

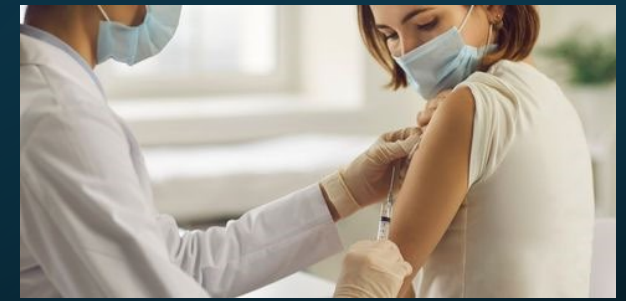
- **Its hard to change clinical practice.**
- Antivirals need to be started soon after symptom onset which means distribution and supply chain are critical.
- Oseltamivir is recommended for both treatment and PEP. Shortages could occur if we have a larger outbreak. We don't know the optimal dose.
- Our existing antivirals are effective but only moderately so.
- Steroids do not improve outcomes for seasonal flu but the were important in COVID.
- Children were left out of clinical research for Covid-19, which was not catastrophic because the burden on children was not as great.
- There will be a need to develop clinical guidelines.
- **Research questions include:**
 - Novel ways to dispense testing and antivirals such as telemedicine and alternate delivery modes such as the use of drones.
 - We will need an effective rapid clinical trial response as we did for CoVPN to evaluate newer agents (antivirals and monoclonals) as well as combination therapy.
 - Role of steroids and other therapies targeting the host response
 - Be sure to include children and pregnant women in clinical trials

NIAID Adaptive Randomized, Controlled Treatment Trial for COVID-19



1,062 enrollees at trial close, 4/19/2020

Vaccination



Lessons learned from covid can be reused to scale up vaccination if that becomes necessary



Prototype H5N1 vaccines exist, however, egg-based production cannot provide enough vaccine in a timely fashion



Research priorities include:

- Need data on effective vaccines that can be produced quickly – cell-culture based, recombinant and hopefully mRNA.
- Need production capacity for these vaccines
- Need to understand the neutralizing effect of the currently available vaccines against the circulating virus
- We need better vaccines

Communication

Communications should make clear that recommendations and policies can and will change.



Research priorities include:

We need effective research, evaluation and communication around non-pharmaceutical interventions

Communication is key, but to improve, we need to deploy real time research on communication strategies, effective ways to combat misinformation and to understand what channels work, particularly for marginalized communities

Equity, equity, equity....

There were tragedies and successes in reaching at risk communities during COVID. We can use that experience to do better.

Reality, Barriers, and Gaps: Infection Prevention and Control for Novel Influenza

Erica S. Shenoy, MD, PhD, FIDSA, FSHEA

Chief of Infection Control, Mass General Brigham

Physician, Division of Infectious Diseases, Massachusetts General Hospital

Medical Director, Emerging Special Pathogens Treatment Center, Massachusetts General Hospital

Associate Professor, Harvard Medical School

Roadmap

- Background on IPC approaches and impact
- Current state reality and barriers
- Research gaps

Acronyms:

IPC: Infection Prevention and Control

HCP: healthcare personnel

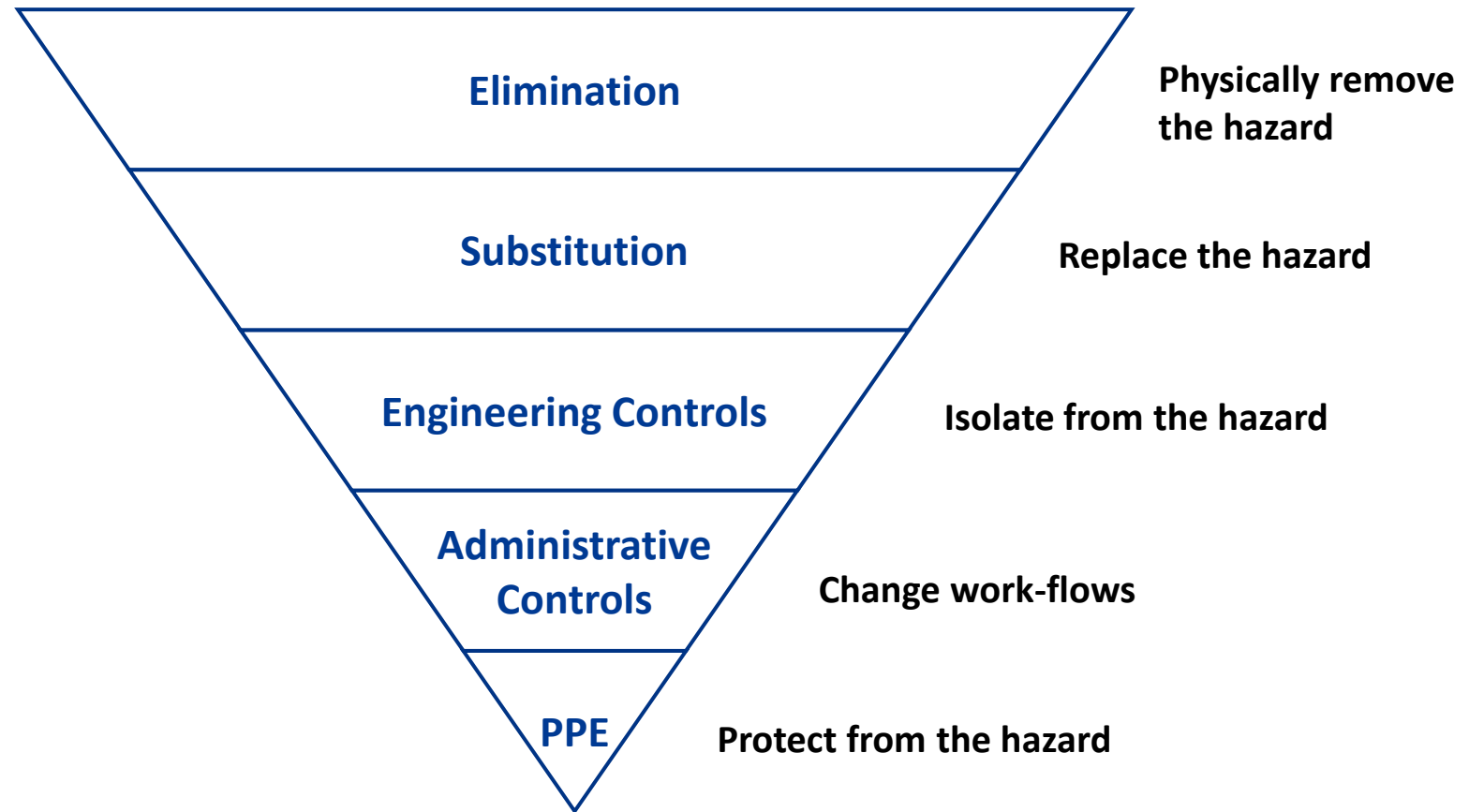
PPE: Personal Protective Equipment

AIIR: Airborne Infection Isolation Room (“Negative Pressure” room)



Background on IPC and a Framework for Hazard Reduction

- Infection Prevention and Control (IPC) uses evidence-based strategies to reduce the risk of transmission of infection in healthcare settings
- For an emerging infection, we will need to apply principles and available evidence related to modes of transmission, severity of illness, availability of medical countermeasures, and other factors to approach to management of patients, healthcare personnel (HCP), and visitors



<https://www.cdc.gov/niosh/topics/hierarchy/default.html>

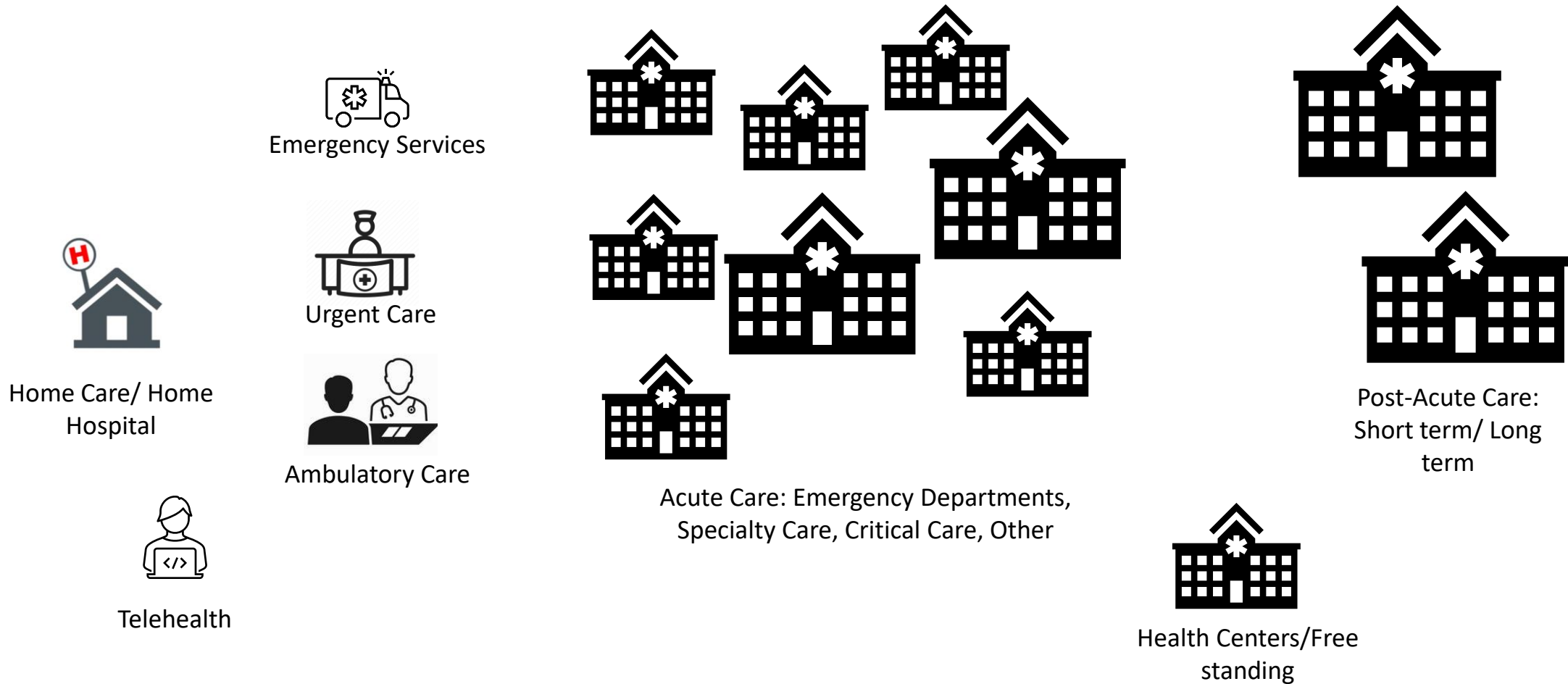


When an infection emerges/re-emerges

- Early in the emergence of a pathogen with potential for human impact and person-to-person spread, HCP will be unfamiliar with risk factors, presentation, as well as testing strategies, isolation, PPE, clinical evaluation and management, and de-isolation
 - New information will need to be assimilated by a healthcare workforce that is experiencing unprecedented burn out
 - Minimizing cognitive burden is essential to patient and HCP safety
 - Testing availability will be key to inform IPC
- IPC choices and strategies will have major impacts on quality of care and healthcare facility operations
 - Bed capacity and patient throughput
 - Supply chain (lab, PPE, cleaning and disinfection products...)
 - Workforce capacity and resiliency
 - Data/surveillance integrity
 - Collateral impact on healthcare associated infections, patient safety

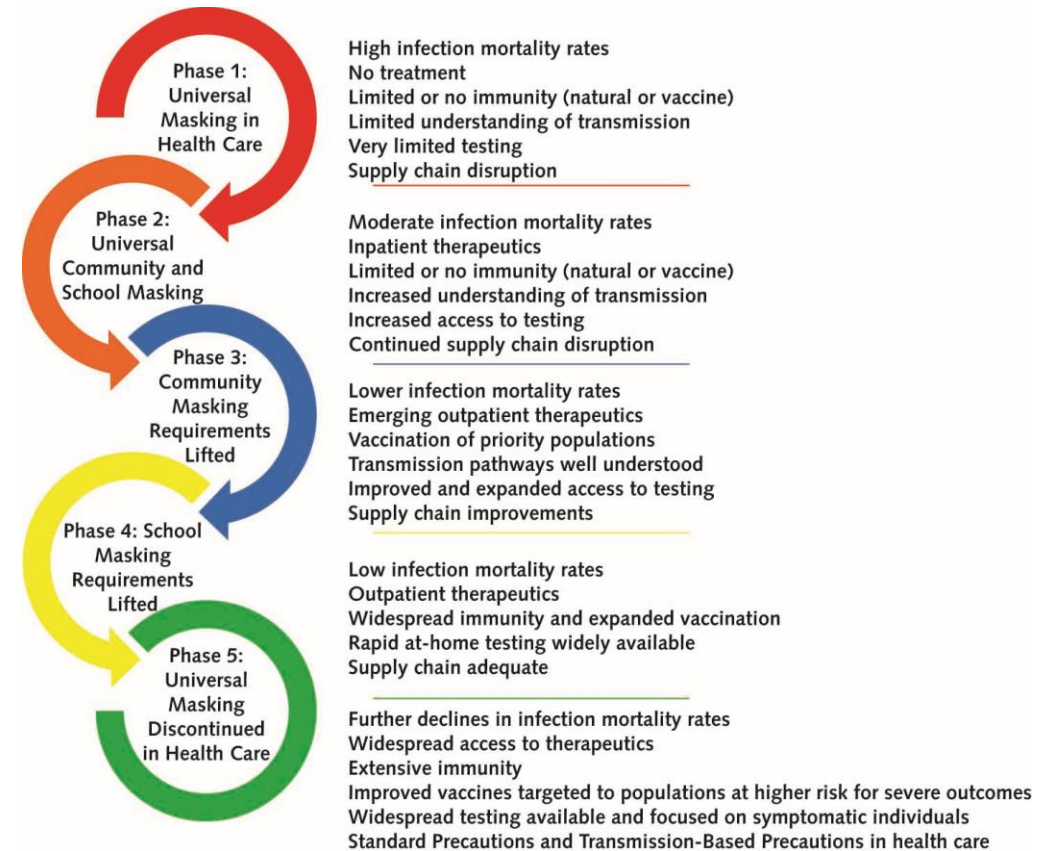


IPC Needs Span **All** Healthcare Settings | Patients and Healthcare Personnel **Move** Between Settings



We need IPC on-ramps *and* off-ramps...

- Our IPC approaches to emerging infections need to be implemented, and de-implemented when appropriate
- Periodic reassessment of risk : benefit of approaches is necessary
- De-implementation can be bumpy
 - Ex: universal masking in healthcare settings



Shenoy ES, Babcock HM, Brust KB, Calderwood MS, Doron S, Malani AN, Wright SB, Branch-Elliman W. Universal Masking in Health Care Settings: A Pandemic Strategy Whose Time Has Come and Gone, For Now. *Ann Intern Med.* 2023 Jun;176(6):859-861. doi: 10.7326/M23-0793. Epub 2023 Apr 18. PMID: 37068281; PMCID: PMC10111407.



Current State Reality and Barriers



Current State (1): How will HCP **identify** patients at risk for novel influenza in order to **isolate** and evaluate?

- Current novel influenza exposure risks are specific and geographic
 - How should screening for risks be incorporated into healthcare facility triage, keeping in mind current workforce challenges, resiliency, likelihood of changing case definitions?
- If wider distribution of human cases and then human-human/community spread, specific exposure risks become less helpful in assessment, and triage will be based mostly on symptoms
- Changing definitions and protocols will overwhelm HCP and make triage less efficient

Travel/Exposure/Symptom Screening

Possible Novel Influenza

@PHSEXTFEEDBACK@The patient has symptoms and epidemiological exposures that put them at risk for Novel Influenza. Ensure the patient is wearing a facility-issued facemask and room the patient immediately in an Airborne Infection Isolation room ("negative pressure" room) or private standard room. Refer to the [High Consequence Infectious Disease \(HCID\) Resources](#) page on MGB Infection Control Vitals for instructions on next steps and local points of contact in your site's First Steps Guides.

Primary clinical team should launch .EVALHCID in a Progress Note to complete the risk assessment to determine if the patient should continue Novel Influenza evaluation.

Acknowledge Reason

Do you have new red eye or irritation?

Additional Screening

In the last 3 weeks, have you worked on a large industrial farm/processing plant in close proximity to livestock, zoo, backyard animals, and farm tours are excluded.)

Were you in close contact (<6 ft) with a person with confirmed COVID-19 for a total of

Current State (2): Where will patients be **evaluated** and what **PPE** will be used?

Seasonal Influenza

- **Patient Placement**
 - Standard patient room
 - Cohorting with confirmed type (Flu A with Flu A)
- **HCP PPE**
 - Mask
 - +/- eye protection
- **Patient PPE**
 - Mask outside room

SARS-CoV-2

- **Patient Placement**
 - Standard patient room
 - Cohorting permitted once confirmed infection
- **HCP PPE**
 - N95
 - Eye protection
 - Gowns and gloves- CDC recs; some jurisdictions have stopped
- **Patient PPE**
 - Mask outside room

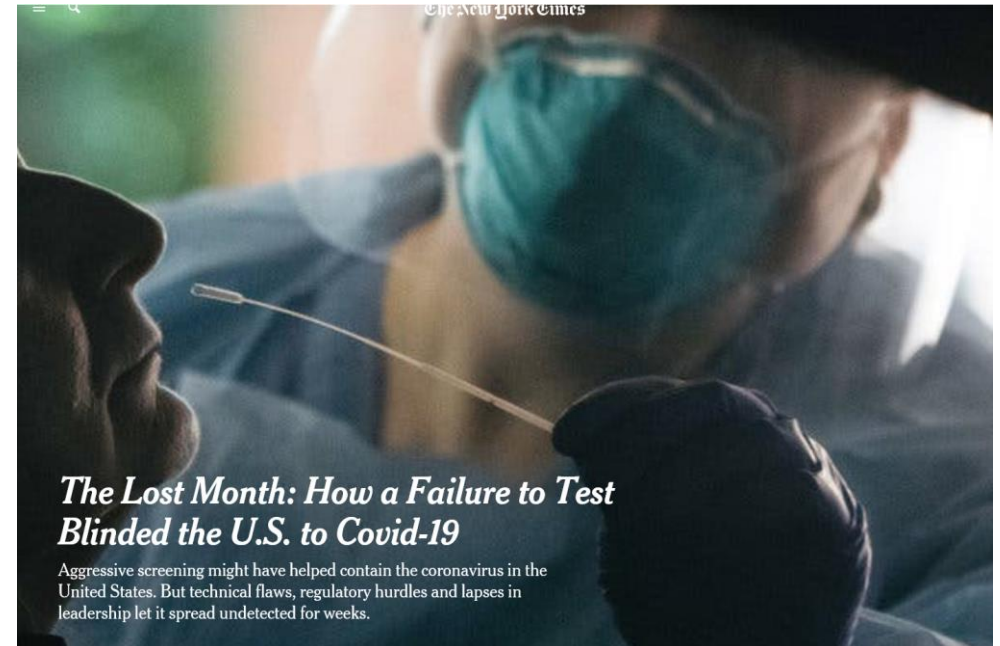
Novel Influenza

- **Patient Placement**
 - AIIR
 - No Cohorting
- **HCP PPE**
 - N95 respirator
 - Eye protection
 - Gowns
 - Gloves
- **Patient PPE**
 - Mask outside room



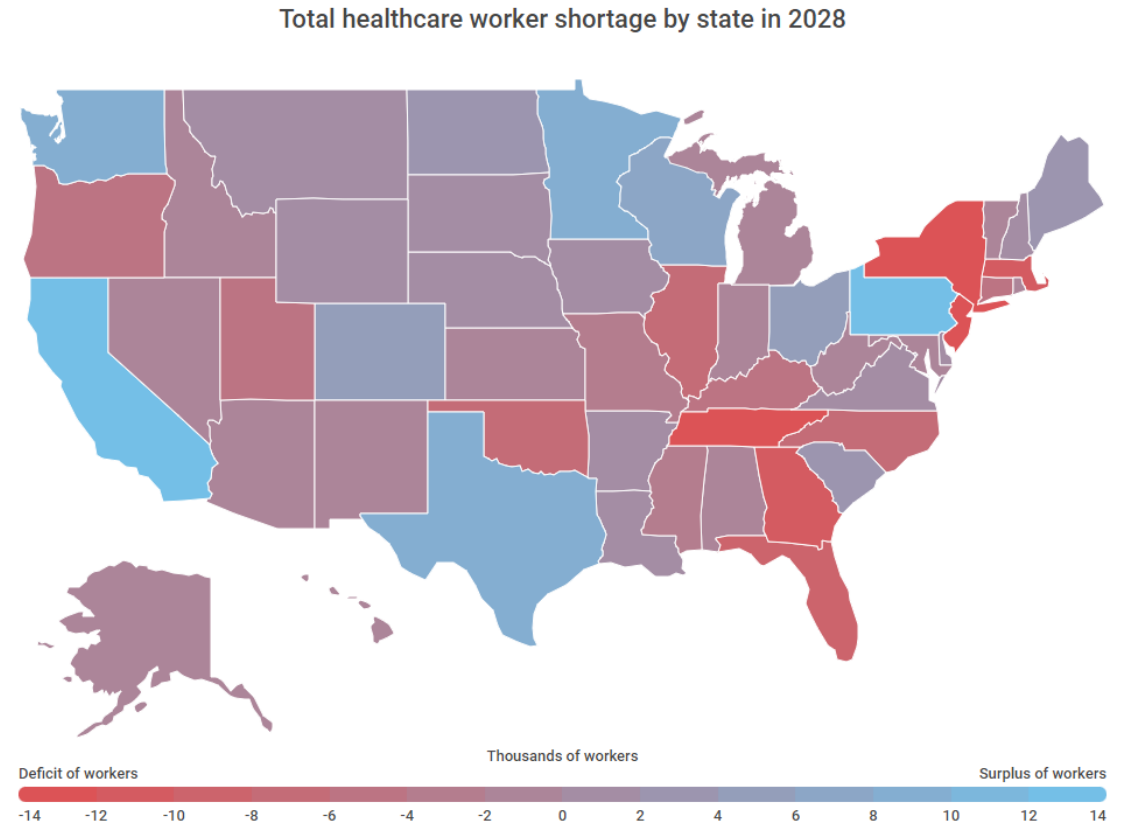
Current State (3): How will patients be **tested** so we can determine isolation, de-isolation, treatment, and more?

- **Laborious process** for *both* HCP and public health colleagues
 - Request approval for testing (hours)
 - Collect specimens (hours)
 - Fill out paper forms (why?)
 - Ship specimens (hours)
 - Await result (days)
 - Results interface delays
- Patient **remains isolated** during that time, treatment delayed, other impacts
- This will be a major bottleneck that we can anticipate, now, and it **won't just last a month**.



Current State (4): How will HCP with exposure, symptoms, infection be **managed**?

- Public health requirements
 - monitoring potentially exposed
 - restriction from work for unprotected exposure
 - Testing, prophylaxis and treatment
- Impact on workforce staffing, healthcare capacity to deliver care and HCP well-being can be anticipated, now



[Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease | Bird Flu | CDC; https://www.advisory.com/daily-briefing/2024/09/09/workforce-shortage](https://www.advisory.com/daily-briefing/2024/09/09/workforce-shortage)

Research Gaps



Questions we need answers to

- IPC Fundamentals
 - Transmission
 - PPE
 - Engineering controls
- Data and Informatics
 - Data collection, maintenance, and release
 - Informatics solutions to support patient evaluation
- Workforce Resiliency, Communication, and De-implementation
 - Supporting workforce resiliency
 - Communicating change and maintaining trust
 - Metrics guiding de-implementation



IPC Research Needs (1): IPC Fundamentals



Transmission

- What is the **major mode** of transmission?
- What are the **incubation, infectious, and exposure** periods?
- How does **type** of exposure impact risk of infection?



PPE

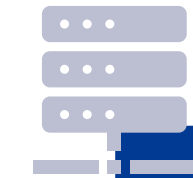
- Should **masks or respirators** be utilized to prevent infection?
- Does transmission and infection occur through **contact**?
- If there is relevant **supply chain disruption**, what are optimal strategies to ensure continuity of operations and patient care? (not specific to H5N1)



Engineering Controls

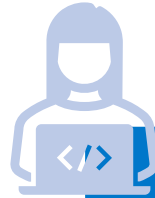
- Are **AIIRs indicated** for all patients, specific patients, specific procedures, or not at all?
- Are there **other engineering controls** that should be implemented to reduce risk of infection?

IPC Research Needs (2): Data and Informatics



Data Collection, Maintenance, and Release

- How can we reduce surveillance, reporting, and other data flow **burdens** on healthcare facilities and HCP while **optimizing** use of data to inform policy at facility, state, and national level?



Clinical Decision Support

- How can we leverage electronic decision support to **reduce cognitive burden** on clinicians and support up to date evaluations (including isolation, PPE, testing, de-isolation)?



Healthcare Workforce Decision Support

- How can we deploy workforce decision support to assist with **communicating** changing public health guidance?

IPC Research Needs (3): Workforce Resiliency, Communication, and De-implementation



Workforce Resiliency

- How can the healthcare workforce be educated and supported to **respond effectively** to emerging infections?



Communication

- How can changes in policy and recommendation be **communicated in a transparent, accessible manner**?

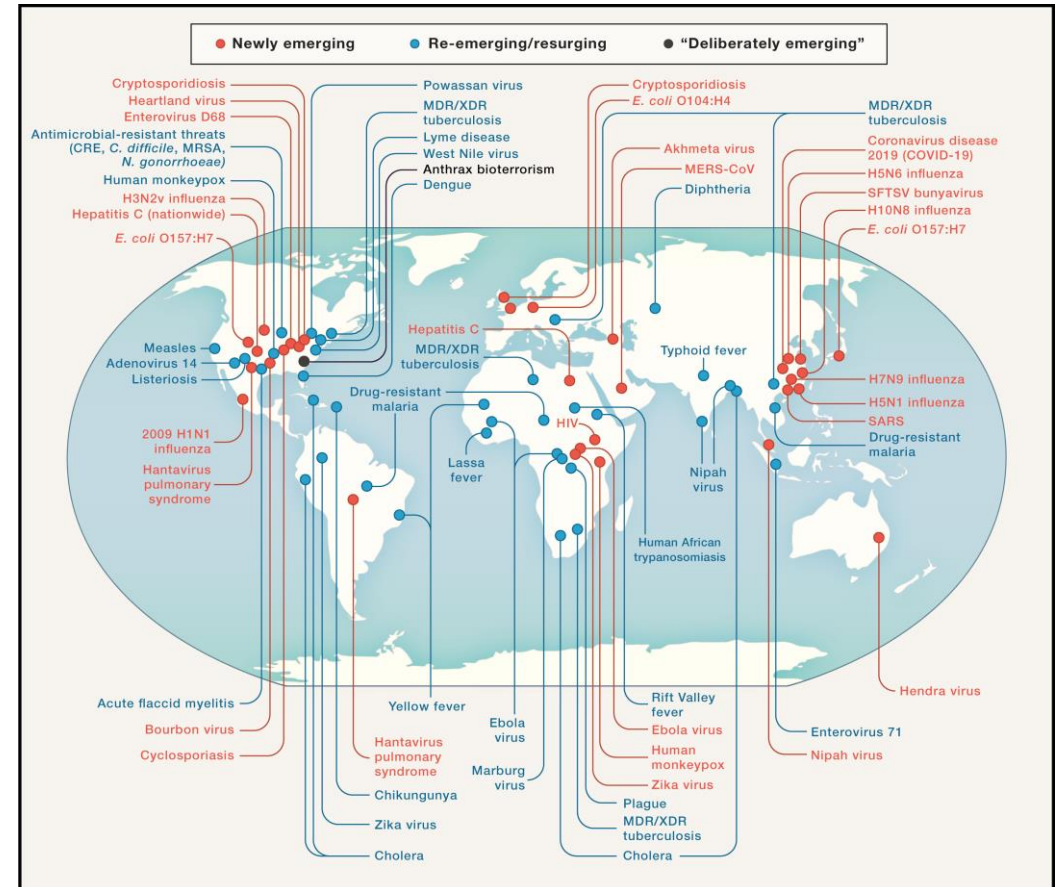


De-implementation

- What **metrics** will be used to guide **de-implementation** of interventions?

Here and *Now*

1. Prioritize **testing** availability in healthcare settings
2. Establish protocols for conducting **real world studies** on transmission, use of PPE, engineering controls
3. Invest in **data infrastructure and ways to leverage informatics** to guide patient evaluation and workforce decision making
4. Incorporate workforce **resiliency, communication** from IPC experts, **de-implementation** into planning



Morens DM, Fauci AS. Emerging Pandemic Diseases: How We Got to COVID-19. *Cell*. 2020 Sep 3;182(5):1077-1092. doi: 10.1016/j.cell.2020.08.021. Epub 2020 Aug 15. Erratum in: *Cell*. 2020 Oct 29;183(3):837. doi: 10.1016/j.cell.2020.10.022. PMID: 32846157; PMCID: PMC7428724.

Resources

Force Resilience

Infect Control & Hospital Epidemiology (2024), 49, 804–807
doi:10.1017/S0950268824001626

SHEA Position Paper

SHEA position statement on pandemic preparedness for policymakers: building a strong and resilient healthcare workforce

David B. Banach MD, MPH, MSc^{1,2,3}, Trini A. Mathew MD, MPH^{4,5,6,7}, Lynne Jones Batshon BS⁸, Westyn Branch-Elliman MD, MMSc^{2,4}, Ghinwa Dumnyi MD^{2,10}, Sarah Haessler MD^{11,12}, Vincent P. Hsu MD, MPH^{13,14}, Robin L. P. Jump MD, PhD^{15,16}, Anurag N. Malani MD¹⁷, Rekha K. Murthy MD^{18,19}, Steven A. Pergam MD, MPH^{20,21,22}, Erica S. Shenoy MD, PhD^{23,24}, and David J. Weber MD, MPH²⁵
¹School of Medicine, University of Connecticut, Storrs, CT, USA; ²Yale School of Public Health, New Haven, CT, USA; ³Healthcare Workforce Institute, University of Connecticut, Storrs, CT, USA; ⁴Yale School of Public Health, New Haven, CT, USA; ⁵Yale School of Public Health, New Haven, CT, USA; ⁶Yale School of Public Health, New Haven, CT, USA; ⁷Yale School of Public Health, New Haven, CT, USA; ⁸Yale School of Public Health, New Haven, CT, USA; ⁹Yale School of Public Health, New Haven, CT, USA; ¹⁰Yale School of Public Health, New Haven, CT, USA; ¹¹Yale School of Public Health, New Haven, CT, USA; ¹²Yale School of Public Health, New Haven, CT, USA; ¹³Yale School of Public Health, New Haven, CT, USA; ¹⁴Yale School of Public Health, New Haven, CT, USA; ¹⁵Yale School of Public Health, New Haven, CT, USA; ¹⁶Yale School of Public Health, New Haven, CT, USA; ¹⁷Yale School of Public Health, New Haven, CT, USA; ¹⁸Yale School of Public Health, New Haven, CT, USA; ¹⁹Yale School of Public Health, New Haven, CT, USA; ²⁰Yale School of Public Health, New Haven, CT, USA; ²¹Yale School of Public Health, New Haven, CT, USA; ²²Yale School of Public Health, New Haven, CT, USA; ²³Yale School of Public Health, New Haven, CT, USA; ²⁴Yale School of Public Health, New Haven, CT, USA; ²⁵Yale School of Public Health, New Haven, CT, USA

Background

Throughout the COVID-19 pandemic, many areas in the United States experienced healthcare personnel (HCP) shortages tied to a variety of factors. Infection prevention programs, in particular, faced increasing workload demands with little opportunity to delegate tasks to others without specific infectious diseases or infection control expertise. Shortages of clinicians providing input care to critically ill patients during the early phase of the pandemic were multifactorial, largely attributed to increasing demands on hospitals to provide care to patients hospitalized with COVID-19 and fatigue¹. HCP shortages and challenges during later years, including the Omicron variant-associated surge, were largely attributed to HCP infections and associated work restrictions during infection periods and the need to care for family members, particularly children, with COVID-19. Additionally, the detrimental physical and mental health impact of COVID-19 on HCP has led to attrition, which further exacerbated shortages². Demands increased in post-acute and long-term care (PALT) settings, which already faced critical staffing challenges difficulty with recruitment, and high rates of turnover. Although individual healthcare organizations and state and federal governments have taken actions to mitigate recurring shortages, additional work and innovation are needed to develop longer-term solutions to improve healthcare workforce resiliency. The critical role of those with specialized training in infection prevention, including healthcare epidemiologists, was

well-demonstrated in pandemic and COVID-19 pandemic underscored these fields³. This commentary outlines healthcare workforce in preparation for future pandemics. **Rationale** Healthcare workforce needed for The COVID-19 pandemic had vulnerabilities of healthcare delivery robust and nimble healthcare work force, creating substantial challenges during later years. In preparation for later work force will need to have a family members, particularly children, with COVID-19. Additionally, the detrimental physical and mental health impact of COVID-19 on HCP has led to attrition, which further exacerbated shortages². Demands increased in post-acute and long-term care (PALT) settings, which already faced critical staffing challenges difficulty with recruitment, and high rates of turnover. Although individual healthcare organizations and state and federal governments have taken actions to mitigate recurring shortages, additional work and innovation are needed to develop longer-term solutions to improve healthcare workforce resiliency. The critical role of those with specialized training in infection prevention, including healthcare epidemiologists, was

SHEA position statement on pandemic preparedness for policymakers: the role of healthcare epidemiologists in communicating during infectious diseases outbreaks

Erica S. Shenoy MD, PhD^{23,24}, David B. Banach MD, MPH, MSc^{1,2,3}, Lynne Jones Batshon BS⁸, Westyn Branch-Elliman MD, MMSc^{2,4}, Ghinwa Dumnyi MD^{2,10}, Sarah Haessler MD^{11,12}, Vincent P. Hsu MD, MPH^{13,14}, Robin L. P. Jump MD, PhD^{15,16}, Anurag N. Malani MD¹⁷, Trini A. Mathew MD, MPH^{4,5,6,7}, Rekha K. M. Steven A. Pergam MD, MPH^{20,21,22}, Matthew Wayne Seeger PhD²⁶ and David J. Weber MD, MPH²⁵
¹Massachusetts General Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Mass General Brigham, Boston, MA, USA; ⁴University of Connecticut, Farmington, CT, USA; ⁵Yale School of Public Health, New Haven, CT, USA; ⁶Yale School of Public Health, New Haven, CT, USA; ⁷Yale School of Public Health, New Haven, CT, USA; ⁸Yale School of Public Health, New Haven, CT, USA; ⁹Yale School of Public Health, New Haven, CT, USA; ¹⁰Yale School of Public Health, New Haven, CT, USA; ¹¹Yale School of Public Health, New Haven, CT, USA; ¹²Yale School of Public Health, New Haven, CT, USA; ¹³Yale School of Public Health, New Haven, CT, USA; ¹⁴Yale School of Public Health, New Haven, CT, USA; ¹⁵Yale School of Public Health, New Haven, CT, USA; ¹⁶Yale School of Public Health, New Haven, CT, USA; ¹⁷Yale School of Public Health, New Haven, CT, USA; ¹⁸Yale School of Public Health, New Haven, CT, USA; ¹⁹Yale School of Public Health, New Haven, CT, USA; ²⁰Yale School of Public Health, New Haven, CT, USA; ²¹Yale School of Public Health, New Haven, CT, USA; ²²Yale School of Public Health, New Haven, CT, USA; ²³Yale School of Public Health, New Haven, CT, USA; ²⁴Yale School of Public Health, New Haven, CT, USA; ²⁵Yale School of Public Health, New Haven, CT, USA; ²⁶Yale School of Public Health, New Haven, CT, USA

Background

Effective communication is a fundamental aspect of any emergency response, including outbreaks of infectious diseases, epidemics, and pandemics, during which rapidly evolving conditions, and changing or conflicting recommendations can generate confusion and mistrust¹. During the COVID-19 pandemic, the rapid pace of changing public health guidance, the emergence and distribution of misinformation, as well as diminishing overall trust in public agencies by both healthcare personnel and the general public, presented key challenges to communication which impacted the effectiveness of the public health policy response. The role of the healthcare epidemiologist is increasingly recognized as essential in the synthesis and communication of emerging science for healthcare settings, and for the general public. This commentary describes the challenges faced by healthcare epidemiologists and infection prevention and control experts, during the COVID-19 pandemic and proposes solutions to strengthen future emergency responses.

Rationale

Effective communication should adhere to the Centers for Disease Control and Prevention's Crisis and Emergency Risk (CERC) framework². This framework stresses timeliness, accuracy, and transparency while informing, building trust, and promoting

Corresponding author: Erica S. Shenoy, Email: erica.shenoy@yale.edu
On the article: Shenoy ES, Banach DB, Batshon LJ, et al. SHEA position statement on pandemic preparedness for policymakers: the role of healthcare epidemiologists in communicating during infectious diseases outbreaks. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001626
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Infect Control & Hospital Epidemiology (2024), 49, 812–827
doi:10.1017/S0950268824001627

SHEA Position Paper

Society for Healthcare Epidemiology of America position statement on pandemic preparedness for policymakers: mitigating supply shortages

David Jay Weber MD, MPH¹, Anurag N. Malani MD², Erica S. Shenoy MD, PhD^{3,4}, David B. Banach MD, MPH, MSc^{1,2,3}, Lynne Jones Batshon BS⁵, Westyn Branch-Elliman MD, MMSc^{6,7}, Ghinwa Dumnyi MD^{2,10}, Sarah Haessler MD^{11,12}, Vincent P. Hsu MD, MPH^{13,14}, Robin L. P. Jump MD, PhD^{15,16}, Trini A. Mathew MD, MPH^{4,5,6,7}, Rekha K. Murthy MD^{18,19}, Steven A. Pergam MD, MPH^{20,21,22}, and Matthew Wayne Seeger PhD²⁶
¹Massachusetts General Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Mass General Brigham, Boston, MA, USA; ⁴University of Connecticut, Farmington, CT, USA; ⁵Yale School of Public Health, New Haven, CT, USA; ⁶Yale School of Public Health, New Haven, CT, USA; ⁷Yale School of Public Health, New Haven, CT, USA; ⁸Yale School of Public Health, New Haven, CT, USA; ⁹Yale School of Public Health, New Haven, CT, USA; ¹⁰Yale School of Public Health, New Haven, CT, USA; ¹¹Yale School of Public Health, New Haven, CT, USA; ¹²Yale School of Public Health, New Haven, CT, USA; ¹³Yale School of Public Health, New Haven, CT, USA; ¹⁴Yale School of Public Health, New Haven, CT, USA; ¹⁵Yale School of Public Health, New Haven, CT, USA; ¹⁶Yale School of Public Health, New Haven, CT, USA; ¹⁷Yale School of Public Health, New Haven, CT, USA; ¹⁸Yale School of Public Health, New Haven, CT, USA; ¹⁹Yale School of Public Health, New Haven, CT, USA; ²⁰Yale School of Public Health, New Haven, CT, USA; ²¹Yale School of Public Health, New Haven, CT, USA; ²²Yale School of Public Health, New Haven, CT, USA; ²³Yale School of Public Health, New Haven, CT, USA; ²⁴Yale School of Public Health, New Haven, CT, USA; ²⁵Yale School of Public Health, New Haven, CT, USA; ²⁶Yale School of Public Health, New Haven, CT, USA

Background

Emerging infectious diseases (EID) are defined as pathogens that have recently been identified in a population or had previously reduced in scope but are rapidly increasing in incidence or geographic range. Pandemics occur when new or re-emergent EID spread over multiple regions or continents. Interactions in our dynamic global society accelerate the emergence of EID^{1,2}, suggesting that other pathogens with pandemic potential remain a pressing concern and could emerge or re-emerge at any time.

Factors involved in driving the spread of emerging infectious diseases

Recent examples of EID demonstrate the importance of addressing underlying factors contributing to their emergence. The One Health concept exploring the interaction of animals and the environment with humans provides useful insight into our understanding of emerging zoonotic infections, making a strong economic case for additional investment to prevent the next pandemic³. Multiple interconnected changes such as increased urbanization coupled with human spread into previously uninhabited areas became opportunities for the emergence and rapid spread of pathogens such as Ebola and represents an ongoing worldwide risk. Agricultural ventures increase the potential for another severe influenza pandemic due to the reassortment of genetic material from birds, pigs, and humans leading to an antigenically shifted virus with the potential for rapid spread and high lethality. Avian influenza can stem from strains originating in other countries or in the United States, although without sustained

Corresponding author: Vincent P. Hsu, Email: vincent.hsu@yale.edu
On the article: The VP, Pergam SA, Shenoy ES, et al. SHEA position statement on pandemic preparedness for policymakers: mitigating infectious disease shortages. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001626
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Abstract

The COVID-19 has had major direct (e.g., deaths) and indirect (e.g., social inequities) effects in the United States. While the public health response to the epidemic featured some important successes (e.g., universal masking and rapid development and approval of vaccines and therapeutics), there were systemic failures (e.g., inadequate public health infrastructure) that overwhelmed those successes. Key reasons for the U.S. response were shortages of personal protective equipment (PPE) and supply chain deficiencies. Recommendations are provided for mitigating supply shortages and supply chain failures in healthcare settings in future pandemics. Some key recommendations for preventing shortages of essential components of infection control and prevention include increasing the stockpile of PPE in the U.S. National Strategic Stockpile, increased transparency of the Stockpile, involving the Defense Production Act at an early stage, and rapid review and authorization by FDA/PEA/OSHA of non-U.S. approved products. Recommendations are also provided for mitigating shortages of diagnostic testing, medications and medical equipment.
(Received 9 February 2024; accepted 18 March 2024; electronically published 5 June 2024)

Background

Following the initial recognition of coronavirus disease 2019 (COVID-19) in late 2019, the causative agent, severe acute respiratory coronavirus virus 2, was rapidly identified¹. The COVID-19 pandemic has had major direct (e.g., cases, hospitalizations, deaths) and indirect (e.g., economic disruption, 8–12 school closings, decreased health maintenance, social inequality) far-reaching effects across all sectors of society including healthcare². In the early stage of the COVID-19 pandemic, the public health response featured some important successes, such as universal masking and rapid development and deployment of COVID-19

Corresponding author: David B. Banach, Email: dbanach@mgh.harvard.edu
On the article: Weber DJ, Malani AN, Shenoy ES, et al. Society for Healthcare Epidemiology of America position statement on pandemic preparedness for policymakers: mitigating supply shortages. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001627
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Infect Control & Hospital Epidemiology (2024), 49, 818–820
doi:10.1017/S0950268824001628

SHEA Position Paper

SHEA position statement on pandemic preparedness for policymakers: emerging infectious threats

Vincent P. Hsu MD, MPH¹, Steven A. Pergam MD, MPH^{1,4,5}, Erica S. Shenoy MD, PhD^{3,4}, David B. Banach MD, MPH, MSc^{1,2,3}, Lynne Jones Batshon BS², Westyn Branch-Elliman MD, MMSc^{2,12}, Ghinwa Dumnyi MD^{2,14}, Sarah Haessler MD^{15,16}, Robin L. P. Jump MD, PhD^{17,18}, Anurag N. Malani MD¹⁹, Trini A. Mathew MD, MPH^{21,22,23}, Rekha K. Murthy MD^{24,25} and David J. Weber MD, MPH²⁶
¹Massachusetts General Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Mass General Brigham, Boston, MA, USA; ⁴University of Connecticut School of Medicine, Farmington, CT, USA; ⁵Yale School of Public Health, New Haven, CT, USA; ⁶Yale School of Public Health, New Haven, CT, USA; ⁷Yale School of Public Health, New Haven, CT, USA; ⁸Yale School of Public Health, New Haven, CT, USA; ⁹Yale School of Public Health, New Haven, CT, USA; ¹⁰Yale School of Public Health, New Haven, CT, USA; ¹¹Yale School of Public Health, New Haven, CT, USA; ¹²Yale School of Public Health, New Haven, CT, USA; ¹³Yale School of Public Health, New Haven, CT, USA; ¹⁴Yale School of Public Health, New Haven, CT, USA; ¹⁵Yale School of Public Health, New Haven, CT, USA; ¹⁶Yale School of Public Health, New Haven, CT, USA; ¹⁷Yale School of Public Health, New Haven, CT, USA; ¹⁸Yale School of Public Health, New Haven, CT, USA; ¹⁹Yale School of Public Health, New Haven, CT, USA; ²⁰Yale School of Public Health, New Haven, CT, USA; ²¹Yale School of Public Health, New Haven, CT, USA; ²²Yale School of Public Health, New Haven, CT, USA; ²³Yale School of Public Health, New Haven, CT, USA; ²⁴Yale School of Public Health, New Haven, CT, USA; ²⁵Yale School of Public Health, New Haven, CT, USA; ²⁶Yale School of Public Health, New Haven, CT, USA

Background

Emerging infectious diseases (EID) are defined as pathogens that have recently been identified in a population or had previously reduced in scope but are rapidly increasing in incidence or geographic range. Pandemics occur when new or re-emergent EID spread over multiple regions or continents. Interactions in our dynamic global society accelerate the emergence of EID^{1,2}, suggesting that other pathogens with pandemic potential remain a pressing concern and could emerge or re-emerge at any time.

Factors involved in driving the spread of emerging infectious diseases

Recent examples of EID demonstrate the importance of addressing underlying factors contributing to their emergence. The One Health concept exploring the interaction of animals and the environment with humans provides useful insight into our understanding of emerging zoonotic infections, making a strong economic case for additional investment to prevent the next pandemic³. Multiple interconnected changes such as increased urbanization coupled with human spread into previously uninhabited areas became opportunities for the emergence and rapid spread of pathogens such as Ebola and represents an ongoing worldwide risk. Agricultural ventures increase the potential for another severe influenza pandemic due to the reassortment of genetic material from birds, pigs, and humans leading to an antigenically shifted virus with the potential for rapid spread and high lethality. Avian influenza can stem from strains originating in other countries or in the United States, although without sustained

Corresponding author: Vincent P. Hsu, Email: vincent.hsu@yale.edu
On the article: The VP, Pergam SA, Shenoy ES, et al. SHEA position statement on pandemic preparedness for policymakers: emerging infectious threats. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001628
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Abstract

The COVID-19 has had major direct (e.g., deaths) and indirect (e.g., social inequities) effects in the United States. While the public health response to the epidemic featured some important successes (e.g., universal masking and rapid development and approval of vaccines and therapeutics), there were systemic failures (e.g., inadequate public health infrastructure) that overwhelmed those successes. Key reasons for the U.S. response were shortages of personal protective equipment (PPE) and supply chain deficiencies. Recommendations are provided for mitigating supply shortages and supply chain failures in healthcare settings in future pandemics. Some key recommendations for preventing shortages of essential components of infection control and prevention include increasing the stockpile of PPE in the U.S. National Strategic Stockpile, increased transparency of the Stockpile, involving the Defense Production Act at an early stage, and rapid review and authorization by FDA/PEA/OSHA of non-U.S. approved products. Recommendations are also provided for mitigating shortages of diagnostic testing, medications and medical equipment.
(Received 9 February 2024; accepted 18 March 2024; electronically published 5 June 2024)

Background

Following the initial recognition of coronavirus disease 2019 (COVID-19) in late 2019, the causative agent, severe acute respiratory coronavirus virus 2, was rapidly identified¹. The COVID-19 pandemic has had major direct (e.g., cases, hospitalizations, deaths) and indirect (e.g., economic disruption, 8–12 school closings, decreased health maintenance, social inequality) far-reaching effects across all sectors of society including healthcare². In the early stage of the COVID-19 pandemic, the public health response featured some important successes, such as universal masking and rapid development and deployment of COVID-19

Corresponding author: David B. Banach, Email: dbanach@mgh.harvard.edu
On the article: Weber DJ, Malani AN, Shenoy ES, et al. Society for Healthcare Epidemiology of America position statement on pandemic preparedness for policymakers: mitigating supply shortages. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001627
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Infect Control & Hospital Epidemiology (2024), 49, 822–825
doi:10.1017/S0950268824001629

SHEA Position Paper

SHEA position statement on pandemic preparedness for policymakers: pandemic data collection, maintenance, and release

Westyn Branch-Elliman MD, MMSc^{1,2,3}, David B. Banach MD, MPH, MSc^{4,5}, Lynne J. Batshon BS⁶, Ghinwa Dumnyi MD^{2,14}, Sarah Haessler MD^{15,16,17}, Vincent P. Hsu MD, MPH^{18,19}, Robin L. P. Jump MD, PhD^{20,21}, Anurag N. Malani MD²², Trini A. Mathew MD, MPH^{23,24,25}, Rekha K. Murthy MD^{26,27}, Steven A. Pergam MD, MPH^{28,29,30}, Erica S. Shenoy MD, PhD^{31,32}, and David J. Weber MD, MPH³³
¹Massachusetts General Hospital, Boston, MA, USA; ²Harvard Medical School, Boston, MA, USA; ³Mass General Brigham, Boston, MA, USA; ⁴University of Connecticut School of Medicine, Farmington, CT, USA; ⁵Yale School of Public Health, New Haven, CT, USA; ⁶Yale School of Public Health, New Haven, CT, USA; ⁷Yale School of Public Health, New Haven, CT, USA; ⁸Yale School of Public Health, New Haven, CT, USA; ⁹Yale School of Public Health, New Haven, CT, USA; ¹⁰Yale School of Public Health, New Haven, CT, USA; ¹¹Yale School of Public Health, New Haven, CT, USA; ¹²Yale School of Public Health, New Haven, CT, USA; ¹³Yale School of Public Health, New Haven, CT, USA; ¹⁴Yale School of Public Health, New Haven, CT, USA; ¹⁵Yale School of Public Health, New Haven, CT, USA; ¹⁶Yale School of Public Health, New Haven, CT, USA; ¹⁷Yale School of Public Health, New Haven, CT, USA; ¹⁸Yale School of Public Health, New Haven, CT, USA; ¹⁹Yale School of Public Health, New Haven, CT, USA; ²⁰Yale School of Public Health, New Haven, CT, USA; ²¹Yale School of Public Health, New Haven, CT, USA; ²²Yale School of Public Health, New Haven, CT, USA; ²³Yale School of Public Health, New Haven, CT, USA; ²⁴Yale School of Public Health, New Haven, CT, USA; ²⁵Yale School of Public Health, New Haven, CT, USA; ²⁶Yale School of Public Health, New Haven, CT, USA; ²⁷Yale School of Public Health, New Haven, CT, USA; ²⁸Yale School of Public Health, New Haven, CT, USA; ²⁹Yale School of Public Health, New Haven, CT, USA; ³⁰Yale School of Public Health, New Haven, CT, USA; ³¹Yale School of Public Health, New Haven, CT, USA; ³²Yale School of Public Health, New Haven, CT, USA; ³³Yale School of Public Health, New Haven, CT, USA

Background

Emerging infectious diseases (EID) are defined as pathogens that have recently been identified in a population or had previously reduced in scope but are rapidly increasing in incidence or geographic range. Pandemics occur when new or re-emergent EID spread over multiple regions or continents. Interactions in our dynamic global society accelerate the emergence of EID^{1,2}, suggesting that other pathogens with pandemic potential remain a pressing concern and could emerge or re-emerge at any time.

Factors involved in driving the spread of emerging infectious diseases

Recent examples of EID demonstrate the importance of addressing underlying factors contributing to their emergence. The One Health concept exploring the interaction of animals and the environment with humans provides useful insight into our understanding of emerging zoonotic infections, making a strong economic case for additional investment to prevent the next pandemic³. Multiple interconnected changes such as increased urbanization coupled with human spread into previously uninhabited areas became opportunities for the emergence and rapid spread of pathogens such as Ebola and represents an ongoing worldwide risk. Agricultural ventures increase the potential for another severe influenza pandemic due to the reassortment of genetic material from birds, pigs, and humans leading to an antigenically shifted virus with the potential for rapid spread and high lethality. Avian influenza can stem from strains originating in other countries or in the United States, although without sustained

Corresponding author: Vincent P. Hsu, Email: vincent.hsu@yale.edu
On the article: The VP, Pergam SA, Shenoy ES, et al. SHEA position statement on pandemic preparedness for policymakers: pandemic data collection, maintenance, and release. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001629
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

Abstract

The COVID-19 has had major direct (e.g., deaths) and indirect (e.g., social inequities) effects in the United States. While the public health response to the epidemic featured some important successes (e.g., universal masking and rapid development and approval of vaccines and therapeutics), there were systemic failures (e.g., inadequate public health infrastructure) that overwhelmed those successes. Key reasons for the U.S. response were shortages of personal protective equipment (PPE) and supply chain deficiencies. Recommendations are provided for mitigating supply shortages and supply chain failures in healthcare settings in future pandemics. Some key recommendations for preventing shortages of essential components of infection control and prevention include increasing the stockpile of PPE in the U.S. National Strategic Stockpile, increased transparency of the Stockpile, involving the Defense Production Act at an early stage, and rapid review and authorization by FDA/PEA/OSHA of non-U.S. approved products. Recommendations are also provided for mitigating shortages of diagnostic testing, medications and medical equipment.
(Received 9 February 2024; accepted 18 March 2024; electronically published 5 June 2024)

Background

Following the initial recognition of coronavirus disease 2019 (COVID-19) in late 2019, the causative agent, severe acute respiratory coronavirus virus 2, was rapidly identified¹. The COVID-19 pandemic has had major direct (e.g., cases, hospitalizations, deaths) and indirect (e.g., economic disruption, 8–12 school closings, decreased health maintenance, social inequality) far-reaching effects across all sectors of society including healthcare². In the early stage of the COVID-19 pandemic, the public health response featured some important successes, such as universal masking and rapid development and deployment of COVID-19

Corresponding author: David B. Banach, Email: dbanach@mgh.harvard.edu
On the article: Weber DJ, Malani AN, Shenoy ES, et al. Society for Healthcare Epidemiology of America position statement on pandemic preparedness for policymakers: pandemic data collection, maintenance, and release. Infect Control Hosp Epidemiol 2024; 49: 804–807. doi:10.1017/S0950268824001629
© The Author(s), 2024. Published by Cambridge University Press on behalf of The Society for Healthcare Epidemiology of America.

SHEA position statements on pandemic preparedness for policymakers. Infect Control Hosp Epidemiol. 2024 Jul.



Thank you





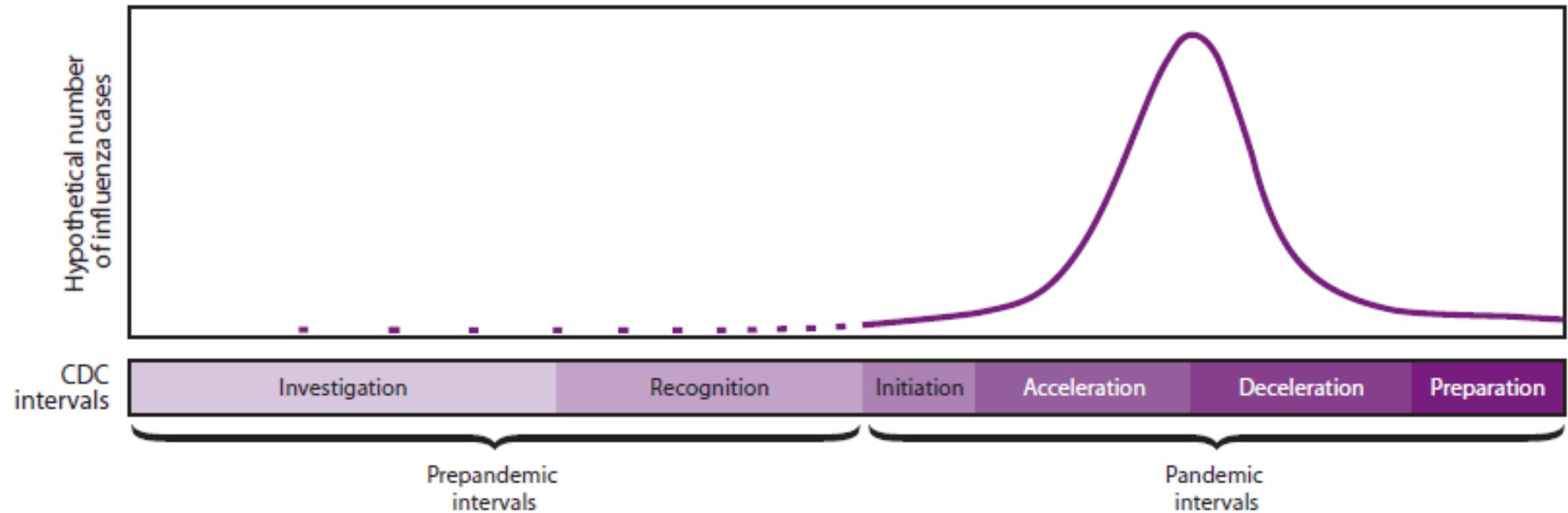
Mass General Brigham



Potential Research Priorities to Inform Readiness and Response to Highly Pathogenic Avian Influenza A (H5N1)

Clinical Care, Preparedness and Response

Preparedness and response framework for novel influenza A virus pandemics: CDC intervals



Influenza A (H5) subtyping by PCR available in 90 public health laboratories

Existing Influenza A assays will detect the circulating H5N1 virus

CDC has 16 licensing agreements with 14 companies to use their basic assay design

CDC awarded IDIQ contract to 5 laboratories to support surge testing with specific workorders in place for Influenza A (H5)

USG is working with manufacturers to develop Influenza A(H5) specific tests (lab based and POC)

FDA has granted enforcement discretion for laboratory developed tests (LDTs) for Highly Pathogenic Avian Influenza (HPAI)

CDC is working with pharmacy networks on a pilot program to provide free testing of symptomatic persons in California and one other state

Develop high throughput Influenza A (H5) assays on random access platforms

Explore alternatives to RT-PCR to improve sensitivity in specimens with low virus copies

Assess performance of existing point of care tests with this virus and develop H5 specific POC tests with that technology

Assess pandemic intervals and develop evidence-based triggers for expanding diagnostic capacity

Identify approaches to improve access to testing in public health laboratories and at CDC including cost analysis for implementation

Assess performance of antigen tests with conjunctival swabs and assure material is available for test verification

Leveraging Networks for H5N1 Research Preparedness

Lauren M. Sauer

Director

Special Pathogens Research Network

**National Emerging Special Pathogens
Training and Education Center**



Big Picture

Where are we?



Research Response Challenges

- New animal population and limited access to farms/animals and personnel for sampling
- Work environment
- PPE challenges
 - Temperature
 - Education/Training
 - Uptake
- Wild/farmed animal interface
- Workforce overlap
- Upcoming respiratory virus season
- Farm/Fair Season

2 attractions pulled from Iowa State Fair due to avian influenza concerns

Story by Griffin Wright • 1h •  2 min read

 Health Topics mentioned in this article

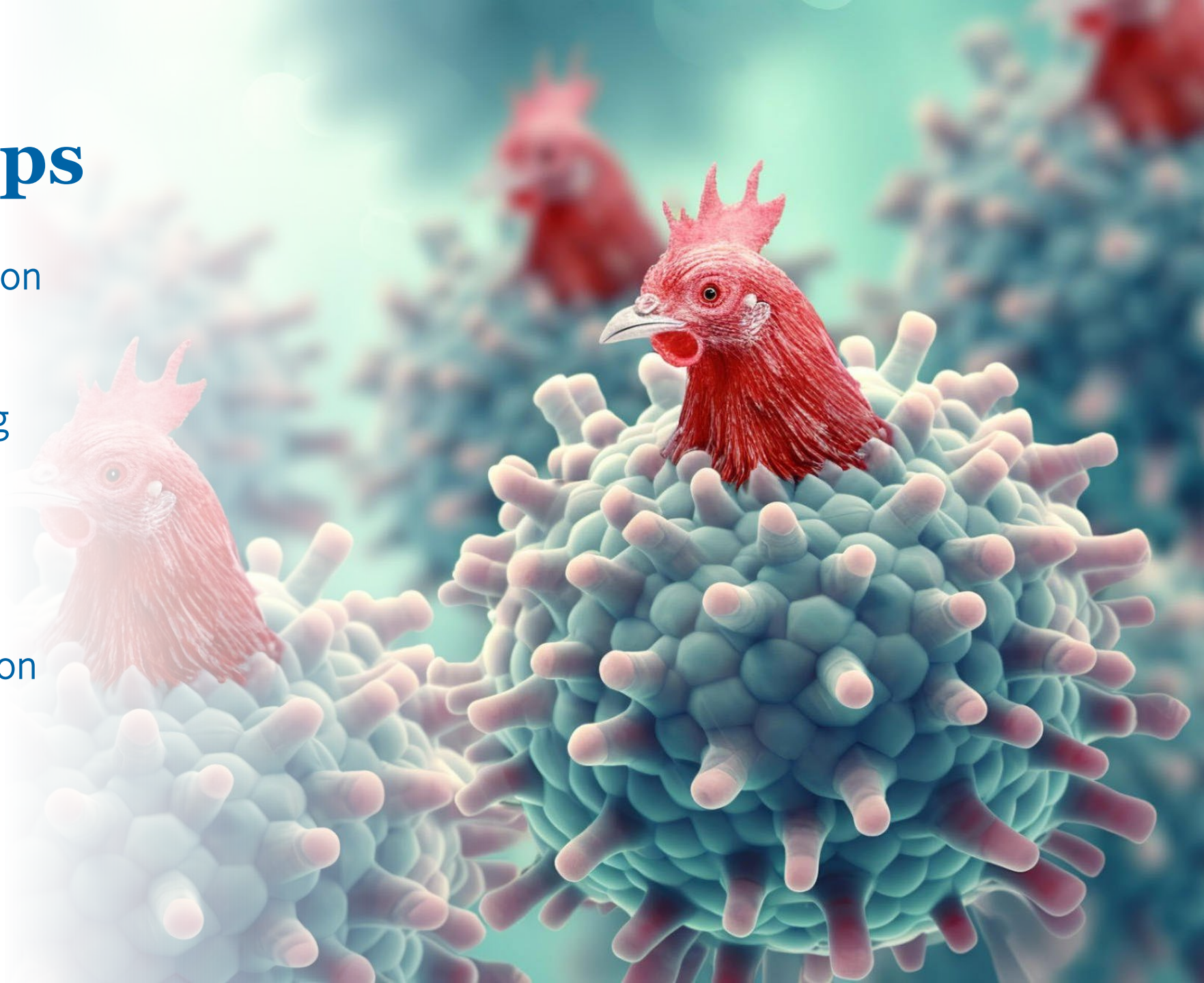
 +4 Q&A: Bird Flu

 +110 Q&A: Flu



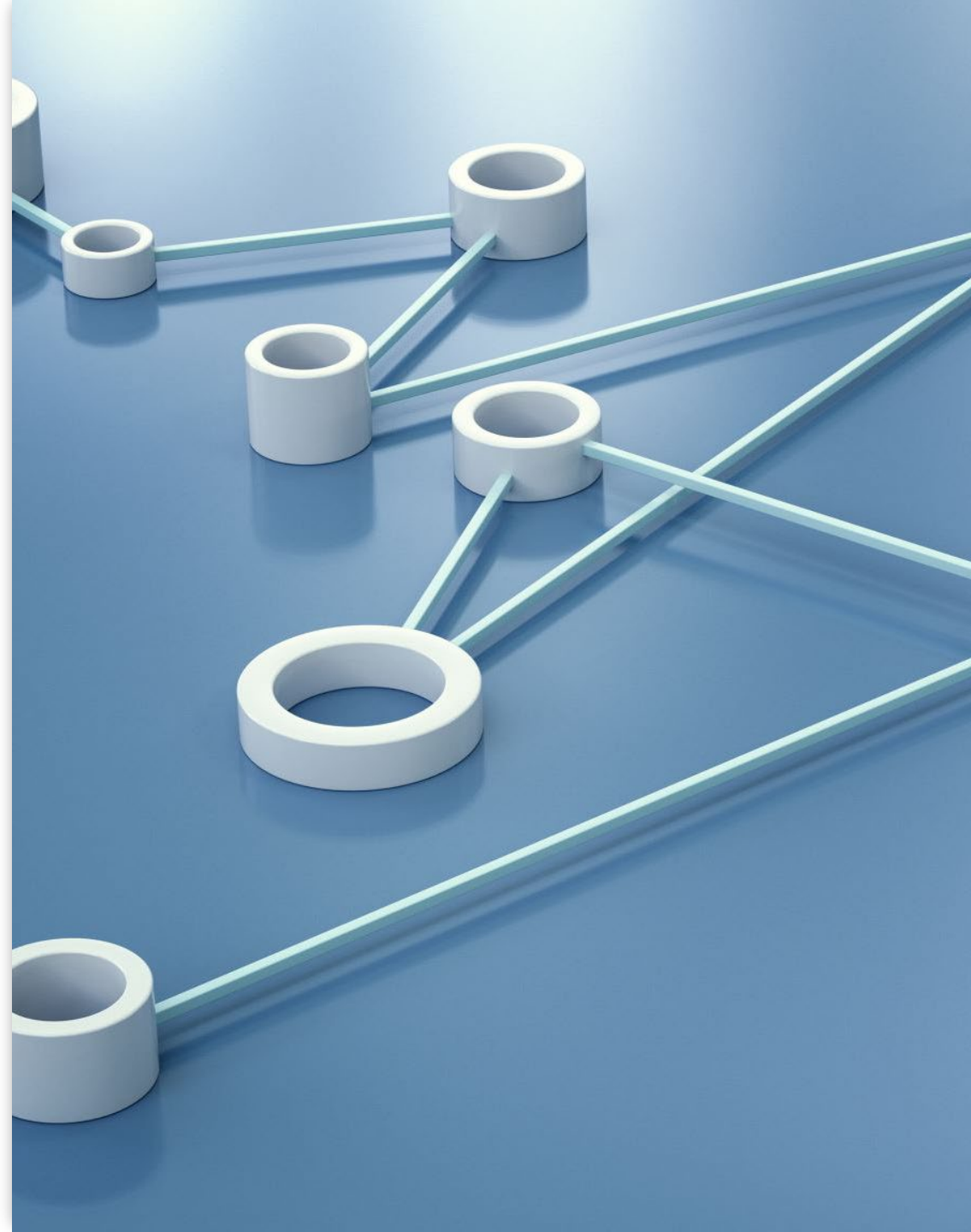
Research Gaps

- Surveillance and Early Detection
 - Wildlife Surveillance
 - Human Surveillance
 - Environmental Monitoring
- Viral Evolution and Genetic Mutations
- Longitudinal Immunologic Studies
- Human Cases and Transmission
 - Spillover
 - H2H Transmission
- Medical Countermeasures
- Community-Based and RCCE Research



How can Research Networks Help?

- Leveraging existing resources and access to participants
- Ensuring study designs are scientifically sound and ethical
- Supporting access to research through existing trusted relationships
- Pivoting resources for rapid implementation
- Creating cross-network connections for research at scale



Clinical Research Network Opportunities



- **Prepositioning Research Frameworks**
 - Establish community-based frameworks that allow for the quick mobilization of essential workers into H5N1 studies.
 - Opportunities for use of pre-approved study protocols and rapid-response teams that can be activated when a case presents
- **Co-Designing Studies**
 - Involve community leaders and essential workers in the design of H5N1 research studies, ensuring the studies reflect their needs and priorities.
 - Can increase participation rates and improve data collection.
- **Decentralized Systems**
 - Develop streamlined, community-based enrollment systems that connect research networks with at-risk workers through their employers, local clinics, or community groups
 - Reduces complexity , increases efficiency and access

The Need for Community Engagement

- Use of Local Infrastructure
- Community Health Worker Partnerships
- Co-creation of Research Protocols
- Addressing Misinformation and Building Trust
- Feedback and Reciprocity
- Use of Local Infrastructure



Community Networks as Gateways to Essential Workers

- **Building Trust**
 - Can help bridge the gap between clinical researchers and the population by addressing concerns, misconceptions, and hesitations.
 - Critical in high-risk populations like essential workers, who may be cautious about participating in research.
- **Increasing Accessibility**
 - Create research participation opportunities and access to research in communities where essential workers live and work
 - Reduce barriers such as transportation, time constraints, and resource access.

Community Network Impact



RAPID ACCELERATION OF DIAGNOSTICS (RADx)

RADx

[RADx Programs](#)[Funding](#)[Governance](#)[News, Blogs, Videos](#)[Events](#)[Contact Us](#)

On this page

[Overview](#)[Challenge](#)[Opportunity](#)[Accomplishments](#)

Collage of circular shapes and photos representing COVID-19 research

Thank you!