

DEPARTMENT OF GLOBAL HEALTH

UNIVERSITY *of* WASHINGTON

Transforming Pandemic Disease Preparedness & Response

UW Department of Global Health
External Advisory Board Meeting
November 9-10, 2020

UW Medicine
SCHOOL OF MEDICINE



SCHOOL OF PUBLIC HEALTH
UNIVERSITY *of* WASHINGTON

Pandemic Disease Preparedness & Response

- Rationale & original concept
- 2017 EAB recommendations
- Reconceptualization & progress in last 3 years
- Strategy going forward
- Questions for EAB

Need for a new approach: The world has changed

- **Crowding:** population growth & urbanization
- **Movement:** international travel & migration
- **Human-animal-insect contact:** climate change, deforestation, intensified agriculture
- **Access to health information & services:** poverty & social inequity



Need for a new approach: Current approach inadequate

- **Reactive:** disease-specific, ignoring cross-cutting reasons for ↑ frequency & severity
- **Slow:** reliance on weak surveillance & HC systems; no sustained support for R&D on countermeasures & diagnostics
- **Disjointed:** poor coordination & unclear governance across critical sectors & agencies

UW MetaCenter for Pandemic Disease Preparedness & GH Security

A Proactive, Integrated Systems Approach

- Focus on risk, not just outbreaks
 - Identify geographic areas of increased vulnerability for spread, as well as emergence
 - Identify groups of pathogens w/ substantial pandemic potential before outbreak explodes
- Link with accelerated development & testing of diagnostics, drugs, vaccines
- Provide technical assistance to speed effective implementation

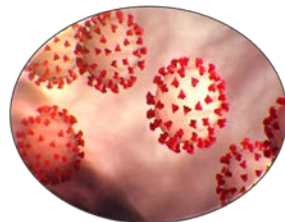
A dark blue world map with a white grid overlay, showing the continents of North America, South America, Africa, Europe, and Asia.

In 2017 you said...

- In light of UW's longstanding strengths in infectious diseases, it is timely to explore this area
- It requires further thinking about the value added
 - This is a crowded field
 - What is the glue?
 - What is the right balance between delivering global goods and providing support to countries in need?
- Refine the focus

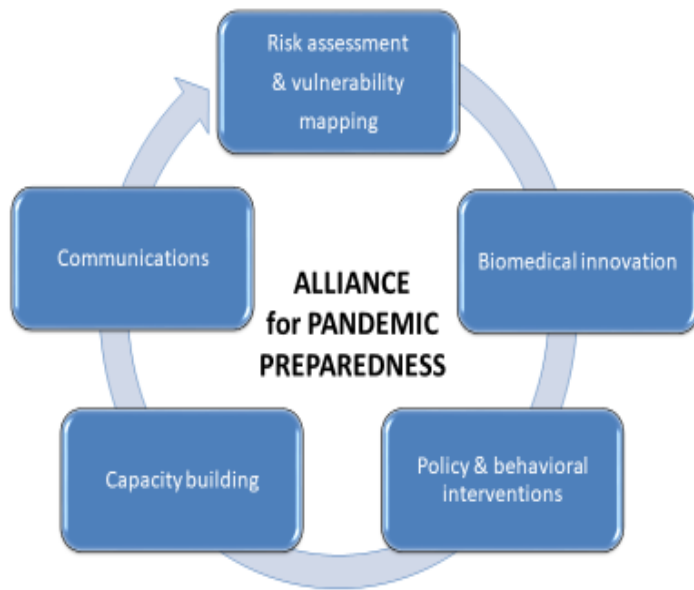
Glue, balance, focus...

- New name: *Alliance for Pandemic Preparedness*
- Refined concept with focus on 5 critical functions
- Launched initiatives and/or research in each area
- Expanded local & international partnerships
- Refocusing future efforts on implementation via a platform of 4 *proactive pandemic preparedness learning (P3L) hubs* developed w/ LMIC partners



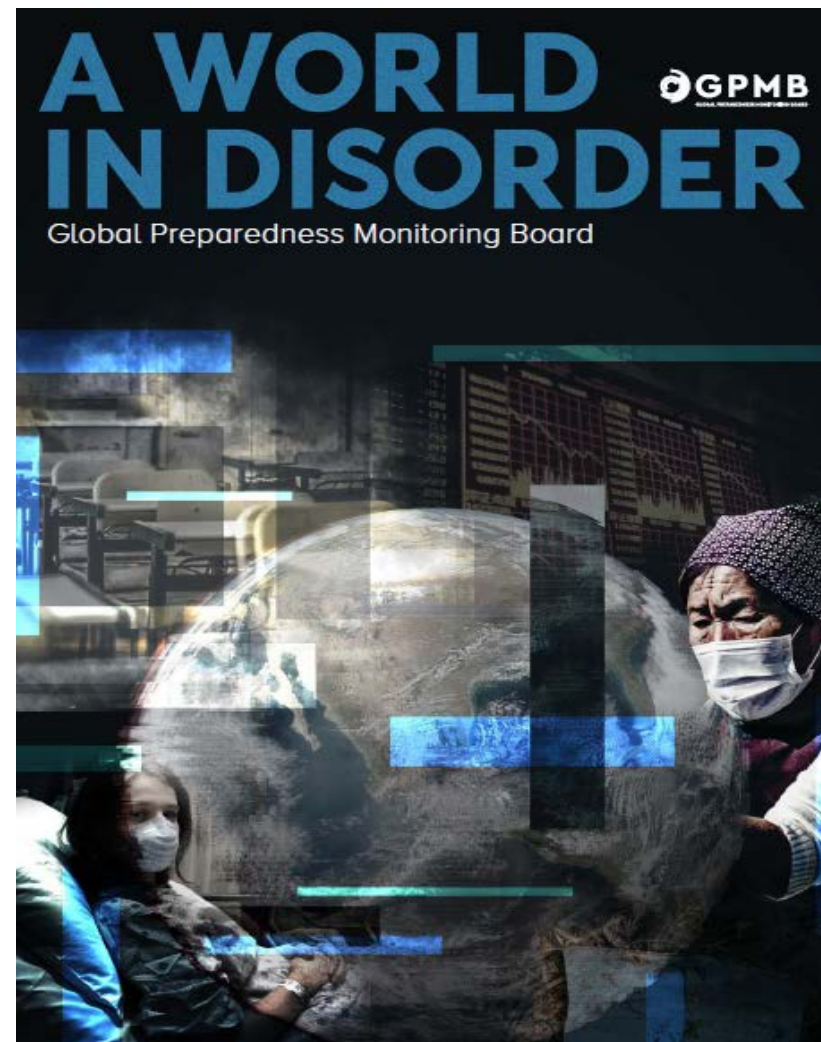
Alliance for Pandemic Preparedness (APP): 5 Critical Functions

An end-to-end continuum



- Identifying “hotspot” places & pop’ns at risk of emergence & spread before an outbreak
- Designing, testing & accelerating development of biomedical countermeasures & *policy interventions* to mitigate transmission & contain outbreaks
- Translating complex information & innovations from laboratory research & fieldwork into timely, appropriate action at large scale

Global Preparedness Monitoring Board Call to Action



- Responsible leadership
- Engaged citizenship
- **Strong, agile national & global systems for GH security**
 - Identify, predict & detect emergence of pathogens w/ pandemic potential based on a 'One Health' approach;
 - build core PH capacity for surveillance, early detection & info sharing;
 - improve coordination & support for R&D; rapid development & equitable access to vaccines, drugs, diagnostics & NPIs
- Sustained investment
- Robust global governance

APP Initiatives & Research

- **Risk & vulnerability assessment**
 - Dengue vulnerability assessment in Peru
 - Rift valley fever vulnerability assessment in Kenya
- **Biomedical innovation**
 - United World for Antiviral Research Network (UWARN), an NIAID Center for Research in Emerging Infectious Diseases
- **Policy & behavioral interventions**
 - Mask use trends in WA counties
 - Impact of school reopening models on health, educational & economic outcomes in WA (in development)
- **Communications**
 - COVID-19 daily, curated *Literature Report*
(<https://globalhealth.washington.edu/covid-19-literature-situation-report>)

Alliance Core Centers & Institutes

- Center for Development & Deployment of Diagnostic Technologies for Low Resource Settings (CD3)
- Center for Emerging & Reemerging Infectious Diseases (CERID)
- Center for Health & the Global Environment (CHanGE)
- Center for One Health Research (COHR)
- Center for Innate Immunity & Immune Disease (CIID)
- Department of Global Health (DGH)
- Global Medicines Program
- International Center for Clinical Research (ICRC)
- International Training & Education Center for Health (I-TECH)
- Institute for Health Metrics & Evaluation (IHME)
- Institute for Protein Design (IPD)
- Seattle Coronavirus Assessment Network (SCAN)
- Washington National Primate Research Center (WANPRC)

IHME: COVID-19 models

Forbes

Updated Apr 23, 2020, 10:38am EDT

TOPLINE A University of Washington model of coronavirus deaths was updated—and increased 10%—Wednesday to include a presumed increase in nursing home deaths (according to CNN), ultimately predicting the country will see 66,000 deaths from the disease by August.



President Trump stands next to a graph of University of Washington data during a coronavirus task force meeting. PHOTO BY WIN MCNAMEE/GETTY IMAGES

KEY FACTS

- The model, created by the University's Institute for Health Metrics and Evaluation, includes mortality data from Johns Hopkins University, along with data from the World Health Organization

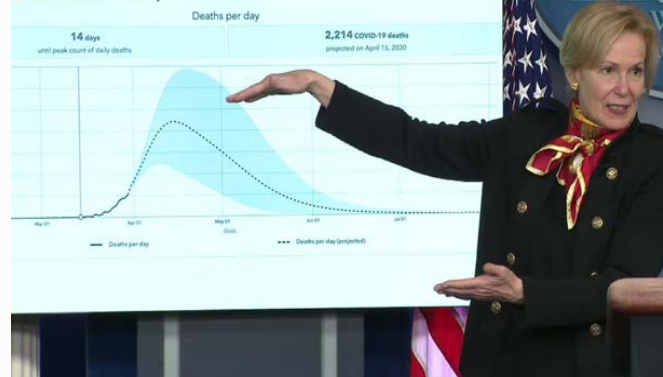
The Washington Post

Democracy Dies in Darkness

March 31, 2020

The White House coronavirus task force on Tuesday presented a grim picture of where the U.S. could be heading over the next couple of months, even with interventions like physical distancing. The task force projects 100,000 to 240,000 deaths from the virus, with mitigation.

Model by Chris Murray



Birx's next slide showed a short-term projection for the toll the virus might take on the United States. Using a model from the University of Washington, it indicates the at the number of deaths in the country each day may peak in the middle of April with more than 2,200 deaths on April 15.

The Seattle Times

Inslee announces new COVID-19 restrictions at Washington colleges in response to outbreaks

Oct. 20, 2020



By Joseph O'Sullivan
Seattle Times staff reporter

OLYMPIA — Gov. Jay Inslee on Tuesday announced a host of new restrictions, including limits on indoor gatherings for students, at institutions of higher education that are intended to slow the spread of COVID-19.

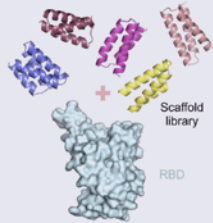
The announcement comes as outbreaks of the novel coronavirus have continued around college campuses, including at the University of Washington's Greek Row.

At a news conference, Inslee said there have been 35 outbreaks at Washington's universities and colleges, with more than 800 cases tied to social gatherings or student living spaces.

Applying best-in-class molecular design software to COVID-19

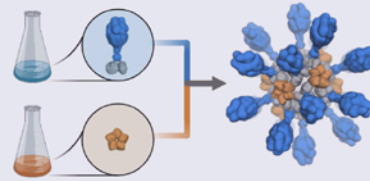
SARS-CoV-2 ANTIVIRALS

Goal: Design **ultrastable proteins** (<55 AA) that bind **receptor binding domain** (RBD) of SARS-CoV-2 Spike glycoprotein (~15 pM), blocking ACE2 interaction.



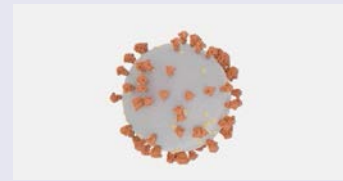
ULTRAPOTENT VACCINE

Goal: Design self-assembling **nano-particle vaccine** displaying 60x **Spike RBDs**



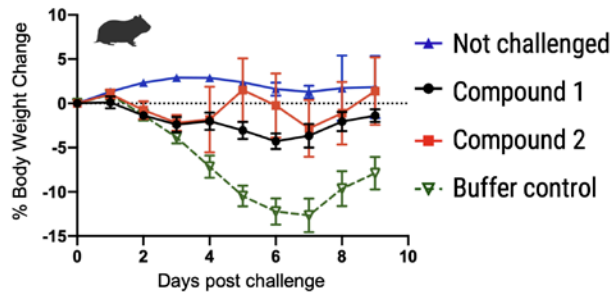
RAPID DIAGNOSTICS

Goal: Design **protein-based biosensor** for reliable, inexpensive at-home detection in nasal swabs.



Nasal administration protects hamsters

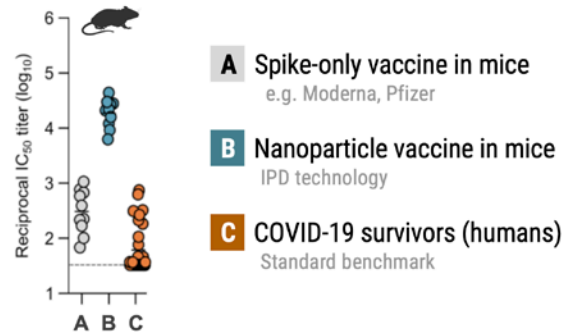
Hamsters received nasal administration of Spike-binding protein 12 hours prior to challenge.



Cao, L *et al.* **Science**. (2020)

Extremely high neutralizing antibody titers

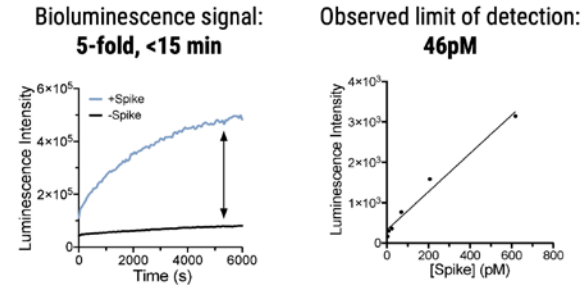
Nanoparticle vaccine elicits high levels of non-redundant nAbs



Walls A, Fiala B *et al.* **Cell**. (2020) Accepted

Designed protein switches respond to Spike

Luciferase activity rapidly reconstituted upon mixing with target protein.



Rubio A, *et al.* **Nature**. Under review

Status: Ongoing animal trials

- Lead candidates are being formulated for nasal delivery.
- Bacterial production should enable ultracheap manufacturing.

Status: Headed to the clinic

- Licensed (royalty-free, 5y) to Icosavax, Inc & SK biosciences.
- First-in-human trials begin 2021.

Status: Optimizing biosensor

- Exploring manufacturing and delivery formats
- Also developing biosensors for COVID-19 antibody detection

ICRC: Hydroxychloroquine PEP RCT

The Seattle Times

Gates-funded UW study shows hydroxychloroquine doesn't prevent COVID-19

Oct. 24, 2020 at 9:00 am | Updated Oct. 24, 2020 at 5:55 pm



By Sandi Doughton

Seattle Times staff reporter



A study involving nearly 800 people found that hydroxychloroquine does not prevent coronavirus infections. (David J. Phillip / The Associated Press)

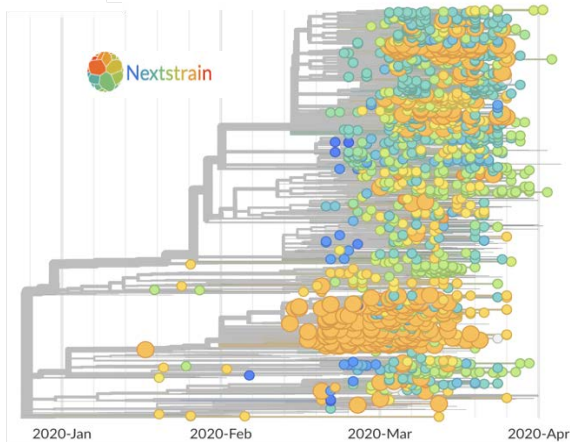
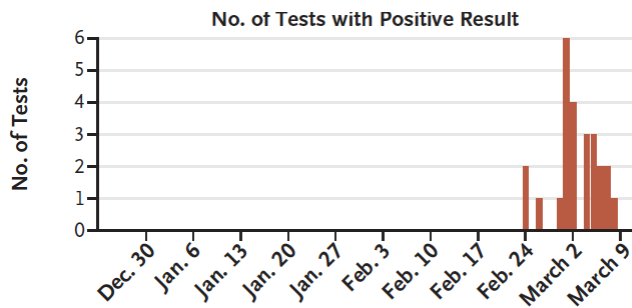
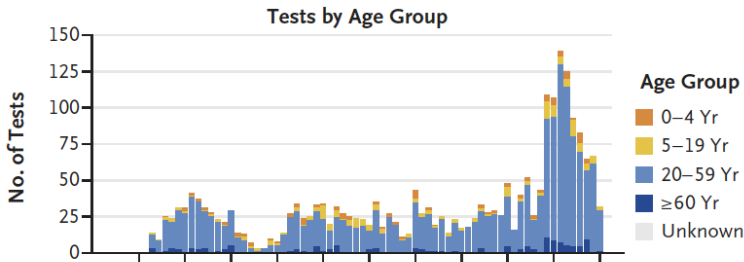


A large clinical trial conducted by the University of Washington found that people who took hydroxychloroquine were just as likely to get COVID-19 as those who took a placebo, adding to growing evidence that the drug promoted by President Donald Trump early in the pandemic doesn't seem to work against the novel coronavirus.

Nearly 800 people from 38 states volunteered for the trial, which was funded with \$9.5 million from the [COVID-19 Therapeutics Accelerator](#), a research fund created by The Bill & Melinda Gates Foundation, the British philanthropy Wellcome, and others.

The goal was to find out whether hydroxychloroquine could protect people who had been exposed to the virus from getting infected and sick. Participants all had a family member or close contact who had tested positive for the virus, and were randomly assigned to get either a daily pill of hydroxychloroquine or placebo over a 14-day period. The volunteers swabbed their noses every day and sent the specimens to a lab for analysis.

First detection of SARS-CoV-2 community transmission in the United States



Chu, NEJM 2020
Bedford, Science, 2020

SCIENCE TRANSLATIONAL MEDICINE | EDITORIAL

CORONAVIRUS

Courage in a climate of fear

Every day in clinics and hospitals across the United States and worldwide, unheralded heroes strap on their masks and gowns, braving the unknown to save lives. We understand the challenge: To speak out

We cannot leave it to a few lone health care heroes to stand up to the corruption and misinformation promulgated by the current administration. Helen Chu, a University of Washington epidemiologist, felt the moral and ethical need to act—she disobeyed federal instructions to hide critical health data. It was her team who first demonstrated community spread of COVID-19 in a patient who had no travel or contact history, a pivotal moment in the early days of the pandemic. Rick Bright,



Rick Bright is the Director of the Center for Global Health and Director of the Department of Global Health, Stanford University Medical Center, Stanford, CA, USA. Email: rbright@stanford.edu

COVID-19 PREVENTION NETWORK PHASE 3 EFFICACY TRIAL TIMELINE

Published online May 11, 2020

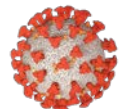
Science

A Strategic Approach to COVID-19 Vaccine R&D

L Corey, JR Mascola, AS Fauci & FS Collins

The full development pathway for an effective vaccine for SARS-CoV2 will require that industry, government, and academia collaborate in unprecedented ways, each adding their individual strengths. . . . We further discuss a collaborative platform for conducting harmonized, randomized controlled vaccine efficacy trials. This mechanism aims to generate essential safety and efficacy data for several candidate vaccines in parallel, so as to accelerate the licensure and distribution of multiple vaccine platforms and vaccines to protect against COVID-19

July	August	September	October	November
Moderna July 27	AstraZeneca August 29	Johnson & Johnson	Novavax	Sanofi
Pfizer July 28	Paused Sept. 9	September 22	Late October	Early December



COVID-19
Prevention Network

A world map in shades of blue and purple, showing the continents, serves as the background for the top portion of the slide.

Alliance International Partners

- Aga Khan University, Karachi, Pakistan
- CDC Kenya
- Chang Gung Memorial Hospital, Taipei, Taiwan
- Fundação Oswaldo Cruz (Fiocruz), Rio de Janeiro & Salvador, Brazil
- Institut De Recherche En Santé De Surveillance Épidémiologique Et De Formation, Dakar, Senegal
- University of KwaZulu-Natal, Durban, South Africa
- Universidad Peruana Cayetano Heredia, School of Public Health & Administration, Lima Peru

Proactive Pandemic Preparedness Learning (P3L) Hubs

- 4 *P3L hubs* across 3 continents
- Leverage resources & partnerships of APP core centers & institutes to:
 - develop, evaluate, & implement innovative, user-friendly outbreak vulnerability assessment tools, and biomedical & socio-behavioral countermeasures
 - Evaluate impact of integrated, combination approaches to pandemic diseases on health, social & economic outcomes
- Initial foci: COVID-19 & risk of emerging disease from arboviruses

Questions for the EAB

- **Is the APP approach appropriate & strategic?**
 - What are its strengths & weaknesses?
 - How could we improve it?
- **What foci/activities should APP prioritize as you think about the intersection of:**
 - the most potentially high impact unmet PDP needs & opportunities, and
 - the broader UW capabilities?