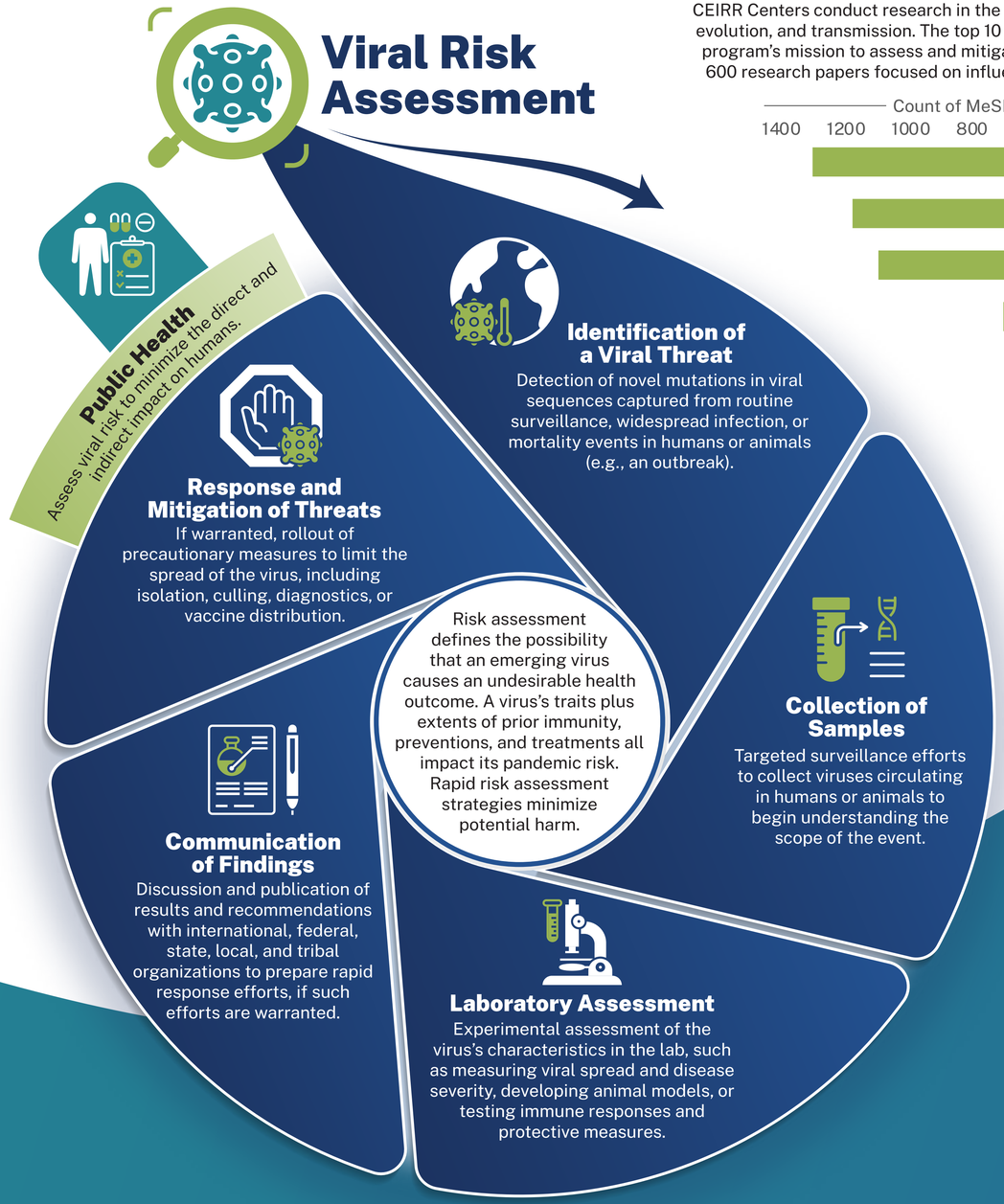
The NIAID CEIRR Program:

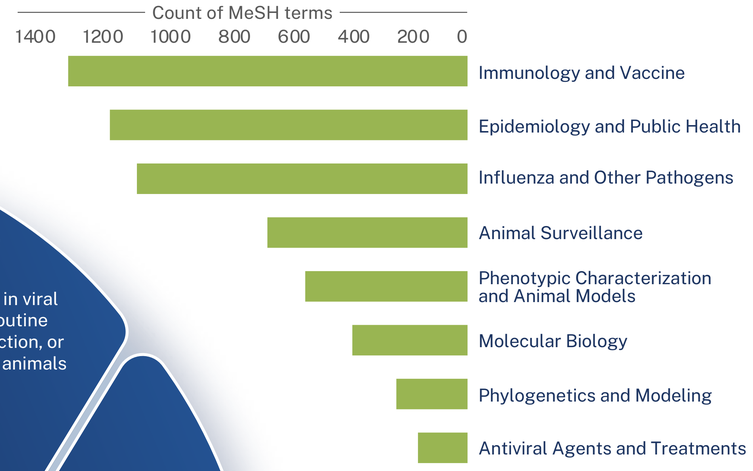
Viral Risk Assessment and Pandemic Response

The Centers of Excellence for Influenza Research and Response (CEIRR) Network is a multidisciplinary and collaborative research network funded by the National Institute of Allergy and Infectious Diseases (NIAID). CEIRR investigators conduct surveillance projects to assess risk, or possibility of an undesirable outcome, and investigate how influenza viruses infect, evolve, and spread in both human and animal infections. Each of the six academic Centers have prepared studies to rapidly launch as part of an international emergency research response to outbreaks of influenza and other emerging viral pathogens.



Expertise and Impact

CEIRR Centers conduct research in the US and abroad on key topic areas related to viral infections, evolution, and transmission. The top 10 topics from CEIRR investigators' publications reflect the program's mission to assess and mitigate viral risks. Since its inception, CEIRR has published over 600 research papers focused on influenza, SARS-CoV-2, and other viruses with pandemic potential.



Methodology: MeSH (Medical Subject Headings) terms from CEIRR publications were categorized into broad research areas. Only MeSH terms that appeared in two or more publications were included, and each term's frequency was counted to reflect its usage.

Pandemic Response

CEIRR Risk Assessment Pipeline (RAP) Response to H5N1

CEIRR established the RAP to streamline the coordination and collaboration among the CEIRR Centers and other government agencies for risk assessment activities, like surveillance and characterization of emergent viruses. This effort resulted in:

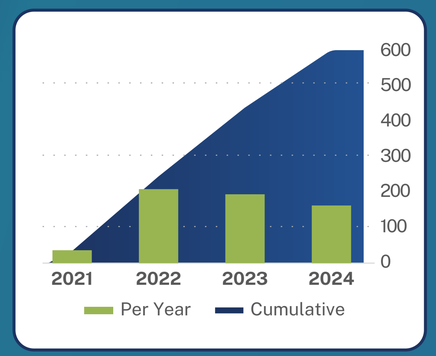
- A comprehensive data package of influenza H5N1 risk assessment included in two World Health Organization TIPRA reports and one CDC IRAT report
- Trackers for wild animal surveillance efforts and phenotypic characterization of H5 strains
- Publicly available computational and modeling tools

SARS-CoV-2 Assessment of Viral Evolution (SAVE) Program

The US Department of Health and Human Services established the SARS-CoV-2 Interagency Group to maximize coordination between federal health agencies for the US public health response to the COVID-19 pandemic. NIAID formed the SAVE consortium to provide a comprehensive real-time risk assessment of emerging mutations in SARS-CoV-2 strains.

- Collaboration among the CDC, NIH, FDA, BARDA, and DoD
- Assess mutations that could affect transmissibility, virulence, and infection- or vaccine-induced immunity

Publications



Existing Population Immunity

Using hemagglutinin inhibition as a proxy for existing human population immunity as part of assessing influenza pandemic risk.
Emerg Infect Dis. | PMID: 35447069

Evaluation of Omicron in Rodents

Preclinical rodent models helped characterize the risk that SARS-CoV-2 Omicron variants pose to the public as the variants became the dominant circulating strain.
Nature | PMID: 36323336

H5N1 Outbreak in Cattle

A mutation in dairy cow-associated H5N1 viruses increases receptor binding breadth, which could impact the range of host species it may infect.
Nat Commun | PMID: 39737954

Assessment of SARS-CoV-2

The SAVE Program acts as a template for a collaborative, real-time risk assessment infrastructure as it responds to SARS-CoV-2 variants of concern.
Nature | PMID: 35361968

Computational Sequence Insights

A machine learning tool detects evolutionary changes to influenza A viral antigens using sequence data to improve surveillance insights and vaccine development.
Proc Biol Sci | PMID: 39140324

Evaluating Pandemic Risk

A pipeline to triage and determine the potential pandemic risk of circulating swine H1N2 influenza viruses suggests high risk but moderate impact.
Nat Commun | PMID: 38871701