

Information for Action: Integrating Public Health Data into Outbreak Modeling and Analytics

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A Joint Appointment

University of Nebraska
Medical Center (UNMC)

Assistant Professor

Director of Practice Based
Programs

Lead, Applied Epidemiology
Group

Nebraska Department of
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(NE-DHHS)

Epidemiologist



Academic Health Department



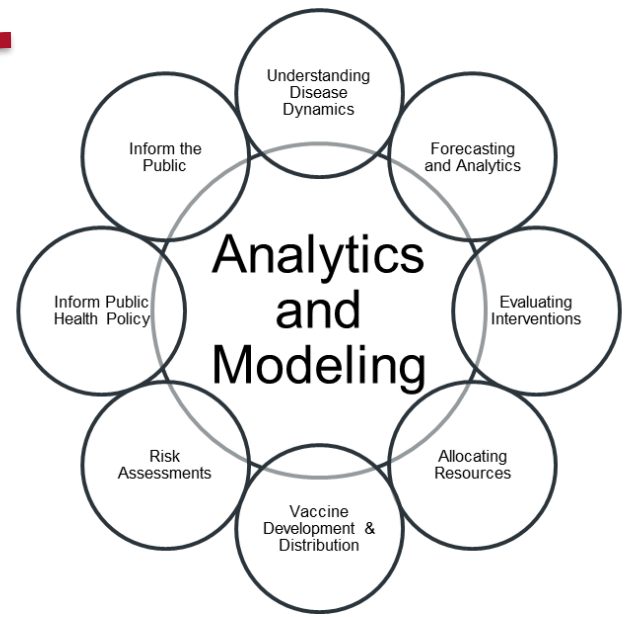
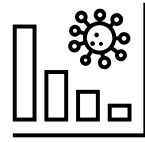
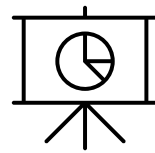
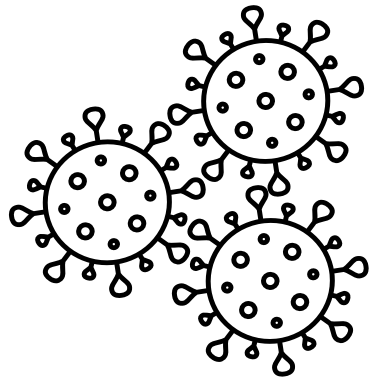
2018

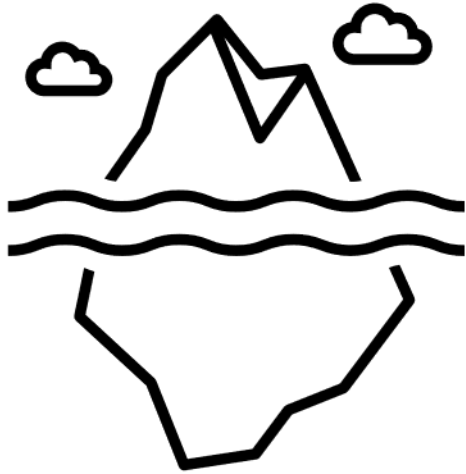
- AHD Agreement Formed

2023

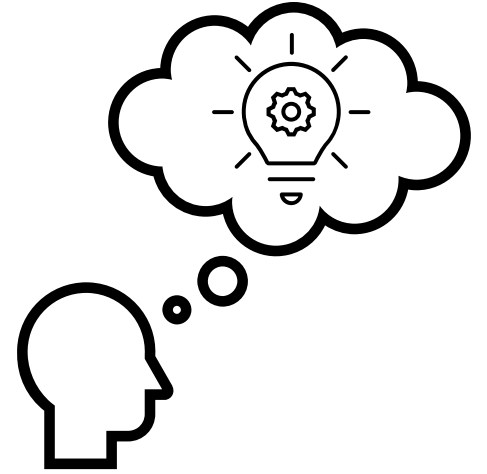
- 2 Joint Appointees
- 4 UNMC/DHHS Contractors
- 5 Graduate Assistants
- MANY Interns
- DOZENS of Joint Publications







1. Data
2. Capacity
3. Use-Cases



The Present



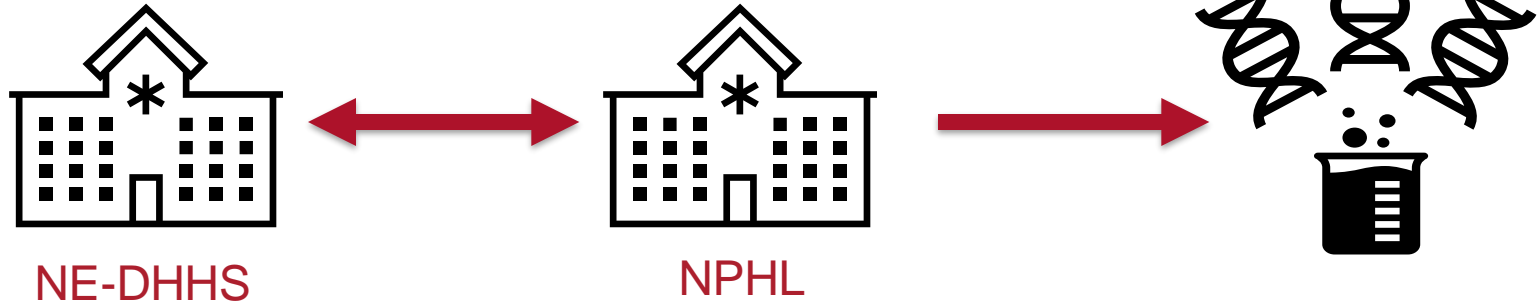
The Whole Population Cohort

Key Properties

1. Longitudinal (2020-2023)
2. Covers ENTIRE Nebraska population
3. Individual-level data
4. Accounts for multiple events
 - COVID-19 tests
 - Infections
 - Hospitalizations
 - Vaccinations



Genomic Sequencing



Over 32,000 COVID-19 samples sequenced

72% of Mpox cases sequenced

100% of carbapenemase producing organisms

Future targets: chlamydia, gonorrhea, additional HAIs, foodborne pathogens



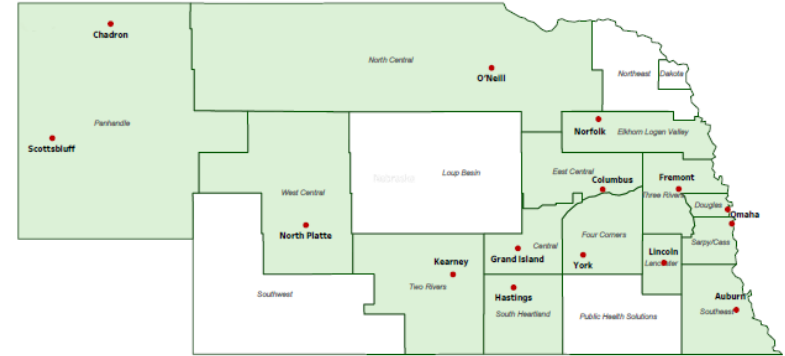
Wastewater Surveillance

Nebraska Wastewater Surveillance System (NeWSS)

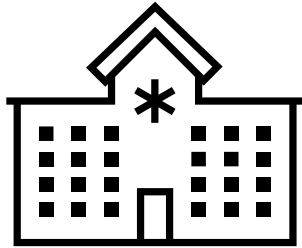
- Launched December 2021
- 18 WWTPs, 4 facilities
- 70% coverage of NE population
- Current pathogens: Influenza, SARS-CoV-2, RSV
- Future targets: *Candida aureus*, antibiotic resistant genes

Nebraska Wastewater Surveillance System (NeWSS)

Participating Sites as of November 20, 2023

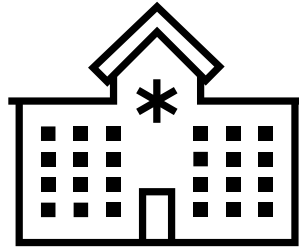


Hospitalization Data



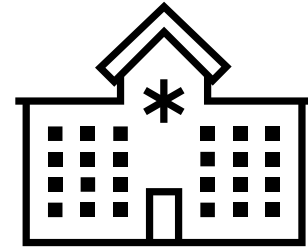
Nebraska Hospital Association

- ❑ Hospital Discharge Data
- ❑ 85% of NE Hospitals
- ❑ 94% of COVID-19 Hospitalizations



CyncHealth

- ❑ Real-Time Data
- ❑ 123 NE Hospitals and Clinics
- ❑ ~70% of Nebraskans



CRANE

- ❑ All NebraskaMed Visits + 2 Community Connect Sites
- ❑ 1.3 Million Patients
- ❑ 250K Recent Visits
- ❑ Adding Children's Health Data



Building Partnerships



Nowcasting the COVID-19 Pandemic



Estimating COVID-19 Mortality Risk



Evaluating the Evolving Effectiveness of COVID-19 Vaccination



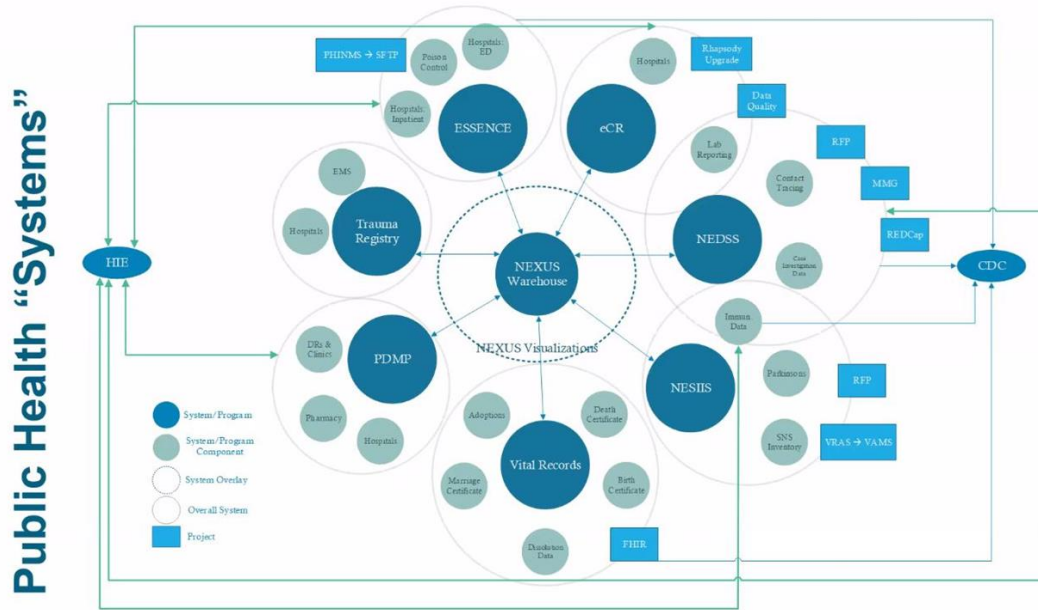
Minimally Sufficient PPE to Prevent Respiratory Infections



The Future



Data Nexus



Abbreviations: ED=Emergency Department; eCR= Electronic Case Reporting; RFP= Request for Proposal; MMG= Message Mapping Guide; VRAS= Vaccination Registration and Appointment System; VAMS= Vaccine Administration Management System; FHIR= Fast Healthcare Interoperability Resources; DR= Doctor; EMS= Emergency Medical Services; NEDSS= Nebraska Electronic Disease Surveillance System; SNS= Strategic National Stockpile; Immun=Immunization

Goals:

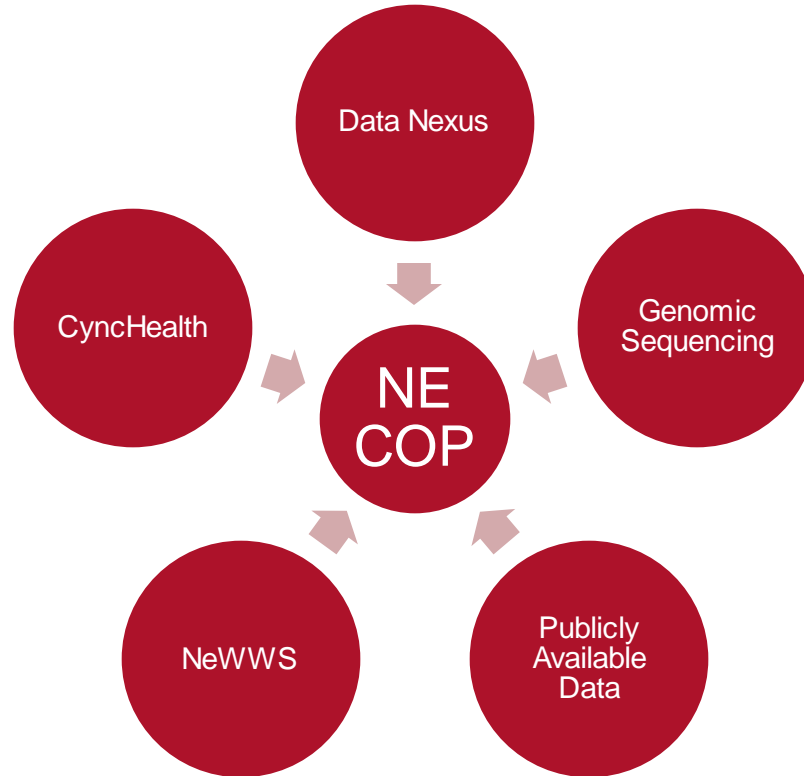
1. Improve quality and timeliness of data collection
2. Remove barriers to internal data access
3. Improve integration of data sources
4. Increase efficiency of data analysis
5. Improve decision making processes
6. Enhance the public's access to data



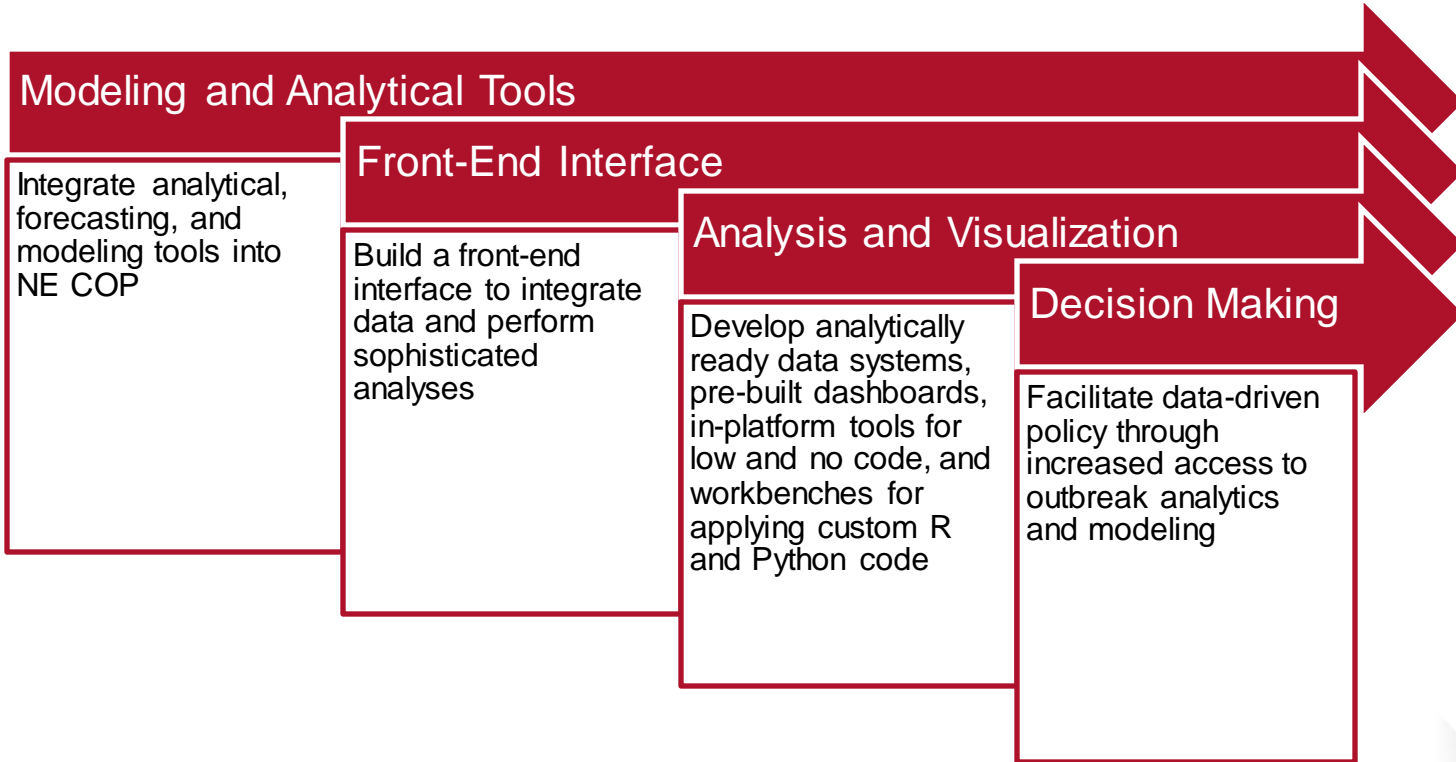
Building Capacity/ Beyond COVID



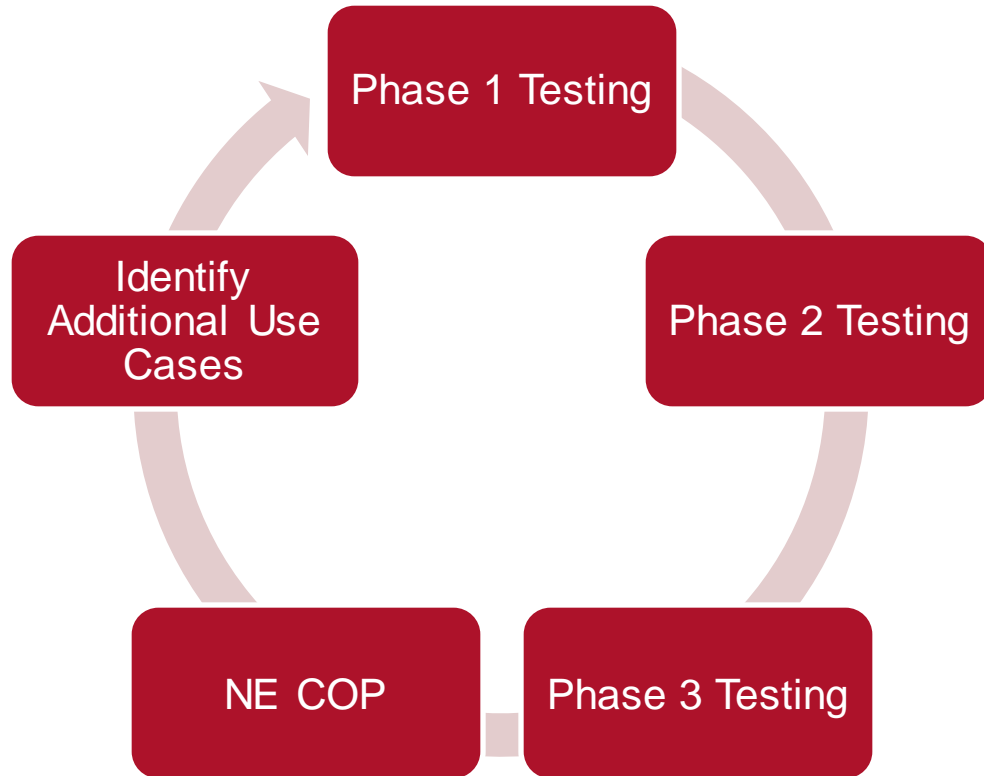
HHS Protect: Nebraska Common Operating Picture (NE COP)



Scaling Beyond DHHS



Model Testing, Evaluation, and Integration



Phase 1

- Adapt models for compatibility with DHHS data systems
- Test, calibrate, and validate analytical tools

Phase 2

- Develop easy to use analytic and visualization tools

Phase 3

- Assess model performance under simulated, different real-world conditions



Acknowledgements

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Kansas State

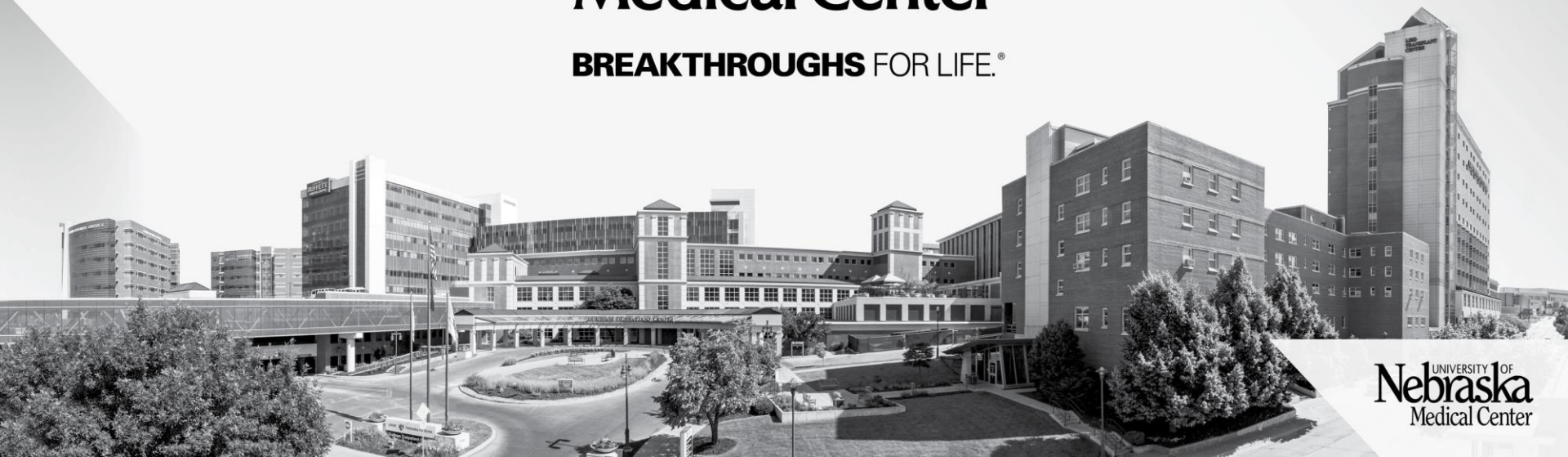
- Cindi Dunn





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