With so much COVID-19 data, why didn't we have better information about the pandemic?

DONAHUE | CREIGHTON ID SYMPOSIUM | 4.22.23

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1

NEEDS

Move & join large amounts of data quickly

Streamline everyday work

System ready for *pandemic era*

2

DATA SILOS & ECPI

MOVE & JOIN LARGE AMOUNTS OF DATA QUICKLY

3

TRADITIONAL PATH

4

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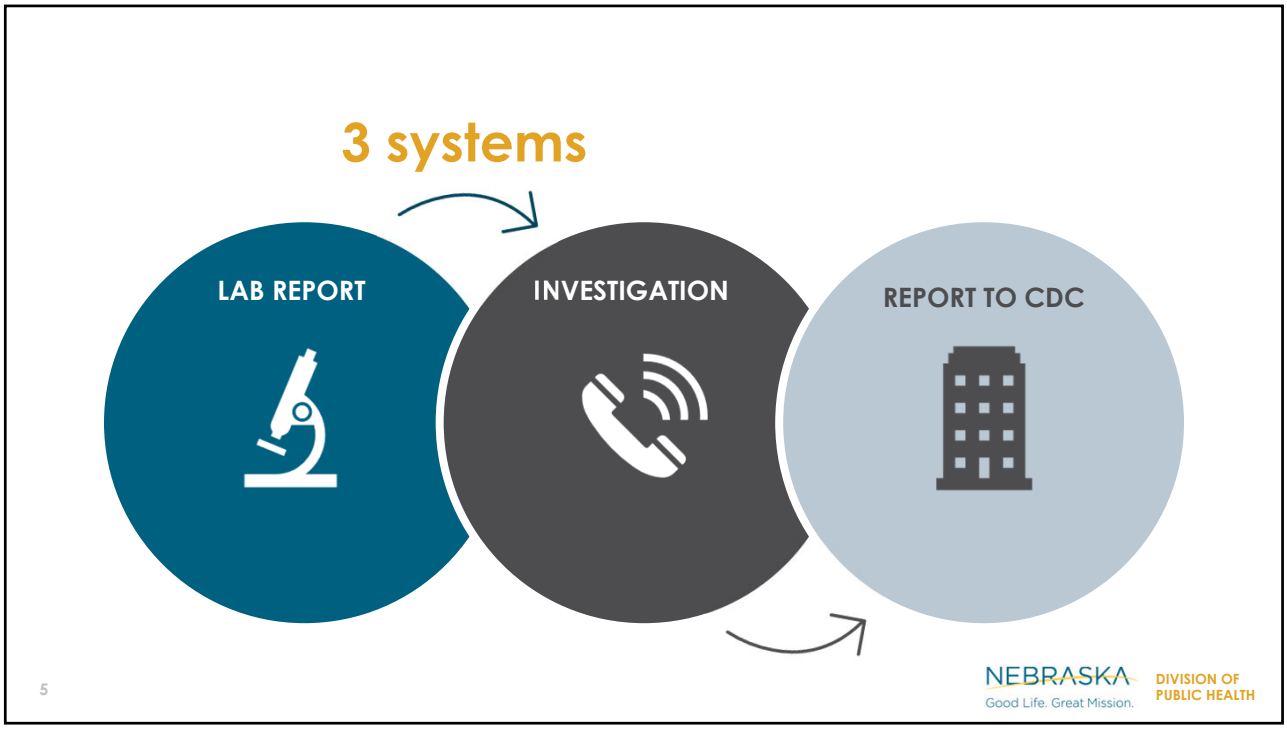
3 systems
LAB REPORT
INVESTIGATION
REPORT TO CDC
5
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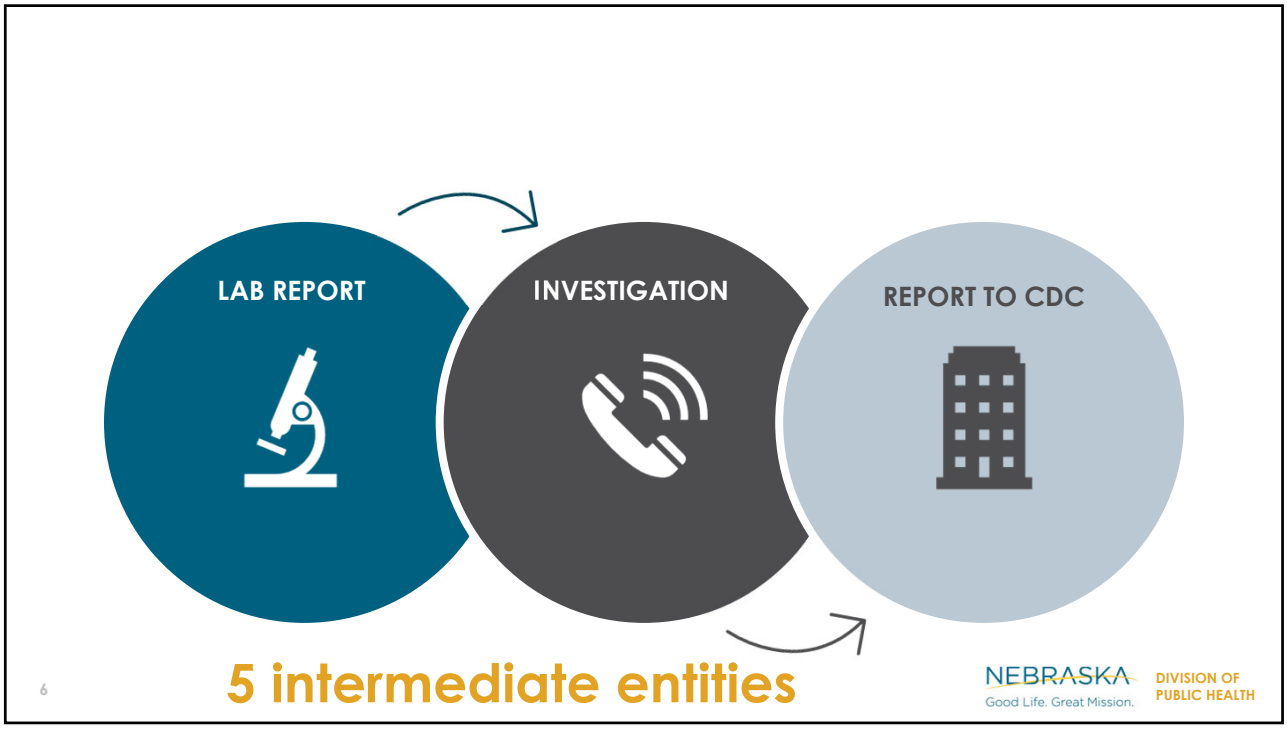
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INVESTIGATION
REPORT TO CDC
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5 intermediate entities
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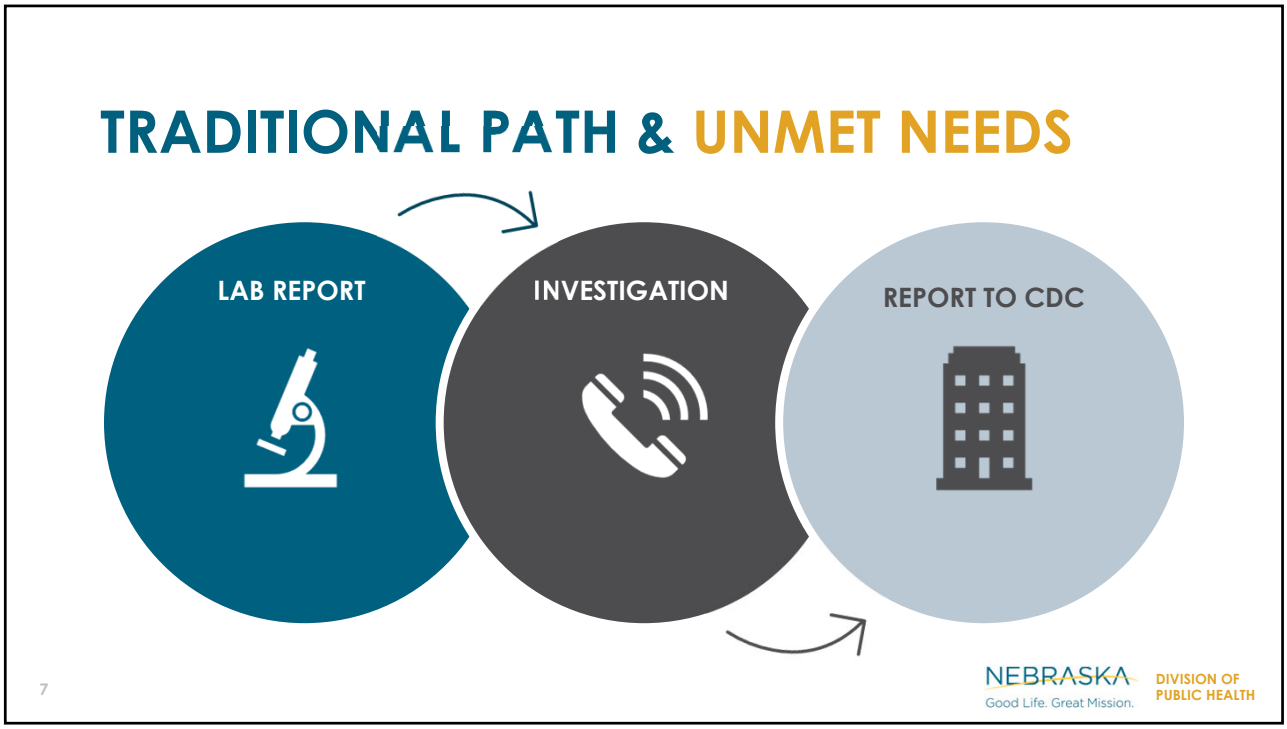
TRADITIONAL PATH & UNMET NEEDS
LAB REPORT
INVESTIGATION
REPORT TO CDC
7
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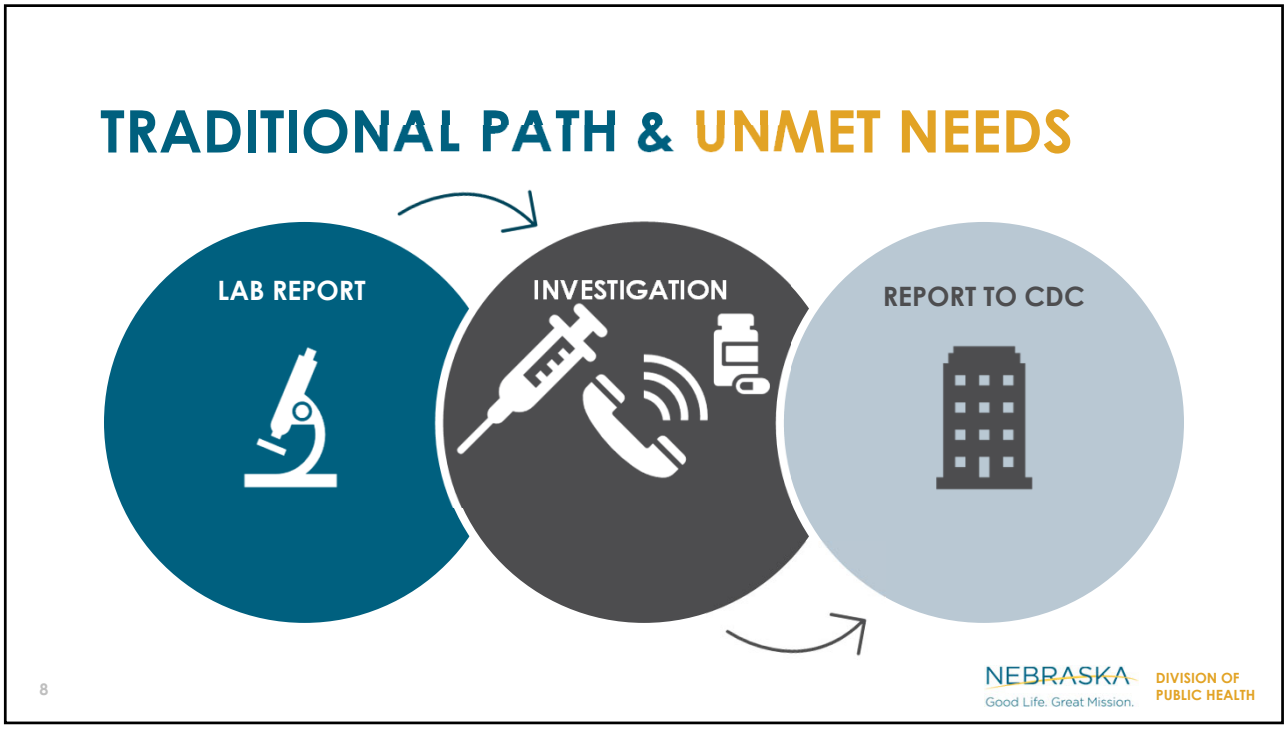
TRADITIONAL PATH & UNMET NEEDS
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TRADITIONAL PATH & UNMET NEEDS

9

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TRADITIONAL PATH & UNMET NEEDS

10

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TRADITIONAL PATH & UNMET NEEDS

11

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"…the pandemic isn't what we normally do."

We NEED to be able to meet every unmet need encountered throughout the pandemic

12

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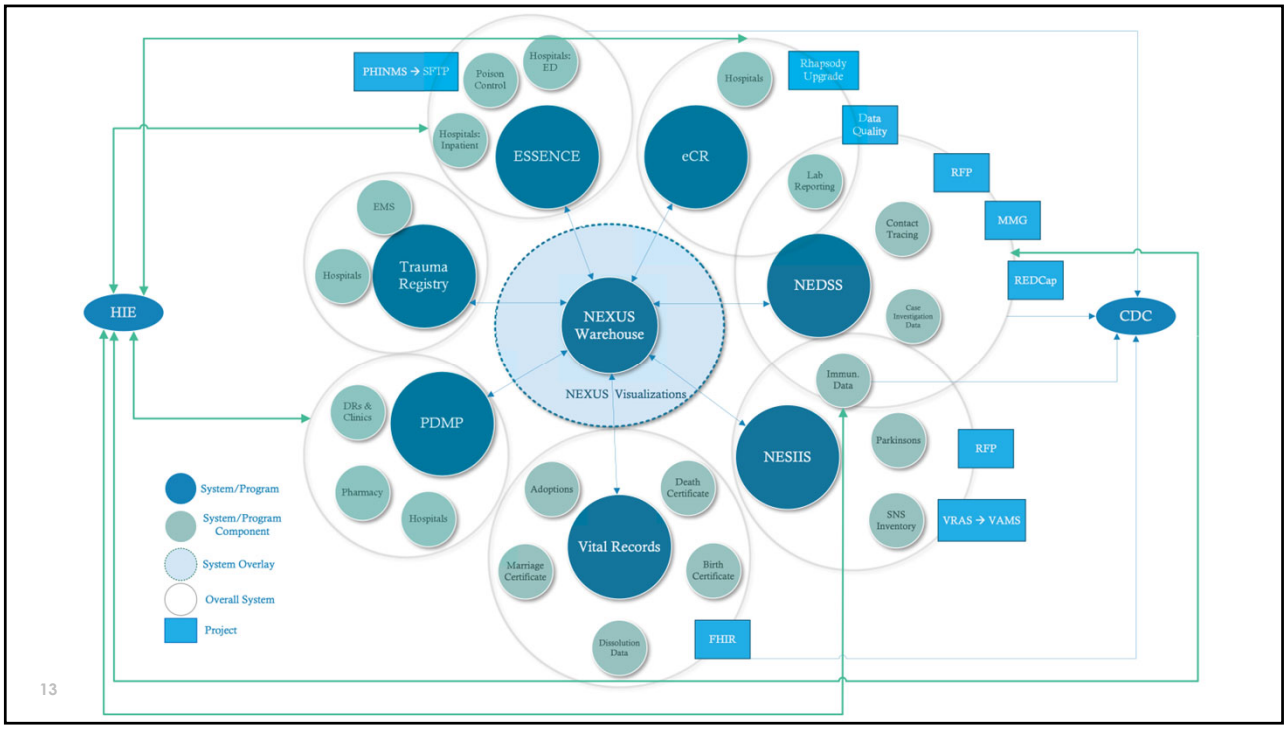


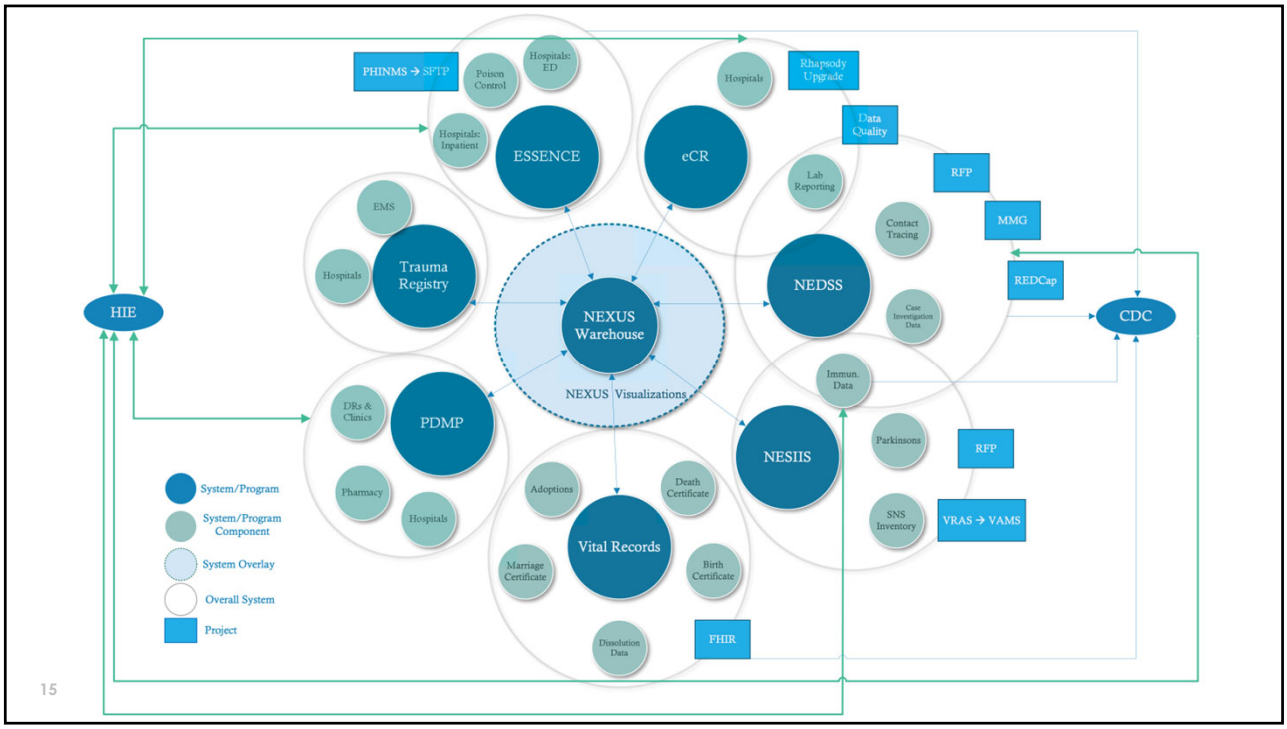
13

Data NEXUS solar system

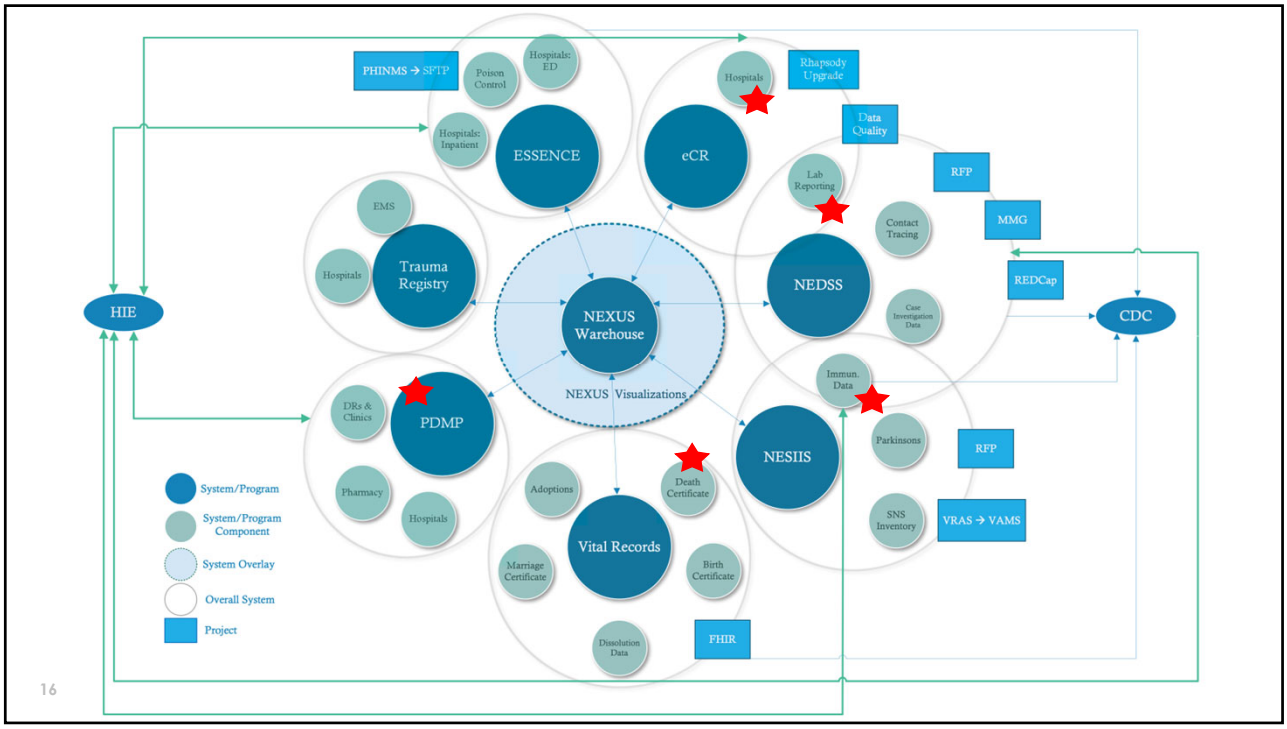
DHHS DATA NEXUS

14

14


PHINMS → SFTP
Poison Control
Hospitals: ED
Hospitals: Inpatient
ESSENCE
eCR
Hospitals
Rhapsody Upgrade
Data Quality
Lab Reporting
RFP
MMG
Contact Tracing
REDCap
CDC
EMS
Hospitals
Trauma Registry
NEXUS Warehouse
NEDSS
Case Investigation Data
HIE
Immun. Data
NEXUS Visualizations
DRs & Clinics
PDMP
NESIIS
Parkinsons
RFP
Pharmacy
Hospitals
Adoptions
Death Certificate
Vital Records
SNS Inventory
VRAS → VAMS
Marriage Certificate
Birth Certificate
Dissolution Data
FHIR
System/Program
System/Program Component
System Overlay
Overall System
Project
15

15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16

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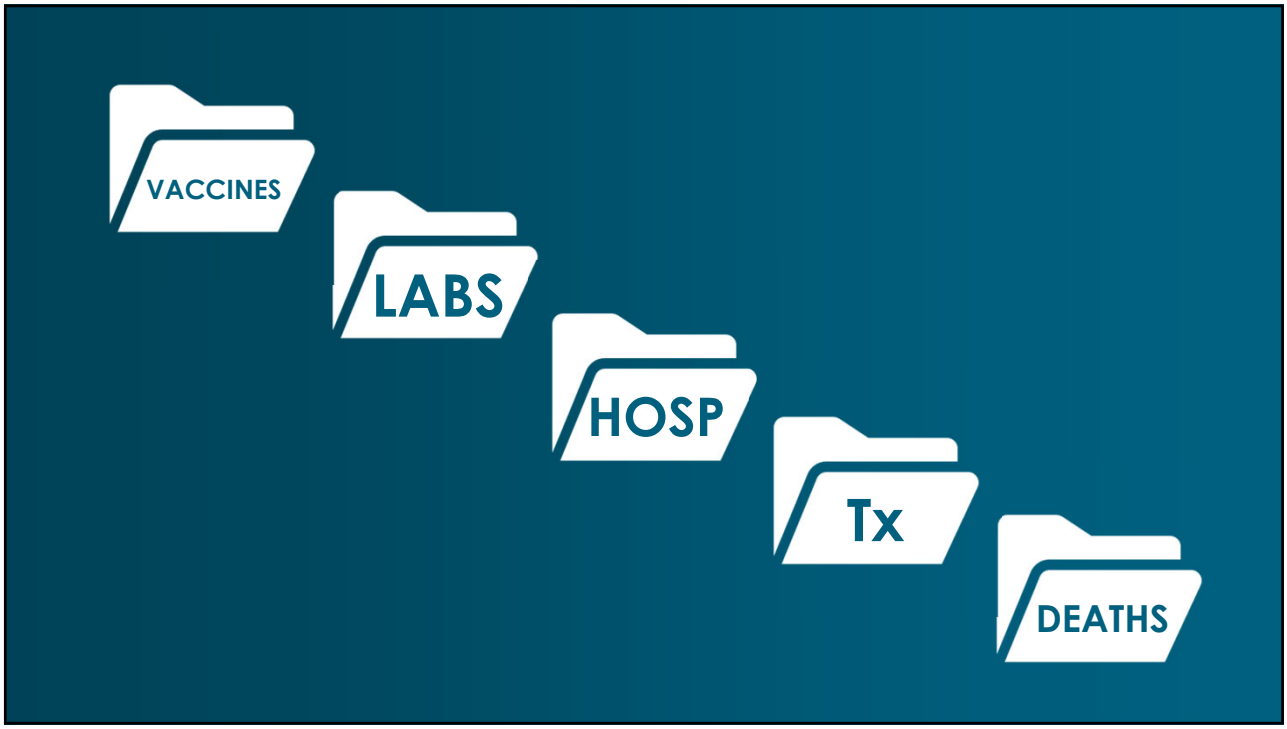

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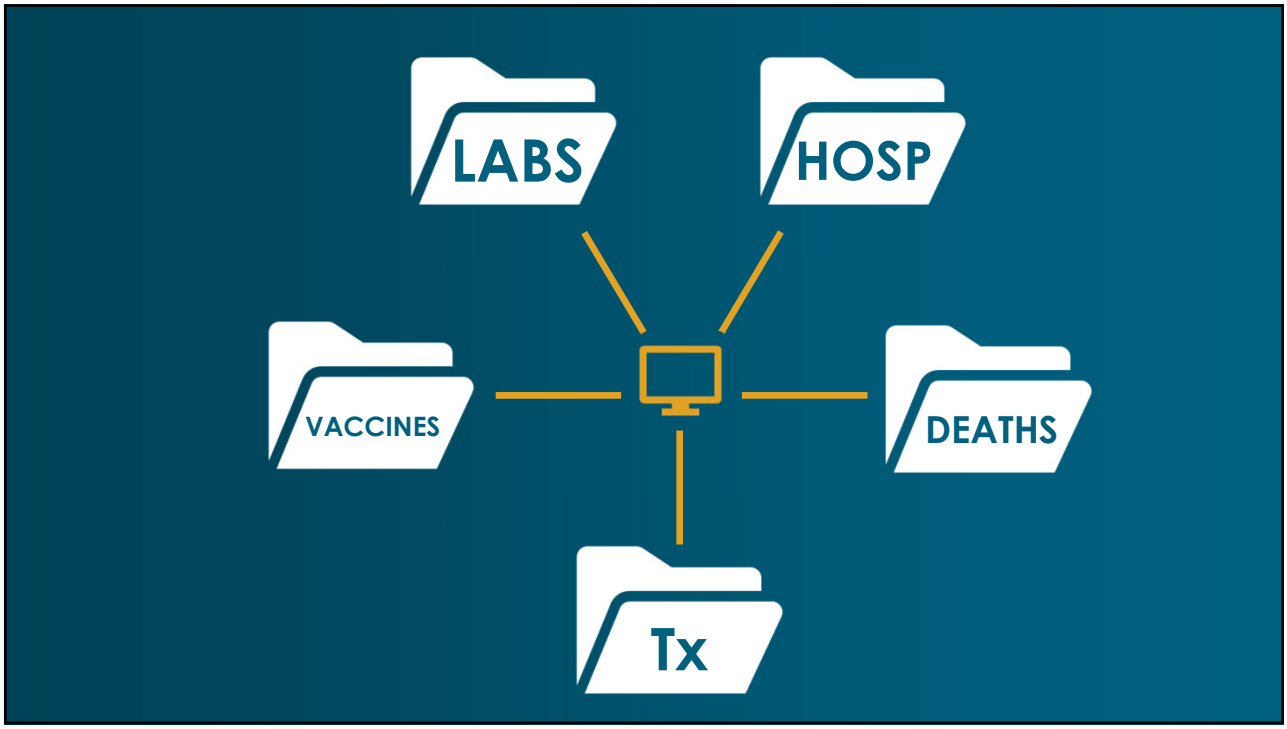

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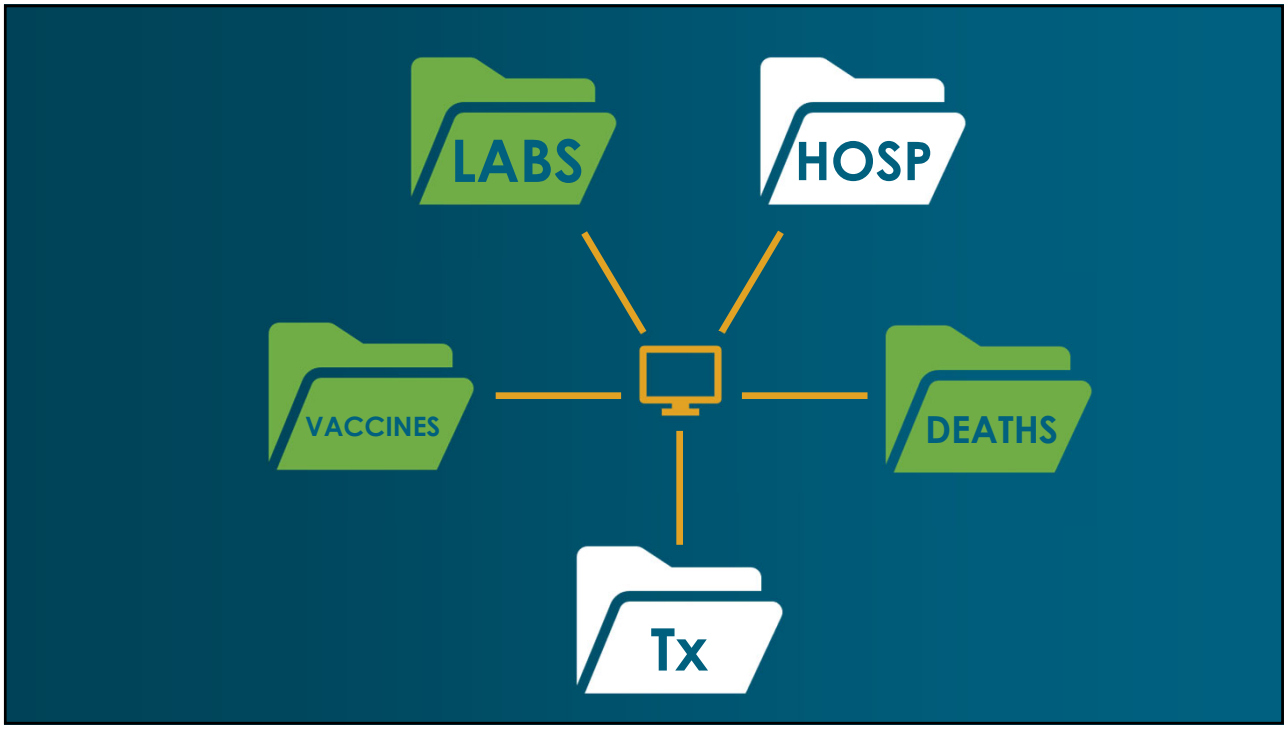

19

CHOOSE TODAY!

Get your booster vaccination against COVID-19 at your local pharmacy, doctor's office, or health dept.

VACCINATED WITHOUT UPDATED BOOSTER	VACCINATED WITH UPDATED BOOSTER
2x	**17x**
LOWER RISK OF DEATH	LOWER RISK OF DEATH

Over the last 20 weeks, people who were vaccinated **without an updated booster** were **2X** less likely to die from COVID-19 and people who were vaccinated **with an updated booster** were **17X** less likely to die from COVID-19 compared with people who were not vaccinated.

About the Analysis

The 20-week (Sept 01, 2022, to Jan 28, 2023) period was considered in the analysis as bivalent vaccines were approved on September 1, 2022.
Records having immunosuppressive conditions along with COVID-19 were excluded from the analysis.
Vaccination (ara): Obtained from Nebraska state immunization information System (NESIIS)
Death Data: Obtained from Nebraska vital records death certificate data.
Incidence Rate Ratios (IRRs) for vaccinated without an updated booster for the past twenty weeks were calculated by dividing the average weekly incidence rates among the unvaccinated population by that among the population vaccinated without an updated booster. IRRs for those vaccinated with an updated booster for the past twenty weeks were calculated by dividing the average weekly incidence rates among the unvaccinated population by that among the population vaccinated with an updated booster.
Vaccine effectiveness was calculated based on the formula VE = 1 - Rate vaccinated / Rate unvaccinated
Age-adjusted IRRs were calculated by IRR = 1/ (1-Age-adjusted VE)

Authors: Sai Paritala and Yi Du

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20

How well does infection-induced immunity work?

How long does it last?

How well does it protect against infection, hospitalization, and death?

Does it prevent long-COVID-19 or complications like MIS?

How well does cross-variant immunity work?

How vulnerable are we to another big surge?

21

We have vaccine effectiveness but what about nuance?

How long do vaccines work?

Against infection, hospitalization, and death?

How does effectiveness differ per variant?

Is there one brand that's better?

What boosting timeline is most effectiveness?

Are these answers different across age groups, races, ethnicities, medical comorbidities, or rural/urban residence?

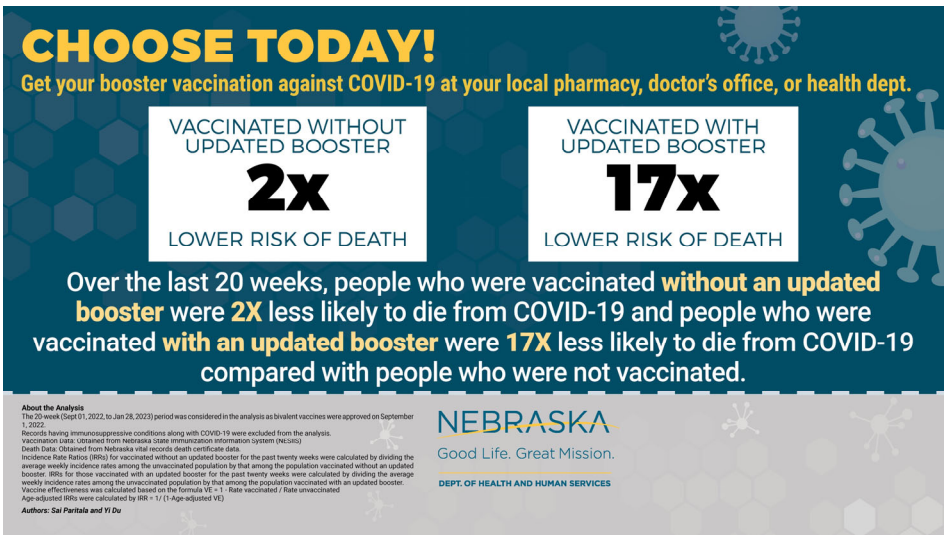
22

What about antiviral effectiveness

How well does nirmatrelvir-ritonavir work IN Nebraska?

Who is accessing it and where are the missed opportunities?

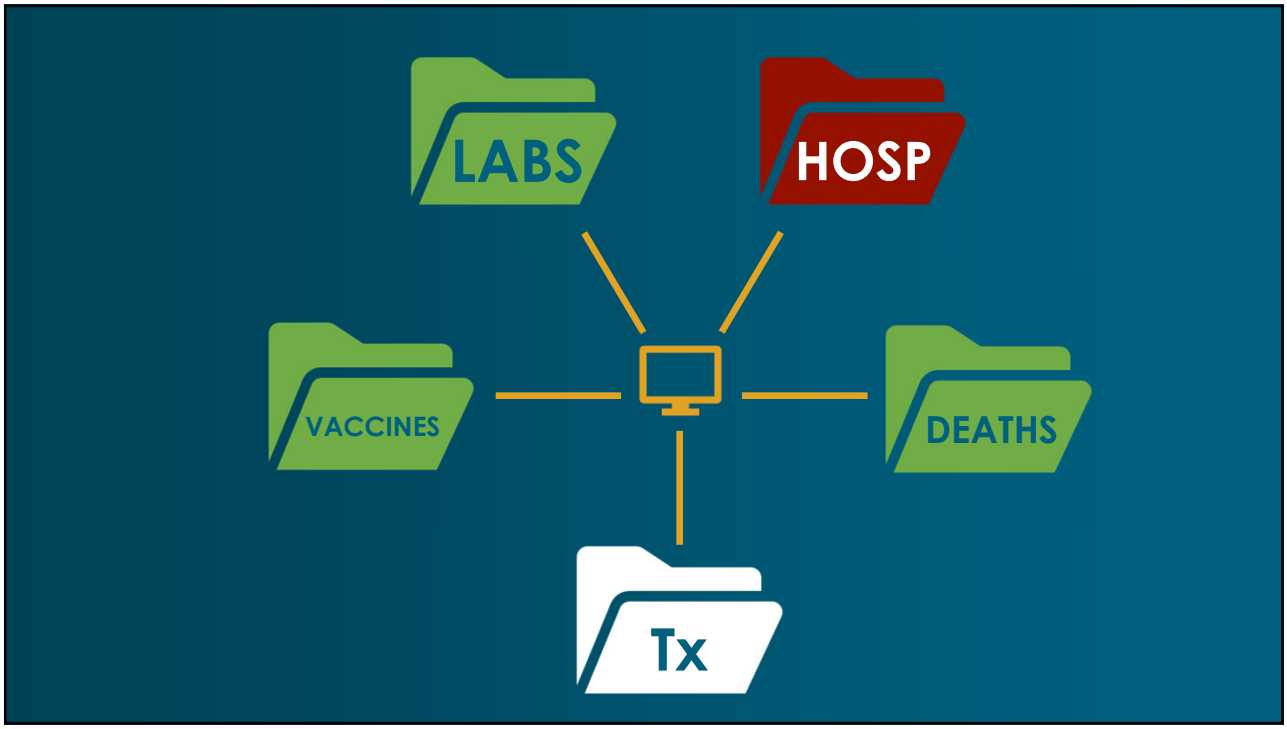
23



Death certificate data, not hospitalization data

24

24



25

AUTOMATED

REALTIME

COMPLETE

IDENTIFIABLE

FLEXIBLE

26

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	NHA
AUTOMATED	N
REALTIME	N
COMPLETE	Y
IDENTIFIABLE	Y
FLEXIBLE	Y

27

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	NHA	JUVARE
AUTOMATED	N	N
REALTIME	N	Y
COMPLETE	Y	N
IDENTIFIABLE	Y	N
FLEXIBLE	Y	N

28

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	NHA	JUVARE	HHS PROTECT
AUTOMATED	N	N	N
REALTIME	N	Y	Y
COMPLETE	Y	N	Y
IDENTIFIABLE	Y	N	N
FLEXIBLE	Y	N	N

29

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29

	NHA	JUVARE	HHS PROTECT	ECR
AUTOMATED	N	N	N	Y
REALTIME	N	Y	Y	Y
COMPLETE	Y	N	Y	N
IDENTIFIABLE	Y	N	N	Y
FLEXIBLE	Y	N	N	N

30

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	NHA	JUVARE	HHS PROTECT	ECR	HIE
AUTOMATED	N	N	N	Y	Y
REALTIME	N	Y	Y	Y	Y
COMPLETE	Y	N	Y	N	N
IDENTIFIABLE	Y	N	N	Y	Y
FLEXIBLE	Y	N	N	N	Y

31

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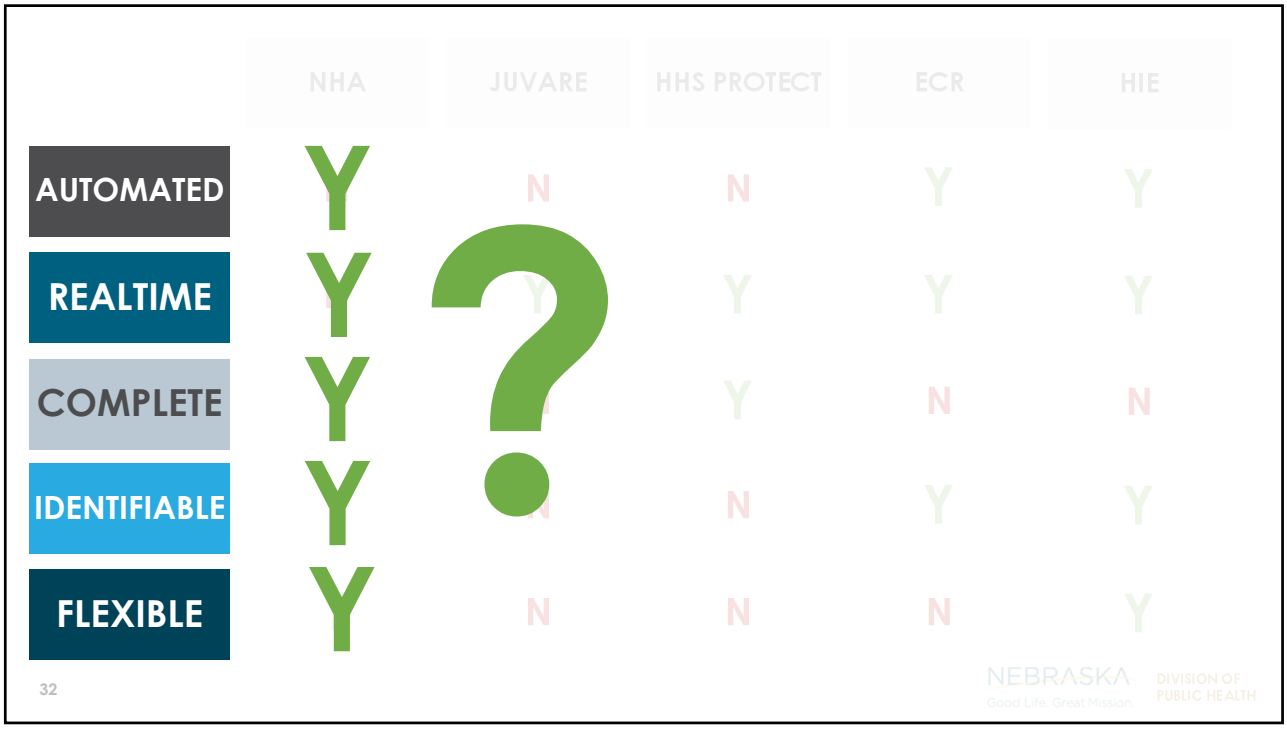


32

FRAMEWORK

National
COVID
Cohort
Collaborative

https://tracs.unc.edu/index.php/news/1668-national-covid-cohort-collaborative

33

MODERN TOOLS

STREAMLINE EVERYDAY WORK

34

QR enrollment

↓

AOEs for automated realtime case-control analysis

↓

Scheduling

↓

Test ordering

TESTING

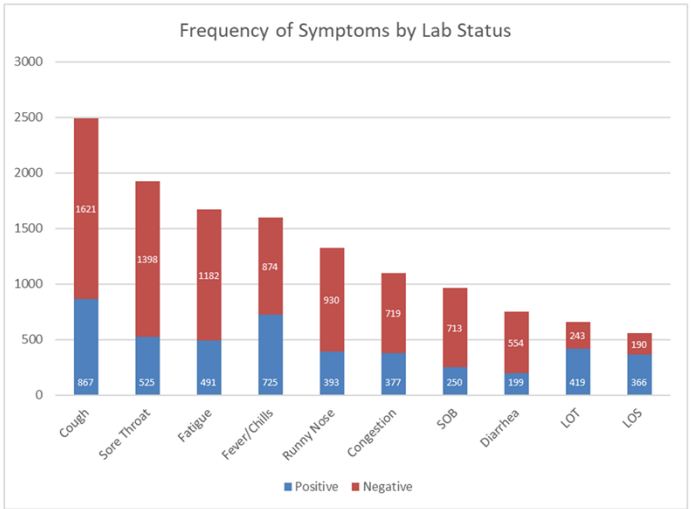
35

36

37

NEBRASKA NATIONAL GUARD COVID-19 TESTING

Figure 1: Frequency of symptoms by lab status in REDCap training dataset



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38

Realtime AOE case-control identified LOS/LOT as strongest predictors of COVID-19 infection, prior to national recognition

Table 4: Odds ratios of significant (p<0.05) symptoms and symptom combinations derived from logistic regression analysis

Symptom/Combination	Odds Ratio	Wald 95% Confidence Intervals	
Loss of Smell	10.14	6.07	16.94
Loss of Taste	6.91	4.35	10.99
Fever/Chills	6.57	5.30	8.13
Sore Throat*Loss of Taste*Loss of Smell	5.92	2.10	16.69
Fever/Chills*Loss of Smell*Fatigue	5.16	2.10	12.70
Loss of Smell*Diarrhea	4.17	1.57	11.08
Fever/Chills*Cough*Congestion	3.64	1.80	7.35
Cough	3.47	2.89	4.16
Fever/Chills*Runny Nose*Loss of Taste	3.38	1.15	9.91
Cough*Sore Throat*Loss of Smell	3.38	1.36	8.41
Sore Throat*Loss of Taste*Diarrhea	3.37	1.21	9.39
Fever/Chills*Shortness of Breath*Sore Throat	2.91	1.37	6.18
Congestion	2.76	1.91	3.98
Sore Throat*Runny Nose*Congestion	2.32	1.13	4.75
Shortness of Breath*Loss of Taste	1.94	1.11	3.38
Sore Throat	1.56	1.23	1.99

39

39

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Built outside of existing disease surveillance & case management system due to inflexibility and absence of needed tools

40

40

EBOLA DGMQ NOTICE

↓

RISK ASSESSMENT

↓

ACTIVE MONITORING

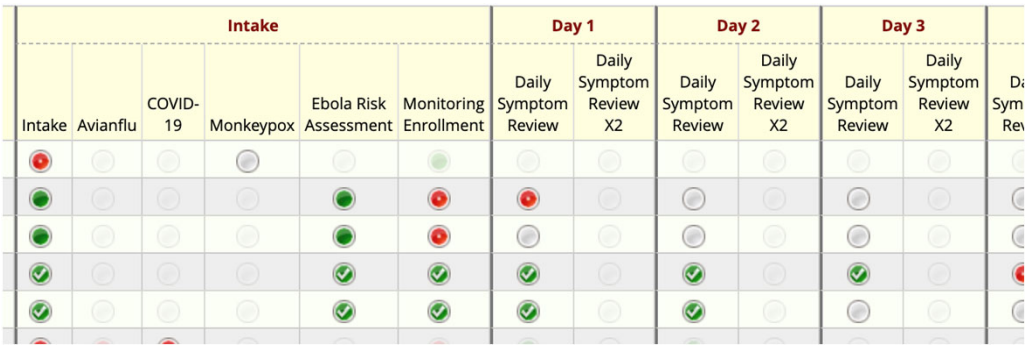
↓

TEST ORDERING

ACTIVE MONITORING

41

Ebola active monitoring: borrowed from COVID-19 & highly pathogenic avian influenza (HPAI)



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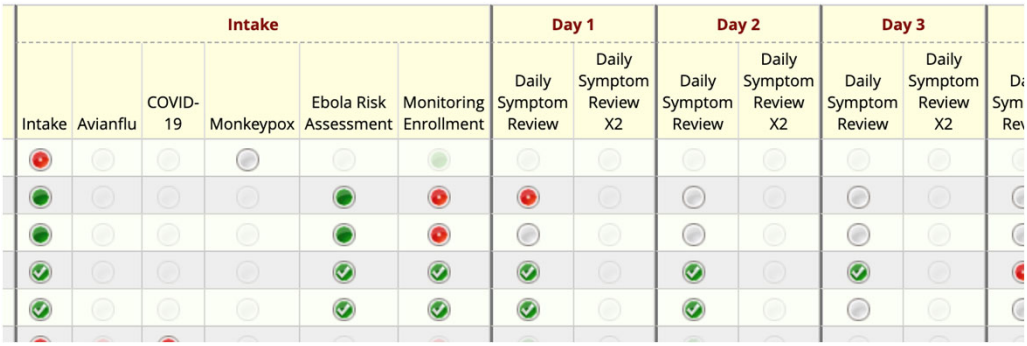
Ebola active monitoring: borrowed from COVID-19 & highly pathogenic avian influenza (HPAI)



Built outside of existing disease surveillance & case management system due to inflexibility and absence of needed tools

43

43

CASE

↓

PROSPECTIVE & RETROSPECTIVE CONTACT TRACING

↓

POSITIVE LAB REPORTS

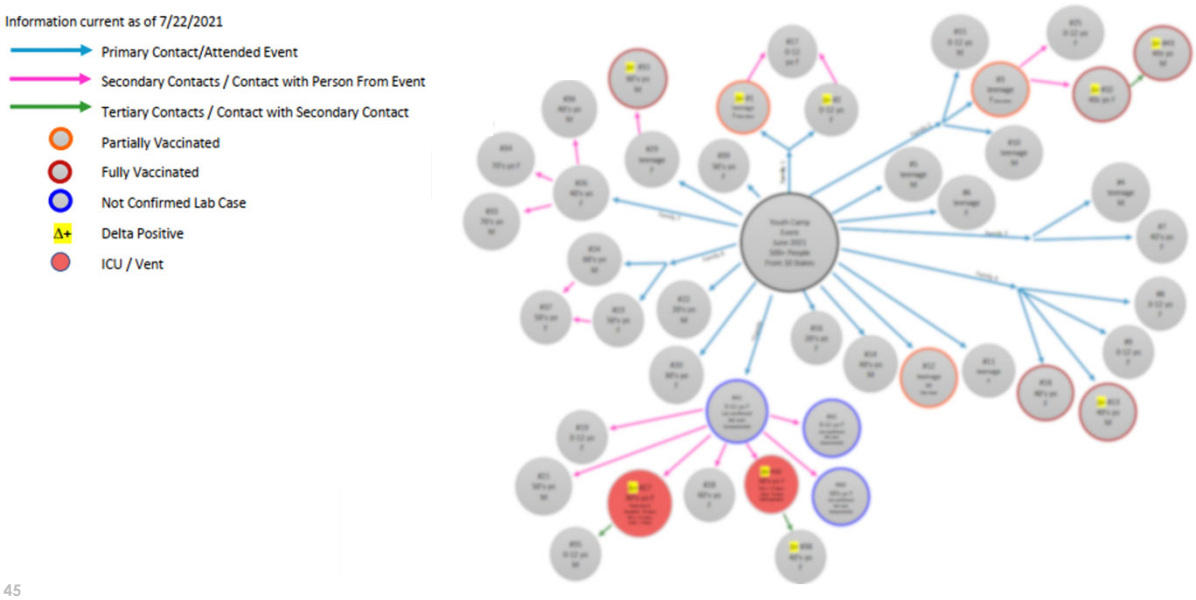
↓

QUARANTINE/ISOLATION

CLUSTER MAPPING

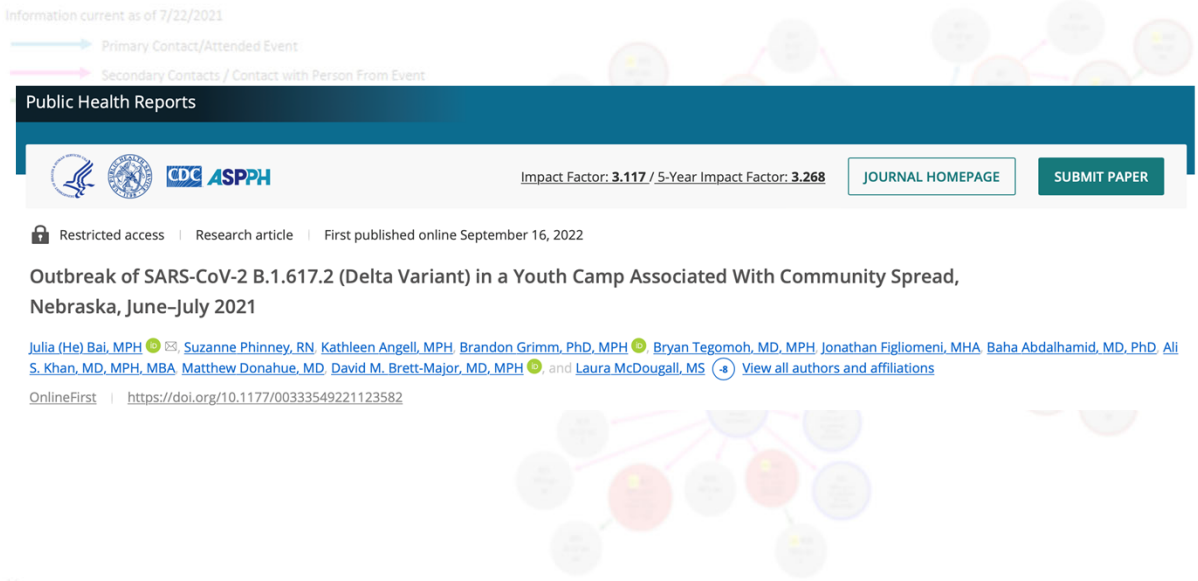
44

Traditional cluster mapping (Powerpoint, NE)



45

Traditional cluster mapping (Excel, NE)



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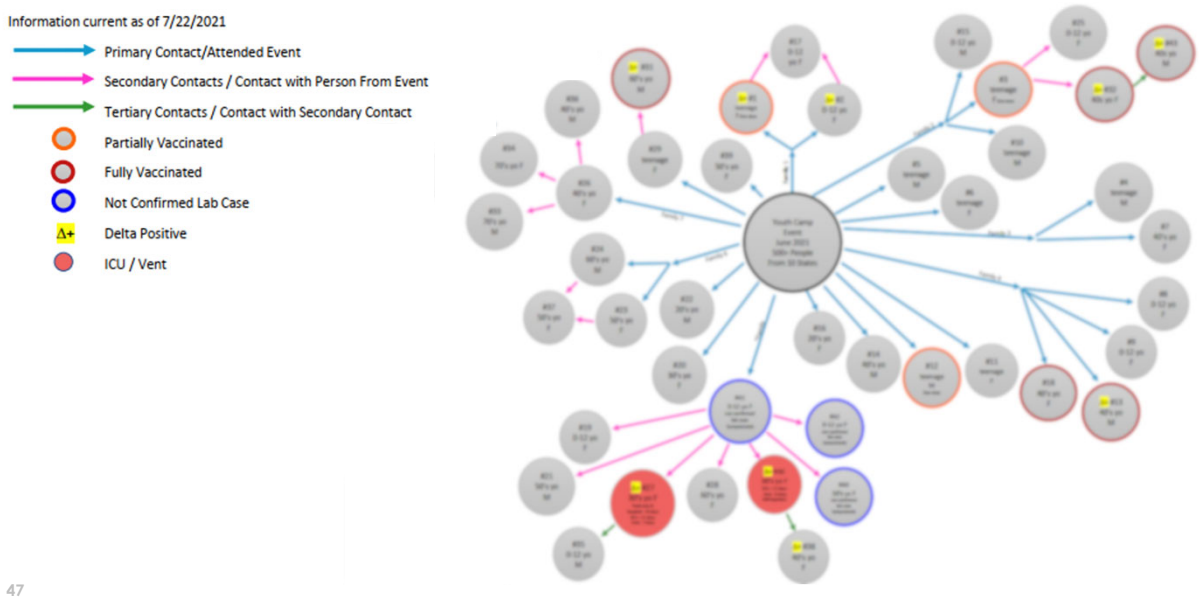
Traditional cluster mapping (Powerpoint, NE)

Built outside of existing disease surveillance & case management system due to inflexibility and absence of needed tools



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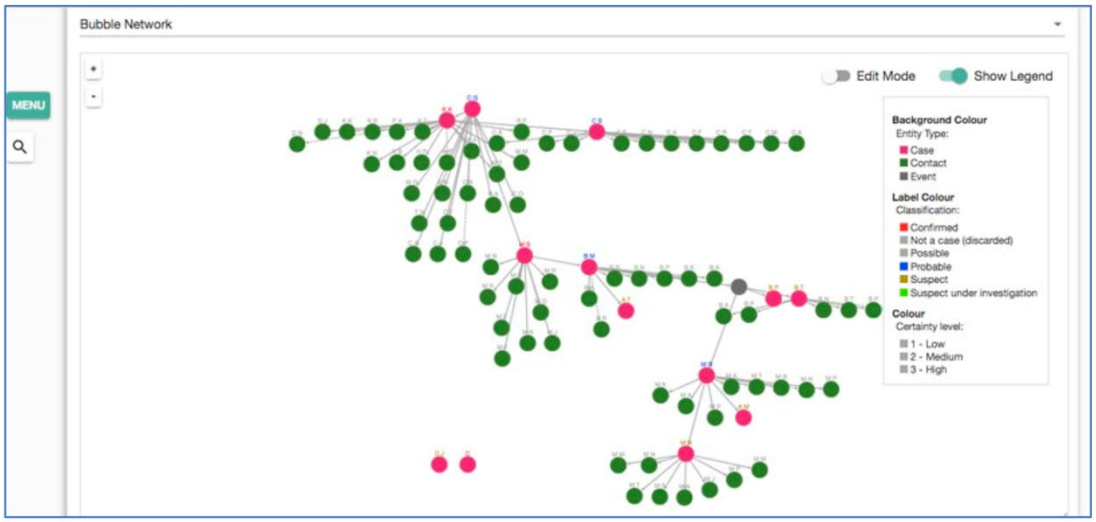
47

Traditional cluster mapping (Go.Data, WHO)



- **Geospatial map**: Uses the mapping servers configured during outbreak setup to transpose transition chains on a geographic map.

48

COMPLEX LAB REPORT

↓

ONE SYSTEM

↓

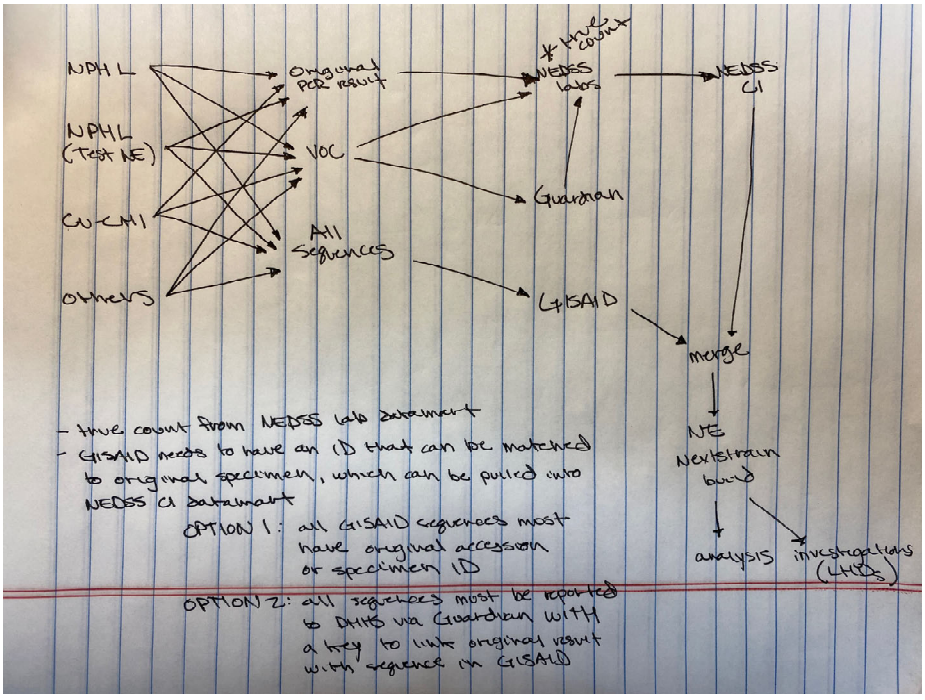
LINEAGE IDENTIFICATIONS

↓

PHYLOGENETIC ANALYSIS & CLUSTER MAPPING

GENOMICS

49



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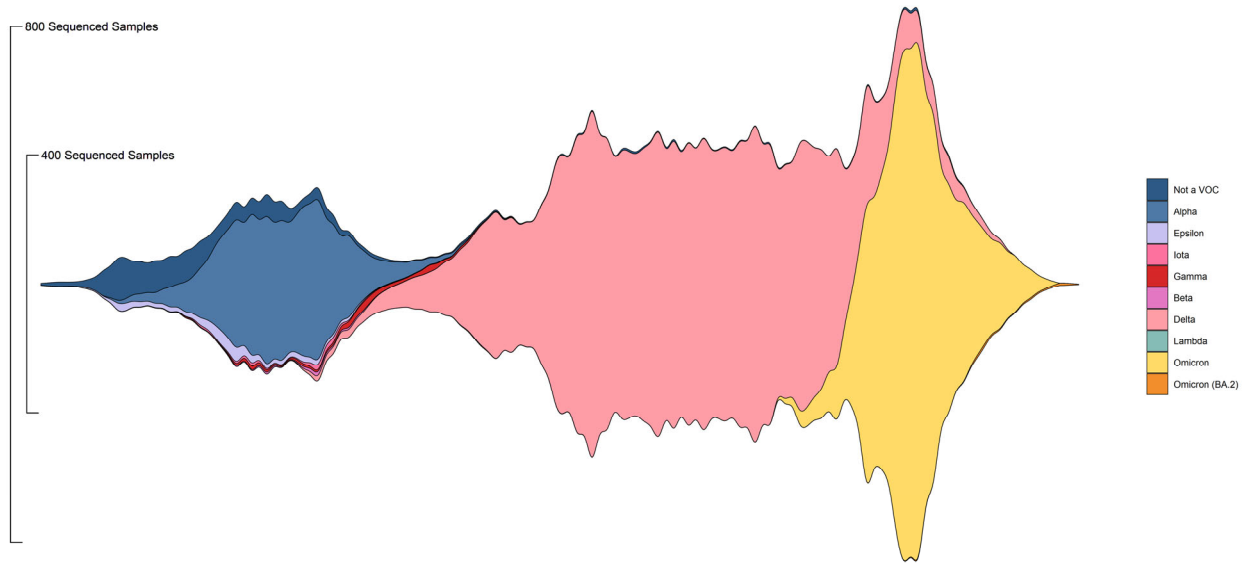
LINEAGE IDENTIFICATIONS



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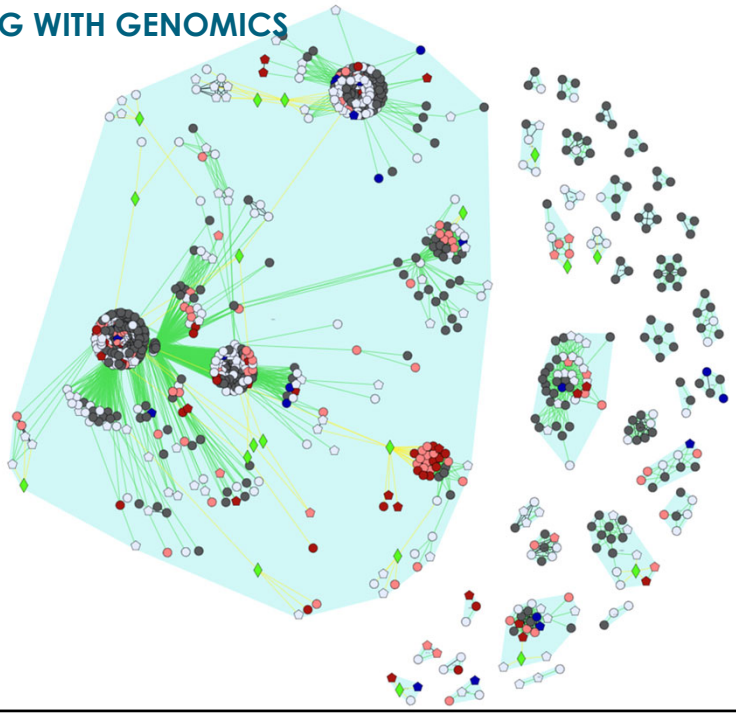
51

CLUSTER MAPPING WITH GENOMICS



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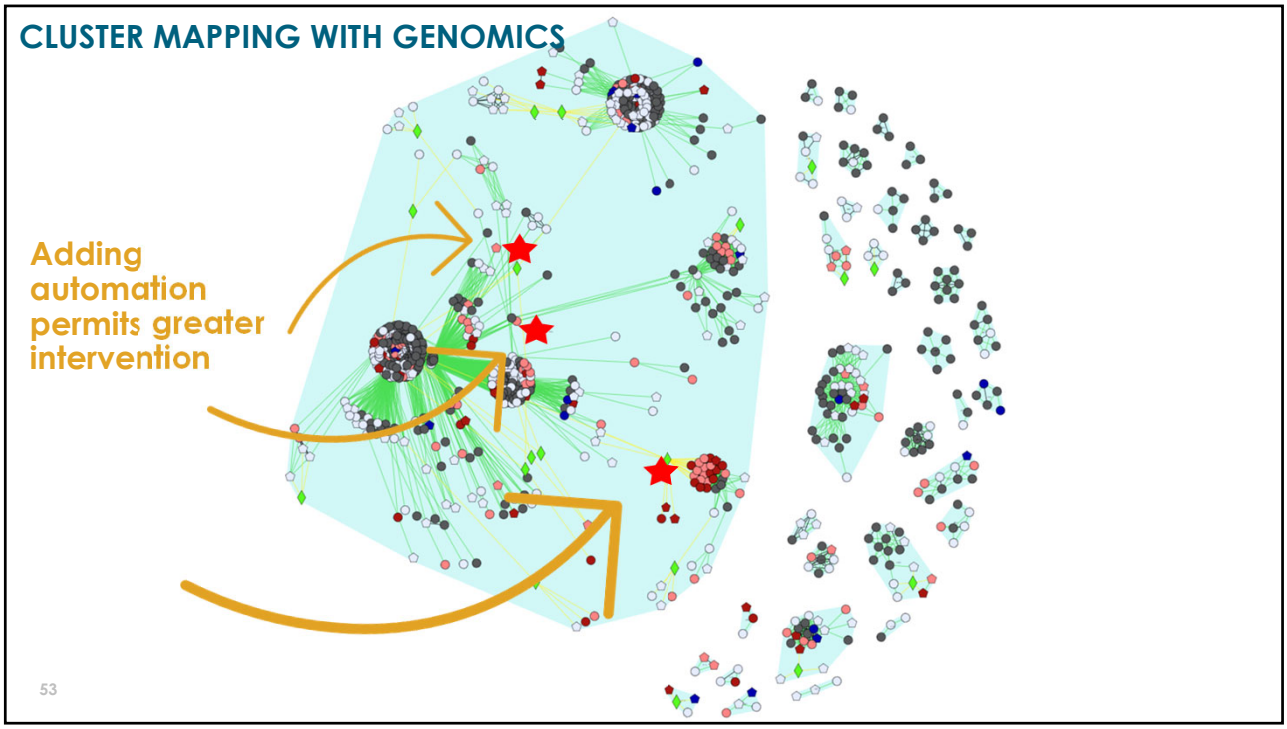
52

CLUSTER MAPPING WITH GENOMICS



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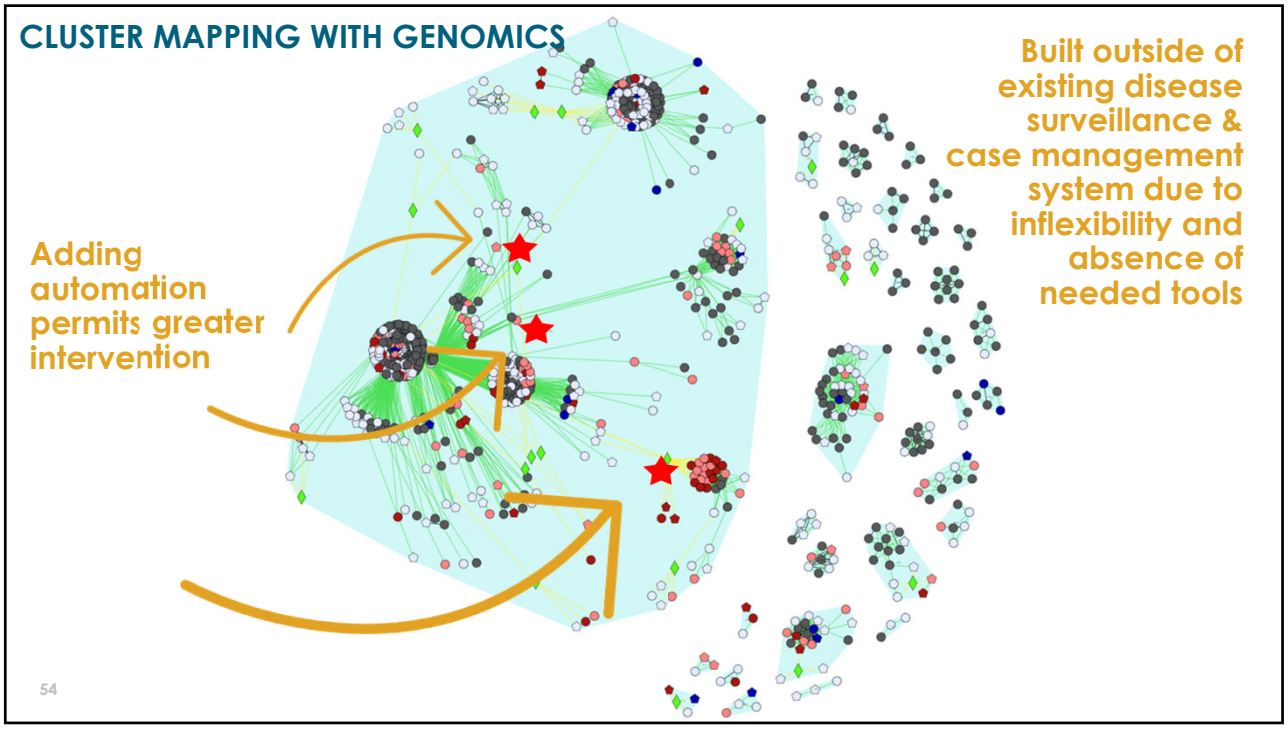
CLUSTER MAPPING WITH GENOMICS



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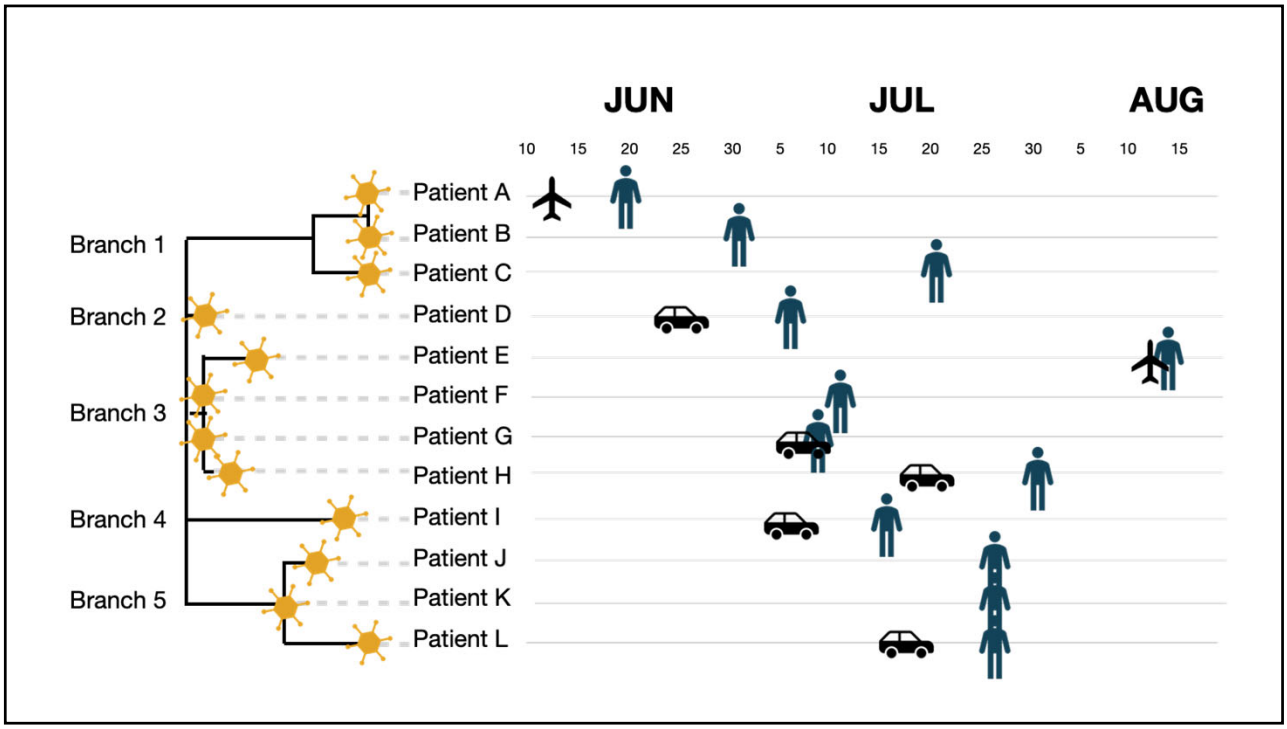
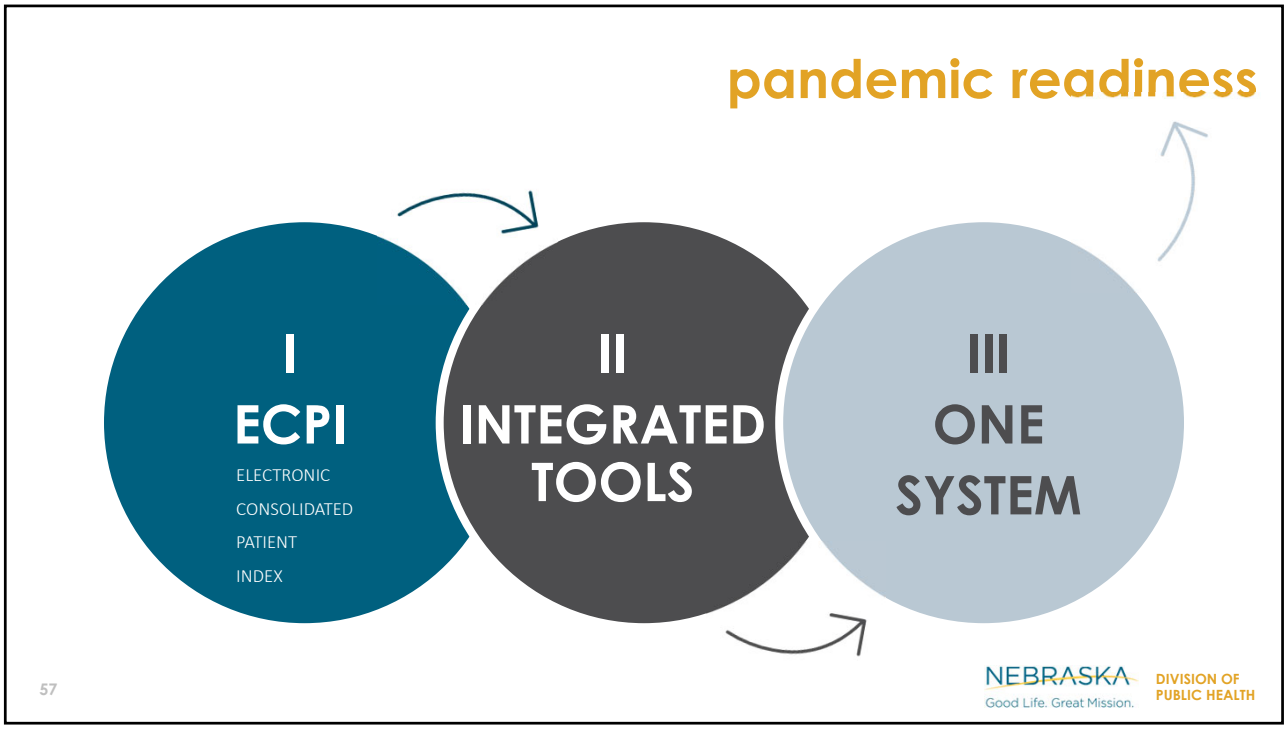


55

ONE SYSTEM

SYSTEM READY FOR THE NEXT PANDEMIC ERA

56



57

ONE SYSTEM - REQUIREMENTS

	LEAST COMPLEX	LESS COMPLEX	MORE COMPLEX	MOST COMPLEX
Move data	ELR, ECR,vaccine, environmental, (NEXUS eCPI)	Map condition to workflow	Create notifications & queues	Send to CDC
Basic functions	DAGs, permissions, audit trail	Manage cases & contacts	Create, edit forms	Easy export, realtime visualization
Next steps	Scheduling, QR, test ordering	Active monitoring w/texting	Link & map cases, contacts, outbreaks	Genomics, GIS

58

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EBOLA
SITREP

MONKEYPOX
Genomic epidemiology

COVID-19
Bivalent VE

59

59

"…the pandemic isn't what we normally do."

DONAHUE | EPI UPDATES | 10.11.22

EBOLA
SITREP

MONKEYPOX
Genomic epidemiology

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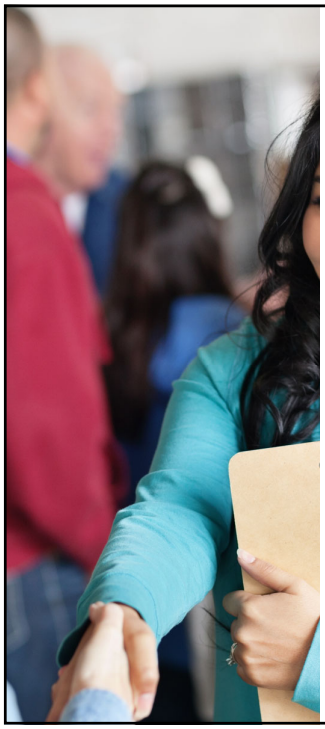
Bivalent VE

Ready for *pandemic era*

We NEED to be able to meet every unmet need encountered throughout the pandemic

60

60



THANK YOU

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MATTHEW DONAHUE, MD
matthew.donahue@nebraska.gov

61