CDC's Data Modernization Initiative

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WHAT IS THE
DATA MODERNIZATION
INITIATIVE?

CDC is at the heart of a national effort to create modern, integrated, and real-time public health data and surveillance that can protect us from any health threat.
DMI IS A UNIFYING FOUNDATION FOR CHANGE

DMI IS BOTH RESOURCED AND COMPREHENSIVE, AND IT UNIFIES US IN WAYS NO OTHER STRATEGY HAS BEFORE.

PARTNER SUPPORT
• Unprecedented connection to public health and healthcare partners, state and local health departments, researchers, academics, innovators, and industry leaders

CONGRESSIONAL SUPPORT
• First-ever funding dedicated to modernization, accelerated by CARES

PUBLIC SUPPORT
• New threats change awareness and demands

CDC SUPPORT
• Unified, whole-of-agency approaches
BENEFITS TO PUBLIC HEALTH

EMPower Scientists
Focus on Knowledge Discovery and Public Health

Get Better Data
Access to Complete, Accurate, and Up-to-Date Information

Save Time
Faster and More Streamlined IT Development and Implementation

Encourage Innovation
Enhance Productivity and Creativity

Promote Collaboration
Ensure Alignment & Enhance Productivity

Ensure Sustainability
Maximize Value and Flexibility
**DMI PRIORITIES**

**Data to Partners**
Technical and policy solutions for timely, complete, and accurate data from EHRs, labs, and other primary and new data sources to STLT partners and others in government, academics, and industry

**Data to CDC and USG**
Streamlined, coordinated, and interoperable public health reporting via API gateways supporting timely, complete, and accurate bi-directional data flows between STLT public health partners

**Building a Public Health Workforce**
Reskilling, upskilling, recruitment, and retention of a data science workforce with skills to design, implement, sustain, and innovate data modernization efforts

**Ongoing Data Modernization and Innovation**
Leverage state-of-the-art analytics and data visualization capabilities to integrate data from new or non-traditional sources with minimal IT assistance to strengthen the detection, response, prevention, and forecasting of health threats
ELEMENTS OF SUSTAINABILITY

SUSTAINABLE

SECURE  TRANSPARENT

REUSABLE  EXTENDABLE

ALIGNED  ADAPTABLE

Derived from "Procuring Interoperability: Achieving High-Quality, Connected, and Person-Centered Care"
https://nam.edu/procuring-interoperability-achieving-high-quality-connected-and-person-centered-care
Roadmap

- Lays out a path from where we are now to where we need to be:
  - Activities
  - Outcomes for Short-Term, Intermediate, and Long-Term
- Presents a vision
- Guides resources
- Tracks progress
## CDC Roadmap of Activities + Expected Outcomes for DMI

### ACTIVITIES
If we (CDC and partners) do this …

**COORDINATE PEOPLE AND SYSTEMS**
- Create interoperable systems: federal, state, local, and healthcare
- Coordinate investments, decisions, and policies across CDC and with partners
- Make data sharing easier through common policies, practices, and standards
- Advance academic and private partnerships

**ACCELERATE DATA FOR ACTION**
- Identify data for priority public health needs
- Upgrade and modernize IT infrastructure
- Strengthen the data science workforce
- Adopt open standards and tools while protecting data security
- Translate data into evidence-based recommendations

**SUPPORT STRATEGIC INNOVATION**
- Seek partner-driven data solutions
- Develop next-generation tools (e.g., modeling, visualization, predictive analysis, machine learning)
- Strengthen predictive analytics and forecasting

### SHORT-TERM OUTCOMES
… then we expect these changes to occur …

**Increased collaboration, communication, and messaging** among CDC and partners

**Reduced data collection and reporting burden** at state, tribal, local, and territorial levels

**Improved data sharing and interoperability** through common standards like HL7 FHIR®

**Increased capacity** to quickly analyze, interpret, and act on data

**Increased electronic reporting** and specific enhancements to flagship CDC surveillance systems

**Stronger workforce** in data science, analytics, modeling, and informatics

**Targeted real-time communication** of data and results

### INTERMEDIATE OUTCOMES
… which will lead to …

**Effective coordination** on complex health and emergency response challenges

**Timely and complete data reporting** to CDC

**Efficient, secure data access and exchange** between systems across the country

**A more comprehensive picture** to improve decision-making and protect health for all

**Real-time, linked systems** that recognize threats early to inform timely response

**A highly skilled workforce** that applies state-of-the-art data skills and tools

**High-quality information and guidance** to protect people’s health

**Open-source, enterprise-level technologies** and coordinated systems

**New approaches to address present and future threats**

### LONG-TERM OUTCOMES
… our ultimate goals.

**CDC can rapidly identify and effectively mitigate emerging threats**

**Trusted data promotes evidence-based behaviors, interventions, and solutions to protect health**

**Every American has equal opportunity to attain the highest level of health possible**

**All people have the right information at the right time to make decisions**

**Our country is better prepared for, and protected from, all types of public health threats**

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**CDC Data Modernizations Initiative Fact Sheet:**

THE PUBLIC HEALTH ECOSYSTEM
TOWARD COORDINATED AND SEAMLESS EXCHANGE OF DATA

Reduce Burden + Add Value  
Enhance + Promote Interoperability  
Put Data to Action

- Data Hub for Common Ingress + Egress
- Immunization Information
- Birth + Death Registration
- Sydromic Surveillance
- Integrated Case-Based Surveillance
- Other

- Data Hub for Common Ingress + Egress
- EIP
- NSSP
- DCIPHER
- NNDSS
- NHSN
- IMZ Gateway
- NVSS
- NBS

New + Alternative Data Sources
Healthcare Providers
Labs
Inform the Public
Evaluate Health Outcomes
Drive Decision Making

Put Data to Action
SYNDROMIC SURVEILLANCE

Gives faster understanding of emerging health threats through electronic reporting of emergency department visits

ELECTRONIC CASE REPORTING

Reduces burden on states for reporting notifiable diseases to CDC through modernized electronic messages

NOTIFIABLE DISEASES

Offers earlier disease detection and intervention through automated reporting of certain diseases and conditions from electronic health records

ELECTRONIC LABORATORY REPORTING

Supports faster, more complete automated laboratory reporting of notifiable conditions to local and state health departments

VITAL RECORDS

Captures data from ~6 million births and deaths annually that can signal changes in trends, monitor urgent public health events, and provide faster notification of cause of death
Strengthening Core Surveillance Capabilities

- Syndromic Surveillance
DMI Activities for Syndromic Surveillance

- **Real Time Data**
  - 49 states and 70% of US Emergency Departments
  - 75% of data received within 24 hours of the visit
  - 6 million messages per day

- **Routine use in COVID Response**
  - County-level monitoring of COVID-Like Illness (CLI)

- **Syndromes and ICD Codes for every encounter are captured**
DMI Activities for Syndromic Surveillance

- Add **new ED facilities** to increase national representation and coverage
- Negotiate with participating jurisdictions for **broader data access** for CDC beyond national emergencies
- Increase the number of states providing **death data** to NSSP
- **Migrate BioSense** platform to enterprise CDC cloud platform
- Scale **ESSENCE** for more complex queries using multiple data sources
- **Enhance analytic capabilities** such as automated anomaly detection
- Employ supervised **machine learning** to improve syndrome classification
- Engage with other CDC programs on data integration to create **pandemic dashboards**
Strengthening Core Surveillance Capabilities

- Electronic Case Reporting (eCR)
COVID-19 highlighted the need for standard, scalable process for reporting cases. eCR advances a shared approach with rapid adoption and implementation nationwide.

eCR for COVID-19 allows for future expansion to all other reportable conditions.

CARES funding accelerates implementation and onboarding of healthcare organizations to eCR.

- Scale nationwide and adapt to meet evolving needs
- Reduce manual reporting burden on healthcare
- Improve the timeliness and quality of data available to public health for action
- Operate and scale a shared services infrastructure to support data exchange between healthcare and public health
eCR Rapid Implementation

Healthcare Facilities
As of January 20, 2020

Public Health Agencies
As of April 8, 2021

As of April 8, 2021

Updated 1/20/2021
Strengthening Core Surveillance Capabilities

- Notifiable Diseases
Case Reporting – more efficient data exchange between healthcare and public health

- Promote **data standards** across healthcare and public health for electronic data exchange (e.g., eCR, ELR, and Vocabulary Services)
- Support development and use of **interoperable data systems** that enable linkage between systems and ingestion of electronic data (e.g., NBS)
- **Case Notification – more timely and complete data to CDC**
  - Improve mapping of data from state systems to CDC reporting templates
  - Use data **messaging standards** to more efficiently report data to CDC (HL7 v2 now but piloting FHIR)
  - Replace outdated **data transport** application (PHIN MS)
  - Provide **tools and dashboards** to monitor the quality and completeness of notifiable disease data
  - Migrate NNDSS infrastructure to **cloud**
  - Provision NNDSS data to **data lakes** for broader access and integrated data analytics and visualization

DMI Activities for Case Reporting (NNDSS)

The illustration shows the connection between case reporting and case notification; from left to right: a row of three icons, a hospital icon, a healthcare provider icon and a laboratories icon; arrows point to the middle column with an icon for Local/Regional/State/Public Health Authority icon with arrows pointing to the last row with icon representing Centers for Disease Control and Prevention above and arrow pointing to icon representing the World Health Organization.
Strengthening Core Surveillance Capabilities

- Electronic Laboratory Reporting
Electronic Lab Reporting Before CARES Act and COVID-19 Response
Prior to COVID, a high proportion of reportable results were being transmitted to the STLT public health departments electronically; however, the infrastructure was not robust, the data were incomplete, and lack of automation led to manual steps at the state level.

Distributed CARES Act Funding Enhanced Laboratory Testing & Reporting
STLT PHAs received $631M to support COVID-19 related response activities. Also, CDC stood up COVID ELR (CELR) to more rapidly identify emerging outbreaks and testing needs.

COVID ELR System: A Game Changer
Built at break-neck speed for a multiplicity of tests plus new reporting requirements, CELR enabled a dramatic acceleration of ELR – refined and expanded nascent pipelines were built out enabling a broader array of formats to increase sender adoption.

A Foundation for the Future
Continued advancements for COVID-19 reporting paves the way for a more complete, robust Electronic Lab Reporting across the country.
CELR has accelerated ELR modernization by:

- Rapidly expanding ELR use to support 1M messages daily
- Onboarding new types of data exchange partners
- Laying the groundwork for future non-COVID electronic messaging

- Built scalable infrastructure at CDC for centralizing the reporting of lab data to states
- Able to handle a dramatic increase in volume of tests to be reported in near real time.
- Moved CDC into receiving mass lab data from states, laboratories and points of care into the cloud infrastructure.
- Created new options for data collection and reporting at non-laboratory test sites
Strengthening Core Surveillance Capabilities

- Vital Records
The Mortality Data Flow begins with Medical and Demographic gathers and inputs data:

- **Medical** is conducted by:
  - Physicians input the medical history into the EHR (Health Records Systems) and provide data to ME/C Case Management Systems.
  - Medical Examiners & Coroners input data from the death scene, autopsy, and toxicology. The toxicology data is entered into the ME/C Case Management System.

- **Demographic** is conducted by Funeral Home Directors who gather demographic data and enter the data into the funeral home system.

All areas of the Medical and Demographic funnel data to State Registrars for input into the Death Registration Systems (EDRS). The Death Registration Systems provide data for state surveillance, public use, and restricted data. Information is passed on to the Director of Division of Vital Statistics to be added into the National Vital Statistics System where National Analyses and Reports, National Death Index (NDI), and National Surveillance, Public Use, and Restricted Data can access information.
Mortality Data Flow

**National Vital Statistics System (NVSS)**

### State EDRS to NCHS Data Flow

- Vital Record Death Reporting FHIR Implementation Guide Development
- Bidirectional data flow/messaging
- NCHS Internal System Modernization
  - Geo Coding; Modify data review process

### Medical Examiner/Coroner Data Flows

- Medical Device Integration FHIR Implementation Guide Development

### CDC WONDER Enhancements

- Ad-hoc query public access to provisional mortality data.
- Modernization of WONDER API (data access)
- Other functional improvements
Building Foundational Infrastructure for DMI
Modernization through Collaboration

**CURRENT**
- Data flows in lots of different directions
- Multiple copies of data, in multiple locations
- Impossible to obtain holistic view of data

**MODERNIZED**
- All data flows through the same place
- Centers have access to variety of data sources
- Integration enables holistic views
- Partners upload once
- Consistent data management

**OUTCOME**
- Faster access to data
- Creation of large datasets enable advanced technologies (AI/ML)
- Novel predictions

System and Data Set Ownership Maintained
DMI calls for cloud, expanded analytics, and collaboration.

An enterprise approach ensures consistency, economies, interoperability, and security.
Questions