



# Data Modernization Initiative: Updates from the National Vital Statistics System (NVSS)

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# NVSS Modernization

We are reinventing the NVSS to make vital information more available for action

*Moving vital information faster*



- Build a broad community to implement new technologies, like FHIR, that create interoperability across our nation's systems

*Improving data quality*



- Offer guidance, training, technology, and support to make birth and death data more accurate and complete

*Informing emergency response*



- Release provisional data that can be used for public health surveillance and response that are made available in advance of our final data releases.

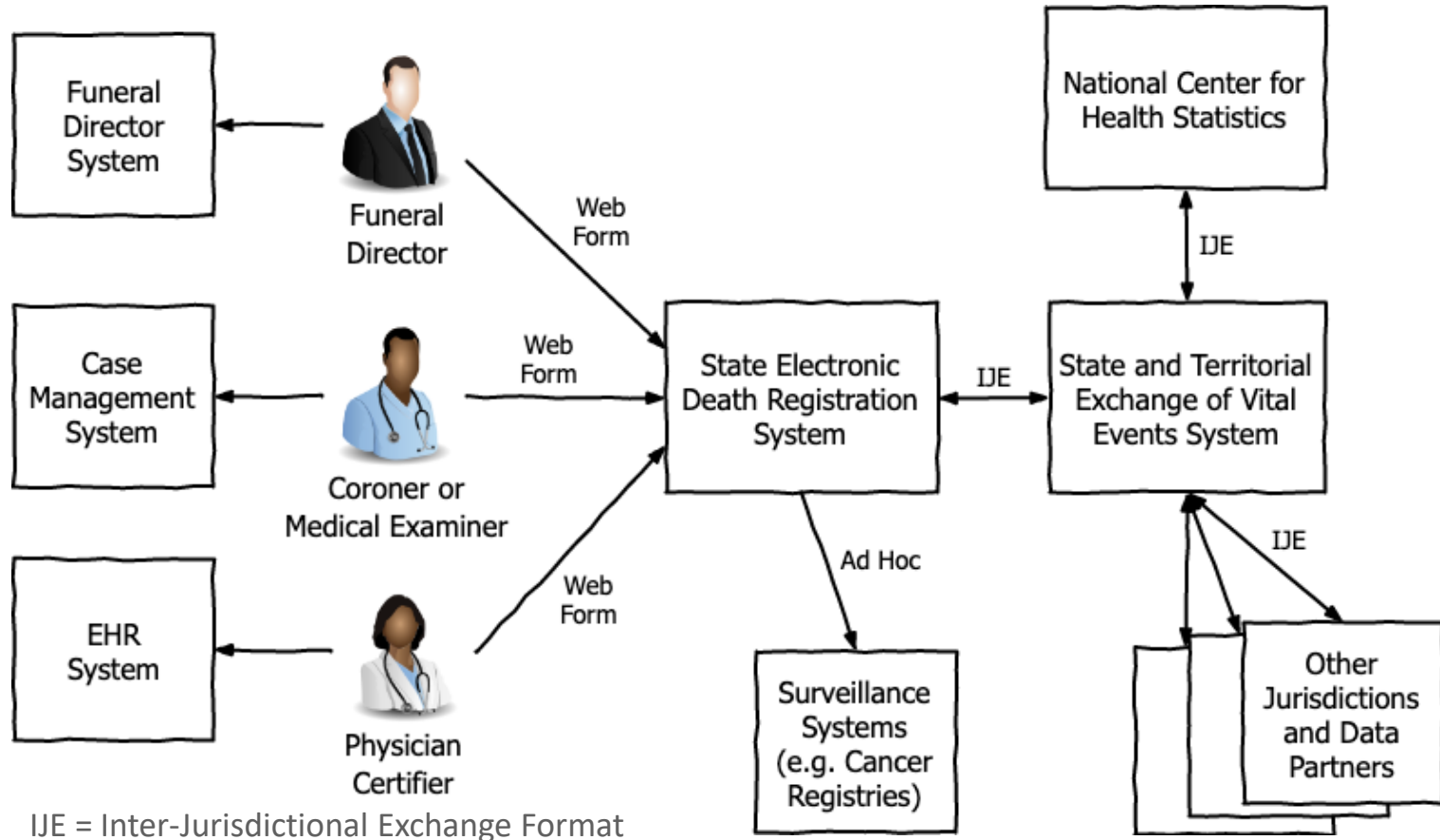
*Enhancing data analysis methods*



- Apply methods to better analyze available data, (e.g., mining information from the written (literal) cause of death text on the death certificate)

**Interoperability: APIs and FHIR Standards**

# Current State of Mortality Data Interoperability



## Improved Interoperability

- Record level exchange
  - Improve timeliness both sending data to NCHS and receiving responses from NCHS
- Automation
  - Less time shepherding the process and more time deriving value from the data
- Reliability and robustness
  - Build reliable message delivery into the architecture

## Application Programming Interface (API)

- The NVSS API will allow vital records jurisdiction mortality data systems to automate communication with NCHS in a robust and repeatable way.
  - Automation improves timeliness of data exchange and reduces burden on vital records stakeholders.
- The NVSS API implements the NCHS Messaging Infrastructure section of the FHIR Messaging for NVSS documentation.

## Fast Healthcare Interoperability Resources (FHIR) Standards

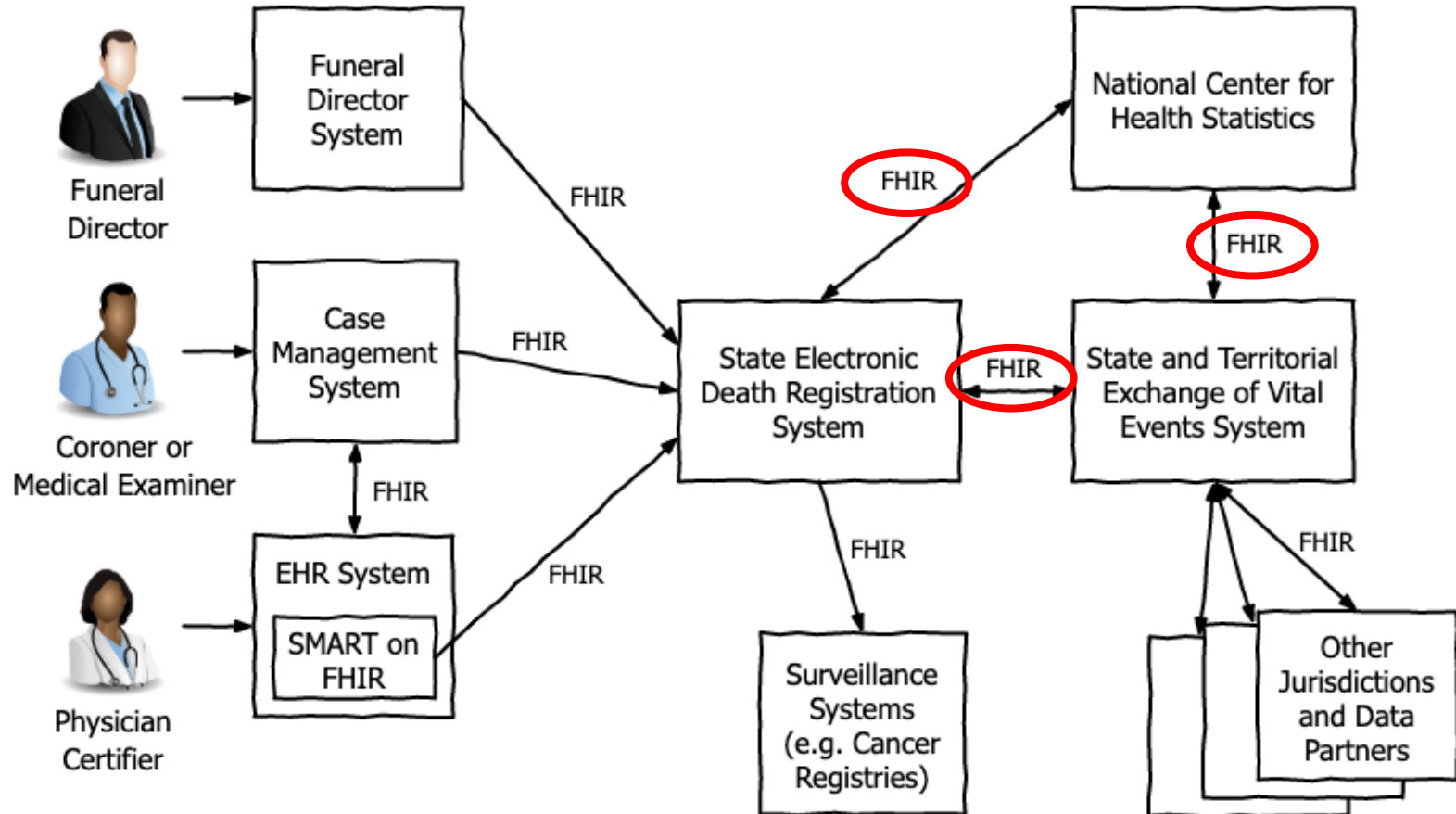
- Standard for the electronic exchange of health information.
- Created by the Health Level Seven (HL7) International standards organization.
- Uses standard data representations that allow health information to be reused by multiple parties for multiple purposes.
- Follows the 80/20 rule: the base standard covers 80% of health use cases and is extensible to support the remaining 20%.
- The Vital Records Death Reporting (VRDR) FHIR Implementation Guide builds on the base FHIR standard to support the capture and exchange of mortality data.

## Why FHIR for Vital Records?

- Standardization within vital records
- Standardization against non-vital records systems
- Automated validation
- Developer support
  - Common technologies
  - Shared tools
  - Large technical community
  - Transferable skills
- Process improvements



# FHIR-based Mortality Data Interoperability



# Application Programming Interfaces (APIs)



- NCHS has implemented a fully functional NVSS API that is available to jurisdictions for testing. The NVSS API can receive and process test messages from the jurisdictions and generate appropriate response messages. The production NVSS API server will be rolled out later this year.  
<https://github.com/nightingaleproject/Reference-NCHS-API>
- An opensource Reference Client API is also available to all jurisdictions to download. The Reference Client API is an example implementation for jurisdictions that handles submitting VRDR FHIR Messages, reliable delivery (acknowledgements and retries), and retrieving message responses from the NVSS API server.  
<https://github.com/nightingaleproject/Reference-Client-API>

# VRDR STU v1.3 FHIR Implementation Guide

<http://build.fhir.org/ig/HL7/vrdr/>



- Maps all Inter-Jurisdictional Exchange (IJE) fields currently in use to FHIR Profiles
  - Submission of Death Records to NCHS
  - TRX and MRE-equivalent Coding Responses to Jurisdictions
- Provides full documentation of the mapping
  - Data dictionary shows how each IJE field is mapped to FHIR elements
  - Complete value sets included in Implementation Guide
  - Examples for all profiles and extensions
  
- VRDR .NET and Java libraries available to map all fields to/from IJE
- Plan to start HL7 process after feedback from June testing event

# Vital Records Messaging FHIR Implementation Guide

[http://build.fhir.org/ig/nightingaleproject/vital\\_records\\_fhir\\_messaging\\_ig/](http://build.fhir.org/ig/nightingaleproject/vital_records_fhir_messaging_ig/)



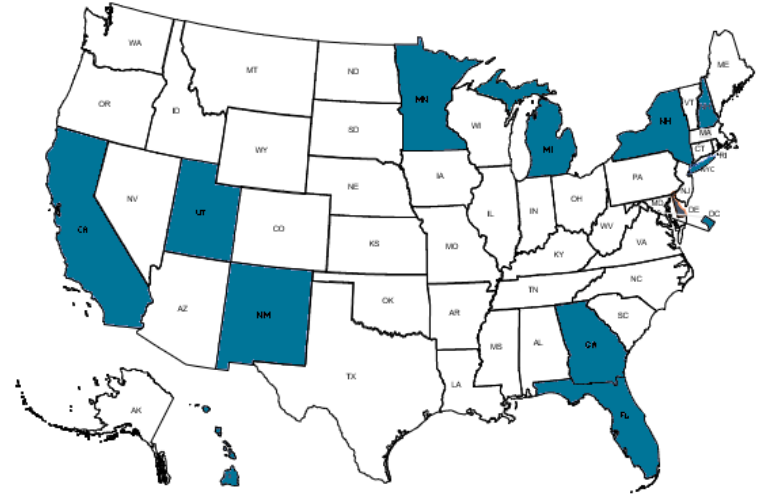
- Now provided as a complete FHIR Implementation guide
- Supports all messages in Vital Records Workflow
  - Submission/Update of Death Records to NCHS
  - Submission/Update of Coding (Demographic and Cause of Death) to Jurisdictions
  - Void and Alias of Death Records

**Vital Statistics Modernization Community of Practice**

## From an Implementers' Community to a Community of Practice

- Building on the same ideas that have worked well for the Implementers' Community to modernize death data.
- This Vital Statistics Modernization Community of Practice does not replace the Implementers' Community and other workgroups but is an overarching body that remains open to any jurisdiction or partner working in the space of vital records modernization.

Implementers Community Jurisdictions, 2020



# Vital Statistics Modernization Community of Practice

The Vital Statistics Modernization Community of Practice is a virtual forum for sharing ideas, technical tools, resources, and promising practices to improve birth and death data. We welcome all jurisdictions and partners interested in modernizing the vital records system, at any level of experience.

<https://www.cdc.gov/nchs/nvss/modernization/cop.htm>



## Technologies

Definitions and links to technical tools



## Stories

Insights from our community members



## Projects

NVSS modernization projects and initiatives

## Goals of the Vital Statistics Modernization Community of Practice

- Create an environment that fosters technical collaboration, knowledge transfer, and sharing of lessons learned
- Promote the adoption of modern standards for interoperability
- Identify challenges and work toward solutions
- Explore opportunities to collaborate with new partners
- Promote best practices
- Share advances and lessons learned with communities outside of the CoP who have relevant touchpoints
- Foster innovation
- Create “bi-directional” understanding of where participating entities are in terms of modernization efforts



## Vital Statistics Modernization Community of Practice Offerings

Community Meetings	Communications	SharePoint Knowledge Management Site	On-demand Resources	Virtual Testing
<ul style="list-style-type: none"> <li>• Monthly CoP call</li> <li>• Monthly technical subgroup call</li> <li>• Weekly office hours</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly NVSS Newsletter</li> <li>• List of email addresses of all CoP members</li> <li>• NVSS Modernization Mailbox: <a href="mailto:NVSSModernization@cdc.gov">NVSSModernization@cdc.gov</a></li> </ul>	<ul style="list-style-type: none"> <li>• Meeting minutes</li> <li>• Recordings</li> <li>• Testing event artifacts</li> <li>• Documents</li> <li>• Peer-to-peer connection folder where jurisdictions can share relevant materials with each other</li> </ul>	<ul style="list-style-type: none"> <li>• Training PowerPoints and videos</li> <li>• Virtual helpdesk</li> <li>• NVSS Modernization website</li> <li>• NVSS Modernization SharePoint site</li> </ul>	<ul style="list-style-type: none"> <li>• Scheduled quarterly virtual testing sessions</li> </ul>

## Active and Engaged Community



Attendance by Month	Main Call	Technical Subgroup Call
April 2022	180	141
March 2022	219	140
February 2022	154	126
January 2022	137	135



Implementing a Community of Practice Steering Committee with representatives from jurisdictions, NAPHSIS, and NCHS. Steering Committee will assist with developing agendas for monthly community calls and help ensure the community understands and is effectively supporting all jurisdictions in their modernization efforts.

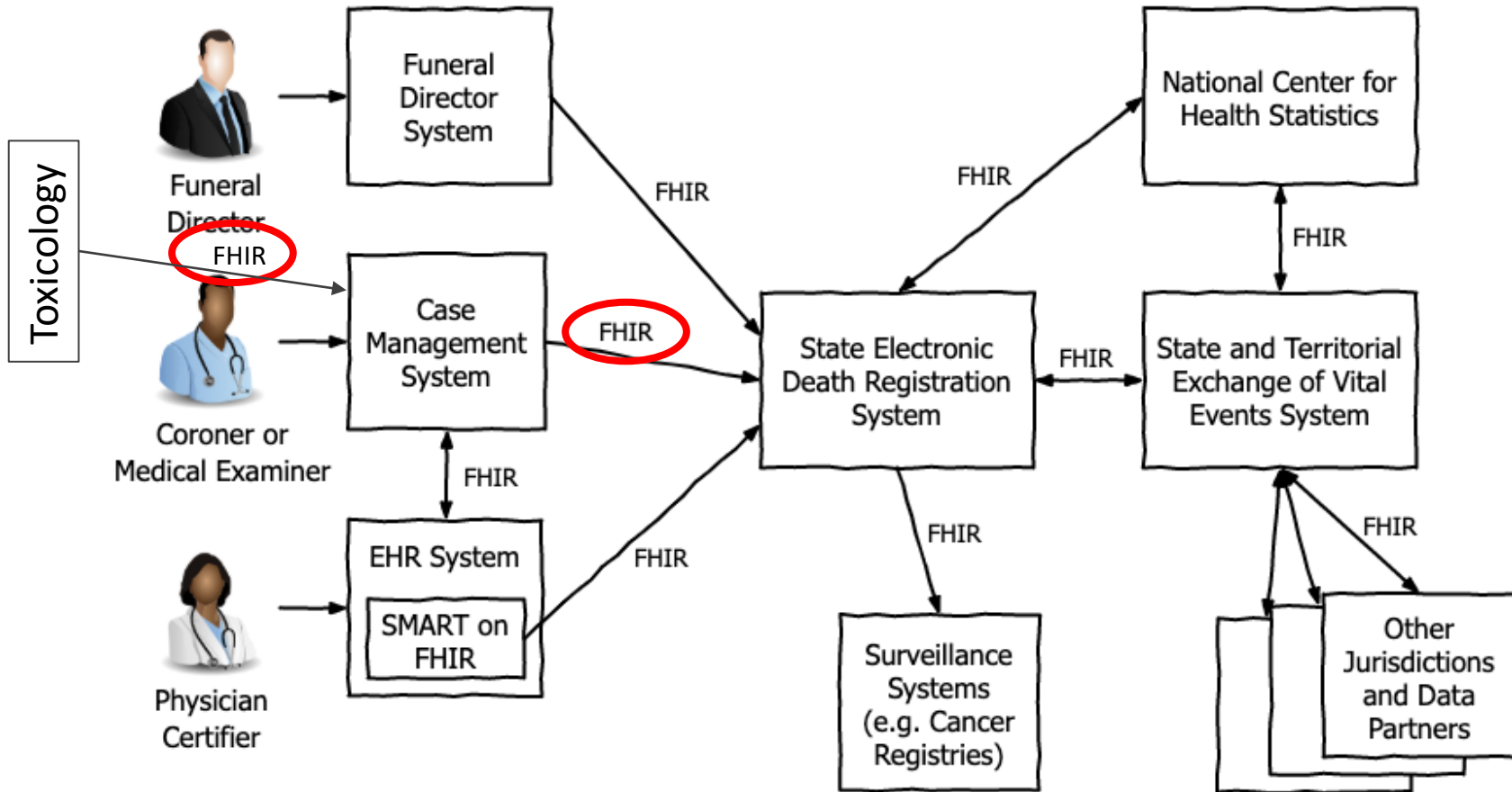
## NCHS hosted Quarterly Testing Events (aka mini connect-a-thons)



- Next testing event scheduled for June 27-28th, 2022
- Provide jurisdictions with an opportunity to test bidirectional FHIR based interoperability between EDRS, STEVE, and NCHS using the NVSS API
- Testing event is free, less formal than traditional connect-a-thon events, and focus on assisting jurisdictions with achieving milestones in their ELC cooperative agreement project plan
- Also, helps NCHS with validating recent changes/updates to the VRDR FHIR IG and Vital Records Messaging FHIR IG.

# **Coordinating Office for Medical Examiners and Coroners (COMEC)**

# FHIR-based Mortality Data Interoperability



## Medicolegal Death Investigation (MDI) Data Modernization

- Develop MDI FHIR Implementation Guide (MDI IG)
- Identify commonly collected and exchanged MDI data
- Build tools and provide support for interoperability
- Design API for MDI Case Management System to jurisdictions' Electronic Death Registration Systems
- Support *design, test, build* approach, including MDI participating in connect-a-thons to test MDI FHIR IG

## MDI STU v1.0 FHIR Implementation Guide

<http://hl7.org/fhir/us/mdi/2022MAY/index.html>




- Tested at HL7 Jan. 2022 FHIR Connectathon
  - NH, CT, GA and FL all participated and successfully tested
- Balloted April 30-May 4
  - Met requirements for total number and positive votes to be published as standard for trial use

# MDI Data: Commonly Exchanged



- Report from National Institute of Standards and Technology, Organization of Scientific Advisory Committees, Medicolegal Death Investigation Subcommittee
- Working the medical examiner and coroner community to establish MDI data commonly collected and exchanged with stakeholders



**Medicolegal death investigation data commonly collected and exchanged**

A Report by the Organization of Scientific Area Committees (OSAC) for Forensic Science's Medicolegal Death Investigation (MDI) Subcommittee, part of the Medicine Scientific Area Committee.

**Summary**

The National Institute of Standards and Technology (NIST) Organization of Scientific Area Committees (OSAC) for Forensic Science Medicolegal Death Investigation (MDI) Subcommittee,<sup>1</sup> which is comprised of medical examiners, coroners, medicolegal death investigators, public health researchers and other stakeholders, identified the types of data commonly collected and held by MDI offices. The data, if stored and available in a secure manner and in a standard form, could assist the MDI community and other stakeholders.

This report outlines the process to identify and prioritize the MDI core data elements. In addition, the paper provides the background and rationale for this work, outlines the importance of the MDI data for improving death investigation, for the MDI community, stakeholders and forensic science researchers, and presents challenges in exchanging data such as security concerns. This report also presents approaches others have taken to standardizing data in other disciplines and other issues related to data standards development.

This report is intended to inform the wider MDI community as well as stakeholders on the essential information on the death collected during every competent death investigation as well as the issues related to such data.

**Background and rationale**

The information that medical examiners and coroners collect during the course of a death investigation varies by many factors, including the cause of death. Authoritative reports have discussed the need for more standardized and automated approaches to collect and exchange data among medical examiners, coroners, forensic toxicologists, and other groups.

For instance, in September 2016, the National Science and Technology Council, in a report entitled "Strengthening the Medicolegal Death Investigation System: Improving Data Systems,"<sup>2</sup> recommended that:

- To enhance the quality, timeliness, and accessibility of MDI data, Federal agencies should work with State, local, and Tribal entities to envision and adopt a 21st-century-electronic-data system

<sup>1</sup> National Institute of Standards and Technology (NIST) Organization of Scientific Area Committees (OSAC) Crime Scene/Death Investigation Medicolegal Death Investigation (MDI) Subcommittee  
<https://www.nist.gov/topics/forensic-science/medicolegal-death-investigation-subcommittee>

<sup>2</sup> National Science and Technology Council, White House Office of Science and Technology Policy, Strengthening the Medicolegal Death Investigation System: Improving Data Systems, 2016. (Available at <https://www.ncjrs.gov/pdffiles1/NIJ/251423.pdf>)

7/9/2021



# MedCoder - Cause of Death Coding System

## MedCoder

- A new NCHS system for coding causes of death literal text from death certificates to ICD-10 codes
- Based on a fusion of newer natural language processing and machine learning technologies with well-established rule-based approaches.

### Benefits:

- Much easier to maintain system
- Streamlined process to make corrections
- Systematic process to test changes/updates before they are implemented in production
- Processes death records one record at a time
- Prepares NCHS for FHIR standard-based record transmission

## MedCoder Evaluation – Approach and Objectives

- The entire 2020 dataset (about 3.4 million records) were processed through MedCoder and compared against the 2020 final data
  - Not strictly a comparison between MedCoder and legacy coding system (MMDS)
- Evaluate consistency (i.e., % agreement) between MedCoder and final data
- Identify systematic errors in MedCoder that will need manual review
- Assess the effective throughput of MedCoder, i.e., % of records that can be autocoded correctly

## MedCoder Evaluation - Results

- Consistency was generally very good
  - Lack of consistency in some cases resulted from existing errors in the legacy system (MMDS)
- No evidence of random errors. Some systematic errors identified and documented... these will be automatically rejected for manual review.
- Estimated MedCoder throughput rate, i.e., % of records autocoded correctly by the system = approximately 85% (compared to ~70% with MMDS)
- Conclusion: performance of MedCoder significantly exceeds performance of MMDS

## MedCoder Implementation



- Blackout to begin June 6<sup>th</sup> (expected to last up to 2 weeks)
- Cause of death coding of 2022 data will be paused during the blackout
- Any data received from Jurisdictions will be queued and processed after the blackout
- During the blackout all 2022 data will be reprocessed through MedCoder
- When the reprocessing is complete all jurisdictions will be sent a new 2022 Year to Date file that contains the MedCoder coded cause of death

# Data Dissemination

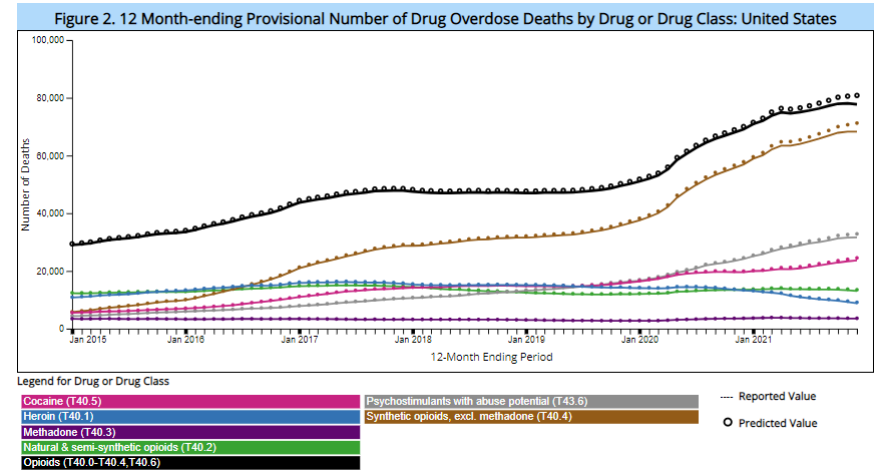
Improved Timeliness and Enhanced Access

# Improved Timeliness of Provisional Drug Overdose Counts



Reporting lag for provisional drug overdose counts shortened by 2 months (from 6 months to 4 months).

Most recent provisional drug overdose counts available for 12-months ending December 2021.



<https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm>

# Enhanced Access to Provisional Mortality Data via CDC WONDER

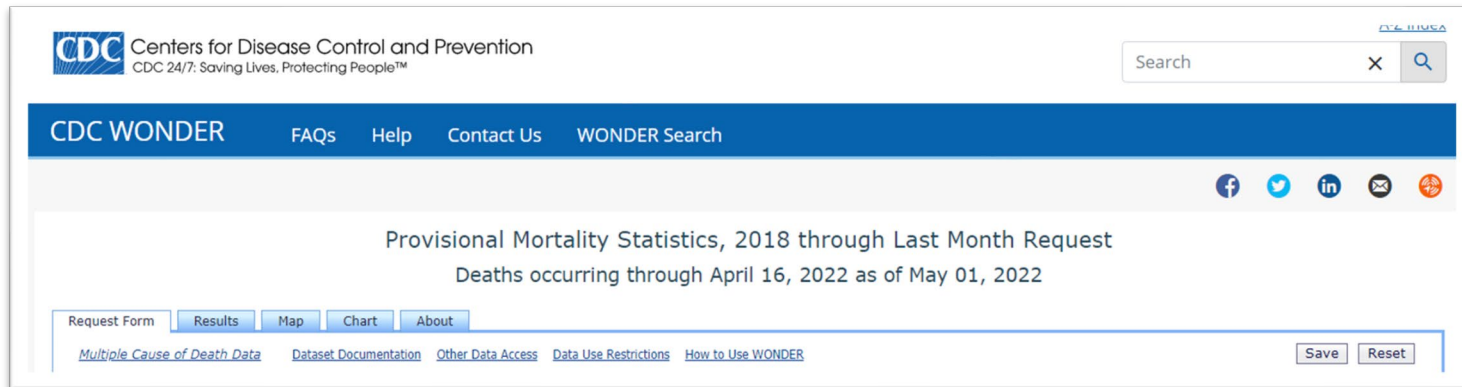


Access the **newest provisional mortality data** through



Create **customizable data tables** that fit your needs.

<https://wonder.cdc.gov/mcd-icd10-provisional.html>



The screenshot displays the CDC WONDER website interface. At the top left is the CDC logo and the text "Centers for Disease Control and Prevention" with the tagline "CDC 24/7: Saving Lives, Protecting People™". A search bar is located at the top right. Below the header is a navigation bar with links for "CDC WONDER", "FAQs", "Help", "Contact Us", and "WONDER Search". Social media icons for Facebook, Twitter, LinkedIn, Email, and YouTube are visible. The main content area is titled "Provisional Mortality Statistics, 2018 through Last Month Request" and "Deaths occurring through April 16, 2022 as of May 01, 2022". Below this is a navigation bar with tabs for "Request Form", "Results", "Map", "Chart", and "About". At the bottom, there are links for "Multiple Cause of Death Data", "Dataset Documentation", "Other Data Access", "Data Use Restrictions", and "How to Use WONDER". "Save" and "Reset" buttons are located at the bottom right of the interface.



## Enhanced Access to Provisional Birth Data via CDC WONDER



- Currently documenting requirements with development beginning soon thereafter.
- Expect to launch later this year.

**coming soon!**

## NVSS Modernization Discussion Questions

- Are our goals and priorities consistent with the needs of the public health surveillance and research community?
- What are we missing in our data modernization efforts (i.e., what should we be doing that we aren't)?