



Enhancing Identification of Opioid-Involved Hospitalizations with Clinical Data and Notes from Electronic Health Records

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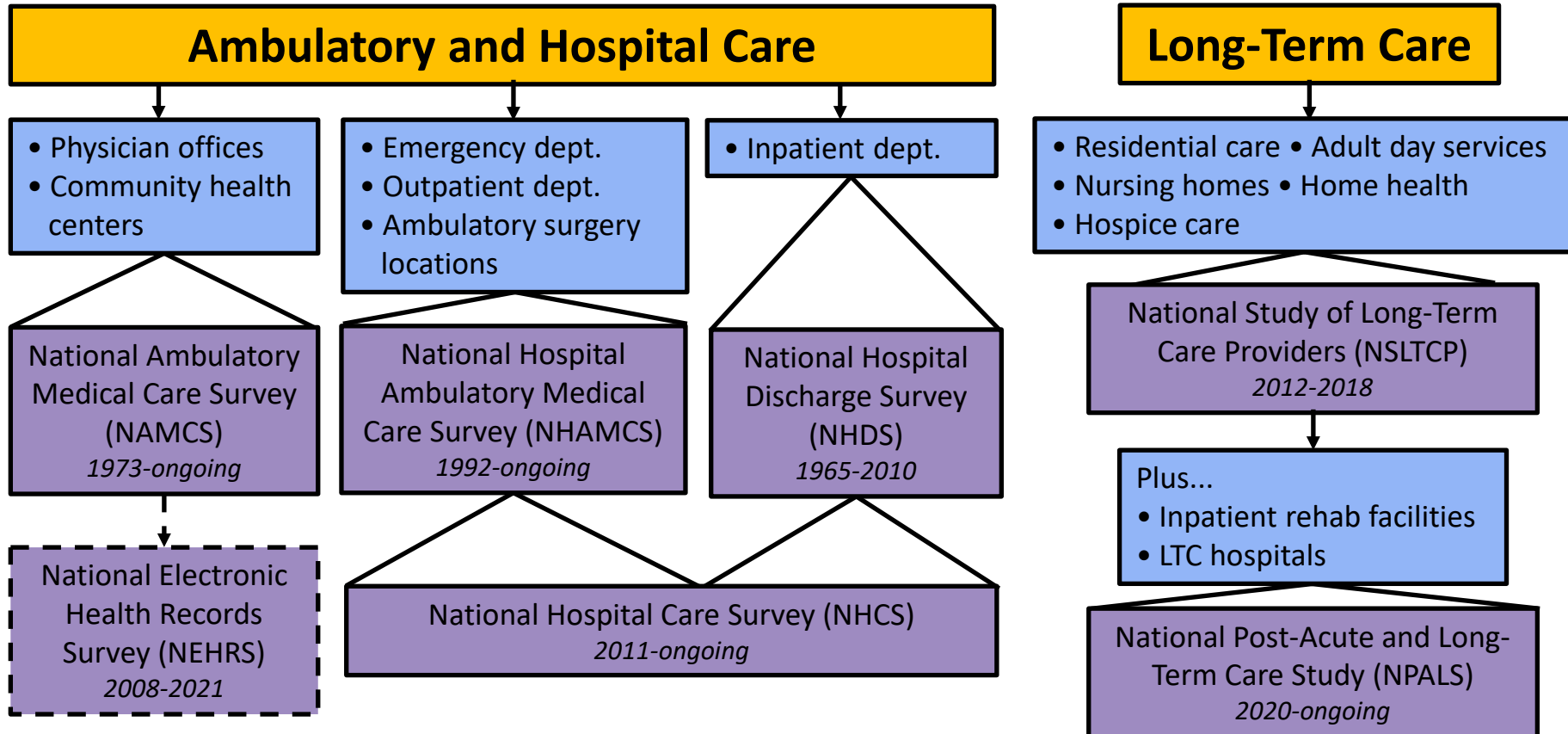
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Agenda

- Overview of National Health Care Surveys
- National Hospital Care Survey
- National Hospital Care Survey and National Death Index Data linkage
- Enhanced Opioid Identification Algorithm
- Identifying Co-occurring Disorders among Opioid Users Algorithm

National Health Care Surveys

National Health Care Surveys Spectrum of Care



National Hospital Care Survey

National Hospital Care Survey (NHCS)

- **Goal:**
 - Provide reliable and timely healthcare utilization data for hospital-based settings.
- **Data coverage:**
 - Sample of 608 non-institutional, non-federal hospitals with six or more staffed inpatient beds.
 - All hospitalizations and emergency department (ED) visits for a calendar year.
 - Includes patient personally identifiable information (PII) so patient and encounter level counts can be determined.
- **Data Sources:**
 - Uniform Billing (UB)-04 administrative claims
 - Electronic health record (EHR) data

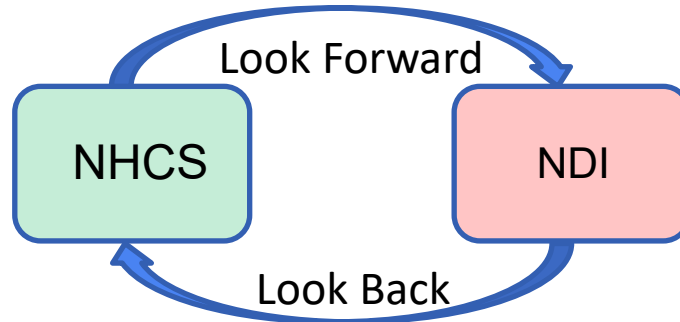
Data Elements

- Patient PII
- Patient's age and sex
- Encounter dates
- Diagnoses and procedures (UB-04: up to 25 codes, EHR: Unrestricted)
- Revenue codes
- Insurance information
- Lab tests and results (EHR only)
- Medications and vital signs (EHR only)
- Clinical notes (EHR only)

National Hospital Care Survey and National Death Index Data Linkage

NHCS and National Death Index Data Linkage

- **Goal:** Link the NHCS to the National Death Index (NDI) to study in-hospital and post-acute mortality and cause of death for in-hospital deaths.
- Allows for look forward and look back analyses.
 - Retroactive analysis of previous medical encounters from NDI cause of death information.
 - Analyze post-acute cause of death for patients by hospital conditions.



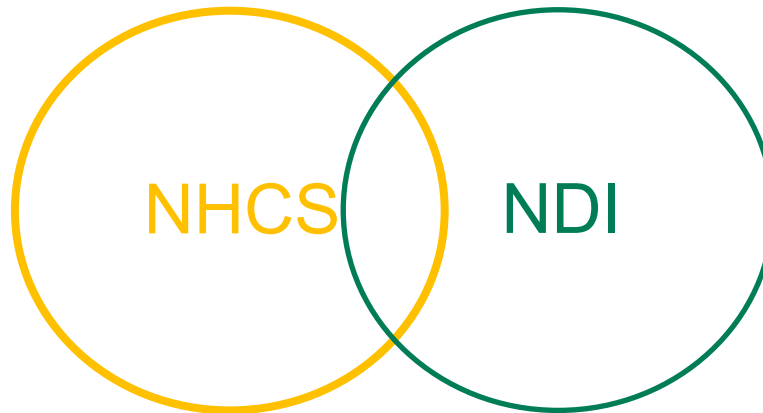
Data Elements in the linked NHCS and NDI RDC file

NHCS

- Patient demographics
- Diagnoses
- Services received
- Discharge Status

NDI

- Cause of death
- Date of death



Enhanced Opioid Identification Algorithm

Enhanced Opioid Identification Project

- **Goal:** Improve the identification of opioid-involved ED visits and overdoses.
- **Project tasks:**
 - Add information from the Drug-Involved Mortality (DIM) file to both the 2014 NHCS data linked to the 2014-2015 NDI and the 2016 NHCS data linked to the 2016-2017 NDI. Data available in the NCHS RDC.
 - Enhanced identification of opioid-involved hospital and death certificate data. Add enhanced opioid-involved information to the 2016 NHCS data linked to the 2016-2017 NDI/DIM file. Data available in the NCHS RDC.

Approach to improving identification of opioid-involved hospital encounters

- Utilize all available data fields including the additional data fields captured in the EHR data such as medications, laboratory results, and clinical notes.
- Use machine classifiers and rule-based algorithms to find encounters.
 - Use coded diagnoses information.
 - Natural Language Processing (NLP) provides an efficient way to query unstructured mentions of opioid-involvement.



Enhanced Opioid-identification Algorithm Findings

- An **opioid-involved encounter** is the mention of past or present use of an opioid. Includes opioid use prior to arrival at the hospital and opioids administered during the encounter or prescribed upon discharge.
 - 1,370,827 opioid-involved encounters in the inpatient and ED settings in the NHCS 2016 dataset.
- **Opioid overdose** were identified as a subset of opioid-involved encounters with a mention of opioid toxicity or poisoning.
 - 21,603 opioid-involved overdose encounters in the inpatient and ED settings in the NHCS 2016 dataset.

Variables to Indicate Type of Opioid Taken

1. Buprenorphine/
Norbuprenorphine
2. Codeine
3. Fentanyl/Fentanyl Analogs
4. Heroin (6-AM & 6-MAM)
5. Hydrocodone
6. Hydromorphone
7. Levorphanol
8. Meperidine
9. Methadone
10. Morphine
11. Oxycodone
12. Oxymorphone
13. Tramadol
14. Other Opioid/Opiate (Y/N)
15. Other Opioid/Opiate (Text) –
comma delimited list
16. Naltrexone
17. Naloxone

Data Elements in Enhanced 2016 NHCS RDC file

NHCS

- Patient demographics
- Diagnoses
- Services received
- Discharge Status

Enhanced Opioid Variables

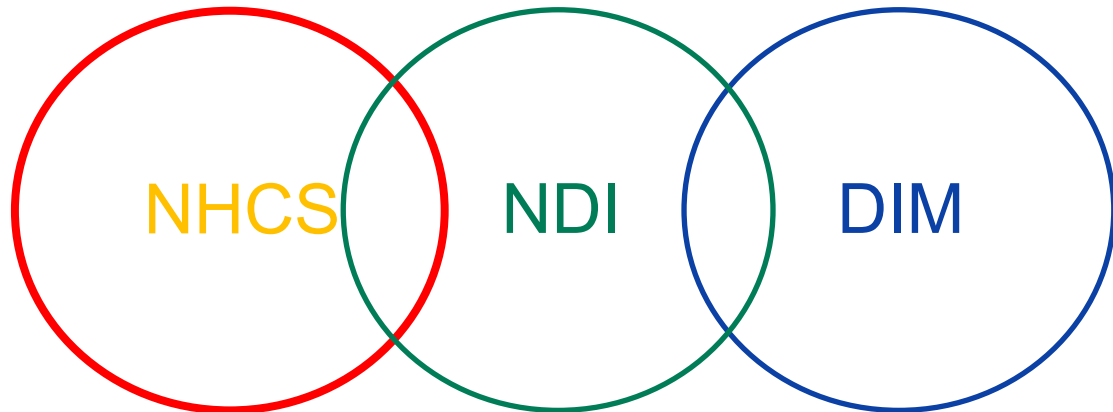
- Opioid-involved
- Opioid overdose
- Type of opioids
 - Buprenorphine
 - ...
 - ...
 - Other opioid

NDI

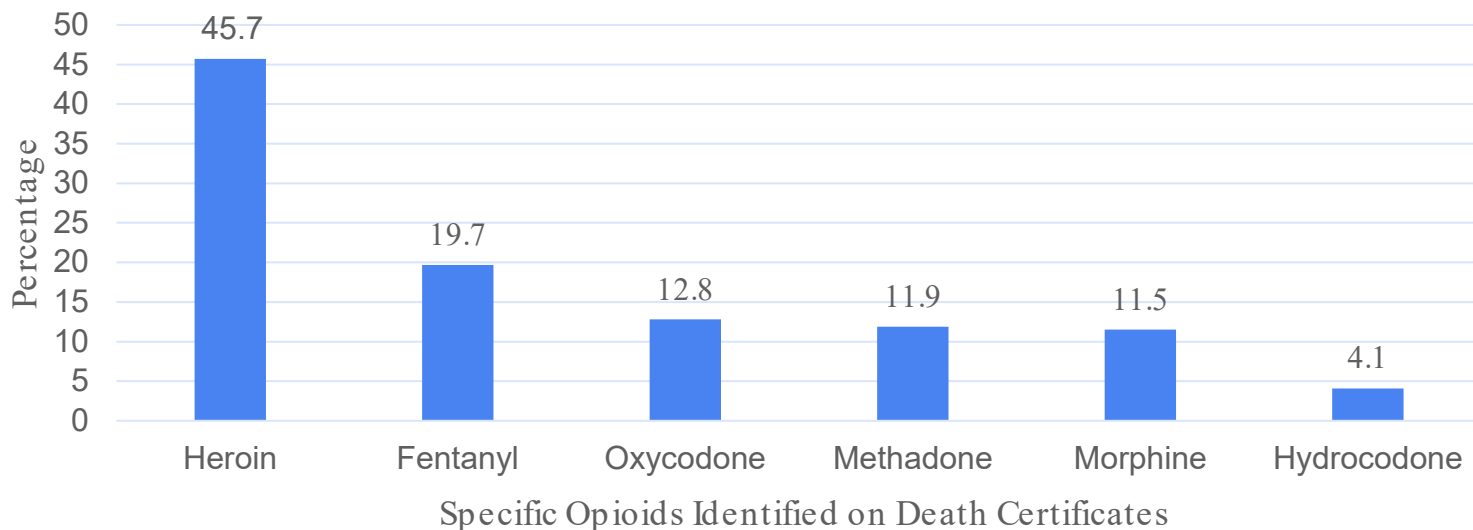
- Cause of death
- Date of death

DIM

- Specific opioid-involved in overdose



Findings: Specific opioids identified on death certificates among patients with an opioid-involved hospitalization who died within 1-year post-discharge of a drug overdose involving an opioid



NOTES: Emergency department visits that resulted in the patient being admitted to the hospital were included in hospitalizations. Newborns and those who died during the hospitalization were excluded from analysis. Two records did not have an underlying cause of death and were also excluded from analysis. Data are not nationally representative. There were 243 decedents with an opioid mentioned as involved in the death.

SOURCES: NCHS, 2014 National Hospital Care Survey data linked to the 2014–2015 National Death Index and to the 2014–2015 Drug-Involved Mortality.

Identifying Co-Occurring Disorders among Opioid Users Algorithm

Identifying Co-Occurring Disorders among Opioid Users Using Linked Hospital Care and Mortality Data

Objective:

- Serve as a capstone to enhanced opioid-identification project to improve data on co-occurring substance use disorders (SUD) and selected mental health issues (MHI) (anxiety and depressive disorders).
- Conduct study to validate the algorithms to identify the use of opioids and the existence of co-occurring disorders.

FY19 Case Definition Development – Substance Use Disorder (SUD)

- SUD encounters must have at least one of the following SUDs of interest:

- Alcohol Use Disorder
- Cannabis Use Disorder
- Cocaine Use Disorder
- Hallucinogen Use Disorder
- Inhalant Use Disorder
- Nicotine Use Disorder
- Opioid Use Disorder
- Other Psychoactive Use Disorder
- Other Stimulant Use Disorder
- Sedative Use Disorder

Selected Disorders – Mental Health Issues (MHI)

▪ Anxiety

- Generalized anxiety disorder
- Panic disorders
- Social anxiety disorders/Social phobias

▪ Self-Harm

- Suicide ideation
- Suicide attempt

▪ Depression

- Major depression (single/recurrent episodes)

▪ Obsessive Compulsive Disorder

▪ Trauma and Stressor Related Disorders

- Acute stress reaction
- Post-traumatic stress disorder

Co-occurring Disorders Algorithm Findings

- Of the 1,370,827 opioid-involved encounters in the inpatient and ED settings in the NHCS 2016 dataset:
 - 399,632 had a SUD-only,
 - 100,102 had an MHI-only, and
 - 159,491 had an SUD and MHI

Additional Data Elements in Enhanced 2016 NHCS RDC file

NHCS

- Patient demographics
- Diagnoses
- Services received
- Discharge Status

Enhanced Opioid Variables

- Opioid-involved
- Opioid overdose
- Type of opioids

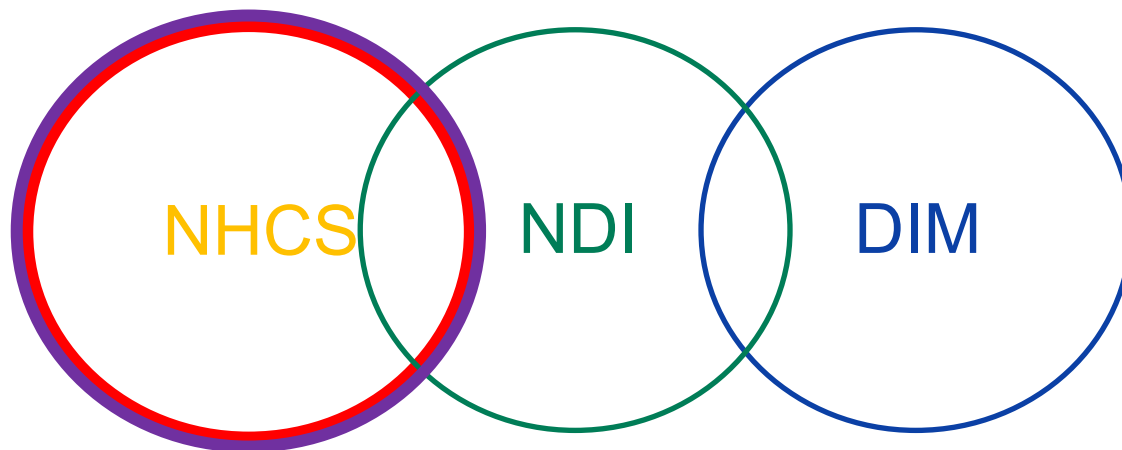
Opioids w/ MHI & SUDs

NDI

- Cause of death
- Date of death

DIM

- Specific opioid-involved in overdose



Validation Study for Enhanced Opioid and Co-occurring Disorder Algorithms

- To further improve the enhanced algorithm a validation study was conducted.
- The study evaluated the algorithm's performance by abstracting 900 hospital encounters directly from 9 hospitals' electronic medical record system.
- Abstractors then completed a questionnaire that provides information on the presence of opioids in the medical record.
- Initial results show that 92.8% of the 865 encounters identified by the opioid-involved algorithm had evidence of opioid-involvement.

NCHS Reports

Published

- National Hospital Care Survey demonstration projects: Opioid-involved emergency department visits, hospitalizations, and deaths. NHR; no 141.
- Enhancing identification of opioid-involved health outcomes using National Hospital Care Survey data. National Center for Health Statistics. Vital Health Stat 2(188). 2021.

Upcoming

- NCHS Series 2 Report: Identifying Co-occurring Mental Health and Substance Use Disorders Among Patients with an Opioid Involved Hospital Encounter Using Linked Hospital Care and Mortality Data
- NCHS NHR: National Hospital Care Survey Demonstration Projects: Identification of Co-occurring Mental Health and Substance Use Disorders Among Patients With Opioid-Involved Hospital Encounters in Linked Hospital and Mortality Data
- Validation study summary report

THANK YOU!

Questions



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