May 20th, 5:00 PM - 7:00 PM

Validation of Acute Myocardial Infarction (AMI) in the FDA's Mini-Sentinel Distributed Database

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Et al.

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Background

The Food and Drug Administration's (FDA) Mini-Sentinel is a pilot program that aims to conduct active surveillance to detect and refine safety signals that emerge for marketed medical products.

The purpose of this Mini-Sentinel AMI Validation project was to:
(a) develop and design an abstraction and adjudication process to use when full text medical record review is required to confirm a coded diagnosis; and
(b) to test this approach by validating a code algorithm for acute myocardial infarction (AMI).

Participants

The Mini-Sentinel AMI Validation project was a collaboration between the FDA, the Mini-Sentinel Operations Center, and selected Academic and Data Partners. Four Mini-Sentinel Data Partners participated in this project: (1) HealthCore, Inc.; (2) Humana; (3) three member health plans within the Kaiser Permanente Center for Effectiveness and Safety Research; and (4) two member health plans within the HMO Research Network.

Design

(1) AMI Case Identification

Goal: Establish ICD-9-CM-based algorithm to identify patients hospitalized for AMI within the Mini-Sentinel Distributed Database

Approach: Reviewed previous validation studies. Considered using a broad algorithm (incorporating Acute Coronary Syndrome codes, or codes to capture death after ER discharge).

Algorithm: Include ICD-9 hospital discharge codes (a principal or primary discharge code only) of 410.x0 and 410.x1.

(2) AMI Case Retrieval

Goal: Establish and carry out procedure for **chart retrieval and extraction**, ensuring patient privacy, collecting and transferring the minimal amount of de-identified information needed to validate potential cases of AMI.

Approach:
(1) Identify required chart components (examples: EKG's, cardiac biomarkers, dictated doctor notes).

(2) Determine whether chart abstraction would take place **centrally** or in a **locally distributed** fashion; **(Centralized approach was chosen**)

(3) Establish protocols for ensuring the **privacy and security** of data and for explaining the status of this effort as a **public health surveillance activity not under the oversight of IRBs.**

(3) Abstraction

Goal: Design abstraction form and train 2 nurse abstractors to gather key data for AMI validation.

Approach: 36-item abstraction form included demographic information, brief medical history, biomarker data, EKG copies, cardiac test results and disposition at discharge.

(4) Adjudication

Goal: Design protocol-driven Adjudication process

Approach: Protocol developed based on American Heart Association Universal Definition of MI. Two UMass Cardiologists independently reviewed each case and classified as (1) Definite MI; (2) Probable MI; (3) No MI; or (4) Unable to Determine. Cardiologists met to reach consensus in cases where they differed.

(5) Calculation of PPV (Positive Predictive Value)

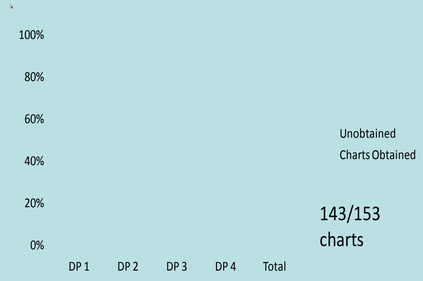
Goal: Calculate PPV of algorithm (ratio of confirmed AMI cases to all identified cases)

Approach:

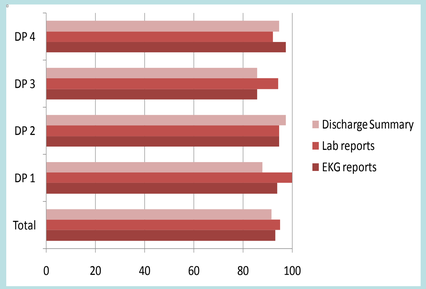
$$PPV = \frac{\text{Definite + Probable AMI}}{\text{All retrieved cases}}$$

RESULTS

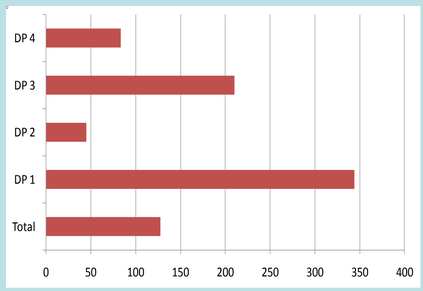
Percent of Requested Charts that were Obtained (93% overall)



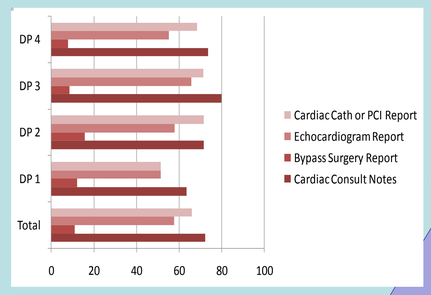
Availability of Critical Chart Components



Average Size of Chart (Pages)



Availability of Cardiac-Specific Chart Components



Note: DP1 through 4 indicates Data Partners 1-4.

Positive Predictive Value of AMI Identification Algorithm

DATA PARTNER	YES MI	NO MI	TOTAL # OF CHARTS	PPV (%)	95 % CONFIDENCE INTERVAL
DP1	26	6	32	81.3	64.7, 91.1
DP2	29	9	38	76.3	60.8, 87.0
DP3	33	2	35	94.3	81.4, 98.4
DP4	35	3	38	92.1	79.2, 97.3
OVERALL	123	20	143	86.0	79.4, 90.8

Subgroup PPV's:
age <75 (74 charts) = 94.6% (95% CI 86.9 to 97.9)
age 75+ (53 charts) = 79.2% (66.5 to 88.0)
males (76 charts) = 93.4% (88.5 to 97.2)
females (67 charts) 77.6% (63.3 to 85.9)
Lower PPV for females: driven by the women in 75+ age group
Women <75 (29 charts) 93.1% (78.0 to 98.1);
Women 75+ (27 charts) 70.4% (51.5 to 84.1)

Conclusions

A PPV of 86% may be considered adequate for some surveillance activities relevant to medication and device safety, but not for others.

Further research may be merited examining between-age group and between-gender differences in the positive predictive value of this AMI identification algorithm.