



Meaningful use. Meaningful data. Meaningful care.

The 3M™ Healthcare Data Dictionary (HDD):  
Implemented with a data warehouse



# Executive summary



A large academic research institution uses the **3M Healthcare Data Dictionary (HDD)** to integrate over **100,000 medication concepts** from disparate systems for comprehensive data assimilation.

*Before the 3M HDD*, researchers were performing **manual data mining** of each system to identify patients receiving a certain medication, and they had to know all the different ways the medication was represented within their electronic health record (EHR) system, other systems, and the formulary. System codes were loaded into a spreadsheet for the researcher, who then looked up each patient by the source terminology code.

When all of the data from all of this institution's systems was brought together in a data warehouse, multiple codes and representations existed for each unique pharmacy concept. **There was a lot of data, but no accurate or efficient means of accessing that data and mining information from it.**

## Summary: What was needed and what the 3M HDD could do

### Needs

- Assimilate structured and unstructured data from multiple EHRs and other systems from multiple hospitals and clinics into one location
- Standardize medication data

### Objectives

- Integrate multiple EHR systems
- Efficiently select patient groups
- Apply rule-based approach to identifying cohorts for clinical studies

### Challenges

- Synonymous concepts with different identifiers (duplicate codes and representations of concepts)
- Flat lists of codes deficient of organization or meaningful relationships
- Lack of a common language between systems

### 3M HDD solution

- Extract and map clinical metadata through a streamlined, systematic approach
- Apply a knowledge base and concept hierarchies
- Use a coded medical vocabulary for consistent treatment and translation of diverse clinical terminologies
- Provide a relational database in a scalable solution

# The 3M HDD solution in action

## Step 1: Map the concepts

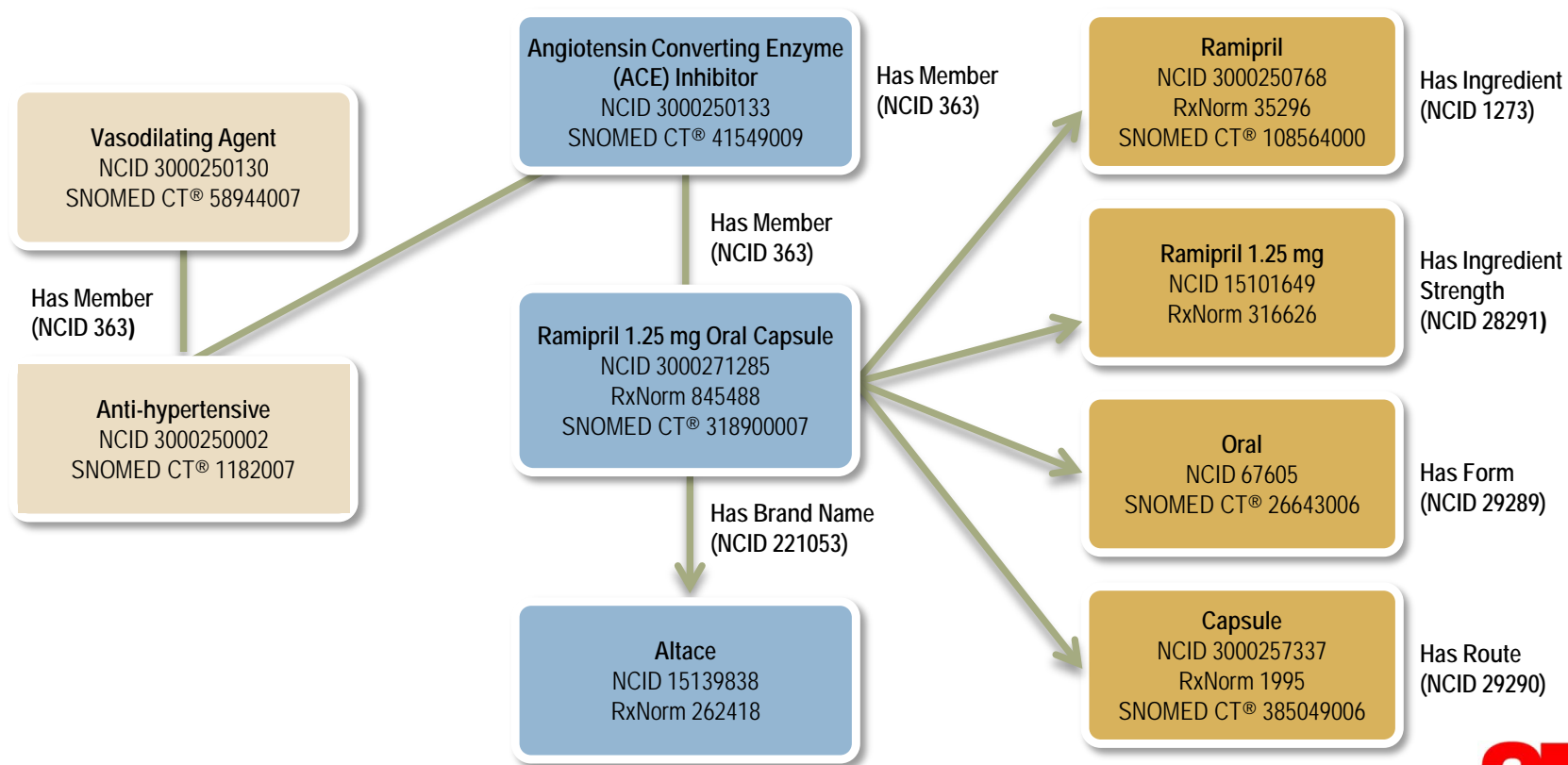
All of the concepts in use from all sources and systems were mapped to the 3M HDD, so concepts could be uniquely identified as structured, coded data even if the surface form was different. For example, the following *table* shows how various system representations for the drug **Ramipril** were mapped to the 3M HDD to create one common concept.

3M HDD numeric concept ID (NCID)	3M HDD representation	Source system	Source system code	Source system representation
3000271285	RAMIPRIL, 1.25 MG, CAPSULE, ORAL	EHR 1	2183481	ramipril 1.25 mg oral capsule
		Formulary system	2186471	Altace 1.25 mg oral capsule
		EHR 2	304	ALTACE 1.25 MG OR CAPS
		EHR 3	88482	RAMIPRIL 1.25 MG OR CAPS

# The 3M HDD solution in action

## Step 2: Apply a knowledge base and hierarchies

The 3M HDD has a knowledge base and poly-hierarchical structure that define each clinical drug's relationships. This shows the relationships that exist for **Ramipril**; any of the concepts can be used to query against the 3M HDD and a data warehouse.



# The 3M HDD solution in action



Each of the more granular attributes (ingredient, strength, form, route, etc.) acts as a bridge to link clinical drugs and drug classes, forming the foundational knowledge base in the 3M HDD.

The knowledge base allowed the hospital's researchers to customize their searches by various levels of granularity and organize their clinical content into meaningful relationships.

This shows the various medication domains in the 3M HDD that can be exploited for searches.

Domain	3M HDD numeric concept ID (NCID)	Definition
Drug class	153735	Domain that groups medications
Clinical drug	221049	Domain that encompasses clinical drugs
Brand name	221052	Domain that encompasses brand names
Ingredient	54577	Domain that encompasses ingredients
Ingredient strength	221043	Domain that encompasses ingredient strengths

# The 3M HDD solution in action

## Step 3: Gain access to — and extract information from — the data

Once the clinical concepts were mapped into the 3M HDD, the researchers could efficiently trace back to the patient records associated with a designated medication, generate patient lists from their queries, and identify cohorts for clinical studies.

Researcher identifies medication concept(s)

Identify all patients who received Ramipril

The 3M HDD is searched for given medication concepts with data warehouse codes mapped to them

Ramipril search returns 1,097 results for branded and generic drugs

Search criteria can be refined by drug ingredient, strength, dose, route or form

The 3M HDD is used to convert data warehouse codes to EHR codes

Each code and source are identified

EHR 1 = 2183481 or Formulary system = 2186471

EHR codes are connected back to the patient record

Patients on Ramipril are identified and grouped according to research needs

Patients can be further classified by demographic data (sex, race, age, etc.)

# The 3M advantage

3M HDD delivers three major benefits when it is implemented with a data warehouse.

## Efficiency

- ✓ Saves clinician **time** by grouping patients by treatment setting, so data can be sorted by context (e.g., inpatient, outpatient, etc.); researchers spend less time identifying cohorts for studies
- ✓ Provides a **holistic view** of all patients across the enterprise, identifying patients regardless of which system collected the medication information
- ✓ Applies both **standard and local terminology codes** so searches can be done by an RxCUI, FDB ingredient, Medi-Span® identifier, SNOMED CT® ingredient code, etc.
- ✓ Finds **all associated medication concepts**, including local and legacy codes

## Accuracy

- ✓ Locates all patients who received the medication, regardless of all the different representations the medication has within the EHR system or formulary; locates both brand name and generic medications
- ✓ Allows searching by **ingredient, brand or generic name, route and dosage**; searching on brand name returns a drug ingredient, which is linked to all medications containing the ingredient and their associated source system code

## Data integrity

- ✓ Uses a **single unique identifier** (3M HDD numeric concept ID) to capture all different surface forms in queries, accounting for all medication codes across all systems
- ✓ Collects a **sample size reflective of the entire patient population**, helping to maintain the integrity of the research cohort





## About 3M Health Information Systems

Best known for our market-leading coding system and ICD-10 expertise, **3M Health Information Systems** delivers innovative software and consulting services designed to raise the bar for clinical documentation improvement, computer-assisted coding, case mix and quality outcomes reporting, and document management. Our robust healthcare data dictionary and terminology services also support the expansion and accuracy of your electronic health record (EHR) system.

With 30 years of healthcare industry experience and the know-how of more than 100 credentialed 3M coding experts, 3M Health Information Systems is the go-to choice for 5,000+ hospitals worldwide that want to improve quality and financial performance.

For more information on how the **3M™ Healthcare Data Dictionary** can assist your organization with data warehousing needs, contact your 3M sales representative, call us toll-free at **800-367-2447**, or visit us online at <http://www.3mhis.com/hdd>.



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