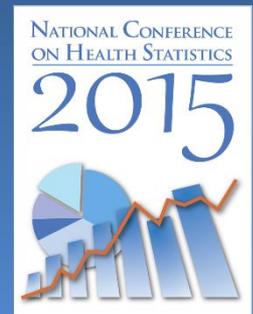# Analyzing Drug Data from NAMCS and NHAMCS

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Session Goals

Understand 2012 NAMCS (and NHAMCS) drug data

- File structure, drug characteristics, Multum Lexicon for generic ingredient and therapeutic classes

Understand the 2012 drug ingredient file

- Purpose of file, how to use it

Understand how to manipulate multiple years of drug data for trending purposes

- Changes in file structure prior to 2006
- Use new mapping program and drug database file to append 2012 drug characteristics to older data

Ambulatory Care Drug Database online

Acronyms Used

NAMCS is National Ambulatory Medical Care Survey

NHAMCS is National Hospital Ambulatory Medical Care Survey

ED is Emergency Department

OPD is Outpatient Department

Rx is Prescription

OTC is Over the Counter

How are the NAMCS and NHAMCS Drug Data Collected?

US Census Bureau acts as our data collection agent.

In 2012, 98% of NAMCS visit records were abstracted by Census Field Representatives (FRs) using an automated survey instrument on laptops.

2012 NAMCS and NHAMCS Outpatient Department Medication Item from Patient Record Sample Card

MEDICATIONS & IMMUNIZATIONS

Enter drugs that were ordered, supplied, administered or continued during this visit. *Include Rx and OTC drugs, immunizations, allergy shots, oxygen, anesthetics, chemotherapy, and dietary supplements.*

☐ NONE

		New	Continued
(1)		1 ☐	2 ☐
(2)		1 ☐	2 ☐
(3)		1 ☐	2 ☐
(4)		1 ☐	2 ☐
(5)		1 ☐	2 ☐
(6)		1 ☐	2 ☐
(7)		1 ☐	2 ☐
(8)		1 ☐	2 ☐
(9)		1 ☐	2 ☐
(10)		1 ☐	2 ☐

2012 NHAMCS Emergency Department Medication Item

MEDICATIONS & IMMUNIZATIONS

List up to 12 drugs given at this visit or prescribed at ED discharge. Include Rx and OTC drugs, immunizations, and anesthetics.

☐ NONE

	Given in ED	Rx at discharge
(1) _____	1 ☐	2 ☐
(2) _____	1 ☐	2 ☐
(3) _____	1 ☐	2 ☐
(4) _____	1 ☐	2 ☐
(5) _____	1 ☐	2 ☐
(6) _____	1 ☐	2 ☐
(7) _____	1 ☐	2 ☐
(8) _____	1 ☐	2 ☐
(9) _____	1 ☐	2 ☐
(10) _____	1 ☐	2 ☐
(11) _____	1 ☐	2 ☐
(12) _____	1 ☐	2 ☐

2012 NAMCS/NHAMCS Caveats

An automated tool was used for the first time in 2012; there were glitches with this new mode of data collection.

We only collect the following information:
- Medication name as entered on tool
- New/continued (NAMCS/OPD)
- Given in ED/Rx at Discharge (ED)

We do not collect any of the following:
- Dosage, route of administration, regimen
- Whether prescription was filled with generic or proprietary drug
- Whether patient filled the prescription or took the medication
- Was drug specifically ordered, administered, or provided at the visit?

2012 NAMCS/NHAMCS Drug Data

Up to 10 drugs collected per visit (MED1-10) for NAMCS and OPD. Up to 12 drugs collected (MED1-12) for ED.

- New vs. continued (NAMCS/OPD)
- Given in ED/Rx at Discharge (ED)

We call entries of drugs on the PRF "drug mentions" – refers to drugs provided, prescribed or continued at the ambulatory care visit.

Visits with one or more "drug mentions" are "drug visits".

2012 NAMCS/NHAMCS Drug Data (2)

Drug names are coded as entered using an internal classification system developed in 1980.

Drug mentions = MED1-MED10 (NAMCS and OPD), MED1-MED12 (ED).

We add prescription status, composition status, controlled substance status, generic code, ingredients and therapeutic categories during data processing.

2012 NAMCS/NHAMCS Drug Data (3)

Starting in 2006, each MED code is associated with a DRUGID code (MED1 and DRUGID1, MED2 and DRUGID2, etc.).

DRUGID represents the generic composition of the drug and encompasses multiple ingredients:

- based on Multum Lexicon, a proprietary database.
- Multum has ~ 2,000 single ingredient drugs and ~ 700 combination products. If a drug has more than one ingredient, it is covered by one code.
- alphanumeric variable, such as "d00015".

Multum codes begin with "d". We have added some others with "a", "c", or "n".

Codes beginning with "a"

- a match could not be found between a generic ingredient name on our pre-Multum database and the Multum Lexicon (about 800 substances).
- combination products in our pre-Multum database could not be matched with Multum combination DRUGIDs (about 1,800 combinations).

2012 NAMCS/NHAMCS Drug Data (5)

Codes beginning with "c"

- we knew only the therapeutic effect of a substance on our pre-Multum database, ingredients not known.

Codes beginning with "n"

- Replace "a" and "c" codes starting in 2008. "a" and "c" prefixes will still be used for older drugs, but any new drugs entering the system which cannot currently be coded to Multum are assigned prefixes of "n" starting with 2008 data.

2012 NAMCS/NHAMCS Therapeutic Classification

Multum assigns therapeutic classes (called drug categories) to DRUGID codes.

Multum Lexicon uses a 3-level therapeutic classification scheme:

- 21 first-level codes
- More than 200 second-level codes
- More than 220 third-level codes

It does not use a hierarchical numbering system.

2012 NAMCS/NHAMCS Therapeutic Classification (2)

Each DRUGID can be associated with up to 4 therapeutic categories:

- MED1 is assigned DRUGID1, which is associated with RX1CAT1, RX1CAT2, RX1CAT3, RX1CAT4.
- These RXCAT variables will always reflect the highest level therapeutic code available (some drugs only have 1 or 2 levels).
- So, running RXCAT variables may give you an assortment of first-, second-, and third-level codes all in one output.
- To provide an alternative, we put additional variables on the files that reflect the complete nested structure for each RXCAT variable.

Fluoxetine (marketed mainly as Prozac)

- Has a single therapeutic category in Multum = 208, SSRI antidepressant.
- So, the RX1CAT1 value is 208.
- The full breakdown behind that value is as follows:
  - Level 1 (RX1V1C1) is 242 (psychotherapeutic agents)
  - Level 2 (RX1V2C1) is 249 (antidepressants)
  - Level 3 (Rx1V3C1) is 208 (SSRI antidepressant)
- Whatever the finest level possible for the drug is, that is also the value of the RXCAT variable.

2012 NAMCS/NHAMCS Summary of drug variables

For MED1 – these are the drug characteristic variables:

- DRUGID1, PRESCR1, CONTSUB1, COMSTAT1, RX1CAT1, RX1CAT2, RX1CAT3, RX1CAT4
- For each RXCAT variable, there is a separate Level 1, Level 2 and Level 3 variable that all together show the complete nested structure of the therapeutic category.
- For RX1CAT1:
    - The Level 1 codes are RX1V1C1, RX1V1C2, RX1V1C3, and RX1V1C4 (where V=level)
    - The Level 2 codes are RX1V2C1, RX1V2C2, RX1V2C3, and RX1V2C4
    - The Level 3 codes are RX1V3C1, RX1V3C2, RX1V3C3, RX1V3C4
- This enables you to run drugs at either the first, second, or third level of classification.
- You can also concatenate the 3 levels to get a single complete nested structure for every DRUGID   'xxxxxxxxx'.

2012 NAMCS/NHAMCS
Conceptualizing Drug Data

NAMCS/NHAMCS data can generate estimates of VISITS for a particular drug/class of drugs reported (# of visits where Prozac/antidepressants were provided, prescribed, or continued).

NAMCS/NHAMCS data can generate estimates of DRUG MENTIONS (# of occurrences of fluoxetine hydrochloride provided, prescribed, or continued).

NAMCS/NHAMCS data can generate estimates of therapeutic classes (# of occurrences of antidepressants (2nd level) or SSRIs (3rd level) provided, prescribed, or continued.

Some Good and Bad Uses of NAMCS and NHAMCS Drug Data

What are the drug data good for?

- Making estimates of drugs reported at ambulatory care visits. Generic composition (DRUGID) is better for analysis than the name collected (MED).

What are the drug data NOT good for?

- Making estimates of number of people taking a particular drug. NAMCS/NHAMCS are sample surveys of visits, not people, and the same person can have multiple sampled visits, in theory. We do not track patients.

- State-level estimates. NAMCS before 2012 and all years of NHAMCS are designed to produce national and regional estimates only.   Even in 2012, there may be insufficient sample data to make drug estimates for a particular state.

2012 NAMCS/NHAMCS
Drug Ingredients

Each medication (MED1-10) can have up to 6 ingredients in our public use data.

Multum calls ingredients "members".

In Multum, therapeutic categories are assigned to DRUGIDs, but, for multi-ingredient products, the therapeutic code is not specific (for example, "bronchodilator combinations").

However, Multum also assigns specific therapeutic categories for each ingredient of a DRUGID.

We have a separate ingredient (or "member") file that contains up to 4 therapeutic categories for each of a drug's 6 ingredients (or members).

Users will match on DRUGID to merge ingredient data with drug data on the public use file.

2012 NAMCS/NHAMCS Drug Ingredient Variables

EXAMPLE:

- MED1-DRUGID1
  - Up to 6 ingredients – MEMBER1, MEMBER2…MEMBER6
  - Up to 4 therapeutic category variables for each ingredient
  - Just the most detailed level of therapeutic category is included (similar to RXCAT)

    MEM1CAT1, MEM1CAT2, MEM1CAT3, MEM1CAT4
    MEM2CAT1, MEM2CAT2, MEM2CAT3, MEM2CAT4
    MEM3CAT1, MEM3CAT2, MEM3CAT3, MEM3CAT4
    MEM4CAT1, MEM4CAT2, MEM4CAT3, MEM4CAT4
    MEM5CAT1, MEM5CAT2, MEM5CAT3, MEM5CAT4
    MEM6CAT1, MEM6CAT2, MEM6CAT3, MEM6CAT4

2012 NAMCS/NHAMCS Ingredient Example

EXAMPLE:

- MED1 – 14525 (HISTALET-DM SYRUP)
- DRUGID1 – d03370 (CHLORPHENIRAMINE; DEXTROMETHORPHAN; PSE)
- RX1CAT1 – 132 (UPPER RESPIRATORY COMBINATIONS)
  - RX1V1C1 – 122 (RESPIRATORY AGENTS)
  - RX1V2C1 – 132 (UPPER RESPIRATORY COMBINATIONS)
  - RX1V3C1 -- NO 3RD LEVEL FOR THIS DRUGID
- To obtain specific therapeutic categories for each separate ingredient, must go to INGREDIENT file

Ingredients of HISTALET-DM SYRUP and their Therapeutic Categories:

- CHLORPHENIRAMINE – 123 (ANTIHISTAMINE)
- DEXTROMETHORPHAN – 124 (ANTITUSSIVE)
- PSEUDOEPHEDRINE – 127 (DECONGESTANT)

Trending NAMCS/NHAMCS Drug Data

Background of NAMCS drug data collection
(NAMCS began in 1973):

- 1980 (first year of drug data collection), 1981 - Up to 8 drugs collected (no NAMCS in 1982-84)

- 1985, 1989-1994 – Up to 5 drugs collected

- 1995-2002 – Up to 6 drugs collected

- 2003-2011 – Up to 8 drugs collected

- 2012-2013 – Up to 10 drugs collected

- 2014-2015 – Up to 30 drugs collected

Trending NAMCS/NHAMCS Drug Data (2)

Background of NHAMCS drug data collection
(NHAMCS began in 1992):

- 1992-1994 – Up to 5 drugs

- 1995-2002 – Up to 6 drugs

- 2003-2011 – Up to 8 drugs

- 2012-2013 – Up to 10 drugs (OPD), up to 12 drugs (ED)

- 2014-2015 – Up to 30 drugs

Trending NAMCS/NHAMCS Drug Data (3)

PRF items related to drugs

- Is this a new medication? -- 1980-1992, 2005-present

- Is this a continued medication? -- 2005-present

- Is medication for primary diagnosis? – 1980-1990

- Was medication from formulary list? -- 1997-2000

- Was medication given in ED/Rx at discharge? – 2005-present

Trending NAMCS/NHAMCS Drug Data (4)

Drug characteristics added during data processing --1980-2005
- Prescription status
- Controlled substance status
- Composition status
- Generic substance (for single ingredient drugs)
- Up to 5 ingredients (for multi-ingredient products)
- National Drug Code Directory (NDC) 2 digit therapeutic class – 1985-92
- NDC 4 digit therapeutic class – 1993-2005
- Single NDC class coded through 2001, 3 classes coded from 2002-2005
- We provided a program and file on the web that allowed researchers to replace drug characteristics from 1993-2004 with the most up-to-date drug characteristics from 2005. This has been superseded by our switch to Multum.

Trending NAMCS/NHAMCS Drug Data (5)

- Between 1980 and 1992, we released two sets of public use files each year – one for visits and one for drugs.
- The visit file included PRF drug data (medications, related items) but not drug characteristics.
- The drug file was an "exploded" visit file, with one record for each drug mention.
  - For example, if there were 25,000 visit records and each one had 5 drug mentions on it, the drug file would have 125,000 records, or 5 x 25,000. Each record had all of the original visit information for each drug, plus the drug characteristics.

Trending NAMCS/NHAMCS Drug Data (6)

- Starting in 1993, we began releasing a single file that combined the drug characteristics with the visit data.

- Each record reflects a visit, but the drug characteristics were added to the end of the record, repeated for each drug mention.

Trending NAMCS/NHAMCS Drug Data (7)

- To trend drug data across any years before and since 2006, it is necessary to apply Multum drug characteristics to previous years of drug data.

- This can be accomplished by using the DRUGID mapping program along with the 2010 drug database file containing the current drug characteristics.

- It is necessary to match MED codes from each year of pre-2006 data with MED codes on the 2012 drug database. The program we supply will drop the old characteristics and apply the current Multum characteristics for each MED code's DRUGID.

Some Important Reminders

- NAMCS/NHAMCS data are from sampled providers and sampled visits. The data MUST be weighted to produce national (or state, for 2012 NAMCS) estimates.

- NAMCS/NHAMCS estimates should be reliable for your analysis. You must have at least 30 sampled records and a standard error of not more than 30 percent for an estimate to be considered reliable by NCHS standards. Review Basic and Advanced Hands-On Sessions at our website to learn more about the surveys.

- The surveys change from year to year. It is important to read the Public Use File Documentation for the years of interest to understand changes for each year.

The Ambulatory
Care Drug Database System

- Online application for looking up drugs in NAMCS and NHAMCS.

- Results shown for 2009 data from both NAMCS and NHAMCS combined. Will be updated to 2012 in the future.

- We also kept a copy of the older system for drugs using NDC classification. It's still useful for looking up drugs in pre-2006 data.

- At our web site, http://www.cdc.gov/nchs/ahcd.htm. Under Research Tools on the left navigation bar.

Questions? Check the
Public Use Data File Documentation – updates posted at our website

Each booklet includes:

- A description of the survey

- Record format

- Marginal data (summaries)

- Various definitions

- Reason for Visit classification codes

- Medication & generic names

- Therapeutic classes

Need more info?

Visit: http://www.cdc.gov/nchs/ahcd.htm

Call the Ambulatory and Hospital Care Statistics Branch at 301-458-4600.

Email SSchappert@cdc.gov for questions on public use data.

Email JWatts@cdc.gov for questions on drug database.