

Performance of the National Library of Medicine RxMix, FDA National Drug Code Directory, and Redbook to Identify Prescription Records

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KEY POINTS



Compared to the NLM RxMix interface and the FDA NDC Directory, Micromedex Redbook® can recognize almost all medication records in MEPS for the top 25 drugs prescribed in the US.



The current study aims to bring the attention of the researchers for carefully selecting drug knowledge base sources for pharmacoepidemiology research.

BACKGROUND

- Drug knowledge bases for National Drug Codes (NDCs) are critical for identifying drug exposure in pharmacoepidemiology research and warrant a careful selection as this can significantly impact the study populations and associated outcomes.
- Although proprietary, Micromedex Redbook® is a widely used drug knowledge base, the National Library of Medicine (NLM) and Food and Drug Administration (FDA) have their own drug knowledge bases, which are publicly available and used frequently in research studies.
- The current analysis compared the NLM RxMix, FDA National Drug Code (NDC) Directory, and Micromedex Redbook® in identifying frequently prescribed medication records in nationally representative medication utilization data¹.

Every year, there are approximately 5 billion outpatient prescriptions filled in the US².

Top 25 drugs account for 30% of outpatient prescriptions filled³.

METHOD

Study Design and Data Sources:

- This is a cross-sectional study that analyzed data from the Medical Expenditure Panel Survey (MEPS) data.
- MEPS Household Component (MEPS-HC)⁴ prescribed medicine files from 2017-2018 were used to obtain prescription records of the top 25 prescribed medications.
- NLM RxMix interface, FDA NDC Directory, and Micromedex Redbook® were used to identify NDCs corresponding to the top 25 prescribed medications.

Study Population:

- Medication records for the top 25 most prescribed drugs based on generic name.

Outcome:

- Proportion of medication records identifiable using three separate sources- NLM RxMix interface, FDA NDC Directory, and Micromedex Redbook®, respectively.

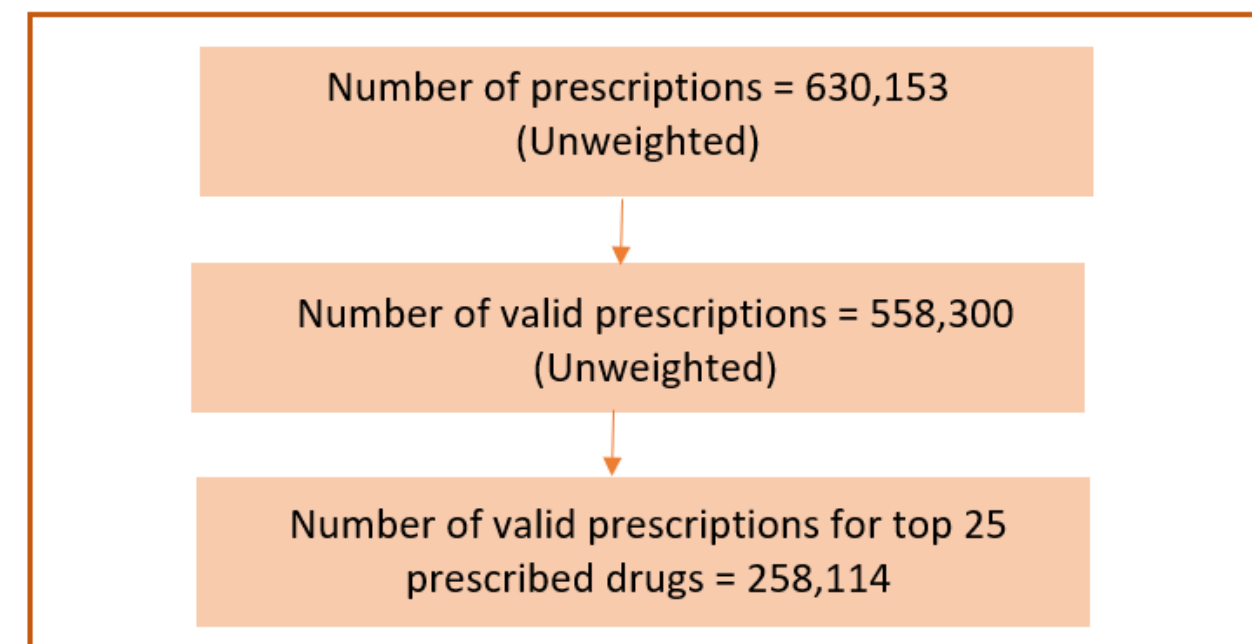
Statistical Analysis:

- Survey weighted frequency and percentage were reported for each of the top 25 drugs based on NDC to generic name mapping from the three sources.

RESULTS

- The study identified an unweighted sample of 258,114 medication records representing 2.63 billion medication records nationally.

Figure 1: Prescription Selection



- Micromedex Redbook® based NDC to generic name mapping tables identified 99.89% medication records overall.
- FDA NDC directory-based mapping tables only identified 93.23% of the overall records.
- NLM RxMix interface-based mapping only identified 93.16% of the overall records.
- The performance of FDA NDC directory-based mapping varied across different drugs and was lowest for levothyroxine (69.91%), acetaminophen (75.46%), and simvastatin (84.10%).
- Similarly, the performance of NLM RxMix was lowest for citalopram (45.42%), alprazolam (68.65%), and metoprolol (82.05%).

Table 1: Mapping of Different Drugs using NLM RxMix Interface, FDA NDC Directory, and Micromedex Redbook®

Drug Name	Medication Records MEPS (Millions)	NLM RxMix Interface Records (%)	FDA NDC Directory Records (%)	Micromedex Redbook® Records (%)
Lisinopril	223.38	97.52	90.29	100.00
Levothyroxine	198.95	99.18	69.91	100.00
Atorvastatin	207.12	99.98	98.72	99.94
Metformin	179.11	96.09	94.72	99.88
Simvastatin	101.29	85.48	84.10	99.51
Omeprazole	126.71	86.66	89.90	99.33
Amlodipine Besylate	148.81	94.88	87.86	99.98
Metoprolol	126.06	82.05	91.24	99.79
Acetaminophen	119.39	90.72	75.46	99.76
Albuterol	115.40	93.85	95.35	100.00
Hydrochlorothiazide	156.39	98.03	94.92	99.88
Losartan	123.49	97.07	90.43	99.91
Gabapentin	86.69	97.23	95.75	99.78
Sertraline	73.32	100.00	98.09	100.00
Furosemide	56.51	97.94	95.12	99.99
Atenolol	37.60	99.99	97.90	100.00
Pravastatin	46.33	98.18	98.18	100.00
Amoxicillin	70.90	99.38	96.60	99.92
Fluoxetine	45.52	97.71	98.26	100.00
Citalopram	94.41	45.42	95.77	100.00
Trazodone	43.24	96.54	99.00	100.00
Alprazolam	45.49	68.65	98.50	100.00
Fluticasone	86.34	99.79	99.99	100.00
Bupropion	46.12	99.87	92.04	99.75
Carvedilol	42.58	99.96	97.15	99.82

Figure 2: Mapping of Difference Drugs with the Lowest Performance in the FDA NDC Directory

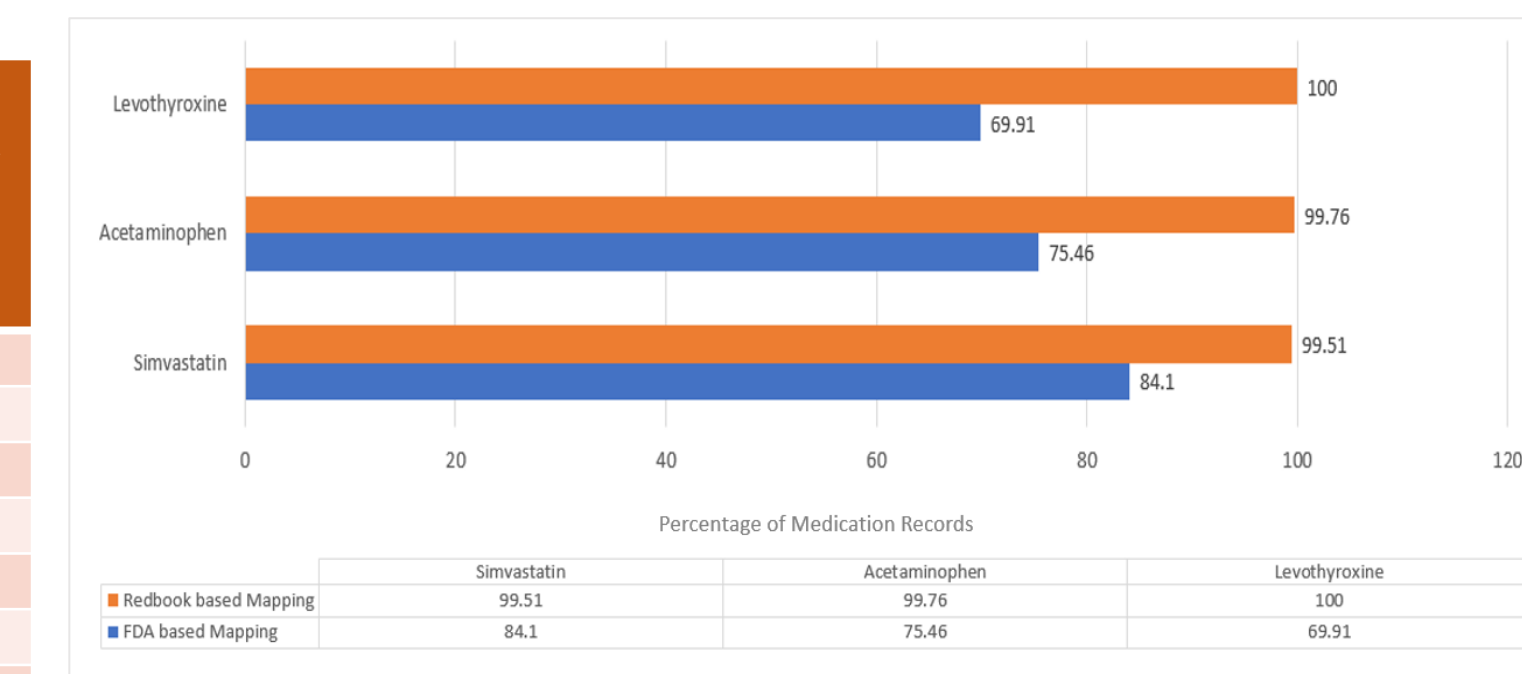
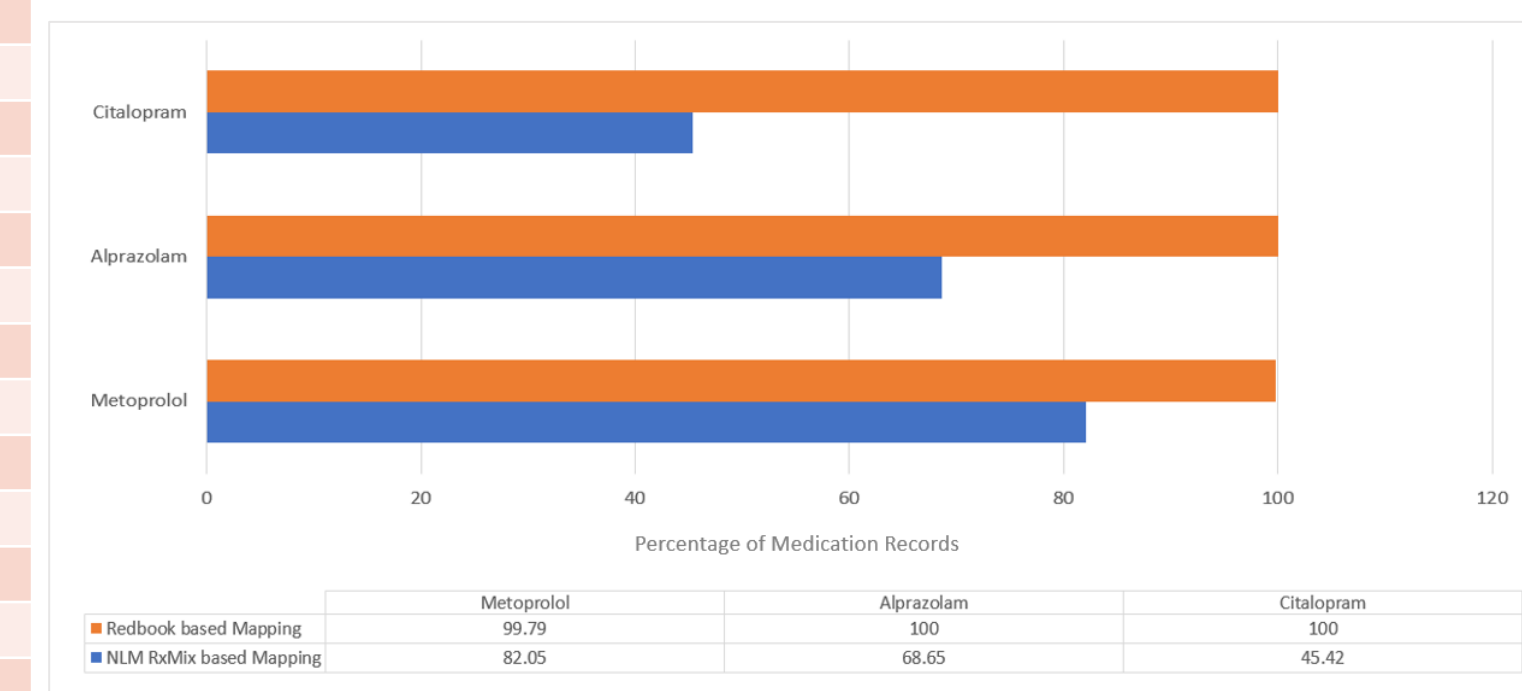


Figure 3: Mapping of Difference Drugs with the Lowest Performance in the NLM RxMix Interface



CONCLUSIONS

- The coverage for the 25 most frequently prescribed medications by the publicly available NLM RxMix interface and FDA NDC directory-based mapping tables was variable and incomplete.
- Micromedex Redbook®, in contrast, provides complete coverage of the 25 most frequently prescribed medications.

LIMITATIONS

- The study only compared the drug knowledge bank against the top 25 most prescribed drugs.
- Future studies are needed to identify potential reasons for such differences in coverage by different databases.

For any questions please email: manvi.sharma@cheors.com



CONFLICT OF INTEREST

- No funding was received from any external organization
- The authors report no other conflicts of interest in this work

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