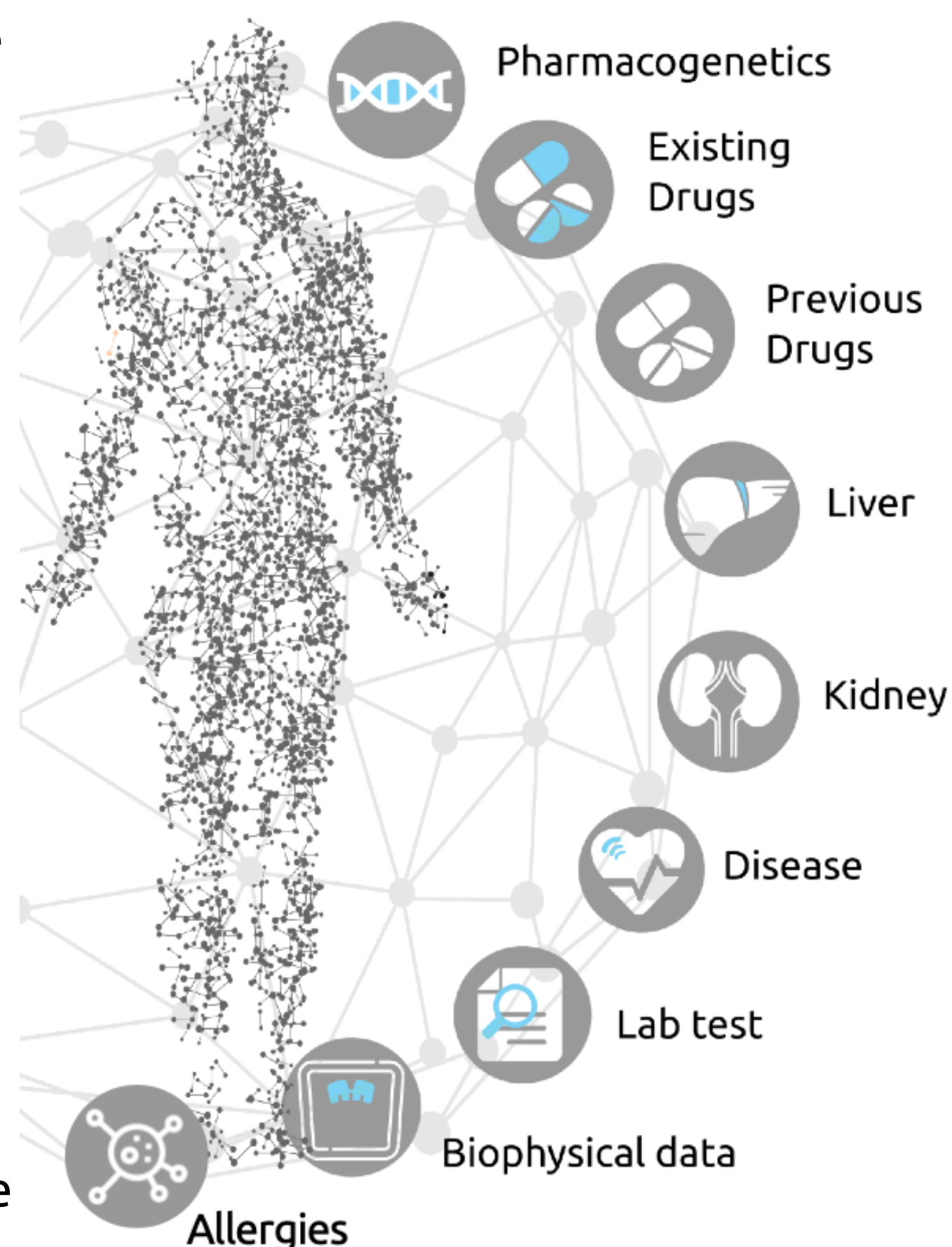


IdentifyPGx Prescribing Data Analysis

Pharmacogenetics (PGx) helps identify the safest and most effective drug options for a patient. A six-step process begins with all the drug options possible and ends with a smaller personalized list after considering all of the patient's characteristics:

1. Identify the drug options for the condition. This may be very few in some cases, or over thirty for other conditions such as mental health or cardiovascular diseases
2. Identify which of these drugs should be avoided or need dose adjustment, taking into account:
 - a. Pharmacogenetic variation
 - b. Liver impairment
 - c. Kidney impairment
3. From the resulting modified list of drugs, identify any potential drug-disease interactions that may, for instance, cause heart failure.
4. Identify any other biophysical factors such as low sodium and known drug allergies that may affect the ability to use certain drugs.
5. Identify any potential drug-drug interactions if the patient takes multiple medications.
6. Select a drug from the remaining drug options available and correctly dose-adjust for that patient.



All of this information needs to be kept updated as new knowledge, especially about drug-drug and drug-genetic interactions, appears all the time. Drug interaction paper reports are outdated the moment they are printed. For that reason, clinicians have used drug-drug interaction software to ensure they are using the most up-to-date information in this process.

At GenXys we provide the same process for drug-gene interactions. Our software integrates all the information described above and provides clinicians with a list of medication options personalized on that information in seconds. In this rapid report, we provide a snapshot of the drugs being used and the reasons for encounters seen in this population. We identify the drugs with known drug-gene interactions but have also identified drugs where there are liver and kidney interactions, and drug-drug interactions. A pharmacogenetic test may be re-used for many diseases and drugs over a patient's lifetime.



IdentifyPGx Prescribing Data Analysis

Current Medication Use & Benefit of Pharmacogenetic Testing

Report Contents

- Population Overview
- Polypharmacy
- Top 20 Drugs by Number of People Receiving that Drug
- Reasons for Inappropriate Prescriptions
- Reasons For Encounters

Ordered By

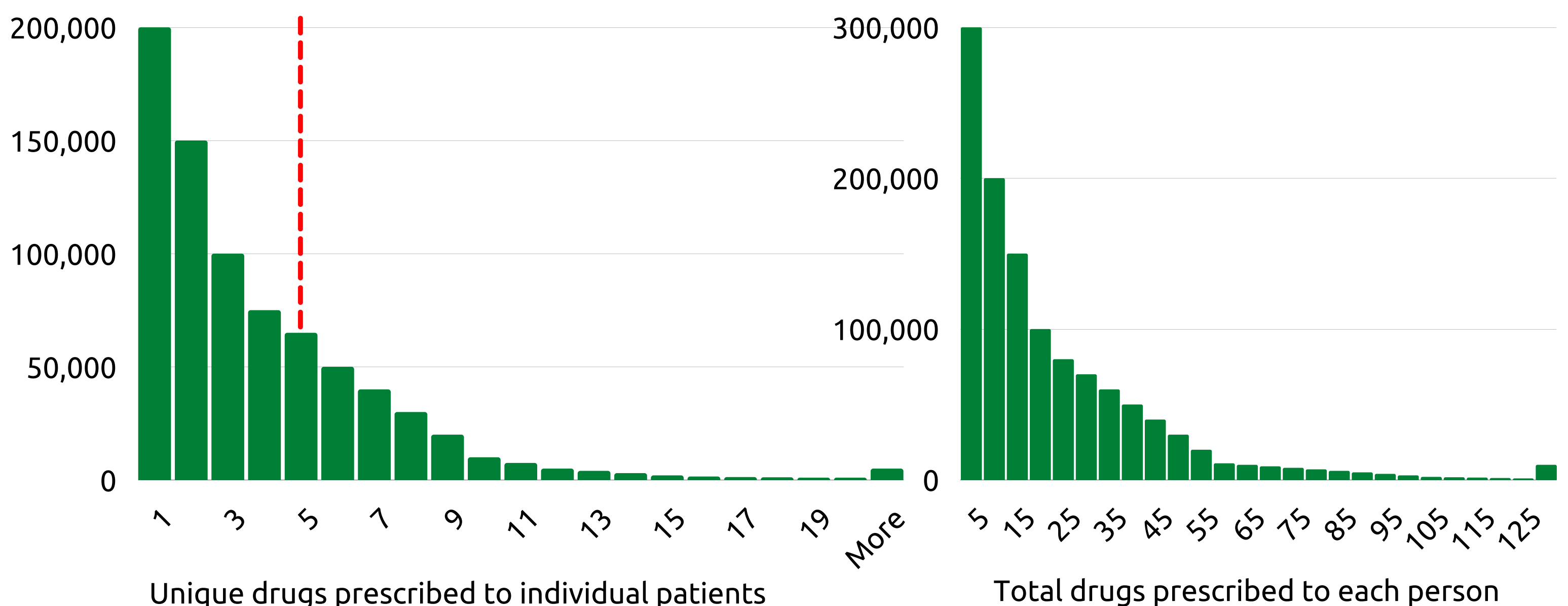


Claims data file:
"Your Data Here"

Population Overview

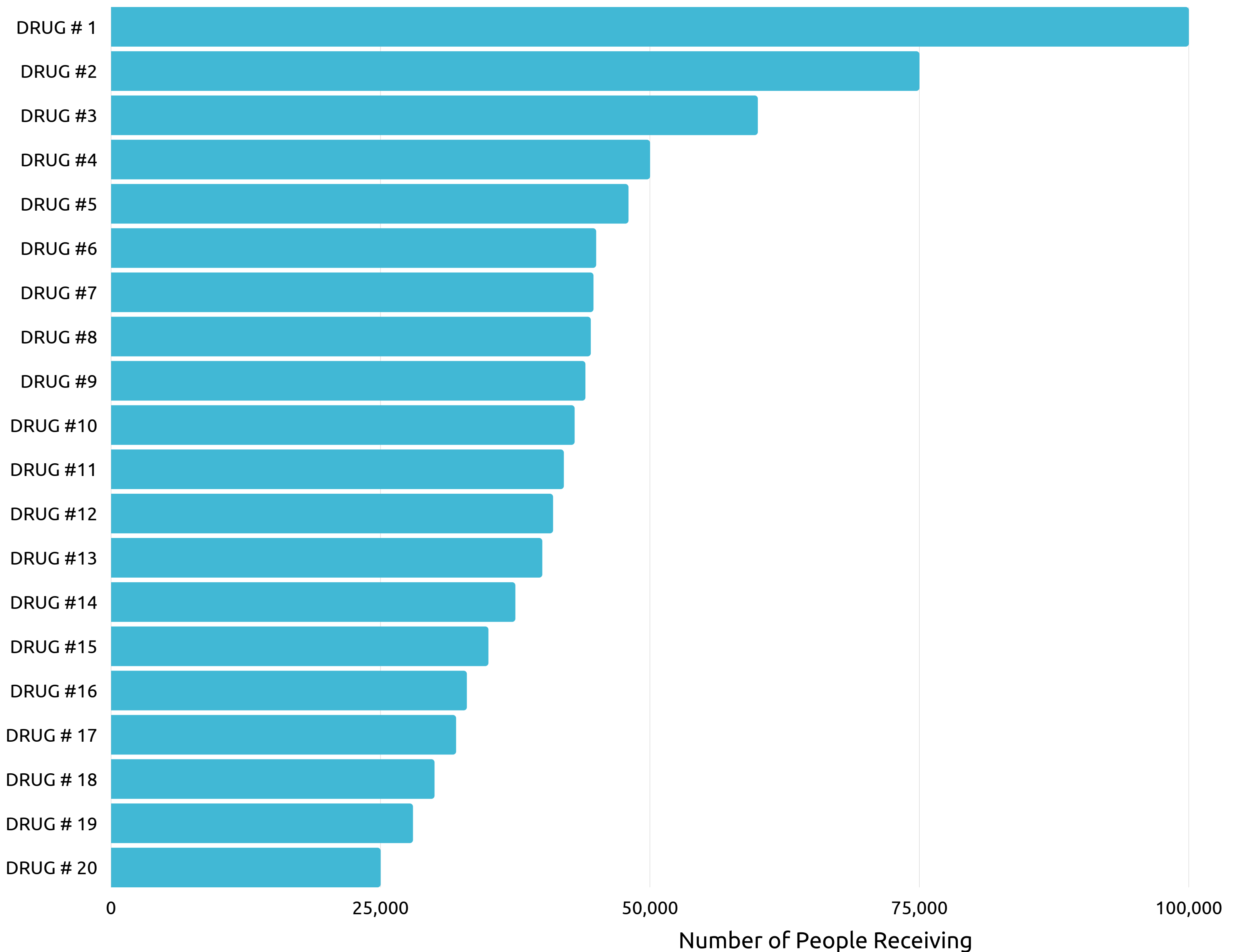
NUMBER OF UNIQUE INDIVIDUALS	600,000
TOTAL NUMBER OF UNIQUE DRUGS	3,000
EARLIEST PRESCRIPTION DATE	MM/DD/YYYY
LATEST PRESCRIPTION DATE	MM/DD/YYYY
NUMBER (%) FEMALE	360,000 (60.0%)
NUMBER (%) MALE	240,000 (40.0%)
AGE RANGE (YRS)	0-99
MEDIAN AGE (YEARS)	39
NUMBER OF PRESCRIPTIONS FILLED PER PERSON (MIN - MAX)	1 - 65
AVERAGE NUMBER OF PRESCRIPTIONS PER PERSON	9.3
NUMBER OF PRESCRIPTIONS FILLED PER PERSON OVER TIME PERIOD (MIN - MAX)	1 - 1234
AVERAGE NUMBER OF PRESCRIPTIONS PER PERSON OVER TIME PERIOD	22.3
TOTAL NUMBER OF PRESCRIPTIONS	2,500
TOTAL NUMBER OF UNIQUE PRESCRIPTIONS WITH KNOWN DGI'S	60,000
AVERAGE NUMBER INDIVIDUAL MEDICATIONS PER INDIVIDUAL PLUS RANGE	6.3 (1-23)

Polypharmacy



IdentifyPGx Prescribing Data Analysis

Top 20 Drugs by Number of People Receiving that Drug



Many patients with mental health conditions are taking drugs with known Drug-Gene Interactions

There were 125,000 patients with a mental health condition given as the reason for the encounter.

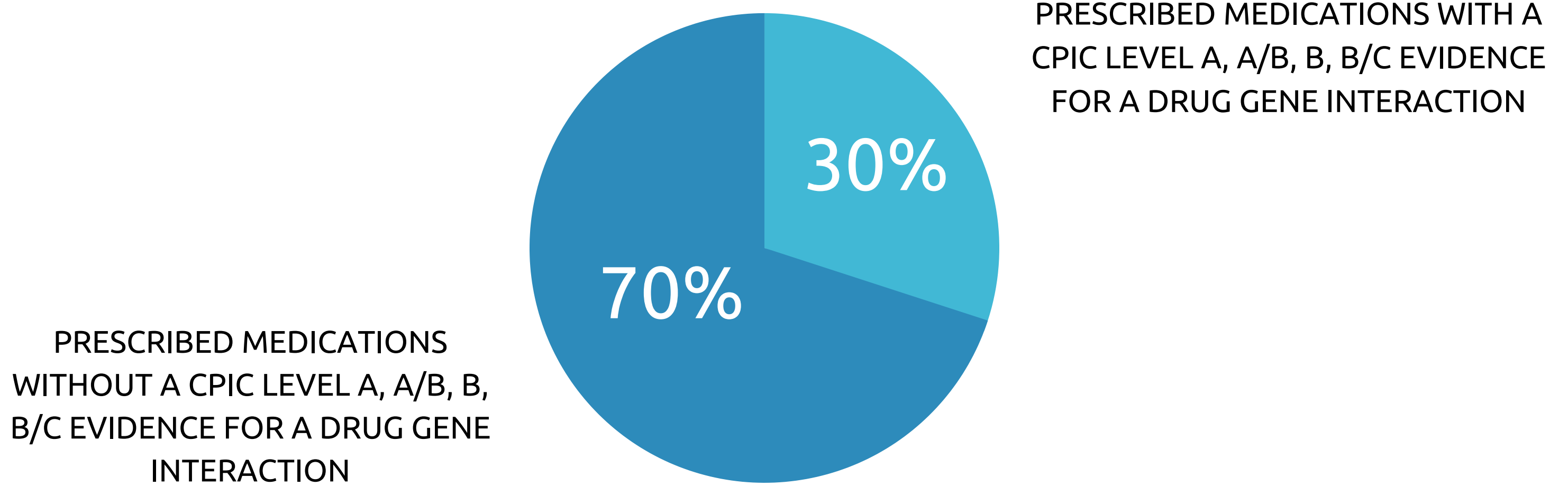
32% of these patients (40,000) were taking one of four antidepressants (Drug #1, Drug # 2, Drug #3 , & Drug # 4) with known high evidence level Drug Gene Interactions.

The total of the "average price per unit" amounts for all drugs classified as psychotherapeutic was \$11.1 Million. The NNT is 6 for a PGX test to get a patient with depression into remission



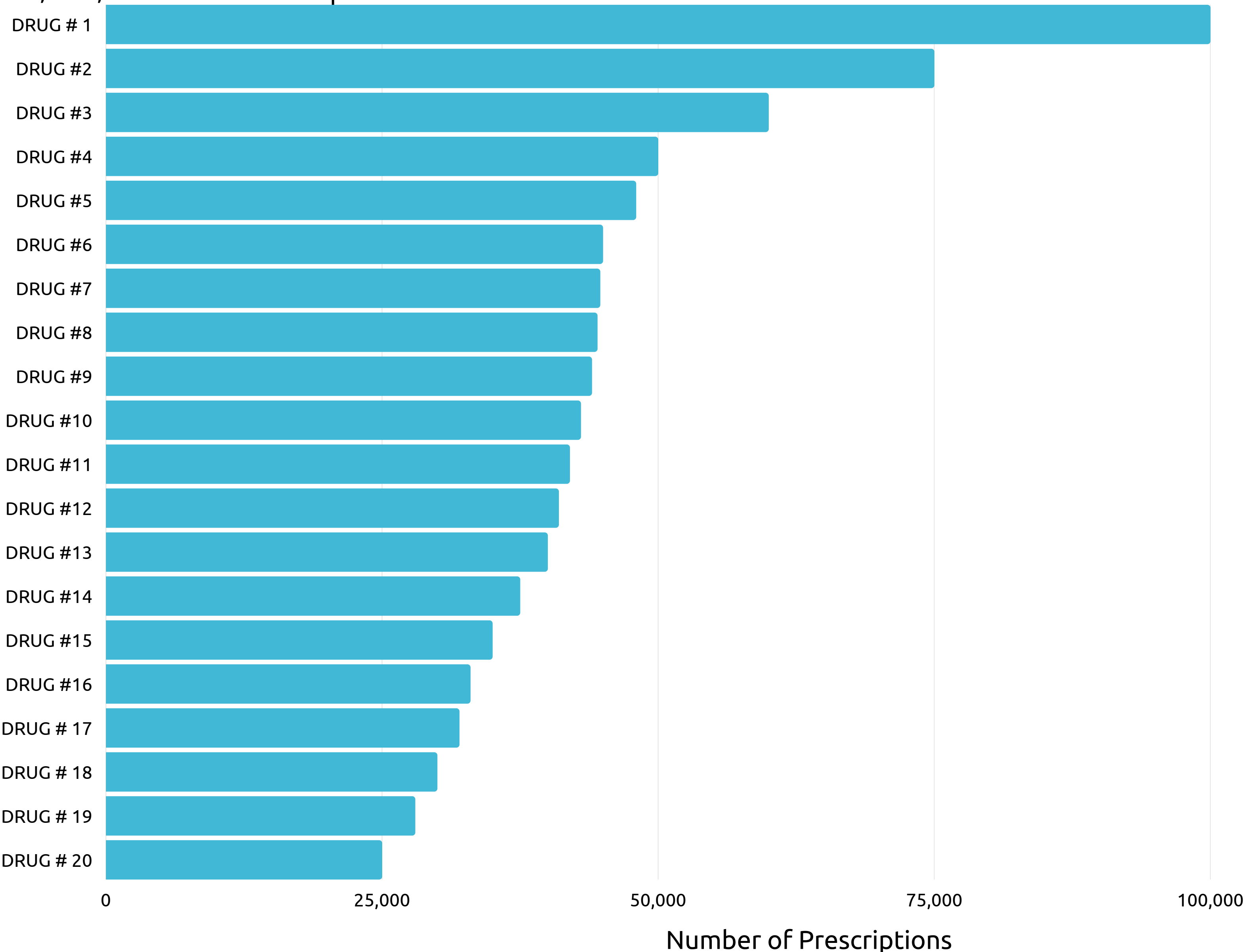
IdentifyPGx Prescribing Data Analysis

Top 50 Prescription Drugs - DGI Report



20 Prescription Drugs, In the Top-50, with Known DGI's - By Prescriptions

1,234,567 Total Prescriptions



IdentifyPGx Prescribing Data Analysis

Reasons for Inappropriate Prescriptions Leading to Adverse Drug Reactions and Ineffective Treatment

Drug Gene Interactions	Number of Drugs	Cost (\$)	% of Total Budget (\$400,000,000)
CPIC C	25	95,000,000	24%
Renal	140	20,000,000	5%
CPIC A&B	240	20,000,000	5%
Liver	90	17,500,000	4%
CPIC A&B, and C	265	120,000,000	30%
CPIC A&B, Renal, and Liver	470	60,000,000	15%

Drug-Drug Interactions

The published prevalence of drug-drug interactions is 13% (Guthrie et al 2015).

We used a standard high-risk drug-drug interaction to indicate the prevalence of drug-drug interactions in this data. In this dataset, there were 20,000 people taking anticoagulant drugs (for example warfarin or Apixaban) of whom 6,000 (30%) were taking an NSAID (for example ibuprofen or aspirin).

To provide comparison data we know from a large peer-reviewed study of 18,113 patients taking anticoagulant drugs 2,279 (12.6%) patients used NSAIDs at least once. **This drug-drug interaction was associated with a 68% increase in major bleeding (Kent et al 2018).**

Reusability of Pharmacogenetics

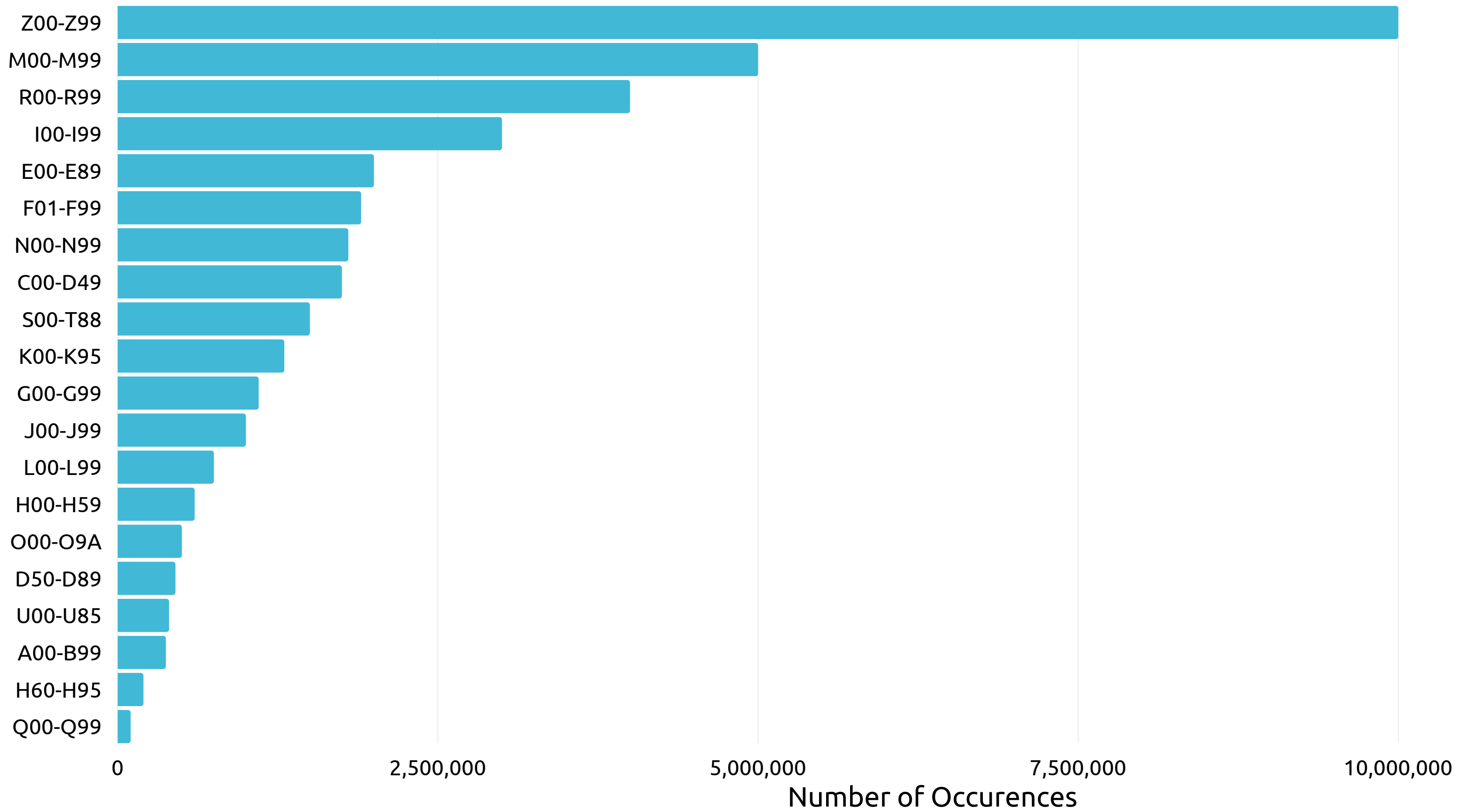
We assessed the number of patients prescribed clopidogrel (n=10,000) which has a strong drug-gene interaction (CYP2C19). In those patients, we identified how many were given one of the four SSRIs with strong drug-gene interaction (n=2,250) with the same gene. **In this case, 22.5% of the patients would have been able to reuse the pharmacogenetic tests for another drug.**



IdentifyPGx Prescribing Data Analysis

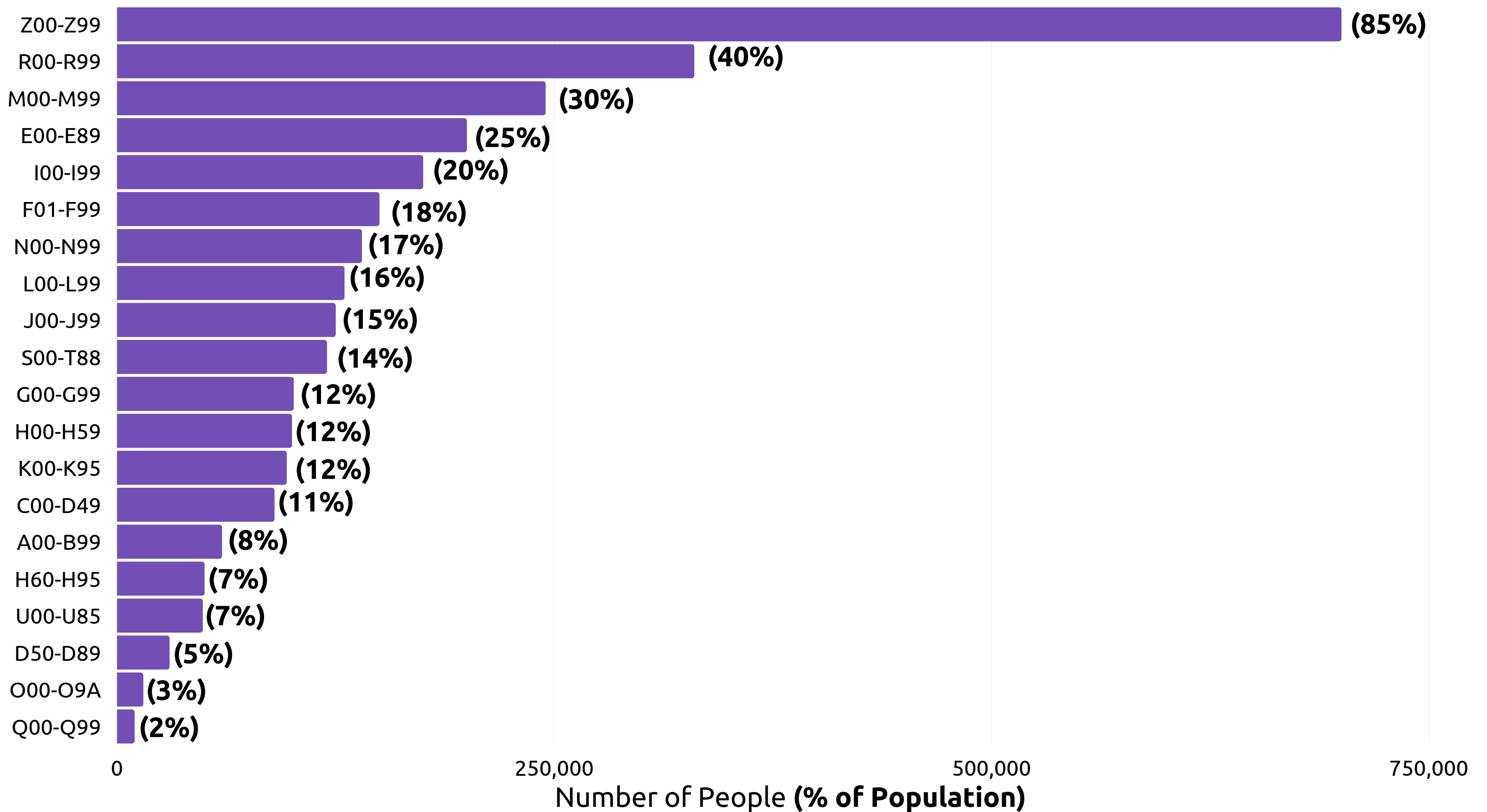
Reasons for Encounter using ICD10* Top-Level Groups - by Number of Occurrences

50,550,455 Total Occurrences



Reasons for Encounter using ICD10* Top-Level Groups - by Number of People

900,000 Population Size



IdentifyPGx Prescribing Data Analysis

ICD10 Code Description

Z00-Z99: Factors influencing health status and contact with health services

R00-R99: Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified

M00-M99: Diseases of the musculoskeletal system and connective tissue

E00-E89: Endocrine, nutritional and metabolic diseases

I00-I99: Diseases of the circulatory system

F01-F99: Mental, Behavioral and Neurodevelopmental disorders

N00-N99: Diseases of the genitourinary system

L00-L99: Diseases of the skin and subcutaneous tissue

J00-J99: Diseases of the respiratory system

S00-T88: Injury, poisoning, and certain other consequences of external causes

G00-G99: Diseases of the nervous system

H00-H59: Diseases of the eye and adnexa

K00-K95: Diseases of the digestive system

C00-D49: Neoplasms

A00-B99: Certain infectious and parasitic diseases

H60-H95: Diseases of the ear and mastoid process

U00-U85: Codes for special purposes

D50-D89: Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism

O00-O9A: Pregnancy, childbirth, and the puerperium

Q00-Q99: Congenital malformations, deformations, and chromosomal abnormalities

