Comprehension of Top 200 Prescribed Drugs in the US as a Resource for Pharmacy Teaching, Training and Practice

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Abstract: Pharmacists have access to a plethora of information related to drugs. Online compendia concerning top 200 prescribed drugs are readily-accessible, comparatively-easy to search. While these resources provide some information about the commonly prescribed drugs, they lack in furnishing in-depth knowledge to pharmacy students, pharmacists and other healthcare professionals. The aim of this paper is to present the relevant details of top 200 most prescribed drugs in the United States. The names and therapeutic classes of top 200 prescribed drugs were compiled from online resources. The pharmacological actions of drugs, any reported adverse reactions and black box warnings are collected from drug bank resources, such as AccessPharmacy and Lexicomp. The paper provides comprehensive information about top 200 prescribed drugs, which includes generic names, pharmacological action, route of administration and adverse reaction profile including black box warning when applicable. Overall, the drug list may serve as an easy access of ideas for pharmacists, researchers and other healthcare professionals interested in developing new strategies for treating patients with various ailments.

Keywords: black box warning; oral administration; cardiovascular; central nervous system; endocrine; gastrointestinal; antibiotics; antihypertensive; inhalers; biologics; nasal; injection

1. Introduction

Over the past few decades, the health care needs of our population changed along with the role of pharmacists [1]. Historically, pharmacists’ role in healthcare was centered on dispensing medications and ensuring the accurate delivery of medications to patients. In addition to allocating medications and safeguarding patient safety, today pharmacists are an integral part of our health care team and also are considered the most accessible health care professionals [2]. This approachability enables them to perform their pharmacists’ patient care process (PPCP), such as collect, access, plan, implement and follow-up to monitor and evaluate the appropriateness and effectiveness of medications and obtain patient feedback [3]. Additionally, pharmacists advise other health professionals concerning medication therapy decisions, the composition of drugs, their physicochemical and biological properties. Pharmacists also ensure the drug purity, efficacy, their interactions and side effects [4].

As per the survey conducted by National Pharmacist Workforce in 2014, over a decade pharmacists providing medication therapy management increased from 13% to 60% and those performing immunizations incremented from 15% to 53% respectively [5,6].

To deliver excellent pharmacy services to patients, pharmacists need to have complete knowledge of commonly prescribed drugs [7,8]. In 2014, the total number of prescriptions dispensed were approximately 4.325 billion, out of which the top 200 most prescribed drugs accounted for
approximately 2.87 billion \([9,10]\). The top 200 drugs represent 66.6\% \((2/3)\) of total prescriptions filled in the US. The topic on top 200 most prescribed drugs in the US has been previously compiled in number of resources \([11,12]\). They offer a short comprehensive review of this topic \([13,14]\). However, in order to maximize studying, these guide/books/chapters, it is critical that a student has a firm grasp on the complete knowledge of the most commonly used medications \([15]\). This includes generic drugs as well as mechanism of action (MOA), side effects, first line therapy indication, black box warning, and most common routes of administration. Therefore, the purpose of this article is to summarize the most commonly prescribed medications in the US and provide pharmacists and pharmacy students a resource before undertaking the task of practicing and studying for North American Pharmacist Licensure Examination (NAPLEX).

2. Materials and Methods

To accomplish the study objectives, this study was divided into two phases. Phase I consisted of gathering information on the drug names and therapeutic classes, which were compiled from the ClinCalc.com. The Clinicalc.com website obtains its data annually from medical expenditure panel survey [MEPS] which is conducted by the US government \([10]\). Phase II entails collecting information on the drugs, their pharmacological actions, adverse reactions, and any possible black box warnings from resources, such as Clinical Drug Information from AccessPharmacy database on drug monographs and Lexicomp \([16,17]\). The prescribed drugs in the Figure 1a–d are numerically arranged based on the number of prescriptions filled and dispensed for each generic drug in the US. A set of inclusion and exclusion criteria was developed to select 200 commonly prescribed drugs. We included generic drugs obtained from the ClinCalc website, pharmacological actions and drug classes when applicable, most frequently used routes of administration, top two body systems affected by adverse drugs reactions, and the most advocated black box warming. Chemicals and biologics are included. The drugs not listed as top 200 drugs in the ClinCalc website were excluded. Additionally, if a drug is used in combination with another drug it is treated as a separate drug entity from the parent drug.
| No. | Drug Name | Class | ADRs | Notes |
|-----|-----------|-------|------|-------|
| 1   | Lisinopril | ACEI  | CV, CNS | BB: Weight Loss |
| 2   | Levohydroxine | Hypothyroidism | PO | CV, CNS | BB: Pregnancy |
| 3   | Atorvastatin | HMG-CoA Reductase Inhibitor | PO | GI, Diarrhea | BB: Neurou muscular |
| 4   | Metformin | Biguanide | PO | GI | BB: Lactic Acidosis |
| 5   | Simvastatin | HMG-CoA Reductase Inhibitor | PO | CV, CNS |
| 6   | Omeprazole | PPI | PO | Carcinoma, CDAD |
| 7   | Amlodipine | BB: Diuretic | PO | CV, CNS |
| 8   | Metoprolol | BB: Beta Blocker | PO | CV, CNS |
| 9   | Acetaminophen | Pain | PO | CV, CNS | BB: Respiratory Depression |
| 10  | Albuterol | BB:2 agonist | PO | Respiratory, CNS |
| 11  | Hydrochlorothiazide | Diuretic | PO | CV, Endocrine |
| 12  | Losartan | BB: Antihypertensive | PO | Respiratory |
| 13  | Gabapentin | Anticonvulsant | PO | CNS, Viral infection |
| 14  | Sertraline | SSRI | PO | CNS, GI |
| 15  | Furosemide | Loop Diuretic | PO | CV, Endocrine |
| 16  | Acetaminophen | Analgesic | PO | Endocrine, Renal |
| 17  | Atorvastatin | HMG-CoA Reductase Inhibitor | PO | CV, CNS |
| 18  | Pravastatin | BB: Beta Blocker | PO | CV, CNS |
| 19  | Amoxicillin | BB: Antibiotic | PO | CV, GI |
| 20  | Fluoxetine | BB: Antidepressant | PO | CNS, GI |
| 21  | Citalopram | BB: SSRI | PO | CNS, GI |
| 22  | Trazadone | BB: Antidepressant | PO | CNS, GI |
| 23  | Alprazolam | BB: Benzodiazepine | PO | CNS, GI |
| 24  | Fluticasone | BB: Corticosteroid | PO | CNS |
| 25  | Dapoxetine | BB: Selective Serotonin Reuptake Inhibitor | PO | CV, CNS |
| 26  | Carvedilol | BB: Beta Blocker | PO | CV, CNS |
| 27  | Potassium Chloride | BB: Electrolyte Supplement | PO | Dermatologic, Endocrine |
| 28  | Tramadol | BB: Opioid Analgesic | PO | CNS, GI |
| 29  | Pantoprazole | BB: PPI | PO | CNS, GI |
| 30  | Montelukast | BB: Leukotriene Receptor Antagonist | PO | CNS, Dermatologic |
| 31  | Escitalopram | BB: SSRI | PO | CNS, GI |
| 32  | Prednisone | BB: Corticosteroid | PO | CV, Endocrine |
| 33  | Rosuvastatin | BB: HMG-CoA Reductase Inhibitor | PO | CV, Endocrine |
| 34  | Ibuprofen | BB: Non-steroidal Anti-inflammatory Drug | PO | CV, GI |
| 35  | Meloxicam | BB: NSAID | PO | CNS, GI |
| 36  | Insulin Glargine | BB: Antidiabetic | PO | CV, Endocrine |
| 37  | Hydrochlorothiazide & Lisinopril | BB: HMG-CoA Reductase Inhibitor | PO | CV, Endocrine |
| 38  | Clonazepam | BB: Benzodiazepine | PO | CNS, GI |
| 39  | Aspirin | BB: Salicylate | PO | CV, CNS |
| 40  | Clopidogrel | BB: Antiplatelet | PO | Hematologic, Dermatologic |
| 41  | Glibizide | BB: Sulfonylurea | PO | CNS, Dermatologic |
| 42  | Warfarin | BB: Anticoagulant | PO | Hematologic, CV |
| 43  | Lymecaprine | BB: Muscle Relaxant | PO | CNS, GI |
| 44  | Insulin Human | BB: Anti Diabetic | PO | CV, Endocrine |
| 45  | Tamoxifen | BB: Estrogenic | PO | CV, CNS |
| 46  | Zolpidem | BB: Hypnotic | PO | CNS, GI |
| 47  | Enoxacin | BB: Nongerminate Opioid Analgesic | PO | CV, CNS |
| 48  | Diclofenac | BB: Non-steroidal Anti-inflammatory Drug | PO | CNS, GI |
| 49  | Ramipril | BB: Angiotensin Converting Enzyme Inhibitor | PO | CNS, GI |
| 50  | Venlafaxine | BB: SNRI | PO | CNS, Dermatologic |

(a) Figure 1. Cont.
| 51 | Fluticasone; Salmeterol Beta-2 Agonist Corticosteroid Inh. | 52 | Oxycodeone Opioid Analgesic PO ADR: CNS, Dermatologic | 53 | Azithromycin Antibiotic PO ADR: GI, Loose stools | 54 | Amphetamine CNS Stimulant PO ADR: GI, Respiratory | 55 | Lorazepam Benzodiazepine Antianxiety Antidepressant IM ADR: CV, CNS | 56 | Allopurinol Xanthine Oxidase Inhibitor Antigout PO ADR: CNS, Endocrine | 57 | Paroxetine SNRI Antidepressant PO ADR: CNS, Endocrine BB: Suicidal Thoughts | 58 | Methylphenidate CNS Stimulant PO ADR: CNS, GI | 59 | Estradiol Estrogen Derivative PO ADR: CNS, Neuroendocrine BB: Pregnancy | 60 | Hydrochlorothiazide & Losartan K ARB/Diuretic Antihypertensive PO ADR: CNS, Neuronal BB: Pregnancy |
| 61 | Ethinyl Estradiol/Norethindrone Contraceptive PO ADR: CNS, GI | 62 | Fenofibrate Antihyperlipidemic PO ADR: CV, CNS BB: Hyperalgesia | 63 | Propranolol Beta Blocker Antithyroidal PO ADR: CV, CNS BB: CV | 64 | Glipizide Sulfonylurea Antidiabetic PO ADR: Endocrine, CNS | 65 | Ergocalciferol Vitamin D Analog Liq. ADR: Endocrine, GI BB: Electrolyte Imbalance | 66 | Esomeprazole PPI Anti-GERD PO ADR: CNS, GI BB: Tachyphylaxis | 67 | Spiradoline Diuretic Antihypertensive PO ADR: CV, CNS BB: Hypertension | 68 | Loratadine Histamine H1 Antagonist Antihistamine PO ADR: CNS, Dermatologic BB: Allergic Reactions | 69 | Naproxen NSAID Analgesic PO ADR: CV, CNS BB: Gastrointestinal | 70 | Lanestrogene Anticoagulant PO ADR: GI, CV BB: Skin Reactions |
| 71 | Hydrochlorothiazide/Triamterene Diuretic/Thiazide Antihypertensive PO ADR: CV, CNS BB: Hyperalgesia | 72 | Cetirizine Histamine H1 Antagonist Antihistamine PO ADR: CNS, GI BB: CNS Depression | 73 | Sulfamethoxazole; Trimethoprim Antibiotic PO ADR: CNS, CV BB: CNS Depression | 74 | Lovastatin HMG-CoA Reductase Inhibitor Antihyperlipidemic PO ADR: Neuronal; CNS | 75 | Dilazem CCB Antianginal PO ADR: CV, CNS BB: CNS Depression | 76 | Clopidal Alpha-2 Agonist Antihypertensive PO ADR: CNS, Endocrine | 77 | Topiramate Anticonvulsant PO ADR: CNS, Endocrine | 78 | Amoxicillin Penicillin Antibiotic PO ADR: GI BB: Respiratory | 79 | Pregabalin Anticonvulsant PO ADR: CV, CNS BB: Respiratory | 80 | Folic Acid Essential Vitamin PO ADR: CV, Dermatologic BB: Anemia |
| 81 | Alendronate Sodium Bisphosphonate Bone Health PO ADR: Endocrine, CNS | 82 | Hydrocodeon Bitartrate Opioid Analgesic PO ADR: GI, CV BB: Respiratory Depression | 83 | Amithypine TCA Antidepressant PO ADR: CV, CNS BB: Respiratory Depression | 84 | Diclofenac NSAID Analgesic PO ADR: CV, CNS | 85 | Insulin Aspart Insulin Analog BB: Neuronal BB: Respiratory | 86 | Drotrecogin Anticoagulant BB: Respiratory | 87 | Quetiapine Fumarate Antipsychotic BB: Antidepressant | 88 | Enalapril ACEi Antihypertensive BB: Cardiovascular | 89 | Polymyxin B Sulfate Antibiotic IV ADR: CV, CNS BB: Nephrotoxicity | 90 | Sitagliptin Phosphate DPP-4 Inhibitor Antidiabetic PO ADR: Endocrine, GI |
| 91 | Diazepam Benzodiazepine Anticonvulsant PO ADR: CV, CNS BB: CNS depression | 92 | Lutamocigot Antidiuretic Oral Inhibitor PO ADR: CNS, Dermatologic | 93 | Cyclophosphamide Antibiotic PO ADR: CNS, Dermatologic | 94 | Electrolyte Formoterol Beta-2 Agonist Corticosteroid Inh. BB: Respiratory Death | 95 | Hydroxyurea Histamine H1 Antagonist Antithrombotic Liq. ADR: CNS, GI BB: Cigarette Smoking | 96 | Etosytin Extravascular Leuvenorgestrel Contraceptive PO ADR: CNS, CV BB: Cigarette Smoking | 97 | Docetaxel Steal Steroid Laxative BB: Respiratory | 98 | Valsartan ARB Antihypertensive BB: Cardiovascular | 99 | Finastristeride 5 Alpha-Reductase Inhibitor Urinary Retention PO ADR: CV, CNS BB: Pregnancy | 100 | Ondanestron SHT3 Antagonist Antipsychotic PO ADR: CNS, GI |

Figure 1. Cont.
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Figure 1. (a) List of 1–50 most prescribed drugs; (b) List of 51–100 most prescribed drugs; (c) List of 101–150 most prescribed drugs; (d) List of 151–200 most prescribed drugs.
3. Results and Discussion

Top 200 most prescribed drugs shown in Figure 1a–d, were developed using the data obtained from Clincalc website. The individual drugs are represented by generic name, drug class (when applicable), pharmacological action, major route of administration, adverse drug reactions and any applicable black box warnings [BB]. The lists contain many blockbuster drugs of the last 10 to 15 years, such as atorvastatin, simvastatin, etc. The most prescribed drugs based on systems were cardiovascular (49), central nervous system (42), endocrine (30) and musculoskeletal (19). They accounted for approximately 140 drugs (70%) of top 200 most prescribed drugs. Drug utilization by systems is shown in Figure 2.

![Figure 2. Lists the number drugs prescribed for each system.](image)

3.1. Blackbox Warning

As per FDA regulations any drug that may lead to adverse reactions and that might cause serious injury or result in death should be labeled by black box warning [18]. The number of drugs with black box warning are 81 drugs (40.5%) of 200 most prescribed medicines.

3.2. Dosage Forms

The lists also highlights the dosage forms of top 200 most prescribed drugs, they were oral, PO (166), inhalation, inh (7), intravenous, IV (3), intramuscular, IM (2), injections, inj (7), liquids, liq (4), subcutaneous, SQ (4), ophthalmological, ophth (3), nasal, NAS (1), topical, TOP (1), transdermal, TM (1) and vaginal, VAG (1).

3.3. Biologicals and Chemicals

As per the lists, only 7 (3.5%) of drugs were biologicals among the top 200 most prescribed drugs, rest were chemical entities.

3.4. Opioids

Five opioids namely, acetaminophen/hydrocodone, tramadol, oxycodone, hydrocodone, and morphine are among the top 200 most prescribed drugs. In fact, Acetaminophen/hydrocodone is 1 of the top 10 most prescribed drugs. Tramadol and oxycodone are listed among top 60 most prescribed drugs in the US.

3.5. Adverse Drug Reactions

Within top 200 drugs the most common ADRs and their range according to the systems are shown in Figure 3.
4. Conclusions

The visual language of the top 200 most prescribed drugs presented in the paper will foster long-term learning and enable students and residents to be more confident and competent before facing actual patients. Also will provide a quick reference about their therapeutic use, side effects, dosage forms and black box warning information of 66% of the total drugs prescribed in the US. Additionally, the drug lists will be handy for pharmacists, researchers and other healthcare professionals interested in developing new strategies for treating patients with various ailments.

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Abbreviations

| Abbreviation | Description         |
|--------------|---------------------|
| CV           | Cardiovascular      |
| GI           | Gastrointestinal    |
| IM           | Intramuscular       |
| Opth         | Ophthalmic          |
| Inj          | Injection           |
| ADR          | Adverse Drug Reaction|
| CNS          | Central Nervous System|
| PO           | Oral                |
| IV           | Intravenous         |
| Inh          | Inhalation          |

Figure 3. The most common adverse drug reactions for top 200 drugs by systems
Liq | Liquid
BB | Black Box Warning
SQ | Subcutaneous
TD | Transdermal
CDAD | Clostridium Difficile Associated Diarrhea
GERD | Gastroesophageal Reflux Disease
ACEi | Angiotensin-Converting-Enzyme Inhibitor
ARB | Angiotensin II Receptor Blockers
HMG-CoA Reductase Inhibitor | 3-hydroxy-3-methyl-glutaryl-coenzyme A reductase Inhibitor
PPI | Proton Pump Inhibitor
CCB | Calcium Channel Blocker
SSRI | Selective Serotonin Reuptake Inhibitors
SNRI | Serotonin–Norepinephrine Reuptake Inhibitors
TCA | Tricyclic Antidepressant
NRI | Norepinephrine Reuptake Inhibitor
NSAID | Non-Steroidal Anti-Inflammatory Drug
SGLT2 Inhibitor | Sodium-Glucose co-Transporter-2 Inhibitor
DPP-4 Inhibitor | Dipeptidyl Peptidase-4 Inhibitor

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