



HL7 Cross Paradigm Specification:
Allergy and Intolerance Substance Value Set(s) Definition
Release 1

August 2018

HL7 Informative Document

Sponsored by:
Patient Care Work Group
Vocabulary Work Group

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Terminology	Owner/Contact
Current Procedures Terminology (CPT) code set	American Medical Association http://www.ama-assn.org/ama/pub/physician-resources/solutions-managing-your-practice/coding-billing-insurance/cpt/cpt-products-services/licensing.page?
SNOMED CT	SNOMED International https://www.snomed.org/
Logical Observation Identifiers Names & Codes (LOINC)	Regenstrief Institute
International Classification of Diseases (ICD) codes	World Health Organization (WHO)
NUCC Health Care Provider Taxonomy code set	American Medical Association. Please see 222.nucc.org . AMA licensing contact: 312-464-5022 (AMA IP services)

Acknowledgments

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The Patient Care WG also is grateful to the organizations that provided invaluable data sets for this work:

- Cerner Population Health – Larry McKnight and Michelle Miller
- Veterans Administration – Catherine Hoang
- Department of Defense – David Parker
- Kaiser Permanente – Rita Barsoum
- Intermountain Health – Susan Matney
- University of Nebraska – Jim McClay
- Cleveland Clinic – Sue Kent
- NIH Clinical Center – Elaine Ayres

The following individuals provided assistance with data annotation and analysis:

Olivier Bodenreider – NIH National Library of Medicine	David Parker - Defined IT, Inc
Della Dunbar – DM&A	Donna Quirk – Lexington Health
Jennifer Harward – US Air Force	Kate Russell – NIH Clinical Center
Clare Hicks – CBORD, Inc.	Sharon Solomon – Morrisons
Lindsey Hoggle – Academy of Nutrition and Dietetics	Jim Coates – Wolters Kluwer
Sue Kent – Cleveland Clinic	Larry McKnight – Cerner

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1. Problem Statement

Different clinical systems use different assumptions when recording patient allergies and intolerances. Because it is conceivable that a patient may be sensitive to virtually any substance, the assumptions tend to support the capture of a wide variety of substances, and they do so in a variety of ways. The Consolidated CDA (R2.1)¹ specification, for instance, specifies a rule² whereby substances can be recorded as any substance identified by SNOMED CT, UNII, NDF-RT, or RxNorm. The sheer number of concepts involved means:

1. It may be difficult to find a concept that is appropriate, making it likely that an approximation will be used,
2. The use of such approximations may mean that the same condition may be recorded multiple times, in terms that are difficult to reconcile,
3. The use of multiple terminology systems introduces synonymy, making redundant and possibly confusing records likely, and
4. Automated systems may choose to adopt their own shorter, more tractable lists, making interoperability more challenging.

2. Goal of this Project

The primary goal of the effort was to produce a substance list to support better alignment across stakeholder systems.

Two approaches seem to promise better results: better semantic engineering of the list, and development of a list based upon real-world frequency of use.

The first approach (better semantic engineering) would fix or constrain the specified code systems to reduce the number of concepts to a more manageable level. This is the approach of the US Core FHIR profile, which begins to address this issue by sub-setting

¹ http://www.hl7.org/implement/standards/product_brief.cfm?product_id=408

² *Value Set: Substance-Reactant for Intolerance urn:oid:2.16.840.1.113762.1.4.1010.1*

A substance or other type of agent (e.g., sunshine) that may be associated with an intolerance reaction event or a propensity to such an event. These concepts are expected to be at a more general level of abstraction (ingredients versus more specific formulations). This value set is quite general and includes concepts that may never cause an adverse event, particularly the included SNOMED CT concepts. The code system-specific value sets in this grouping value set are intended to provide broad coverage of all kinds of agents, but the expectation for use is that the chosen concept identifier for a substance should be appropriately specific and drawn from the available code systems in the following priority order: NDFRT, then RXNORM, then UNII, then SNOMED CT. This overarching grouping value set is intended to support identification of drug classes, individual medication ingredients, foods, general substances and environmental entities. Value set intensionally defined as a GROUPING made up of: Value Set: Medication Drug Class (2.16.840.1.113883.3.88.12.80.18) (NDFRT drug class codes); Value Set: Clinical Drug Ingredient (2.16.840.1.113762.1.4.1010.7) (RxNORM ingredient codes); Value Set: Unique Ingredient Identifier - Complete Set (2.16.840.1.113883.3.88.12.80.20) (UNII ingredient codes); Value Set: Substance Other Than Clinical Drug (2.16.840.1.113762.1.4.1010.9) (SNOMED CT substance codes).

the constituent code systems, e.g., using the SNOMED CT substance hierarchy, but excluding certain sub-branches. This may be a feasible approach to limiting synonymy, and it suggests an approach that can be used programmatically to validate content. However, the respective code systems are not designed to classify substances by likely cross-reactivity, so significant overlap and unwanted concepts are likely to remain.

The other approach, and the primary goal of this project, is to develop a list of common allergy terms based on the terms' observed frequencies of use in large health systems. This short (preferably under 1000 members) list of substances, substance classes, and mixtures will be chosen purely based on observed frequency of use. These concepts will support almost all allergy and intolerance records, and they will do so in a form that will allow clinicians to develop familiarity with the list and reduce confusion.

We recognize that standard representations of the concepts on this list would also be useful. While this was not a primary goal, it not only would support unambiguous use of the identified concepts, but it turned out to be a necessary part of the analysis process. Aggregating data from diverse systems required us to identify a code system of record in order to disambiguate similar concepts consistently.

The analysis also supported a third outcome: guidance for capturing substance concepts that are both accurate and actionable. This resulted from certain common terms that result from imperfect understanding on the part of the recorders.

The “cross paradigm” desideratum of this effort means that the values provided in these lists may be used in any information model or interoperability specification; we should not need or expect implementers to use different values for HL7 V2, CDA, and FHIR communications. Absence values place a limit on this reusability, as some specifications require these values while some prohibit them: see section 6e, below, for more information.

3. Intended use of lists

The intended uses for these subsets follow:

- 1) When capturing information, the user should attempt to select an appropriate value from this list—and if more than one value fits, use the most granular. For example, use the RxNORM ingredient level code as opposed to other RxNORM codes (e.g. BCD, SCD, BN, SY, UNII ingredient, NDFRT code, etc.) that might include this ingredient. This makes it easier for downstream systems to interpret this code correctly without complex inferencing.
- 2) When sending data to some other system, send the originally captured text (and local encoding if available) for human review, but use a value from list (if

appropriate) as the standard code. For example, if sending data to represent the patient statement “I am allergic to Percocet,” send “Percocet” and the local coding (perhaps 'RxNORM:42844|Percocet|'), but send the RxNorm value “214183|Acetaminophen / oxyCODONE” as the standard value so that downstream users might clearly understand both the information as it is captured, and what decision support or reconciled equivalent it should be matched with.

- 3) When interpreting data from other systems, be able to understand and trigger logic for the value in this set *at a minimum*. In other words, if a decision support system (DSS) can create an allergy alert for a user placing an order for "Percocet" it should recognize the code RxNORM:214183 and generate the alert.
- 4) This list in no way restricts the recording of substances not included in this list, and they may be encoded and used in DSS; rather, this list represents a threshold for semantic interoperability. When sending values from this subset, a higher expectation of decision support or reconciliation is reasonable.

This document represents implementation guidance to US realm for existing interoperability standards that represent allergies. Other realms may adapt this set to country-specific terminologies using alternative equivalent coding where license restrictions or ingredient code systems may be in conflict with local needs.

The output of this project is a collection of domain-specific value sets of substances based on the values identified here. The Patient Care workgroup will publish and maintain these value sets within the Value Set Authority Center (VSAC) maintained by the NIH National Library of Medicine (NLM).³ To link the various domain specific value sets created, a grouping value set will be used to link drug, food, environmental and absence value sets.

Changes will follow the rules used in this iteration unless and until reasons are identified to modify those rules.

4. History and Context

This project is driven in part by the need emphasized by the US realm adoption of Consolidated CDA and the unwieldy value set it implies, as outlined above.

Other drivers include concerns about the quality of allergy data in patient records, most notably the concern around alarm fatigue resulting from inaccurate information or information concerning subcritical risks.

³ NIH National Library of Medicine Value Set Authority (VSAC): <https://vsac.nlm.nih.gov/>

The US Pharmacopeia is conducting a similar effort. Key methodological differences include that effort's focus on a small initial set of drug classes (statins, nsaid, opioids, and antibiotics) and the effort to establish substance-based classes of manifestation, including criticality.

The collection of allergy data poses a number of issues which must be considered when evaluating data from electronic health records.⁴ We describe the process of allergy information capture and use in order to identify relevant assumptions and issues.

It is possible to be allergic or have intolerance to almost any substance. Substances causing reactions are commonly medications, but may also include foods or environmental substances. In many cases, a reaction is recorded to a prescribed or administered medication: in these cases, identification of the causative agent is straightforward. However, in most cases, this information is captured as a patient's response to a question, and it may be vague or inaccurate. For instance, many patients state they were told they have a Penicillin allergy as a child, but have no memory of the event or reaction. Because of the vague provenance, many substances are recorded as allergies which the patient clearly tolerates.

Human entry of data is typically supported by picklists designed to ensure that sensitivities are captured in a way that decision support systems—specifically, drug and diet order check rules—can screen orders for contraindications. The terms in these lists follow a Zipf⁵ distribution, where most records can be described with a small set of values, but where higher percentages of coverage require exponentially higher numbers of terms in a “long tail” that is impractical to encode.

Once captured, this information may also be provided to other systems in structured documents or messages, but the quality of the data depends on the source provenance. During an encounter, this information may be confirmed by query, e.g., “I see that your record shows you have allergy to statins; is that true?”

Allergy records are used to inform decision support rules. However, the variety of possible allergies, options for encoding in different systems, and the uncertain specificity of information available to the clinician regarding the exposure, (not to mention common misconceptions regarding sensitivity) all mean that the rules have low specificity, resulting in many spurious alerts.

The variety and breadth of the substance concepts also means that reconciling allergy data from one or more systems is time consuming because of the many ways data may be recorded.

⁴ Comments courtesy of Larry McKnight

⁵ George K. Zipf (1935) *The Psychobiology of Language*. Houghton-Mifflin.

This understanding points out several issues, and some tactics for addressing them:

- We expect that using a short heuristic list will reduce the number of alerts for redundant encodings; it will not, of course, reduce alerts for incorrect or low-criticality records.
- We address some of the more common immunology and sensitivity misconceptions in the guidance section of this document, and we flag in our list concepts that are clinically not actionable.
- We also observe that there are no "drug class" concepts designed to capture cross-reactive substances. Cross-reactivity may be adequately represented by a corresponding NDF-RT class--e.g., a class based on chemical structure or method of action--but this basis is certainly not always valid, and where it may be, it has not been proven.
- We note that the capture of combinations of substances (such as "Percocet") may be followed by information about a patient's ability to tolerate one component. The ability to remove items from the allergy list when this happens will also reduce the burden on providers resulting from spurious alerts.

5. Considerations

We point out several considerations that may help inform readers about the goal and the constraints we encountered in the process.

a. This is not pharmacovigilance

The primary purpose of these substance value sets is *not* to support pharmacovigilance (e.g. monitoring adverse events or reactions). The pharmacovigilance case requires identifiers for administered substances far more specific than those for sensitivity risk. Specific reactions to substances should record as much detail as possible about the substance, including dose, brand, manufacturer, and lot number. The substance concept used in the allergy record, however, is a more general concept used to identify other products that might contain the substance. If the precise substance is known, a good drug knowledge base check product ought to be able to determine whether a proposed ordered substance contains a relevant active moiety, but the substance list also aims to inform the clinician of substances to avoid prior to order, as well as to support cases where the ordered product is not known.

b. Class definitions

There is no system that defines cross-reactive substance classes. NDF-RT and ATC define classes, but they do so by enumeration. Any intensional⁶ semantics in these groups are

⁶ Value sets defined by intension are value sets that are defined by a computable expression that can be resolved to an exact list of codes. HL7 Value: Set Definitions:
http://wiki.hl7.org/index.php?title=Domain_and_Value_Set_Definitions_and_Binding#Value_Sets

presumed to be supplied by the stated axes for some axes (mechanism of action, chemical structure, etc.), or not, for others (Established pharmacologic class, e.g.).

SNOMED CT could provide classes defined specifically for cross-reactivity, but it does not do so now. We adopt the general SNOMED CT substance classes as an interim measure, and we observe that substance classifications designed for cross-reactivity remain a gap in our informatics landscape.

Note that classifications provided in our list for food and environmental allergens are used to assist with searching and are not at this time meant to imply cross-reactivity or any other biological or clinically relevant relationships.

c. Mixtures

Since allergy statements may be captured from the user in various forms, it is not infrequent to have patients state allergy to brand forms that contain multiple ingredients, where it is in general not known which ingredient is the offending agent. Currently systems may send this either as separate allergy statements (e.g. allergy to 'Oxycodone', and separately allergy to 'Acetaminophen'), or as a single code representing the multiple ingredients (e.g. RxNORM MIN).

Often there may be common assumption or other direct evidence that the offending substance cannot be one of the ingredients. However, a gap exists in methods to assert positive tolerance to an agent (for example, the patient was witnessed to tolerate the 'Acetaminophen' without adverse reaction). Codification rules are therefore needed to ensure that interpretation of multiple ingredient forms are given correct interpretation in relation to their individual components, and that when a substance has been vindicated, it can avoid generating inappropriate alerts and causing alert fatigue.

For the purposes of frequency, we capture “multiple ingredient” substances as asserted, understanding that there is likely one sensitivity, but that which substance is responsible is unknown. We leave the important question of how this record is maintained to the application designers.

d. Terminology system selection

We evaluated the following systems for use in providing standard identifiers for substances. In Table 1, columns 2-6 assess the systems' respective coverage of the identified domains; 7-10 capture other important requirements. Systems selected for this iteration are in green.

System	Substance	Mixture	Class	Food	Env	Realm	License	Available
SNOMED CT	Yes	Products	Yes	Yes	Yes	International	Required	Batch
RxNorm	Yes	Yes	No	No	No	US	Free	Batch
UNII	Yes	No	No	Specific	Specific	US	Free	Batch
G-SRS	Yes	No	No	Specific	Specific	International	Free	Search
NDF-RT	No	No	Possible	No	No	US	Free	Batch
ATC	No	No	Possible	No	No	International	Free	Batch
INN	Yes	No	No	No	No	International	TBD	Search

Table 1: Candidate substance terminologies

We found NDF-RT and ATC to offer many classes that seemed useful. On closer examination, however, the boundary definitions were problematic. Two classes with the same name (“opioid agonist,” e.g.) might refer to different constituent substances. The bases for classification are specified, however, and they are not cross-reactivity. For this reason, we chose to use SNOMED CT for substance classes: even though the SNOMED concepts also list children, they do so in an “open world” context: there is no implication that the enumerations constitute the semantics of the class, and no consequent opportunity for inadvertent contradiction.

SNOMED CT seemed best for foods and environmentals for similar reasons. It offers classifying concepts, and it does so without implying specific memberships.

We found UNII to be often too precise for the patient safety use case, providing concepts for many kinds of rockfish, e.g., but not rockfish in general. SNOMED CT offers more variable granularity, which supports these cases well, especially for foods, environmentals, and drug classes. It does not, however, define the level of granularity, making the more predictable RxNorm the preference for specific drug substances.

For specific drug substances, UNII is a viable option. However, it does not support mixtures, as RxNorm does. Because we needed RxNorm for mixtures, we felt it best to minimize the number of systems and use RxNorm for specific substances as well. We expect this choice to be easily reversible, as there are maps from UNII to RxNorm.

G-SRS is an effort by the US Food & Drug Administration (FDA), the European Medicines Agency (EMA), and affiliated organizations to establish an international registry of substances, primarily but not exclusively for pharmacovigilance. The current pilot, available at <https://tripod.nih.gov/ginas/>, seems to use UNII identifiers and would, we expect, face similar issues for the patient safety use case. The stated goal of leveraging the ISO Identification of Medical Products (IDMP) suite of standards suggests that mixtures and classes may be supported in the future. When the project goes live, we will be able to assess these hypotheses.

We use RxNorm for drug substances, including the ingredient (IN) and multiple ingredient (MIN) term types. We do not use precise ingredient (PIN) terms, as they tend to identify salts without immunological relevance.

The WHO's International Nonproprietary Names (INN) does not seem to have an accessible aggregate publication, nor does it publish concept identifiers for its preferred strings.

SNOMED CT is our current choice for foods, environmentals, and drug classes.⁷ It has broad international reach, but licensing issues remain for many jurisdictions; we will continue to review our choices as events unfold.

e. Criticality

The goal of the work is to make it easier to work with the substance list, and consequently to provide better care and data interoperability. One of the threats facing patient safety is alarm fatigue, and a shorter list may help with this problem by making it easier to find common representations of common substances and reducing the likelihood of redundant records. Another tactic to address alarm fatigue may be to identify which sensitivities are critical in order to focus time and attention on risks more likely to cause harm. It has been suggested that, in some cases, substances can be categorically associated with criticalities, and that this inferred criticality can then be used to grade alerts. This is not an objective of this project, but other projects are investigating this question, and there may be opportunities for constructive engagement.

A full discussion on criticality, as well as the difference between severity and criticality in the documentation of an adverse reaction can be found in the Patient Care WG Allergy and Intolerance Domain Analysis Model⁸. Below is a brief explanation provided by Dr. Russell Leftwich on this topic taken from Appendix A of the Allergy and Intolerance Domain Analysis Model:

Discussion of Criticality – Russell B. Leftwich, MD

Severity and criticality are two related but distinct concepts in the domain of allergic and intolerance reactions.

Severity is an attribute of a symptom or a sign that is part of a reaction or an attribute of the constellation of signs and symptoms that constitute an episode of a reaction. Since there are a variety of different signs or symptoms and a variety of different reaction types, it would not be plausible to have a single rating scale that could be applied to different symptoms or two different types of reactions. It is true that rating scales

⁷ Goss et al. agree that SCT & RxNorm “can satisfy most criteria” for allergy substance records based on coverage (Goss FR, et al. J Am Med Inform Assoc 2013;20:969–979. doi:10.1136/amiajnl-2012-000816).

⁸ HL7 Version 3 Domain Analysis Model: Allergy and Intolerance Release 1

http://www.hl7.org/implement/standards/product_brief.cfm?product_id=308 (Accessed on July 27, 2017)

have been established for research purposes to compare different episodes of a reaction type, such as anaphylaxis. It is also true that symptoms or reactions themselves are considered to have a range of severity and this is often divided intuitively into mild, moderate, and severe with mild and severe intuitively representing the two ends of the spectrum.

The list of allergies and intolerances for an individual is a list of conditions that represent a propensity to have a reaction if exposed to a specific substance in the future. This is based on a history of one or more past reactions. The potential seriousness of a future reaction is an attribute referred to as criticality. This represents a clinical judgment about the worst case scenario for a future reaction. It would be based on the severity of past reactions, the dose and route of exposure that produced past reactions, and the life-threatening or organ system threatening potential of the reaction type.

Although the list of allergies and intolerances for an individual might refer to a severe penicillin allergy or severe bee sting allergy, and the meaning is clear, this is not appropriate from a modeling standpoint. The model breaks down when the reaction type is not the presumed anaphylactic reaction of the penicillin allergy or the bee sting allergy.

As an example to contrast severity and criticality, an individual might have severe vomiting as an intolerance reaction for sulfa drugs. This reaction would be listed as a sulfa drug intolerance with low criticality, since the potential for serious injury from this is low. An individual who had a reaction immediately after a bee sting consisting of generalized itching, hives, and wheezing, which resolved without treatment would be considered to have had a mild anaphylactic episode. That individual's condition of anaphylactic sensitivity to bee stings would be considered of high criticality, because of the life-threatening potential.

High criticality does not equate to a future severe reaction, but rather the potential for a severe and life-threatening reaction. Most reaction types are dose dependent, including anaphylaxis. Therefore, although they have a sensitivity of high criticality, exposure to a small dose of the substance to which they are sensitive might result in only a mild reaction. Severity of the reaction is also dependent on the route of exposure, but criticality since it applies to the condition, is not.

f. Length

In order for the list to be useful, it must be long enough to meet most content requirements without becoming cumbersome. For medications, we found that mapping all concepts with at least 1000 observations (out of 81MM) to be a reasonable pragmatic cutoff covering >97.7% of all allergy observations. Thus, agreement of both sender and receiver on the limited set of codes in appendix B would mean that 97.7% of the time there might be reasonable expectation that the code would be understood and trigger systems downstream appropriately and the burden of maintenance for this assurance is reasonable.

This would also indicate that use of this list as described above would entail that 2.3% of the time an allergy record might be sent representing some extremely rare allergen code or a freetext item that would not be recognized. At first glance this may seem to be a high exception rate; however, each code below this threshold would individually represent at maximum 0.003% of all allergens sent, and there is a very long list of possible but very rare codes each contributing a very small amount, but which in total sum to 2.3%. The maintenance costs to include more rare codes increases exponentially, and thus the need for a somewhat arbitrary but pragmatic cutoff. Beyond some point, senders and receivers will not understand each other, so allowance for appropriate use of a freetext exception is needed.

The coverage number is lower for vaccines (84.1%), as there is great deal of specificity in the vaccine strings; however, the dozen vaccine concepts cover the great majority of lower-frequency unmapped strings.

For foods, all concepts with a frequency of > 1000 (from a total sample size of 3 MM records) as well as concepts included on international food allergy labeling lists we used to develop the value set. This inclusion criteria resulted in a value set representing 98.5% of food reported in over 100 million allergy records.

g. Vaccines

Vaccine concepts in RxNorm are based on the Centers for Disease Control's CVX codes. These codes are very specific, and we felt they would not be optimal for our heuristic purpose.

The International Consensus (ICON) on allergic reactions to vaccines provides a comprehensive evaluation of research on this topic⁹. While the reference does not

⁹ Dreskin, S.C. et al. International Consensus (ICON): allergic reactions to vaccines. World Allergy Organization Journal 2016;9:32 <https://doi.org/10.1186/s40413-016-0120-5> See also AAAAI's "Adverse reactions to vaccines practice parameter 2012 update" (doi:10.1016/j.jaci.2012.04.003) at <https://www.ncbi.nlm.nih.gov/pubmed/22608573>.

discuss the representation of vaccines in an EHR, it does provide an international consensus on the evaluation and management of allergic reactions to vaccines, and it does so following a general classification.

We have chosen to use SNOMED concepts at the level of granularity suggested in the ICON report.

h. List crossover

Some substances (notably caffeine, ethanol) appear on both drug and food sensitivity lists. The respective food and drug lists address these substances with their own methodologies. For the purpose of this publication, we include such substances identified with both RxNorm and SNOMED CT identifiers.

VSAC will provide the ability to include mapping tables in the future – it does not do so at the present time.

6. Approach

Our basic approach was to solicit allergy frequency counts from several large healthcare systems, harmonize their record strings to standard concept codes, aggregate counts for the values so identified, and select a threshold for high-frequency substances.

a. Collection

We solicited counts of allergy records from several large health systems, classified by substance. Lists were compiled by domain – drugs, foods, environmentals and statements of absence—and then analyzed by frequency. E.g., if 1000 patients have allergies to 100 substances, but have on average 1.5 allergies each, the system would provide a list of 100 substance names with counts totaling 1500. This approach was used to determine substances that are most frequently found on allergy lists to best inform the creation of constrained lists of substances.

The following institutions responded: (See Appendix A for counts from each data source)

- US Veterans Administration (VA)
- Cerner Population Health
- US Department of Defense (DOD)
- Kaiser Permanente
- Intermountain Healthcare
- University of Nebraska
- Cleveland Clinic (food only)
- NIH Clinical Center (food only)

b. Analysis of Medication, Medication Classes, Vaccine, Biologics

- i. We asserted mappings from the reported strings to concept codes in standard terminologies based on maps provided by data contributors, the NLM's RxMix mapping

- tool, and Health Language’s Language Engine. We ensured mappings for strings occurring with a combined data set frequency of at least 1000 observation counts: this threshold resulted in coverage of 97.7% of instances.
- ii. We confirmed the mappings by multiple independent sources, manually reviewing cases with too few or divergent maps. (See quality assurance passage below.)
 - iii. We summed the counts over the standard mappings to produce the lists to come up with relative frequencies of medications, medication classes, vaccines and biologics.

c. Analysis of Food

- i. Each data set was annotated for food substances and products by subject matter experts representing the Academy of Nutrition and Dietetics. (Note that a small data set from Nebraska was not included in the analysis.)
- ii. Text strings were parsed into component foods.
- iii. Lists from each source were then combined and normalized, e.g., combining counts for hazelnuts and filberts (a regional term difference), combining oranges and orange juice, as well as combining singular/plural terms and misspellings.
- iv. Food substances with a frequency of 1000 or greater were then classified by type: additives, alcohol, artificial sweetener, bee products, chocolate, coconut, dairy, dye, eggs, fish, flavorings, fruit, gluten, grains, legumes, meat, mollusks, nuts, oil, other, poultry, seafood, seeds, shellfish, soy, spices and vegetables. In addition, foods that appear on food labels (either regulatory or voluntary) were added to the value sets. . These classes differ from classes proposed by Plasek et al. at Harvard Partners¹⁰, where fruits and vegetables were combined, extracts included oils, and fungus included mushrooms and yeast.
 - a. NOTE: classes for food allergens are used to assist with searching and are not at this time meant to imply cross-reactivity or any other biological relationships.
- v. Foods and classes were then mapped to SNOMED CT using Apelon TermManager¹¹.
 - a. When a term was not available via TermManager, the IHTSDO SNOMED CT browser was used to manually retrieve terms.
- vi. Quality Assurance
 - a. Lists and data mappings were reviewed and verified by subject matter experts

d. Analysis of Environmental Allergens

- a. Three large data sets (VA, DOD, Cerner Population Health) were combined to create a discrete set of environmental allergens.
- b. Frequencies of greater than 100 records were mapped to SNOMED CT using Apelon Term Manager.

¹⁰ Plasek, JM Food Entries in a large allergy data repository. J Amer Med Assoc 2016 Apr;23(e1):e79-87. <https://www.ncbi.nlm.nih.gov/pubmed/26384406>

¹¹ Apelon Term Manager Version 1.6 Copyright © 2017 Apelon Inc., 750 Main St #1500, Hartford, CT 06103, SNOMED CT version SNOMED CT [2017.01.16AB]

- c. Quality assurance compared mappings provided by contributory systems to mappings provided by Apelon Term Manager.
- d. NOTE changes in R2
 - 1. Seasonal allergies were removed from the environmental allergen value set. The term seasonal allergies is not considered to be an actionable concept.
 - 2. A provided SNOMED CT mapping for nickel was changed to 43921001 |Nickel compound (substance)|. It is the salt of nickel that can cause an adverse reaction on contact (e.g. jewelry).

e. Analysis of AbsenceTerms

Data sets contained records reflecting no allergies, no drug allergies, no food allergies as well as other absence terms. Rather than include these terms on specific domain substance lists, an absence value set was developed and mapped to SNOMED CT.

Absence lists are provided for those information models that use terminology for expressing negation. Use of absence terminology when absence is handled in the information model may result in double negation and should be avoided. For instance, a C-CDA allergy template, which uses a “negation indicator” to mean that the allergy is question is not present, would not use any absence concepts, whereas a FHIR allergy resource instance might record absence in the focal concept code.

f. List Output

The Patient Care WG will after the completion of this informative ballot publish five value set lists (Medications, Food, Environmental, Absence, and two versions of Aggregated) in a globally accessible location that supports automated retrieval – currently the National Library of Medicine’s Value Set Authority Center (VSAC).

Note that existing value set specifications do not support metadata, e.g., frequencies.

The resulting lists of substances most frequently found on system allergy lists can be viewed in the spreadsheet attachments to this ballot. The four spreadsheets include

- a. Medications
- b. Foods
- c. Environmentals
- d. Absent or unknown
- e. Aggregated value set for the four value sets above
- f. Aggregated value set that includes drugs, food and environmental but excludes absence

The aggregate list is reproduced in Appendix B of this document. Additional detail is available for those interested on the Patient Care wiki.

7. Issues

a. Source data discrepancies

Source data was collected opportunistically. Donors did not always have precise characterizations of their populations or time frames. Also note that the provenance of data is also unknown, e.g., whether data was added to an allergy list by a clinician based on observation vs. a patient reported allergy or intolerance. One data source provided associated reactions with their data set.

The largest set (Cerner) contains data based on health information exchanges, and as such certainly contains a significant number of duplicated records, but the contributors were unable to provide information for de-duplicating this data. We suspect that such duplication may magnify the contributions of medications for critical chronic conditions (e.g., statins), but we have no remedy. (Note, however, that statins had a significantly higher representation in VA data, which does not suffer from this uncertainty, than in the Cerner data.) Dataset sizes range by over two orders of magnitude, from ~150k to ~60MM.

b. Discrepancies between best practice and reality

We observed several cases where data records seem to reflect common misconceptions. Particularly in the food domain, we were able to disambiguate these terms and provide better concepts. In the medication domain, we were unable to discern intent and untangle the issues. For both cases, we offer guidance in section 9.

8. Quality assurance for medication data

The value sets provided are a heuristic tool for user interface support: we are not providing mappings of actual patient conditions for clinical use. The misranking of one or more concepts, in other words, is unlikely to cause serious harm to patients or serious inconvenience to providers. That said, we do wish to provide data that is as accurate and useful as possible.

For foods and environmentals, quality assurance is managed by multiple reviewers. For medications, the volume of data made this impractical.

Most of the medication data contributors provided mappings of their own to standard terminologies, so we assume that the intent of these strings is accurately reflected by the provided mapping. However, the selected system is not always the system we have chosen. In these instances, we have supplied new mappings. We have also mapped strings for which no mappings have been provided. Our mappings have been provided

by a pilot implementation of Health Language’s Language Engine¹², queries against the US National Library of Medicine’s RxMix medication terminology API, and manual search of the terminologies.

In cases where we have mappings for a string from multiple sources to the same concept, and no mappings that disagree, we assume that the mapping is correct.

In cases where we have multiple mappings to the same concept and at least one mapping disagrees, and in cases where we have only one mapping, we have manually reviewed the mappings and selected the appropriate one, based on these guidelines:

1. RxNorm for substances (IN) and mixtures (MIN)
2. SNOMED CT (substance) for classes
3. No salts (PIN) or brands

In the example below, row 1 breaks rule 3; row 2 seems appropriate; row 3 contains an error; and row 4 maps to the wrong system. We ran another query against the HL (Health Language) Language Engine to generate row 5, which confirms row 2.

Num	Provided string	Map source	Map name	Map code	Map System	Comment
1	Dihydroergotamine	Provider	Dihydroergotamine mesylate	203176	RxNorm	Salt
2	Dihydroergotamine	Provider	Dihydroergotamine	3418	RxNorm	Appropriate
3	DIHYDROERGOTAMINE	Provider	Dihydroergotoxine	3419	RxNorm	Error in supplied map
4	Dihydroergotamine	Provider	Dihydroergotamine	387267005	SNOMED CT	Not chosen system
5	DIHYDROERGOTAMINE	HL LE	Dihydroergotamine	3418	RxNorm	Appropriate

Table 2: Quality Assurance Example

9. Findings

Our primary result is the list of substance values in the attached spreadsheet, which will be used to create service-accessible value sets in the NLM’s VSAC publication.

a. Medications

About half of medication records assert no known allergy. After absence terms (“no known”), medications are the most common class of assertions recorded in allergy lists.

After a relatively high peak (67% of instances covered with 38 values; 90% with 152), the approach of mapping common (>1000 instances) strings covers 97.6% of instances with 628 standard values.

There is noticeable variance in the frequencies across contributed data sets. For this reason, we provide, in addition to the value set in the main attachment, a source

¹² Language Engine Access Portal by Health Language. Accessed 9/28/16. Copyright Wolters Kluwer (<http://wolterskluwer.com/>).

variation spreadsheet to illustrate the differences, available on the HL7 Patient Care wiki. We do not speculate here about the reasons for these differences.

b. Foods

Food allergies are subject to international food labeling regulations based on frequency data. The data from 7 million subject records reflects the known frequency of eight major food categories in the US which serve as the basis for the FDA FALCPA food labeling laws^{13 14 15}. The data also supports the inclusion of additional foods found in international labeling regulations. A summary of these labeling regulations and associated substances can be found in Appendix B. The food value set spreadsheet also presents findings that relate to US and international food labeling regulations.

What the data show are the other major foods that are not represented in US food labeling laws, but that are included in allergy and intolerance lists. Food sensitivities include not only protein-based foods, but a wide range of legumes, fruits, vegetables and food additives. The food data was uniform across sources and did not show any significant variability in composition.

c. Environmentals

Environmental data shows lower total frequencies than other categories. As they are recorded for clinical management and not for patient safety, we have brought more scrutiny to food and medication categories.

10. Guidance

In general, we advise against terms that are not actionable, i.e., that cannot be used to guide decisions unambiguously; e.g., “mold” (environmental respiratory issue, or a specific sensitivity?), “antibiotics” (in the unlikely event all classes of antibiotics are contraindicated, they should be contraindicated explicitly), “tape” (unclear whether there is an adhesive substance sensitivity or a skin integrity concern).

This guidance is not intended to enforce decisions on legacy data that cannot be evaluated; rather, it recommends clarifying ambiguous or incorrect conceptions when possible.

¹³ <https://www.fda.gov/downloads/food/ingredientpackaginglabeling/ucm192048.pdf>

¹⁴

<https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/Allergens/ucm106890.htm> Accessed 7/25/17

¹⁵ Hefle, SL, Nordlee, JA and Taylor, SL. Allergenic Foods Critical Reviews in Food Science and Nutrition 1996; 36(S):569-589

a. Seafood

Patients have been confirmed to have allergies to mollusks, crustaceans, and certain varieties of fish. “Seafood” may be an attempt to generalize one or more of these concepts, but the term seafood is ambiguous and therefore a non-actionable term. The term seafood would exclude snails, which are mollusks, or may be taken to exclude freshwater fish. Its use should be avoided. However, the data show an overwhelming use of this term.

In addition, “shellfish” should be disambiguated as either mollusks, crustaceans, or both.

RECOMMENDATION:

- i. Do not use the term seafood. Use specific terms for fish, mollusks or crustaceans as available.
- ii. Do not use the term shellfish. Use specific terms for mollusks or crustaceans as available.

b. Iodine

Patients with “seafood” allergies are often assumed to have iodine sensitivities, which may result in a contraindication to using radiocontrast media. This may result in either unnecessary use of more expensive low osmolality media or reduced use of radiocontrast media altogether with decreased diagnostic sensitivity for the patient.

It is true that the use of low-osmolality radiocontrast media carries an approximately $\frac{2}{3}$ reduction of risk of serious reactions. The reduction is not however related to the presence of iodine since low-osmolality radiocontrast media is also an iodinated compound^{16 17}. The sensitivity, however, is not allergic but related to activation of the complement system; it is only patient-specific because driven by the patient’s condition.

The frequency numbers for iodine, iodinated contrast media, and contrast media are almost certainly inflated.

RECOMMENDATION:

- i. Do not record "iodine" for mollusk, crustacean, or fish sensitivities.

¹⁶ Schabelman, E, Whitting, M. the relationship of radiocontrast, iodine and seafood allergies: a medical myth exposed. J Emerg Med 2010 Nov; 39(5):701-7.

<https://www.ncbi.nlm.nih.gov/pubmed/20045605>

¹⁷ Huang, SW. Seafood and iodine: an analysis of a medical myth. Allergy Asthma Proc 2005 Nov-Dec; 26(6):468-9. <https://www.ncbi.nlm.nih.gov/pubmed/16541971>

c. Penicillin

Studies show that penicillin allergies are vastly over-reported, but the only data we have is that they are reported, so we have no basis for modifying the data.

Two tactics may improve the situation. First, the creation of a more accurate set of cross-reactive classes may support more precise recording of actual sensitivities. Given the frequency of a reported penicillin allergy in the US population (8%) vs. the actual number of those who demonstrate a sensitivity to penicillin (1%)^{18 19}, the clinical safety of assuming cross reactivity based on a documented penicillin allergy is ill-founded. The risk of a penicillin allergy should be based on clear documentation of what specific medication caused the reaction (penicillin or other beta-lactams) without the use of a medication class. Second, the ability to record an override reason, and to persist that reason with an allergy record, may support grading the criticality of the records and reduction in alarm fatigue.

RECOMMENDATION:

- i. Do not use a medication class to represent penicillin or other beta-lactams. Be as specific as possible about the product a patient is believed to have reacted to and enter that on the allergy list, not a class or category.

d. Vaccines

Many reaction records list very specific vaccines. At the reaction level this is perfectly appropriate, but it's unclear at the allergy level whether a reaction to a vaccine with a specific set of antigens is a useful indicator for other vaccines, and if so which ones. See footnote #? for further information on this issue.

The guidance from the 2 allergist professional societies (AAAAI and ACAAI) is instantiated in a joint position statement for influenza immunization which comes from chick embryo: the position is that no extra precaution is needed for individuals with egg allergy.

The authors of the ICON report concur: "Egg allergy does not appear to impart an increased risk of an anaphylactic reaction to immunization with either inactivated or live attenuated influenza vaccines currently available in the United States and Europe . . . Although cases of immediate hypersensitivity reaction such as urticaria may occur, they appear to be no more common in egg-allergic than nonegg-allergic vaccine recipients"; a similar disclaimer is made for MMR.²⁰

¹⁸ <https://www.aaaai.org/global/latest-research-summaries/New-Research-from-JACI-In-Practice/penicillin-label>

¹⁹ Vyles D, Adams J, Chiu A, et al. Allergy Testing in Children With Low-Risk Penicillin Allergy Symptoms. *Pediatrics*. 2017;140(2):e20170471

²⁰ Dreskin, *op cit.*, 7.

e. Oils

The analysis of data indicated an adverse sensitivity to a number of edible oils. Based on the literature, edible oils as a derivative of a nut (e.g. almond oil), seed (sesame seed oil), legume (e.g. peanut oil) or vegetable (e.g. vegetable oil, olive oil) do not contain protein and therefore would not cause a Type 1 immediate hypersensitivity reaction.^{21 22 23}

f. Environmental allergens

Non-actionable terms were included in the frequency data but are not recommended for inclusion on an allergy list. Terms such as “seasonal allergies” do not convey adequate specificity.

RECOMMENDATION

- i. Use actionable substances such as “tree pollen” for inclusion on the allergy list.
- ii. Put seasonal allergies on the problem list.

g. Nickel

The term “nickel” was prevalent, but many devices are manufactured using atomic nickel precisely because it is not very reactive. When patients react to nickel, they react to salts, typically nickel sulfate.

RECOMMENDATION

- i. The term nickel should be mapped to nickel compound, comprising any substance likely to engender an adverse reaction.

²¹ Taylor, SL et al. Peanut oil is not allergenic to peanut-sensitive individuals. *J. allergy Clin. Immunol.* 1981 Vol. 68; No. 5: 372-375

²² Fremont, S. et al Allergenicity of oils. *Allerg Immunol (Paris)* 2002 Mar;34(3):91-94.

²³ Crevel, R.W. R., et al. Allergenicity of refined vegetable oils. *Food and Chemical Toxicology.* 2000 38:385-393.

Appendix A: International Labeling Regulations for Food Allergens

<http://farrp.unl.edu/IRChart>

<http://farrp.unl.edu/documents/Regulatory/International%20Allergens%205-25-17.pdf>

Citation: University of Nebraska – Lincoln, Institute of Agriculture and Natural Resources, Food Allergy Research and Resource Program. Website accessed on July 23, 2017

Appendix B: Value Set Metadata published in VSAC

Field	Value
OID	2.16.840.1.113762.1.4.1186.1
Name	Common drug substances for allergy and intolerance documentation
Clinical focus	Documentation of a medication substance commonly suspected of causing an allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	RxNorm substances of term type ingredient (IN) or multiple ingredient (MIN)
Exclusion criteria	Other RxNorm term types

Field	Value
OID	2.16.840.1.113762.1.4.1186.2
Name	Common drug classes for allergy and intolerance documentation
Clinical focus	Documentation of a class of medication substances suspected of causing an allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	SNOMED CT substance classes commonly relevant to allergy or intolerance cross-reactivity
Exclusion criteria	SNOMED CT products, drug classes not commonly relevant to allergy or intolerance cross-reactivity

Field	Value
OID	2.16.840.1.113762.1.4.1186.3
Name	Common dietary substances for allergy and intolerance documentation
Clinical focus	Documentation of foods and dietary substances suspected of causing an allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	SNOMED-CT dietary substances ingested by patients, both specific (e.g., strawberry) and general (e.g., crustaceans); Substances that may be either foods or drugs (e.g., ethanol)
Exclusion criteria	SNOMED-CT products; environmental substances; expressions asserting absence of conditions; specific antigen substances; actual conditions caused by exposure (reactions, allergies)

Field	Value
OID	2.16.840.1.113762.1.4.1186.4
Name	Common environmental substances for allergy and intolerance documentation
Clinical focus	Documentation of environmental substances suspected of causing an

	allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	SNOMED-CT environmental substances suspected of causing reactions
Exclusion criteria	Drugs and foods; expressions asserting absence of conditions; specific antigen substances; actual conditions caused by exposure (reactions, allergies)

Field	Value
OID	2.16.840.1.113762.1.4.1186.5
Name	Common refutations of substance causes for allergy and intolerance documentation
Clinical focus	Refutation of associations between substances and reactions
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	SNOMED CT situation concepts asserting that a substance or class of substances does not cause adverse reactions in the patient
Exclusion criteria	Substances; actual conditions caused by exposure (reactions, allergies)

Field	Value
OID	2.16.840.1.113762.1.4.1186.7
Name	Common substances for allergy and intolerance documentation
Clinical focus	Documentation of substances suspected of causing an allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	Specific or general substances to which a patient may be exposed and which may be suspected of causing an adverse reaction. This list is a subset of the large value set extensionally defined in C-CDA (urn:oid:2.16.840.1.113762.1.4.1010.1).
Exclusion criteria	Actual conditions caused by exposure (reactions, allergies); negations of these conditions

Field	Value
OID	2.16.840.1.113762.1.4.1186.8
Name	Common substances for allergy and intolerance documentation including refutations
Clinical focus	Documentation of substances suspected of (or not suspected of) causing an allergy or intolerance reaction in an individual
Date element Scope	Reactant element of allergy or intolerance record
Inclusion criteria	Specific or general substances to which a patient may be exposed and

	which may be suspected of causing an adverse reaction; assertions refuting these suspicions
Exclusion criteria	Actual conditions caused by exposure (reactions, allergies)

Appendix C: List of common entries for allergy & intolerance substance

As there are two implementable value sets (with and without refutations) and five component value sets (drug substance, drug class, food, environmental, and refutations), we refer implementers to the National Library of Medicine's Value Set Authority Center to retrieve the value sets described in appendix B. All six value sets are also reproduced in the spreadsheet included with this publication.

We reproduce the refutations and the aggregate without refutations here for the reader's convenience.

Refutations

Concept Name	Concept Code	System	Count	Fraction	Cumulative
No known allergy (situation)	716186003	SNOMED CT	25,201,317	47%	47%
No known drug allergy (situation)	409137002	SNOMED CT	21,754,778	40%	87%
No known food allergy (situation)	429625007	SNOMED CT	5,184,483	10%	96%
No known environmental allergy (situation)	428607008	SNOMED CT	1,944,275	4%	100%
No known latex allergy (situation)	716184000	SNOMED CT	77,883	0%	100%

Aggregate substances

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Penicillin -class of antibiotic- (substance)	373270004	SNOMED CT	5,127,642	12.91%	12.91%
Sulfonamide (substance)	387406002	SNOMED CT	2,327,334	5.86%	18.77%
Codeine	2670	RxNorm	1,869,736	4.71%	23.47%
Morphine	7052	RxNorm	964,327	2.43%	25.90%
Amoxicillin	723	RxNorm	915,208	2.30%	28.20%
Lisinopril	29046	RxNorm	876,031	2.21%	30.41%
Acetaminophen / Hydrocodone	214182	RxNorm	849,257	2.14%	32.55%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Sulfamethoxazole / Trimethoprim	10831	RxNorm	801,007	2.02%	34.56%
Aspirin	1191	RxNorm	769,209	1.94%	36.50%
Latex	1314891	RxNorm	654,309	1.65%	38.15%
Erythromycin	4053	RxNorm	548,578	1.38%	39.53%
Ibuprofen	5640	RxNorm	510,174	1.28%	40.81%
Iodine	5933	RxNorm	502,815	1.27%	42.08%
Simvastatin	36567	RxNorm	489,832	1.23%	43.31%
Adhesive agent (substance)	418920007	SNOMED CT	461,297	1.16%	44.47%
Amoxicillin / Clavulanate	19711	RxNorm	436,437	1.10%	45.57%
Ciprofloxacin	2551	RxNorm	407,120	1.02%	46.60%
Acetaminophen / Oxycodone	214183	RxNorm	387,481	0.98%	47.57%
Seafood (substance)	44027008	SNOMED CT	374,032	0.94%	48.51%
atorvastatin	83367	RxNorm	367,409	0.92%	49.44%
Cephalexin	2231	RxNorm	367,300	0.92%	50.36%
Meperidine	6754	RxNorm	350,721	0.88%	51.24%
Tramadol	10689	RxNorm	342,883	0.86%	52.11%
Latex (substance)	111088007	SNOMED CT	338,528	0.85%	52.96%
Shellfish (substance)	735029006	SNOMED CT	321,256	0.81%	53.77%
Levofloxacin	82122	RxNorm	287,362	0.72%	54.49%
Sulfadiazine	10171	RxNorm	272,536	0.69%	55.18%
Iodinated contrast media (substance)	426722004	SNOMED CT	268,938	0.68%	55.85%
Non-steroidal anti-inflammatory agent (substance)	372665008	SNOMED CT	253,652	0.64%	56.49%
Azithromycin	18631	RxNorm	245,448	0.62%	57.11%
Naproxen	7258	RxNorm	238,854	0.60%	57.71%
Peanut (substance)	762952008	SNOMED CT	238,012	0.60%	58.31%
Eggs (edible) (substance)	102263004	SNOMED CT	237,278	0.60%	58.91%
Hydrocodone	5489	RxNorm	221,627	0.56%	59.47%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Contrast media (substance)	385420005	SNOMED CT	220,629	0.56%	60.02%
Nut (substance)	13577000	SNOMED CT	209,748	0.53%	60.55%
gabapentin	25480	RxNorm	196,265	0.49%	61.04%
Tetracycline	10395	RxNorm	193,114	0.49%	61.53%
Clindamycin	2582	RxNorm	190,038	0.48%	62.01%
Niacin	7393	RxNorm	187,555	0.47%	62.48%
Acetaminophen	161	RxNorm	176,868	0.45%	62.93%
Metformin	6809	RxNorm	173,046	0.44%	63.36%
celecoxib	140587	RxNorm	169,722	0.43%	63.79%
Pravastatin	42463	RxNorm	168,201	0.42%	64.21%
Pollen (substance)	256259004	SNOMED CT	167,525	0.42%	64.63%
Acetaminophen / Propoxyphene	48274	RxNorm	166,083	0.42%	65.05%
Hydrochlorothiazide	5487	RxNorm	164,423	0.41%	65.47%
Bee venom (substance)	288328004	SNOMED CT	161,882	0.41%	65.87%
Cefaclor	2176	RxNorm	161,349	0.41%	66.28%
Cephalosporin -class of antibiotic- (substance)	373262009	SNOMED CT	161,316	0.41%	66.69%
Angiotensin-converting enzyme inhibitor agent (substance)	372733002	SNOMED CT	161,076	0.41%	67.09%
Diphenhydramine	3498	RxNorm	160,390	0.40%	67.49%
Nitrofurantoin	7454	RxNorm	157,523	0.40%	67.89%
Oxycodone	7804	RxNorm	156,842	0.39%	68.29%
Prochlorperazine	8704	RxNorm	154,448	0.39%	68.68%
Doxycycline	3640	RxNorm	152,060	0.38%	69.06%
Amlodipine	17767	RxNorm	151,792	0.38%	69.44%
Hydromorphone	3423	RxNorm	144,489	0.36%	69.80%
Clarithromycin	21212	RxNorm	142,353	0.36%	70.16%
Opioid receptor agonist	404642006	SNOMED CT	135,452	0.34%	70.50%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
rosuvastatin	301542	RxNorm	132,516	0.33%	70.84%
Vancomycin	11124	RxNorm	132,360	0.33%	71.17%
Bacitracin / Neomycin / Polymyxin B	692572	RxNorm	131,028	0.33%	71.50%
Tetanus vaccine (substance)	412375000	SNOMED CT	130,964	0.33%	71.83%
Bupropion	42347	RxNorm	127,982	0.32%	72.15%
Dairy foods (substance)	226760005	SNOMED CT	127,498	0.32%	72.47%
Ketorolac	35827	RxNorm	126,513	0.32%	72.79%
Promethazine	8745	RxNorm	123,041	0.31%	73.10%
Penicillin G	7980	RxNorm	121,731	0.31%	73.41%
Prednisone	8640	RxNorm	120,453	0.30%	73.71%
Metronidazole	6922	RxNorm	119,968	0.30%	74.01%
Milk (substance)	70813002	SNOMED CT	116,498	0.29%	74.31%
Gluten (substance)	89811004	SNOMED CT	114,267	0.29%	74.59%
Cat dander (substance)	260152009	SNOMED CT	111,793	0.28%	74.87%
Metoclopramide	6915	RxNorm	111,748	0.28%	75.16%
Sulfamethoxazole	10180	RxNorm	109,606	0.28%	75.43%
Propoxyphene	8785	RxNorm	103,114	0.26%	75.69%
Prawns (substance)	227151004	SNOMED CT	95,880	0.24%	75.93%
Strawberry (substance)	102261002	SNOMED CT	94,639	0.24%	76.17%
Terazosin	37798	RxNorm	93,775	0.24%	76.41%
3-Hydroxy-3-methylglutaryl-coenzyme A reductase inhibitor (substance)	372912004	SNOMED CT	93,174	0.23%	76.64%
Phenytoin	8183	RxNorm	92,696	0.23%	76.87%
Ampicillin	733	RxNorm	89,206	0.22%	77.10%
Sertraline	36437	RxNorm	88,820	0.22%	77.32%
zolpidem	39993	RxNorm	87,575	0.22%	77.54%
Influenza virus vaccine (substance)	396425006	SNOMED CT	87,077	0.22%	77.76%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Quinolone -class of antibiotic- (substance)	372722000	SNOMED CT	86,159	0.22%	77.98%
Lovastatin	6472	RxNorm	83,126	0.21%	78.19%
Acetaminophen / Codeine	817579	RxNorm	80,753	0.20%	78.39%
Dust (substance)	33008008	SNOMED CT	79,257	0.20%	78.59%
Metoprolol	6918	RxNorm	77,682	0.20%	78.79%
moxifloxacin	139462	RxNorm	76,362	0.19%	78.98%
Trazodone	10737	RxNorm	74,916	0.19%	79.17%
Povidone-Iodine	8611	RxNorm	72,281	0.18%	79.35%
Sumatriptan	37418	RxNorm	71,764	0.18%	79.53%
Haloperidol	5093	RxNorm	70,848	0.18%	79.71%
pregabalin	187832	RxNorm	70,292	0.18%	79.89%
Tetracycline (class of antibiotic, substance) (substance)	373206009	SNOMED CT	69,249	0.17%	80.06%
Carbamazepine	2002	RxNorm	69,023	0.17%	80.23%
cyclobenzaprine	21949	RxNorm	68,475	0.17%	80.41%
Mold (organism)	84489001	SNOMED CT	67,790	0.17%	80.58%
Fentanyl	4337	RxNorm	65,576	0.17%	80.74%
Lorazepam	6470	RxNorm	65,423	0.16%	80.91%
Omeprazole	7646	RxNorm	64,853	0.16%	81.07%
Diazepam	3322	RxNorm	63,464	0.16%	81.23%
Losartan	52175	RxNorm	63,451	0.16%	81.39%
Lidocaine	6387	RxNorm	61,618	0.16%	81.54%
Sulfonylurea (substance)	372711004	SNOMED CT	61,194	0.15%	81.70%
Fluoxetine	4493	RxNorm	60,890	0.15%	81.85%
Lactose (substance)	47703008	SNOMED CT	60,188	0.15%	82.00%
Procaine	8701	RxNorm	59,948	0.15%	82.15%
cefdinir	25037	RxNorm	58,504	0.15%	82.30%
Amitriptyline	704	RxNorm	58,377	0.15%	82.45%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Atenolol	1202	RxNorm	57,974	0.15%	82.59%
Soy protein (substance)	7791007	SNOMED CT	57,518	0.14%	82.74%
Pseudoephedrine	8896	RxNorm	57,037	0.14%	82.88%
meloxicam	41493	RxNorm	57,006	0.14%	83.03%
Citalopram	2556	RxNorm	56,361	0.14%	83.17%
duloxetine	72625	RxNorm	56,223	0.14%	83.31%
Ceftriaxone	2193	RxNorm	55,522	0.14%	83.45%
Alendronate	46041	RxNorm	55,058	0.14%	83.59%
Tomato (substance)	734881000	SNOMED CT	54,520	0.14%	83.73%
Chocolate (substance)	102262009	SNOMED CT	54,405	0.14%	83.86%
Grass pollen (substance)	256277009	SNOMED CT	54,152	0.14%	84.00%
Fish (substance)	735971005	SNOMED CT	53,764	0.14%	84.13%
venlafaxine	39786	RxNorm	53,530	0.13%	84.27%
Penicillin V	7984	RxNorm	52,340	0.13%	84.40%
clopidogrel	32968	RxNorm	52,218	0.13%	84.53%
Aspirin / Oxycodone	214256	RxNorm	51,818	0.13%	84.66%
Heparin	5224	RxNorm	50,008	0.13%	84.79%
Phenobarbital	8134	RxNorm	49,987	0.13%	84.91%
Paroxetine	32937	RxNorm	49,888	0.13%	85.04%
Valproate	40254	RxNorm	49,603	0.12%	85.16%
Dog dander (substance)	260154005	SNOMED CT	49,186	0.12%	85.29%
Cefuroxime	2194	RxNorm	47,878	0.12%	85.41%
Ondansetron	26225	RxNorm	46,648	0.12%	85.53%
Gemfibrozil	4719	RxNorm	45,625	0.11%	85.64%
lamotrigine	28439	RxNorm	43,595	0.11%	85.75%
Banana (substance)	256307007	SNOMED CT	43,178	0.11%	85.86%
Epinephrine	3992	RxNorm	43,111	0.11%	85.97%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Trimethoprim	10829	RxNorm	43,011	0.11%	86.08%
Albuterol	435	RxNorm	42,889	0.11%	86.18%
topiramate	38404	RxNorm	42,797	0.11%	86.29%
Nickel compound (substance)	43921001	SNOMED CT	42,759	0.11%	86.40%
tamsulosin	77492	RxNorm	42,525	0.11%	86.51%
rofecoxib	232158	RxNorm	41,753	0.11%	86.72%
Cortisone	2878	RxNorm	41,223	0.10%	86.82%
Wheat bran (substance)	412533000	SNOMED CT	41,095	0.10%	86.92%
Enalapril	3827	RxNorm	40,990	0.10%	87.03%
Warfarin	11289	RxNorm	39,911	0.10%	87.13%
quetiapine	51272	RxNorm	39,261	0.10%	87.23%
Citrus fruit (substance)	102259006	SNOMED CT	39,235	0.10%	87.33%
Nifedipine	7417	RxNorm	38,881	0.10%	87.42%
Clavulanate	48203	RxNorm	38,820	0.10%	87.52%
ezetimibe	341248	RxNorm	37,593	0.09%	87.62%
sildenafil	136411	RxNorm	35,155	0.09%	87.70%
Nortriptyline	7531	RxNorm	34,982	0.09%	87.79%
Cefazolin	2180	RxNorm	34,921	0.09%	87.88%
Morphine derivative (substance)	440327007	SNOMED CT	34,723	0.09%	87.97%
Minocycline	6980	RxNorm	34,379	0.09%	88.05%
Diclofenac	3355	RxNorm	33,969	0.09%	88.14%
Diltiazem	3443	RxNorm	33,916	0.09%	88.23%
Indomethacin	5781	RxNorm	33,841	0.09%	88.31%
Piperacillin / tazobactam	74169	RxNorm	33,762	0.08%	88.40%
Risperidone	35636	RxNorm	33,618	0.08%	88.48%
Neomycin	7299	RxNorm	33,607	0.08%	88.56%
varenicline	591622	RxNorm	33,548	0.08%	88.65%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Loratadine	28889	RxNorm	32,409	0.08%	88.73%
Allopurinol	519	RxNorm	32,275	0.08%	88.81%
beta-Blocking agent (substance)	373254001	SNOMED CT	31,911	0.08%	88.89%
Spirololactone	9997	RxNorm	31,739	0.08%	88.97%
Guaifenesin	5032	RxNorm	30,527	0.08%	89.05%
Clonidine	2599	RxNorm	30,442	0.08%	89.13%
Etodolac	24605	RxNorm	30,317	0.08%	89.20%
donepezil	135447	RxNorm	30,269	0.08%	89.28%
Pork (substance)	226934003	SNOMED CT	30,243	0.08%	89.35%
Sulfur	10223	RxNorm	29,808	0.08%	89.43%
oxybutynin	32675	RxNorm	29,760	0.07%	89.50%
Bacitracin	1291	RxNorm	29,448	0.07%	89.58%
Caffeine (substance)	255641001	SNOMED CT	29,282	0.07%	89.65%
Furosemide	4603	RxNorm	29,145	0.07%	89.73%
Midazolam	6960	RxNorm	28,943	0.07%	89.80%
Nicotine	7407	RxNorm	28,641	0.07%	89.87%
Pentazocine	8001	RxNorm	28,349	0.07%	89.94%
flunisolide	25120	RxNorm	27,832	0.07%	90.01%
cefprozil	19552	RxNorm	27,652	0.07%	90.08%
Butorphanol	1841	RxNorm	27,406	0.07%	90.15%
Amiodarone	703	RxNorm	26,904	0.07%	90.22%
aripiprazole	89013	RxNorm	26,662	0.07%	90.29%
Mirtazapine	15996	RxNorm	26,634	0.07%	90.35%
Ranitidine	9143	RxNorm	26,414	0.07%	90.42%
Hydroxyzine	5553	RxNorm	26,378	0.07%	90.49%
Methadone	6813	RxNorm	26,309	0.07%	90.55%
Fenofibrate	8703	RxNorm	25,983	0.07%	90.62%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Quinine	9071	RxNorm	25,765	0.06%	90.68%
Mushroom (substance)	735045008	SNOMED CT	25,731	0.06%	90.75%
Methocarbamol	6845	RxNorm	25,236	0.06%	90.81%
Escitalopram	321988	RxNorm	24,786	0.06%	90.87%
Doxazosin	49276	RxNorm	24,753	0.06%	90.93%
pantoprazole	40790	RxNorm	24,587	0.06%	91.00%
Hydralazine	5470	RxNorm	24,357	0.06%	91.06%
Corn (substance)	412357001	SNOMED CT	24,351	0.06%	91.12%
Nitroglycerin	4917	RxNorm	24,287	0.06%	91.18%
Glipizide	4821	RxNorm	24,268	0.06%	91.24%
fluticasone / salmeterol	284635	RxNorm	24,044	0.06%	91.30%
Methylprednisolone	6902	RxNorm	23,783	0.06%	91.36%
nabumetone	31448	RxNorm	23,687	0.06%	91.42%
valsartan	69749	RxNorm	23,007	0.06%	91.48%
Chlorpromazine	2403	RxNorm	22,844	0.06%	91.54%
Ethinyl Estradiol / Levonorgestrel	214558	RxNorm	22,776	0.06%	91.59%
Pneumococcal vaccine (substance)	398730001	SNOMED CT	22,746	0.06%	91.65%
pioglitazone	33738	RxNorm	22,721	0.06%	91.71%
Lithium	6448	RxNorm	22,292	0.06%	91.76%
fluticasone	41126	RxNorm	22,224	0.06%	91.82%
Baclofen	1292	RxNorm	22,072	0.06%	91.88%
benazepril	18867	RxNorm	22,030	0.06%	91.93%
Caffeine	1886	RxNorm	22,003	0.06%	91.99%
Piroxicam	8356	RxNorm	21,766	0.05%	92.04%
Pineapple (substance)	256313003	SNOMED CT	21,424	0.05%	92.10%
Alprazolam	596	RxNorm	21,387	0.05%	92.15%
Acyclovir	281	RxNorm	21,236	0.05%	92.20%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
carvedilol	20352	RxNorm	21,079	0.05%	92.26%
Fluconazole	4450	RxNorm	21,042	0.05%	92.31%
montelukast	88249	RxNorm	20,993	0.05%	92.36%
Verapamil	11170	RxNorm	20,866	0.05%	92.41%
Propranolol	8787	RxNorm	20,744	0.05%	92.47%
Yellow food coloring (substance)	446274005	SNOMED CT	20,193	0.05%	92.52%
Nalbuphine	7238	RxNorm	20,119	0.05%	92.57%
Bupirone	1827	RxNorm	20,117	0.05%	92.62%
Antihistamine (substance)	372806008	SNOMED CT	20,015	0.05%	92.67%
Cetirizine	20610	RxNorm	19,884	0.05%	92.72%
Ramipril	35296	RxNorm	19,478	0.05%	92.77%
Esomeprazole	283742	RxNorm	19,166	0.05%	92.82%
lansoprazole	17128	RxNorm	18,955	0.05%	92.86%
Sulfasalazine	9524	RxNorm	18,870	0.05%	92.91%
Hydrochlorothiazide / Triamterene	258337	RxNorm	18,840	0.05%	92.96%
Gentamicin	1596450	RxNorm	18,396	0.05%	93.01%
Tetanus immune globulin	1727875	RxNorm	18,324	0.05%	93.05%
Fosinopril	50166	RxNorm	17,845	0.04%	93.10%
Droperidol	3648	RxNorm	17,445	0.04%	93.14%
Iodine (substance)	44588005	SNOMED CT	17,355	0.04%	93.18%
Ofloxacin	7623	RxNorm	17,327	0.04%	93.23%
Kiwi fruit (substance)	260176001	SNOMED CT	17,228	0.04%	93.27%
Blue food coloring (substance)	442381000124103	SNOMED CT	17,207	0.04%	93.31%
Chlorhexidine	2358	RxNorm	17,145	0.04%	93.36%
Carisoprodol	2101	RxNorm	17,054	0.04%	93.40%
Hydroxychloroquine	5521	RxNorm	17,006	0.04%	93.44%
Diphtheria + tetanus vaccine (product)	350327004	SNOMED CT	16,884	0.04%	93.49%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
varденаfil	306674	RxNorm	16,839	0.04%	93.53%
Apple (substance)	735215001	SNOMED CT	16,556	0.04%	93.57%
fluvastatin	41127	RxNorm	16,416	0.04%	93.61%
Clonazepam	2598	RxNorm	16,346	0.04%	93.65%
Levetiracetam	114477	RxNorm	16,265	0.04%	93.69%
Purified Protein Derivative of Tuberculin	8948	RxNorm	16,210	0.04%	93.73%
fexofenadine	87636	RxNorm	16,130	0.04%	93.77%
gatifloxacin	228476	RxNorm	16,093	0.04%	93.82%
Hydrochlorothiazide / Lisinopril	214618	RxNorm	16,004	0.04%	93.86%
ziprasidone	115698	RxNorm	15,961	0.04%	93.90%
Arachis oil (substance)	417889008	SNOMED CT	15,787	0.04%	93.94%
Monosodium glutamate (substance)	75665004	SNOMED CT	15,614	0.04%	93.97%
Prazosin	8629	RxNorm	15,606	0.04%	94.01%
Methotrexate	6851	RxNorm	15,482	0.04%	94.05%
tiotropium	69120	RxNorm	15,411	0.04%	94.09%
brimonidine	134615	RxNorm	15,362	0.04%	94.13%
terbinafine	37801	RxNorm	14,950	0.04%	94.17%
Isosorbide	6057	RxNorm	14,900	0.04%	94.21%
valdecoxib	278567	RxNorm	14,666	0.04%	94.24%
oxcarbazepine	32624	RxNorm	14,536	0.04%	94.28%
Cefadroxil	2177	RxNorm	14,196	0.04%	94.32%
Phenazopyridine	8120	RxNorm	14,188	0.04%	94.35%
ezetimibe / Simvastatin	484211	RxNorm	14,078	0.04%	94.39%
Fish Oils	4419	RxNorm	14,053	0.04%	94.42%
Mango fruit (substance)	260179008	SNOMED CT	14,047	0.04%	94.46%
Enoxaparin	67108	RxNorm	13,907	0.04%	94.49%
Walnut - nut (substance)	256352005	SNOMED CT	13,829	0.03%	94.53%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Sulindac	10237	RxNorm	13,808	0.03%	94.56%
aspirin / butalbital / caffeine / codeine	214160	RxNorm	13,732	0.03%	94.60%
aspirin / calcium carbonate	817958	RxNorm	13,716	0.03%	94.63%
Methylphenidate	6901	RxNorm	13,497	0.03%	94.66%
Testosterone	10379	RxNorm	13,497	0.03%	94.70%
olanzapine	61381	RxNorm	13,189	0.03%	94.73%
Ethanol	448	RxNorm	13,151	0.03%	94.76%
Budesonide / formoterol	389132	RxNorm	12,956	0.03%	94.80%
Corticosteroids and derivatives (substance)	304275008	SNOMED CT	12,898	0.03%	94.83%
Theophylline	10438	RxNorm	12,759	0.03%	94.86%
oxaprozin	32613	RxNorm	12,725	0.03%	94.89%
levothyroxine	10582	RxNorm	12,573	0.03%	94.93%
Felodipine	4316	RxNorm	12,458	0.03%	94.96%
Dexamethasone	3264	RxNorm	12,402	0.03%	94.99%
Sulfacetamide	10169	RxNorm	12,238	0.03%	95.02%
Diphtheria + pertussis + tetanus vaccine (product)	421245007	SNOMED CT	12,217	0.03%	95.05%
Cefixime	25033	RxNorm	12,167	0.03%	95.08%
Aspirin / Dipyridamole	226716	RxNorm	12,080	0.03%	95.11%
Erythromycin / Sulfisoxazole	113588	RxNorm	11,990	0.03%	95.14%
Colestipol	2685	RxNorm	11,967	0.03%	95.17%
Finasteride	25025	RxNorm	11,934	0.03%	95.20%
infliximab	191831	RxNorm	11,826	0.03%	95.23%
Risedronate	73056	RxNorm	11,812	0.03%	95.26%
Tree nut (substance)	442571000124108	SNOMED CT	11,579	0.03%	95.29%
Anabolic steroid (substance)	111151007	SNOMED CT	11,410	0.03%	95.32%
Polymyxin B	8536	RxNorm	11,404	0.03%	95.35%
Macrolide (class of antibiotic, substance) (substance)	372480009	SNOMED CT	11,369	0.03%	95.38%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
tizanidine	57258	RxNorm	11,295	0.03%	95.40%
Avocado (substance)	735249009	SNOMED CT	11,211	0.03%	95.43%
Hydrocortisone	5492	RxNorm	11,149	0.03%	95.46%
quinapril	35208	RxNorm	11,112	0.03%	95.49%
metaxalone	59078	RxNorm	10,995	0.03%	95.52%
Colchicine	2683	RxNorm	10,987	0.03%	95.54%
Cinnamon (substance)	227388008	SNOMED CT	10,970	0.03%	95.57%
Temazepam	10355	RxNorm	10,913	0.03%	95.60%
Dicyclomine	3361	RxNorm	10,850	0.03%	95.63%
Insulin (substance)	67866001	SNOMED CT	10,835	0.03%	95.65%
Succinylcholine	10154	RxNorm	10,787	0.03%	95.68%
Mometasone	108118	RxNorm	10,603	0.03%	95.71%
Coconut oil (substance)	28942008	SNOMED CT	10,563	0.03%	95.73%
Animal dander (substance)	264287008	SNOMED CT	10,519	0.03%	95.76%
Cimetidine	2541	RxNorm	10,427	0.03%	95.79%
Salicylate (substance)	255637000	SNOMED CT	10,391	0.03%	95.81%
Primaquine	8687	RxNorm	10,334	0.03%	95.84%
Benzodiazepine (substance)	372664007	SNOMED CT	10,302	0.03%	95.86%
Famotidine	4278	RxNorm	10,201	0.03%	95.89%
Acetaminophen / Aspirin / Caffeine	466584	RxNorm	10,190	0.03%	95.92%
Dust mite protein (substance)	720687003	SNOMED CT	10,106	0.03%	95.94%
Cherry (substance)	735248001	SNOMED CT	10,058	0.03%	95.97%
Thimerosal	10472	RxNorm	9,992	0.03%	95.99%
Benzoyl Peroxide	1418	RxNorm	9,769	0.02%	96.02%
rosiglitazone	84108	RxNorm	9,734	0.02%	96.04%
benzonatate	18993	RxNorm	9,694	0.02%	96.07%
Peach (substance)	735049002	SNOMED CT	9,552	0.02%	96.09%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
acetaminophen / aspirin / Phenylpropanolamine	689556	RxNorm	9,486	0.02%	96.11%
Streptomycin	10109	RxNorm	9,402	0.02%	96.14%
ropinirole	72302	RxNorm	9,373	0.02%	96.16%
Bee pollen	253157	RxNorm	9,259	0.02%	96.18%
Chlorthalidone	2409	RxNorm	9,102	0.02%	96.21%
Garlic (substance)	735030001	SNOMED CT	9,069	0.02%	96.23%
Amlodipine / benazepril	214223	RxNorm	9,035	0.02%	96.25%
Azathioprine	1256	RxNorm	8,874	0.02%	96.28%
Acetaminophen / Tramadol	352362	RxNorm	8,854	0.02%	96.30%
diphenhydrAMINE / Phenylephrine	690693	RxNorm	8,845	0.02%	96.32%
Aminoglycoside -class of antibiotic- (substance)	14443002	SNOMED CT	8,805	0.02%	96.34%
Iron	90176	RxNorm	8,781	0.02%	96.36%
Glyburide	4815	RxNorm	8,756	0.02%	96.39%
Orange - fruit (substance)	256306003	SNOMED CT	8,690	0.02%	96.41%
Nitrate salt (substance)	89119000	SNOMED CT	8,611	0.02%	96.43%
Propofol	8782	RxNorm	8,555	0.02%	96.45%
Captopril	1998	RxNorm	8,525	0.02%	96.47%
Oseltamivir	260101	RxNorm	8,514	0.02%	96.49%
Pertussis vaccine (substance)	396433007	SNOMED CT	8,458	0.02%	96.52%
Thiazide diuretic (substance)	372747003	SNOMED CT	8,367	0.02%	96.54%
Almond (substance)	256350002	SNOMED CT	8,345	0.02%	96.56%
travoprost	283809	RxNorm	8,272	0.02%	96.58%
olmesartan	321064	RxNorm	8,222	0.02%	96.60%
dabigatran etexilate	1037042	RxNorm	8,215	0.02%	96.62%
Horse serum protein (substance)	412138001	SNOMED CT	8,162	0.02%	96.64%
Calcium channel blocker (substance)	373304005	SNOMED CT	8,054	0.02%	96.66%
Meclizine	6676	RxNorm	8,034	0.02%	96.68%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Oxytetracycline	7821	RxNorm	7,999	0.02%	96.70%
Dicloxacillin	3356	RxNorm	7,985	0.02%	96.72%
Penicillamine	7975	RxNorm	7,983	0.02%	96.74%
Digoxin	3407	RxNorm	7,981	0.02%	96.76%
Primidone	8691	RxNorm	7,956	0.02%	96.78%
Nystatin	7597	RxNorm	7,912	0.02%	96.80%
Onion (substance)	735047000	SNOMED CT	7,909	0.02%	96.82%
cefepime	20481	RxNorm	7,841	0.02%	96.84%
Aspartame	1311524	RxNorm	7,710	0.02%	96.86%
Galantamine	4637	RxNorm	7,662	0.02%	96.88%
Estrogen (substance)	41598000	SNOMED CT	7,621	0.02%	96.90%
Orphenadrine	7715	RxNorm	7,510	0.02%	96.92%
sitagliptin	593411	RxNorm	7,489	0.02%	96.94%
Triamterene	10763	RxNorm	7,421	0.02%	96.95%
Salsalate	36108	RxNorm	7,413	0.02%	96.97%
Watermelon (substance)	419420009	SNOMED CT	7,387	0.02%	96.99%
Dipyridamole	3521	RxNorm	7,310	0.02%	97.01%
Atropine	1223	RxNorm	7,259	0.02%	97.03%
Gadolinium	1310171	RxNorm	7,186	0.02%	97.05%
zolmitriptan	135775	RxNorm	7,132	0.02%	97.06%
Fruit (substance)	72511004	SNOMED CT	7,098	0.02%	97.08%
ferrous sulfate	24947	RxNorm	7,027	0.02%	97.10%
Horse dander (substance)	256417003	SNOMED CT	7,016	0.02%	97.12%
cefepodoxime	20489	RxNorm	6,983	0.02%	97.14%
Melon (substance)	260177005	SNOMED CT	6,975	0.02%	97.15%
Triamcinolone	10759	RxNorm	6,903	0.02%	97.17%
Rifampin	9384	RxNorm	6,901	0.02%	97.19%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
linezolid	190376	RxNorm	6,866	0.02%	97.21%
Scopolamine	9601	RxNorm	6,865	0.02%	97.22%
Benzocaine	1399	RxNorm	6,797	0.02%	97.24%
Acetaminophen / butalbital / Caffeine	214130	RxNorm	6,760	0.02%	97.26%
Chloroquine	2393	RxNorm	6,718	0.02%	97.27%
Alcohol (substance)	53041004	SNOMED CT	6,682	0.02%	97.29%
Crab (substance)	736159005	SNOMED CT	6,675	0.02%	97.31%
Cholestyramine Resin	2447	RxNorm	6,650	0.02%	97.32%
Methimazole	6835	RxNorm	6,621	0.02%	97.34%
Pramipexole	746741	RxNorm	6,595	0.02%	97.36%
colesevelam	141626	RxNorm	6,555	0.02%	97.37%
Quinidine	9068	RxNorm	6,507	0.02%	97.39%
latanoprost	43611	RxNorm	6,479	0.02%	97.41%
rivaroxaban	1114195	RxNorm	6,466	0.02%	97.42%
Neomycin / Polymyxin B	466541	RxNorm	6,464	0.02%	97.44%
Cox-2 inhibitor (substance)	387050005	SNOMED CT	6,296	0.02%	97.45%
mesalamine	52582	RxNorm	6,201	0.02%	97.47%
isoniazid	6038	RxNorm	6,193	0.02%	97.49%
Bacitracin / Polymyxin B	645555	RxNorm	6,112	0.02%	97.50%
Lanolin	6227	RxNorm	5,957	0.01%	97.52%
Barium Sulfate	1331	RxNorm	5,933	0.01%	97.53%
Pseudoephedrine / Triprolidine	214807	RxNorm	5,911	0.01%	97.55%
Lactase	41397	RxNorm	5,909	0.01%	97.56%
Benzotropine	1424	RxNorm	5,882	0.01%	97.58%
Ampicillin / Sulbactam	1009148	RxNorm	5,881	0.01%	97.59%
irbesartan	83818	RxNorm	5,858	0.01%	97.61%
Tobramycin	10627	RxNorm	5,817	0.01%	97.62%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
rizatriptan	88014	RxNorm	5,808	0.01%	97.63%
Cashew nut (substance)	227493005	SNOMED CT	5,803	0.01%	97.65%
Ipratropium	7213	RxNorm	5,747	0.01%	97.66%
Phenothiazine AND/OR derivative (substance)	373208005	SNOMED CT	5,744	0.01%	97.68%
Memantine	6719	RxNorm	5,730	0.01%	97.69%
Dextromethorphan	3289	RxNorm	5,672	0.01%	97.71%
tolterodine	119565	RxNorm	5,672	0.01%	97.72%
Barbiturate (substance)	372798009	SNOMED CT	5,573	0.01%	97.74%
formoterol	25255	RxNorm	5,568	0.01%	97.75%
Lobster (substance)	736162008	SNOMED CT	5,551	0.01%	97.76%
Potassium Chloride	8591	RxNorm	5,550	0.01%	97.78%
fluPHENAZine	4496	RxNorm	5,535	0.01%	97.79%
Atropine / Hyoscyamine / Phenobarbital / Scopolamine	689606	RxNorm	5,529	0.01%	97.80%
Chicken - meat (substance)	226955001	SNOMED CT	5,509	0.01%	97.82%
Benzoin	1406	RxNorm	5,457	0.01%	97.83%
rabeprazole	114979	RxNorm	5,454	0.01%	97.85%
Anticonvulsant (substance)	255632006	SNOMED CT	5,446	0.01%	97.86%
Eszopiclone	461016	RxNorm	5,390	0.01%	97.87%
silver sulfadiazine	9793	RxNorm	5,271	0.01%	97.89%
Sucralfate	10156	RxNorm	5,263	0.01%	97.90%
Aloe vera preparation	318340	RxNorm	5,227	0.01%	97.91%
Ticlopidine	10594	RxNorm	5,211	0.01%	97.93%
Carrot (substance)	256319004	SNOMED CT	5,177	0.01%	97.94%
adalimumab	327361	RxNorm	5,172	0.01%	97.95%
Tricyclic antidepressant (substance)	373253007	SNOMED CT	5,162	0.01%	97.97%
Thiopental	10493	RxNorm	5,161	0.01%	97.98%
Hydrocodone / Ibuprofen	214627	RxNorm	5,098	0.01%	97.99%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
valacyclovir	73645	RxNorm	5,031	0.01%	98.00%
Formaldehyde	4530	RxNorm	4,977	0.01%	98.02%
Ibandronate	115264	RxNorm	4,971	0.01%	98.03%
Codeine / Guaifenesin	214442	RxNorm	4,948	0.01%	98.04%
Beef (substance)	226916002	SNOMED CT	4,907	0.01%	98.05%
Doxepin	3638	RxNorm	4,871	0.01%	98.07%
trimethobenzamide	38685	RxNorm	4,862	0.01%	98.08%
Aspartame (substance)	11526002	SNOMED CT	4,846	0.01%	98.09%
Flavoring agent (substance)	412069004	SNOMED CT	4,826	0.01%	98.10%
cilostazol	21107	RxNorm	4,808	0.01%	98.11%
prednisolone	8638	RxNorm	4,799	0.01%	98.13%
Aspirin / butalbital / Caffeine	214159	RxNorm	4,695	0.01%	98.14%
Minoxidil	6984	RxNorm	4,646	0.01%	98.15%
Methyldopa	6876	RxNorm	4,643	0.01%	98.16%
Flurandrenolide	4500	RxNorm	4,634	0.01%	98.17%
Miconazole	6932	RxNorm	4,626	0.01%	98.19%
Citric Acid	21183	RxNorm	4,617	0.01%	98.20%
Tolmetin	10636	RxNorm	4,598	0.01%	98.21%
Ketamine	6130	RxNorm	4,585	0.01%	98.22%
Timolol	10600	RxNorm	4,525	0.01%	98.23%
Labetalol	6185	RxNorm	4,523	0.01%	98.24%
Sulfur Dioxide	1362879	RxNorm	4,491	0.01%	98.25%
Acetazolamide	167	RxNorm	4,455	0.01%	98.27%
leflunomide	27169	RxNorm	4,397	0.01%	98.28%
Sodium sulfite (substance)	3692009	SNOMED CT	4,391	0.01%	98.29%
rivastigmine	183379	RxNorm	4,382	0.01%	98.30%
Etanercept	214555	RxNorm	4,363	0.01%	98.31%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Imipramine	5691	RxNorm	4,351	0.01%	98.32%
Ketoconazole	6135	RxNorm	4,284	0.01%	98.33%
Chlordiazepoxide	2356	RxNorm	4,261	0.01%	98.34%
Oyster (substance)	736031006	SNOMED CT	4,254	0.01%	98.35%
Ioracarbef	28981	RxNorm	4,203	0.01%	98.36%
Gramicidin / Neomycin / Polymyxin B	692794	RxNorm	4,170	0.01%	98.37%
Ascorbic Acid	1151	RxNorm	4,169	0.01%	98.38%
Solifenacin	322167	RxNorm	4,151	0.01%	98.39%
Amantadine	620	RxNorm	4,132	0.01%	98.40%
Raloxifene	72143	RxNorm	4,109	0.01%	98.42%
Diclofenac / Misoprostol	214502	RxNorm	4,063	0.01%	98.43%
Dextromethorphan / Doxylamine	815166	RxNorm	3,996	0.01%	98.44%
Sodium nitrate (substance)	228102000	SNOMED CT	3,973	0.01%	98.45%
Ephedrine	3966	RxNorm	3,936	0.01%	98.46%
Phenylpropanolamine	8175	RxNorm	3,934	0.01%	98.47%
exenatide	60548	RxNorm	3,923	0.01%	98.48%
Mupirocin	42372	RxNorm	3,903	0.01%	98.49%
Acarbose	16681	RxNorm	3,897	0.01%	98.49%
Peas (substance)	260184002	SNOMED CT	3,893	0.01%	98.50%
Itraconazole	28031	RxNorm	3,868	0.01%	98.51%
Budesonide	19831	RxNorm	3,861	0.01%	98.52%
Phenylephrine	8163	RxNorm	3,818	0.01%	98.53%
Albuterol / Ipratropium	214199	RxNorm	3,783	0.01%	98.54%
First generation cephalosporin (substance)	372889003	SNOMED CT	3,776	0.01%	98.55%
Honey (substance)	227598003	SNOMED CT	3,769	0.01%	98.56%
Chlorpheniramine	2400	RxNorm	3,759	0.01%	98.57%
Thioridazine	10502	RxNorm	3,751	0.01%	98.58%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
alfuzosin	17300	RxNorm	3,740	0.01%	98.59%
Artificial sweetener (substance)	116274004	SNOMED CT	3,714	0.01%	98.60%
Raspberries (substance)	227444000	SNOMED CT	3,714	0.01%	98.61%
Nitrous oxide	7486	RxNorm	3,636	0.01%	98.62%
liraglutide	475968	RxNorm	3,530	0.01%	98.63%
Blueberries (substance)	412061001	SNOMED CT	3,510	0.01%	98.64%
Clotrimazole	2623	RxNorm	3,502	0.01%	98.65%
rituximab	121191	RxNorm	3,491	0.01%	98.65%
Cantaloupe (substance)	412062008	SNOMED CT	3,476	0.01%	98.66%
Chlorzoxazone	2410	RxNorm	3,464	0.01%	98.67%
Sotalol	9947	RxNorm	3,458	0.01%	98.68%
Dapsone	3108	RxNorm	3,455	0.01%	98.69%
Lincomycin	6398	RxNorm	3,436	0.01%	98.70%
Oats (substance)	418504009	SNOMED CT	3,422	0.01%	98.71%
Magnesium Sulfate	6585	RxNorm	3,408	0.01%	98.71%
nefazodone	31565	RxNorm	3,363	0.01%	98.72%
Sulfisoxazole	10207	RxNorm	3,313	0.01%	98.73%
Beclomethasone	1347	RxNorm	3,309	0.01%	98.74%
ertapenem	325642	RxNorm	3,295	0.01%	98.75%
Coconut (substance)	735211005	SNOMED CT	3,294	0.01%	98.76%
nickel sulfate	31738	RxNorm	3,273	0.01%	98.76%
Adenosine	296	RxNorm	3,270	0.01%	98.77%
Cefoxitin	2189	RxNorm	3,267	0.01%	98.78%
Diflunisal	3393	RxNorm	3,264	0.01%	98.79%
Pecan nut (substance)	260189007	SNOMED CT	3,245	0.01%	98.80%
Atropine / Diphenoxylate	594040	RxNorm	3,232	0.01%	98.81%
Isopropyl Alcohol	797541	RxNorm	3,232	0.01%	98.81%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
meropenem	29561	RxNorm	3,195	0.01%	98.82%
Carbamate (substance)	406748003	SNOMED CT	3,194	0.01%	98.83%
Daptomycin	22299	RxNorm	3,191	0.01%	98.84%
Methadone analog (substance)	418000008	SNOMED CT	3,183	0.01%	98.85%
Dye (substance)	61789006	SNOMED CT	3,179	0.01%	98.85%
dorzolamide	60207	RxNorm	3,162	0.01%	98.86%
Nafcillin	7233	RxNorm	3,161	0.01%	98.87%
Lincomycin and derivatives (substance)	373234002	SNOMED CT	3,129	0.01%	98.88%
Lactulose	6218	RxNorm	3,111	0.01%	98.89%
Yeast (substance)	412534006	SNOMED CT	3,107	0.01%	98.89%
homatropine / Hydrocodone	214614	RxNorm	3,078	0.01%	98.90%
Triazolam	10767	RxNorm	3,078	0.01%	98.91%
Iron-Dextran Complex	5992	RxNorm	3,067	0.01%	98.92%
Hydrochlorothiazide / Losartan	214619	RxNorm	3,043	0.01%	98.92%
Angiotensin II receptor antagonist (substance)	372913009	SNOMED CT	3,023	0.01%	98.93%
Polymyxin B / Trimethoprim	219314	RxNorm	3,022	0.01%	98.94%
Carbidopa / Levodopa	103990	RxNorm	3,020	0.01%	98.95%
Acetaminophen / dichloralphenazone / isometheptene	214153	RxNorm	3,011	0.01%	98.95%
Misoprostol	42331	RxNorm	3,008	0.01%	98.96%
Cheese (substance)	102264005	SNOMED CT	3,007	0.01%	98.97%
Potato (substance)	735053000	SNOMED CT	3,002	0.01%	98.98%
ranolazine	35829	RxNorm	2,988	0.01%	98.98%
Cyclosporine	3008	RxNorm	2,988	0.01%	98.99%
Isosorbide Dinitrate	6058	RxNorm	2,973	0.01%	99.00%
Glucocorticoid (substance)	419933005	SNOMED CT	2,959	0.01%	99.01%
Terfenadine	42330	RxNorm	2,955	0.01%	99.01%
Melatonin	6711	RxNorm	2,950	0.01%	99.02%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Procainamide	8700	RxNorm	2,947	0.01%	99.03%
Ketoprofen	6142	RxNorm	2,934	0.01%	99.04%
Pistachio nut (substance)	227512001	SNOMED CT	2,907	0.01%	99.04%
Steroid (substance)	116566001	SNOMED CT	2,898	0.01%	99.05%
Hydrocolloid (substance)	400872007	SNOMED CT	2,876	0.01%	99.06%
Probenecid	8698	RxNorm	2,857	0.01%	99.07%
tadalafil	358263	RxNorm	2,839	0.01%	99.07%
Aspirin / Caffeine / Propoxyphene	689518	RxNorm	2,815	0.01%	99.08%
Pepper (substance)	412066006	SNOMED CT	2,809	0.01%	99.09%
Carboplatin	40048	RxNorm	2,779	0.01%	99.09%
fexofenadine / Pseudoephedrine	214565	RxNorm	2,757	0.01%	99.10%
Scallop (substance)	736027000	SNOMED CT	2,730	0.01%	99.11%
Aztreonam	1272	RxNorm	2,725	0.01%	99.11%
Hazelnut (substance)	256353000	SNOMED CT	2,713	0.01%	99.12%
Rice (substance)	67324005	SNOMED CT	2,711	0.01%	99.13%
Hydrochlorothiazide / valsartan	214626	RxNorm	2,707	0.01%	99.14%
Sesame oil (substance)	89707004	SNOMED CT	2,706	0.01%	99.14%
Grapes (substance)	256317002	SNOMED CT	2,684	0.01%	99.15%
Sesame seed (substance)	260167008	SNOMED CT	2,672	0.01%	99.16%
Zinc	11416	RxNorm	2,642	0.01%	99.16%
Typhoid vaccine (substance)	396441007	SNOMED CT	2,628	0.01%	99.17%
zonisamide	39998	RxNorm	2,609	0.01%	99.18%
Hyoscyamine	153970	RxNorm	2,605	0.01%	99.18%
Amphetamine aspartate / Amphetamine Sulfate / Dextroamphetamine saccharate / Dextroamphetamine Sulfate	822929	RxNorm	2,594	0.01%	99.19%
Metolazone	6916	RxNorm	2,585	0.01%	99.20%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Povidone	8610	RxNorm	2,579	0.01%	99.20%
Magnesium	6574	RxNorm	2,539	0.01%	99.21%
glimepiride	25789	RxNorm	2,520	0.01%	99.21%
Calcium Carbonate	1897	RxNorm	2,494	0.01%	99.22%
tapentadol	787390	RxNorm	2,479	0.01%	99.23%
Grapefruit (substance)	256315005	SNOMED CT	2,471	0.01%	99.23%
Estrogens, Conjugated (USP)	4099	RxNorm	2,461	0.01%	99.24%
Naloxone / Pentazocine	214721	RxNorm	2,459	0.01%	99.25%
Bean (substance)	256354006	SNOMED CT	2,457	0.01%	99.25%
xanthine	1311085	RxNorm	2,454	0.01%	99.26%
Loratadine / Pseudoephedrine	214682	RxNorm	2,420	0.01%	99.26%
Fluorouracil	4492	RxNorm	2,419	0.01%	99.27%
nebivolol	31555	RxNorm	2,417	0.01%	99.28%
Phenylpiperazine antidepressant (substance)	412051008	SNOMED CT	2,395	0.01%	99.28%
Codeine / Pseudoephedrine	214445	RxNorm	2,381	0.01%	99.29%
Pear (substance)	735050002	SNOMED CT	2,381	0.01%	99.29%
Medroxyprogesterone	6691	RxNorm	2,369	0.01%	99.30%
Griseofulvin	5021	RxNorm	2,357	0.01%	99.31%
Flecainide	4441	RxNorm	2,334	0.01%	99.31%
Hydrocortisone / Neomycin / Polymyxin B	217627	RxNorm	2,330	0.01%	99.32%
Terbutaline	10368	RxNorm	2,329	0.01%	99.32%
Belladonna Alkaloids	1359	RxNorm	2,325	0.01%	99.33%
Aubergine (substance)	227219006	SNOMED CT	2,321	0.01%	99.34%
iodinated glycerol	27723	RxNorm	2,319	0.01%	99.34%
Cranberries (substance)	227421003	SNOMED CT	2,305	0.01%	99.35%
bismuth subsalicylate	19478	RxNorm	2,299	0.01%	99.35%
Chloramphenicol	2348	RxNorm	2,289	0.01%	99.36%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Iohexol	5956	RxNorm	2,273	0.01%	99.36%
salmeterol	36117	RxNorm	2,265	0.01%	99.37%
Vitamin E	11256	RxNorm	2,258	0.01%	99.38%
Estradiol	4083	RxNorm	2,241	0.01%	99.38%
ethyl ether	1363043	RxNorm	2,215	0.01%	99.39%
Propafenone	8754	RxNorm	2,214	0.01%	99.39%
Anthrax vaccine (substance)	396420001	SNOMED CT	2,185	0.01%	99.40%
Vitamin B 12	11248	RxNorm	2,163	0.01%	99.40%
Dihydroergotamine	3418	RxNorm	2,162	0.01%	99.41%
Antiparkinsonian agent (substance)	372783007	SNOMED CT	2,158	0.01%	99.41%
Acetaminophen / Brompheniramine / Pseudoephedrine	689558	RxNorm	2,132	0.01%	99.42%
Desipramine	3247	RxNorm	2,118	0.01%	99.42%
Enalaprilat	3829	RxNorm	2,117	0.01%	99.43%
Trospium	236778	RxNorm	2,114	0.01%	99.44%
Menthol	6750	RxNorm	2,111	0.01%	99.44%
Opium	7676	RxNorm	2,099	0.01%	99.45%
Celery (substance)	256326004	SNOMED CT	2,087	0.01%	99.45%
Smallpox vaccine (substance)	396439006	SNOMED CT	2,078	0.01%	99.46%
Aminophylline	689	RxNorm	2,068	0.01%	99.46%
Indapamide	5764	RxNorm	2,063	0.01%	99.47%
Naltrexone	7243	RxNorm	2,061	0.01%	99.47%
Progesterone	8727	RxNorm	2,037	0.01%	99.48%
telithromycin	274786	RxNorm	2,027	0.01%	99.48%
saxagliptin	857974	RxNorm	2,013	0.01%	99.49%
Acetaminophen / butalbital / Caffeine / Codeine	689561	RxNorm	2,008	0.01%	99.49%
torseamide	38413	RxNorm	2,007	0.01%	99.50%
Cerivastatin	596723	RxNorm	2,003	0.01%	99.50%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Pepperoni (substance)	442771000124102	SNOMED CT	1,994	0.01%	99.51%
acetaminophen / chlorpheniramine / dextromethorphan / pseudoephedrine	689582	RxNorm	1,984	0.00%	99.51%
Almond oil (substance)	391737006	SNOMED CT	1,971	0.00%	99.52%
Calcium	1895	RxNorm	1,943	0.00%	99.52%
Seed (substance)	264337003	SNOMED CT	1,939	0.00%	99.53%
oxaliplatin	32592	RxNorm	1,936	0.00%	99.53%
Turkey - meat (substance)	226967004	SNOMED CT	1,933	0.00%	99.54%
Barley (substance)	735124003	SNOMED CT	1,931	0.00%	99.54%
Berry (substance)	63045006	SNOMED CT	1,924	0.00%	99.55%
Hydrogen Peroxide	5499	RxNorm	1,911	0.00%	99.55%
Coffee (substance)	29263009	SNOMED CT	1,905	0.00%	99.56%
milnacipran	588250	RxNorm	1,904	0.00%	99.56%
Loperamide	6468	RxNorm	1,904	0.00%	99.57%
Wheat (substance)	412071004	SNOMED CT	1,901	0.00%	99.57%
Tuna fish (substance)	227144008	SNOMED CT	1,898	0.00%	99.58%
dorzolamide / Timolol	662263	RxNorm	1,885	0.00%	99.58%
Tamoxifen	10324	RxNorm	1,884	0.00%	99.58%
Wheat (substance)	226734009	SNOMED CT	1,882	0.00%	99.59%
Mustard (substance)	51905005	SNOMED CT	1,866	0.00%	99.59%
Papaya (substance)	735212003	SNOMED CT	1,864	0.00%	99.60%
Vitamin D	11253	RxNorm	1,861	0.00%	99.60%
fosphenytoin	72236	RxNorm	1,860	0.00%	99.61%
Psyllium	8928	RxNorm	1,859	0.00%	99.61%
Sunflower seed (substance)	260205009	SNOMED CT	1,848	0.00%	99.62%
Clam (substance)	736030007	SNOMED CT	1,845	0.00%	99.62%
Ginger (substance)	227400003	SNOMED CT	1,845	0.00%	99.63%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Chlorpheniramine / HYDROcodone	214392	RxNorm	1,829	0.00%	99.63%
Ceftazidime	2191	RxNorm	1,810	0.00%	99.64%
Cucumber (substance)	735213008	SNOMED CT	1,795	0.00%	99.64%
Silicones	9778	RxNorm	1,794	0.00%	99.65%
Caffeine / Ergotamine	214336	RxNorm	1,789	0.00%	99.65%
Propylthiouracil	8794	RxNorm	1,781	0.00%	99.65%
Lithium Carbonate	42351	RxNorm	1,774	0.00%	99.66%
Ergotamine	4025	RxNorm	1,772	0.00%	99.66%
HYDROcodone / Pseudoephedrine	214631	RxNorm	1,768	0.00%	99.67%
Betamethasone	1514	RxNorm	1,761	0.00%	99.67%
Formula milk (substance)	386127005	SNOMED CT	1,750	0.00%	99.68%
Rye (substance)	412068007	SNOMED CT	1,741	0.00%	99.68%
Bee pollen (substance)	412583005	SNOMED CT	1,726	0.00%	99.69%
Red meat (substance)	226915003	SNOMED CT	1,691	0.00%	99.69%
Aloe Extract	91263	RxNorm	1,685	0.00%	99.69%
carbinoxamine / Pseudoephedrine	214364	RxNorm	1,660	0.00%	99.70%
Potassium	8588	RxNorm	1,650	0.00%	99.70%
apixaban	1364430	RxNorm	1,646	0.00%	99.71%
Ciprofloxacin / Dexamethasone	465397	RxNorm	1,644	0.00%	99.71%
Acetaminophen / Diphenhydramine	214181	RxNorm	1,636	0.00%	99.71%
Chlordiazepoxide / clidinium	611854	RxNorm	1,634	0.00%	99.72%
formoterol / Mometasone	1002293	RxNorm	1,628	0.00%	99.72%
trichloroacetaldehyde	38574	RxNorm	1,604	0.00%	99.73%
Mercury, Ammoniated	29542	RxNorm	1,604	0.00%	99.73%
atomoxetine	38400	RxNorm	1,599	0.00%	99.73%
Adhesive agent (substance)	418920007	SNOMED CT	1,586	0.00%	99.74%
Acetaminophen / Dextromethorphan / Doxylamine	705258	RxNorm	1,585	0.00%	99.74%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Paclitaxel	56946	RxNorm	1,553	0.00%	99.75%
Diphtheria + pertussis + tetanus + Haemophilus influenzae type b vaccine (product)	412373007	SNOMED CT	1,550	0.00%	99.75%
Zinc Oxide	11423	RxNorm	1,543	0.00%	99.75%
Wasp venom (substance)	256440004	SNOMED CT	1,542	0.00%	99.76%
Hydrochlorothiazide / irbesartan	214617	RxNorm	1,533	0.00%	99.76%
Insulin Glargine	274783	RxNorm	1,513	0.00%	99.77%
Lemon (substance)	735340006	SNOMED CT	1,507	0.00%	99.77%
Spinach (substance)	256329006	SNOMED CT	1,507	0.00%	99.77%
telmisartan	73494	RxNorm	1,495	0.00%	99.78%
lurasidone	1040028	RxNorm	1,492	0.00%	99.78%
resorcinol	35382	RxNorm	1,482	0.00%	99.78%
Dobutamine	3616	RxNorm	1,479	0.00%	99.79%
Trifluoperazine	10800	RxNorm	1,452	0.00%	99.79%
Food preservative (substance)	51386004	SNOMED CT	1,445	0.00%	99.80%
zafirlukast	114970	RxNorm	1,428	0.00%	99.80%
Ethinyl Estradiol	4124	RxNorm	1,427	0.00%	99.80%
Food flavoring agent (substance)	80259003	SNOMED CT	1,426	0.00%	99.81%
Diphenhydramine / Zinc Acetate	466522	RxNorm	1,421	0.00%	99.81%
Dutasteride	228790	RxNorm	1,406	0.00%	99.81%
Broccoli (substance)	735123009	SNOMED CT	1,401	0.00%	99.82%
Dextromethorphan / guaifENesin	214488	RxNorm	1,392	0.00%	99.82%
Salmon (substance)	735009005	SNOMED CT	1,391	0.00%	99.82%
Sulfur (substance)	43735007	SNOMED CT	1,390	0.00%	99.83%
guaiacolsulfonate / HYDROcodone	1008519	RxNorm	1,389	0.00%	99.83%
Aspirin / Caffeine / Orphenadrine	466549	RxNorm	1,377	0.00%	99.83%
Levalbuterol	237159	RxNorm	1,369	0.00%	99.84%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Benzalkonium / Lidocaine	690077	RxNorm	1,363	0.00%	99.84%
Plum (substance)	735051003	SNOMED CT	1,360	0.00%	99.85%
Bisoprolol / Hydrochlorothiazide	214317	RxNorm	1,338	0.00%	99.85%
Ticagrelor	1116632	RxNorm	1,336	0.00%	99.85%
Cholecalciferol	2418	RxNorm	1,335	0.00%	99.86%
Acetaminophen / Dextromethorphan / Diphenhydramine / Pseudoephedrine	466566	RxNorm	1,335	0.00%	99.86%
Carbapenem (substance)	396345004	SNOMED CT	1,334	0.00%	99.86%
Wine (substance)	35748005	SNOMED CT	1,316	0.00%	99.87%
dronedarone	233698	RxNorm	1,308	0.00%	99.87%
Chlorhexidine / Isopropyl Alcohol	484139	RxNorm	1,298	0.00%	99.87%
Red food coloring (substance)	446273004	SNOMED CT	1,297	0.00%	99.87%
Brazil nut (substance)	256351003	SNOMED CT	1,279	0.00%	99.88%
Nitrofurantoin derivative (substance)	360201004	SNOMED CT	1,278	0.00%	99.88%
Aspirin / Pentazocine	214257	RxNorm	1,275	0.00%	99.88%
Lactase (product)	424369009	SNOMED CT	1,269	0.00%	99.89%
phenyltoloxamine	33408	RxNorm	1,267	0.00%	99.89%
Epinephrine / Lidocaine	107602	RxNorm	1,264	0.00%	99.89%
Glucose	4850	RxNorm	1,263	0.00%	99.90%
Pentamidine	7994	RxNorm	1,253	0.00%	99.90%
brimonidine / Timolol	597142	RxNorm	1,243	0.00%	99.90%
Poultry (substance)	28230009	SNOMED CT	1,214	0.00%	99.91%
trovafloxacin	115552	RxNorm	1,211	0.00%	99.91%
guaifenesin / Pseudoephedrine	214599	RxNorm	1,210	0.00%	99.91%
dexlansoprazole	816346	RxNorm	1,209	0.00%	99.92%
dexbrompheniramine / Pseudoephedrine	400674	RxNorm	1,194	0.00%	99.92%
Dimenhydrinate	3444	RxNorm	1,178	0.00%	99.92%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
Amphetamine	725	RxNorm	1,178	0.00%	99.92%
Aspirin / Caffeine	214250	RxNorm	1,175	0.00%	99.93%
Oxytetracycline / Polymyxin B	689467	RxNorm	1,158	0.00%	99.93%
tazobactam	37617	RxNorm	1,150	0.00%	99.93%
Brompheniramine / Dextromethorphan / Pseudoephedrine	690808	RxNorm	1,141	0.00%	99.94%
penicillin G benzathine / penicillin G procaine	466553	RxNorm	1,140	0.00%	99.94%
Plasma protein fraction (substance)	386962001	SNOMED CT	1,133	0.00%	99.94%
Beta-lactam antibiotic (substance)	373297006	SNOMED CT	1,132	0.00%	99.95%
Apricot (substance)	735214002	SNOMED CT	1,117	0.00%	99.95%
Dexamethasone / Tobramycin	883815	RxNorm	1,112	0.00%	99.95%
pitavastatin	861634	RxNorm	1,105	0.00%	99.95%
POLYETHYLENE GLYCOL 3350	221147	RxNorm	1,102	0.00%	99.96%
zileuton	40575	RxNorm	1,097	0.00%	99.96%
Lactase / rennet	1007388	RxNorm	1,091	0.00%	99.96%
Pulse vegetables (substance)	227313005	SNOMED CT	1,091	0.00%	99.96%
gemifloxacin	138099	RxNorm	1,078	0.00%	99.97%
Varicella virus vaccine (substance)	396442000	SNOMED CT	1,070	0.00%	99.97%
Varicella-zoster virus antibody (substance)	259858000	SNOMED CT	1,050	0.00%	99.97%
Norfloxacin	7517	RxNorm	1,050	0.00%	99.98%
Sugar (substance)	74801000	SNOMED CT	1,049	0.00%	99.98%
Iron polysaccharide	219315	RxNorm	1,029	0.00%	99.98%
candesartan	214354	RxNorm	1,027	0.00%	99.98%
Acetaminophen / Caffeine / Chlorpheniramine / Hydrocodone / Phenylephrine	1008298	RxNorm	1,026	0.00%	99.99%
dehydroepiandrosterone	3143	RxNorm	1,019	0.00%	99.99%
Aloe (substance)	391739009	SNOMED CT	1,015	0.00%	99.99%

Concept Name	Concept Code	System	Counts	Fraction	Cumulative
bacitracin / hydrocortisone / neomycin / polymyxin b	689623	RxNorm	1,014	0.00%	99.99%
Thiothixene	10510	RxNorm	1,004	0.00%	100.00%
Gelatin (substance)	373531009	SNOMED CT	693	0.00%	100.00%
Buckwheat - cereal (substance)	226723006	SNOMED CT	462	0.00%	100.00%
Squid (substance)	735006003	SNOMED CT	338	0.00%	100.00%
Marine crustacean (substance)	735977009	SNOMED CT	95	0.00%	100.00%
Yam (substance)	726730005	SNOMED CT	89	0.00%	100.00%
Mackerel (substance)	735043001	SNOMED CT	22	0.00%	100.00%
Abalone canned in brine (substance)	227208008	SNOMED CT	2	0.00%	100.00%
Lupine seed (substance)	710179004	SNOMED CT	0	0.00%	100.00%
SALMON ROE	n/a	n/a	0	0.00%	100.00%
Marine mollusk (substance)	735959004	SNOMED CT	0	0.00%	100.00%