Characterization of the Medical Subject Headings thesaurus for pharmacy

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Evidence-based practice for all health professions consists of integrating individual clinical expertise with the best available evidence from systematic research. Systematic reviews support the advance of science and translation of research evidence into clinical practice and constitute, at the same time, the highest level of scientific evidence by limiting both the bias and the random error inherent in other types of research. Searching the literature is critical when conducting systematic reviews, and searches must be systematically performed and constructed in a way that maximizes results. Additionally, being able to efficiently search the literature is an essential skill for the practice of evidence-based medicine.

In order to find the best and most relevant evidence, reliable systems are required for information retrieval; to that end, several databases are available to practitioners. MEDLINE, the National Library of Medicine (NLM) journal citation database, contains journal citations and abstracts for biomedical literature from around the world. PubMed is a freely available search engine that provides access to the MEDLINE database, among others, and it contains over 23 million citations. In comparison to other databases such as EMBASE and the Cumulative Index to Nursing and Allied Health, MEDLINE alone was shown to cover more than 80% of potentially relevant articles in some biomedical fields. Conversely, for the area of family medicine, EMBASE provided greater coverage of total

Purpose. The completeness and utility of pharmacy-oriented Medical Subject Headings (MeSH) relative to MeSH terminology pertaining to other healthcare professions (dentistry and nursing) are evaluated.

Methods. The 2013 version of the MeSH thesaurus—the standard vocabulary used by the National Library of Medicine (NLM) to index articles in PubMed and MEDLINE—was searched for dentistry-, nursing-, and pharmacy-specific terms using a truncation strategy (search terms: nusr*, dent*, and pharm*); the hierarchical level of each term and the number of descendant terms (an indication of the granularity of the associated NLM-indexed content) were determined. PubMed searches were conducted to identify areas of the MeSH hierarchy containing dentistry- and nursing-specific terms but no equivalent pharmacy-specific term.

Results. The search of the MeSH thesaurus identified 145 terms representing dentistry-specific activities and 94 and 26 terms specific to nursing and pharmacy practice, respectively. Analysis of the three sets of MeSH terms indicated that dentistry-oriented MeSH terms were generally situated more prominently within the MeSH hierarchy than terms for nursing- and pharmacy-oriented research; the MeSH terminology oriented toward nursing or dentistry practice was relatively more granular, allowing for increased specificity and power of information retrieval during PubMed and MEDLINE searches. Seventeen proposed new MeSH terms describing key areas of pharmacy practice were identified; the inclusion of these terms in the MeSH hierarchy could substantially expand and improve the retrievability of NLM-indexed literature.

Conclusion. Imbalances and gaps were found in MeSH coverage of pharmacy concepts and terminology relative to MeSH terminology specific to the nursing and dentistry professions.
retrieved citations than MEDLINE. Among all the online scientific medical resources, PubMed is one of the most widely used for the retrieval of medical literature. Although it remains a matter of controversy, some evidence suggests that PubMed is more specific than Google Scholar for locating relevant primary literature articles, even though PubMed searches yield fewer total citations than Google Scholar results and provide less access to free full-text publications.

The Medical Subject Headings (MeSH) lexicon is the NLM’s controlled vocabulary thesaurus used for indexing and cataloging the literature in PubMed. MeSH terms are arranged in a hierarchical form, or MeSH tree. MeSH tree descriptors are organized in 16 main categories and further divided into subcategories of descendant (i.e., parent and child) MeSH terms. MeSH categories are identified by a capital letter, while subordinate parent and child MeSH terms are identified by the category letter and a number according to the hierarchical level they occupy. For example, one MeSH category is “Anthropology, Education, Sociology and Social Phenomena” (designated as category I). Within that category, there are various descendant terms, such as “Education” (I02); “Education, Professional” (I02.358); “Education, Dental” (I02.358.274); “Education, Medical” (I02.358.399); “Education, Nursing” (I02.358.462); and “Education, Pharmacy” (I02.358.525). The number of descendant terms per MeSH varies, with a higher number of descendants indicating increased granularity of the MeSH structure.

MeSH terms are organized in a nine-level hierarchy, with the 16 main categories at level 1 and each successive level number indicating increasingly less prominence within the MeSH tree (e.g., level 2 terms are more prominently positioned than level 3 terms). MeSH terms placed lower in the tree hierarchy are more specific, while MeSH terms that are broader in scope occupy higher levels. Also, a given MeSH term can be positioned in multiple tree branches. The MeSH database is continuously updated and revised annually, and suggestions for new MeSH terms can be proposed and submitted. Efforts to influence the evolution of the MeSH vocabulary have been made in some professions, such as nursing and dentistry.

Using MeSH terms to conduct literature searches has been shown to improve effectiveness by reducing the number of irrelevant citations retrieved. Furthermore, knowledge and appropriate use of MeSH terms was identified as one of the five critical elements in the development of an effective MEDLINE search. However, the MeSH thesaurus has also been subject to some criticism, especially regarding its degree of completeness as a tool for conducting certain types of research. Portaluppi drew attention to the fact that the MeSH thesaurus was inaccurate and incomplete for retrieving chronobiologic references. Richter and Austin found that several entry terms (i.e., textual search phrases) commonly used by physical therapists did not “map” to an appropriate MeSH. Incompleteness of the MeSH thesaurus or inaccurate indexing of articles could contribute to incomplete literature retrieval and thus be a source of bias in conducting systematic reviews.

We sought to evaluate if there are gaps in the MeSH thesaurus with regard to MeSH headings and subheadings relevant to the pharmacy profession. Therefore, the aim of the study described here was to evaluate the completeness of the MeSH thesaurus for specificity and utility to pharmacy versus two other health professions: nursing and dentistry.

Methods

The 2013 version of the MeSH thesaurus was extracted from the NLM website, exported into Microsoft Excel (Microsoft Corporation, Redmond, WA), and formatted as a hierarchical tree-form spreadsheet. The thesaurus included a total of 26,851 MeSH terms organized in 16 categories. As the same MeSH terms can be positioned in different MeSH tree branches, the 26,851 MeSH terms corresponded to 54,935 different positions.

The MeSH database was then searched to identify all MeSH terms related to the three health professions analyzed—nursing, dentistry, and pharmacy—by using the following truncated terms: nurs*, dent*, and pharm*. MeSH terms that corresponded to specific activities of any of the three professions were included. MeSH terms were excluded from the analysis if they pertained to (1) medical or psychological conditions, (2) chemicals, drugs, or medical devices, (3) anatomy elements, (4) information not related to the profession, or (5) activities performed by more than one profession. Where no definition was available in the online MeSH database or the definition was unclear, the titles and abstracts of the first 40 articles retrieved using the MeSH (i.e., two pages of PubMed results using the default display setting) were analyzed. The articles were sorted by using the “recently added” filter to reflect the most recent indexing practices. At the end of this process, three lists containing MeSH terms referring to specific activities in the nursing, dentistry, and pharmacy professions were obtained. The MeSH terms on these three lists were subsequently identified in the corresponding Excel file, and tree descriptors for each MeSH term included were determined. The hierarchical level of each term and the number of descendant terms (an indication of the granularity of the associated indexed information) were also determined.
To identify areas where potentially useful pharmacy-oriented MeSH terms were lacking, parent terms for which there were both nursing- and dentistry-specific child terms but no equivalent pharmacy-specific child term were identified. Parent terms were found through an automatic process of deleting the three final positions of the tree number for all the nursing, dentistry, and pharmacy MeSH terms in the entire MeSH tree. Subsequently, all MeSH terms that included a nursing- and a dentistry-related child but not a pharmacy-related child were identified in the hierarchical tree-form Excel file.

The number of articles indexed under each nursing or dentistry child MeSH was determined in PubMed, allowing automatic explosion (i.e., the process by which MeSH terms are automatically expanded to enable the retrieval of not only citations that carry the specified MeSH but also citations that carry any of the more specific MeSH terms, or descendants, included beneath the parent MeSH in the tree structure). To estimate the number of pharmacy-related articles that might be appropriately indexed under currently lacking pharmacy-oriented MeSH terms (if those terms were included in the MeSH thesaurus), searches were performed by using the parent MeSH plus the terms pharmacist or pharmacy entered as text-word field descriptors, as designated with the search field tag [TW], and Boolean operators. For example, one search was performed by keying in the following search command: <<philosophy[MH] AND pharmacist*[TW] OR pharmacy[TW]>>. Appending search terms with the [TW] tag allows the retrieval of articles containing the specified words in the article title or abstract as well as MeSH headings and subheadings, among other search fields.

Descriptive statistical analyses were carried out, with absolute values and relative frequencies reported for categorical variables; central tendencies with dispersion are reported for continuous or discrete variables.

Results

The numbers of terms retrieved from the MeSH database in April 2013 using the truncation strategy were 145 for nursing, 921 for dentistry, and 781 for pharmacy (Table 1). After applying exclusion criteria, 51 nursing MeSH terms, 776 dentistry MeSH terms, and 755 pharmacy MeSH terms were excluded. Ultimately, 94 MeSH terms (located in 173 different tree positions) were identified as being nursing-specific terms, with 145 MeSH terms (in 270 positions) identified as dentistry-specific terms and 26 MeSH terms (located in 44 positions) identified as pharmacy-specific terms (appendix).

The majority of the MeSH terms identified for each of the three professions were located at the end of their respective tree branches; thus, 82.7% of the nursing-specific, 76.3% of the dentistry-specific, and 81.8% of the pharmacy-specific MeSH terms did not have any descendants. The number of descendants per MeSH term were not homogeneously distributed across the three professions; the 90th percentile of the number of descendants per MeSH was 2.0 for nursing, 4.9 for dentistry, and 3.5 for pharmacy.

Dentistry terms were generally situated more prominently in the MeSH hierarchy, with 43% of terms at level 4 or higher, relative to nursing and pharmacy terms (only 15% and 25% of terms were at level 4 or higher, respectively). Only dentistry-related MeSH terms included one level 2 term. Both nursing and dentistry MeSH terms branched to level 9, while pharmacy MeSH terms branched only until level 8, as shown in Table 2.

Important differences were found in the categorization of the MeSH terms of the three professions by

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Table 1.

Results of MeSH Database Search for Profession-Specific Terms and Application of Exclusion Criteria

<table>
<thead>
<tr>
<th>Result/Action</th>
<th>Nursing</th>
<th>Dentistry</th>
<th>Pharmacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total terms identified in search</td>
<td>145</td>
<td>921</td>
<td>781</td>
</tr>
<tr>
<td>Term excluded because it referred to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical or psychological conditions</td>
<td>3</td>
<td>148</td>
<td>18</td>
</tr>
<tr>
<td>Chemicals, drugs, or medical devices</td>
<td>6</td>
<td>529</td>
<td>667</td>
</tr>
<tr>
<td>Anatomy elements</td>
<td>...b</td>
<td>47</td>
<td>...</td>
</tr>
<tr>
<td>Activities or issues unrelated to profession</td>
<td>23</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>Activities performed by more than one profession</td>
<td>19</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td>Total terms excluded</td>
<td>51</td>
<td>776</td>
<td>755</td>
</tr>
<tr>
<td>Profession-specific terms (positions in MeSH tree)</td>
<td>94 (173)</td>
<td>145 (270)</td>
<td>26 (44)</td>
</tr>
</tbody>
</table>

*MeSH = Medical Subject Headings.

bNo article excluded.

cTerms listed in appendix.
MEDLINE search category. For the
dentistry profession, 54.4% of MeSH
terms were in the “Procedures and
Techniques” MEDLINE category.
Nursing MeSH terms were mostly
distributed throughout the “Health
Care” (46.8%) and the “Disciplines
and Occupations” (24.9%) catego-
ries, while pharmacy MeSH terms
were mostly in the “Health Care”
(54.5%) and the “Anthropology,
Education, Sociology and Social Phe-
nomena” (15.9%) categories.

Finally, 18 parent MeSH terms
that contained both a nursing- and
a dentistry-related child MeSH but
not a corresponding pharmacy-
related child MeSH were identified
(Table 3), and equivalent phar-
macy terms were proposed for 17
of those terms (there is no phar-
macy-focused National Institutes
of Health [NIH] institute analogous
to the National Institute of Nurs-
ing Research and the National In-
stitute of Dental and Craniofacial
Research). The median numbers
of articles retrieved for each of
the 18 nursing- and dentistry-
related MeSH terms with the use of
the automatic explosion function
were 3,435 (range, 17–73,739) and
1,569 (range, 29–7,289), respective-
ly. The median number of pharmacy-
related articles that were judged to
be potentially appropriate for index-
ing under each of the 17 proposed
equivalent pharmacy MeSH terms was
825, with a range of 22–10,811.

Discussion
To the best of our knowledge,
no studies to date have specifically
analyzed MeSH terms related to the
pharmacy profession, even though
other investigators have cited a need
for such research. In the study
described here, we sought to evaluate
the completeness of the MeSH the-
saurus for pharmacy practice by com-
paring it with the thesauruses of two
other professions: nursing and den-
tistry. Because MEDLINE focuses on
biomedicine—primarily the litera-
ture of the medical profession—we
chose to compare MeSH terms spe-
cific to three other healthcare profes-
sions in order to assess the degree of
MEDLINE coverage of the profes-
sional body of literature of each
and its comparative accessibility to
MEDLINE users.

Our results show a clear imbalance
in the completeness and granularity
of the MeSH thesaurus for pharmacy
compared with the thesauruses of
nursing and dentistry. The number
of pharmacy-relevant MeSH terms
obtained was approximately one
third and one fifth of the numbers
of terms identified for nursing and
dentistry, respectively.

It should be noted that consider-
able research has been conducted
regarding the completeness and
adequacy of the MeSH thesauruses
for nursing and dentistry; this might have contributed to the improvement of the nursing and
dentistry MeSH thesauruses over the
past two decades, which could help
explain the differences found in our
study.

In terms of hierarchical distribu-
tion, existing pharmacy MeSH terms
are concentrated in intermediate
levels (generally at lower levels than
dentistry terms). This could be in-
terpreted as evidence of (1) NLM
attributing more importance to den-
tistry than to pharmacy and nursing
by creating a MeSH category only
for the former discipline or (2) NLM
allowing more specificity in nursing
and dentistry MeSH terms relative to
pharmacy MeSH terms.

We objectively identified 18 MeSH
terms that contained nursing- and
dentistry-specific but not pharmacy-
specific descendants. For example,
although the hierarchy for the
parent MeSH term “Education,
Professional” includes child MeSH
terms specific to all the profes-
sions analyzed and the medical
profession (i.e., “Education, Den-
tal,” “Education, Medical,” “Eduea-
tion, Nursing,” and “Education,

Table 2.

<table>
<thead>
<tr>
<th>Level</th>
<th>Nursing</th>
<th>Dentistry</th>
<th>Pharmacy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>1 (0.4)</td>
<td>0</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>3</td>
<td>3 (1.7)</td>
<td>32 (11.9)</td>
<td>2 (4.5)</td>
<td>37 (7.6)</td>
</tr>
<tr>
<td>4</td>
<td>23 (13.3)</td>
<td>83 (30.7)</td>
<td>9 (20.5)</td>
<td>115 (23.6)</td>
</tr>
<tr>
<td>5</td>
<td>90 (52.0)</td>
<td>80 (29.6)</td>
<td>19 (43.2)</td>
<td>189 (38.8)</td>
</tr>
<tr>
<td>6</td>
<td>39 (22.5)</td>
<td>42 (15.6)</td>
<td>11 (25.0)</td>
<td>92 (18.9)</td>
</tr>
<tr>
<td>7</td>
<td>16 (9.2)</td>
<td>19 (7.0)</td>
<td>2 (4.5)</td>
<td>37 (7.6)</td>
</tr>
<tr>
<td>8</td>
<td>1 (0.6)</td>
<td>12 (4.4)</td>
<td>1 (2.3)</td>
<td>14 (2.9)</td>
</tr>
<tr>
<td>9</td>
<td>1 (0.6)</td>
<td>1 (0.4)</td>
<td>0</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Total</td>
<td>173 (100)</td>
<td>270 (100)</td>
<td>44 (100)</td>
<td>487 (100)</td>
</tr>
</tbody>
</table>

*MeSH = Medical Subject Headings.
*All data are no. (%).
*In descending order of prominence in MeSH tree (i.e, level 2 terms are more prominently positioned than level 3 terms).
<table>
<thead>
<tr>
<th>Parent Term</th>
<th>Existing Child Term (No. Indexed Articles)</th>
<th>Existing Child Term (No. Indexed Articles)</th>
<th>Proposed Pharmacy-Specific Child Term (No. Indexed Articles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Research</td>
<td>Nursing Research (44,854)</td>
<td>Dental Research (2,137)</td>
<td>Pharmacy Research (1,152)</td>
</tr>
<tr>
<td>Clinical Audit</td>
<td>Nursing Audit (2,908)</td>
<td>Dental Audit (331)</td>
<td>Pharmacy Audit (245)</td>
</tr>
<tr>
<td>Comprehensive Health Care</td>
<td>Nursing Process (73,739)</td>
<td>Comprehensive Dental Care (548)</td>
<td>Pharmacy Process (1,621)</td>
</tr>
<tr>
<td>Delivery of Health Care</td>
<td>Nurse's Practice Patterns (652)</td>
<td>Dentist's Practice Patterns (1,533)</td>
<td>Pharmacist's Practice Patterns (10,811)</td>
</tr>
<tr>
<td>Economics</td>
<td>Economics, Nursing (3,871)</td>
<td>Economics, Dental (3,898)</td>
<td>Economics, Pharmacy (8,510)</td>
</tr>
<tr>
<td>Evidence-Based Practice</td>
<td>Evidence-Based Nursing (1,589)</td>
<td>Evidence-Based Dentistry (621)</td>
<td>Evidence-Based Pharmacy (361)</td>
</tr>
<tr>
<td>Faculty</td>
<td>Faculty, Nursing (7,995)</td>
<td>Faculty, Dental (1,908)</td>
<td>Faculty, Pharmacy (481)</td>
</tr>
<tr>
<td>Forensic Sciences</td>
<td>Forensic Nursing (284)</td>
<td>Forensic Dentistry (2,284)</td>
<td>Forensic Pharmacy (44)</td>
</tr>
<tr>
<td>History</td>
<td>History of Nursing (2,999)</td>
<td>History of Dentistry (2,643)</td>
<td>History of Pharmacy (5,175)</td>
</tr>
<tr>
<td>Informatics</td>
<td>Nursing Informatics (898)</td>
<td>Dental Informatics (129)</td>
<td>Pharmacy Informatics (108)</td>
</tr>
<tr>
<td>National Institutes of Health (U.S.)</td>
<td>National Institute of Nursing Research (17)</td>
<td>National Institute of Dental and Craniofacial Research (29)</td>
<td>...</td>
</tr>
<tr>
<td>Patient Care Management</td>
<td>Nurse's Practice Patterns (652)</td>
<td>Dentist's Practice Patterns (1,533)</td>
<td>Pharmacist's Practice Patterns (6,857)</td>
</tr>
<tr>
<td>Personnel, Hospital</td>
<td>Nursing Staff, Hospital (36,455)</td>
<td>Dental Staff, Hospital (212)</td>
<td>Pharmacy Staff, Hospital (825)</td>
</tr>
<tr>
<td>Philosophy</td>
<td>Philosophy, Nursing (16,698)</td>
<td>Philosophy, Dental (3,148)</td>
<td>Philosophy, Pharmacy (770)</td>
</tr>
</tbody>
</table>

Continued on next page
Pharmacy"), the parent MeSH “Evidence-Based Practice” includes child MeSH terms specific only to dentistry, medicine, and nursing, with no corresponding “Evidence-Based Pharmacy” child MeSH (Table 3).

Some of the 18 terms appeared in the 2013 version of the MeSH lexicon as an “entry term,” or synonym, for the applicable parent MeSH, including the term “Pharmacy Faculty” (synonymous with “Faculty, Pharmacy”); however, this should not be considered sufficient given that “Medical,” “Dental,” and “Nursing” exist as descendants of the MeSH “Faculty,” resulting in a more specific indexing of the literature pertaining to those three professions compared with the pharmacy-pertinent literature.

For other proposed pharmacy MeSH terms identified in this study, similar terms already exist, such as “Economics, Pharmaceutical” (an existing MeSH), which is similar to “Economics, Pharmacy” (no existing MeSH). However, literature indexed under the MeSH “Economics, Pharmaceutical” is mainly focused on the impact of pharmaceuticals on the cost of care, while that indexed under “Economics, Dental”, “Economics, Medical”, and “Economics, Nursing” (terms equivalent to “Economics, Pharmacy”) covers the economic aspects of service provision by the respective practitioners of said professions; this is especially striking on considering the descendants of these MeSH terms (e.g., “Fees, Medical”, “Fees, Dental”), which convey a focus on the amount charged for professional services, while the descendant term “Fees, Pharmaceutical” reflects a focus on the amount charged for medications.

Including the proposed 17 new terms in the MeSH thesaurus in 2014—“Pharmacy Residency” and “Polypharmacology”—neither corresponds to any of those that we have proposed.

According to our results, to date over 2000 pharmacy articles, on average, would be indexed under each of the proposed new pharmacy-specific MeSH terms. Even though this figure is small compared with the number of articles covered by each of the correspondent dentistry-specific MeSH terms, it is similar to the number of articles indexed under the correspondent nursing MeSH terms. The deemphasis on pharmacy-specific versus dentistry- and nursing-specific literature in NLM databases is not limited to the incompleteness of the pharmacy MeSH thesaurus but is also evidenced by the comparatively small number of pharmacy journals indexed in MEDLINE and PubMed.

The imbalance of pharmacy versus dentistry or nursing coverage is common to other aspects of NLM indexing, such as the journal categories within the PubMed database. PubMed literature searches can be performed for specific nursing and dentistry journal subsets, but no subset of pharmacy journals currently exists. This situation may be a reflection of the NIH organizational culture. Among the 27 institutes and centers of NIH, there are institutes devoted to nursing and dental research, but no such institute has been created for pharmacy.

Our findings have several implications for the pharmacy profession, particularly for practitioners who are committed to evidence-based practice and research. Even though previous research has demonstrated that published pharmacy practice research may be difficult to access by conducting database searches alone, establishing evidence through systematic reviews using MeSH-based search strategies is advisable. An increased number of MeSH terms specific to pharmacy,
such as those identified in this study, would help refine search strategies by researchers attempting to answer a given clinical question, thus enhancing the utility of MEDLINE and perhaps preventing incomplete indexing. If the MeSH thesaurus were revised in that manner, pharmacy articles would appear indented beneath more specific child MeSH terms instead of just under the broader parent MeSH terms, which would be in accordance with MeSH terms’ main role: to organize information in a way that provides precision and power of retrieval.

In the absence of such a revision of the MeSH hierarchy, text-word searching continues to be an option, but the search specificity of such searches was shown to be lower than that of MeSH-based searches.

It is our intention to submit the results of our study to NLM staff responsible for MeSH matters in order to contribute to the improvement of the completeness of the pharmacy MeSH thesaurus.

The main limitation of our study was the highly restrictive method employed to identify potential new pharmacy MeSH terms. However, even with our restrictive method, we identified a substantial number of current MeSH terms specific to the nursing and dentistry professions for which equivalent pharmacy-specific terms are arguably needed. Previous investigators have contended that MeSH terms should be created to encompass beneath the applicable parent MeSH; it is possible that deeper within the MeSH hierarchy there are additional semantically equivalent child MeSH terms specific to nursing and dentistry that were not identified through our method.

**Conclusion**

Imbalances and gaps were found in MeSH coverage of pharmacy concepts and terminology relative to MeSH terminology specific to the nursing and dentistry professions.

**References**

Appendix—Pharmacy-specific terms currently included in the Medical Subject Headings thesaurus

- Behind-the-Counter Drugs
- Clinical Pharmacy Information Systems
- Community Pharmacy Services
- Dictionaries, Pharmaceutic
- Drug Compounding
- Education, Pharmacy
- Education, Pharmacy, Continuing
- Education, Pharmacy, Graduate
- Ethics, Pharmacy
- Fees, Pharmaceutical
- Insurance, Pharmaceutical Services
- Legislation, Pharmacy
- Licensure, Pharmacy
- Pharmaceutical Services
- Pharmaceutical Services, Online
- Pharmacies
- Pharmacists
- Pharmacists’ Aides
- Pharmacy
- Pharmacy Administration
- Pharmacy and Therapeutics Committee
- Pharmacy Service, Hospital
- Schools, Pharmacy
- Societies, Pharmaceutical
- Students, Pharmacy
- Technology, Pharmaceutical