ACCP Commentary

The 2016 ACCP Pharmacotherapy Didactic Curriculum Toolkit

Terry L. Schwinghammer, Andrew J. Crannage, Eric G. Boyce, Bridget Bradley, Alyssa Christensen, Henry M. Dunnenberger, Michelle Fravel, Holly Gurgle, Drayton A. Hammond, Jennifer Kwon, Douglas Slain, and Kurt A. Wargo
American College of Clinical Pharmacy

The 2016 American College of Clinical Pharmacy (ACCP) Educational Affairs Committee was charged with updating and contemporizing ACCP's 2009 Pharmacotherapy Didactic Curriculum Toolkit. The toolkit has been designed to guide schools and colleges of pharmacy in developing, maintaining, and modifying their curricula. The 2016 committee reviewed the recent medical literature and other documents to identify disease states that are responsive to drug therapy. Diseases and content topics were organized by organ system, when feasible, and grouped into tiers as defined by practice competency. Tier 1 topics should be taught in a manner that prepares all students to provide collaborative, patient-centered care upon graduation and licensure. Tier 2 topics are generally taught in the professional curriculum, but students may require additional knowledge or skills after graduation (e.g., residency training) to achieve competency in providing direct patient care. Tier 3 topics may not be taught in the professional curriculum; thus, graduates will be required to obtain the necessary knowledge and skills on their own to provide direct patient care, if required in their practice. The 2016 toolkit contains 276 diseases and content topics, of which 87 (32%) are categorized as tier 1, 133 (48%) as tier 2, and 56 (20%) as tier 3. The large number of tier 1 topics will require schools and colleges to use creative pedagogical strategies to achieve the necessary practice competencies. Almost half of the topics (48%) are tier 2, highlighting the importance of postgraduate residency training or equivalent practice experience to competently care for patients with these disorders. The Pharmacotherapy Didactic Curriculum Toolkit will continue to be updated to provide guidance to faculty at schools and colleges of pharmacy as these academic pharmacy institutions regularly evaluate and modify their curricula to keep abreast of scientific advances and associated practice changes. Access the current Pharmacotherapy Didactic Curriculum Toolkit at http://www.accp.com/docs/positions/misc/Toolkit_final.pdf

Key Words pharmacotherapy, disease states, pharmacy education, curriculum, accreditation, practice competency.

(Pharmacotherapy 2016;36(11):e189–e194) doi: 10.1002/phar.1846

This document was prepared by the 2016 ACCP Educational Affairs Committee: Terry L. Schwinghammer, Pharm.D., FCCP, BCPS (Chair); Andrew J. Crannage, Pharm.D., BCPS (Vice Chair); Eric G. Boyce, Pharm.D.; Bridget Bradley, Pharm.D., BCPP; Alyssa Christensen, Pharm.D.; Henry M. Dunnenberger, Pharm.D., BCPS; Michelle Fravel, Pharm.D., BCPS; Holly Gurgle, Pharm.D., BCACP, CDE; Drayton A. Hammond, Pharm.D., MBA, BCPS, BCCCP; Jennifer Kwon, Student Pharmacist; Douglas Slain, Pharm.D., FCCP, BCPS; and Kurt A. Wargo, Pharm.D., FCCP, BCPS.

Approved by the American College of Clinical Pharmacy Board of Regents on July 18, 2016. Final version received August 10, 2016.

Address reprint requests to the American College of Clinical Pharmacy, 13000 W. 87th St. Parkway, Suite 100, Lenexa, KS 66215; e-mail: accp@accp.com; or download from www.accp.com.

The 2016 American College of Clinical Pharmacy (ACCP) Educational Affairs Committee was charged with updating and contemporizing ACCP's 2009 Pharmacotherapy Didactic Curriculum Toolkit[1] to reflect the current consensus of pharmacotherapy experts and practicing clinical pharmacists. Many U.S. and international academic pharmacy institutions have used the 2009 toolkit as a guide for developing their didactic pharmacotherapy curriculum. However, new medical disorders and syndromes have been identified or become more prevalent since the 2009 toolkit was published by ACCP. In addition, many new drug treatments have become available, and some disease states now have specific pharmacotherapy options that were previously unavailable. Because of the many disease states that may be treated with drug therapy, the ongoing challenge to schools and colleges of pharmacy is to determine which topics should be included in a pharmacy curriculum that contains limited time for therapeutic content. Disease frequency, socioeconomic burden to society, and impact of pharmacist involvement in medication therapy should be considered in making these decisions. An updated pharmacotherapy toolkit can provide valuable guidance to schools and colleges of pharmacy as they develop, maintain, and modify their curricula to keep pace with major scientific advances and practice changes.

Process for Revision

The committee met face to face at the ACCP Global Conference on Clinical Pharmacy in October 2015. Individual committee members were assigned specific tasks, the outcomes of which were discussed during follow-up telephone conference calls. Using their individual knowledge and clinical interests, members searched the primary literature,[2–6] reviewed pharmacotherapy and medical textbooks,[7–12] and examined documents from national and international organizations[13–17] to identify the disease states treatable with drug therapy. Committee members also considered information from the curricula at their own academic institutions. The 2009 toolkit was placed in a Google Docs spreadsheet to serve as the starting point for revisions. Members then selected specific organ system–based categories to review and make recommendations for changes. These suggested changes were then evaluated by the entire committee during telephone conference calls. This process resulted in additions of disease states, changes in nomenclature, and exclusion of some potential diseases from the toolkit. Additional diseases that were considered but ultimately excluded from the revised toolkit were rejected if there was no specific pharmacotherapy for the disease, the disease was noted to occur rarely, or pharmacists were perceived as unlikely to be involved in the disease's management. This review process resulted in the following changes relative to the 2009 toolkit:

- The priority tier numbers were changed from Roman numerals to Arabic numbers for clarity.
- When possible, the categories were labeled as organ system disorders (e.g., Cardiovascular Disorders).
- The names of some organ system categories were changed (e.g., Psychiatry was changed to Psychiatric and Behavioral Disorders).
- Several new organ system categories were added (e.g., Dermatologic Disorders, Urologic Disorders).
- Within organ system categories, new medical disorders were added, some topics were merged or renamed, and some topics were deleted.
- When a given topic could be placed in two different organ systems, the committee generally deferred to the organ system approach used in accepted pharmacotherapy textbooks (e.g., osteoporosis was placed in the Musculoskeletal Disorders section rather than in Endocrinologic Disorders).
- The organ systems in the 2016 toolkit are listed alphabetically.
- Following the organ system categories, two categories are listed separately: Disorders of Special Populations and a new category of Toxicologic Disorders. Certain topics are included in an organ system section and in the Disorders of Special Populations section because they require a different treatment approach in specific population subsets (e.g., pain is listed in three sections: Neurologic Disorders, Critically Ill Patients, and Terminally Ill Patients)

For general disease states (e.g., electrolyte disorders), examples of specific topics are given in parentheses (e.g., sodium, potassium, calcium). These examples are not meant to be all-inclusive, but to provide guidance for individual schools and colleges in selecting specific topics within broader disease state categories. The committee leaves it to the discretion of

individual schools to determine which specific disorders to include within a broad topic area.

Priority of Disease State Topics and Tier Definitions

The 2009 tier definitions for disease states were changed for the 2016 revision. In the 2009 toolkit,[1] tier levels were designed to guide the breadth of topics and the depth to which they should be "covered" in the curriculum. The 2009 definitions are as follows:

2009 Teaching-Based Tier Definitions

- **Tier I:** Topic must be covered by all colleges.
- **Tier II:** Topic should be covered by most colleges.
- **Tier III:** Topic could be covered if time and resources were available.

The 2009 toolkit contains 161 different diseases or content topics: 100 (62%) tier I, 40 (25%) tier II, and 21 (13%) tier III. Given the high percentage of tier I topics, the question arises, "How much pharmacotherapy content can reasonably be included in the curriculum with the expectation for graduates to be competent to provide high-quality patient care in all of the areas?" The 2016 Accreditation Council for Pharmacy Education Standards state that graduates should be "practice-ready" and "team-ready"—prepared to directly contribute to patient care in collaboration with other health care providers.[13] However, the standards provide no guidance on the core disease states that all pharmacists must be capable of managing upon graduation. Similarly, the 2013 American Association of Colleges of Pharmacy CAPE educational outcomes do not outline specific pharmacotherapy content for schools and colleges of pharmacy.[18] A primary goal of the 2009 pharmacotherapy toolkit and this 2016 revision is to provide guidance on a core pharmacotherapy curriculum (i.e., the tier 1 topics) that schools and colleges should provide to all students. The toolkits permit flexibility to emphasize additional content areas for which schools have particular faculty expertise, adequate infrastructure, and specialized practice opportunities. Tiers 2 and 3 are included to provide further guidance in this area.

However, attempts to "teach everything students need to know" tend to foster what has been termed *bulimic learning*,[19] whereby students are required to memorize large quantities of information for examinations but are given little opportunity to develop the practice skills required to provide patient-centered care. A more sound educational strategy would lay a foundation of primary pharmacotherapy content areas and give students ample practice opportunities to become proficient in providing patient-centered care in the area. For example, pharmacists should be competent to provide patient-centered care for common acute disorders (e.g., cough, minor wounds, constipation, upper respiratory tract infections) and for the common chronic conditions that account for the largest societal disease burden and greatest morbidity and mortality (e.g., hypertension, dyslipidemia, heart disease, diabetes, obesity, chronic lung disease).[20, 21]

For these reasons, the 2016 committee took a different approach from the 2009 committee to defining tier levels by emphasizing practice competencies rather than teaching disease state topics. As pharmacists take greater accountability for pharmacotherapy-related outcomes, it is important that pharmacy curricula also consider the student skills and abilities needed to achieve positive patient outcomes. Thus, rather than recommend to schools and colleges the extent to which topics should be taught in the curriculum, the 2016 committee adopted a competency-based approach that considers the level of proficiency in providing patient-centered care that should be expected after completing the education and training in the professional Pharm.D. curriculum as well as after PGY1 or PGY2 residency training (or equivalent practice experience). The 2016 Competency-Based Tier Definitions are as follows:

- **Tier 1:** Students receive education and training on this topic to prepare them to provide collaborative, patient-centered care upon graduation and licensure.
- **Tier 2:** Students receive education and training on this topic, but additional knowledge or skills may be required after graduation (e.g., residency training) to prepare them to provide collaborative, direct patient care.
- **Tier 3:** Students and residents may not receive education and training on this topic; rather, they will be expected to obtain the required knowledge and skills on their own to provide collaborative, direct patient care, if required in their practice.

After the committee developed a first draft of the toolkit using these tier definitions, it sought input from additional practicing clinical pharmacists with expertise in the various organ system categories. An invitation to review the draft toolkit was sent to the leadership (chairs and vice chairs) of the ACCP Practice and Research Networks (PRNs). The PRNs were asked to obtain member responses to a series of focused questions. Written comments were received from 18 of the 25 PRN groups invited to review the draft and from a representative of the American Society of Consultant Pharmacists. The committee then met by conference call to discuss and accept, reject, or modify each suggestion. The committee also considered suggestions for revising the tier definitions. The revised toolkit was then submitted to the ACCP Board of Regents for review and approval.

Using the 2016 Toolkit for Curricular Change

The 2016 toolkit contains 276 diseases and content topics. Of these, 87 (32%) are tier 1 topics, 133 (48%) are tier 2, and 56 (20%) are tier 3. The percentage of tier 1 topics is reduced from 62% in the 2009 toolkit to 32% in the 2016 toolkit. Nevertheless, 87 discrete topics is a large number for which to ensure competency. However, some of the tier 1 topics may not require extensive didactic instruction (e.g., common eye, ear, nose, and throat disorders), or they can be taught as part of a broader topic (e.g., many topics in the pediatric and geriatric population sections). Schools and colleges will need to use creative educational strategies to achieve adequate competencies for the topics considered necessary. Clearly, shifting the emphasis from "topic coverage" to "practice competence" will require additional time in the didactic (prior to advanced pharmacy practice experiences) curriculum for students to practice and develop proficiency in the practice skills and abilities required of clinical pharmacists.

This tier classification highlights the importance of postgraduate training, with most topics requiring additional skills after graduation (48% are tier 2) through postgraduate residency training or equivalent practice experience in order for practitioners to provide high-quality, collaborative, direct patient care. This is consistent with a report from Health2 Resources and Blue Thorn Inc., which provided a snapshot of nationwide expert practices in comprehensive medication management (CMM) in ambulatory and community pharmacy settings.[22] Most clinical pharmacists interviewed for the Health2 Resources/Blue Thorn Inc. report believed that pharmacy school provides insufficient training for CMM practice and that residency training or on-the-job mentorship is needed. Board certification can also serve as a benchmark for achieving the requisite knowledge and skills in relevant specialty practice areas. Moreover, the clinical pharmacists interviewed for this report stated that other health care providers view board certification as an indicator of competence and that it enhances the recognition of pharmacists as valued members of patient care teams.[22]

Even for some tier 1 topics, additional postgraduate experience and training may be required to manage more complex disease aspects. For example, Pharm.D. programs should prepare pharmacists to treat most patients with diabetes, but certain aspects such as providing insulin pump therapy or treating patients with extreme insulin sensitivity may require additional expertise gained after graduation. Certainly, not all of the tier 2 topics are likely to be mastered within a single residency program. Clinical pharmacists who complete PGY1 residencies should have improved competence to manage common diseases and master the management of additional complex disease states. Similarly, PGY2-trained individuals have specialized knowledge and patient care skill sets that not only expand on PGY1 training, but also differ from those of clinical pharmacists who completed PGY2 residency programs in other specialty areas.

Foundational Knowledge Across Organ Systems

In addition to learning about disease states, pharmacotherapy, and related topics, students must acquire foundational pharmacotherapy knowledge related to each organ system and the specific disorders within them. Gaining a thorough understanding of the patient care process is an essential first step.[23, 24] Within organ system–based courses (e.g., cardiovascular pharmacotherapy), sufficient attention should be devoted to patient assessment of the organ system, including medical history and physical examination findings, clinical laboratory testing, medical imaging, and other diagnostic testing. Knowledge of individual drugs and drug classes must also be acquired, including aspects of medicinal chemistry, pharmacology, adverse drug effects, drug interactions, pharmacokinetics, pharmacodynamics, therapeutic drug monitoring, pharmacoeconomics, and

patient education.[a] The impact of individual patient differences on drug therapy selection and response is also critically important, including pharmacogenomics/pharmacogenetics and ethnic, cultural, gender, and age considerations. Global health aspects are becoming increasingly important for many diseases; for example, incidence and prevalence may vary across the world, and available treatments may differ. Regional differences in disease prevalence and incidence rates must also be considered by schools and colleges when evaluating their curricula. Finally, as emphasized in the 2009 toolkit narrative, "pharmacotherapy content should be current, evidence based, guideline oriented, and strong in depth in areas where pharmacists are known to make a positive difference in patient outcomes, such as chronic diseases with high use of medications, high-cost drug therapies, preventable adverse drug reactions, and disease prevention."[1]

Conclusions

As with the 2009 toolkit, the intent of the updated version is to provide guidance to schools and colleges of pharmacy on curricular content related to the pharmacotherapy of disease states. Because medical science is continually evolving, schools must regularly evaluate their curricula and make adjustments to keep pace with practice changes. Schools that have adopted an organ system–based approach to courses may find the organ system categorization of this 2016 toolkit particularly helpful. The revised tier classifications may help programs focus more readily on practice competencies than on "teaching topics." The 2016 toolkit delineates the topic areas for which all graduates should be able to provide competent patient-centered care and more clearly identifies the topics for which postgraduate training or experience is required to achieve optimal clinical, humanistic, and economic outcomes.

Acknowledgment

We gratefully acknowledge the assistance and contributions of Brian L. Erstad, Pharm.D., FCCP, Board of Regents liaison to the 2016 Educational Affairs Committee.

[a]Pharmacokinetics/pharmacodynamics are included as separate topics in the toolkit for special populations (pediatrics, geriatrics, critically ill), in whom these factors may vary substantially from the norm and require different treatment approaches.

References

1. **American College of Clinical Pharmacy, Slain D, Wong-Berringer A, Blake B, Bumgardner M, Rowen R, et al.** Pharmacotherapy didactic curriculum toolkit 2009. Available from http://www.accp.com/docs/positions/misc/pharmacotherapytoolkit.pdf. Accessed June 14, 2016.
2. **Addo-Atuah J, Dutta A, Kovera C.** A global health elective course in a PharmD curriculum. Am J Pharm Educ 2014;78(10):1–12: Article 187.
3. **American College of Clinical Pharmacy, Burke JM, Miller WA, Spencer AP, Crank CW, Adkins L, et al.** Clinical pharmacist competencies. Pharmacotherapy 2008;28:806–15.
4. **Cook AM, Weant KA, Gross AK, Ashton JN, Lemon SJ Jr, Winstead PS.** Survey of critical care education in US colleges of pharmacy. Curr Pharm Teach Learn 2011;3:290–8.
5. **Pitman SK, Sorofman B.** Medication use as evidence for pharmacotherapeutics curriculum content. Am J Pharm Educ 2009;73(8):1–5: Article 148.
6. **Prescott WA, Dahl EM, Hutchinson DJ.** Education in pediatrics in US colleges and schools of pharmacy. Am J Pharm Educ 2014;78(3):1–9: Article 51.
7. Alldredge BK, Corelli RL, Ernst ME, Guglielmo BJ, Jacobson PA, Kradjan WA, et al., eds. Koda-Kimble & Young's applied therapeutics: the clinical use of drugs. 10th, ed. Philadelphia: Lippincott Williams & Wilkins, 2013.
8. **American Psychiatric Association (APA).** Diagnostic and statistical manual of mental disorders, 5th ed. (DSM-5). Arlington, VA: APA; 2013.
9. Benavides S, Nahata MC, eds. Pediatric pharmacotherapy. Lenexa, KS: American College of Clinical Pharmacy, 2013.
10. DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM, eds. Pharmacotherapy: a pathophysiologic approach. 9th, ed. New York, NY: McGraw-Hill, 2014.
11. Kasper D, Fauci A, Hauser S, Longo D, Jameson JL, eds. Harrison's principles of internal medicine. 19th, ed. New York, NY: McGraw-Hill, 2015.
12. Krinsky DL, Berardi RR, Ferreri SP, Hume AL, Newton GD, Rollins CJ, et al., eds. Handbook of nonprescription drugs: an interactive approach to self-care. 18th, ed. Washington, DC: American Pharmacists Association, 2015.
13. **Accreditation Council for Pharmacy Education (ACPE).** Accreditation standards and key elements for the professional program in pharmacy leading to the doctor of pharmacy degree ("Standards 2016"). Chicago: ACPE; 2016. Available from https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf. Accessed March 26, 2016.
14. **Association of Faculties of Pharmacy of Canada (AFPC).** Educational outcomes for first professional degree programs in pharmacy (entry-to-practice pharmacy programs) in Canada. Vancouver, British Columbia, Canada: AFPC, June 30, 2010. Available from http://www.afpc.info/sites/default/files/AFPC%20Educational%20Outcomes.pdf. Accessed March 26, 2016.
15. **National Association of Boards of Pharmacy (NABP).** NAPLEX. Mount Prospect, IL: NABP, 2016. Available from https://nabp.pharmacy/programs/naplex/. Accessed October 18, 2016.
16. **Pharmaceutical Society of Australia (PSA).** National competency standards framework for pharmacists in Australia. Sydney: PSA, 2010. Available from http://www.psa.org.au/download/standards/competency-standards-complete.pdf. Accessed March 26, 2016.
17. **National Association of Boards of Pharmacy (NABP).** PCOA. Mount Prospect, IL: NABP, 2016. Available from https://nabp.-pharmacy/programs/pcoa/. Accessed October 18, 2016.
18. **Medina MS, Plaza CM, Stowe CD, Robinson ET, DeLander G, Beck DE, et al.** Center for the Advancement of Pharmacy Education (CAPE) educational outcomes 2013. Am J Pharm Educ 2013;77(8):1–10:Article 62. Available from http://www.aacp.org/documents/CAPEoutcomes071213.pdf. Accessed March 26, 2016.
19. **Zorek JA, Sprague JE, Popovich NG.** Viewpoint: bulimic learning. Am J Pharm Educ 2010;74(8):1–3: Article 157.

20. **Milken Institute.** An unhealthy America: the economic burden of chronic disease. Santa Monica, CA: Milken Institute, 2007. Available from https://www.sophe.org/Sophe/PDF/chronic_disease_report.pdf. Accessed March 26, 2016.
21. **U.S. Public Health Service, Giberson S, Yoder S, Lee MP.** Improving patient and health system outcomes through advanced pharmacy practice. A report to the U.S. Surgeon General. Office of the Chief Pharmacist. U.S. Public Health Service, December 2011. Available from http://www.accp.com/docs/positions/misc/improving_patient_and_health_system_outcomes.pdf. Accessed March 26, 2016.
22. **McInnis T, Capps K.** Get the medications right: a nationwide snapshot of expert practices—comprehensive medication management in ambulatory/community pharmacy. Health2 Resources, May 2016. Available from http://static.correofarmaceutico.com/docs/2016/07/15/getthemedicationsright.v22final-5.20.pdf. Accessed September 20, 2016.
23. **Joint Commission of Pharmacy Practitioners (JCPP).** Pharmacists' patient care process. JCPP, 2014. Available from https://www.accp.com/docs/positions/misc/JCPP_Pharmacists_Patient_Care_Process.pdf. Accessed March 26, 2016.
24. **American College of Clinical Pharmacy (ACCP).** Standards of practice for clinical pharmacists. Pharmacotherapy 2014; 34:794–7. Available from http://www.accp.com/docs/positions/guidelines/StndrsPracClinPharm_Pharmaco8-14.pdf. Accessed March 26, 2016.