

## AACP CURRICULAR CHANGE SUMMIT SUPPLEMENT

### Preparing Pharmacy Graduates for Traditional and Emerging Career Opportunities

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Educational programs in pharmacy must focus on educating pharmacists of the future who are prepared to serve as competent and confident health care “providers” whose “practice” can occur in any number of current and future settings; and whose expertise is essential to an interprofessional health care team. Graduates must be able to incorporate a scholarly approach to their practice in identifying patient care problems; practicing in an evidence-based manner; and ensuring safe, effective, and appropriate use of medications. It is time for colleges and schools of pharmacy to implement contemporary teaching and assessment strategies that facilitate effective and efficient student learning that is focused at the graduate professional level, to evolve the content around which the curriculum is organized, and clearly articulate the abilities graduates must have to function effectively in the myriad professional roles in which they may find themselves.

#### INTRODUCTION

Pharmacy education has a long, proud tradition of educating future pharmacists who are ready to meet the needs of the profession. Educators have and continue to be forward thinking in advancing educational programs to meet the changing pharmacist’s role in a diverse variety of health care settings.<sup>1</sup> The background papers written in the late 1980s through the mid-1990s by the American Association of Colleges of Pharmacy (AACP) Commission to Implement Change provided the academy with the essential missions of pharmacy practice and education; the curricular outcomes, content, and educational process; the recommendation for the doctor of pharmacy

(PharmD) to be the first professional degree; the responsibility of pharmacy educators for scholarship, graduate education, fellowships, and postgraduate education and training; and the need for pharmacy educators to maintain their commitment to the preparation of graduates capable of providing pharmaceutical care in an evolving health care environment.<sup>2-6</sup>

The mission of pharmacy education evolved from educating pharmacists with a product focus, involving the safe and effective preparation and dispensing of medications, to educating pharmacists to provide patient-centered care and integrate and provide services for safe drug preparation and distribution, collaborative drug therapy management, medication therapy management, and medication reconciliation. The 2004 Center for the Advancement of Pharmaceutical Education (CAPE) Educational Outcomes provided the necessary framework to assist colleges and schools to transform their curriculums to support the education of practitioners to deliver

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these advanced patient care services.<sup>7</sup> Furthermore, the Accreditation Council for Pharmacy Education (ACPE) Standards 2007 reflects these expanded and expected professional competencies.<sup>8</sup> Yet, there is much more we can do to enhance the education of future pharmacists. As AACP President Yanchick stated in his 2008 address, we must transform pharmacy curricula away from a baccalaureate-level focus to a professional doctoral-level focus.<sup>9</sup> To achieve this goal, pharmacy education programs must focus on educating pharmacists who are prepared to serve as competent and confident health care “providers” whose “practice” can occur in any number of current and future settings; and whose expertise is essential to an interprofessional health care team. They must also incorporate a scholarly approach to their practice in identifying problems, utilizing the literature for the best evidence-based practices, and analyzing, synthesizing, and applying this information to ensure safe, effective, and appropriate use of medications by their patients.<sup>9</sup>

A consistent element in the doctor of pharmacy educational program is the foundation of the pharmaceutical and biomedical sciences. Contemporary pharmacy education has also been strengthened by the growth and enhancement in the clinical, and social and administrative sciences. Successful future practitioners must have the fundamental knowledge, skills, and attitudes/values in the pharmaceutical, biomedical, clinical, and social and administrative sciences, in conjunction with the practice proficiency gained through experiential learning in pharmacy educational programs. The goals of this paper are to provide: (1) an analysis of the economic and health care climate impact on professional education and practice; (2) an overview of contemporary issues related to the scope of education, from preprofessional preparation to the outcomes, content, and processes of the professional degree program; (3) a discussion of the provider and professional activities of graduates; and (4) recommendations for consideration by AACP and its member institutions.

## **IMPACT OF THE ECONOMIC AND HEALTH CARE CLIMATE**

As it did during the transition to the PharmD as the first professional degree in pharmacy, it remains essential for pharmacy programs to constantly monitor changes in the economic and health care climate and be agile, if necessary, to modify educational outcomes to meet the needs of graduates and, importantly, the evolving health care needs of society. The focus on improved health care by improving quality, enhancing information technology, and adding value has been linked to health professions education through a series of Institute of Medicine (IOM)

reports.<sup>10-11</sup> The nature and structure of health professions education is being refocused on patient-centered care, interprofessional teams, evidence-based practice, quality improvement, and use of informatics.<sup>11</sup>

The volatility of today’s national and global economic climate has impacted upon all aspects of health care services. Pharmacy graduates will practice in a dynamic health care and economic environment. Health care delivery is increasingly focused on economic models that optimize patient-centered evidence-based care, increase access to care, reduce disparities in health care availability and quality, and seek to minimize costs at all levels. There is an increasing emphasis on the importance of broad and sweeping reforms in the health care system. Yet, it remains to be seen if and how healthcare reforms will be implemented. This environment represents an enormous opportunity for pharmacists to become further engaged as health care providers. Pharmacy graduates need to understand and be able to adapt the scope and nature of their practice to the changing economic and health care environment.

## **PREPROFESSIONAL EDUCATION AND CURRICULUM CONSIDERATIONS**

Preprofessional educational requirements provide the foundation for building the capabilities of professionals. The breadth and depth of preparation, perhaps more than any other factor, enables or limits the extent to which professional students are able to accept personal responsibility for their education and consequently their potential as health care providers. There are several significant questions that need to be addressed if pharmacy graduates, future pharmacists, are to advance professional practice:

- How will preprofessional and professional preparation in the foundational sciences expand to encompass new areas of knowledge necessary to maintain pharmacists’ role as scientific experts in drug action, delivery, and discovery?
- Should students in professional programs become “educated persons” through inclusion of liberal studies<sup>12-13</sup> or should they arrive at professional programs as “educated persons”?
- Will professional programs require of candidates a level of maturity that can only be gained through a full range of educational and personal experiences?<sup>14</sup> Does completion of a bachelor’s degree help to establish a common denominator for a familiar background and a thoughtful decision process needed to enter professional education?

The requisite knowledge, skill sets, and maturity obtained during preprofessional years and needed for

success in professional education must be aligned with the anticipated roles and competencies for which future practitioners will be educated. Preprofessional preparation determines which students are accepted into pharmacy school, the level of academic rigor and complexity at which faculty members can engage students, and the capability of new graduates to become change agents for the profession and the health care system.

### **Professional Practice Outcomes: Core Generalist vs. Specialist Educational Outcomes**

Practice entry expectations, the nature and scope of educational programs to prepare a generalist practitioner, and the role of postgraduate education and training in the preparation of specialists within the profession have been the subject of numerous discussions and committee deliberations. The CAPE Educational Outcomes, developed in 1994 and revised in 1998, provided educators with a framework for the design of a PharmD curriculum and outlined the professional knowledge, skills, attitudes, and values, organized by general abilities and practice-based abilities, for those graduating from PharmD programs.<sup>15</sup> Revised in 2004 to blend general and ability-based outcomes, the CAPE Educational Outcomes document outlines the outcome abilities of a new generalist pharmacist practitioner in 3 areas: (1) providing pharmaceutical care at the patient and population level, (2) effectively managing and using resources and systems, and (3) enhancing public health by promoting health improvement, wellness, and disease prevention.<sup>7</sup> The confluence of the CAPE Educational Outcomes with the ACPE standards and guidelines for the PharmD curriculum further emphasizes the role of colleges and schools of pharmacy in the education of generalist practitioners.<sup>7,8</sup> While colleges and schools have been able to successfully transition to the PharmD degree, it is time now to advance towards an education that is truly at the professional doctoral level to enable graduates to be competent in today's health care and economic environment. The role of residency training, fellowship training, and graduate studies in developing specialist practitioners and scientists will be briefly discussed in a later section of this paper.

### **Curricular Activities: What Should be the Core Educational Approaches Needed for Successful Future Practitioners?**

The PharmD curricula must include a wide variety of educational approaches to achieve the desired core program learning outcomes. Active-learning strategies (eg, discussions, small groups, and audience response systems), hands-on laboratory experiences, self-directed learning, and pharmacy practice experiences must remain

key components for students to learn how to think as future pharmacy practitioners. Learning style differences and methods to enable learning must always be considered in the design and structure of educational programs.

Expansions of communication technology will impact pharmacy education. Professional clinical and scientific organizations are increasingly reaching out to promote global educational opportunities. Distance-learning opportunities are becoming the norm as entire courses, lectures, and symposium proceedings are being offered globally in synchronous, asynchronous, and various hybrid formats. These represent unique opportunities for students, pharmacists, and scientists to learn from the experts across the globe. Pharmacy graduates will need to have the skills to learn from these diverse educational opportunities during their formal education and throughout their professional careers.

To develop future pharmacy practitioners who have the competencies outlined in the CAPE Educational Outcomes and who can successfully practice in a changing health care environment, we must find efficient ways to integrate and strengthen the following into the PharmD curriculum: (1) informatics and information technology, (2) simulations, (3) interprofessional education, (4) self-assessment and reflection, (5) community and professional engagement, (6) leadership development and advocacy, (7) global health, (8) scholarly activities, (9) personal development and entrepreneurship, and (10) continuing professional development.

### **Informatics and Information Technology**

Informatics and information technology represent an area of major evolution and transition within the pharmacy curriculum. Previously, this area would be comfortably grouped under the concept of drug information, with an emphasis on the broad range of tertiary sources of information and an approach to a systematic and critical review of the primary literature based on an understanding of study design and biostatistics. With continuing advances in technology, how pharmacists, other health care professionals, and the public access health and medication-related information continues to change. Additionally, the types of information readily accessible are also changing. The curriculum must evolve to prepare graduates not only to use technology to access information to facilitate their work, but also to help patients and the public interpret the health-related information so readily available.

The ability to organize, combine, and analyze complex data sets is emerging as a critical skill for future graduates. Health information technology has the potential to significantly transform the tools with which pharmacists provide

care. Graduates must have the skills to manage technology tools to effectively access, interpret, and use patient information to improve the quality of care provided, prevent medication and medical errors, reduce health care costs, and increase access to care.<sup>16</sup>

### **Simulations**

Simulation-based learning (SBL) allows students the opportunity to apply what they learn in the classroom. Integration of SBL into pharmacy education has been endorsed by the ACPE<sup>8</sup> and several types have been employed in pharmacy education including computer-based learning simulations,<sup>17-20</sup> virtual patients,<sup>21</sup> simulated and/or standardized patients,<sup>22-24</sup> and high-fidelity human patient simulators (HPSs).<sup>25-28</sup>

Computer-based patient case simulation, online interactive prescription simulations, multimedia case-history programming to simulate case-history taking, and the use of virtual patients have been well received by pharmacy students.<sup>17-20</sup> Virtual reality has not been studied within pharmacy education, but its ability to enhance perceptual variation while allowing students to practice rare and/or critical skills make it a potentially useful educational tool in the future, particularly if costs can be substantially reduced. Standardized patients portraying patients with specific medical conditions and health concerns, personal characteristics, and communication styles are an effective and commonly used method of SBL in pharmacy education. While minimizing patient risk and harm, standardized patients are used to teach and practice patient care skills and afford students the opportunity to better communicate with and better understand the psychosocial needs of patients.<sup>22-24, 29</sup>

A novel method of SBL uses HPSs controlled by computer programs with the capacity to realistically portray a variety of medical conditions and demonstrate physiologic responses to drug administration. The use of HPSs is becoming a valuable resource in pharmacy education, allowing students to actively assess and treat a simulated patient in a safe, immersive, controlled environment, under the direct supervision of a faculty member who can provide immediate feedback and facilitate repetition of the exercise as needed to achieve competence.<sup>25-28</sup> Human patient simulators have been employed in pharmacy curriculum to teach blood pressure assessment, critical care, and cardiovascular pharmacotherapeutics, and interprofessional team skills in an emergency department setting.<sup>25-28</sup> The use of SBL with HPS is highly beneficial in furthering pharmacy student comprehension of the therapeutic principles and skills taught within the conventional didactic setting, allowing students to practically apply and reinforce their learned

knowledge while improving their confidence in caring for patients.<sup>25-28</sup>

### **Interprofessional Education**

Much attention is being given to interprofessional education as a strategy to prepare future health care practitioners to achieve the goals of effective, patient-centered, timely, efficient, and equitable health care.<sup>30</sup> Pharmacy graduates' repertoire of abilities must include not only the provision of pharmaceutical care, management of resources and systems, and promotion of health and disease prevention, but also how they will fulfill these roles as members of teams of health care professionals. Thus, training pharmacy students to work collaboratively and communicate effectively with physicians, nurses, and other health care providers is imperative and has been endorsed by the ACPE.<sup>8</sup>

### **Self-Assessment and Reflection**

Graduates must learn how to be reflective practitioners, specifically as reflection relates to self-assessment of their professional strengths and weaknesses.<sup>31,32</sup> Time must be allowed for pharmacy students to reflect on how they learn in order to enhance their skills as life-long learners. Furthermore, graduates must be able to determine their self-efficacy or what they are able to do or not to do in their professional practice.<sup>33</sup> Self-efficacy is the confidence to perform or accomplish specific tasks in one's professional practice. Self-assessment and self-efficacy will be requisite qualities/abilities in PharmD graduates as they embrace the importance of developing an individualized plan for continuous professional development.

### **Community and Professional Engagement**

An area of exciting promise for professional programs and future graduates is community engagement. Implementing and increasing the role of the community-engaged pharmacist will require educational programs to provide students with the mentoring, tools, time, and confidence needed to engage in these activities. Defining community engagement is hard, not because it is a small matter, but because community engagement can be an elusive concept with respect to how activities are incorporated into existing curricular elements. The Centers for Disease Control and Prevention (CDC) defines community engagement as "the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people."<sup>34</sup> Gelmon and colleagues defined community engagement as "applying institutional resources (eg,



knowledge and expertise of students, faculty and staff, political position, buildings and land) to address and solve challenges facing communities through collaboration with these communities.”<sup>35</sup> Either of these definitions can apply in professional programs; however, in order to simplify even further for the purposes of this paper community engagement is students and faculty members working collaboratively with their community to achieve mutually beneficial health outcomes.

There is broad support for community engagement from national and global organizations such as the IOM and Community-Campus Partnerships for Health. Organizations such as the Carnegie Foundation for the Advancement of Teaching, the Centers for Disease Control and Prevention, and the World Health Organization all support the practice of community engagement. In addition, ACPE recommends the inclusion of community-based activities in the pharmacy curriculum.<sup>8</sup> Each of these organizations has recognized the importance of community engagement, through provision of research funding, the development of guidelines and tools, or creation of networking opportunities. This recognition creates a sense of importance, and perhaps urgency, in higher education for faculty and student involvement in communities.

The role of social and physical environments, lifestyles, and behaviors and their relationship to health have been clearly articulated by the IOM.<sup>36</sup> Graduates must have the skills and knowledge as pharmacists to become actively involved in the prevention of disease and promotion of wellness as a key components of their practice. These broadly educated and skilled pharmacists can have a dramatic effect on the lifestyle and health of patients.<sup>37</sup> Embracing their role as community leaders, pharmacists can work to decrease health disparities and improve health literacy by changing their practice behaviors and influencing others’ behaviors. Colleges and schools of pharmacy must incorporate into their culture the desire to (1) support community engagement in teaching and scholarship, (2) develop or implement available tools to document ongoing activities, and set goals for improvement by faculty and students across professional activities, (3) recognize faculty members and students who actively engage in their community, and (4) develop existing or innovative partnerships and opportunities that enable engagement with communities.

### **Leadership Development and Advocacy**

As AACP Past-President Wells counseled, “All of us have a responsibility to develop leadership abilities in ourselves, in our colleagues, and in our students.”<sup>38</sup> Pharmaceutical education is responsible for preparing stu-

dents to enter into the practice of pharmacy and to function as professionals and informed citizens in a changing health care system. It also encourages students to take active roles in shaping policies, practices, and future directions of the profession.<sup>2</sup> The changing health care system and need for advocacy represent constants around which we must shape leadership development.

The current need for rational medication use has been well articulated. Pharmacy practice and education have evolved to embrace a patient-centered approach. Yet, practices that provide medication therapy management are not commonly seen in job descriptions for currently available positions. Often, these roles are created in organizations by individuals with an ability to lead and manage change in their practice. Equipping students with the ability to advocate on multiple levels and lead change successfully is paramount in graduates from programs at the professional doctoral level.

The addition of more core and elective experiences in leadership skills development must be considered in curricular planning and evaluation. Core topics that foster an understanding of leadership principles, the leader’s role in change, and the process for leading change are essential elements for leadership development. In addition, pharmacy graduates must understand organizational decision-making processes and the advocacy necessary to navigate the systems in which they may work. Elective topics to develop leadership skills further should be considered and include self-directed and experiential activities in leadership to garner confidence.

With the focus of pharmacy education on preparing generalist practitioners, leadership development for all is inferred and must be applicable to practitioners regardless of their position or practice setting. Demand for and shortage of pharmacists in specific leadership positions, such as health-system pharmacy departments, has been clearly articulated.<sup>39</sup> Pharmacy education, in the future, must be cognizant of such specific needs in the practice environment, and the PharmD curriculum must be agile and flexible enough to enable students to develop their knowledge, skills, and abilities to be successful in these positions. The development of generalist leadership knowledge, skills, and attitudes is applicable to a variety of settings and can be applied regardless of their position or title. The core material taught must be combined with additional elective, postgraduate, and continuous professional development opportunities to prepare those students who choose to pursue leadership positions in pharmacy.

### **Global Health and Health Professions Education**

Health care services and health professions education will not be immune to the dramatic changes in the global

market place associated with a “world-is-flat” environment characterized by increased expectations for access to health care. Advances in information technology will enable better communication between health care professionals and enhance health professions education around the globe with the focal point of global improvement in patient care. As such, pharmacy education programs must incorporate increased global cultural competence (eg, health beliefs and behaviors, caring for underserved populations, etc), and global health issues (eg, geographic impacts on disease prevalence, epidemiology, surveillance, drug distribution and marketing, and global health economics).

### **Scholarly Activities**

The majority of students enters PharmD programs with an intellectual curiosity and drive to learn about medications and how they can utilize medications to provide optimized patient care. However, by the time they graduate, many students have lost their intellectual curiosity as well as their desire to advance science, pharmacy practice, and the profession, and simply want to “make money and pay off their loans.” The increasingly intense nature of PharmD programs may limit the time these individuals have to develop scholarly pursuits or professional activities needed to stimulate further their intellectual curiosity and enthusiasm. To what extent and how often do PharmD programs provide time to enable students to work with faculty members and other professionals to tackle interesting questions or problems? What are PharmD programs doing to promote a passion in graduates to become the future leaders/agents of change in their profession? It seems pharmacy educational programs have become so prescriptive in nature and focused only on successfully completing a set of courses and pharmacy practice experiences that students’ intellectual curiosity and time to pursue scholarly interests have been limited. Although a study found that the majority of colleges/schools of pharmacy surveyed taught research skills, 75% did not require their students to conduct a research project.<sup>40</sup> Engaging in a scholarly activity often provides the needed spark in students, as well as the confidence and drive, to pursue postdoctoral studies. Specifically, what are educators and administrators doing in pharmacy programs to stimulate the intellectual curiosity of graduates?

### **Personal Development and Entrepreneurism**

Pharmacy curriculums have been extremely successful in educating excellent clinicians as evidenced by the ability of graduates to care for their patients in a diverse array of health care settings. However, do the above out-

comes, standards, and guidelines develop graduates with the tools and skills needed to be the agents of change to advance current and innovative professional practice? An entrepreneur spirit combined with the scholarly passion and willingness to take risks does not seem to be promoted in the professional curriculum given the demands for increased core competencies and experiential requirements. Curriculums have become so packed with courses needed to meet standards and guidelines that students have little or no time to explore scholarly activities, engage in practice-based research, or develop new practice ideas or concepts that could form the foundation for advancing their practice roles.

### **Continuing Professional Development**

In spite of the increased emphasis on postgraduate training that has been advanced by many professional organizations within pharmacy<sup>41</sup> and by colleges/schools of pharmacy, only a minority of students are seeking residency training, fellowship training,<sup>42</sup> and graduate studies. This may be influenced in part by the increased cost of education, making many students eager to seek full-time employment to reduce their educational debt. While this is somewhat mitigated by the ability to defer loan payments, increased scholarship funds, and alternative loan payback programs for those seeking postgraduate training (similar to that offered by the NIH for those pursuing careers in research<sup>43</sup>) may be required as the costs of a pharmacy education continue to rise. The interest to require postgraduate training residencies for positions is being hampered by the current shortage of practitioners. However, as the shortage of practicing pharmacists eases over the ensuing decade<sup>44,45</sup> and employment becomes more competitive, postgraduate education may be needed for pharmacists to attain entry-level or clinical specialist positions. Apart from these external forces related to manpower issues and clinical practice, students should be introduced to the value of postgraduate training through exposure to current trainees in colleges and schools of pharmacy or through collaborations with other health care organizations in our community. This could be accomplished at multiple points (didactic teaching, laboratories, and recitations) but may be more effective in introductory pharmacy practice experiences (IPPE’s) or question-and-answer sessions for students. This should not be limited to information regarding clinical or academic positions. Nearly all positions in the pharmaceutical industry require skills gained during postdoctoral residencies and fellowships combined with on-the-job training, or through further graduate education. Colleges/schools must take a more active role in providing information on the unique opportunities available to pharmacy graduates and the

additional education and training these positions may require. The profession must be prepared to redirect or expand training opportunities should market forces and student interests shift. Even given the relative modest number of students seeking residency training, the current number of applicants exceeds the number of positions available.

## **PROVIDER AND PROFESSIONAL ACTIVITIES FOR PHARMACY GRADUATES**

Success in achieving a professional doctoral level degree will provide pharmacists with the knowledge, skills, and attitudes/values necessary to be well prepared to pursue any of the vast array of provider opportunities, as well as have the ability to successfully transition into one or more other areas during their professional career. Sir Francis Bacon reminded us that “a wise man will make more opportunities than he finds.” As we reflect on what pharmacy students will do immediately after graduation, we must also anticipate future roles for these pharmacists.

### **Pharmacist’s Role in Community Care**

Pharmacists must view themselves as essential health care providers who can utilize their clinical expertise in a variety of community settings. Pharmacists will always be an essential health care provider given their availability to patients through community pharmacy settings. This specific provider role must never be diminished as it serves critical patient needs (eg, dispensing and counseling for medications, expertise in nonprescription drugs, compounding, immunizations, and the use of medication administration or monitoring devices) that are not being met by other health care providers. However, this would not preclude pharmacists serving as providers in alternative, innovative settings such as ambulatory clinics located inside pharmacies and other retail environments; in independent practices focusing on medication therapy management, medication reconciliation, or pharmacogenomic drug counseling; in a community agency or organization where they are responsible for integrating and advocating for patient care across many other health care providers to promote continuity of care; or in organizations that coordinate research to enhance practice through pharmacy practice-based research networks. Pharmacy providers must seek out opportunities to engage in inter-professional patient care activities where and when they occur or as they develop in communities. For example, alternative modified practice could center on providing pharmacy and wellness services to adult and retirement communities given the increasing number of these as the

US population continues to age. Pharmacy graduates who serve in the United States Public Health Service, the Armed Forces, and as federal pharmacists in other capacities will be the essential link to enhancing access and reducing disparities in the provision of quality affordable health care for underserved individuals in our communities across the country and around the world. As these pharmacists develop innovative practice settings, they must be the drivers for expansion in the scope of pharmacy practice at the community, state, and national levels. Pharmacy educators must ensure that graduates have the requisite knowledge, skills, attitudes/values, and practice experiences, as well as the confidence, drive, and entrepreneur spirit, to be agents of change to facilitate these and other advances in the scope and type of community pharmacy practice.

### **Pharmacist’s Role in Inpatient Care in the Acute and Long-Term Setting**

As it continues to transition from a centralized distribution-based model to a decentralized model, inpatient pharmacy practice enables pharmacists to provide care within an interprofessional team based upon their expertise to ensure safe and cost-effective use of all medications. Pharmacy graduates must be willing to provide key clinical services and care. Seven clinical pharmacy services reduce mortality in the inpatient setting: drug-use evaluation, in-service education, adverse drug reaction management, drug protocol management, participation on the cardiopulmonary resuscitation team, participation on medical rounds, and admission drug histories.<sup>46</sup> At minimum, these services should be provided by pharmacists for every patient in the inpatient setting. However, inpatient pharmacists have the opportunity to provide care in other novel and innovative settings as well.

Novel roles for the pharmacist are emerging, including the pharmacist case manager (PCM), antibiotic stewardship pharmacists, and medication safety pharmacists.<sup>47-49</sup> Inpatient pharmacists are increasingly contributing their expertise through participation on pharmacy and therapeutics committees and pharmacist-led medication safety teams or serving as clinical researchers in these organizations. Inpatient pharmacists also could focus on the transition and care of patients from inpatient to long-term care facilities, or coordinate novel clinical services responsible for optimizing patient care based upon continued advances in pharmacogenomics and pharmacogenetics testing and screening and its role in safe and effective use of medications. Opportunities for innovative inpatient care also can be driven by those pharmacists in the Armed Services who provide care to military personnel

and their families, as part of humanitarian efforts, and during war-time operations.

Pharmacy graduates will need to pursue postgraduate training to advance their provider skills if they desire to take on these more specialized, novel roles for inpatient pharmacists within the health care system. The American Society of Health-System Pharmacists (ASHP) and the American College of Clinical Pharmacy (ACCP) are supportive of this movement.<sup>41,50</sup> However, the balance between entry-level and specialized practitioners to meet patient needs will require resolution by the academy and practitioners and based always on optimizing patient care.

### **Pharmacist's Roles in the Pharmaceutical Industry**

Pharmacy graduates with broad scientific knowledge and laboratory skills in optimizing dosage form development and drug delivery have and can be viewed as an entry-level formulator in the pharmaceutical industry. A strong educational background in biomedical, pharmaceutical, and clinical sciences, and completion of residencies, fellowships, or graduate studies with advanced course work in biostatistics, experimental design, pharmacokinetics, and pharmacodynamics, can enable PharmD graduates to collaborate or lead project management teams in clinical pharmacology, clinical trials, and pharmacokinetic/pharmacodynamic analysis.<sup>51,52</sup> Pharmacy graduates also are well situated to take leadership roles in investigating the role of pharmacogenetics and pharmacogenomics in optimizing drug therapy. Alternatively, pharmacy graduates are well positioned to engage in entry-level regulatory affairs and assume medical ethics positions, particularly if they took appropriate elective courses while completing their PharmD degree. Marketing and sales are 2 other areas that play to the strengths of pharmacy graduates, particularly those who enter our programs with business or management degrees or complete a combined PharmD/MBA degree program. Educators must ensure that pharmacy graduates understand the vast array of professional roles available at large pharmaceutical organizations, as well as those roles available in smaller contract research organizations or niche companies.

### **Pharmacist's Role in Managed Care Pharmacy**

The increased emphasis on accessible, high-quality, and cost-effective health and pharmacy care services combined with a focus on reducing health disparities will require more of our graduates to assume roles in managed care pharmacy. PharmD graduates have the knowledge and skill sets to advance and lead in critical areas such as drug utilization review and formulary development, outcomes and practice-based research, integration of health care data and disease state management in health maintenance

organizations, pharmacy benefits management, pharmacy consultant organizations, and Medicare and Medicaid Services.

### **Pharmacist's Role in the FDA and Other Regulatory Agencies**

The integration of pharmacists into regulatory work within the FDA has evolved over time along with the changes in pharmacy education. The broad therapeutic knowledge gained in our programs is instrumental in allowing pharmacy graduates to be an integral part of the drug approval and regulatory process. Although physicians compose the majority of the clinical reviewers for investigational agents, pharmacy graduates who have strong clinical backgrounds and knowledge of drug development can easily step into these roles. While pharmacy is the only profession that focuses primarily on pharmaceuticals, the biomedical and pharmaceutical sciences in the PharmD curricula may not prepare graduates for the many additional opportunities within the drug approval and regulatory arena. Residencies, fellowships, clinical experience, graduate studies, or combined degrees (eg, PharmD/JD) can provide the foundation needed for those who want to assume positions dealing with monitoring drug safety within the regulatory framework. Pharmacy graduates could also become engaged in the activities within the Environmental Protection Agency or Occupational Safety and Health Administration given their strong scientific background in pharmacology, drug delivery, and pharmacokinetics.

### **Pharmacist's Role in Local, State, and National Government Structures, Policy Making, and Advocacy**

Pharmacy graduates can play an important role in shaping health care policy and legislation that advances patient care at the local, state, and national governmental levels. PharmD degree programs, which provide a strong scientific and clinical foundation, combined with development of written and oral communication skills, leadership, and advocacy skills, could provide graduates with an excellent foundation for assuming positions as legislative and committee staffers or in advocacy roles for professional organizations. The skills needed for these practice roles could be expanded through elective course work, elective practice experiences, and/or specialized joint-degree programs or postdoctoral programs.

### **Pharmacists' Role in Academic Pharmacy and Other Health Care Professions**

Career activities in academic pharmacy and other health professions education should be promoted to pharmacy



students. Furthermore, pharmacy faculty members should be encouraged to participate in interprofessional educational programs.<sup>10</sup> The need for well-qualified individuals to meet the faculty and staff requirements for an increasing numbers of colleges and schools of pharmacy is well documented.<sup>53</sup>

The instructional focus of our professional programs has increasingly reflected a need for opportunities to apply what is learned in the classroom through laboratories, simulations, or experiential learning, thus necessitating different types of faculty and staff positions to meet these educational demands. Innovative types of faculty and staff positions with greater attention to teaching or practice and less responsibility for traditional research have emerged in PharmD programs and we must encourage pharmacy graduates to pursue these roles. Concurrently, we must encourage PharmD graduates to pursue graduate degrees at the masters or doctor of philosophy level or advanced research-based fellowships to become the next generation of faculty members providing the foundation for and research in the biomedical, pharmaceutical, clinical, and administrative sciences within pharmacy programs.

What is being done specifically in the academy and health professions educational programs to promote these career opportunities to pharmacy students? Pharmacy educators need to become more engaged in developing specialized educational opportunities to prepare the next generation of faculty and staff members and reconsider the types and nature of faculty and staff positions in our institutions in order to attract graduates to become involved in the academy. Pharmacy graduates also should be encouraged to explore potential roles in other health science educational programs given the increased emphasis on interprofessional teams in health professions education being essential to high-quality patient care.

### **Pharmacists' Role in Advancing Pharmacy and Information Technologies**

With the demand for improvements in technology accompanying the increased emphasis on providing safe and effective care that minimizes errors, pharmacy graduates have the potential for engaging in the innovative design and development of new technologies for the distribution and dispensing of pharmaceuticals and information systems to facilitate communication with other health care providers and patients. PharmD graduates can bring their educational perspectives to challenges involved with integration of the drug distribution process with the essentials needed to help patients to optimize the use of medications. As such, graduates would be well positioned

to collaborate with engineers, computer scientists, and biomedical engineers in developing the next generation of technologies. Pharmacy students must be encouraged to consider these types of positions and roles in arenas that may or may not be directly related to pharmacy. Concurrently, pharmacy educators and administrators must continuously scan the horizon outside of pharmacy and reach out to these alternative future employers to learn how PharmD graduates could contribute to their organizations' missions and goals.

### **Pharmacist's Role in the Environmental Health and Green Movement**

Graduates with a strong background in pharmacology, toxicology, and pharmacokinetics are well positioned to engage in issues related to environmental health and the rapidly expanding *green movement*. This is particularly true due to the increased concern for promoting a green or environmentally friendly marketplace for the use of prescription and nonprescription medications. Pharmacy graduates can play a key role in the evolving "Green Pharmacy Program"<sup>54</sup> or other programs addressing the disposal of medications or medication delivery devices. These programs being developed across the country help communities safely dispose of or perhaps reutilize expired and unused medications. On the industrial side, safe disposal of waste streams from synthesis facilities and the environmental impact of medicinals in human and veterinary waste have prompted expensive efforts to protect the environment. All these efforts to promote and protect the environment represent potential innovative practice environments for pharmacy graduates that could be addressed through PharmD/MPH, PharmD/MS, PharmD/PhD, or other novel integrated degree programs.

### **RECOMMENDATIONS**

We must continue to advance the focus of pharmacy education programs towards a professional doctoral level of instruction in order to enable our graduates to be competent providers in today's health care and economic environment. The majority of graduates should and will remain centered on providing patient care in community and institutional practice. Yet, the strong educational background and clinical experiences at the professional doctoral level enables PharmD graduates to pursue many alternative and potentially unlimited professional practice roles. Pharmacy graduates must be encouraged to seek these opportunities or to envision future practice roles that may not exist. The responsibility of educators and practitioners is to continuously scan the economic and

health care environment for these possibilities and provide the requisite support and mentorship to those who seek these alternative career paths. Furthermore, we must be ready to prepare our alumni through continuing education/professional development programs with the tools and skills needed to transition to alternative or innovative provider roles as they encounter new frontiers, challenges, and opportunities in their careers. The list below provides the recommendations for consideration by AACP and its member institutions as we look towards the future of pharmacy education to assist our graduates to make more opportunities than we see:

- Pharmacy educational programs must respond quickly to opportunities that develop in a changing health care and economic climate.
- Pharmacy graduates must accept the responsibility that they are health care “providers” whose skills allow them to provide care in a variety of environments.
- Pharmacy graduates must make health care more beneficial and cost effective through the appropriate use of all medications (prescription, non-prescription, dietary supplements, and other drug classes) and medication use tools.
- Pharmacy graduates must embrace information technology and employ it to provide care and interact with a diverse and widespread audience of patients, educators, other health care professionals, managers, executives, and regulators.
- Pharmacy graduates must have the skills and confidence to be adaptable and flexible to changes they will encounter during their professional careers and embrace life-long learning as essential to their role as a provider of pharmacy knowledge, services, and care. As such, they will embrace their role as an agent for change and be willing to take risks and experiment to advance new practice roles.
- Pharmacy graduates must take responsibility for their continuous professional development through mastery of self-assessment and self-efficacy. They will embrace the potential for postdoctoral educational pharmacy opportunities to advance their continuous professional development.
- Pharmacy graduates must be willing to work collaboratively, including taking leadership roles, in a variety of existing or future settings with other health care professionals and individuals.
- Pharmacy graduates must engage their communities to help define and solve challenges facing

our communities within and outside of pharmacy issues.

- Pharmacy graduates must be leaders and advocates, regardless of their position or title, for pharmacy and for advancing the diverse provider roles that pharmacists can offer to our communities.
- Pharmacy graduates must be culturally competent in the provision of their care and seek to reduce health care disparities.
- Pharmacy graduates must embrace a global focus and seek to comprehend global health issues and their relevance to patient care.
- Pharmacy graduates must assume the responsibility to address society’s needs and advance our knowledge through research on medications and their uses in patient care.

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