



Pharmacy Education in the United States: What Lies Ahead?

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Pharmacy education in the United States evolved from an apprentice model, originating in Europe in the Middle Ages to our present 4 year Doctor of Pharmacy (Pharm.D.) degree, requiring a minimum of 2 years of predoctoral collegiate education.¹ The incremental changes in the US that occurred over 150 years evolved in a very discontinuous fashion and were often prompted by changes in pharmacy practice or public expectations, although on occasion academics moved to change curricula prospectively in an effort to move practice forward. At nearly every stage, agreement was not easily obtained and even when some element of national consensus was achieved to alter the length and/or content of curricula and experiential education, many programs lagged several years before making the transition. A review of this evolution is instructive as we examine the changes in pharmacy practice and pharmacy education over time and try to use these reflections to anticipate and attempt to predict the directions we must now take as we envision an ever more rapidly changing health care and scientific landscape in the years ahead. This progression will also be helpful as pharmacy leaders in other countries examine the current status of both pharmacy practice and education and plan for the future.

Key words: Pharmacy education, pharmaceutical syllabus, Pharm. D. program, history of pharmacy

THE PAST

Until the early 1900's pharmacy was generally described by the common dictionary definition, which is: *"The art and science of compounding and dispensing drugs and medicines"*. Thus historically the focus of pharmacy education has been the drug product.² The compounding elements included discovery or invention, formulation, safety, efficacy, and manufacture/preparation, while the dispensing function dealt with distribution, prescription filling, delivery to patients and drug administration. From the earliest recorded history of pharmacy there has been controversy and disagreement among pharmacists and others as to whether or not pharmacy met the criteria for a profession, with many feeling it was in fact a higher level vocational or technical trade. An early observation by Abraham Flexner, noted physician, who authored a report that would transform medical education, captures this controversy. He observed: *"Pharmacy has definiteness of purpose, possesses a communicable technique, and derives at least part of its essential material from science. On*

the other hand, the activity is not predominantly intellectual in character and the responsibility is not original or primary. The physician thinks, decides and orders; the pharmacist obeys — obeys, of course with discretion, intelligence and skill — yet in the end obeys and does not originate". He thus concluded that pharmacy was *"an arm added to the medical profession, a special and distinctly higher form of handicraft, not a profession"*.³

In the 19th century pharmacy education occurred primarily though apprentice education since very few university programs existed. Only one in eight practicing pharmacists had received any formal education through 1896.⁴ Apprenticeships were often indentured servitude and could extend for up to 7 years. In many cases these also served as the path for a trainee to eventually work in and ultimately own the practice. Training initially focused on reading and arithmetic and progressed to compounding, dispensing and later business operations. The first pharmacy college in the US was established in Philadelphia in 1821 followed by 5 others by 1856, but there was no agreement on length or content of training and less than 5% actually graduated from one of these schools earning degrees that varied from 1-4 years in length.⁵ The earliest conversations about organizing around pharmacy education occurred around 1870⁶ within the American Pharmaceutical Association (APhA) and the early beginnings of what is now the American Association of Colleges of Pharmacy (AACPh) occurred in the late 1890's shortly after the American Association of Medical Colleges was formed.⁷ This early

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organization was known as the American Conference of Pharmaceutical Faculties (The Conference)⁸. By 1900 there were 55 schools of pharmacy all teaching elements of chemistry, materia medica and pharmacy, but there was little agreement on other topical areas or training format. There were already early signs of disagreement over pharmacy practice with mass merchandise and chain stores insisting on apprenticeship while a group of early educators promoting the need for laboratory based scientific training “... to put pharmacy on a full academic footing as an applied scientific discipline”.⁹

The Conference gained authority and momentum after the turn of the 20th century and addressed membership, prerequisites to licensure including educational qualifications, and licensure examinations — all contentious issues between various factions of schools and state pharmacy associations. Noteworthy during this period was the significant effort which went into developing a uniform core curriculum under what was known then as the Pharmaceutical Syllabus project between 1906 and 1925¹⁰. In 1917 the Conference was renamed the AACP¹¹ and continues to function today as the only national organization with full membership among all of the accredited schools and colleges of pharmacy in the US with affiliate members in Canada and elsewhere. As AACP matured, pharmacy educators faced new conflicting realities. As commercial manufacturing continued to advance pharmacy compounding decreased and two practice models emerged that still exist today continued to confound curricular discussions. Many pharmacies turned to enhancing their product lines with non prescription health care and ultimately non health care products, and became retail establishments, which also dispensed medications. Other educator leaders recognized that health care was becoming more complex and sophisticated with the introduction of newer more efficacious and potentially more dangerous products. They foresaw the role of pharmacist filling prescriptions and working at the interface between the physician and the patient and saw the potential for pharmacy to gain stature as a true health profession. With funding from the Commonwealth Fund, a comprehensive assessment of the functions of a pharmacist helped resolve this tension between “retailer” and “professional” and over the period 1923-1927 consensus developed over these defined functions and the underlying science that allowed the pharmacists to practice. The release of the so called Charters Study (known formally as Basic Material for a Pharmaceutical Curriculum)¹² produced agreement in principle on the topical areas needed in a curriculum and deans, boards of pharmacy and state pharmacy associations agreed that this was an important

unifying step for pharmacy and pharmacy education. This work also served as a basis for further revision of the Pharmaceutical Syllabus during this same period. At this time there was also growing support for moving to a 4 year Bachelors degree as a minimum requirement for pharmacy practice and this was finally achieved as an accreditation mandate by 1932. During this same period an intriguing conversation continued about the value of a very early version of the Doctor of Pharmacy degree, originally Initiated at the University of Maryland in 1871 to provide evidence of scientific rigor and accomplishment. While only a few schools adopted this nomenclature, by the time agreement was reached on the 4 year B.S. there was little interest in maintaining the Pharm.D. and it ceased to be awarded in 1938. As things unfolded it was clearly an idea ahead of its time.

The next phase of development involved establishing an accrediting body to assure quality in pharmacy education by developing standards for curricula, facilities, personnel and finances that schools of pharmacy would have to comply with in the future to gain accredited status. While this started within AACP, it evolved to independent status in the late 1920's and in 1932 the American Council on Pharmaceutical Education (ACPE) was formally established.¹³ The initial roster of 54 accredited programs was published in 1940.

The excitement about pharmacy's future waned during the depression and World War II with the public again perceiving pharmacists as retailers and in great oversupply. Pharmacists were not generally considered essential for health care delivery and they were not granted deferments while in school during the war on the basis that their “professional status” was again not clear. In addition, in the early 1940's several prominent, highly regarded younger faculty and administrators began to question the depth and scientific rigor of the curriculum which has been based on the Pharmaceutical Syllabus.

The cumulative concerns about the curriculum, the state of the profession and the public and government image of pharmacists led to call from several quarters to once again conduct a comprehensive survey of pharmaceutical education. In concert with the clear need to launch a strong public a public relations campaign this was initially discussed 1943 annual American Pharmaceutical Association (APhA) meeting. With the support of prominent deans and leaders in the profession the planning began for an external survey led by highly credible non pharmacy professionals with ample representation from all phases of the Pharmacy profession. Edward Elliot, President Emeritus of Purdue University, was selected to lead the Survey, which was

conducted under the auspices of the American Council on Education over the period 1946-1949. It is still regarded as the most comprehensive review of pharmacy and resulted in 11 action proposals. The report was highly controversial with Elliot stating that “... *Vigorous offensive action was clearly indicated if pharmacy was to maintain a recognized ranking position among the health professions*”. The authors correctly foresaw the mass manufacture of medicinal products as a threat to the status quo and opined that as health care became more complex, pharmacists had the potential to interact closely with other providers (especially physicians) in improving health care for a large percentage of the population. They also referred to a greater level of intensity of practice in hospital settings and predicted that all pharmacists will have that opportunity in the future. Overall the report boldly challenged the profession to reexamine its purpose, goals, as well as the breadth, depth and length of its educational requirements. The Committee on the Pharmaceutical Survey recommended explicit time for pre-pharmacy requirements and an increase in general education requirements consistent with other professions. Further recommendations included (1) significant strengthening of the scientific components of the current B.S. curriculum, (2) immediate development of a program leading to professional doctor of pharmacy degree, (3) inclusion of sufficient electives to permit students to combine their professional program with graduate studies leading to a M.S. and/or Ph.D. and (4) with incredible foresight, suggested that the AACP and ACPE develop and adopt a plan whereby existing practitioners could become eligible for the Pharm. D. degree through additional education and a comprehensive examination. The Committee, rather than prescribe a revision of the Pharmaceutical Syllabus, urged a serious reconsideration of the entire construct of pharmacy education, despite the nearly even split among the Deans in 1948 as to whether the current 4 year curriculum was sufficient or should be lengthened¹⁴.

With the exception of the University of Southern California and the University of California at San Francisco, where the Pharm.D. was adopted in 1950 and 1955, respectively, the national debate focused on the length of the program, rather than the Doctoral education idea, with a prolonged period of consideration of the 5 year degree as a compromise occurring over the next few years. Ultimately in late 1954, the decision was made to move to a mandatory minimum 5 year program no later than April, 1965. While the National Association of Boards of Pharmacy (NABP) and APhA supported this transition, there were still dissenters and the issue was not settled until

ACPE made this an accreditation requirement for classes entering college in 1960¹⁵.

While much disagreement remained about the relative balance between science/rigor versus retailing/management during the period from 1955-1975, most programs adopted relatively uniform curricula based on requisite accreditation standards which laid out guidelines in required disciplines and mandatory experiential education. There was room for flexibility and some programs emphasized different practice models and had differing requirements for electives, general education and to some extent, prepharmacy requirements. Programs in public research institutions also focused on expansion of research and graduate programs during this period as many saw this as means to increase stature as well as prepare future pharmacy faculty. Basic science continued to evolve into discrete disciplines and most colleges were organized around these individual disciplines (departments) for both undergraduate and graduate education.

As more and more products were being produced in mass quantities by the pharmaceutical industry and drug therapy was becoming more complex, many recognized the importance of shifting the emphasis of the profession and our education from strictly a product orientation to include the education of drug experts who could participate in decisions related to therapy options and advise physicians and others about drugs and drug products. Early pioneers like Paul Parker at Kentucky started experimenting with in-patient pharmacists spending time with physicians and becoming partners on the health care team as early as 1957¹⁶. This progressed steadily throughout many institutions with a milestone occurring at the University of California at San Francisco in 1966 with the initiation of the so called “9th floor” project. Here the first comprehensive clinical pharmacy service was established and included 24 hour decentralized pharmacy where pharmacists were responsible for interoperation, processing, and distribution for all orders to the point of drug administration. They also initiated the first formal drug information service, unit dose drug distribution and utilized pharmacy technicians to assist with technical dispensing functions. In 1965, Donald Brody captured the essence of this new role stating that the ultimate goal of pharmacy services must be the safe use of drugs and referred to “*drug use control*” as ‘*the sum total of knowledge, understanding, procedures, skills, controls and ethics that assures optimal safety in the distribution and use of medication*’.¹⁷

Over the next 30 years there has been steady, but uneven, progress towards this “clinical pharmacy” paradigm. Curricula expanded to include required experiential education

for all students adding hospital “clerkships” to traditional pharmacy internships in the community. Most colleges started to hire “clinical faculty, whose main responsibilities were teaching and patient care serving as practice role models and there was increasing discussion of the Pharm.D. degree, initially as a 2-year postbaccalaureate add-on for small numbers of students and then ultimately as the sole entry level degree for all graduates. Nebraska became the third college to adapt the all-Pharm.D. curriculum and by 1989 there were 10 all-Pharm.D. programs and 22 schools offered both the B.S. and the post B.S. Doctorate. While the trend towards this “clinical paradigm” was clear the contentiousness of the issues among deans and faculty of schools of pharmacy and various elements of the profession created a near endless debate with no consensus on the degree issue. Points of disagreement included the relevance of this practice model in the community, the legitimacy of clinical faculty (who did not perform research) in major universities to hold tenure and vote on faculty matters, and the concerns that this change in education mandated shifting of resources away from the basic sciences in terms of curricula content as well as new faculty hiring needs.

Three important taskforces helped inform this debate during this period. First was the Report of the Millis Commission (Pharmacists for the Future) released in 1975, which analyzed pharmacy’s current place in health care and proposed that pharmacy transform itself into a “knowledge system” focused on working with others to provide critically needed drug information for the benefit of society. This report also suggested that the curriculum become “competency based”, that sophisticated specialized practice roles need to be developed and that clinical faculty needed higher levels of education to practice in these new roles as well as serve as role models for students. This very scholarly report, although offered by a distinguished panel of pharmacy and non-pharmacy practitioners and educators was not widely embraced at the time.² As the debate raged and many leaders within the profession grew frustrated with the slow pace of change among the educators, APhA implemented the Task Force on Pharmacy Education in 1981 with strong leadership and the latitude to take this on from the practice standpoint. In their final report released in November of 1984, they made several key recommendations including; curricula be examined in light of professional competency needed; ACPE encourage experimentation and that tracking be allowed within curricula to allow some differentiation based on desired practice model for the students; that the quality and quantity of clerkships be such that they allow these to replace current internship requirements; assess the demand by existing practitioners

for a non-traditional Pharm.D. and start making plans to implement such a program, either as individual schools or as consortia; rigorously review graduate programs and invest in those that can become centers of excellence; that ASHP seek funding to establish and expand residency education in “appropriate and clearly delineable areas of expertise”; and finally that curricula evolve to an entry level Pharm.D. as the sole practice credential while maintaining the current B.S. until that time frame is established¹⁸.

THE PRESENT

The final body of work, which proved to be critical to the eventual transition to the Pharm.D. degree was the collective works from the Commission to Implement Change in Pharmaceutical Education, which had been appointed by AACP to “...implement a mission for practice which would serve as the basis for pharmaceutical education in the future relating well defined outcome goals and assessment of student progress and program effectiveness”.

The first of three papers issued by Commission focused the academy discussion on mission and society’s future needs, and in conjunction with the proposed action by ACPE in 1989 when they issued a Declaration of Intent to move to adopt the Pharm.D. as the single entry level degree no later than 2000, finally moved the AACP to act and at their annual meeting in July of 1992. After nearly 50 years of debate this was adopted by a 92-57 vote by the delegates. At that time 19% of the schools had a Pharm.D. — only program. By 1996 that jumped to 50% and all schools ultimately converted by the 2000 ACPE deadline. Subsequent Commission papers helped frame the discussion around curriculum content and sequencing as well reiterate the critical importance of strong graduate education among the nation’s colleges of pharmacy. With assistance from AACP, schools worked hard to move their curricula to meet the standards for ACPE as well as the criteria outlined by the Commission and there was continued expansion of experiential education and significant growth in numbers of clinical faculty¹⁹.

In the early ‘90’s there was also consensus developing around a modified paradigm for clinical pharmacy that came to be known as “Pharmaceutical Care”. Originated by Hepler and Strand in the early 90’s, this practice model focused on the pharmacist taking direct responsibility for assuring optimal use of drugs by individual patients and extending clinical pharmacy directly to patient care. Most importantly it assigned the responsibility to the pharmacist for assuring the best possible outcomes with drug therapy in all practice settings, thus clearly defining a direct patient

care role for the pharmacist that hopefully would be recognized for adding value and ultimately provide a means for direct compensation for.²⁰ Based upon the competencies and curricular content outlined in the 2nd and 3rd papers of the Commission to Implement Change in Pharmaceutical Education all pharmacy programs embraced this model and defined professional outcomes around competencies needed to deliver this type of care. ACPE also reinforced this paradigm with the revised Pharm.D. Standards that went into affect in 2000 in conjunction with the entry level Pharm.D. program implementation deadline.^{21,22}

With this nearly uniform level of agreement on what constitutes the necessary curriculum for a “Generalist Pharmacy Practitioner” efforts continue to continuously upgrade, curricula, modify teaching to increase the level of student centered non-lecture learning, enhance the quality and quantity of experiential education and broaden opportunities for residency training as specialty practice opportunities continue to be developed. The breadth and depth of residency programs has grown exponentially over the past 25 years with now more than 2,200 accredited positions available on an annual basis to the current 8,000 pharmacy graduates.²³ In addition community pharmacy residencies, which were initiated in independent community practice sites, and are now being expanded in chain practice, are also attracting increased numbers of graduates. From modest beginnings in the early 1980’s the Board of Pharmaceutical Specialties has developed credentialing for pharmacists in 5 major areas. These include: Nuclear pharmacy (established in 1978), Nutrition Support Pharmacy (established in 1988, Pharmacotherapy (established 1988), Oncology Pharmacy (established in 1996) and Psychiatric Pharmacy (established 1992)²⁴. The numbers of board certified pharmacists has been increasingly rapidly from 2,000 in 1997 to nearly 6,000 today with several other practice areas are under consideration for establishing future specialties. The principal motivation appears to be the expectations that this credential will be needed in the future to qualify subsets of pharmacists for payment for specialized services.

THE FUTURE

In many ways pharmacy practice and education remain at the crossroads between product orientation and patient care. The current system for reimbursing pharmacists in the US is based mainly on margin from dispensing prescriptions and is rapidly declining as a result of extreme cost containment pressure focused on reducing drug prices. As we continue to debate how to best reform health care,

improve our outcomes and increase access to the more than 40 million Americans without health insurance, many see the community pharmacist as a key provider who can add great value in improving how medicines are used and the quality of patient’s lives. The continuous, intense pressure to reduce costs though means that a strong financial case must be made to change the payment system to enable pharmacists to be reimbursed for their direct patient care for which they are so well prepared. In addition to cost pressures, our health care debate continues to revolve around how to increase access to health care for nearly, 50 million Americans and also make our health care system safer. Several high level and widely read reports issued by the Institute of Medicine²⁵ have raised grave concerns regarding the safety of our health care system and the inadequate interaction and sharing of information among providers to assure better patient care. There have been many studies documenting huge added costs to the system related to the improper use and less than optimal outcomes associated with drug therapy, with the study by Bootman and Johnson being the most widely quoted.²⁶

All of this strongly suggests an important role for expanding the patient care elements of pharmacy practice to reduce drug related problems, improve overall outcomes of treatment and therapy and dramatically reduce total health care costs. Missing thus far has been a large statistically sound study documenting this so strongly that it alters large insurers and state and federal health care reimbursement strategies.

While there is much talk about a nationalized health care system insuring coverage for all citizens, the political reality suggests that this is still an elusive goal. In 2004 our remodeled Medicare system offered some hope for pharmacist compensation in the form of payment for medication therapy management services (MTMS) in cases of highly complex patients. Many pharmacists have been exploring economical ways to deliver these services although a uniform reimbursement model has not yet evolved. Ultimately for pharmacists to realize their full potential in our system serious reform and altered payment systems are needed that will recognize the value of the time spent in patient care and not just dispensing.²⁷ Until then, we continue to try to balance the demands for large numbers of graduates mainly driven by the aging of our population to function primarily in a dispensing role, while at the same time preparing graduates for much higher levels of specialty clinical care in all settings. Many educators and some practitioners see a continued shift in the pharmacy workforce to favor increased numbers of lower paid, but more intensively trained, technicians to handle much of the

dispensing needs along with continued automation of dispensing thus potentially reducing the number of pharmacists needed to strictly deliver patient care²⁸. This increased prescription volume and the pressure to reduce costs has resulted in the rapid growth of certified pharmacy technicians from 75,000 in 2000 to more than 300,000 in 2007.²⁹ However, there continues to be pressure to produce more and more graduates to keep up with the increased prescription volume and growing number of pharmacies. More than 20 new schools of pharmacy have opened in the past 15 years and several others have significantly increased class sizes to meet this continued anticipated demand. Currently about 8,000 students graduate annually from the nation's colleges of pharmacy, but this number is expected to increase to more than 13,000 in 5 years after all of the newer programs start to graduate students.³⁰ This in turn has led to grave concerns regarding the quality of the educational programs in light of such rapid expansion in the absence of adequate resources and at the same time has created a serious shortage of pharmacy faculty with greater concerns on the horizon as many of our school face large scale retirement of senior faculty over the next 10 years.

As schools and colleges examine how to position our programs we ironically are still caught up in the age old question of whether pharmacy is mainly a technical trade or a true profession with independent judgment and value in patient care. Recent changes in pharmacy school accreditation have focused even more strongly on patient care, communication and public health skills with the details outlined in "Standards 2007" which went into effect in July, 2007.³¹ The new standards significantly increase requirements for experiential education, expectations for assessment data demonstrating how well we achieve our curricular objectives, demonstrated expertise among our faculty and a commitment to scholarship and research as well as to high quality teaching. Despite agreement on the Pharm.D. as well as the pharmaceutical care role of our graduates it is still clear the graduates of many of our schools still practice mainly in a dispensing capacity and some are concerned that the new ACPE standards do not clearly focus on patient care as a primary outcome of our educational programs³². The next few years will be crucial in assessing the future roles and future educational paradigm. If ACPE clearly enforces expected patient care outcomes many believe that there are large numbers of schools in the US that will struggle to stay accredited. However, as long as the retail pharmacy marketplace places great emphasis on dispensing this dichotomy that has been characteristic of the profession for nearly 150 years will still persist.

Other major questions we are dealing with include:³³ (1)

changes in the program needed to increase prepharmacy requirements leading to the possible requirement that future students will have to a B.S. degree prior to admission thus extending pharmacy education in the US to a minimum of 8 collegiate years; (2) anticipating the importance of sequencing the human genome may lead to individualized patient therapy and require extensive changes in the curriculum in areas of genetics, genomics and biotechnology; (3) the challenge in implementing a curriculum that expands more on student centered learning to develop critical thinking and problem solving skills in our graduates and relies less on the lecture format; (4) reframing pharmacy and other health professions education to increase interactions among medical, dental, nursing and pharmacy students in the early years of the curriculum recognizing that the practice of health care in the future will require effective teamwork among various providers; (5) the impact on technological advances in terms of changes in pharmacy practice as well as providing new delivery methods for education and continuing education in pharmacy; (6) many believe that pharmacists of the future will have to much more sophisticated in therapeutics and require specialty training to practice effectively in the next 15 years. Accredited residency sites have increased from 234 in 1980 to over 1000 today³³ and there is a broad discussion occurring now as to whether residency education will be a requirement to practice in the future. Funding of residency education and the applicability of residency training to community pharmacy practice remain major issues to be resolved. The case for this evolution to a post graduate education model was strongly stated in white papers by the American Society of Health systems Pharmacy (ASHP) and the American College of Clinical Pharmacy (ACCP), with both proposing an implementation date of 2020.^{34,35}

While pharmacy practice and pharmacy education in the US has embraced an increasingly strong patient care role over the past 150 years, there remains confusion on the part of the public and other health care providers as to what can be uniformly expected across the profession of pharmacy. While many see the value that pharmacy adds in managing patients' drug therapy in the hospital and clinic setting, many others still see pharmacists as the purveyor of commercially manufactured medications and not as a true health care professional. This is particularly true in the retail setting and in large busy pharmacies. Until we get uniform acceptance from patients, providers and health care payers of the value that pharmacy brings to health care there will be debate and controversy about the curriculum and the future. To paraphrase Wayne Gretzky, the famous Canadian hockey player in the middle 1980's " .. *my goal*

is not to skate to the puck, but to anticipate and skate to where the puck is going to be". This ability to anticipate where professions, industries and policy will be in the years ahead is crucial to allowing us to modify curricula and meet the future health care needs of society.

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