Pharmacist Workforce Challenges:

Exploring Today's Manpower Shortage

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Published by Cardinal Health 12.01

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Publisher's Note:

We are pleased to provide *Pharmacist Workforce Challenges: Exploring Today's Manpower Shortage* as the third in Cardinal Health's white paper series focused on issues of importance to healthcare providers and, more specifically, to the profession of pharmacy.

Prior publications in this series include:

- *Reducing the Human and Economic Costs of Drug Therapy Complications* (published January 1998)
- *Reducing the Human and Economic Costs of Drug Therapy Complications: Responding to the Medication Safety Issue* (published May 2000)

Comments regarding this monograph or others in the series are welcomed and should be directed to:

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Foreword

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Understanding Our Workforce

There is no doubt that manpower is a top of mind issue for virtually all pharmacy managers, irrespective of practice setting. Recruitment of new staff requires a great deal of time and energy. Training to the level of competency we require today requires substantial effort and resources. Vacancies are a tremendous burden on existing staff who must, often without choice, staff those shifts that are open, including evenings, nights and holidays. The smart manager needs to devote as much time and attention to the retention of staff as to recruitment. Yet, turnover is inevitable and minimizing it is essential for us to be successful in our manpower planning.

Knapp's work in this "Pharmacist Workforce Challenges" monograph is especially illuminating. She has compiled data from each segment of pharmacy practice and from virtually every perspective. This work is timely since other health professions are experiencing similar workforce issues, thus having created an industry-wide problem.

Recent data from the American Hospital Association paint a bleak picture. Within the hospital sector, vacancies among pharmacists top out at 21%, radiological technologists at 18%, medical records coders at 18%, laboratory technologists at 12% and nurses at 11%.[1] Bidding wars for limited staffs in certain markets are common. Sign-on bonuses may attract candidates, but do they build loyalty to the hiring organization? An examination of where we can achieve synergies with other health professions, particularly with nursing, could prove fruitful.[2] Can we look comprehensively at the skills and knowledge base of nurses, physicians and pharmacists to determine where we can best deploy these scarce resources? Can we develop multi-skilled technical staffs that can help facilitate the medication use system? Can we implement flexible information technologies that can support our professional staffs without taking even more of their time and attention than they now spend on information management?

Many of the issues that caused this pharmacist workforce shortage are positive. The transition to the all PharmD degree was long overdue. The increased use of prescription drugs has extended the lives of countless Americans, many of whom reply on chronic medication use to maintain health. Hospitals and their ambulatory centers are areas of intense and increasingly complex medication administration. The medication safety initiatives in which pharmacists are involved are essential to providing safe and appropriate medication administration. They are important to the public in restoring confidence in our work and in our profession. Pharmacists are integrally involved in implementing a number of medication safety initiatives and many organizations have a role for a pharmacist as medication safety officer, yet another extension of our workforce. Even the implementation and maintenance of computerized physician order entry will take increased effort by pharmacists to assure the success of these important systems.

A counterbalance to the positive roles that pharmacists play is the increase in the amount of time that we spend on reimbursement and payment issues. Pharmacists in ambulatory care play a role in adjudication of third party claims and often bring the news to patients that a drug ordered for them is not covered by their pharmacy benefit. This often places us in conflict with the patient and their physician in a system that is not our creation. The difficult financial condition of many hospitals places the pharmacist in roles of assuring reimbursement for pharmaceuticals for both inpatient and ambulatory care. The Ambulatory Payment Classification (APC) system is intricate and terribly complex and pharmacists must be directly involved in some aspect of the coding to assure payment. These roles do not represent the optimal use of our scarce manpower.

I have proposed the following as solutions to pharmacy's workforce crisis.[3] First, that pharmacy managers make every effort to make the pharmacy work environment as satisfying as possible. Second, that we review each pharmacist position to determine whether all of the tasks performed require a pharmacist's skill and knowledge. The selective use of well thought out and implemented information systems and other technologies can help in this regard. Finally, in order to be successful in the first two efforts, we must make a commitment to retrain pharmacists, including those released from the performance of non-pharmacist duties, as part of position restructuring. Knapp's data and their analysis suggest that there will not be any quick fixes to the shortage in the pharmacist workforce. This is a long-term problem that will require considerable energy and creativity, something we have used in advancing our profession.

[1]_____. The hospital workforce shortage: immediate and future. http://www.ahapolicyforum.org/trendwatch/twjune2001.asp. Accessed November 1, 2001.
[2]Gouveia WA, Shane R. Establishing professional synergy with nursing. Am J Health-Syst Pharm. In press, 2001.
[3]Gouveia WA. Solutions to pharmacy's staffing crises. Am J Health-Syst Pharm. 2001;58(9):807-8.

Executive Summary

Background. The recent, intense interest in the pharmacist workforce stems from the perception that there are not enough pharmacists to fill open positions. A similar shortfall occurred over a decade ago and gradually resolved. Therefore, the initial reports of a new shortage in 1998 were not met with alarm. It was not until more than a year passed during which vacancies continued to mount across a variety of pharmacist employment settings that the possibility of a long-term workforce problem was considered. A Congressional report in 2000 characterized the pharmacist shortage as an acute event most strongly related to increased use of prescription medications and new healthcare roles for pharmacists. Both these factors increased the demand for pharmacists and pharmaceutical care services.

A New Model Describing the Pharmacist Workforce. Data characterizing the pharmacist workforce have improved over the last decade. In 2000, the Bureau of Health Professions published information about a new model that projects pharmacist numbers by gender and age through 2020. The model estimates there were 196,011 active pharmacists in 2000 and that pharmacist numbers will increase by about 1.4% per year through 2010. This rate of growth slightly exceeds the projected U.S. population growth of approximately 1% per year. The model also portrays an increasingly female pharmacist workforce with 46% women pharmacists in 2000 rising to 58% by 2010. Through 2010, pharmacists leaving the workforce by reason of death or retirement will be predominantly men. The model also estimates that about 314 pharmacists trained outside the U.S. will enter the pharmacist workforce each year.

The principal shortcoming of the new model is that the estimated headcount it provides does not factor in work patterns of pharmacists. Historically, women pharmacists have preferred to work part-time during child-bearing and child-rearing years and men pharmacists have tended to work more than a 40-hour week. If these patterns were to persist, the increasingly female pharmacist workforce would coincide with a continually decreasing work contribution for each pharmacist. Another work pattern observed in women pharmacists has been a preference for work in institutional settings such as hospitals. If the shortage persists, this preference could be problematic for pharmacist employers in non-institutional settings.

Recent Information about the Pharmacist Shortage. In 2000, the American Society of Health-System Pharmacists (ASHP) called attention to growing pharmacist vacancies using survey data from directors of pharmacy. Their report noted that more pharmacy directors (70%) were having difficulty filling positions requiring experienced practitioners than filling entry-level positions (40%). These findings were mirrored by survey results from The Lazarus Report, also from directors of institutional pharmacies. The Lazarus Report also documented rapidly rising pharmacist salaries in 2000. The National Association of Chain Drug Stores (NACDS), through surveys at six-month intervals, has reported continually growing vacancies in community pharmacies since 1998. *Drug Topics*, a trade journal, has tracked the rise in pharmacist salaries across both the institutional and community settings, an indicator of increased demand. The Aggregate Demand Index, a monthly report of the difficulty in filling open positions across the U.S., found that, since 1999, the highest unmet demand for pharmacists was occurring in Minnesota, California, Wisconsin, Kentucky, Iowa and Texas. The same survey found that only in Hawaii and Rhode Island were supply and demand for pharmacists in balance.

Sorting Out Causes of the Shortage. The 2000 Congressional report concluded that the principal reason for the shortage of pharmacists was the recent growth in the use of prescription medications. Prescription growth rates in the latter 1990s outpaced growth rates earlier in the decade and greatly outpaced the growth of pharmacists. Several factors contributed. As the 1990s progressed, the Baby Boomers, a large population segment, entered age groups where medication use is known to accelerate. At the same time, third party coverage increased from 44% of prescriptions in 1992 to

78% in 1999 and covered prescriptions are known to be more often filled and refilled. Direct-to-consumer advertising was also growing in the late 1990s further increasing the demand for prescription medications. Prescription medication use was also rising in the institutional setting although this phenomenon is more difficult to quantify. Overall, all these factors, occurring concurrently, increased the demand for pharmacists and their services beyond the available supply.

Further exacerbating the emerging problem has been the expansion of pharmacist roles in healthcare. ASHP surveys of the responsibilities of ambulatory care pharmacists in 1997 and 1999 showed pharmacists in integrated health systems were increasing their routine participation in non-traditional activities involving both patient care and management. At the same time, community pharmacies began offering immunization programs and programs that address common, chronic diseases treated primarily with medications (for example, asthma and diabetes mellitus). Screening programs coupled with patient education targeting, for example, osteoporosis and hypertension have also become more widespread. These new activities further increased the demand for pharmacists.

Looking Forward … What Can Help? The supply of pharmacists can be increased but probably not enough to serve as a sole solution to the shortage problem. Since 1996, six new pharmacy schools have opened. Other schools have completed the transition to the Doctor of Pharmacy degree, a step that often reduces graduate numbers, at least temporarily. Support for increasing the supply of pharmacists must include steps to increase applications to pharmacy schools that have been falling since 1997.

Pharmacists already in the workforce can also contribute to solving the shortage. With the proper incentives, women pharmacists may change from traditional work patterns and work more. Incentives may also induce pharmacists to postpone retirement and remain in the workforce.

Broader use of pharmacy technicians is another avenue for coping with the shortage. It is estimated that there are about 200,000 pharmacy technicians in the U.S., about one technician for every pharmacist. Other data characterizing pharmacy technicians are sparse. By passing the Pharmacy Technician Certification Board examination, almost 90,000 pharmacy technicians have demonstrated competencies that give pharmacists and employers confidence in delegating responsibilities to them. With the recognition of medication errors as an unsolved, national problem, however, other steps such as additional training may also be necessary.

Legislation also impacts on the shortage situation. Legislation, generally at the state level, is required to change the allowable activities of pharmacy technicians and other aspects of delivering healthcare. California and Florida could increase the flow of pharmacists into their states by adopting the reciprocity practices of other states. State-based changes could also accelerate the rate at which students move into practice after graduation.

Automation and technology offer the strongest possibilities for moving the quality of the medication use process forward even if pharmacists are in short supply. Many advances in automation have, to date, been applicable mostly to large systems such as the Veterans Affairs system or the Kaiser Permanente system. In institutions, automated medication dispensing cabinets and bar coding can enhance safety as well as productivity. Physician use of electronic prescribing software could make the process of dispensing prescriptions safer and more efficient. The adoption of automation and technology solutions can be held back by cost, restrictive legislation and the fact that many advances are still applicable primarily to large systems while many pharmacy operations are relatively small. However, as recently pointed out in an Institute of Medicine report, the very limited application of technology to healthcare has been an obstacle to achieving quality. The pharmacist shortage may be a spur to the wider and better use of automation and technology in the medication use process.

Summary. It is widely accepted that the pharmacist shortage is a reality. Nevertheless, quality gains in the medication use process must move forward; and, therefore, multiple, partial solutions should be considered and implemented judiciously. These solutions should be built on the expectation that the demand for pharmacists and their services will continue to grow in the foreseeable future.

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Background on Pharmacist Workforce Issues

Over the past 20 years, there have been periodic shifts in the balance between the supply and demand for pharmacists. For example, in the late 1980s and early 1990s, when an unexpected shortage of pharmacists developed, employers, educators, the professional associations and researchers were perplexed. At the time, the principal source of information about health profession workforces was the Bureau of Health Professions (BHPr). This organization, which received federal funding to report to the Congress every other year about the status of health professions—including pharmacy—in the United States, had made no predictions about an impending shortage.

Although that shortage was never explained, one outcome of the mismatch between BHPr information and what was observed in the market place was the creation of the Pharmacy Manpower Project (PMP), a consortium of pharmacy organizations and the Bureau of Health Professions. The PMP organized and coordinated a national census of pharmacists that showed that in 1991 there were approximately 194,570 pharmacists in the United States and about 171,611 of these pharmacists were actively practicing. The PMP census count matched quite closely to BHPr estimates. The close match between the census count and the estimates from BHPr suggested that whatever was causing the pharmacist shortage was not a miscalculation on the part of BHPr about how many pharmacists there actually were in the United States.

Eventually, in the middle 1990s, the imbalance between supply and demand resolved, at least to the extent that retail employers were able to open new pharmacies and institutional pharmacies were not hampered by workforce shortages. Meanwhile, the efforts to understand the dynamics of the early 1990s shortage led to the realization that data collection on the pharmacist workforce was insufficient. Most available data about workforce issues related to supply while the ability to study demand issues was very limited. Unless both supply and demand data were available and could be compared, it was virtually impossible to reach defensible conclusions about the cause of a workforce imbalance. In response, the PMP committed to a broader collection of data about the pharmacist workforce including demand data. These efforts were hastened by evidence of another shortage in the latter 1990s.

In 1998, the National Association of Chain Drug Stores (NACDS), speaking on behalf of its member organizations, announced that another shortage of pharmacists appeared to be developing. Their alert was based on survey data collected at six-month intervals from member organizations, mostly chain pharmacy corporations. The surveys were showing more and more vacancies in pharmacist positions. From that point to today, there has been increasing evidence of a national, dynamic shortage of pharmacists. The situation has sparked reaction across many sectors from the federal government to pharmacy corporations to schools and colleges of pharmacy. In the remainder of this paper, we will examine this workforce situation from both supply and demand perspectives.

Available Information about the Pharmacist Workforce

2000 Congressional Report

In December 2000, the Health Resources and Services Administration (HRSA) released a Congressionally-mandated report about the pharmacist shortage. The report was titled *The Pharmacist Workforce: A Study of the Supply and Demand for Pharmacists.*[1] The full text of the report is available on the Web at www.bhpr.hrsa.gov. The principal findings of the report included the following:

- There was (in 2000) an acute shortage of pharmacists in the United States that was most strongly related to increased demands for pharmacists and pharmaceutical care services.
- The demand for pharmacists and their services was not likely to slacken in the next 10 years.
- The growth in demand was strongly related to increased medication use across all practice sectors that had outpaced the growth of pharmacists and the U.S. population.
- The shortage of pharmacists could hinder the important role pharmacists play in reducing medication errors in all practice settings.
- The shortage of pharmacists could hinder needed improvements in the medication use process—both in the care of patients and in the provision of cost-effective medication use.
- Despite the addition of 10 new schools of pharmacy since 1980 and near-completion of the transition to the entry-level Doctor of Pharmacy (PharmD) degree, pharmacy graduates were projected to grow at only 1.4% through 2010—a rate far below the need created by expanding roles of pharmacists and expanding medication use.
- The shortage had intensified the competition for pharmacists with post-graduate training. These pharmacists with advanced training were critical to resolving the shortage and improving medication use through their roles as pharmacy faculty, as clinical practitioners with specialized skills and as researchers in the medication use process.

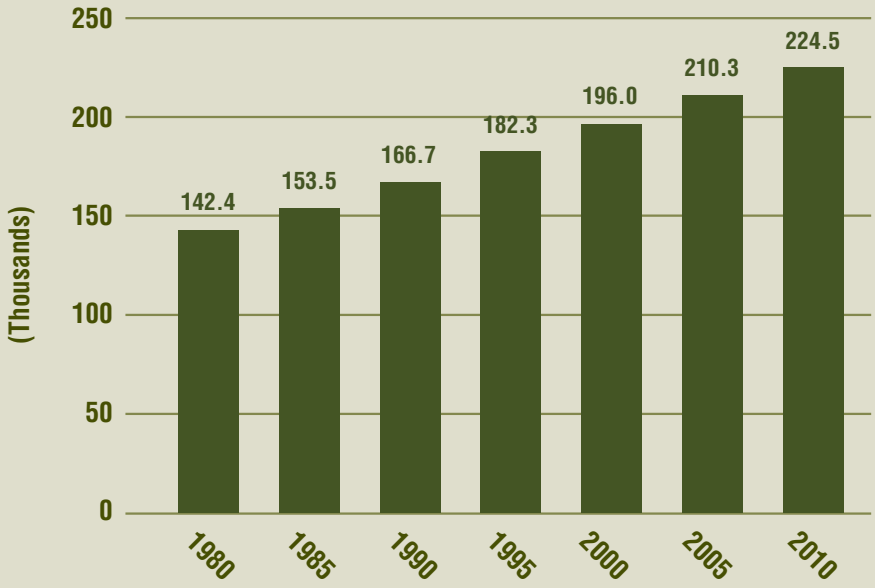
This report was particularly valuable in comparison to previous efforts because it included consideration of both supply and demand factors affecting the pharmacist workforce. The report looked at the dramatic, recent growth in the use of prescription medications and linked this growth to a pharmacist workforce not able to keep up with rising demand either through producing more pharmacists or through changing systems associated with medication use.

The New Bureau of Health Professions (BHPr) Pharmacist Supply Model

Important to pharmacist supply considerations are the projections of a new pharmacist supply model put forth by the Bureau of Health Professions in 2000.[2] The new model supplanted an earlier supply model that had been used throughout the 1980s and 1990s to estimate the size of the workforce. The new model included several improvements to its basic structure, a structure that consisted of a base count of pharmacists drawn from PMP census data to which new graduates were added annually and estimates of pharmacists departing from the workforce for reasons of retirement and death were subtracted. The improvements included addition of actual graduates (as opposed to estimates) from the 1990s by gender and degree, a revision of the separation rates used to estimate departing pharmacists and the inclusion of international pharmacy graduates.

Figure 1 shows active pharmacists in the United States including the new model's projections of pharmacist numbers to 2010, at which time the model estimates 224,524 active pharmacists. In 2000, the model estimated there were 196,011 active pharmacists. The annual growth of the workforce from 2000 to 2010 is projected at about 1.4% per year, somewhat more than the projected rate of population growth, which is about 1%. Based on these estimates, the number of pharmacists per 100,000 population will rise slowly to 75. However, as noted prominently in the 2000 HRSA report, the growth rates of both pharmacists and population lag substantially behind the growth of prescription medications (discussed later).

Figure 1. Active Pharmacists in the U.S.: 1980–2010



Source: BHPr Pharmacist Supply Model

The new BHPr model also described the gender balance of the pharmacist workforce as shown in Figure 2. During the current decade, women pharmacists will become the predominant gender. Starting in 2000 when 46% of the pharmacist workforce were women, the percent women pharmacists will gradually rise to 58% by 2010. The significance of this shift rests on two established work preferences of women pharmacists. The first is a well-documented preference for part-time work, especially during child-bearing and child-rearing years, and the second is a preference for working in the hospital or institutional setting as compared to the community or retail setting.[3,4,5]

Figure 2. Changing Gender Ratios in the Pharmacist Workforce: 1991-2010

Source: BHPr Pharmacist Supply Model

The loss of pharmacists through death and retirement, as portrayed by the BHPr model, is presented in Table 1. Each year more than 2% of the workforce must be replaced just to maintain constant numbers of pharmacists. Fortunately, BHPr estimates of new graduates exceed 7,000 each year so there is a net gain of pharmacists projected through 2010. Throughout this decade, those pharmacists leaving the workforce will be predominantly male by virtue of the fact that age is the principal determinant for leaving the workforce; and among older pharmacists, males are predominant. Table 1 illustrates the gender pattern of pharmacists leaving the workforce. Table 1 also illustrates that, over time, the gender balance of departing pharmacists gradually becomes less male and more female.

Table 1. Pharmacist Workforce Losses: Mostly Men

Year	Loss of Men	Loss of Women	Total Losses	Percent of Total Workforce
1995	4,338	902	5,240	2.9
2000	3,882	1,158	5,040	2.6
2005	3,711	1,578	5,289	2.5
2010	3,553	2,203	5,756	2.6

Source: BHPr Pharmacist Supply Model

Estimates of international pharmacy graduates (IPGs), that is, U.S.-licensed pharmacists trained outside the United States, were also included in the new BHPr model. Unlike foreign-trained physicians, IPGs in the U.S. are relatively few in number; for example, only 358 IPGs passed the North American Pharmacy Licensure Examination (NAPLEX) in 1999, and this was the highest number of IPGs passing the NAPLEX in recent years. Likewise, in California, where there is a different licensure examination, only 51 IPGs tested successfully in 1999. The number of new IPGs annually, while small, has also been fluctuating with increasing numbers passing the NAPLEX and decreasing numbers gaining licensure through the California licensure examination. Thus, given these uncertainties, the BHPr model used a three-year average of 314 new licensees each year as its annual (unchanging) estimate of IPGs. This number is a small fraction of the over 7,000 annual graduates from U.S. schools.

There is uncertainty about the future numbers of IPGs and the role they might play in allaying the pharmacist shortage. Employers have made some efforts to recruit IPGs from some English-speaking countries with similar pharmacy training although recruitment is made more difficult by the requirement of a special immigration visa.[6] But generally, pharmacy programs outside the U.S. do not meet the increasing educational requirements of U.S. schools of pharmacy. Where international educational programs fall short, few U.S. schools have shown an interest in providing special programs to equalize coursework and particularly clinical experience. Thus, the uncertainty about IPGs' contribution to the future supply of pharmacists remains.

Next Step … Refine the Models

The BHPr model provides estimates of future headcounts of pharmacists—clearly a shortcoming in the sense that neither men nor women pharmacists contribute, on average, a single full-time equivalent (FTE) per person. Therefore, an important next step in more accurately predicting the size and character of the future pharmacy workforce is to overlay what is known about past and current work patterns of pharmacists on the BHPr model.

Table 2 outlines weekly hours worked by men and women pharmacists as recorded in a 2000 national survey.[7] The study found, as several previous studies had, that men pharmacists in three principal work settings worked more than 40 hours per week and women pharmacists worked less than 40 hours weekly in the same settings.[7,8] This dichotomy in work patterns has implications on the *effective* size of the future workforce. Assuming that the women pharmacists continue to work, on average, less than 40 hours per week, as the workforce becomes more female, the average number of hours worked by each pharmacist will decrease. For example, in Table 2, in the retail setting, men pharmacists recorded 2.6 hours above a 40-hour workweek while women pharmacists worked 2.6 hours below the 40-hour workweek. As long as the workforce remains predominantly male—until about 2003—the total FTEs or the effective workforce will be greater than the headcount. Once women pharmacists are over 50% of the workforce, the headcount will be higher than the FTE count.

Table 2. 2000 National Workforce Study: Hours Worked Per Week

Work Setting	Males	Females
Retail	42.6	37.4
Institutional	43.7	38.8
Non-Patient Care	43.3	35.7

Source: Pharmacy Manpower Project, National Workforce Study, 2000

Table 3 presents a modification of BHPr estimates taking into account the changing gender balance of the workforce and corresponding weekly hours worked.[9] The table shows that, in 1991, for example, the effective workforce was about 1% greater than the headcount. By contrast, in 2010, the effective workforce will be about 3% less than the BHPr estimated headcount. The gap will continue to grow until a new equilibrium is reached and the gender balance of the workforce stabilizes. The growing gap between headcount and effective size of the workforce is not inevitable, however; for example, an increase in the percentage of male graduates in schools of pharmacy or an increase in the weekly hours worked by women pharmacists could reduce or nullify the gap.

Table 3. Headcounts Versus Estimated Full-Time Equivalents (FTEs)

	1991 (68% male)	2000 (54% male)	2010 (42% male)
Headcount	171,611	196,011	224,524
FTE*	173,581	193,412	217,709

**FTE=40 Hours Per Week*

Presented at 2001 APhA Annual Meeting, San Francisco, CA (Gershon SK, Cultice JM, Knapp KK)

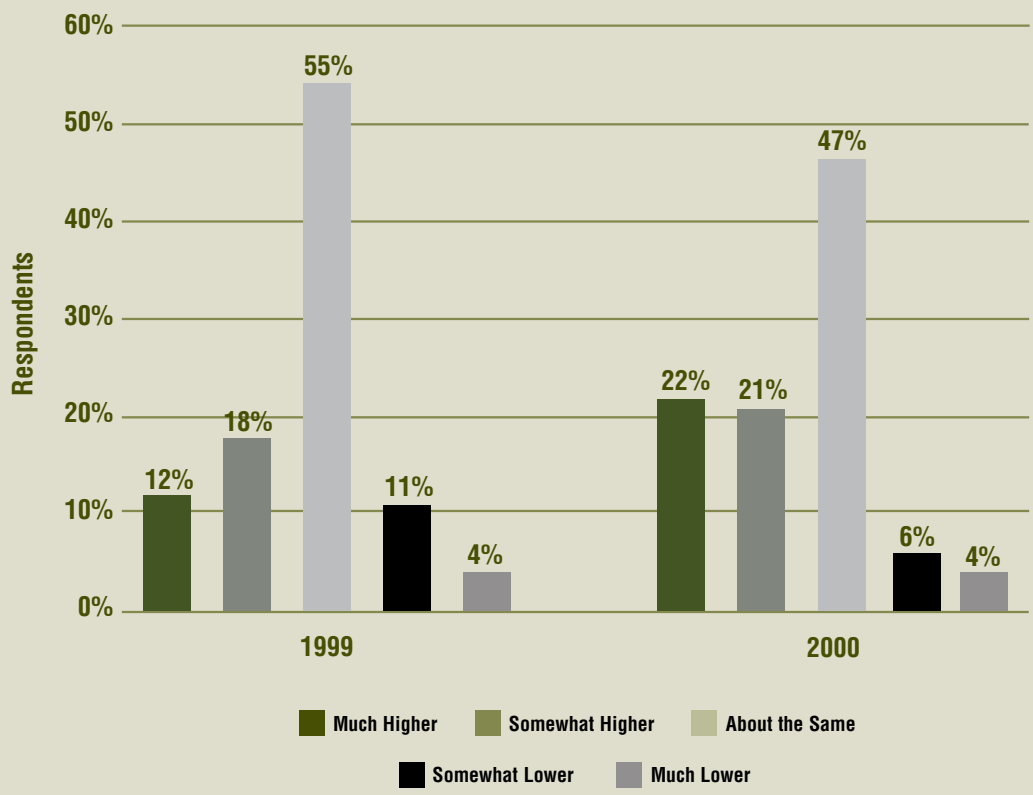
Women pharmacists have also shown a preference for working in an institutional pharmacy setting—hospitals and medical centers—over a community pharmacy setting, and a recent study showed that this propensity has persisted over many years.[3] In the context of a pharmacist shortage and an increasingly female workforce, this preference could result in greater difficulties for community pharmacy employers. This preference is, however, offset by another long-standing economic fact; that is, salaries are higher in the community sector (discussed later). If the pharmacist shortage persists, it is likely employers will use these competing motivations to vie for available pharmacists.

Surveys That Shed Light on Pharmacist Workforce Issues

American Society of Health-System Pharmacists (ASHP)

The survey series described here is but one of several longitudinal surveys supported by ASHP. This survey series queried 432 directors of hospital and health-system pharmacies about the difficulty in filling vacancies in hospitals and health systems. Figure 3 shows the results of annual surveys in 1999 and 2000. The survey was not repeated in 2001. The figure shows the increasing difficulty experienced by those attempting to fill these positions between 1999 and 2000. Also reported was a higher level of difficulty in filling positions requiring experience than entry-level positions with 40% reporting "severe" difficulty in filling vacant entry-level positions while 70% reported "severe" difficulty filling experienced practitioner positions. The results suggested that, over this time period, the market for experienced pharmacists was particularly and increasingly competitive.

Figure 3. ASHP Surveys: Vacancies Today Compared to Vacancies 5 Years Ago

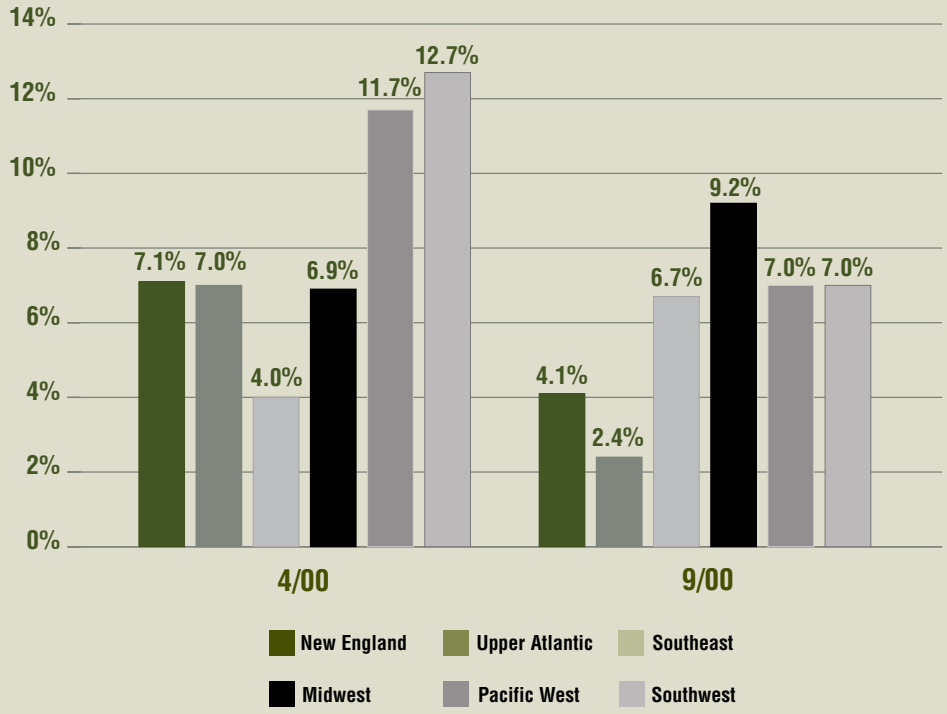


Source: ASHP Press Release, 7/25/00

The Lazarus Report

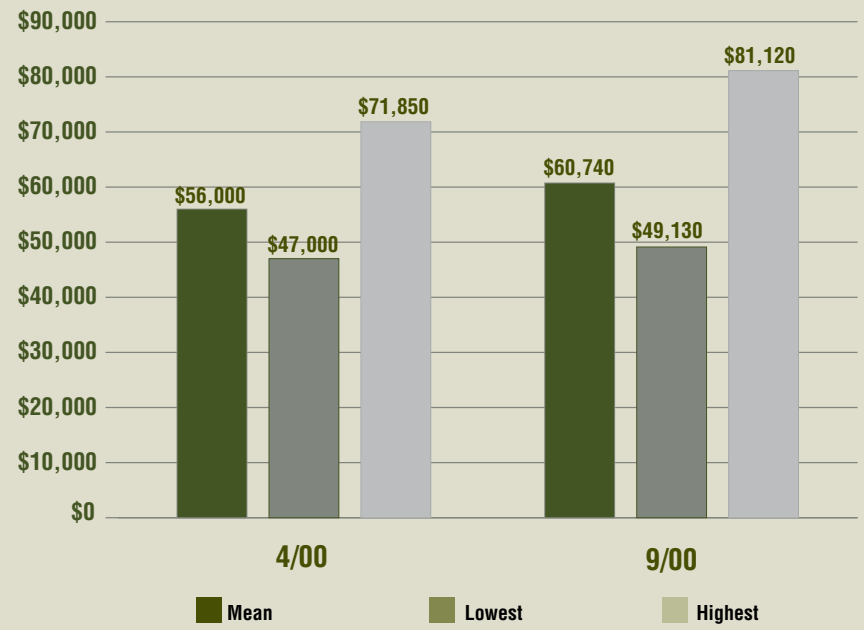
This survey series also addresses institutional pharmacy. Directors of pharmacy from 42 institutions throughout the United States regularly submit information about their pharmacy operations. Figure 4 describes a portion of the year 2000 and shows that from Spring 2000 to Fall 2000, there was some drop in the intensity of the pharmacist shortage nationally. Figure 5 shows the concomitant, rapid rise in mean entry-level salaries that perhaps contributed to the decline in open positions. The rapid rise in pharmacist salaries documented by this survey is one indicator of a demand for pharmacists in excess of available supply despite the addition of new graduates into the market place.

Figure 4. Lazarus Report 2000: Vacancy Rates in the Institutional Setting



Source: The Lazarus Report, 9/00

Figure 5. Lazarus Report 2000: Entry Level, Annual Salaries in the Institutional Setting

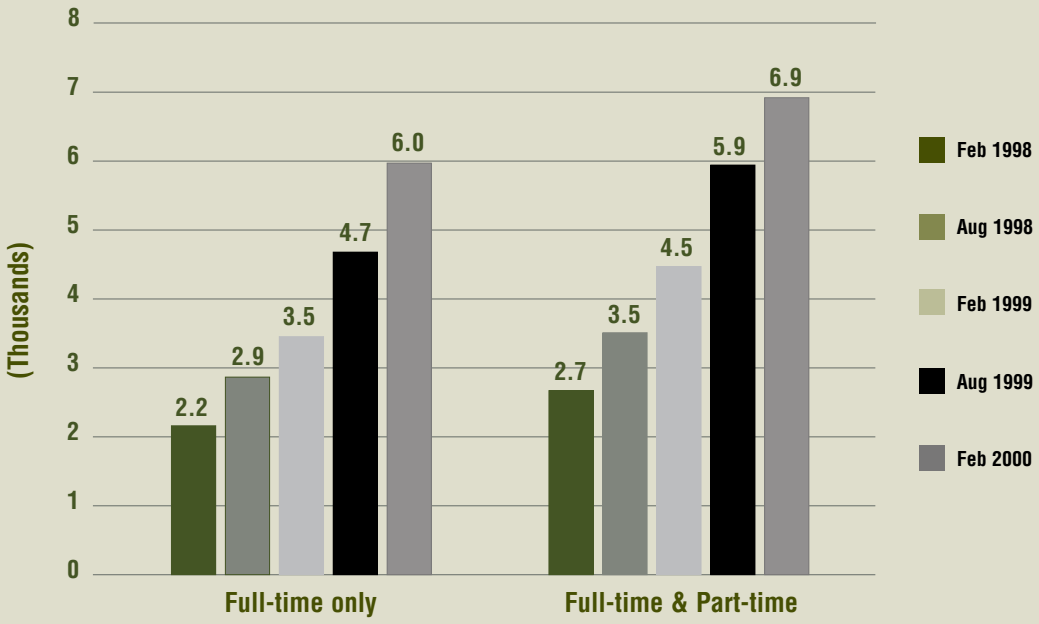


Source: The Lazarus Report, 9/00

The National Association of Chain Drug Stores (NACDS)

The NACDS was the first pharmacy association to call attention to the emerging shortage of pharmacists. In surveys completed at six-month intervals, NACDS identified growing numbers of vacancies in community pharmacies. Figure 6 presents the results of a series of these surveys. Both full-time and part-time vacancies continued to climb throughout the period described.

Figure 6. NACDS Surveys: Pharmacist Vacancies in Member Drug Stores

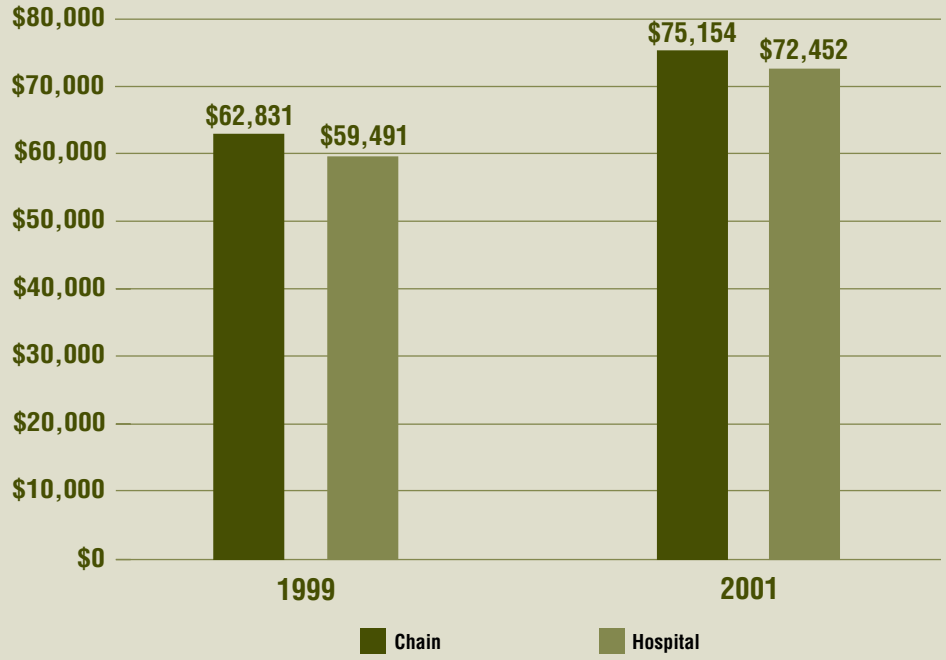


Source: National Association of Chain Drug Stores Surveys, 1998-2000

Drug Topics

This publication is a trade journal that conducts several survey series addressing pharmacist salaries and other topics. The journal has been able to track the recent rise in pharmacist salaries. Figure 7 describes a 19.6% rise in chain pharmacy salaries between 1999 and 2001 and a 21.8% rise in hospital pharmacy salaries over the same period. While chain pharmacy salaries remained higher than hospital salaries, the gap between them narrowed slightly. The dramatic salary rise over the two-year period is another indicator of the unmet demand for pharmacists.

Figure 7. 2001 *Drug Topics* Salary Survey: Average Annual Salary

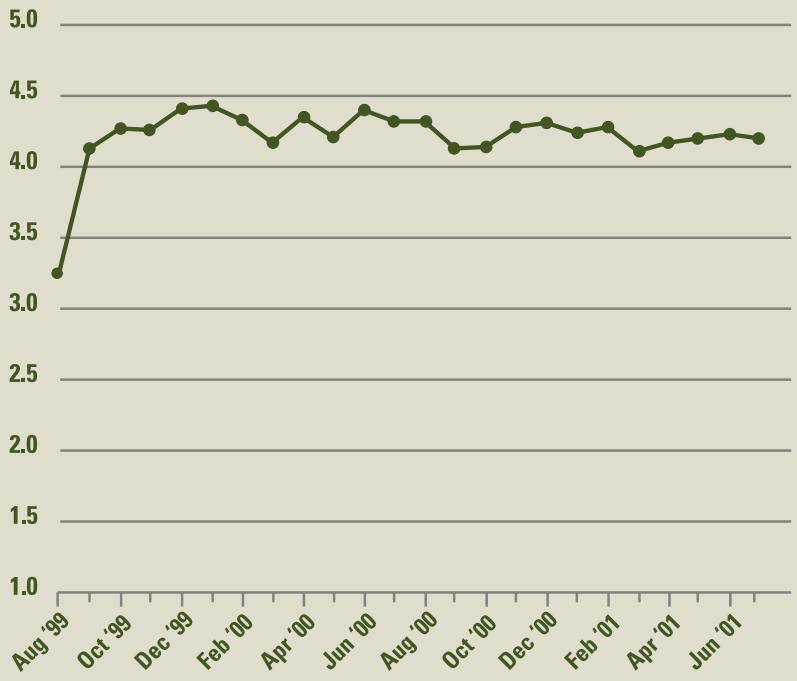


Source: *Drug Topics*, 3/19/01

The Aggregate Demand Index (ADI)

The Pharmacy Manpower Project has sponsored this national, monthly survey since August 1999. The data are provided by panelists who are directly involved in the hiring of pharmacists. Panelists submit monthly reports about the level of difficulty they have experienced in filling open positions. Specifically, panelists submit a difficulty rating for each state or states where they are responsible for keeping positions filled. The ratings are based on a 5-point scale where 5=high demand: difficult to fill open positions; 4=moderate demand: some difficulty filling open positions; 3=demand in balance with supply; 2=demand is less than the pharmacist supply available; and 1=demand is much less than the pharmacist supply available. From these ratings, a mean rating or demand index for each state is determined. Then, using demand indices from all states and the District of Columbia, a population-weighted national index of the difficulty in filling open positions, the Aggregate Demand Index, is calculated. Population-weighted regional demand indices are also calculated. Figure 8 shows the ADI from August 1999 through July 2001. Except for the first survey in August 1999, the monthly demand levels have remained between 4 and 5 suggesting that there is an excess demand over available supply. The design and performance of the ADI project including details about the selection and composition of the panel and findings by geographic areas and type of position have been reported.[10]

Figure 8. Aggregate Demand Index: August 1999 – July 2001



Source: Pharmacy Manpower Project, Aggregate Demand Index

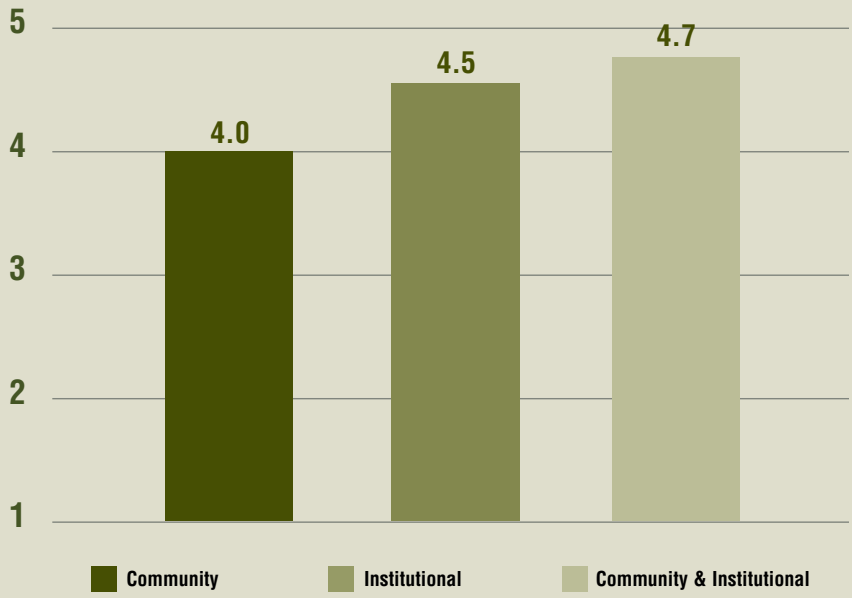
The monthly results of the ADI project are posted on the Web (www.pharmacymanpower.com). The site can also be accessed using the key words "pharmacy manpower" on most search engines. To allow comparisons over time, the Web site for the project lists the ADI for the previous month and for the same month during the previous year. Regional and divisional indices convey the level of demand for pharmacist positions within smaller geographic areas. Information at the state level is maintained in the ADI database but not posted on the Web site at present. Data about demand levels that organizations face in filling types of pharmacy positions (primarily community positions, primarily institutional positions or both community and institutional positions) have also been tracked in the database but not posted on the Web site.

ADI data show that pharmacist demand levels vary substantially at the state level. From August 1999 through July 2001, the states with the highest demand level were Minnesota, California, Wisconsin, Kentucky, Iowa and Texas. The demand levels for these states averaged 4.5 or greater on the 5-point scale used by panelists signifying it was difficult to fill open positions. At the other extreme, Hawaii and Rhode Island were the states with the lowest demand levels; their average demand indices were less than 3.5 suggesting these states were in or close to balance with respect to the demand for pharmacists and the available supply. The remaining 42 states and the District of Columbia showed average demand levels between 3.5 and 4.5 indicating at least some difficulty in filling open positions.

The data from the ADI project can also be used to estimate the degree of exposure of the U.S. population to the pharmacist shortage. Based on state-level demand data, the percentage of the population living in states with varying levels of demand can be calculated; for example, in July 2001, 26% of the resident U.S. population lived in states where the demand level was greater than 4.5, 72% in areas where the demand level was between 3.5 and 4.5 and less than 2% in areas where the demand for pharmacists was in balance with available supply.

Some panelists from the ADI project can be described as hiring primarily community pharmacists (chain pharmacy organizations, independent pharmacies, supermarkets and mass merchandisers), others as hiring primarily institutional pharmacists (hospitals and medical centers) and others as hiring both community and institutional pharmacists (integrated health systems). From these, the ADI data yield demand information based on the type of organization. Figure 9 shows mean demand levels for the three types of organizations. From August 1999 through July 2001, organizations hiring both community and institutional pharmacists reported the highest difficulty in filling open positions (mean 4.7) followed by organizations with primarily institutional positions (mean 4.5) followed by organizations with primarily community positions (mean 4.0). The reasons for the varying levels of difficulty are not known.

Figure 9. Demand Index by Type of Organization: August 1999 – July 2001



Source: Pharmacy Manpower Project, Aggregate Demand Index

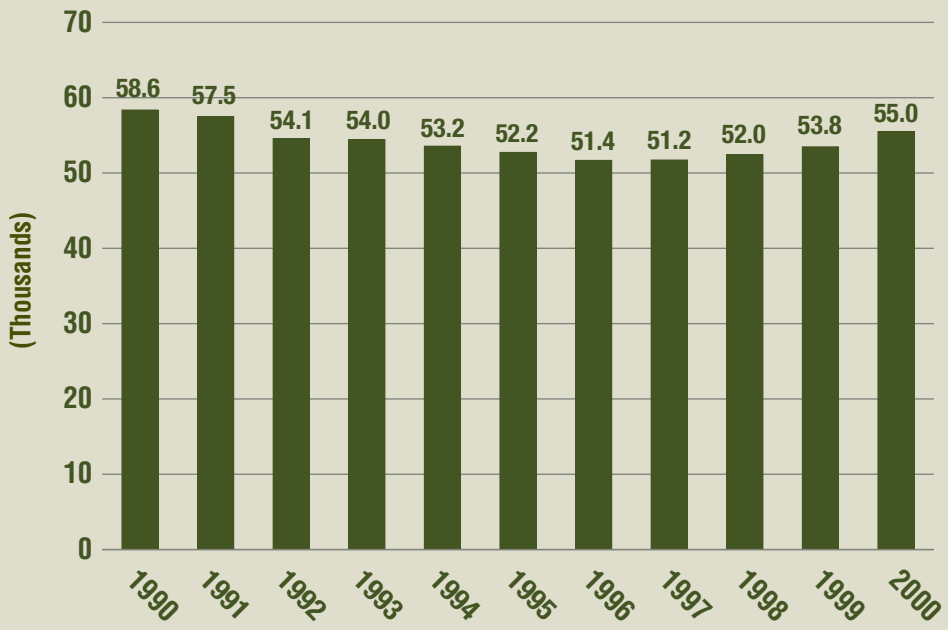
Sorting Out Reasons … and Non-Reasons … for the Pharmacist Shortage

In the Congressional report cited earlier, invited public commentary about the cause(s) of the shortage yielded a variety of explanations. Some of these were supportable by evidence and others were not. In these sections, we explore some of the most commonly cited reasons for the shortage.

The Growth of Pharmacies

A popular conception is that the 1990s saw a vast expansion of community pharmacies. Indeed, many consumers and pharmacists alike have blamed the shortage of pharmacists on the "explosion" of community pharmacies. Actual counts of pharmacies portray a different story. Figure 10 shows total retail pharmacies from 1990 through 2000. The counts include independent, mass merchandise, supermarket and chain drug pharmacies. The data illustrate that pharmacy numbers in 2000 were over 3,000 fewer than in 1990. The decade saw significant contraction of the independent pharmacy sector, significant growth in the mass merchandise and supermarket sectors and modest growth in the chain drug store sector. While there are other issues such as store size, number of pharmacists per store and hours of operations, the data suggest that changes in the number of pharmacies do not explain the pharmacist shortage.

Figure 10. Licensed Retail Pharmacy Outlets: 1990-2000

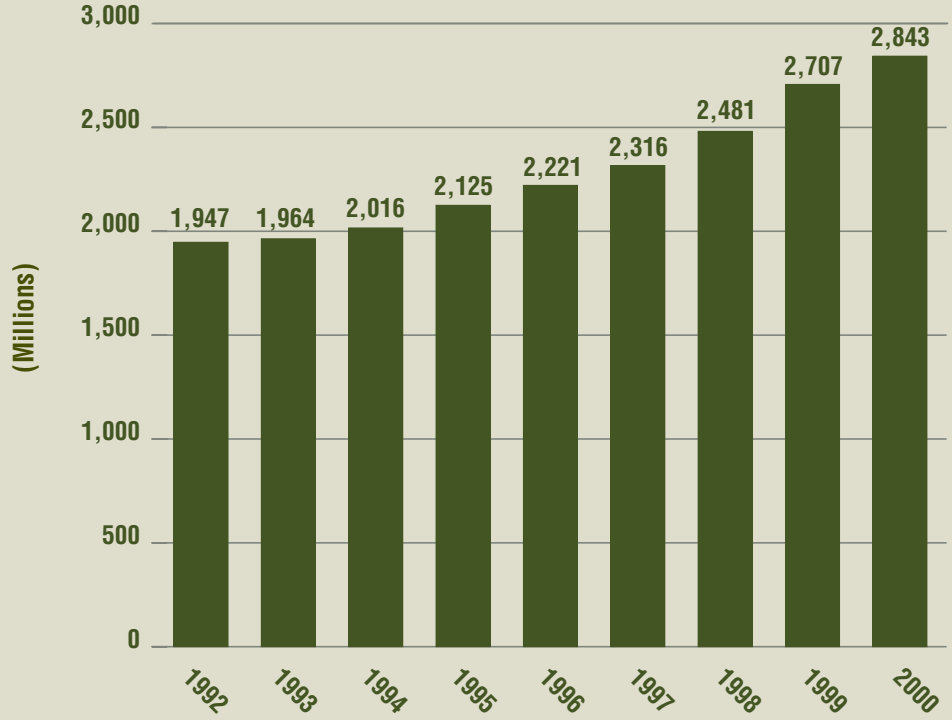


Source: National Association of Chain Drug Stores, *Industry Profile 2001*

Prescription Growth in the Retail Sector

The 1990s saw a tremendous growth in the use of medications, particularly prescription medications. In the main, patients acquire their prescriptions through community pharmacies (95%) or mail order pharmacies (5%). Figure 11 shows the growth of prescriptions in the 1990s. Through 1997, growth was averaging about 4% per year. Then in 1998 and 1999, growth rates of 7% and 9% respectively were observed. These years signaled the onset of today's pharmacist shortage. Although growth backed off to 5% in 2000, the high numbers of retail prescriptions attained through the two years of rapid growth could be seen as maintaining pressure on a system being inundated with prescriptions.

Figure 11. Retail Prescriptions: 1992-2000



Sources: IMS Health; NACDS Economics Department

The causes for the growth in retail prescriptions throughout the 1990s are easier to explain than the surge observed after 1997. The gradual growth of the over-65 year-old cohort of the U.S. population has driven increased consumption of prescription medications throughout the 1990s. Table 4 lists data showing how prescription use increases with age. There are two big jumps in per capita prescription usage: one as people move into the 45-64 year-old age group and the next when they move into the 65-74 year-old group. The Baby Boomers, a large segment of the U.S. population, are moving through the 45-64 year-old consumption range and approaching the higher over-65 consumption rate—leading to increased prescription usage across the U.S.

Table 4. Annual Prescription Usage by Age Group and Gender

Age (Years)	Males	Females
0-4	5.6	5.2
5-17	3.3	2.4
18-24	3.2	5.7
25-44	4.0	8.0
45-64	10.4	16.5
65-74	20.5	21.1
75-84	23.3	23.2
85+	23.3	23.2

Source: Medical Expenditure Panel Study, 1996

A second cause for increased prescription consumption throughout the 1990s was the spread of prescription drug benefits, usually as part of health plans. In 1992, third party payers covered the cost of only 44% of prescriptions.[a] By 1995, this percentage had grown to 62% and by 1999 to 78%. It has been established that prescriptions paid for by a third party are more likely to be filled and refilled; thus, the growth in prescription drug coverage promotes increased use of prescription medications. Other factors that could contribute are the growth in direct-to-consumer advertising that creates demand for prescription medications and the increase in prescribers—physicians and physician extenders such as physician assistants and nurse practitioners. Pharmacists also prescribe under protocol in some states.

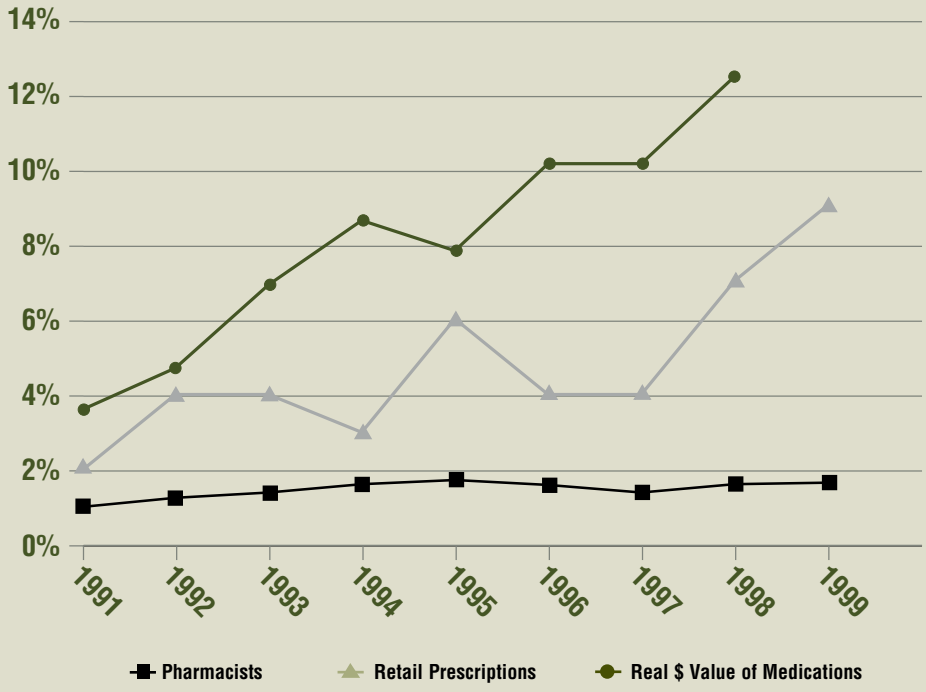
Why was the system inundated by the rapid prescription growth? As shown in Figure 12, the numbers of pharmacists—including community pharmacists—were only growing at about 1.4% per year during the decade of the 1990s. The growth of pharmacists and the growth of retail prescriptions were mismatched. The situation becomes worse when we consider the overall growth in the use of medications as shown by the constant dollar value of medications in Figure 12. The rationale for using dollars to track overall medication use requires some explanation.

The problem with aggregating medication use across different practice settings is that units of measurement differ. For the community or retail setting, prescriptions provide a convenient measure of medication use. Hospitals and other institutional settings do not use "prescriptions" but rather "medication orders" as the basic unit for medication dispensation. The medication order can involve multiple and changing doses and, therefore, counting medication orders to measure medication use is not appropriate. Therefore, when combining settings to achieve an estimate of overall growth in medication use, dollars spent on medications, adjusted for inflation, become the best measure available. Dollars are still of limited value in describing medication use growth because of increases in medication costs, substitution of more costly medications for less costly ones and other reasons.

[a]IMS Health data provided by the National Association of Chain Drug Stores

As shown in Figure 12, the rate of rise of the constant dollar value of medications was even higher than prescription drug growth. This suggests that not only were retail prescriptions growing but also the use of medications in hospitals, medical centers, long term care and other areas where pharmacists work. Thus, it is not surprising that pharmacists and pharmacies were eventually overwhelmed, observable starting in about 1998, by the amount of medication to be delivered and managed.

Figure 12. Relative Growth Rates



Sources: IMS Health (prescriptions and dollar value); BHPr Pharmacist Supply Model (pharmacists)

Managed Care and Societal Expectations

Simultaneously with the increased use of medications, pharmacists have been moving into new healthcare roles. This movement is particularly apparent in services to ambulatory patients and well people in the community. The increased demand is related to the spread of managed care that emphasizes the reduced use of hospitalization and other forms of institutional care and promotes prevention and providing care through clinics and outpatient services. The American Society of Health-System Pharmacists (ASHP) began a survey series in 1997 to track the activities of pharmacists in ambulatory care settings.[11] The series has focused on integrated health systems including hospital-based systems. The 1997 survey inquired about routine pharmacist participation in 24 ambulatory care activities; by 1999, the prevalence of most of these activities had increased substantially.[12] Table 5 shows the growth observed for the most prevalent functions. Most of these activities would not be considered "traditional" pharmacist functions. Several were related to "population health," a new way of thinking about healthcare developed through managed care's concern about health maintenance, prevention and cost containment. Pharmacists, with unique knowledge and experience in the use of medications, were an increasingly valuable resource to health systems developing formularies and trying to contain medication costs. Pharmacists were also found to be valuable partners in clinics for patients with chronic diseases such as asthma, hypertension, hypercholesterolemia and diabetes mellitus where medications are the mainstay of therapy.

Pharmacists were tapped also to play a role in oncology and anticoagulation clinics. The survey data did not show how many pharmacists were working in these new areas but the prevalence of the activities throughout integrated health systems suggests that the numbers were great enough to add demand for pharmacists to an already stressed system.

Table 5. Examples of Routine Pharmacist Participation in Ambulatory Functions in Integrated Health Systems

Functions Reported by Survey Respondents	1997	1999
Using pharmacoeconomic data for making formulary decisions	76%	82%
Conducting medication management programs (DUR and DUE)	76%	81%
Monitoring patient outcomes	71%	73%
Conducting wellness and preventive health programs	58%	61%
Conducting specialized clinics	33%	38%

Source: American Society of Health-System Pharmacists, *1999 Survey of Managed Care and Ambulatory Care Pharmacy Practice*

In addition to the expanding pharmacist roles documented by the ASHP surveys, there have been other new roles, although the documentation for these has not been as thorough. For example, pharmacists play an important role in medication error reduction. The awareness of medication errors as an important cause of morbidity and mortality was heightened by a 1999 report from the Institute of Medicine.[13] The report emphasized the need for better surveillance of the medication use process and the need for change where situations increased the likelihood of errors. The new emphasis on these activities—frequently involving pharmacists—came at a time when the pharmacist shortage was already established resulting in further pressure on pharmacists and their employers.

Another area of role expansion has been observed in community pharmacies. Responding to public health initiatives for higher levels of immunization and also an opportunity for a new source of revenue, pharmacists began to offer immunization programs in community pharmacies widely in the latter 1990s. Disease management services aimed at common, chronic diseases such as asthma and diabetes mellitus started appearing in community pharmacies during the same period. Screening programs coupled with patient education components targeting, for example, osteoporosis and hyperlipidemia are becoming more widespread. These activities have provided a new energy and enthusiasm for community practice even where revenue enhancement has been modest, and this has contributed to their continued growth. Thus, while these programs have increased the demand for pharmacists, they have also, with the continued shortage of pharmacists, offered a competitive advantage to employers in this practice sector.

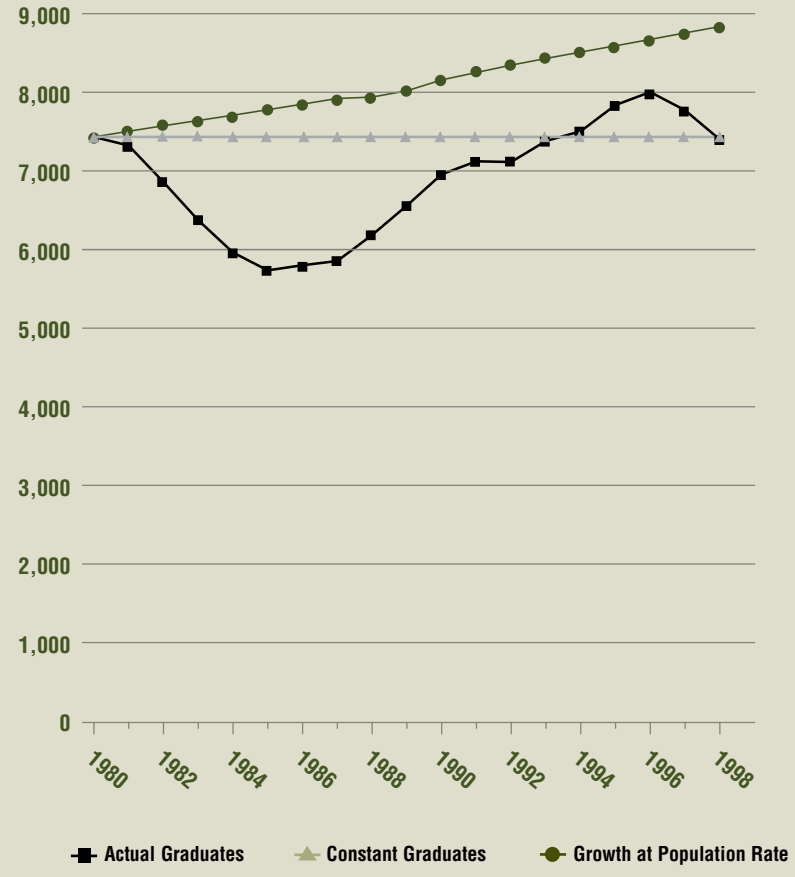
Responding to the Current Workforce Challenges

The several events that have driven the demand for pharmacists and their services upward have shown little tendency to abate. And yet, there is a commitment to continue improving the medication use process in which pharmacists play a key role. The next sections briefly explore solutions. Each of these is considered in the context of continuing the pursuit of the highest quality medication use process whether or not the current shortage of pharmacists persists.

Generating More Pharmacists: Pharmacy School Applications, Enrollments and Graduates

Pharmacy school enrollments, like all professional program enrollments, have shown fluctuations since the 1980s as external conditions such as the national economy, the interest level in science, the prospects of healthcare careers and other variables have shifted. As noted in the 2000 report to Congress, a downturn in pharmacy graduates in the early 1980s potentially "cost" between 16,000 and 23,000 pharmacists for the workforce going forward.[1] This event is portrayed in Figure 13 which shows actual graduate numbers and potential graduates under two alternate scenarios: one where graduates remain constant from 1980 onward (resulting in about 16,000 more graduates) and another where graduates theoretically grow at the rate of the U.S. population over the period, slightly less than one percent annually (resulting in about 23,000 additional graduates). The two scenarios emphasize the importance of attention to the "pipeline"—that is, applications, numbers of students enrolling and numbers of students graduating. The impact of smaller graduating classes lasts literally for multiple decades.

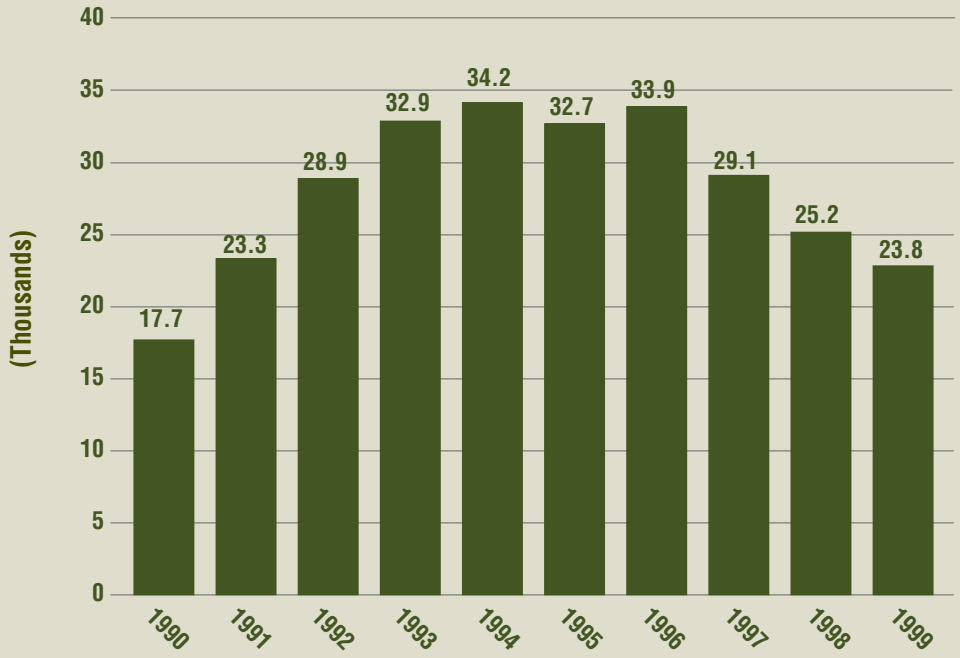
Figure 13. Actual Graduates and Alternate Scenarios: 1980-1998



Source: American Association of Colleges of Pharmacy (actual graduates)

The application pool size is an indicator of the level of interest in pharmacy careers. Figure 14 illustrates the application history for pharmacy schools during the 1990s. There was a strong upward trend in the early to middle 1990s followed by a sharp, downward trend after 1996. Between 1996 and 1999, there was a drop of 30% in applications. The reasons for the upward and then downward trends are not known; nevertheless, the downward trend of the late 1990s was ominous in that the need for more pharmacists was already apparent. Market factors that would tend to increase interest in pharmacy and therefore applications include solid prospects of employment after graduation and rising salaries. Both these factors are present in today's economy giving hope that the application pool will begin to grow again.

Figure 14. Pharmacy School Applications: 1990-1999



Source: American Association of Colleges of Pharmacy

New Schools

During the 1990s, pharmacist graduate numbers, as shown in Figure 13, were held back somewhat by the transition to the entry-level PharmD degree and enhanced by the graduates from three new schools founded in 1987 (2) and 1992 (1). From 1996 to the present, six more schools were established that are already graduating pharmacists; and other schools are in various stages of development (Table 6). According to a survey of deans of pharmacy schools reported in the 2000 report to Congress, other schools and colleges of pharmacy are planning to expand class size in the near future.[1] Whether these actions will result in graduate numbers exceeding the estimates of the Bureau of Health Professions model which projects the addition of three new schools each decade with an average 100-person class in each remains to be seen. Should expansions and new schools exceed the anticipated 1.4% annual growth rate in graduates, this could impact beneficially on the shortage.

Table 6. New Pharmacy Schools: Anticipated Class Size and Program Type

School/College of Pharmacy	Year	Class	Program
Lake Erie College of Osteopathic Medicine	2002	78	Accelerated
Nevada	2001	40	Accelerated
Palm Beach Atlantic	2001	45	
University of California, San Diego	2002	25	
University of Nevada	2003	40	
University of New England	2001		Accelerated
University of Oklahoma	2001		Accelerated

Source: *Drug Topics*, 3/5/01

International Graduates

The expanded recruitment of international pharmacy graduates has been suggested as an avenue to reduce the pharmacist shortage. There are significant barriers to this solution mostly related to educational equivalency issues that will only become more problematic when the PharmD becomes the sole entry-level degree in the United States in 2003. Nevertheless, special programs to bring international graduates into educational equivalency could be developed if demand were sufficient.

Staying in the Workforce … Longer

The pharmacist workforce would increase in size if pharmacists postponed retirement and instead continued to work either full-time or part-time. Likewise, the size of the workforce would be increased if fewer pharmacists changed to other types of work. A recent study showed that, in 2000, pharmacists were not leaving practice in greater numbers than in 1990 despite the shortage and its pressures.[7] Thus, it is unlikely that these avenues would substantially impact on the shortage.

Expanding the Pharmaceutical Care Team: Pharmacy Technicians

Pharmacy technicians assist pharmacists under supervision; they contribute particularly to the medication distribution process. Laws and regulations about the use of technicians vary from state to state, and there has been pressure to expand the use of pharmacy technicians as the pharmacist shortage has persisted. Unfortunately, there has been a paucity of published data about pharmacy technicians. The 2000 report to Congress estimated that there were about 200,000 pharmacy technicians in 2000, a ratio of approximately one technician for every pharmacist.[1]

Most parties knowledgeable about pharmacy issues agree that pharmacy technicians have become more important in recent years in delivering pharmaceutical care and have the potential to aid in addressing the pharmacist shortage. The expanded use of technicians is not, however, without problems. On one hand, proponents of broader responsibilities for technicians argue that pharmacy technicians can relieve pharmacists of many tasks that do not require their professional judgment and free them for other activities where their professional training is required. On the other hand, those focusing on medication safety—including many pharmacists—point to the uneven training of pharmacy technicians and to incidents where serious errors involving technicians have occurred.[14,15] A national certification program for pharmacy technicians, offered through the Pharmacy Technician Certification Board (PTCB), has been a major advance in the standardization of technician competencies and skills. The program has been widely and increasingly embraced by individual states. As of September 2001, 89,620 pharmacy technicians had passed this certification examination, close to one half the estimated number of technicians nationally.[16] The number of certified technicians has risen rapidly as only 47,973 technicians were PTCB-certified in 1999.

Increased Productivity

There are several ways that the pharmacist workforce could become more productive. For example, an immediate gain in productivity would be observed if women pharmacists worked more hours weekly. A comparison between a 1990 survey and a 2000 survey showed that women have indeed increased weekly work hours but have still averaged less than a 40-hour workweek.[4]

Re-engineering the pharmacy work place has also been suggested to increase efficiency.[17] Previous studies of the activities of pharmacists have shown that handwritten prescriptions lead to lost productivity as pharmacists and physicians lose time clarifying handwriting.[18] A study sponsored by the NACDS showed that electronic communication problems between pharmacies and insurance programs reduce pharmacist productivity.[19] Respondents cited in the 2000 report to Congress noted that pharmacists and technicians do not work together optimally resulting in decreased productivity; they suggested that pharmacy students learn how to work with technicians as part of their training.[1]

Regulatory Changes

As noted earlier, the continuing shortage has led to the introduction of state-level legislation to broaden the use of pharmacy technicians. Another avenue of possible regulatory change relates to licensure reciprocity. At present, California and Florida are the only two states that do not recognize pharmacist licensure achieved through passing the North American Pharmacist Licensure Examination (NAPLEX). Were these states to adopt reciprocity agreements similar to those that exist through the rest of the nation, the flow of pharmacists into these highly populated and high demand (according to the ADI project) states could be eased. It should be noted, however, that this measure would not increase the number of pharmacists. Other regulatory changes such as allowing students to take the NAPLEX during their final year of pharmacy school could accelerate the rate of entry of new pharmacists into the workforce.

Automation and Technology

The expanded use of automation and technology probably offers the strongest possibilities for moving the quality of the medication use process forward even if pharmacist production is relatively slow growing. Automation for the preparation of prescriptions has been widely adopted in large, closed systems such as the Veterans Affairs system and the Kaiser Permanente integrated health system. Automated prescription filling in a central pharmacy facility that would act as a hub for clusters of community pharmacies, known as central fill, may speed prescription preparation while preserving opportunities for counseling and monitoring ambulatory patients. Within hospitals, the use of bar coding, highly sophisticated medication dispensing cabinets and automated medication preparation promote enhanced safety as well as productivity. Their wider adoption is likely if pharmacy personnel remain in short supply. Physician use of electronic prescribing software promises to reduce or eliminate problems related to illegibility of prescriptions and medication selection where a formulary is in effect. The processing of prescription claims could benefit from standardization, likely to be achieved through technology and resulting in better pharmacist productivity. Respondents cited in the 2000 report to Congress advocated the adoption of a universal prescription card to achieve this aim.[1]

The decision to expand the use of automation and technology may be a viable solution to address pharmacy staff shortages for some pharmacy operations; however, the adoption of automation and technology can be held back by cost, restrictive legislation and the fact that many advances are still applicable primarily to large operations while many pharmacy operations are relatively small. The 2001 report of the Institute of Medicine noted that the very limited application of technology to healthcare has been an obstacle to achieving quality.[20] The existence of a pharmacist shortage may, indeed, turn out to be a spur to the wider and better use of automation and technology in the medication use process.

Summary

The existence of a pharmacist shortage in the United States is an established fact. This situation has developed at the same time that national priorities for improved safety and quality in the medication use system have achieved wide support. Because it is unlikely that the number of new pharmacists can be greatly increased, the simultaneous implementation of multiple partial solutions should be considered. These solutions should be considered in the light of continuing progress toward a medication use system of the highest quality and a likely scenario that the demand for pharmacists and their services will continue to exceed the available supply.

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