

## Pharmacist work force in 2020: Implications of requiring residency training for practice

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*Am J Health-Syst Pharm.* 2008; 65:166-70

Pharmacy is undergoing a transformation from a profession of primarily providing a commodity (medications) in reaction to the orders of a prescriber to one of providing and ensuring optimal drug therapy in conjunction with a prescriber and other members of the health care team. This transformation is having a profound impact on the pharmacist work force, the expectations placed on that work force, the education and training that will be required of new pharmacists for entering practice, and the continuing education of established pharmacists.

As of 2004, the only available entry-level professional degree for pharmacists in the United States is the doctor of pharmacy (Pharm.D.) degree. Accredited programs include four years (or credit-based equivalent) of professional training preceded by two to four years of prepharmacy undergraduate course work. The Pharm.D. curriculum, as outlined in "Standards 2007" of the Accreditation Council for Pharmacy

Education, is a rigorous program that must be designed to provide three core professional competencies (appendix).<sup>1</sup> All three competencies speak to the direct provision of patient care in cooperation with the patient and physician and other members of the health care team. This training and direct patient interaction make the pharmacist the central health care worker ensuring that patients have optimal medication management and outcomes.

Even though there has been an increase in academic rigor and training for pharmacists (especially in recent years), postgraduate training has been sought by pharmacists since the early 1930s.<sup>2</sup> This postgraduate training was officially termed residency training in the 1960s. Residency training is now delineated into postgraduate year 1 (PGY1) and postgraduate year 2 (PGY2) programs. PGY1 programs typically have a general practice focus, while PGY2 programs focus on a specialty area. PGY1 programs are available in

health systems and community and managed care settings.

Because of the demand for higher skill levels in the pharmacy work force, pharmacy professional organizations, notably the American College of Clinical Pharmacy (ACCP)<sup>3</sup> and the American Society of Health-System Pharmacists (ASHP),<sup>4</sup> now advocate that all pharmacists aspiring to direct patient care roles complete residency training as a prerequisite, with full implementation targeted for 2020. ACCP and ASHP further advocate that clinical pharmacy practitioners become board-certified.<sup>4,5</sup> While an abundance of literature suggests that achieving such goals will require significant resources,<sup>6-11</sup> there is a lack of comprehensive literature reviewing the cost to health care of providing postgraduate training for all pharmacists entering practice, the impact on the pharmacist work force, and the implications for recruiting and retaining pharmacists. In this commentary I examine these issues from a work-force-planning perspective and attempt to estimate the cost and work-force impact of requiring residency training for new practitioners. The need for PGY2 training continues to evolve, so my discussion will address primarily PGY1 training as the minimum standard.

### Current pharmacist work force

Before examining the potential impact of residency training requirements on the pharmacist work force, I will review statistics on the current work force. According to the U.S. Bureau of Labor Statistics, there were 239,920 employed pharmacists in May 2006 (Table 1).<sup>12</sup> This represents an increase of about 40,000 pharmacists over the number reported for

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DOI 10.2146/ajhp070231

2001 by the Pharmacy Manpower Project (Table 2).<sup>13</sup>

There is a shortage of pharmacists in almost all practice areas. As of January 2007, nearly 4000 positions were unfilled at chain pharmacies (down from a shortage of 7500 pharmacists in January 2006),<sup>14</sup> and in 2006 the average vacancy rate in health systems was 7% (4000–4500 positions).<sup>15</sup> A website supported by the Pharmacy Manpower Project reports an aggregate demand index (ADI) on a monthly basis.<sup>16</sup> The ADI is based on ongoing surveys of the people who hire pharmacists; an ADI rank of 5 means there is current high demand for pharmacists, with positions being difficult to fill, and a rank of 1 indicates that demand is much lower than the supply. The national ADI score was 4.13 in June 2007. Three states had a rank of 5, while 46 states (including the District of Columbia) had a rank of 4. Only 2 states reported relatively balanced supply versus demand (a score of 3). The pharmacist shortage is likely to continue for the foreseeable future.

If the projections in Table 2 are correct, there will be a change over the next decade in the number of pharmacists needed for the various pharmacy services, and therefore a shift will be necessary in the training and types of pharmacy practitioners in the work force. This shift in needs suggested by the Pharmacy Manpower Project was used by ACCP to help draft its statement calling for all pharmacists involved in direct patient care to complete residency training prior to entering the work force.<sup>3</sup> These same numbers were used by ASHP when creating its vision document for the pharmacy work force, which also calls for residency training for direct patient care providers.<sup>4</sup> Both organizations are looking at 2020 as the target for realizing their vision of the work force.<sup>3,17</sup> Pharmacists who provide only order fulfillment may not need residency training, although additional training in other areas, such as technology and information systems, may be necessary. Therefore, if the projection of a need for 417,000 pharmacists in

2020 is correct (Table 2), then approximately 300,000 pharmacists will need residency training or equivalent continuing professional development by 2020 to meet the goals established by the Pharmacy Manpower Project.

### Current graduation rates and residency training

One hundred two colleges of pharmacy are fully accredited or pending accreditation.<sup>18</sup> Fourteen new schools have opened in the past five years or have announced plans to open. The most current statistics regarding enrollment status were compiled in 2006.<sup>19</sup> At that time, about 48,500 pharmacy students were enrolled nationwide. On the basis of these enrollments, and not accounting for attrition, the class of 2007 had 9,865 graduates, the class of 2008 will have 10,828, the class of 2009 will have 11,421, and the class of 2010 will have 10,992. (The figure for 2010 is currently smaller than that for 2009 because enrollment reporting for three-year programs was not available in 2006. Actually, it can be expected that the number of graduates will continue to rise.) As new schools open and existing programs expand, the number of graduates will grow. However, there is probably some finite capacity within the education system for experiential training sites and therefore for enrollment capacity. Adequate numbers of qualified faculty may also be a rate-limiting factor. Current enrollments and overall system capacity suggest that graduation of 12,000 new pharmacists annually may be a reasonable assumption for the next decade.

According to Gershon and colleagues,<sup>20</sup> who in 2000 published pharmacist work-force projections through 2020, there will be attrition through retirement or other removal from the work force of about 6,000 pharmacists annually. Therefore, the growth rate for pharmacists will be approximately 6,000 per year through 2020. If 6,000 pharmacists

Table 1.  
Pharmacist Employment in 2006<sup>12</sup>

Practice Site	No. Pharmacists Employed
Community	155,010
Health systems	63,190
Public administration	7,450
Other	14,270
Total	239,920

Table 2.  
Projected Need for Pharmacists<sup>a</sup>

Service Type	No. Pharmacists Employed in 2001	No. Pharmacists Needed in 2020
Order fulfillment	136,400	100,000
Primary services	30,000	165,000
Secondary and tertiary services	18,000	130,000
Indirect and other	12,300	22,000
Total	196,700	417,000

<sup>a</sup>Adapted from reference 13, with permission.

per year are added for the next 13 years, there will be approximately 314,000 pharmacists practicing by 2020. If net growth can be increased to approximately 8,000 per year, there will be 357,000 pharmacists. This number still falls short of the 417,000 pharmacists projected to be needed by 2020, but it is much closer. It should be noted that this figure of 417,000 pharmacists is an estimate and may not necessarily reflect future patient or health-system demand for pharmaceutical services. Our profession must continue to advocate for the improved patient care and financial outcomes that an adequate pharmacist work force can help ensure.

ASHP's 2004 pharmacy staffing survey indicated that 14% of health-system pharmacists were residency trained.<sup>21</sup> Since that survey, about 3,500 pharmacists have completed residency training, so the proportion today is probably closer to 20% (~12,000 pharmacists). If we conservatively assume that an additional 30% of hospital pharmacists have accumulated the experience ("residency equivalent") necessary to fully provide direct patient care services, then at least 50% of health-system pharmacists are optimally qualified to provide direct patient care. There are no data on the number of residency-trained pharmacists practicing in other areas, such as community and managed care pharmacy.

ASHP is the sole accrediting body for pharmacy residencies in the United States. In 2007 approximately 1600 PGY1 residency positions were available, and over 1300 residency candidates obtained positions through the ASHP Resident Matching Program.<sup>22</sup> If all PGY1 positions were ultimately filled, then 16% of the approximately 10,000 pharmacy graduates in 2007 entered residency training. If the annual number of graduates indeed increases to 12,000 (or more), and if 75% of graduates choose to enter direct patient care roles (based on work-force-projection numbers and

proportions [Table 3]),<sup>13</sup> then at least 9,000 residency positions in multiple practice settings will have to be available annually by 2020.

Clearly there is a disconnect between the number of residency positions available and the number of residency-trained pharmacists likely to be needed in the future. Currently, most residency training programs are conducted in a health-system setting. Even if these health-system-based positions triple by 2020, the numbers will fall well short of the goal of providing residency training for all pharmacists providing direct patient care. Furthermore, it is not reasonable to train all pharmacists in acute care settings yet expect their eventual practice to be in community practice and other primary care areas. New sites for residency training will have to be established rapidly to achieve the goal of residency training as a prerequisite for direct-care practice. Table 3 details the increase in training programs projected to be needed to meet the goals described by Knapp<sup>13</sup> in 2002.

**Implications of requiring residency training**

While it is possible to develop enough training sites to ensure residency training as a prerequisite to enter practice in direct patient care,

300,000 residency-trained pharmacists will not be available by 2020. However, there are many ways that pharmacists who did not pursue residency training immediately after graduation will be able to develop skills while in practice. These alternative pathways may include continuing-education programs, abbreviated or employer-supported residency programs, traineeships, focused seminars, and other continuing professional development programs. Such opportunities, however, are probably not the most efficient or standardized routes, and the data and rationale for requiring residency training are compelling. ACCP in particular provides a strong, detailed case for residency training.<sup>3,5</sup> In summary, the benefits include teaching residents problem-solving and leadership skills, introducing them to innovative practice developments, involving them in lifelong learning, and providing them with in-depth education in a variety of practice settings with a variety of patient populations. The end result is a better educated, better trained work force and improved medication use. Admittedly, there is very little direct evidence that pharmacy residency training affects patient outcomes, but extrapolation from medicine and other professions is certainly appropriate.<sup>3</sup>

Table 3. Statistics Pertinent to Need for Pharmacy Residency Training	
Variable	Value
Projected no. Pharm.D. graduates, 2007–20	150,000 (~12,000 annually)
No. residency positions needed for 75% of graduates to complete residency training by 2020	~9,000
Annual growth in no. residency positions needed to achieve 9,000 positions by 2020 (%)	13.7
Projected no. residency graduates, 2008–20	57,200 <sup>a</sup>
Current no. residency-trained pharmacists	~13,000
No. residency-trained pharmacists by 2020	70,000
No. residency-trained pharmacists needed by 2020	~300,000
No. residency-trained pharmacists needed by 2020 minus no. available	230,000

<sup>a</sup>1600 × 13.7% annual increase in residency positions × 13 years.

If it is agreed that pharmacy residency training is beneficial for both patients and the profession, then the next issue is the cost of the training. There appear to be no published data that adequately describe the current cost of training pharmacy residents. Miller and Woller<sup>23</sup> described costs associated with residency training in 1997 of approximately \$65,000 per resident. My institution estimates the gross cost of training one PGY1 resident at approximately \$112,000 (in 2007 dollars). This includes the resident's salary, preceptor time, office resources, overhead, travel, and professional conferences, which are cost factors similar to those listed by Miller and Woller. My institution's estimated costs are equal to an annual increase over the 1997 figures of approximately 5.6%, which seems reasonable. Therefore, using a rough number of \$110,000 per PGY1 resident as an average gross cost (this number would certainly vary with practice setting, geographic location, and other factors) and multiplying by the anticipated need for 9000 residency positions each year by 2020, the total training cost for pharmacy residency programs will be just short of \$1 billion annually (in 2007 dollars). If the 5.6% annual cost increase holds constant and is extrapolated to 2020, then the total cost in 2020 would be just over \$2 billion, or ~\$220,000 per resident. This estimate includes only annual program costs and does not account for program-development costs or calculations for PGY2 training. These costs can be put in perspective by noting that the Kaiser Family Foundation estimates that \$1.9 trillion was spent on health care in the United States in 2004 and that approximately \$200 billion of that was spent on prescription medications.<sup>24</sup> Therefore, spending \$1 billion per year (about 0.5% of prescription drug spending) or even \$2 billion per year to help ensure the best use of medications would appear to be

a wise investment for the overall health system.

While these basic calculations provide a global estimate of training costs, one cannot discount the fact that residents provide service to the institution and its patients. Residents render direct patient care, contribute positively to the medication-use process, serve on committees, teach, and deliver many additional services that would otherwise have to be provided by a pharmacist or other pharmacy personnel. Therefore, the net cost (or even net savings) of residency training to the health system is hard to quantify.

Opportunity costs to the pharmacist and the work force for pursuing residency training are mostly related to delaying entry into practice by at least a year. If the number of residency positions increases at a fairly constant rate of approximately 14% per year (as suggested by Table 3), the impact on the work force each year will most likely be negligible. Residents are typically asked to forgo about half of the salary they could potentially earn in the first year after graduation. This sacrifice, combined with escalating tuition costs and student loan debt, may have a negative influence on students' willingness to pursue residency training. Average student loan debt for pharmacists with zero to five years of experience at the time of graduation was \$42,600 in 2004.<sup>25</sup> Other factors that may push new graduates away from residency training are many and will most likely increase with time. To counter these influences, the profession and the public should demand that pharmacists have the appropriate education and training to provide needed patient care services.

### Changing demographics of the work force

The numbers and calculations presented thus far do not take into account pharmacists who wish to work part-time or who do not wish

to work in pharmacy at all. Over the past 20 years or so, pharmacy has been transforming itself into a primarily female profession. While recent surveys indicate that 45.9% of practicing pharmacists are women,<sup>25</sup> in 2006 approximately 67% of pharmacy students were women, compared with 55% in 1984.<sup>19</sup> The implications of this change are perhaps best illustrated by the latest pharmacist work-force survey, which indicates that over 25% of female pharmacists work part-time, versus 15.4% of male pharmacists.<sup>25</sup> How the part-time work force affects or is affected by a requirement for residency training has yet to be determined. There may be no impact, or there may be a decrease in part-time work as a more highly trained work force pursues full-time practice opportunities. The inverse may also be true as diverse practice settings allow certain segments of the pharmacist work force, especially pharmacists in primary care, to enjoy a more flexible, "clinic"-type arrangement under which patients are scheduled to visit pharmacists for medication management. ASHP convened a task force in 2006 to explore the impact of changing demographics on the pharmacist work force; the final report and recommendations were published in 2007.<sup>26</sup> The task force's insightful and sound recommendations should be reviewed by anyone concerned about the pharmacy work force. It will be interesting to see how changes in demographics and in education and training over the next decade will affect the overall number of available pharmacists and the pharmacy work force.

### Summary and recommendations

Pharmacy residency training as a requirement for entry into direct patient care is an attainable goal. Costs for these training programs appear reasonable compared with overall medication-related spending. The number of residency positions in all

settings will need to grow by approximately 14% per year to reach targeted levels by 2020. Growth in community and primary care settings will be especially important. Shortages in the overall number of pharmacists and in residency-trained pharmacists will most likely continue. The profession must determine which areas of practice will require PGY2 training, and further work is needed to quantify the cost of an additional year of postgraduate training. Practicing pharmacists should plan for continuing professional development to ensure they are able to adapt as the overall practice of pharmacy shifts from providing a commodity to providing medication management and direct patient care. Pharmacy professional organizations will need to lead the way to making residency training a requirement for entry into practice.

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**Appendix — Standard No. 12 (Professional Competencies and Outcome Expectations) from the Accreditation Council for Pharmacy Education Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree, effective July 1, 2007 ("Standards 2007")<sup>1,a</sup>**

Professional pharmacist competencies that must be achieved by graduates through the professional degree program curriculum are the ability to

1. Provide patient care in cooperation with patients, prescribers, and other members of an interprofessional health care team based upon sound therapeutic principles and evidence-based data, taking into account relevant legal, ethical, social, cultural, economic, and professional issues; emerging technologies; and evolving biomedical, pharmaceutical, social, behavioral, administrative, and clinical sciences that may impact therapeutic outcomes.
2. Manage and use resources of the health care system in cooperation with patients, prescribers, other health care providers, and administrative and supportive personnel to promote health; to provide, assess, and coordinate safe, accurate, and time-sensitive medication distribution; and to improve therapeutic outcomes of medication use.
3. Promote health improvement, wellness, and disease prevention in cooperation with patients, communities, at-risk populations, and other members of an interprofessional team of health care providers.

These professional competencies must be used to guide the development of stated student learning outcome expectations for the curriculum. To anticipate future professional competencies, outcome statements must incorporate the development of the skills necessary to become self-directed lifelong learners.

<sup>a</sup>Derived, with minor changes, from "Educational Outcomes, 2004" by the American Association of Colleges of Pharmacy Center for the Advancement of Pharmaceutical Education.