

# ORIGINAL RESEARCH ARTICLES

## Visions for Required Postgraduate Year 1 Residency Training by 2020: A Comparison of Actual versus Projected Expansion

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**Study Objective.** To explore the feasibility of expanding postgraduate year (PGY) 1 residency training as proposed by the American College of Clinical Pharmacy and American Society of Health-System Pharmacists (ASHP).

**Design.** Prospective survey analysis.

**Data Source.** The ASHP Online Residency Directory was used to obtain PGY1 residency program data from June 2007–June 2008. A four-item questionnaire was developed to survey future residency growth in identified PGY1 programs.

**Measurements and Main Results.** Survey data were aggregated to project future residency growth in the “next few years” (range 2–4 yrs). Estimates of Doctor of Pharmacy (Pharm.D.) graduates to 2020 were used to calculate PGY1 residency positions and average annual growth rates required if 24% (scenario 1), 75% (scenario 2), and 100% (scenario 3) of pharmacy graduates pursue PGY1 residencies. Projected growth from the survey was compared with required growth under the scenarios, as well as with actual PGY1 growth from June 2007–June 2008. A subset analysis of college-affiliated and Veterans Affairs (VA) PGY1 programs was performed. The survey response rate was 57%. The PGY1 positions were projected to increase by 8.3%/year in the next few years or 4193 positions by 2020 if 8.3% growth is sustained. Required average annual growth rates for scenarios 1–3, respectively, were 4.8%, 14.4%, and 17%. Projected growth rates were sufficient to achieve only scenario 1 in which 24% (percentage of pharmacists estimated to practice in health systems) of graduates pursue PGY1 residencies. The actual PGY1 growth rate from 2007–2008 was 9.9%. The VA positions actually grew at 12.5% and college-affiliated positions grew at 8.3% over this period, whereas VA projection for growth was 4.8% and college-affiliated projection was 9.6%.

**Conclusion.** Having sufficient PGY1 residency positions available for all Pharm.D. graduates by 2020 would require at least a 17% average annual growth rate, whereas survey respondents predicted 8.3%. Actual residency growth in 2008 (9.9%) exceeded survey projections. Study data suggest that the ASHP aspiration to have all graduates who pursue health-system pharmacy careers complete a PGY1 residency is achievable. Higher percentages, 75% or 100%, are only partially achievable. Continued growth of college-affiliated residencies and sustained growth in the VA system are important to achieving residency growth goals.

**Key Words:** residency training, pharmacy education, workforce, vision statements.

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The continuing evolution of the role of pharmacists toward clinical activities and integration into team health care has been well described.<sup>1,2</sup> Pharmacy residencies play an important role in preparing pharmacists for these roles by conferring essential skills and practice experience beyond that provided by the Doctor of Pharmacy (Pharm.D.) training.<sup>1,2,3</sup> Based on the belief that the opportunities for clinical roles will continue to grow and that many pharmacists will require residency training to fill them, in 2006, the American College of Clinical Pharmacy (ACCP) recommended that all pharmacy graduates complete postgraduate year (PGY) 1 residency training before entry into pharmacy practice involving direct patient care by the year 2020.<sup>4</sup> In 2007, the American Society of Health-System Pharmacists (ASHP) set forth its vision for the health-system pharmacy workforce to be residency trained in a similar time frame.<sup>5</sup> It is important to verify the feasibility of these visions and the progress made toward them.

Of equal consideration is the level of demand for residency training from the pharmacist workforce. The basis for demand, as reported by pharmacy students and residents, is primarily to acquire knowledge and experience (primary reasons) and also to enhance confidence to obtain specialized training and desired positions.<sup>6,7</sup> Demand is also based on the perception, as reported by PGY1 resident candidates, that pharmacy school curricula alone do not provide enough training to practice as hospital pharmacists.<sup>8</sup> Data suggest that, at present, there is a reasonable balance between supply and demand for residency training, with 2092 applicants for 1762 ASHP-accredited PGY1 positions in 2008 (personal communication, Janet Teeters, ASHP, May 2008). However, there were over 9000 pharmacy graduates in 2007.<sup>9</sup> If the attitudes of pharmacy graduates toward residency training are affected by professional directions and directives, such as those of ACCP and ASHP, and the demand for residency training rises as a

result, there is serious question whether adequate training opportunities would be available. In addition, pharmacists already in the workplace may increasingly wish to obtain residency training for similar reasons.

Colleges of pharmacy are likely to influence both the supply of and the demand for residencies. Whereas these organizations have historically provided residency training opportunities, recent changes in American Council of Pharmacy Education (ACPE) standards require support for residency education, which is likely to result in more residency positions.<sup>10</sup> Pharmacy students may develop new attitudes toward residency training as a by-product of having more exposure to residents during their Pharm.D. education, thereby influencing demand. Another reason to focus on college-affiliated residencies is their role in community pharmacy residencies. In March 2009, the ASHP Online Residency Directory (ORD) listed 56 community residency programs, of which 39 (70%) were either wholly sponsored by or affiliated with a college of pharmacy.<sup>11</sup> The supply of community pharmacy residencies may then be related to residency growth in the college sector.

Another important influence on residency supply has been Veterans Affairs (VA) residencies. Studies have documented the leadership of the VA system in the growth of clinical activities of pharmacists particularly in VA ambulatory care clinics, and the VA system has historically been a major provider of residencies.<sup>12-15</sup> In 2009, 419 resident positions were supported by the VA system and VA ambulatory care, and inpatient units provide experiential education sites for many colleges of pharmacy (personal communication, Dr. Jannet Carmichael, VA Sierra Pacific Network, March 24, 2009).

The purpose of this study was to evaluate the feasibility of expanding PGY1 residency growth as proposed by ACCP and ASHP by surveying PGY1 programs about plans for growth and comparing survey data with actual growth over a 1-year period, and by estimating the PGY1 residency growth required under three scenarios related to the percentage of pharmacy graduates pursuing PGY1 residencies. For purposes of interpreting survey data, we analyzed the number and distribution of PGY1 residencies from the ASHP ORD in 2007 and 2008 and calculated actual growth. We also conducted subset analyses for programs sponsored by or affiliated with colleges of pharmacy and VA facilities.

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## Methods

We obtained PGY1 residency program data for 2007 and 2008 from the ASHP ORD for June 2007 and June 2008, respectively.<sup>16, 17</sup> Data for the population of the United States were obtained from the U.S. Census Bureau.<sup>18</sup> Data on Pharm.D. graduates were obtained from the American Association of Colleges of Pharmacy.<sup>9</sup> The data were used together to calculate the ratios of PGY1 positions to the population and PGY1 positions to Pharm.D. graduates at the state level. The ASHP PGY1 residency data from 2007 and 2008 were used to calculate year-over-year actual growth. Other calculations were based on 2007 data, the latest year for which data for all variables were available.

The PGY1 residencies sponsored by or affiliated with colleges of pharmacies and those sponsored by the VA were identified from the ASHP data sets. Only those programs that included a school or college of pharmacy or a version of VA in the name of the program were included. We calculated year-over-year actual growth for each type of program.

### Residency Program Survey

A four-item questionnaire was developed and checked for face validity by a faculty member with extensive experience in residency training. The survey questions were as follows:

- How many PGY1 positions are currently available at your institution?
- How many positions were available 5 years ago?
- How many positions were available 10 years ago?
- Will the number of positions change in the next few years? If so, when and how many?

From April–July 2007, 582 surveys were sent by e-mail to the designated contact person for each PGY1 program as identified on the ASHP ORD. Since the ASHP ORD is constantly updated, programs were added to the survey list during the period. If no e-mail response was received within 7–10 business days, up to two telephone calls were made. For the telephone surveys, an introductory script was used followed by the same survey questions.

Responding programs were compared with the ASHP ORD dataset of all PGY1 residencies. Comparisons included geographic distribution, number of PGY1 positions per program, and the percentage of PGY1 programs affiliated with the VA system and with colleges of pharmacy.

### Residency Growth Required Through 2020

This study examined three scenarios for PGY1 growth related to the 2020 visions. For scenario 1, we estimated average annual growth needed if the PGY1 residency mandate applied only to pharmacists practicing in health systems, an emphasis of the ASHP vision statement. This scenario was based on 24% of graduates requiring PGY1 residencies—the percentage of pharmacists estimated to practice in health systems.<sup>19</sup> For scenario 2, we estimated average annual growth needed if 75% of graduates entered PGY1 residencies. This scenario was based on ACCP estimates that about 75% of future pharmacy positions involve “direct patient care” requiring PGY1-level training.<sup>4</sup> For scenario 3, we calculated the average annual residency growth needed to make at least one PGY1 residency position available to each graduating student through 2020.<sup>20</sup>

Whereas the percentage of graduates needed to fulfill scenarios 2 and 3 were defined, scenario 1 required estimating the percentage of pharmacists in health-system positions. We used Bureau of Labor Statistics data and assumed that all pharmacists working in hospitals and ambulatory health care services would be included in health-system positions and therefore required residencies.<sup>19</sup> Once positions required for each scenario were calculated, Pharm.D. graduates in 2007, numbers of PGY1 ASHP positions in 2007, and estimated Pharm.D. graduates in 2020 were used to calculate the average annual growth required for each of the three scenarios (24%, 75%, and 100%). Projected Pharm.D. graduates in 2020 were drawn from the 2007 Bureau of Health Professions Pharmacist Supply Model.<sup>20</sup>

The PGY1 positions and the annual growth needed for each of the three scenarios were compared with the actual growth in ASHP PGY1 positions from 2007–2008 and with the anticipated growth reported by survey respondents. For the latter calculation, only data from programs that reported a number for PGY1 positions planned for the “next few years” were used. Data from programs that responded “not sure” or “don’t know” were not included. All analyses were performed in MS Excel 2007 (Microsoft Corp., Redmond, WA).

## Results

### Descriptive Residency Data

In June 2007, the ASHP ORD included 582

PGY1 residency programs representing 1487 PGY1 positions in the United States and Puerto Rico and by June 2008, these numbers had risen to 616 programs and 1634 PGY1 positions—a growth of 9.9%. During that year, there were 53 new PGY1 programs accounting for 61 new PGY1 positions. Thus, the 9.9% growth was distributed between existing programs (58%) and new programs (41%). The PGY1 residencies sponsored by or affiliated with colleges of pharmacy accounted for 353 positions (21.6% of total), whereas PGY1 VA residencies accounted for 298 (18.2% of total).<sup>16, 17</sup> Growth in VA positions from 2007 to 2008 was 12.5%, whereas positions sponsored by or affiliated with colleges of pharmacy grew 8.3% over the same period.<sup>16, 17</sup> The PGY1 residency positions in community pharmacy were found to be highly aligned with colleges of pharmacy, with 39 (70%) of 56 positions either sponsored by or affiliated with colleges of pharmacy.

Table 1 shows the 2007 state-level distribution of PGY1 positions, with the largest number of residency positions available in California (191 positions). However, when residency positions were adjusted for population, the District of Columbia, although not a state, had the largest ratio of PGY1 residencies to population (23.8 PGY1 positions/million population) followed by West Virginia with 12.1 positions/million population. Tennessee had the highest ratio of PGY1 residency positions relative to Pharm.D. graduates (5.5 positions/10 graduates). Nationally, there was an average of 4.9 PGY1 positions/million population and 1.5 PGY1 positions/10 Pharm.D. graduates.

### Survey Responses

The survey was e-mailed to 582 PGY1 residency programs nationwide. There were 334 responses (57%) with 81% responding by e-mail and 19% by phone. All responses were usable. Table 2 compares the characteristics of respondents with those of all programs listed in the 2007 ASHP ORD. Based on the characteristics, we judged the respondent programs representative of programs in the 2007 ASHP ORD.

### Survey Results

Of the 334 respondents, 285 (85.3%) provided numeric projections about growth in the next few years, with 48 respondents (14.3%) not sure about future growth. Less than 3% of respondents did not know about past positions either 5 or 10

years ago. Growth calculations included only programs reporting numeric data.

Respondents indicated that PGY1 residency positions grew at 10% average annual rate from 1998–2002 and 7.8% average annual rate from 2003–2007. Since the “next few years” was purposely not defined in the survey, growth rates are reported for respondents’ interpretations, which ranged from 2–4 years (Table 3). Based on the data from the mean interpretation (3 yrs), PGY1 residency positions were predicted to increase within the next few years by 8.3%/year. Colleges of pharmacy reported a projected PGY1 growth rate (9.6%) that was higher than the national average for growth (8.3%), whereas the PGY1 VA programs’ rate (4.8%) was lower than the average.

### The PGY1 Residency Growth Needed by 2020 Under Scenarios 1–3

For scenario 1, Bureau of Labor Statistics data reported 253,110 employed pharmacists in 2007 with 52,520 employed in “general medical and surgical hospitals” and 7000 pharmacists employed in “ambulatory health care services”—24% of total.<sup>19</sup> By using an estimate of 11,455 pharmacy graduates in 2020,<sup>20</sup> scenario 1 was constructed based on 24% of graduates completing PGY1 residencies and requiring 2864 positions, and an average annual growth rate of 4.8%. Scenario 2, with 75% of graduates completing PGY1 residencies, would require 8591 positions and an average annual growth rate of 14.4%. Scenario 3 would require 11,455 PGY1 positions and an average annual growth rate of 17%. Only scenario 1 has an annual growth rate that is exceeded by the growth rate projected by survey respondents (8.3%).

Figure 1 compares actual and projected PGY1 position growth rates with the required growth rates for each of the scenarios. The comparisons illustrate that both actual and projected growth rates support achieving scenario 1, while only partially achieving scenarios 2 and 3.

### Discussion

Residencies sponsored by or affiliated with colleges of pharmacy accounted for 22% of 2008 PGY1 positions. Their year-over-year growth rate (8.3%) was less than the national average (9.9%); however, their projected growth rate (9.6%) exceeded the national average (8.3%). This large cohort of programs, whose growth is encouraged by the 2007 ACPE Standards, may play an

**Table 1. Total PGY1 Residency Positions, Population-Adjusted Positions, and Positions Relative to Pharm.D. Graduates: Total United States and By State**

State	Population	No. of PGY1 Residency Positions	No. of Pharm.D. Graduates	No. of PGY1 Residency Positions per Million Population	No. of PGY1 Residency Positions per 10 Pharm.D. Graduates
Alabama	4,627,851	26	226	5.6	1.2
Alaska	683,478	3	0	4.4	NA
Arizona	6,338,755	38	208	6.0	1.8
Arkansas	2,834,797	9	80	3.0	1.1
California	36,553,215	191	669	5.2	2.8
Colorado	4,861,515	17	123	3.5	1.4
Connecticut	3,502,309	10	88	2.9	1.1
Delaware	864,764	9	0	10.4	NA
District of Columbia	588,292	14	82	23.8	1.7
Florida	18,251,243	89	629	4.9	1.4
Georgia	9,544,750	52	332	5.4	1.6
Hawaii	1,283,388	6	0	4.7	NA
Idaho	1,499,402	6	56	4.0	1.1
Illinois	12,852,548	50	363	3.9	1.4
Indiana	6,345,289	22	273	3.5	0.8
Iowa	2,988,046	28	236	9.2	1.2
Kansas	2,775,997	7	99	2.5	0.7
Kentucky	4,241,474	27	95	6.4	2.8
Louisiana	4,293,204	10	243	2.3	0.4
Maine	1,317,207	6	0	4.6	NA
Maryland	5,618,344	27	115	4.7	2.3
Massachusetts	6,449,755	30	515	4.7	0.6
Michigan	10,071,822	46	224	4.5	2.0
Minnesota	5,197,621	28	157	5.4	1.8
Mississippi	2,918,785	6	79	2.1	0.8
Missouri	5,878,415	39	221	6.6	1.8
Montana	957,861	2	59	2.1	0.3
Nebraska	1,774,571	13	194	7.3	0.7
Nevada	2,565,382	12	123	4.7	1.0
New Hampshire	1,315,828	2	0	1.5	NA
New Jersey	8,685,920	17	196	2.0	0.9
New Mexico	1,969,915	13	86	6.6	1.5
New York	19,297,729	76	633	3.9	1.2
North Carolina	9,061,032	51	287	5.6	1.8
North Dakota	639,715	7	81	10.9	0.9
Ohio	11,466,917	59	434	5.1	1.4
Oklahoma	3,617,316	17	204	4.7	0.8
Oregon	3,747,455	18	77	4.8	2.3
Pennsylvania	12,432,792	68	738	5.5	0.9
Puerto Rico	3,942,375	3	43	0.8	0.7
Rhode Island	1,057,832	0	86	0.0	0.0
South Carolina	4,407,709	21	156	4.8	1.3
South Dakota	796,214	4	56	5.0	0.7
Tennessee	6,156,719	66	119	10.6	5.5
Texas	23,904,380	74	404	3.1	1.8
Utah	2,645,330	14	43	5.3	3.3
Vermont	621,254	2	0	3.2	NA
Virginia	7,712,091	33	222	4.2	1.5
Washington	6,468,424	57	177	8.7	3.2
West Virginia	1,812,035	22	82	12.1	2.7
Wisconsin	5,601,640	42	132	7.5	3.2
Wyoming	522,830	2	46	3.8	0.4
U.S. Total	305,563,532	1487	9791	4.9	1.5

PGY1 = postgraduate year 1; Pharm.D. = Doctor of Pharmacy; NA = not applicable.  
Data are from 2007.



**Table 2. Comparison of PGY1 Program Characteristics Between Questionnaire Respondents and All PGY1 Programs<sup>a</sup>**

Programs	No. of PGY1 Programs	No. of PGY1 Positions	Average No. of Residents per Program	PGY1 Program Affiliation		No. of States Represented <sup>b</sup>
				College or School of Pharmacy (%)	VA System (%)	
Respondents	334	1089	2.24	17.9	15.5	49
All <sup>b</sup>	582	1487	2.55	17.2	14.9	51

PGY1 = postgraduate year 1; VA = Veterans Affairs.

<sup>a</sup>All PGY1 residency programs listed in the American Society of Health-System Pharmacists Online Residency Directory in 2007.

<sup>b</sup>Includes District of Columbia.

**Table 3. Average Annual PGY1 Growth Projections of Schools or Colleges of Pharmacy, VA Programs, and All Respondents Based on Three Interpretations of the “Next Few Years”**

PGY1 Program Affiliation or Sponsor <sup>a</sup>	Current No. of PGY1 Positions Reported in 2007	No. of Positions Projected in NFY	Growth Projected Over 3 Years (%)	Average Annual Growth for Each NFY Interpretation		
				2 Years	3 Years <sup>b</sup>	4 Years
				Schools or colleges of pharmacy	178	235
VA programs	164	188	15.0	7.2	4.8	3.6
All respondents	873	1108	26.9	12.7	8.3	6.1

PGY1 = postgraduate year 1; NFY = “next few years”; VA = Veterans Affairs.

<sup>a</sup>Includes only those programs that reported the number of PGY1 positions planned for the “next few years.”

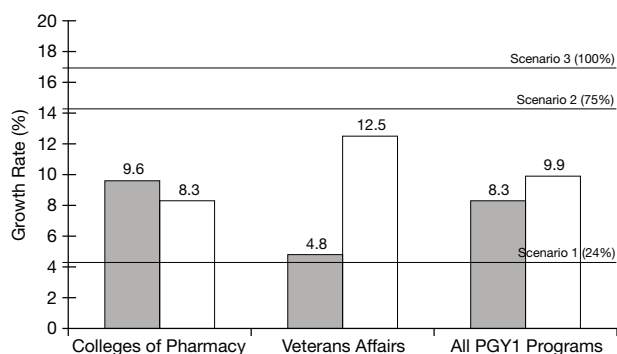
<sup>b</sup>As these were the mean data, they were used for the purpose of comparison with growth rates needed under scenarios 1–3.

important role in future residency growth. It should be noted, however, that the actual and projected growth in residencies sponsored by or affiliated with colleges of pharmacy only supports achievement of scenario 1 goals.

The fact that 70% of 2008 PGY1 community pharmacy residencies are sponsored by or affiliated with colleges of pharmacy suggests that academic programs will likely play an important role in the future growth of this historically slow-

growing residency sector. At present, however, despite the heavy involvement of colleges, the community-based programs account for less than 10% of all PGY1 programs, which is disproportionate to the percentage of pharmacists working in community pharmacy (~62%).<sup>21</sup> Although advocates of more clinical activity in community pharmacy would like to see more postgraduate professional training opportunities in this setting, it should also be noted that other types of residencies, particularly those with substantial ambulatory care exposure, prepare pharmacists to initiate and provide clinical services in the ambulatory or community setting.

The VA system positions accounted for 18% of 2008 PGY1 positions. Actual year-over-year PGY1 VA growth (12.5%) greatly exceeded national growth (9.9%); however, when considering the future, VA respondents projected only 4.8% growth for their own facilities over the “next few years” compared with 8.3% nationally. Data collected for this study do not explain either the VA growth surge between 2007 and 2008 or the slowdown predicted for the future. Since the VA system has been such a leader in advancing clinical activities of pharmacists, it is important to monitor their residency growth patterns during the next several years to determine what



**Figure 1.** Actual position growth rates based on 2007–2008 data (white bars), projected position growth rates over the “next few years” based on survey responses (gray bars), and required position growth rates under three different scenarios. PGY1 = postgraduate year 1.

their contribution to future residency growth will be.

Overall, survey respondents predicted an 8.3% growth rate over the “next few years,” whereas the actual 2007–2008 growth rate was 9.9%. Growth in existing programs, however, was only 5.8%, with the remaining growth due to new programs (4.1%). Although respondents were only predicting residency growth in their own facilities and that growth may have indeed occurred for some, the actual growth for existing programs fell substantially short of overall survey projections. This may not be surprising given that the recent economic decline has led to delay or abandonment of many expansion plans. We suggest that, particularly because of continued economic uncertainty, regular monitoring of both new and existing PGY1 programs is warranted.

At least three factors suggest that the 17% average annual PGY1 growth required in scenario 3 underestimates the positions required to provide 100% of graduates PGY1 residency positions by 2020. First, the number of actual graduates in 2020 may exceed projected graduates from the Bureau of Health Professions Pharmacist Supply Model used in this study.<sup>20</sup> Although we judge these projections to be the best available peer-reviewed estimate of future graduates, a recent study suggests that growth in pharmacy student numbers will likely exceed the model assumption that there will be 100 additional new graduates annually or the equivalent of one new average-sized school starting to graduate students each year.<sup>22</sup> Whether this recent growth pattern can or will persist to 2020 is not known; but at present, the number of graduates is growing faster than predicted.

Second, the ASHP Residency Match Program process does not result in a perfect one-to-one match between applicants and positions. For 100% of graduates to enter PGY1 residencies, a greater ratio of positions to graduates is needed. Third, pharmacists already in the workforce are eligible to apply for available PGY1 positions and are more likely to do so if the trend toward universal residencies progresses. The additional demand source will require a larger pool of PGY1 residencies.

Overall, these factors suggest that scenario 3 is unlikely to be realized without a major change not presently foreseen. To a lesser extent, similar arguments apply to scenario 2, and the data suggest that it also is unlikely to be realized under current conditions. For scenario 1, the actual and projected growth rates suggest an

achievable goal even if the factors cited above require additional positions. The only obstacle foreseen here would be if future growth did not include primarily institutional, ambulatory care—and possibly managed care—positions since that is the focus of scenario 3.

As noted earlier, “growing” PGY1 residency positions is only the supply side of a supply-and-demand equation. Historically, the demand for residencies has appeared to match the applicant pool size fairly well. However, recently the demand has increased, widening the gap between the number of applications and positions (personal communication, Janet Teeters, ASHP, March 2009). Irrespective of the scenario pursued, there is no guarantee that position growth rates will match applicant-pool growth rates. If demand for PGY1 residencies grows faster than positions, the backlog of pharmacists unable to pursue residencies will increase each year (because number of graduates continues to increase through 2020) further exacerbating the mismatch. If positions grow faster than the applicant pool, unfilled and possibly lost positions could result.

The debate surrounding “requiring residencies” for pharmacy graduates has met with thoughtful commentary. Proponents argue that residencies are necessary in order to prepare a confident, experienced, and clinically mature practitioner who can autonomously manage drug therapy for patients.<sup>23</sup> This position is supported by research on graduates’ rationale for pursuing residencies.<sup>6–8</sup> Opponents argue that additional mandatory training is redundant, expensive, and will only exacerbate the shortage of pharmacists.<sup>24</sup> A third position suggests that evolving Pharm.D. admissions requirements and ACPE expectations for enhanced clinical learning will result in graduates more clinically mature but still not necessarily ready to practice independently in advanced clinical roles.<sup>25</sup> While the debates continue, the data provided by this study offer insight into the feasibility of requiring residency training and identify sectors that are important for sustained residency growth.

#### Limitations

Limitations of the survey itself included the lack of a pilot study conducted before survey data collection. However, our survey was conducted by e-mail and telephone, and respondents were able to ask for clarification, if needed. The survey was sent to the person we thought could best answer the question about an institution’s

future growth. Most often the contact person was the chief of pharmacy or the program director. However, the future growth at an institution was sometimes the best guess of one person at that residency site.

The study may have nonresponse bias; however, a comparison of responding programs to all programs showed that they were fairly similar. Respondents' growth projections were limited by possible different interpretations of the "next few years." To counter this, we reported growth rates corresponding to 2–4 years.

Future graduate numbers are particularly difficult to project because of the recent trend of rapid growth. Finally, the profession does not have an agreed-upon definition for direct patient care, which affects estimation of the number of residency positions needed.

## Conclusion

Having sufficient PGY1 residency positions available for all Pharm.D. graduates by 2020 would require at least a 17% average annual growth rate, whereas survey respondents predict an 8.3% annual growth rate. Actual residency growth in 2008 exceeded survey projections, although much of the growth was attributable to new programs. The study data suggest that the ASHP aspiration of having all graduates who pursue health-system pharmacy careers complete a PGY1 residency may be achievable by 2020. However, other goals are only partially achievable. Continued growth of college-sponsored residencies and sustained historic growth levels in the VA system are important to achieving residency growth goals.

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