

## RESEARCH

### Pharmacy Residency Match Rates and Predictors

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**Objective.** To determine acceptance rates to postgraduate year 1 (PGY1) pharmacy residencies and examine the impact of several variables on acceptance rate.

**Methods.** Residency match data for every US college and school of pharmacy with a graduating class between 2008 and 2011 were sorted by graduating class and applicant match rates into PGY1 residency programs. Data were analyzed to determine factors influencing PGY1 match rates.

**Results.** The graduating class match rate to PGY1 residencies was 14.2% for all colleges and schools, 16.0% for public colleges and schools, and 12.6% for private colleges and schools. Colleges and schools with a first graduating class greater than 20 years ago matched 16.7% of students to residency programs.

**Conclusion.** Whether the college or school was public rather than private was an influencing factor on both graduating class and applicant match rates. Years since first graduating class influenced applicant match rate only.

**Keywords:** residency, match, college of pharmacy, predictors

## INTRODUCTION

The training of pharmacists has changed, because of the shift from a bachelor of science in pharmacy to the doctor of pharmacy (PharmD) degree. In 1991, only 17% of degrees conferred to pharmacists were PharmD degrees.<sup>1</sup> In 1997, the Accreditation Council of Pharmacy Education (ACPE) adopted guidelines that required transition to the PharmD degree in the 2000-2001 academic year.<sup>2</sup> By 2005, all conferred degrees were PharmD degrees.<sup>1</sup>

In addition to the changes made to pharmacy student training, the recent expansion of the pharmacist's role in health care has led to residency training becoming a common requirement for hiring in hospital and ambulatory care settings. Interest in completing a residency, particularly a PGY1 pharmacy residency, has increased. In 2008, 2,092 students graduating from ACPE-accredited colleges and schools of pharmacy entered the American Society of Health-System Pharmacists (ASHP) Resident Matching Program to obtain a PGY1 residency.<sup>3</sup> By 2011, that number had increased to 3,277 pharmacy student graduates, an increase of 57% in only a 4-year period. The pharmacy sector has struggled to provide employment

opportunities because of the increased interest in residency training, with applicants for PGY1 residencies consistently outnumbering the positions available since 2003.<sup>4</sup> As the number of applicants to residency programs continues to increase, so must the number of residency positions available, as outlined in the American College of Clinical Pharmacy's Vision of the Future.<sup>5</sup> The purpose of this study was to determine the acceptance rate into accredited pharmacy PGY1 residency programs for every US college and school of pharmacy and examine several potential factors that may impact acceptance rate.

## METHODS

The identities of individual colleges and schools of pharmacy were kept confidential regarding residency acceptance rate. Prescramble residency match data for every college and school of pharmacy were obtained from the American Society of Health-System Pharmacists, and graduation numbers for every college and school were obtained from the American Association of Colleges of Pharmacy (AACP). Inclusion criteria consisted of accreditation by the ACPE, reporting to AACP of at least 1 graduating class during the 4-year period from 2008 to 2011, and the presence of residency match data for the college or school of pharmacy as reported by ASHP for the same period. Data for satellite campuses that were reported separately by ASHP were combined with that of the main campus of their college or school.

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The residency match rates were determined first for each college or school of pharmacy, reporting data in 2 ways: (1) the percent of a college or school of pharmacy's graduating class that was accepted to a residency (graduating class match rate), and (2) the percent of applicants from each college or school of pharmacy accepted to a PGY1 residency program (PGY1 applicant match rate).

The median residency match rate for each of the colleges and schools of pharmacy from 2008 to 2011 was calculated according to graduating class and number of applicants. Median match rates for colleges and schools of pharmacy that did not report data for all 4 years were calculated based only on the years in which data were reported. After calculating a median percentage for each of the colleges and schools, graduating class match rate data were ranked from the highest to lowest percentage. When calculating the match percentage, the median was used to preclude influence of outliers as the data did not show normalized distribution. Residency acceptance rates were also analyzed based on nonmodifiable predictors: public vs private college or school of pharmacy and number of years since the college or school of pharmacy's first graduating class. They were classified as public or private based on the Pharmacy College Application Service (PharmCAS) directory.<sup>6</sup> Colleges and schools were stratified into 4 groups related to years since first graduating class: greater than 20 years, 10 to 20 years, 5 to 10 years, and less than 5 years. A multivariate linear regression was performed to determine the impact of the nonmodifiable predictors. For the regression analysis, colleges and schools of pharmacy established for greater than 20 years were compared to all other groups combined (10 to 20 years, 5 to 10 years, and less than 5 years). A Mann-Whitney U test was performed to detect differences in graduating class and applicant match rates within individual variables. Trends related to changes in PGY1 applicant match rates throughout the course of the study were also examined. This study did not receive IRB approval or exemption, but was determined not to be necessary as the study focused collectively on colleges and schools of pharmacy.

## RESULTS

One hundred of 125 colleges and schools of pharmacy met the inclusion criteria, with 62 public and 38 private colleges or schools of pharmacy. There were 73 colleges or schools of pharmacy with a first graduating class greater than 20 years ago, 7 with a first graduating class 10 to 20 years ago, 5 with a first graduating class 5 to 10 years ago, and 15 with a first graduating class less than 5 years ago (Table 2). Graduating class match rate ranged from

Table 1. Association Between Graduating Class and Applicant Match Rates With College or School Status and Years Since First Graduating Class

Match Rate Variable	P
Graduating Class Match Rate Public vs private school status	0.047
First graduating class greater than 20 years prior	0.07
PGY1 Applicant Match Rate	
Public vs private school status	0.003
First graduating class greater than 20 years prior	<0.001

Abbreviations: First postgraduate year.

3.9% to 49.4%. The median graduating class match rate to a PGY1 residency was 14.2%. Colleges or schools of pharmacy within the upper interquartile range (IQR) matched between 14.2% and 18.9% of their total graduating classes. The PGY1 applicant match rates ranged from 28.2% to 82.5%, with a median of 65.1%. Colleges or schools of pharmacy within the upper IQR matched 65.1% to 72.7% of applicants to PGY1 residencies.

From 2008 to 2011, the PGY1 residency applicant match rate decreased 10.7%. In 2008, 72.2% of applicants matched to a PGY1 residency program. This percentage decreased to 66.7% in 2009, 63.1% in 2010, and 61.5% in 2011.

Colleges or schools of pharmacy with first graduating classes more than 20 years ago had the highest graduating class match rate (16.7%) and applicant match rate (67.9%) to PGY1 residency programs compared to colleges or schools of pharmacy with first graduating classes less than 20 years ago (12.6% and 54.5%, respectively; Table 1). Colleges and schools of pharmacy with a first graduating class greater than 20 years ago had a higher graduating class and applicant match rate than those with a first graduating class less than 5 years ago (Table 2). It could not be determined whether there was a significant difference in graduating class match rate between colleges and schools of pharmacy with a first graduating class greater than 20 years ago and those with a first graduating class 5 to 10 or 10 to 20 years ago.

The median graduating class match rate was 16.0% in public schools and 12.6% in private schools ( $p=0.002$ ). From 2008 to 2011, the percent of graduating classes matched to a residency program increased 3.6% for public schools compared to 1.8% for private schools (Table 3). The PGY1 applicant match rate was 68.8% in public schools and 60.7% in private schools ( $p<0.001$ ). From 2008 to 2011, the percent of applicants matched to residency decreased 11.6% for public colleges and schools compared to 9.9% for private colleges and schools.

Table 2. Association Between Graduating Class and Applicant Match Rates With Median Number of Years Since First Graduating Class

Years	No. of Schools	Graduating Class Matched (IQR)	P	Applicants Matched(IQR)	P
<5	15	9.5 (7.5-12.5)	<0.001	53.3 (45.1-63.7)	<0.001
5 to 10	5	14.9 (10.7-17.6)	0.81	60.6 (59.0-67.3)	0.26
10 to 20	7	13.4 (11.0-14.8)	0.16	49.6 (43.7-55.6)	< 0.002
>20	73	16.7 (11.9-20.5)		67.9 (60.9-73.5)	

Abbreviations: IQR=interquartile range.

## DISCUSSION

The primary ranking method used in comparing colleges or schools of pharmacy was the graduating class match rate. The number of years since the first graduating class did not have an influence on the match rate while public vs private school status did influence graduating class match rate.

An important trend noted during data analysis was the change in the PGY1 residency applicant match rate. A consistent decline in match rate was seen during the study period. One possible explanation is the concomitant increase in the number of applicants to residency programs. When paired with an increasing number of pharmacy students entering the resident matching program from 2008 to 2011, the need for increasing available residency positions is critical.

When examining the impact of time since first graduating class on PGY1 applicant match rate, a difference was seen in all groups except colleges or schools of pharmacy with a first graduating class 5 to 10 years ago. A significant

difference in graduating class matched was observed only in colleges or schools of pharmacy with a first graduating class less than 5 years ago. Based on this information, PGY1 applicant match rate appears to improve with time, while graduating class match rate does not appear to be different after the first 5 years.

The same analysis was performed for public and private school status. There were significant differences between graduating class match rates between public and private colleges and schools overall, as well as all years except 2009. For PGY1 applicant match rate, public colleges and schools matched a higher percentage of applicants for each year compared to private schools.

Several limitations were inherent. All residency match data provided were prior to the scramble period after the initial match. The postscramble percentages are likely different from the data provided, and the effect of scramble data on each college or school's match percentages would be variable. This variability would possibly depend upon availability of postscramble positions, proximity of

Table 3. Median Residency Match Rates for Public and Private Institutions by Year

	All Schools, % (IQR)	Public Schools, % (IQR)	Private Schools,% (IQR)	P
2008	(n=88)	(n=57)	(n=31)	
Graduating Class	13.5 (9.8-18.1)	15.2 (12.1-20.5)	10.9 (7.4-15.1)	0.001
Applicants	72.2 (63.1-80.1)	76.5 (71.4-81.8)	63.2 (56.3-71.9)	<0.001
2009	(n=91)	(n=58)	(n=33)	
Graduating Class	14.3 (10.6-19.0)	15.5 (11.1-21.5)	14.1 (10.2-17.0)	0.2
Applicants	67.2 (57.9-75.0)	70.5 (60.0-78.0)	66.7 (55.6-71.4)	0.03
2010	(n=97)	(n=60)	(n=37)	
Graduating Class	14.4 (9.3-21.0)	16.6 (11.9-22.6)	12.5 (8.1-16.6)	<0.001
Applicants	63.1 (53.3-69.8)	67.1 (58.9-75.0)	58.1 (48.1-63.6)	<0.001
2011	(n=100)	(n=62)	(n=38)	
Graduating Class	15.6 (11.0-21.2)	18.8 (11.9-24.4)	12.7 (8.5-16.4)	0.004
Applicants	61.5 (50.0-69.7)	64.9 (53.0-73.2)	53.3 (50.0-63.0)	0.003
Overall	(n=100)	(n=62)	(n=38)	
Graduating Class	14.3 (10.5-19.3)	16.0 (11.6-20.8)	12.6 (8.8-15.7)	0.002
Applicants	65.1 (56.9-72.5)	68.8 (60.5-73.8)	60.7 (49.9-66.5)	<0.001
Net Change	(n=100)	(n=62)	(n=38)	
Graduating Class	(+)2.1%	(+)3.6%	(+)1.8%	
Applicants	(-)10.7%	(-)11.6%	(-)9.9%	

Abbreviations: IQR=interquartile range.

pharmacy students to those positions, and type of residency positions available. In addition, the study only covered a small period of time. A longer study period, possibly spanning 10 years or more, may reveal shifts in match percentages and trends that are different than those presented because of changes in pharmacy curriculum and the need for residency training. Another potentially beneficial study would involve a comparison of match data between 2 different time periods. This study only analyzed nonmodifiable factors that might influence residency match rates. Further studies analyzing the pedagogical strategies within colleges and schools of pharmacy are needed.

## CONCLUSION

There were a wide range of graduating class match rates and PGY1 residency applicant match rates among the colleges or schools of pharmacy. Public vs private status did have an effect on graduating class match rates while number of years since the first graduating class did not have an effect. With regard to PGY1 residency applicant match rates, both public vs private status and number of years since the first graduating class had an effect on match rate. Long-standing public colleges and schools of pharmacy had the highest percent of graduating class and percent of applicants match to a PGY1 residency

program. Public colleges and schools of pharmacy also had higher graduating class and applicant match rates compared to private colleges and schools.

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