RESEARCH

The Use of Capacity Ratios in Introductory Pharmacy Practice Experiences

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Objective. To describe the use of capacity ratios following the assignment of introductory pharmacy practice experiences (IPPEs) to a rising third-year pharmacy (P3) class.

Methods. Practice experience availability for IPPEs was collected by means of preceptor response to requests. Following assignment of IPPEs to the rising P3 class, capacity ratios from the IPPEs available across the entire state and within each of 4 geographic zones were calculated. Capacity ratios for both community pharmacy and institutional pharmacy also were calculated.

Results. The capacity ratio for IPPEs across the entire state was 2.11, which documents solvency. When the capacity ratios were calculated individually for community pharmacy and institutional pharmacy, solvency was also achieved. Likewise, IPPE capacity ratios were solvent in all 4 geographic zones.

Conclusions. Capacity ratios are helpful in evaluating IPPE availability as they can be used to determine practice experience need in either type of practice experience or geographic zone.

Keywords: experiential education, practice experience, capacity ratio, introductory pharmacy practice experiences, availability

INTRODUCTION

The Accreditation Council for Pharmacy Education implemented new guidelines and requirements for introductory pharmacy practice experiences (IPPEs) in 2007.¹ This portion of the experiential education must comprise at least 5% of the curriculum or a minimum of 300 hours. Many colleges and schools of pharmacy have had to restructure their curriculum to meet these early experiential education experiences.² Administration of vaccinations,³ participation in medication reconciliation,⁴ interaction with real patients in the classroom,⁵ and direct patient contact in hospitals and clinics for case presentations⁶ have been used or suggested as a means of meeting IPPE hours in preparation for advanced pharmacy practice experiences (APPEs). Some colleges and schools of pharmacy have used a formalized practice experience in both community pharmacy and institutional pharmacy. Of the 2 mentioned, institutional pharmacy has historically been the most difficult to schedule because of the limited number of institutions available. The importance of academia working with the available institutions has been addressed in the literature.⁷⁻⁹ The number of pharmacy colleges and

schools in the state of Tennessee expanded from 1 to 6 over a period of 4 years, creating competition for sites, especially for schools using full-time practice experiences in the IPPE program. Our college requires a full-time commitment from students during IPPEs, including two 40-hour weeks for community IPPEs and the same for the institutional IPPEs. These 2 practice experiences take place within a calendar month.

The University of Tennessee College of Pharmacy's IPPE program includes 370 hours from various courses throughout the curriculum (Table 1). The IPPE program includes 210 hours in part-time experiences and 160 hours in full-time IPPEs. The IPPE program is a compilation of various components, such as professionalism, shadow learning, service learning, practice skills, patient care, and the aforementioned IPPE community and institutional practice experiences. Courses that contribute to the program include: introduction to pharmacy, basic clinical and communication skills, introduction to patient care, pharmacy-based immunization delivery, applied therapeutics I and II, and medication therapy management. IPPEs are conducted within a calendar month and include an 80-hour practice experience in community pharmacy and an 80-hour practice experience in an institutional pharmacy. These practice experiences are completed by rising third-year pharmacy students (P3s) in the summer or in the

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spring semester of the P3 year in 1 of 4 geographic zones: Memphis, Knoxville, Nashville, or Chattanooga. The College of Pharmacy has 2 campuses, Knoxville and Memphis, representing the east and west ends of the state, respectively. After all Memphis students complete the first year of pharmacy school (P1 year), approximately one third of students relocate to the Knoxville campus, with the remainder staying in Memphis. Students complete their classroom coursework in the second (P2) year and P3 fall semester at these 2 campuses.

Directing an experiential program is a continuous effort of assessing practice experience needs, developing and maintaining quality sites, gathering availability from the preceptors, scheduling the practice experiences, and overseeing the conduct of the practice experience. Some colleges and schools of pharmacy have adopted business models to help determine the adequacy of their respective experiential programs.¹⁰ In business, current ratios are used to determine solvency by dividing assets by liabilities.

When the current ratio is greater than 1, there are more assets than liabilities and the business is determined to be solvent. The capacity ratio in experiential education can be determined by dividing the number of available practice experiences by the sum of the number of needed practice experiences plus a buffer for changes.¹⁰ In experiential education, a buffer of 15% to 20% excess has been suggested to account for practice experience changes initiated by either preceptors or students that will inevitably occur after initial scheduling.¹¹ Therefore, a capacity ratio of 1 demonstrates solvency in experiential education.¹⁰

We decided to calculate and analyze capacity ratios for our IPPEs after scheduling them in the current cycle. The purpose of this paper was to examine capacity ratios for the entire IPPE program. We also analyzed capacity ratios in both community IPPEs and institutional IPPEs throughout the state as well as in each of the 4 geographic zones. With these data, specific areas requiring increased availability for the future could be identified. Capacity could be assessed by type of IPPE (community or institutional) or by geographic zone. We also explored the opportunity of offering IPPEs to interested rising P2s in the summer after their first academic year.

Table 1. Introductory Pharmacy Practice Experience (IPPE) Hours Contributed by Courses in the Curriculum

Course	Number of Hours
Introduction to Pharmacy	27
Professionalism	
Shadow learning	
Professional development	
IPPE Program	86
Professionalism	
Shadow learning	
Service learning	
Practice skills	
Patient care	
Professional development	
Basic Clinical and	9
Communication Skills	
Professionalism	
Service learning	
Practice skills	
Introduction to Patient Care	8
Practice skills	
Patient care	
Applied Therapeutics I & II	61
Practice skills	
Patient care	
Professionalism	
Medication Therapy Management	19
Practice skills	
Patient care	
IPPE community placements	80
IPPE institutional placements	80
Total	370

METHODS

Total statewide IPPE availability was determined by means of preceptor response to our availability requests. Beginning in January of each year, an e-mail request was sent statewide to all preceptors in the experiential program, requesting their availability for IPPEs. Second and third e-mails were sent only to established IPPE preceptors within the college. A fourth e-mail targeted specific preceptors whose availability was highly desired but had not been offered. Preceptors responded through e-mail or facsimile regarding their availability, which was categorized based on site, practice experience type, month, shift, and number of positions per shift. Our college uses hospitals and other healthcare system sites, such as long-term care, home infusion, and specialty pharmacies for institutional IPPEs. Our college adheres closely to the guidelines established for IPPE experiences.^{1,12} For institutional IPPEs, an introduction to the healthcare system must be provided. Sites are carefully selected, faculty members are appointed to our college faculty, and a site visit is conducted before a student pharmacist appears for an IPPE.

We have some preceptors who take both IPPE and APPE students. The collection of availability for APPEs and IPPEs are done separately during 2 different times across the calendar year. IPPE availability requests begin in January, and APPE availability requests start in May or June. Most preceptors understand the difference and

know what type of practice experience they have to offer. All calculations and data in this paper were conducted with IPPE availability. We have a mixture of sites that take student pharmacists from our college only and some that we share with other schools. We had only 1 response of “first come, first served.” Our reported availability is essentially what was offered specifically to our college.

IPPEs were conducted in June and July following the P2 year and January, February, and March of the P3 year. Each practice experience is a full-time (40 hours per week) commitment of 2 weeks, allowing for 2 practice experiences per calendar month. The practice experiences were assigned in 2-week blocks, as depicted in Table 2. For example, a student with practice experiences in July would be assigned to blocks 3 and 4. Students were allowed to request preferences for their community and institutional practice experiences. When possible, we assigned students to their preferences. Students were not placed in community practice experiences where they were currently or had been previously employed. Although practice experience assignments were made in E*Value (Advanced Informatics, Minneapolis, MN), we did not use optimization for IPPE assignments. Optimization is a program wherein students are assigned electronically to practice experience based on student preferences and practice experience availability. After all practice experiences were scheduled, students and preceptors were notified by means of e-mail that practice experience schedules were available in E*Value.

Based on practice experience availability and class size, capacity ratios were calculated for IPPEs by dividing the number of practice experiences available by the number of practice experiences needed plus 20%.¹⁰ Each student needed 2 practice experiences - 1 institutional and 1 community experience. Therefore, the number of practice experience placements needed was twice the class size. Adjusted capacity ratios were calculated by excluding available sites that were more than 30 miles from the city

center of the respective geographic zone. These distant practice experiences were often in rural areas but were still used by students with available housing in the area, such as the home of a relative or friend. Capacity ratios were calculated for the entire state, for community and institutional practice experiences offered across the entire state, for each geographic zone, and for community and institutional practice experiences in each geographic zone. Geographic zones offered by our college were Memphis, Knoxville, Nashville, and Chattanooga. Adjusted capacity ratios, as described above, were then calculated for each of the aforementioned capacity ratios.

Calculating capacity ratios also allowed us to assess whether IPPEs could be scheduled for rising P2s. Because the rising P2 class was considerably larger than the rising P3 class, assigning some of the rising P2s to IPPEs was expected to result in more manageable assignments in the following year. The Institutional Review Board of the University of Tennessee reviewed our project protocol and assigned it as an exempt study.

RESULTS

Despite an increase in the number of colleges and schools of pharmacy throughout the state of Tennessee and increased competition for available sites and preceptors, the college was able to maintain solvent capacity ratios for IPPEs. The total number of practice experiences offered (ie, availability) across the entire state was 674, and the class size was 133, resulting in 266 practice experiences needed (ie, 133 practice experiences each for community and institutional sites). As shown in Table 3, the capacity ratio for the entire state was calculated to be 2.11. This statewide capacity ratio suggested solvency, as it was greater than 1. Both community and institutional capacity ratios demonstrated solvency, with community practice experiences having a higher capacity ratio than that of institutional practice experiences, which was expected.⁷⁻⁹ Even after excluding several distant practice experiences, our adjusted capacity ratios remained solvent (Table 3). Although most of our students desire IPPEs in Knoxville or Memphis because they will complete classroom education there through the fall of their P3 year, students are allowed to select sites in Nashville or Chattanooga, as many have housing or may be going there for APPEs in the spring of their third year.

When capacity ratios were depicted by geographic zone, a few trends were observed. Memphis and Knoxville appeared solvent and had similar capacity ratios (Table 4). Nashville and Chattanooga, which had high capacity ratios, received fewer students but still offered a substantial number of practice experiences. Adjusted capacity ratios demonstrated solvency for both community and

Table 2. Block Assignments for Introductory Pharmacy Practice Experiences at Community and Institutional Sites

June 1-15	Block 1
June 16-30	Block 2
July 1-15	Block 3
July 16-31	Block 4
January 1-15	Block 5
January 16-31	Block 6
February 1-14	Block 7
February 15-28	Block 8
March 1-15	Block 9
March 16-31	Block 10

Table 3. Actual Capacity and Capacity Ratios for all Statewide, Community, and Institutional Placements

	Statewide	Community	Institutional
P2 class size	133		
Placements needed	266	133	133
Placements available	674	398	276
Placements available adjusted	560	312	248
Capacity ratio ^a	2.1	2.5	1.7
Capacity ratio adjusted ^b	1.8	2.0	1.6

Abbreviation: P2=second-year pharmacy school

^a Capacity ratio calculation: placements available/(placements needed + 20%)

^b Capacity ratio adjusted calculation: placements available adjusted/(placements needed + 20%)

institutional practice experiences in all geographic zones. The areas with the lowest capacity ratios were Memphis institutional practice experiences, with a capacity ratio of 1.51 and an adjusted capacity ratio of 1.39, and Knoxville community practice experiences, with a capacity ratio of 1.69 and an adjusted capacity ratio of 1.32 (Table 4). The high-capacity ratios allowed the Office of Experiential Education to assign 20 (12%) of the rising P2s to IPPEs across the state: 8 to Memphis, 6 to Nashville, 4 to Knoxville, and 2 to Chattanooga. As a result, practice experience assignments were maximized in all 4 geographic zones.

We have added several community sites in east Tennessee because our capacity ratios demonstrated the lowest values in the state for this particular category. We have reactivated 2 sites for institutional IPPEs in west

Tennessee because the capacity ratio was lower than desired, and we have plans to add a third site in this category in west Tennessee.

DISCUSSION

Calculating and analyzing capacity ratios for IPPEs for the University of Tennessee College of Pharmacy allowed us to target specific types of IPPEs by zone that could benefit from more capacity. Although high solvency was observed across the state, once the data were analyzed more closely, some capacity ratios were not as solvent as others. By further breaking down the practice experiences into types and zones, we were able to identify areas of need with more specificity. Calculating these capacity ratios also allowed us to schedule IPPEs for several of the students in the larger rising P2 class. With the

Table 4. Actual Capacity and Capacity Ratios for Community and Institutional Introductory Pharmacy Practice Experiences (IPPEs), by Geographic Zone

Zone	Memphis	Knoxville	Nashville	Chattanooga
P2 students in zone	79	41	10	3
Total placements available	343	175	126	30
Total CR ^a	1.8	1.8	5.3	4.2
Total placements adjusted	273	141	116	30
Total CR _a ^b	1.4	1.4	4.8	4.2
Community placements	200	83	96	20
Community CR ^c	2.1	1.7	8	5.6
Community placements adjusted	141	65	86	20
Community CR _a ^d	1.5	1.3	7.2	5.6
Institutional placements	143	92	30	10
Institutional CR ^e	1.5	1.9	2.5	2.8
Institutional placements adjusted	132	76	30	10
Institutional CR _a ^f	1.4	1.5	2.5	2.8

Abbreviations: P2=second-year pharmacy school; CR = capacity ratio; CR_a = capacity ratio adjusted

^a Total CR calculation: total placements/(placements needed X 2 + 20%)

^b Total CR_a calculation: total placements adjusted/(placements needed X 2 + 20%)

^c Community CR calculation: community placements/(community placements needed + 20%)

^d Community CR_a calculation: community placements adjusted/(community placements needed + 20%)

^e Institutional CR calculation: institutional placements/(institutional placements needed + 20%)

^f Institutional CR_a calculation: institutional placements adjusted/(institutional placements needed + 20%)

anticipation that future classes will be as large and possibly larger, this pattern will likely be repeated in the future. If so, in a college with capacity ratios hovering around 1, which is the bare minimum to maintain solvency, the Office of Experiential Education will likely be anxiously waiting each year to see if an adequate number of sites and preceptors can be secured. With these data emerging from this study, however, it can ensure there are plenty of practice experiences for our students from year to year. It was beneficial for the Office of Experiential Education to target expansions of institutional practice experience sites in Memphis and community practice experience sites in Knoxville. By keeping up with these data and re-evaluating them from year to year, we will be able to monitor trends and place emphasis on areas of need or projected need.

Danielson and colleagues described capacity ratios for APPEs and IPPEs for 6 colleges and schools of pharmacy in the northwestern United States.¹⁰ Rather than comparing capacity ratios of multiple colleges and schools of pharmacy, our data came from 1 college of pharmacy in a state that spans nearly 500 miles, has 2 campuses, and offers students 4 geographical zones in which to complete their IPPEs. When analyzing data for IPPEs, the authors found capacity ratios for institutional practice experiences to be lower than those in the community, mirroring what we expected and observed in our data. A second shift (eg, 2 pm to 10 pm) for institutional IPPEs, which was added by our college in 2008, increased the number of available sites considerably.¹³ We found that some students preferred a second-shift practice experience to a traditional first-shift practice experience. Danielson and colleagues stated that capacity ratios could have a large impact at the individual college level in prioritizing which types of sites need to be expanded, concluding that capacity ratios could guide decisions about preceptor recruitment when specific subsets of practice experiences were examined.¹⁰ This group also calculated capacity ratios based on data from an earlier publication of the Southeastern Pharmacy Experiential Education Consortium.¹⁴ Even though similar capacity ratios were found, they were all APPEs, not IPPEs.

Although our data reflected an adequate number of practice experiences through solvency, they reflect only quantity. When examining IPPEs, it is just as important to ensure the quality of these practice experiences as it is to ensure the quantity. In the American College of Clinical Pharmacy (ACCP) white paper addressing experiential education, Haase and colleagues explained that describing the quantity of experiences is not useful if the experiences are not of good quality.¹⁵ The ACCP position statement on this topic that followed the white paper

described some basic principles that deliver quality experiences.¹⁶ Practice experiences should be well planned, focused on outcomes, and supervised and assessed by a qualified preceptor. Practice sites should demonstrate quality as well. For example, they should be licensed and accredited, allow direct patient care for the students, and provide access to patient medical records, drug information, and technologic resources.

The use of capacity ratios may not be beneficial for all colleges and schools of pharmacy. Those that remain regional with focused experiential training sites may easily be able to manage scheduling and estimating future needs. In contrast, we have a statewide program in a state that is 500 miles long. Our 2 campuses are 400 miles apart, and the clinical education center in Nashville is about 200 miles from each campus. Additionally, we use Chattanooga as a zone for practice experience assignment, and we have several sites in rural areas of Tennessee. The use of capacity ratios may be particularly beneficial for colleges and schools of pharmacy similar to ours.

Capacity ratios can be of great value in evaluating IPPE availability, as they can be used to determine areas in need of recruitment within a geographical region as well as within a particular college or school of pharmacy. If additional colleges and schools of pharmacy were to calculate and analyze capacity ratios, it would be easier for them to monitor trends in practice experience availability. With an increasing number of colleges and schools of pharmacy throughout the United States, collecting data such as capacity ratios may become important in the future; however, there are several issues that need further study before capacity ratios can be used universally by all colleges and schools of pharmacy. The definition of solvency should be agreed upon. Is a value of 1 the ideal measure of solvency or would another safer number be better? Is a 20% allowance for changes in practice experiences a realistic percentage for 2012-2013? Should the availability offered by a pharmacy be specific for a particular college or school or on a first-come, first-served basis? Assuming that all submitted availability is for one's respective college when availability is actually intended to be shared by multiple schools has the potential to inflate capacity ratios. Quality of practice experiences also must be defined and used so that experience and capacity ratio comparisons are meaningful.

CONCLUSION

The use of capacity ratios was helpful in assessing the number of experiential placements available for the IPPE program. These ratios can be used to target specific needs in growth as it relates to type of placement (community or institutional) or geographic location.

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