American Journal of Pharmaceutical Education 2019; 83 (9) Article 7326.

BRIEF

Intersession Remediation to Minimize Attrition in a Three-Year Pharmacy Program

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Submitted August 10, 2018; accepted March 22, 2019; published November 2019.

Objective. To describe an intersession remediation process in an accelerated three-year Doctor of Pharmacy (PharmD) program and to determine if the remediation process reduced attrition rates, including program withdrawals, progression to advanced pharmacy practice experiences (APPEs), and on-time graduation rates.

Methods. Attrition was defined as dismissal, withdrawal, leave of absence, and/or change in graduation date. Progression data from students who matriculated between 2008 to 2016, with data available through spring 2017, were analyzed for number of course failures and successful intersession remediation. Other factors such as pharmacy year (first or second year), course subject, and course repeats were evaluated to characterize successful remediation attempts and identify elements that foster student success.

Results. Of the 812 matriculated students across the time period analyzed, 18% (n=146) failed at least one didactic course (defined as course average <69.5%). Overall, 74.7% (n=109) of the students who failed a course remediated, with 75.2% (n=82) of those able to remediate being successful, remaining on-time for graduation. If students who remediated were instead required to repeat coursework, the college attrition rate would have averaged over 10 percentage points higher for the time period analyzed than the actual rate of 13.4%.

Conclusion. Our study demonstrated that the majority of students who qualified for remediation were successful and graduated on time. Further studies in this area are needed to fully elucidate the effect of remediation processes on learning and retention of knowledge and skills.

Keywords: remediation, accelerated program, pharmacy education, attrition, progression

INTRODUCTION

One of the primary goals in a Doctor of Pharmacy (PharmD) program is to prepare students to become competent practitioners while keeping them on track for on-time graduation within the program's curriculum. Standard 17 of the Accreditation Council for Pharmacy Education (ACPE) Standards 2016 directs colleges and schools of pharmacy to address academic progression and provide students with all policies related to remediation and academic progression.[1] Program quality monitoring through ACPE includes reporting of on-time progression and graduation rates, commonly referred to as attrition rates.[2] Currently, ACPE does not offer specific definitions for remediation or academic difficulty, nor do the standards prescribe the way these policies should be designed or implemented. This results in a wide-variety of processes used by colleges of pharmacy to mitigate poor academic progression with literature identifying many variables intended to achieve success.[3] Remediation practices in a three-year (termed "accelerated") pharmacy program can be considered particularly challenging because of the condensed nature of the curriculum. Following intense didactic work, students are immediately expected to apply their knowledge through self-directed learning to become practice-ready healthcare providers. Currently, descriptions of successful remediation methods in accelerated PharmD programs are lacking.

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Sullivan University College of Pharmacy and Health Sciences (SU COPHS) is a three-year PharmD program. The first two years of the curriculum consists of eight didactic quartered terms, and 11 weeks of introductory pharmacy practice experiences (IPPEs) separated by a two-week break. Subsequently, the third year encompasses seven blocks of six-week advanced pharmacy practice experiences (APPEs) with one-week breaks quarterly. Failure of a required course during the didactic year could result in a year delay in graduation, potential loss of cohort class engagement, and financial difficulty for the student. With these concerns in mind, SU COPHS offers qualified students the opportunity to complete remediation coursework during the two-week didactic break between quarters known as the "intersession" period.

The primary objective of this article is to describe an intersession remediation process in an accelerated three-year PharmD program. The secondary objective is to determine if the remediation process reduced attrition rates, including program withdrawals, progression to APPEs, and on-time graduation rates.

METHODS

With the inaugural matriculation of pharmacy students in 2008, SU COPHS introduced a course remediation program to ensure student success. The procedure for a student to qualify for intersession course remediation at the time of the study is shown in Figure 1 and was also available online in the SU COPHS Student Handbook.[4] All progression and remediation discussions flowed through the institution's Progression Committee in a confidential manner as prescribed by the college bylaws, and all recommendations from this committee related to individual student progression were sent to the dean.

At the time of this study, SU COPHS excluded awarding the letter grade of D. The grading scale was out

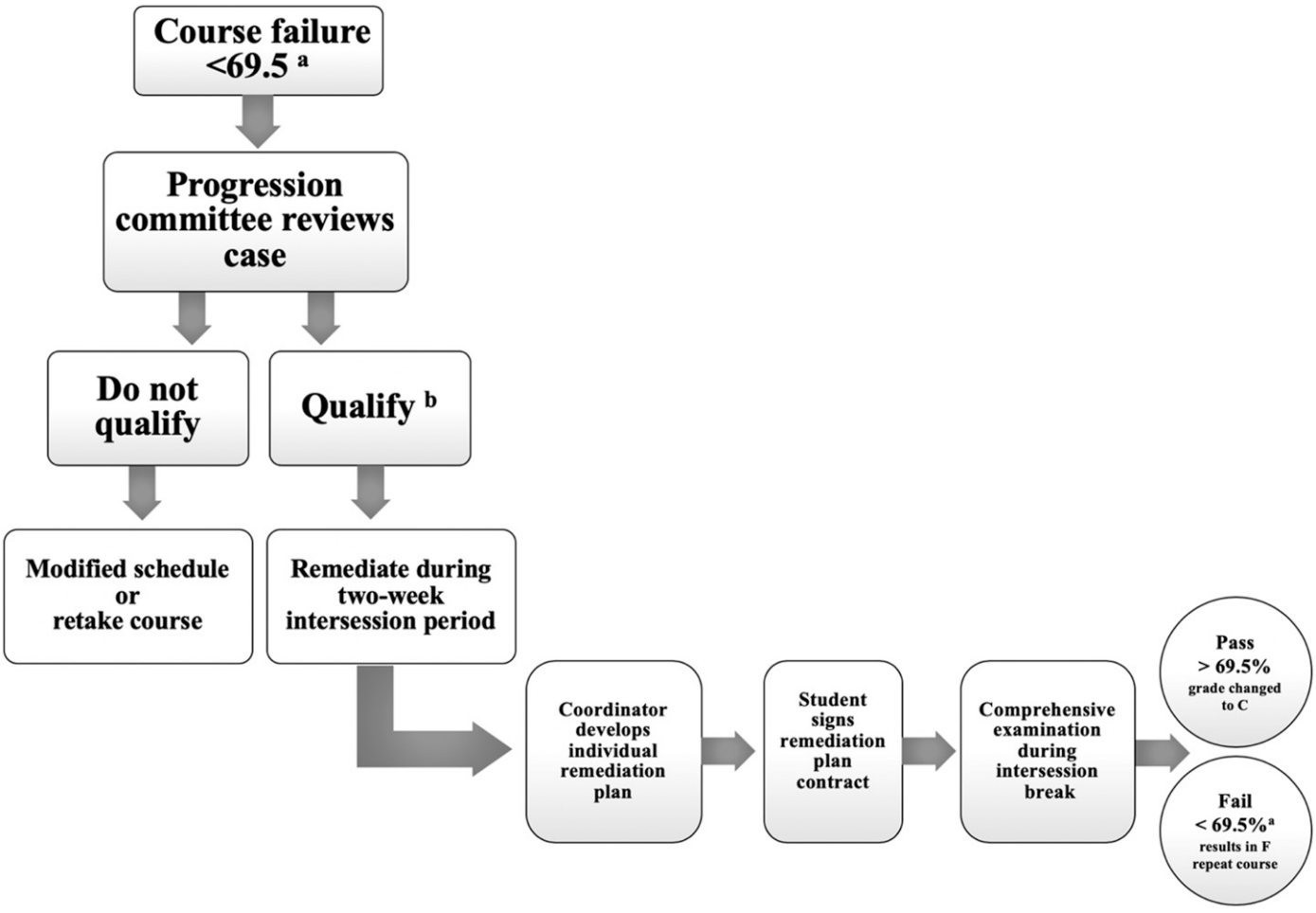

Figure 1. Institutional Policies for Course Remediation Qualification

[a] SU COPHS does not award "D" letter grades. Any score <69.5 is considered an "F."
[b] Students who score >59.5% but <69.5% overall in a course are eligible for remediation after discussion by the progression committee.

of 100%, with final grades stratified in 10-point increments into A (>89.4%), B (>79.4% to 89.4%), or C (>69.4 to 79.4%) awarded for successful completion of a course. Any course average <69.5% resulted in a letter grade of F, which normally necessitated retaking the course in its entirety. If a student failed one course during the quarter with an overall average of 59.5%-69.4% and did not have a pending remediation from a previous quarter, he or she was eligible to attempt remediation during the intersession period. During this time, the student received an uncomplete U on their transcript. If the remediation was passed, the student was awarded the letter grade of C. If remediation was failed the student received a letter grade of F which was calculated into the student's GPA until the course was repeated. Once the course was repeated the F remained on the student's transcript but the repeated course grade was calculated into the student's GPA in place of the F.

Students who scored <59.5% in any course were not eligible for remediation and were required to repeat the course the next time it was offered, unless they received special approval from the Progression Committee. Remediation was also allowed if a student failed two classes during the quarter with a course average of 59.5%-69.4% if neither of the courses were prerequisites for courses in subsequent quarters. For a two-course remediation plan, one course could be remediated during the intersession period and the other course could be remediated during a subsequent intersession period. If the student then failed another course prior to completing remediation of the second course failed the previous quarter, the student was not allowed to remediate and would be delayed one year. If a student failed three courses in an individual quarter, the student was required to repeat all failed courses when they were offered the following year. All students who were required to repeat a year were placed on a "modified" schedule for any elective or non-progressive coursework. Any student who failed five courses within a professional year (not within an individual quarter) was dismissed from the program, as was any student who failed eight or more courses overall (including experiential courses). A student could not take more than two calendar years to complete one professional year of the program, and all PharmD degree requirements were required to be completed within five calendar years of initial matriculation to the program. Students could appeal dismissal decisions to the dean.

Students who were permitted to remediate during the two-week intersession period were provided a remediation plan by the course coordinator. The remediation plans were developed by the course coordinator in collaboration with the department chair, and the student was required to agree to and sign the plan. Remediation plans were course-specific, but all ended with students having to complete an assessment to verify that they had learned the material being remediated. Examples of remediation study plans included strengths and weaknesses assessment and study sessions with a resident or faculty member to discuss exceptionally challenging topics. All remediation activities were required to be completed before the start of the next quarter. Students who did not pass remediation were required to repeat the course the next time it was offered.

This study evaluated progression data from all enrolled first and second professional year (PY1 and PY2) pharmacy students from summer 2008 to spring 2017, collected according to the year of matriculation. Data included the number of students who: failed at least one course, qualified or did not qualify for remediation, passed/failed remediation activity, repeated a course, passed/failed a repeated course, and withdrew or were dismissed from the program. Data collected on attrition parameters included percent withdrawals, percent dismissals, percent with delayed progression, percent overall attrition (including delays, dismissals, and withdrawals), and on-time graduation. Attrition rate in the paper may include other reasons for attrition besides course failures (voluntary withdrawals, failures of capstone assessments, etc).

The number of failures per course was collected. Courses were then combined into content domains per the Pharmacy Curriculum Outcomes Assessment (PCOA) blueprint (Biomedical Sciences, Pharmaceutical Sciences, Clinical Sciences, Social and Behavioral Sciences), as well as academic year and program year (PY1 or PY2). The Sullivan University Institutional Review Board approved this study via an exempt review.

Descriptive statistics were used to analyze all data and were examined using Microsoft Excel 2016 (Redmond, WA). Progression data were compared to ACPE reporting requirements to determine if remediation helped the college stay within ACPE parameters. A chi-square test was used to determine statistical significance between actual attrition rates and the hypothetical attrition rates without remediation. Lastly, data were compared between program years and content domains to determine areas with the greatest number of remediations.

RESULTS

From summer 2008 to spring 2017, a total of 812 students matriculated into the PharmD program at SU COPHS. Of these, 146 students (18.0%) failed at least one didactic course (overall course average <69.5%). Class sizes ranged from 74 to 110 students over the nine years considered in this study, and the number of students per cohort who failed at least one didactic course ranged from 10 to 24.

Table 1. Pharmacy Student Qualification and Success in Intersession Remediation and Course Progression by Matriculation Year (N=812)[a]

Situation		Overall % (n)	Year of Matriculation, % (No.) % (n) 2008 n=74	2009 n=87	2010 n=92	2011 n=104	2012 n=110	2013 n=105	2014 n=74	2015 n=82	2016 n=84
Students who failed a course[b]		18.0 (146)	13.5 (10)	12.6 (11)	13.0 (12)	16.3 (17)	21.8 (24)	22.9 (24)	14.9 (11)	26.8 (22)	17.9 (15)
	Qualified and remediated[c]	74.7 (109)	80 (8)	81.8 (9)	83.3 (10)	88.2 (15)	62.5 (15)	54.2 (13)	72.7 (8)	81.8 (18)	86.7 (13)
	Did not qualify[d]	25.3 (37)	20 (2)	18.2 (2)	16.7 (2)	11.8 (2)	37.5 (9)	45.8 (11)	27.3 (3)	18.2 (4)	13.3 (2)
Results of remediation											
	Passed	75.2 (82)	50 (4)	44.4 (4)	70 (7)	40 (6)	93.3 (14)	100 (13)	75 (6)	88.9 (16)	92.3 (12)
	Did not pass	24.8 (27)	50 (4)	55.6 (5)	30 (3)	60 (9)	6.7 (1)	0 (0)	25 (2)	11.1 (2)	7.7 (1)
Repeated course[e]											
	Pass/progressed	78.1 (50)	100 (6)	85.7 (6)	40 (2)	100 (11)	60 (6)	90.0 (10)	100 (5)	50 (3)	33.3 (1)
	Did not pass or progress	15.6 (10)	0 (0)	14.3 (1)	60 (3)	0 (0)	40 (4)	9.1 (1)	0 (0)	16.7 (1)	0 (0)
	Pending a course repeat	6.3 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	33.3 (2)	66.7 (2)
Attrition rate											
	With Remediation[f]	13.4 (109)[g]	14.9 (11)	10.3 (9)	8.7 (8)	22.1 (23)	12.7 (14)	17.1 (18)	14.9 (11)	7.3 (6)	10.8 (9)
	Without Remediation	23.5 (191)	20.3 (15)	14.9 (13)	16.3 (15)	27.9 (29)	25.5 (28)	29.5 (31)	23.0 (17)	26.8 (22)	25 (21)

[a] Pending students as withdrew/dismissed are considered failures for this calculation. Four students are pending a course repeat, and 10 students withdrew or were dismissed from program
[b] "Passed" is defined as a final course score of ≥69.5%. "Failed" is a final course score <69.5%
[c] Qualified (course average between 59.5% and 69.4%)
[d] Did not qualify (course average <59.5%)
[e] Students who did not qualify or did not pass remediation
[f] Attrition rate includes other reasons for attrition besides course failures (voluntary withdrawals, failures of capstone assessments, etc)
[g] Statistically significant ($p<.05$)

The remediation results based on the number of students who qualified are summarized in Table 1. Overall, of the 146 students who failed a course, 109 (74.7%) qualified for remediation, with 82 (75.2%) being successful and staying on time for progression in the didactic curriculum. Based on the attrition rates shown in Table 1, the program had an overall on-time graduation average of 86.6% (range 77.9%-92.7%). If students had not remediated and instead had repeated coursework, the school's attrition rate would have averaged 23.5% instead of the actual average of 13.4% ($p<.05$). This hypothetical attrition rate is reported as "without remediation" in Table 1, while the actual rate per matriculated cohort is presented as "with remediation."

Overall, 37 (25.3%) students did not qualify for remediation and 27 (24.8%) students failed a remediation attempt. Of the 64 students who either did not qualify for or failed remediation attempts, 50 (78.1%) passed the course they repeated, four (6.3%) were scheduled to repeat a course as of the submission of this manuscript, and 10 (15.6%) withdrew or were dismissed during the didactic curriculum. This led to an overall attrition rate (including withdrawals, delays, and dismissals) of 13.4% (range 7.3%-22.1%), which is below the ACPE accreditation reporting limit of 24%. The average dismissal rate was 1% (range 0-2.9%), which is also below the ACPE accreditation reporting limit of 6%.

Data on student APPE performance was analyzed based on classes in which the matriculated cohort completed all program coursework (2008-2012). Of these five cohorts of students, 74 (15.8%) failed at least one course, with 66 students moving on to APPEs either on time or delayed by a six-week block. Of the 66 students, 16 (24.2%) failed an APPE. Of the students who failed only didactic course work, 65 graduated. Fourteen students who failed both a course and an APPE graduated.

Data were compared between didactic years with a greater percent of failures in PY1 (58.7%) compared to PY2 (41.3%). A review of course failures by PCOA blueprint categories found that 25.6% of course failures were in the basic biomedical sciences domain, 20.8% were in the pharmaceutical sciences domain, 9.4% were in the social/behavioral/administrative sciences domain, and 44.2% were in the clinical sciences domain. The breakdown of topic domains when mapped to didactic year correlate the results in our data (> failures in PY1) as the majority of biomedical and pharmaceutical sciences domain topics are taught in PY1 versus the clinical sciences domain which is taught in PY2.

DISCUSSION

This paper describes a strategy to assist students' progress through a curriculum after failure to pass one or more didactic courses. A specific challenge to be addressed involved the accelerated program at this institution. In some traditional (four-year, non-accelerated) programs, courses can be remediated during a summer, when classes are not in session. Because accelerated didactic coursework is year-round, the opportunity to remediate a course during a summer session is not an option. Another relevant characteristic of this institution is the fact that the grading scale does not award D grades. Whereas, in some schools, a student may still progress after receiving a limited number of D grades, a letter grade of F is assigned for overall course averages <69.5%. However, within the range of 60%-69.4% (the traditional D range), a student is given the opportunity to remediate a course within the two-week break between quarters. As previously discussed, a grade below 59.5% (a traditional F grade) may necessitate retaking the course in its entirety.

A review published in 2010 by Maize and colleagues evaluated remediation programs in pharmacy and other health professions in the United States.[3] They recommended that effective remediation policies include methods for early detection of students with potential academic distress issues. In addition, they propose that pharmacy programs engage in research evaluating current methods of remediation to ascertain what impact they have on successful completion of the doctoral program (graduation rates), first-time pass rates on the North American Pharmacist Licensure Examination (NAPLEX), job success, and cost/benefit to the institution. A more recent 2013 study by Poirier and colleagues reported on the academic progression and retention policies of colleges and schools of pharmacy.[5] They concluded that pharmacy programs have significantly varied criteria for progression and retention and, overall, provide inadequate information related to these topics to students and prospective students.

Recognition of the need for remediation plans has been addressed in other academic settings including educational psychology and other health professions. Bostow and O'Connor reported on a comparison of two experimental groups (n=41) in an introductory educational psychology course that measured testing procedures.[6] In that study, students in one group (n=20) were required to remediate weekly quizzes if they scored less than 90%, while the second group was not allowed to remediate the quizzes regardless of grade. The results of a 100-question final examination demonstrated that the required remediation group scored an average of one-half letter grade higher than the non-remediated group, which was significant.[6]

Within nursing education, various strategies have been examined to facilitate at-risk students successfully completing the licensing examination. Corrigan-Magaldi and Colalillo reported in 2014 on the results of a course

management system (CMS) and an online adaptive quizzing program that assisted at-risk students (n=11) in taking more active roles in their learning.[7] The CMS allowed faculty members to integrate multimedia presentations, additional useful resources, and short module-based reviews for the students to use. Additionally, as a part of the program, students received regular supportive communication from faculty members that was intended to encourage and motivate them. Ninety-one percent of the participants passed the course, and 80% of the at-risk students identified passed the National Council Licensure Examination-Registered Nurse (NCLEX-RN) examination.[7] Several key elements of our course remediation process parallel those reported by Corrigan-Magaldi and Colalillo, including student access to course materials, one-on-one attention and motivation from faculty and staff members, and student access to quizzes and support materials.

Medical educators also recognize the need for a mechanism to assist at-risk students. The results of a targeted remediation process for medical students who failed standardized patient examinations was reported in 2011 by Klamen and Williams.[8] In this two-year study, students who failed the 14-case comprehensive clinical examination, which was a graduation requirement for their program, were enrolled in a month-long focused remediation course designed to treat specific types of clinical performance deficiencies. Students were assessed both pre- and post-course on performance measures including multiple-choice tests measuring diagnostic pattern recognition (DPR), clinical data interpretation, and clinical encounters with standardized participants. Researchers compared post-intervention performance to expected performance based on regression to the mean from the pre-intervention results. In both cohorts analyzed, students scored significantly higher on the post-intervention examinations ($p<.05$) in all but the DPR portion, which was higher post-intervention but failed to reach significance. While robust data are lacking, current literature suggests that remediation programs are useful to help at-risk students successfully complete health profession programs and meet national requirements.

Not every student is prepared for the accelerated nature of a three-year PharmD program. Students may need to have additional support throughout the curriculum to maintain academic progression. The concern regarding effective remediation initiatives in an accelerated program is notable. SU COPHS has implemented several initiatives, such as a modified course schedule, NAPLEX preparatory classes prior to student graduation, and placing students with past remediations on APPEs with full-time teaching faculty members to more closely monitor their progression and provide intensive feedback. Additionally, all students meet at least once per quarter as a group with their faculty advisors to review progress on their professional development plan. A guidance document for these sessions is distributed by the Office of Student Affairs that facilitates group discussion on topics such as self-awareness, emotional intelligence, performance on milestone objective structured clinical examinations (OSCEs) and the PCOA, and professional/career development strategies such as review of curriculum vitae and the American Pharmacists Association Career Pathway Evaluation Program.[9]

It is difficult to interpret the comparability of on-time graduation rates as a metric of the success of a remediation program as comprehensive national remediation and progression rates in pharmacy education have not been reported in the literature or made publicly available. At our institution, data on the number of course failures and remediation success/failures by course are shared with the course coordinators and department chairs in charge of the respective courses as part of normal curricular quality assurance. Course coordinators are encouraged to use these data to improve not only their courses but also their remediation processes.

Although the current remediation process is successful in aiding students in progressing through the curriculum and graduation, future changes to the remediation process at SU COPHS may include increased standardized delivery of course remediation. A more standardized course remediation delivery process may help better describe impact of specific aspects of the remediation process on metrics of student success. The authors echo the points made by Maize and colleagues that additional research is needed to analyze current remediation strategies to determine the influence they have on academic progression and NAPLEX pass rates.[3] There is a significant gap in the literature regarding remediation best practices and outcomes. This paper offers the first description of and outcomes related to a remediation program in an accelerated three-year pharmacy program. Future areas in which this study could be extended include examination of which specific courses might benefit most from remediation, impact on benchmarks such as the PCOA and NAPLEX, and analysis of more detailed trends that may arise from continuing this process.

While the results of this study are promising, there are some potential limitations to note. First, the study only included data from one accelerated PharmD program. It is unclear if the results can be extrapolated to other institutions or non-accelerated programs. Another limitation is the lack of standardization for the activities that students completed for remediation with the exception

that all students passed an exam at the end of the remediation period. Course coordinators were free to include any activities in the remediation plan that they believed would help students master the material. As noted previously, increased standardization and guidance for course remediation material is a future goal within the program. Additionally, the analysis did not consider any changes in curriculum sequence, content, or design that occurred over the period of time the study was conducted.

CONCLUSION

Providing students the opportunity to remediate coursework within an accelerated pharmacy curriculum can be challenging. An effective remediation process allows students to maintain engagement within their matriculated cohort and may lead to success in learning and retention of the knowledge and skills necessary to be an effective pharmacist upon graduation. Overall, our study demonstrated that the majority of students who qualified for remediation were successful and graduated on time. Thus, the remediation process outlined in this article may be a useful tool for other colleges with a similar schedule. Further studies in this area are needed to fully elucidate the effect of remediation processes on learning and retention of knowledge and skills.

ACKNOWLEDGMENTS

The authors would like to thank the late Frank Facione, PhD, for his contribution to the literature reviews.

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