RESEARCH ARTICLE

A Monitoring and Early Intervention Program for At-Risk Students on Advanced Pharmacy Practice Experiences

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Objective: To describe a monitoring and early intervention process for students at risk of substandard performance on Advanced Pharmacy Practice Experiences (APPEs).

Methods: Using a dashboard of key indicators, students with potential deficits in knowledge, skills, or non-cognitive attributes were identified as at-risk for substandard performance on APPEs and placed on a list of students to be monitored during the APPE year. Employing a stoplight-based approach, at-risk students were initially designated as RED monitoring status. If no issues were identified, students were de-escalated to YELLOW status and, subsequently to GREEN status. Monitored students who had issues or received a substandard evaluation on APPEs had a deficit specific action plan implemented.

Results: Between the 2018-2019 and 2019-2020 academic year, 87 of 499 students entering advanced practice experiences were monitored. Of those, 77 or 88.5% completed experiences successfully on the first attempt. While the vast majority completed experiences successfully on first attempt, 66/87 (75.9%) students did require extended higher-level (RED or YELLOW) monitoring. Over the two years, 54/87 (62.1%) of the students deemed at risk did not have a substandard performance on APPEs, with 26 in year one and 28 in year two.

Conclusion: A student monitoring and early intervention process may be beneficial in assisting at-risk students to successfully complete advanced pharmacy practice experiences.

Keywords: Experiential, Readiness, Monitoring, Support, Intervention

INTRODUCTION

Transitioning from didactic to experiential learning comes with a significant increase in responsibility and performance expectation.1 This may present a challenge for some student pharmacists. According to the Accreditation Council on Pharmacy Education (ACPE) Standards 2016, colleges of pharmacy should analyze students’ knowledge, skills and competencies in providing direct patient care and taking part in an interprofessional team prior to starting Advanced Pharmacy Practice Experiences (APPEs).2,3 ACPE calls upon individual institutions to construct their own assessment process to determine APPE readiness. Determining factors that accurately predict which students may perform poorly on APPEs has proven to be challenging. Data looking at predictors of performance in pharmacy school have been varied.4-6 A study by Heldenbrand et.al supports that pre-pharmacy grades, Pharmacy College Admission Test (PCAT) scores, and Multiple Mini Interviews (MMI) are predictive of pharmacy school performance. Individuals having a GPA <3.25, PCAT score < 60% percentile, and MMI score < 4.5 were 12, 7, and 3 times more likely to have academic difficulty (grade of D or F or delayed progression).6 In a study by Schauner et.al., lower PCAT composite and subcategory scores, prepharmacy GPA, prepharmacy math and science GPA, interview score, and fewer cumulative prepharmacy coursework hours, were predictive of those obtaining a D or less in the first year. A study by Meagher et.al. Also supported that PCAT scores and prepharmacy GPA were predictive of success. These studies have largely focused on overall academic performance, as opposed to assessing experiential performance.1 Additionally, applicability beyond the study institution can be difficult as in some cases, some schools have curricular strategies such as readiness and capstone courses which may not be generalizable.7 Progress has been made in recent years, though, as seen with the 2020 study by Nyman and colleagues that focused on factors specifically affecting APPE readiness.7 The authors found that knowledge retention covariates such as course grades in pathophysiology, pharmacology, therapeutics and drug literature evaluation and PCOA scores were identified as positive predictors in 3 models. Other factors with more modest predictability were OSCE scores and age which were positively correlated.7 Also published in 2020, Call and colleagues looked at predictive
factors for poor performance or failure on APPEs. The study had a large cohort (n=669) and found poor academic
performance (specifically failure of pharmaco therapy courses and low professional GPAs) correlated with poor
performance or failure on APPEs. Additionally, the investigators found a negative correlation between professionalism
infractions on introductory pharmacy practice experiences (IPPEs) and APPE success.

The current existing trials may help identify students who are not ready for APPEs based on specific variables,
but they do not provide insight on how to support those students who are at risk for substandard performance on APPEs.
Because appropriate pre-APPE remediation for curriculum milestones takes place, some learners may be deemed ready
for APPEs, but may still need extra support throughout the APPE year to ensure success. If a structured support system is
not in place, there can be a learner support gap when these students embark on advanced practice experiences.
While incorporating a variety of predictive factors into an assessment model may allow colleges to identify those at risk
for failure or poor performance on APPEs, there is not a definitive tool for identifying APPE readiness. The University of
Florida College of Pharmacy recognized that there was a need to develop a comprehensive and integrated tool that
coll ects a variety of information from multiple sources to provide a holistic view of the student’s overall abilities. The tool
evaluates a variety of abilities in the areas of didactic knowledge, skills, and non-cognitive attributes, such as
professionalism and teamwork skills. Details on the development and implementation of this dashboard tool are described
elsewhere. In implementing the dashboard tool, the college identified that students fell into three groups: ready for
APPEs, ready but potentially at risk for substandard performance, and not ready.

When students are accurately classified, creation of an appropriate support plan is possible. Based on the results
of the dashboard process, the experiential program team sought to develop an effective monitoring and support program
for at-risk students on APPEs. In order to be proactive in helping struggling learners in the experiential environment, the
college created a monitoring system for at-risk students identified by the dashboard tool. The monitoring system allowed
for early detection of substandard performance and development of student-centric intervention plans. The primary
objective of this study is to describe the design and utility of a monitoring and support system for students on advanced
pharmacy practice experiences who have been deemed at risk for substandard performance.

METHODS

Prior to the start of APPE years 2018-2019 and 2019-2020, a dashboard of key indicators was used by a readiness
evaluation committee to identify students with potential deficits in knowledge, skills, or non-cognitive attributes. Table 1
shows the indicators assessed to determine knowledge, skill, or non-cognitive attribute deficits over the 2 years evaluated.
Through a holistic evaluation, students with at least 3 deficits were deemed at risk for substandard performance on
APPEs. Substandard performance was defined as per Table 2. Students deemed at risk for substandard performance on
APPEs were placed on a monitoring list, and the regional coordinators from the Office of Experiential Programs (OEP)
were responsible for implementation of the monitoring plan. Regional coordinators are faculty-appointed pharmacists
deployed around the state, serving as the local college contact who supports sites, preceptors, and students in their area.

The frequency of monitoring for each learner was designed around a traffic light-based, color-coded system.
High risk students, placed on RED monitoring status, had the most intensive monitoring with an early, midpoint, and final
check-in for each APPE. The OEP regional coordinators performed a check-in with the student and preceptor within the
first week of each experience. The check-in consisted of the regional coordinator asking the preceptor for general
feedback on the student’s performance on the APPE and obtaining the student’s perception of their own level of
performance. In addition, the regional coordinator conducted a review of the midpoint evaluation within a week of
submission. If there were concerns noted on the midpoint, the regional coordinator would work with the preceptor and
student on a plan for corrective action. Intervention was on an as-needed basis. If students on RED status did not have any
noted concerns or substandard performance after completion of two APPEs, then the monitoring status was changed to
YELLOW. For students on YELLOW status, the regional coordinator decreased the monitoring frequency, but continued
a timely review of the midpoint evaluation. If the midpoint was not submitted on schedule, the regional coordinators
contacted the preceptors to request midpoint feedback. If students on YELLOW status did not have any noted concerns or
substandard performance after completion of two APPEs, then the monitoring status was changed to GREEN. On
GREEN status, students remained on the monitored student list, but no additional proactive monitoring was employed by
regional coordinators. Maintaining students on GREEN facilitated reescalation of monitoring, should challenges arise.
Whenever monitored students had significant issues (concerns about performance that might impact the ability to pass the
rotation) or received substandard evaluations, the experiential office developed deficit-specific evidence-based action
plans, and the students were retained or reinstated to RED status. Students who had minor issues (for example, difficulty
with one aspect of the rotation but able to improve with feedback) were retained at the current level of monitoring level
for an additional APPE, and then de-escalated if there were no issues on the subsequent experience. Regional coordinators
worked with preceptors and students to triage and determine the etiology of the challenge. They then led the development of student-specific action plans in conjunction with the site preceptor. Plans were developed based on recommendations from the text, *Remediation in Medical Education – A Midcourse Correction.* Leadership from the experiential office and student affairs were included in development of the plan if the issues warranted (e.g., medical concerns). Example challenges and associated plans are described in Table 3. The regional coordinators documented the challenges, plans, and outcomes in the student profile using the Salesforce platform. Over the course of each year students could be added to the monitored list if they experienced challenges and needed increased monitoring and support.

The first academic year (2018-2019), all students at risk were initially placed on RED monitoring status. After two APPEs, students without significant issues were de-escalated to YELLOW. Continued progress without significant issues for the subsequent two APPEs resulted in de-escalation to GREEN status. In the second year (2019-2020), students deemed at risk were initially placed on RED or YELLOW status, at the discretion of the evaluation committee. Students placed on YELLOW typically met criteria for monitoring, but indicators were scattered across domains or were indicators with less data to support them as predictors. Students were managed by the same process employed in year one. Monitoring was considered de-escalated on schedule if a student progressed to YELLOW or GREEN after two experiences. Monitoring was considered extended if a student stayed at RED or YELLOW for more than two experiences. Impact of the dashboard and student monitoring process were evaluated by assessing the number of students with substandard performance, the number of students who had issues and experienced delayed de-escalation, no de-escalation, or regression, and the number of students who matriculated on track through APPE experiences. Descriptive statistics were used to describe the outcome parameters and Chi-square tests were used to compare outcomes between years one and two of the monitoring program. The study was approved by the University of Florida Institutional Review Board.

RESULTS

Over the first two years of the monitored student program, the dashboard of key indicators was used to evaluate readiness of 499 students about to enter advanced pharmacy practice experiences. Overall, 87 students were deemed at risk for substandard performance on APPEs and placed on the monitoring list. Of the 87 students, 88.5% completed all APPEs successfully on the first attempt and 62.1% had no substandard performance (See Table 4). While the vast majority completed all experiences successfully on the first attempt, 75.9% of students required extended RED or YELLOW-level monitoring. The percentage of students who required extended monitoring (did not de-escalate on the established schedule) was significantly higher in the second year. A description of de-escalation timeline outcomes by year is provided in Figure 1. The percentage of students who completed experiences without a substandard performance was not significantly different between the 2 years of the program.

For the 2018-2019 APPE year, 39 students were initially identified as at-risk using the readiness dashboard. Two students who were off-track in the 2017-2018 APPE year were carried over from the previous experiential cycle and added to the 2018-2019 monitored student list. Three additional students were placed on the monitored student list during the 2018-2019 year, for a total of 44 students. Students were added to the monitored student list if they had a substandard performance and there was concern that the student would experience another substandard performance without monitoring and early intervention. Of the 44 monitored students, 39 (88.6%) completed all APPEs successfully on the first attempt, and the monitoring level for 16 students (36.4%) was de-escalated on schedule. Of the 28 students who had delayed de-escalation, 15 exhibited substandard performance on one or more APPEs. English language barriers were cited as a factor in 6 students with substandard performance. Of the 15 students with substandard performance, two were placed on remedial experiences and three failed or were removed from an APPE. Remedial experiences were experiences where students worked with preceptors specifically selected to help them improve in an area of identified weakness (remediate) before starting or continuing traditional advanced pharmacy practice experiences.

For the 2019-2020 year, 39 students were initially identified as at-risk and placed on the monitored student list, and 4 students were added to the list over the course of the year. A total of 38/43 (88%) completed all APPEs successfully and on schedule. Of the 43 monitored students, the monitoring level for 5 (11.6%) was de-escalated on schedule. Of those 38 who did not de-escalate on track, 15 had a substandard performance on APPEs. Five students failed an experience, and 2 students were placed on a remedial APPE. English as a second language was cited as a factor in two of the cases. Of the 7 students added to the monitoring list with unanticipated concerns over the two-year program period, two were added due to health issues which impacted performance, two had professionalism infractions, one had a knowledge gap, and two had both knowledge and non-cognitive attribute concerns.

DISCUSSION
The number of monitored students who completed all experiences successfully on first attempt was noteworthy at 88.5%. A significantly greater percentage of students required extended monitoring the second year of the program. A possible cause for the increase in extended monitoring in the second year was that the dashboard tool used to identify at-risk students was modified in the second year. As such, the tool may have done a better job of identifying students truly at risk. Another possible cause of the higher rate of extended monitoring in the second year of the monitored student program was that the COVID-19 pandemic was escalating with a crisis point reached in the spring of the second study year. The stresses and logistical issues associated with the pandemic may have impacted student performance and the need for extended monitoring and support. This idea is supported by data from Elbeshbeshy and colleagues which suggests that the wellbeing of students on APPEs was impacted during the pandemic. It is notable that while the number of students who required extended monitoring increased, the number of substandard performances did not.

The program did allow for students who have unanticipated challenges on APPEs to be added to the monitored student list. Of the 7 students added to the list, only one had a substandard grade after being added to the list. While the outcomes of the students who were added were similar to the initial cohort, the need to add students during the year suggests there is still opportunity to improve the dashboard tool which is used to identify students for the monitored list. An evaluation is currently underway to assess characteristics of students who were not initially identified by the dashboard tool and were added to the monitoring list due to substandard performance. Assessment of this information will help determine opportunities for further refinement of the dashboard metrics.

While the percentage of students who successfully completed an experience on first attempt approached 90%, there may be opportunity to enhance the monitoring and intervention process to further increase the success rate on first attempt and decrease substandard performances. The Office of Experiential Programs will be evaluating characteristics of students who were monitored and still were not successful on first attempt or had substandard performances to determine if there is an opportunity to further improve the monitoring and intervention process. Potential opportunities include conducting the check-ins earlier in the rotation, evaluating effectiveness of intervention plan elements and standardizing in certain situations, and seeking feedback from regional coordinators on where they may need more support or training. While this was an incidental finding, another area of opportunity may be for those with English as a second language, as this was cited in several cases. These students may have unique challenges and approaches to support may differ from those of native English speakers. Diaz-Gilbert and colleagues suggest some students with English as a second language may have deficits in understanding medical terminology and lack essential writing skills. Having students teach back to the preceptor to demonstrate understanding and having opportunity to practice writing might be helpful in these situations.

Evaluation of the monitored student program has potential limitations. For example, the implementation of the dashboard tool and the monitoring process happened concurrently. The identification of a group of students who were ready for APPEs, but at risk prompted the development of a monitoring program in real time, thus limiting the ability to compare the outcomes of students in the monitoring program to a cohort deemed at risk but not monitored. Evaluating a retrospective cohort defined as at risk using the dashboard was also challenging as some of the metrics used to determine risk were new at the institution and were not evaluated in prior student cohorts.

CONCLUSION

A monitoring and early intervention process using evidence-based action plans for students identified as at risk for poor performance utilizing a dashboard screening tool, resulted in the vast majority of at-risk students completing experiences successfully on first attempt. The monitoring and intervention processes may be beneficial in assisting at-risk students. An evaluation of those who were not successful on the first attempt or had substandard performances will be conducted to identify if the intervention process can be improved.

REFERENCES


Table 1. Knowledge, Skills, and Non-cognitive Attribute Indicators Assessed

| Knowledge | Pharmacy Curriculum Outcomes Assessment (PCOA) score less than 50th percentile/internal comparator +
| Grade point average less than 2.5
| Top 200 drugs examination score less than 80% *
| Third year calculations examination score less than 70%
| Patient care course grades less than 10th percentile
| Out of sequence student (off-track with academic progression)
| Skills | Low teamwork Comprehensive Assessment of Team Member Effectiveness (CATME) scores
| Objective Structured Clinical Examination (OSCE) scores two standard deviations below class average ^
| Third year skills lab course grades less than 10th percentile *
| Introductory Pharmacy Practice Experiences (IPPEs) **
| Non-cognitive Attributes
| Referral by faculty leadership
| Professionalism lapses ~
| Situational Judgement Test (SJT) *
| Introductory Pharmacy Practice Experiences (IPPEs) **

+Modified in year 2
# Examination of common characteristics of the most commonly prescribed medications)
* High stakes Examination evaluating counseling, demonstration, and communication skills
~ Violations of college’s professionalism policy
* Added in year 2
^ Less than 80% on final examination, overall performance in the lower 20% of the class
~ Violations of college’s professionalism policy
" Incomplete or unsatisfactory grade on first attempt due to not completing requirements

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Table 2. Substandard Performance Criteria (1 or more of the following)

- Advanced Pharmacy Practice Experience grade C or less*
- Response of “is below” to the APPE assessment question “At this point the student _____ the level I would expect.”
- “Not at goal” or “no” on the APPE assessment professionalism milestone statement “I trust the student to independently and without additional guidance, consistently exhibit professional behavior.” (If students received a “no” on this question, they failed the experience.)

*Advanced Practice experiences are scored on a numeric scale and students are assigned a letter grade.

Table 3. Example Assessments and Plans

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Assessment</th>
<th>Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to develop appropriate care plan</td>
<td>Clinical reasoning problems due to knowledge deficit</td>
<td>Suggested reading, NAPLEX preparation text; Script sorting exercise to organize information</td>
</tr>
<tr>
<td>Late assignment submission</td>
<td>Professionalism problems due to organizational deficit</td>
<td>Utilizing a calendar, creating reminders, breaking up projects into pieces, placing project timeline on calendar</td>
</tr>
<tr>
<td>Late to experience, not engaged, work superficial or incomplete</td>
<td>Professionalism problems due to family issues</td>
<td>Connect student to Student Affairs office and embedded counselor for support and coping strategies</td>
</tr>
</tbody>
</table>

Table 4. Student Monitoring Outcomes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2018-2019 Number/Total (%)</th>
<th>2019-2020 Number/Total (%)</th>
<th>p value*</th>
<th>Overall Number/Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students Monitored</td>
<td>44</td>
<td>43</td>
<td></td>
<td>87</td>
</tr>
<tr>
<td>Successfully completed all experiences on first attempt</td>
<td>39/44 (88.6)</td>
<td>38/43 (88.4)</td>
<td>p = .97</td>
<td>77/87 (88.5)</td>
</tr>
<tr>
<td>Monitoring de-escalated on schedule</td>
<td>16/44 (36.4)</td>
<td>5/43 (11.6)</td>
<td>P = .007</td>
<td>21/87 (24.1)</td>
</tr>
<tr>
<td>Required extended monitoring</td>
<td>28/44 (63.6)</td>
<td>38/43 (88.4)</td>
<td>P = .007</td>
<td>66/87 (75.9)</td>
</tr>
<tr>
<td>Had a substandard performance</td>
<td>18/44 (40.9)</td>
<td>15/43 (34.9)</td>
<td>p = .56</td>
<td>33/87 (37.9)</td>
</tr>
</tbody>
</table>

*Chi square was used to determine significance, defined as p<.05 between 2018-2019 and 2019-2020.
Figure 1. Monitored Student De-escalation Outcomes 2018-2020