Predictors of Success and Struggle: GPA, PCAT, and a Novel Composite as a Diagnostic Test

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BACKGROUND

- Several analyses of admissions data have been performed in an effort to determine predictors of success and struggle in our program.
- GPA and PCAT scores are among the many factors evaluated for prospective pharmacy school candidates. Previous research has established that both factors correlate with pharmacy school performance.1
- While GPA and PCAT are individual predictors of success and struggle in graduate pharmacy programs2,3, no research has been done to our knowledge to compare these variables to one another. Therefore, candidates with high GPA/low PCAT (HGLP) or low GPA/high PCAT (LGHP) can be perplexing to admissions committees.
- It has been hypothesized that a combination of these two variables to derive a composite score may provide a more robust assessment of a candidate than each variable provides independently.

OBJECTIVE

- This study sought to determine whether a difference exists between candidates with HGLP vs. LGHP with respect to success and struggle in a three calendar-year modified block curriculum.
- A derived composite variable (GPxPCAT) was developed and evaluated as a diagnostic test for Struggle in our curriculum utilizing a receiver-operating characteristic (ROC) curve analysis.

METHODS

- Students in our curriculum have three opportunities to pass an assessment with an 84% or better. Achieving ≤94% on the first attempt results in an Honors (H) grade. Students who do not achieve 84% on their first try are afforded two additional opportunities to remediate and reassess.
- We performed a retrospective review of admissions data for students in the Classes of 2014 through 2016.
- Each student’s PCAT percentile score and admissions GPA were collected.
- HGLP vs. LGHP analysis
  - Students in the upper third of GPA and lower third of PCAT percentile were coded as High GPA, Low PCAT (HGLP).
  - Students in the lower third of GPA and upper third of PCAT percentile were coded as Low GPA, High PCAT (LGHP).
  - An independent samples T-test was used to compare HGLP and LGHP with respect to the number of H grades (success) and number of reassessments (struggle).
- GPxPCAT analysis
  - The composite score is calculated as: [(GPA*100*PCAT)/4] (range 0-10,000)
  - An independent samples T-test was used to compare GPxPCAT to success and struggle.
  - An ROC curve was utilized to determine the optimal GPxPCAT cutoff for any significant result.

RESULTS

- All students from the Classes of 2014-2016 were included (N=230). Mean admissions GPA for the three-class cohort was 3.03 (SD ±0.36), mean composite PCAT percentile score was 51.2 (SD ±20.4).
- Cumulative GPA thresholds were defined as ≥3.17 (n=73), 2.84–3.16 (n=75), ≤2.83 (n=76).
- Composite PCAT thresholds were defined as ≥61 (n=80), 41-60 (n=72), and ≤40 (n=78).

HGLP vs. LGHP

- GPA
  - All students from the Classes of 2014-2016 were included (N=230).
  - Mean admissions GPA for the three-class cohort was 3.03 (SD ±0.36), mean composite PCAT percentile score was 51.2 (SD ±20.4).
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GPxPCAT: A new composite variable

- GPxPCAT was calculated for all students with PCAT percentile scores (N=224).
- Among our cohort, 112 students (50%) had never required remediation, while 112 students (50%) required at least one remediation during their P1 or P2 years.

GPxPCAT analysis

- The GPxPCAT composite statistically correlates with struggle (p=0.048) but not with success (p=0.14).

- After ROC analysis (AUC 0.603, 95% CI 0.529, 0.677), a GPxPCAT score <2,000 was found to be 11% sensitive and 91% specific for predicting reassessment. A score <5,000 was 72% sensitive and 31% specific for reassessment.

DISCUSSION

- An AUC of 0.603 indicates a less than ideal balance of sensitivity and specificity. For reference, an AUC of 1.0 is a perfect test (100% sensitivity and 100% specificity) and an AUC of 0.5 is a useless test (50% chance of being correct and 50% chance of being incorrect). In general, a test must have an AUC of >0.8 to have reliable diagnostic value.
- For admissions purposes, a specific test is valued over a sensitive one.
- A GPxPCAT<8,000 is very sensitive, predicting no Struggle with 100% certainty (NPV), but with a high rate of false positives (PPV), i.e., a high rate of incorrectly predicting Struggle.
- Though a GPxPCAT cutoff of <2,000 provides a specific test, it confirms the observation that students with both low GPA and low PCAT scores are more likely to experience Struggle.
- Despite its specificity, a GPxPCAT<2,000 has a poor positive predictive value (PPV) in our cohort.

CONCLUSIONS

- No statistical difference was found between individuals with HGLP vs. LGHP as a visual H grade (Success) or final reassessments (Struggle).
- GPxPCAT correlates with Struggle, but not Success.
- GPxPCAT is not an ideal predictor of student Struggle as defined by reassessment requirements, due to the high rate of false positives. For the test to have fewer false positives, the GPxPCAT cutoff value must be very low.
- Future applications of this method include using alternate definitions of Success and Struggle, as well as utilizing the ROC curve with different test variables.

REFERENCES