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Research

# Correlation of P3 PCOA scores with future NAPLEX scores

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## Abstract

**Objective:** To determine whether a correlation exists between third-year professional (P3) Doctor of Pharmacy (PharmD) students' Pharmacy Curriculum Outcomes Assessment (PCOA) scores and their future National Association of Boards of Pharmacy (NABP) North American Pharmacist Licensure Examination (NAPLEX) scores.

**Methods:** In 2009 and 2010, the PCOA was administered to P3 pharmacy students at North Dakota State University (NDSU). Students subsequently took the NAPLEX the following year and released their scores to the school. Parametric analysis of variance and Kruskal–Wallis tests were used to assess mean differences in PCOA scaled scores (total and subtopic domain) and NAPLEX scaled scores (total and by competency area). Pearson and Spearman analyses were used to assess the magnitude of the correlations between the PCOA and NAPLEX scores.

**Results:** Pearson correlations indicated that the PCOA total and all four subtopic domain scaled scores were significantly correlated with all NAPLEX scores (total and competency areas) with one exception. The PCOA social, behavioral, and administrative subtopic domain score was not significantly correlated with NAPLEX Competency Area 2.

**Conclusion:** NDSU pharmacy students in their P3 year who scored higher on the PCOA exam were more likely to score higher on the future NAPLEX exam. Students may be able to use formative assessment data from the PCOA to correct any possible deficiencies prior to taking the NAPLEX.

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**Keywords:** PCOA; NAPLEX; Assessment

## Introduction

Colleges and schools of pharmacy are held accountable by accrediting bodies for educating students to ensure they have the necessary knowledge, skills, and abilities to enter professional pharmacy practice in a variety of settings.<sup>1</sup> Pharmacy programs commonly track student performance on the National Association of Boards of Pharmacy (NABP) North American Pharmacist Licensure Examination (NAPLEX) as a measure of their success in this endeavor. Prospective pharmacy students are also interested in the NAPLEX pass rates for the various pharmacy programs and

equate high pass rates with program quality.<sup>2</sup> Content on the 185-question NAPLEX corresponds to the Accreditation Council for Pharmacy Education (ACPE) Standard 12: Professional Competencies and Outcome Expectations that must be achieved by graduates through the professional curriculum. Specifically, the NAPLEX assesses a candidate's ability to assess pharmacotherapy to assure safe and effective therapeutic outcomes (Competency Area 1); assess safe and accurate methods to prepare and dispense medications (Competency Area 2); and assess, recommend, and provide health care information to promote public health (Competency Area 3).<sup>3</sup>

Student NAPLEX scores are reported to the college/school in aggregate as pass rates (unless students consent to release their individual scores) with the majority of students passing the NAPLEX on their first attempt.<sup>4</sup> The high pass rates seen among some programs is one reflection of a

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program's ability to prepare its students for licensure and future practice, but other factors may also impact a student's ability to pass the NAPLEX. For instance, since the NAPLEX is a criterion-based exam, it essentially measures only whether a student possesses the minimum knowledge necessary to practice pharmacy.<sup>5</sup> Further, pharmacy programs that provide comprehensive NAPLEX review sessions for their students may increase the likelihood of student success on the exam and overall pass rates.<sup>6,7</sup> Tracking individual student scores in each of the three competency areas rather than aggregate pass rates may be a slightly better measure of a program's effectiveness since competency area scores report the degree of competency and not just whether students meet or exceed the minimum necessary to practice pharmacy. But even then, individual student scores for each of the three competency areas do not represent percentage values. Rather, the score is calculated by first determining the candidate's performance on the NAPLEX and then comparing it to the predetermined minimum acceptable level of performance established by the NABP.<sup>5</sup>

Several pharmacy programs have chosen to administer progress exams periodically throughout the curriculum to assess students' knowledge acquisition and retention as another measure of program quality.<sup>8</sup> Unlike the NAPLEX which is a summative assessment administered at the conclusion of a student's education, progress exams provide formative assessment of a student's academic development. The Pharmacy Curriculum Outcomes Assessment (PCOA) is a progress exam administered by the NABP yielding both individualized and aggregate student information. Exam content on the PCOA corresponds to the Doctor of Pharmacy core curriculum as defined by ACPE Standard 13 (Curriculum Core: Knowledge, Skills, Attitudes, and Values) and is designed to be administered annually in the first through the fourth professional (P1–P4) years.<sup>9</sup> A notable gap in pharmacy education literature is an empirical study of the relationship between intermediate formative assessments of student learning, such as the PCOA, and summative measures of program outcomes as represented by the NAPLEX.

## Objective

The purpose of this study was to determine if North Dakota State University (NDSU) students' PCOA exam scores, collected during the third professional (P3) year of a pharmacy program, correlate in any way to those students' future NAPLEX scores.

## Methods/design

Institutional Review Board (IRB) approval for this research project was granted by the NDSU IRB. This study is an extension of a recently published study comparing student perceptions of their knowledge with actual

knowledge as assessed by the PCOA in 2010 and 2011.<sup>10</sup> In the current study, pharmacy students who were in their third professional year in 2009 and 2010 were provided with an informed consent form describing the research and asked for their voluntary participation in the study. Each cohort of students was given verbal information about the PCOA, including test design (i.e., number of questions and multiple-choice format), the expected time commitment, the link to an internet site for more information, and an explanation of how the results would be used. Students were also asked to release their NAPLEX scores to the school so that the link between PCOA scores and NAPLEX scores could be studied. One week before the PCOA examination, an e-mail reminder was sent to the students reminding them of the date and time of the PCOA examination. NDSU paid the costs of completing the PCOA exam, while students were responsible for all costs associated with taking the NAPLEX exam. Completion of the PCOA exam was voluntary. To encourage student participation and effort on the PCOA, participating students received a free lunch at the conclusion of the exam and students who scored at a predetermined level were eligible to receive additional days off during their Advance Pharmacy Practice Experience (APPE) rotations. Specifically, students scoring at or above the 85th percentile received a total of two extra personal days off (i.e., an unrestricted, excused absence) from APPE rotations, those scoring in the 70th–84th percentile received one extra personal day off, and students scoring in the 40th–69th percentile received one extra professional day (i.e., an excused absence for activities related solely to licensure and the pursuit of employment) off. Lastly, a drawing to award free pre-NAPLEX exams for five students was held after the PCOA results were returned for participating students.

Since no empirical evidence in the pharmacy education literature exists linking performance across the PCOA and the NAPLEX, this study operated under a null hypothesis of no correlation between the two exam scores. This null is corroborated by the fact that the NAPLEX partially (and in conjunction with other exams such as the Multistate Pharmacy Jurisprudence Examination) addresses ACPE Standard 12 (Professional Competencies and Outcome Expectations) while the PCOA exam partially addresses ACPE Standard 13 (Curricular Core: Knowledge, Skills, Attitudes, and Values). While it is logical to conclude that a cumulative mastery of Standard 13 domains should translate into cumulative mastery of Standard 12 domains, no prior knowledge exists to suggest that those partial indicators for each standard should be weakly or strongly (or positively or negatively) linked. PCOA scores are reported as a total scaled score (both overall and by subtopic domains) and as a national percentile per program year ranking. This study focused primarily on the PCOA scaled scores rather than the corresponding percentile rankings of those scores (that were ranked relative to students taking the examination in a given year) because we have a two-year cohort of students, and

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