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Research

Identification of U.S. pharmacy school characteristics that correlate with pre-requisite rigor[☆]

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Abstract

Background: Specific pre-requisite course requirements vary widely in pharmacy education from direct-from-high-school admission to requirement for a bachelor's degree. There is a lack of published studies that have attempted to determine school or university characteristics that may shape the selection of either basic or advanced pre-requisites.

Methods: Pharmacy schools were grouped by either requirement for at least one selected advanced scientific course or by pre-requisite hour requirements of ≤ 72 h, > 72 h or a bachelor's degree. Pre-requisite groupings were then compared to the school's U.S. News ranking, tuition for the first professional year, incoming class size, public/private status, and university's offering of at least one other professional doctoral degree program.

Results: Two characteristics associated with higher science course requirements were the school's public/private status and in private schools, the presence/absence of another professional school. When grouped by categories of increasing hours, the existence of another professional school was positively associated with increased admission standards (both advanced science courses and hours) at private pharmacy programs.

Conclusion: This study indicates that PharmD programs with advanced pre-requisite science requirements tend to be public. In private programs, both lack of requirement for an advanced science course and lower pre-requisite hours were found in institutions lacking additional professional doctoral degree programs.

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Keywords: Pre-requisites; Advanced courses; Other professional schools; Public/private

Abbreviations: AACP, American Association of Colleges of Pharmacy; ANOVA, Analysis of variance; S/COP, School or College of Pharmacy; USNWR U.S., News and World Reports rankings; SEM, Standard error of the mean; Other Dr., The S/COP university has at least one other professional doctoral-conferring health school; No Dr., The S/COP university does not have at least one other professional doctoral-conferring health school; Bach, Bachelor's degree required

Introduction

The medical education literature has well established that undergraduate grade point average (GPA) in pre-

requisite course work is a strong predictor of success in professional doctoral school curricula,^{1,2} including Doctor of Pharmacy (PharmD) programs.^{3–5} However, the specific pre-requisite course requirements vary widely in pharmacy education. The majority of schools or colleges of pharmacy (S/COP) require a pre-professional course load that could be completed in two academic years of college-level courses⁶; however, pre-pharmacy course expectations range from programs requiring as little as high-school level education (referred to as 0–6 programs) to others that have built pre-professional requirements to such an extent that the majority

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of their entering students possess a bachelor's degree.^{6–7} In 2009, the American Association of Colleges of Pharmacy (AACCP)'s Academic Affairs committee recommended the adoption of one of two pre-professional curricular models—a fundamental and an extended.⁸ In the more basic “fundamental” curriculum, science, technology, engineering, and mathematics (STEM) courses included only general biology, microbiology, anatomy, physiology, general and organic chemistries, calculus, physics, and statistics.^{6–8} The extended option added biochemistry, genetics, and immunology, which was deemed a relevant extension because most PharmD pre-requisites currently do not mandate these selected advanced science courses.

Presently, there is a lack of published studies that have attempted to determine factors that directly or indirectly may influence the design of pre-requisite course loads. These factors are important to identify in the field of medical education generally and pharmacy education specifically given that several studies now indicate attainment of a pre-professional bachelor's degree as one of the most significant predictors of academic performance in the early PharmD curriculum.^{3,4} In addition, greater levels of pre-professional course work correlate with higher academic achievement in pharmacy school.⁹ However, this benefit must be balanced against the drawbacks of more advanced undergraduate course work, including greater student stress, longer time prior to professional school admission and completion, added tuition costs, and potentially lower grade point averages (GPAs) due to more rigorous course requirements.

The objective of this study was to understand what characteristics are shared by a S/COP that decides to require more advanced pre-requisites. To determine these characteristics, criteria of the school and/or university that are objective or are third-party determined were collected. The potential associations between U.S. News and World Reports rankings, tuition costs, numbers of expected students, public/private status, and the presence or absence of other doctoral degrees at the institution was correlated with pre-requisite course or hour demands at 130 U.S. S/COP.

Methodology

Data sets

The National Center for Education Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS)¹⁰ was used to obtain data on professional doctoral degrees of Doctor of Chiropractor (DC), Dentistry (DDS/DMD), Allopathic medicine (MD), Osteopathic medicine (DO), Optometry (OD), Podiatric medicine (DPM), and Veterinary medicine (DVM) conferred by institutions that also granted the Doctor of Pharmacy degree. In some instances, these other professional schools shared the same campus as the pharmacy school; in other instances, they are physically separated but are within the same university branch. The

IPEDS was also used to determine the public or private status of each institution with a given S/COP. The American Association of Colleges of Pharmacy (AACCP) website was used to obtain a list of 2013–2014 pre-requisite information including hours and courses required for S/COP.⁷ Total pre-pharmacy semester hours and/or degree requirements as well as requirement for advanced science courses biochemistry, molecular biology, or genetics were taken from this list and used to stratify S/COP with more rigorous admission requirements.

The PharmCAS website (<http://www.pharmacas.org/>) was used to obtain data on most schools' pre-pharmacy PharmD length (i.e., 2 + 4, 3 + 4, 2 + 3 year accelerated, 0–6 year, and bachelor's + 4), the number of students anticipated to be admitted for the 2013–14 academic year (or most recent year data), and verification of the public/private status. Websites for each S/COP were accessed to find tuition costs for the first professional year (data were from the most recent year listed and included professional fees), verify pre-pharmacy and PharmD time lengths, pre-requisite credit hours, courses, and physical location of the school. Schools with more than one branch of their S/COP were treated as separate schools for the purposes of analyzing data if branches had different numbers of variables (tuitions, class sizes, other professional degrees) and if such data were available from the sources searched. Instances of data discrepancies were found between the data sources. The most recent data entry from any source was used in these cases. U.S. News and World Reports (USNWR) ranked S/COP most recently in 2012,¹¹ and these rankings were used to reflect a school's peer assessment. The data used included Accreditation Council for Pharmacy Education (ACPE) accredited S/COP as well as those with pre-candidate accreditation status and one program with no accreditation status.

Conversions of raw data from atypical degree programs

Some schools offer the PharmD degree through a 0–6 program with acceptance out of high school. For these schools, the first two year's course work was assessed as pre-requisite and tuition was calculated based on the third year (first professional year). Other programs offer the PharmD through an accelerated three-year format. To estimate a tuition level comparable with typical four-year formats, tuition for the first year of such three-year programs was multiplied by 0.75.

Sample sizes

Data were collected from a total of 130 S/COP in the U.S. Of these, two did not provide information on pre-requisites to the AACCP; as a result, that information was obtained from the school's website. USNWR assigned a numerical rank to 87 S/COP and due to ties in the rank, schools were ranked 1–80. Schools outside of this range are listed as “unranked.”

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