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Relationship between student selection criteria and learner success for medical dosimetry students

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ABSTRACT

Medical dosimetry education occupies a specialized branch of allied health higher education. Noted international shortages of health care workers, reduced university funding, limitations on faculty staffing, trends in learner attrition, and increased enrollment of nontraditional students force medical dosimetry educational leadership to reevaluate current admission practices. Program officials wish to select medical dosimetry students with the best chances of successful graduation. The purpose of the quantitative ex post facto correlation study was to investigate the relationship between applicant characteristics (cumulative undergraduate grade point average (GPA), science grade point average (SGPA), prior experience as a radiation therapist, and previous academic degrees) and the successful completion of a medical dosimetry program, as measured by graduation. A key finding from the quantitative study was the statistically significant positive correlation between a student's previous degree and his or her successful graduation from the medical dosimetry program. Future research investigations could include a larger research sample, representative of more medical dosimetry student populations, and additional studies concerning the relationship of previous work as a radiation therapist and the effect on success as a medical dosimetry student. Based on the quantitative correlation analysis, medical dosimetry leadership on admissions committees could revise student selection rubrics to place less emphasis on an applicant's undergraduate cumulative GPA and increase the weight assigned to previous degrees.

Introduction

As traditional higher education funding from government sources decreases, universities assume a proactive business model to ensure long-term survival and continued growth.[1] Increases in tuition and student fees do not meet the operational expenses of many institutions.[2] Administrative leadership urges faculty to enlarge student numbers, but instructors cannot compromise academic rigor.[3] With increasing pressure to recruit and retain talented students, medical dosimetry higher education programs attempt to admit only those applicants best suited to complete the rigorous academic and clinical curriculum.[4]

Allied health programs view the influx of student applications as an opportunity to increase enrollment, bolster sagging revenues, contribute to institutional prestige, and supplement the international supply of qualified health care workers.[5] A problem arises when the allied health programs increase student admissions and observe an accompanying spike in learner attrition.[6]

Admissions committees receive more applications than available student slots, and allied health leadership scrutinizes applicant profiles to select the most promising individuals.[7] Even with careful interview procedures, some admitted learners cannot complete the health sciences curriculum and withdraw because of personal, financial, or academic difficulties.[8] A medical dosimetry program, which is a division of radiation oncology at a specialized allied health university, experienced higher than desired attrition.[9] This observation prompted medical dosimetry faculty to investigate the relationship between applicant characteristics and academic success, with an intention of revising student selection criteria.

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Leadership at the medical dosimetry school desired to ascertain the applicant characteristics and background that correlated with student success, as measured by graduation from the medical dosimetry program. The quantitative research method was used for an ex post facto correlational study focused on student selection criteria and potential academic success in the allied health sciences. The independent variables included medical dosimetry applicant cumulative undergraduate grade point average (GPA), science grade point average (SGPA), previous work as a radiation therapist, and prior degrees earned. The dependent variable consisted of the demonstration of successful graduation from a medical dosimetry educational program.

The research questions included the following: What is the relationship between cumulative undergraduate GPA, SGPA, a background in radiation therapy, and possessing a previous degree and medical dosimetry program success, as measured by graduation from a medical dosimetry program? The student selection criteria, or independent variables, were examined individually to ascertain the presence or absence of a statistically significant relationship with the dependent variable of program graduation using the alternative hypotheses $H1_A$ through $H4_A$. The null hypotheses of $H1_0$ through $H4_0$ allowed for the absence of statistically significant relationships among the study variables.

Methods and Materials

Population

The population included students admitted to the medical dosimetry program at a specialized allied health university accredited by the Southern Association of Colleges and Schools and the Joint Review Committee on Education in Radiologic Technology.

Sampling frame

The study population comprised de-identified archival medical dosimetry student data from the academic years of 2003 through 2011 from enrolled learners in an undergraduate allied health medical dosimetry program at a Southern University. The de-identified historic data included information pertaining to cumulative undergraduate GPA, SGPA, prior work as a radiation therapist, previous degrees earned, the attainment of graduation from the medical dosimetry program, and demographic information. The demographic data gathered from the medical dosimetry student records consisted of information about sex, age, ethnicity, year of admission to the medical dosimetry program, and year of graduation from the educational program.

The Southern University supports one of the largest accredited medical dosimetry educational programs in the world. A 1-sample proportion for the graduation rates of the 150 medical dosimetry student records was conducted to estimate the power of the statistical analysis. The sample size of approximately 150 archived de-identified medical dosimetry student records was sufficient for the quantitative correlational analysis.

Informed consent

The student selection criteria study involved no more than minimal risk to the research participants, because data collection included only archival, nonidentifiable student records from the Southern University medical dosimetry program. None of the academic records, including undergraduate GPA, SGPA, previous degrees, prior experience as a radiation therapist, or graduation from the program, were linked to an individual. Ensuring that the students' names were not included in the data collection process contributed to participant anonymity and minimized potential risks to the study population.[10] A waiver of informed consent was approved by the Institutional Review Board (IRB) of the involved institutions.

Data collection

After receiving approval from the appropriate IRB organizations, de-identified archival student information was collected from existing databases at the Southern University. Access to the institutional network was protected with specific active directory passwords.

The data collection and analysis took place on Southern University's encrypted computer network. The archival student information was de-identified during data collection. During the collection of student data, the learners' names were replaced with a participant number. The participant number served as the identifier during the data collection, analysis, and reporting stages of the study.

A statistician from the Southern University served as a consultant during the quantitative correlational analysis of the study. The researcher shared de-identified archival medical dosimetry student records with the statistician over the encrypted institutional network for statistical analysis. The statistician signed a letter of collaboration among institutions and a confidentiality statement.

Data analysis

The 2 main components of descriptive statistics included in the study were distributions of frequency and calculations involving the variables of cumulative undergraduate GPA, SGPA, previous degrees earned, prior work as a radiation therapist, age, sex, ethnicity, and attainment of graduation. Microsoft Excel organized the collected data, and IBM SPSS Statistics, version 21, calculated the necessary frequencies of mean, median, mode, standard deviations, and range of the research variables.

Inferential statistics produced information that could answer the research questions about the relationship between the study variables of undergraduate cumulative GPA, SGPA, prior degrees earned, previous work as a radiation therapist, and successful graduation from a medical dosimetry educational program. Logistic regression provided evidence supporting or refuting the presence of significant relationships between the independent variables of undergraduate GPA, SGPA, previous degrees, and prior radiation therapy experience and the dependent variable of academic success, as measured by graduation from the medical dosimetry program.

The dependent variable of graduation from the medical dosimetry program possessed a binary response (yes/no) and fit the requirements of logistic regression analysis. Correlational analysis suited the needs of the research study, because administrative leadership wanted to know the characteristics of applicants that correlated with future academic success. Logistic regression and correlational analysis could establish a relationship between the study variables, but the chosen quantitative design of correlation did not imply causation.[11]

Results

Descriptive statistics

During the academic years of 2003 through 2011 in the medical dosimetry program at the Southern University, in the 156 archival student records that were collected, 78 (50%) medical dosimetry students were women and 78 (50%) were men.

The ages of students admitted to the medical dosimetry educational program at the Southern University during the academic years of 2003 through 2011 displayed a mean value of 29.45 years (standard deviation [SD] = 7.326).

Graduation rates from admitted learners to the medical dosimetry program during the academic years of 2003 through 2011 were calculated: 156 medical dosimetry students entered the allied health program, and 17 (10.9%) of the admitted students did not successfully graduate from the Southern University. The overall graduation rate for the medical dosimetry program was 89.1%. Table 1 shows the number of admitted students each year and the corresponding graduation rate, as well as the overall graduation rate of the medical dosimetry program.

The data show a general trend in increase in the number of admitted medical dosimetry students at the Southern University over time, with a peak of 32 admitted learners in 2010 (20.5% of the research population). The academic year 2010 coincides with a transition of the medical dosimetry curriculum from a 1-year to a 2-year degree program. In 2010, 32 students were admitted to the medical dosimetry program, but half ($n = 16$) of them were distributed in the last 1-year tract, whereas the other half ($n = 16$) began the new 2-year curriculum. The reformulation of the medical dosimetry program in 2010 and the acceptance of 2 distinct tracts (32 cumulative students) were reflected in the graduation frequency for 2011 (14 1-year tract graduates from an original admitted population of 16 1-year tract students).

Undergraduate cumulative GPA and program success

Students admitted to the medical dosimetry program during the academic years of 2003 through 2011 demonstrated a