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Everyone in the EMS community (who hasn't had their head stuck in the sand for the past several years) is aware that a new eligibility requirement goes into effect January 2013.

This requirement states that candidates must graduate from an EMS educational program accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP), if they want to take the National Paramedic Certification Examination.

This was the result of a membership vote of the National Association of State EMS Officials (NASEMSO) at their 2010 Annual Meeting. The National Registry of Emergency Medical Technicians (NREMT) conducted research over the course of one year, to assess what effect—if any—an accredited EMS educational program had on the probability of a student passing the National Paramedic Certification Examination.

Conclusions from the NREMT's research show that four factors are related to passing the National Paramedic Certification Examination:

1) national program accreditation,
2) lead instructor qualifications,
3) student educational background, and
4) student demographics.

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Estimating the Probability of Passing the National Paramedic Certification Examination

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Abstract

Objectives: It is hypothesized that student and program characteristics will influence the probability of passing the national paramedic certification exam. The objective of this study was to utilize student and program characteristics to build a statistical model to determine the probability of success on the cognitive portion of the national paramedic certification exam.

Methods: The study population for this analysis consisted of graduates attempting the National Registry of Emergency Medical Technicians (NREMT) paramedic written examination from January 1, 2002, through December 31, 2002. To be included in this analysis, graduates must have been first-time testers and have completed a survey attached to the exam. Independent variables analyzed reflected program and student characteristics derived from the survey questions and the NREMT application. A multivariable logistic regression model was fit to the outcome (pass/fail) of the examination.

Results: Complete demographic and survey data were available for 5,208 (86.8%) individuals. The final multivariable logistic regression model included nine independent variables. There were two programmatic characteristics (national accreditation and instructor qualification), six student characteristics (high school class rank, years of education, required for employment, age, race, and gender), and one graduate characteristic (elapsed time since course completion) that had a significant effect on the probability of passing the examination.

Conclusions: National program accreditation, lead instructor qualifications, student educational background, and student demographics are all significantly associated with the probability of success on the national paramedic certification examination. This model can be used by program directors, paramedic program instructors, and prospective paramedic students to maximize the probability of attaining national paramedic certification.

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National certification is required in 46 states to obtain a state paramedic license. To qualify for national certification, individuals must complete a state-approved paramedic training program and pass a cognitive and psychomotor certification exam. The current and projected demand for qualified paramedics[1] highlights the importance of emergency medical services (EMS) training programs that are efficient, effective, and employ data to monitor and continuously improve educational quality.

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There have been several studies describing the impact of student and program attributes and their association with success on the national paramedic certification exam. A number of studies have explored univariate associations with success or failure of the National Registry of Emergency Medical Technicians (NREMT) certification examination. A significant association between paramedic instructor credentials (clinical and educational) and first-time pass rate on the cognitive portion of the NREMT certification examination has been shown.[2] Also, an association between paramedic students' high school class rank and success on the national certification exam has been described.[3] Finally, self-reported educational level was determined to be associated with success on the EMT-Basic national certification examination.[4]

Recently, Dickison et al.[5] utilized a multivariable model to analyze the effects of national program accreditation. They concluded that students who complete an accredited paramedic program were more

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likely to pass the national paramedic examination. The above analysis focused on the effect of national program accreditation while controlling for several demographic variables. Utilizing multivariable regression techniques, which include more program and student characteristics, might allow for the creation of a statistical model with the ability to estimate an individual's probability of passing the national paramedic certification exam. This has been performed in other fields to determine how student and program characteristics can be used to predict success on examinations, such as the United States Medical Licensing Examination (USMLE) and the National Council Licensure Examination (NCLEX).[6,7] Similar statistical techniques have not been utilized within EMS education. Development of a probabilistic model using such methods may be useful for students to compare program characteristics and for educational programs interested in continuous quality improvement.

We hypothesized that a combination of student and program characteristics will influence the probability of passing the national paramedic certification exam. The objective of this study was to utilize student and program characteristics to build a statistical model to determine the probability of success on the cognitive portion of the national paramedic certification exam.

METHODS

Study Design and Population

This study examines a subset of NREMT examination data previously analyzed by Dickison et al.[5] Prior to administration of the cognitive examination, National Registry representatives read an orientation about the written examination to all candidates. Included in the orientation was a request that candidates participate in a research project. Participants were assured that their confidentiality would be maintained.[8] This analysis was approved by the American Institutes for Research Institutional Review Board (Washington, DC).

The study population for this analysis consisted of students attempting the NREMT paramedic written examination from January 1, 2002, through December 31, 2002. In contrast to Dickison et al.,[5] the population of interest for this study was recent paramedic graduates (those individuals taking the exam within 2 years of completing their initial training). First-attempt pass rates are one of the most commonly used indicators of programmatic success. Therefore, fitting a probabilistic model to these students would be likely to generate the most valuable model for educational programs.

Survey Content and Administration

A short questionnaire was included with all cognitive examination answer sheets during the study period. Every recent graduate attempting the NREMT paramedic written examination had the opportunity to complete the questionnaire. This analysis includes only those graduates who were taking the exam for the first time and had completed the questionnaire at the end of the cognitive examination. These selection criteria differ from the analysis performed by Dickison et al.,[5] whose analysis focused on describing the effect of national program accreditation. The questionnaire asked students to describe their educational background and paramedic program characteristics. The questions were developed by NREMT staff in response to NREMT research priorities.

Variable Descriptions

Outcome Variable. The dichotomous outcome variable of interest in this study was "pass" or "fail" on the cognitive portion of the NREMT paramedic certification examination. An explanation of the cognitive examination and the development of the passing standard has been explained elsewhere.[5,9] Briefly, at the time of data collection, the cognitive examination had 180 multiple-choice questions broken into six subtopic areas. Passing the examination required that a student achieve a total score above the minimum passing standard, as well as a minimum passing score in each subtopic area. For analysis, this variable was coded as 0 = failure and 1 = pass.

Independent Variables. The association between the outcome variable and 10 independent variables was explored. Independent variables were classified as graduate demographics, graduate educational characteristics, and program characteristics. Independent variables were obtained from the graduate's application to the test, and the survey attached to the exam answer sheet. All independent variables analyzed were selected because of plausible relationships with the outcome variable.

There were three demographic characteristics: age, gender, and race. Age was analyzed as a continuous and a categorical variable to explore its most appropriate form. Female was the referent category for gender. There were six racial categories (Asian, African American, Hispanic, Native American, other, and white) initially collected.

Of the four variables classified as educational characteristics of the graduate, two were obtained from the paramedic answer sheet survey (high school class rank and course completion as a requirement for employment) and two were obtained from the application (years of education and time since course completion to completion of the cognitive exam). High school class rank was a five-category variable where students were asked to indicate where they ranked upon graduation from high school (bottom 10%, lower 20%, middle 40%, upper 20%, or top 10%). Students were asked to indicate (yes or no) if completing the paramedic course was a requirement for their continued employment. Years of education was coded on the same ordinal scale as Dickison et al.[5] (< 12, 12–13, 14–15, 16–17, and > 17 years). Elapsed time since course completion was a continuous variable with days as the time unit of measure and was also analyzed as a categorical variable to explore its most appropriate form.

The last classification of independent variables, program characteristics, included three variables, two obtained from the paramedic answer sheet survey (instructor qualifications and program setting) and one from the application (national program accreditation).

There were nine levels of instructor qualifications to choose from (paramedic certificate, registered nurse [RN], associate's degree, bachelor's degree, master's degree, doctorate, medical doctor, other, or unknown) and students were asked to select the one level that described the highest level of education their primary paramedic program educator completed. Students were also asked to select the setting in which their program was based (academy, hospital, vocational–technical, community college, university, or other). Educational programs were classified as either accredited or unaccredited using the same criteria discussed by Dickison et al.[5]

Data Analysis

Descriptive analysis of the outcome and independent variable was performed. Univariate logistic regression was conducted to determine what independent variables were associated with the outcome. Variables significantly associated with the outcome were placed into a logistic regression model. An investigator-controlled backward elimination variable selection process was used to determine the main effects model.[10] Variables were systematically removed from the model, and likelihood ratio tests were conducted to determine if removal of the variable significantly altered the model. An alpha level of 0.05 was used to determine variable significance. Finally, variables that were not initially significant in univariate analysis were added back into the model to assess for the presence of confounding.

Once the preliminary main effects model was produced, all continuous variables were assessed for the presence of linearity. If linearity existed, the model would remain unchanged. However, if the continuous variable did not appear linear in the logit, the proper transformation was applied and model building would be repeated.[10]

Upon completion of the main effects model, plausible interaction terms were included to assess for effect modification. For an interaction variable to remain in the model, likelihood ratio test statistics must have shown a significance of $p \leq 0.01$. Model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test.[10] Finally, model diagnostics were performed to assess for any influential covariate patterns. All data analysis was conducted utilizing Intercooled STATA 9 (STATA Corp., College Station, TX) software.

RESULTS

Between January 1 and December 31, 2002, 7,336 individuals attempted the NREMT paramedic cognitive examination for the first time. Of those, 6,000 (81.2%) individuals completed the survey attached to the paramedic answer sheet. Complete demographic and survey data were available for 5,208 (86.8%) individuals.

There were 3,454 (66.3%) individuals who passed the cognitive examination. The average age of candidates was 31.4 years, and the average elapsed time since course completion (ETCC) was 59 days. After completing the unadjusted analysis of independent variables, there were several student and program characteristics that warranted further discussion: years of education and high school class rank. There were 788 (15.1%) participants who indicated that they had received 16 to 17 years of education with a pass percentage of 80.5%. Of those candidates who indicated they had a high school class rank in the top 10%, 1,187 (22.8%), 77.3% passed the examination. In agreement with Dickison et al., national program accreditation was significantly related to passing the examination. Only 1,054 (20.24%) candidates attended a nationally accredited paramedic program; however 75.1% of those candidates passed the examination. Table 1 describes the frequencies and the univariate relationships between the outcome variable and all independent variables.

There were three variables that were modified before being placed in the final multivariable model. Race was changed to a three level categorical variable (white, African American, other) to create a more parsimonious model. Similarly, age was originally collected as a continuous variable and was later categorized (20–26, 27–35, and 36–68 years) because the variable was determined to not meet the assumption of linearity in its original form. Finally ETCC, originally collected continuously, was also categorized (0–14, 15–26, 27–54, and 55–732 days) because it did not meet the assumption of linearity.

Upon completion of model diagnostics and variable transformations, the final multivariable logistic regression model included nine independent variables. Table 2 provides the beta coefficients, odds ratios (ORs), and 95% confidence intervals (CIs) for all parameters in the final model by variable type and in order of significance. It should be noted that the adjusted ORs in the final model are slightly attenuated. Those variables with the largest measure of effect in the univariate model also had the largest measure of effect in the final multivariable model. Specifically, individuals with 16 to 17 years of education have significantly higher odds of passing the examination than those with 12–13 years of education (OR = 2.01, 95% CI = 1.64 to 2.45). Those reporting a high school class rank in the bottom 10% had significantly lower odds of passing the examination than those in the top 10% (OR = 0.47, 95% CI = 0.29 to 0.77). Finally, candidates attending an accredited paramedic program were 1.46 times more likely to pass the exam (95% CI = 1.26 to 1.74) when compared to those not in an accredited program. Although program setting demonstrated overall significance in univariate analysis, it proved to be insignificant in the final model and was the only independent variable dropped during the model building process. Plausible interaction terms were included during the model building process, yet there were no significant interactions. This model demonstrated good fit when utilizing the Hosmer-Lemeshow goodness-of-fit test ($\chi = 9.68$, $p = 0.29$).

DISCUSSION

Utilizing student and program characteristics, a statistical model was created that could determine the probability of success on the cognitive portion of the national paramedic certification exam. Prior to this study, the use of multivariable modeling to determine the

Table 1
Frequencies and Univariate Relationships Presented in Order of Significance

Variable	N (%)	Pass (%)	Univariate OR (95% CI)
Sample	5,208	0.7	—
Program variables			
Instructor qualification			
Paramedic	892 (17.1)	0.6	1.0
Registered nurse	397 (7.6)	0.7	2.3 (1.7, 2.9)
Associate's degree	458 (8.8)	0.6	1.3 (1.1, 1.7)
Bachelor's degree	924 (17.7)	0.7	1.8 (1.4, 2.1)
Master's degree	705 (13.5)	0.7	2.0 (1.6, 2.4)
Doctorate of philosophy	109 (2.1)	0.8	2.6 (1.6, 4.1)
Medical doctor	64 (1.2)	0.7	1.7 (1.0, 2.9)
Other	105 (2.0)	0.5	0.9 (0.6, 1.4)
Unknown	1,554 (29.8)	0.7	1.5 (1.2, 1.7)
Program accreditation			
No	4,154 (79.8)	0.6	1.0
Yes	1,054 (20.2)	0.8	1.7 (1.5, 2.0)
Program setting			
Academy	297 (5.7)	0.7	1.0
Hospital	843 (16.2)	0.7	1.1 (0.8, 1.4)
Vocational–technical	504 (9.7)	0.6	0.9 (0.7, 1.2)
Community college	2,202 (42.3)	0.7	1.2 (0.9, 1.5)
University	318 (8.8)	0.7	1.2 (0.9, 1.6)
Other	902 (17.3)	0.6	0.9 (0.7, 1.2)
Student variables			
Years of education			
<12	10 (0.2)	0.3	0.3 (0.1, 1.0)
12 to 13	3,139 (60.3)	0.6	1.0
14 to 15	1,178 (22.6)	0.7	1.4 (1.2, 1.6)
16 to 17	788 (15.1)	0.8	2.6 (2.1, 3.1)
>17	93 (1.8)	0.8	2.1 (1.3, 3.5)
Gender			
Female	1,208 (23.2)	0.6	1.0
Male	4,000 (76.8)	0.7	1.2 (1.0, 1.4)
Job requirement			
Yes	800 (15.4)	0.6	1.0
No	4,408 (84.6)	0.7	1.1 (1.0, 1.3)
Race			
White	4,533 (87.0)	0.7	1.0
African American	141 (2.7)	0.4	0.4 (0.3, 0.5)
Other	534 (10.3)	0.7	1.1 (0.9, 1.4)
Age (yr)			
20 to 26	1,532 (29.4)	0.7	0.9 (0.8, 1.0)
27 to 35	2,472 (47.5)	0.7	1.0
36 to 68	1,204 (23.1)	0.6	0.8 (0.7, 1.0)
ETCC (days)			
0–14	1,366 (26.2)	0.7	1.0
15–26	1,327 (25.5)	0.7	1.0 (0.8, 1.2)
27–54	1,214 (23.3)	0.7	0.7 (0.6, 0.8)
55–732	1,301 (25.0)	0.5	0.4 (0.4, 0.5)
High school class rank			
Top 10%	1,187 (22.8)	0.8	1.0
Upper 20%	1,716 (33.0)	0.7	0.6 (0.5, 0.8)
Middle 40%	2,023 (38.8)	0.6	0.4 (0.4, 0.5)
Lower 20%	199 (3.8)	0.5	0.3 (0.2, 0.4)
Bottom 10%	83 (1.6)	0.6	0.5 (0.3, 0.8)

ETCC = elapsed time since course completion; OR = odds ratio; CI = confidence interval.

characteristics associated with passing the paramedic cognitive exam have been limited.[5] Most of the relationships between the independent variables and the outcome have been shown to be significantly related through separate univariate analyses.[2–4] Notably, all independent variables that demonstrated significance in the prior univariate analyses remained in this multivariable model.

This study also expands upon the work completed by Dickison et al.,[5] by including a greater number of variables. Unlike Dickison et al., the model presented in this study was constructed as a probabilistic model rather than a risk factor model. Based on this model there appears to be nine variables that affect the probability of passing the paramedic certification examination. This can be useful to graduates, prospective students, and

Table 2
Beta Coefficients, Odds Ratios (ORs), and 95% Confidence Intervals (CIs) for All Parameters in the Final Model Presented in Order of Significance

Variable	Coefficient*	p-Value	OR (95% CI)
Program variables			
Instructor qualification			
Paramedic	Referent	Referent	1.0
Registered nurse	0.675	<0.001	2.0 (1.5, 2.6)
Associate's degree	0.168	0.18	1.2 (0.9, 1.5)
Bachelor's degree	0.379	<0.001	1.5 (1.2, 1.8)
Master's degree	0.449	<0.001	1.6 (1.3, 2.0)
Doctorate	0.626	0.01	1.9 (1.2, 3.0)
Medical doctor	0.269	0.36	1.3 (0.7, 3.0)
Other	−0.105	0.63	0.9 (0.6, 1.4)
Unknown	0.306	0.001	1.4 (1.1, 1.6)
Program accreditation			
No	Referent	Referent	1.0
Yes	0.390	<0.001	1.5 (1.3, 1.7)
Student variables			
Years of education			
<12	−1.296	0.06	0.3 (0.1, 1.2)
12 to 13	Referent	Referent	1.0
14 to 15	0.277	<0.001	1.3 (1.1, 1.5)
16 to 17	0.697	<0.001	2.0 (1.6, 2.5)
>17	0.677	0.01	2.0 (1.2, 3.3)
Gender			
Female	Referent	Referent	1.0
Male	0.249	0.001	1.3 (1.1, 1.5)
Job requirement			
Yes	Referent	Referent	1.0
No	0.170	0.05	1.2 (1.0, 1.4)
Race			
White	Referent	Referent	1.0
African American	−0.904	<0.001	0.4 (0.3, 0.6)
Other	−0.015	0.89	1.0 (0.8, 1.2)
ETCC (days)			
0–14	Referent	Referent	1.0
15–26	−0.037	0.68	1.0 (0.8, 1.2)
27–54	−0.299	0.001	0.7 (0.6, 0.9)
55–732	−0.843	<0.001	0.4 (0.3, 0.5)
Age (yr)			
20 to 26	−0.167	0.02	0.9 (0.7, 1.0)
27 to 35	Referent	Referent	1.0
36 to 68	−0.199	0.01	0.8 (0.7, 1.0)
High school class rank			
Top 10%	Referent	Referent	1.0
Upper 20%	−0.478	<0.001	0.6 (0.5, 0.7)
Middle 40 %	−0.807	<0.001	0.5 (0.4, 0.6)
Lower 20%	−1.118	<0.001	0.3 (0.2, 0.05)
Bottom 10%	−0.751	0.002	0.5 (0.3, 0.8)

ETCC = elapsed time from course completion.
*Intercept coefficient (β_0) = 0.793.

educators. There were two programmatic characteristics that prospective paramedic students should consider when comparing different programs. There are six student characteristics that may impact a graduate's probability of passing the national paramedic certification exam.

Independent of program and student characteristics, ETCC had a significant effect on the probability of passing the national paramedic certification examination. Graduates maximize their probability of success by taking the exam within 26 days of course completion. The probability of passing the exam continues to decrease as ETCC increased, with a dramatic drop off in performance after Months 1 and 2. Paramedic graduates should be encouraged to take the examination as soon as possible after course completion.

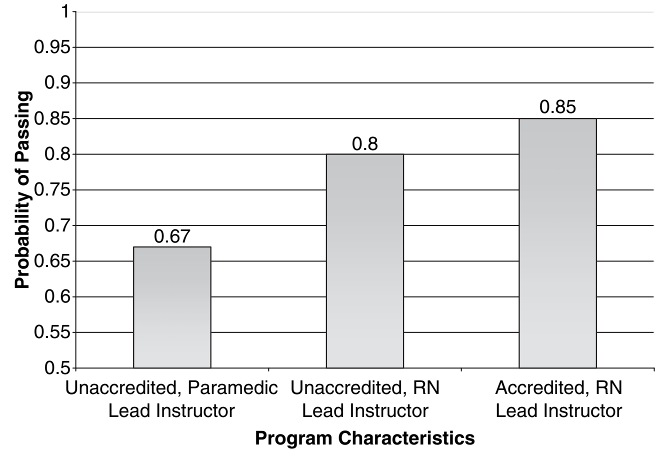

Figure 1. Change in hypothetical student's* probability of passing the paramedic certification exam based on manipulation of program characteristics. *For this example, the hypothetical student represents a 24-year-old, white female, with a high school class rank in the middle 40%, who has completed a bachelor's degree, is not taking the class as a job requirement, and completed the exam within 14 days of course completion. RN = registered nurse.

The results of this study agree with previous work highlighting the importance of national paramedic program accreditation.[5,11] Prospective students should consider the paramedic program accreditation status and the qualifications of the lead instructor when selecting an educational program. A change in either of these variables can increase or decrease a student's probability of passing the exam. This gives students the opportunity to prospectively maximize their potential for success.

Probabilities can be determined by simply summing the intercept coefficient and all relevant beta coefficients shown in Table 2 and then inputting that number into the formula for logistic regression modeling

$$\left(\pi(\chi) = \frac{e^{(\beta 0+\beta 1\times 1\ldots\beta i\times i)}}{1+e^{(\beta 0+\beta 1\times 1\ldots\beta i\times i)}}\right).$$

Figure 1 illustrates how program characteristics can affect a student's probability of passing the paramedic certification exam. Unfortunately, the ideal program presented (an accredited program taught by a RN lead instructor) may not always be an option available to all students, further illustrating the utility of the model for prospective paramedic students.

While students and graduates may have limited options in regard to selection of educational programs, there is an excess of students, each with distinct characteristics, who play a role in success on the national paramedic examination. The student characteristics included in this model, such as high school class rank, highest level of education, age, etc., should be taken into account by program leaders for decisions concerning resource allocation and additional instruction. These characteristics can help identify individuals with lower probabilities of success. As an example, Table 3 includes a hypothetical paramedic class of 10 students

Table 3
Hypothetical Paramedic Class of 10 Students Attending an Unaccredited Paramedic Program with a Lead Instructor Who Has Earned a Bachelor's Degree

Student	Years of Education	High School Class Rank	Race	Gender	Age (yr)	Job Requirement	Probability
1	High school graduate	Top 10%	White	Male	25	Yes	0.78
2	Bachelor's degree	Upper 20%	African American	Male	28	No	0.71
3	Associate's degree	Upper 20%	White	Female	22	No	0.73
4	High school graduate	Middle 40%	White	Male	32	No	0.69
5	Bachelor's degree	Top 10%	White	Male	26	Yes	0.88
6	High school graduate	Bottom 10%	White	Male	30	No	0.70
7	High school graduate	Upper 20%	Asian	Female	21	No	0.66
8	Working on bachelor's degree	Middle 40%	Hispanic	Male	27	No	0.74
9	High school graduate	Middle 40%	White	Female	38	No	0.58
10	High school graduate	Middle 40%	White	Male	50	No	0.64

attending an unaccredited paramedic program with a lead instructor who has earned a bachelor's degree. Table 3 demonstrates how student variables impact the probability of passing the exam. Based on this model, it may be reasonable for the program and instructor to allocate greater attention and/or resources to, and individually matching the traits of Student 1 compared to Student 5. Both Student 1 and Student 5 have the same characteristics, except that Student 5 has a higher level of education prior to admittance into the paramedic program and thus has a higher probability of passing the certification examination.

Students 9 and 10 also offer the opportunity of directly comparing students who vary by one characteristic. From an instructor's standpoint, the effect of gender may not be as obvious as that of educational level. However, when utilizing this model, Student 9 (the female student) has a lower probability of passing the exam. Although this association may not be intuitive, it has been shown to exist in other educational settings.[12–15]

The examples above are some of the simplest between-student comparisons that can be made utilizing this model. This model allows multiple comparisons between theoretical individuals. However, the true utility of this model for educators is that students with the lowest probability of passing the exam, among a diverse population, can be identified.

Diversity in the EMS workforce is an important goal. Results from this analysis suggest that gender and race are associated with a decreased likelihood of passing the cognitive portion of the national paramedic certification exam. Other studies have demonstrated that race is a factor in performance on standardized examinations.[5,16–18] This study supports the need for allocating additional resources to at-risk student groups if diversity in EMS is to be achieved. Allocating appropriate resources to at-risk students is important for the success of current students.[19–21]

This model has utility for program directors, paramedic program instructors, and prospective paramedic students. By achieving national accreditation and hiring highly qualified lead instructors, program directors increase their graduates' probability of passing the national paramedic certification examination. Paramedic program instructors can identify students with lower probabilities of success and allocate appropriate resources to maximize their potential. Finally, prospective paramedic students should seek nationally accredited paramedic programs with highly qualified lead instructors in order to increase their likelihood of success.

LIMITATIONS

Most of the independent variables utilized were obtained through self-report on either a test application or a survey, and the accuracy of this data relies on the recall and honesty of the respondent. There were a number of individuals who were not included in the analysis due to missing survey data. It may be reasonable to believe that these students differ from the study population.

There are many variables that likely play a role in a student's success on the paramedic certification examination that were not taken into account in this analysis, most notably student motivation. It is probable that student motivation may make up for deficits in ability. This may explain the higher odds of passing the exam among those with a high school class rank in the bottom 10% when compared to those with a class rank in the bottom 20%.

Other variables that may impact a student's probability of passing the exam are related to the quality of in-class instruction and other intangible variables, such as teaching style and enthusiasm. In this study, the only variable analyzed that related specifically to the instructor was his/her level of education. This is a crude measure, as there was no separation of clinical and academic credentials. It is possible for a lead instructor to have both academic and clinical credentials. Therefore, there may have been misclassification bias present for this exposure variable (education of the lead instructor). Future efforts should attempt to differentiate instructor qualifications and include other variables that may be linked to success, such as teacher and student motivation.

This study focuses on the interpretation of the presented statistical model. While the probabilities derived from this model may aid in decision-making, the compliment of each probability should also be taken into account, as even the highest probability does not guarantee success on the examination.

CONCLUSIONS

A statistical model was created utilizing student and program characteristics that determined the probability of success on the cognitive portion of the national paramedic certification exam. National program accreditation, lead instructor qualifications, student educational background, and demographics all are significantly associated with the probability of success on the national paramedic certification examination. This model can be used by program directors, paramedic program instructors, and prospective paramedic students to maximize the probability of attaining national paramedic certification.

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