Determining Predictors for Nursing Student Failure:
National Council Licensure Examination

Our Lady of Lourdes Medical Center:
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Abstract: *Our Lady of Lourdes School of Nursing (OLLSN), in order to improve the education of their future nurses, wanted to identify the students who were at risk for failure. The data used were based on students who had already graduated and either passed or failed their National Council Licensure Examination (NCLEX). The goal of the study was to identify the variables that were most predictive of a nursing student's ability to pass or fail the NCLEX. Data collected from May 2007, December 2007, and May 2008 (N=108) included pre-entrance exam scores, cumulative GPA, prerequisite class grades, Nursing class (NSG) grades, and various ATI scores. After statistical analysis of the scores and/or grades between those who passed (N= 100) versus those who failed (N=8), those classes with a statistically significant difference were further analyzed. With only a 7.41% failure rate at OLLSN, the task became to use these statistically significant differences to find a predictor for why these eight students failed.*

METHODOLOGY:

Data were obtained from three classes of nursing school graduates at Our Lady of Lourdes School of Nursing from May 2007, May 2008, and December 2008. Only students with reported NCLEX scores were selected, giving a final sample size of 108 graduates. Of the 108 students, 100 passed the NCLEX, while 8 failed on their first attempt. The dependent variable was the outcome of the NCLEX, as noted by either a pass or fail. The 18 independent variables included the pre-entrance examinations and SAT scores, grades in Anatomy and Physiology, Chemistry, and Microbiology, and overall GPA, and Nursing courses I through IV as well as the standardized tests (ATI) taken during their time at OLLSN. All GPAs and letter grades were based on the scale of 0 to 4 (F=0, A=4).

All data were entered into Microsoft Excel 2003 for statistical analysis. A two sample t-test assuming unequal variances was used to determine statistical significance between each independent variable and the outcome of the NCLEX. The t-test outcomes were examined to determine good predictors of NCLEX results. Percentages were then calculated to determine the probability of passing or failing based on the averages and individual values of the statistically significant independent variables. Correlations between nursing GPA and both the ATI CP and average ATI were also calculated to see if students tended to do well in both class and on standardized tests.

DATA RESULTS and ANALYSIS:

Student statistics drawn from the classes and scores deemed significant are summarized in TABLE 1. That statistics from TABLE 2,3 show a percent comparison to the NCLEX, predicting the probability of failure. Individually the ATI CP was the best predictor of failure (50%), meaning that when a student scored below the average score for failing students, 57.1125, they had a 50% probability of failing the NCLEX. The second best predictors individually were NSG III and ATI II with a 25% probability of predicting failure. A student receiving a grade of a C or below in NSG III had a one in four chance of failing the NCLEX. TABLE 4 contains a correlation between the NSG GPA's and different ATI indicators. The students that passed the NCLEX (N=100) had significantly higher scores and averages across the board then did the students who failed (N=8); this is shown in FIGURE 1,2.

TABLE 1 – Descriptive Statistics of the Significant Variables

Variable	Passing Mean	Passing Stand. Dev.	Failing Mean	Failing Stand. Dev.	P-Value	Deg. Freedom
NSG II	2.79	0.591	2.14	0.378	0.00320	8
ATI II	64.9	8.35	56.1	7.95	0.0402	6
NSG III	2.90	0.541	2.29	0.488	0.0152	7
NSG IV	2.87	0.554	2.38	0.518	0.0335	8
ATI IV	72.1	7.47	67.6	5.01	0.0416	10
ATI CP	66.6	5.93	57.1	3.26	1.49E-05	11

FIGURE 1 – Average Nursing Course Grades for Passing and Failing NCLEX Scores

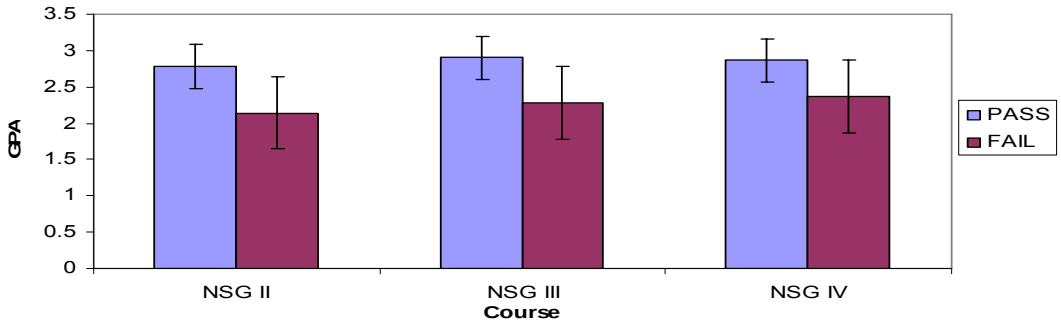

FIGURE 2 – Average ATI Scores for Passing and Failing NCLEX Scores

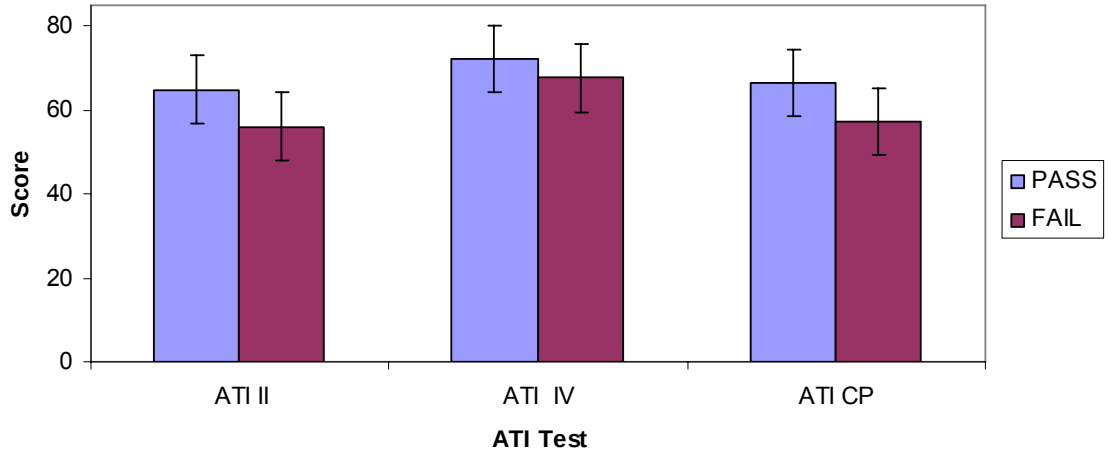

TABLE 2 – Class Scores with Percent Probability of Failure

Class with Score	Percent Probability on NCLEX Failure
C or Below in NSG II	18%
C or Below in NSG III	25%
C or Below in NSG IV	19%
≤56.1 ATI II	25%
≤67.6 ATI IV	13.6%
≤57.1125 ATI CP	50%
Average ATI scores ≤63.35*	13.6%
Average ATI scores ≤61.69**	15.4%

*Median ATI Score for failing students
** Mean ATI score for failing students

TABLE 3 -- Combined NSG Statistics for Predicting Failure

Combined NSG Grades	Percent Probability on NCLEX Failure
C or below in 4 NSG Classes	33.3%
C or below in 3 NSG Classes	23.5%
C or below in 2 NSG Classes	16.1%
An A in 1 or more NSG Class	0.0%

FIGURE 3 – Combined NSG Statistics for Predicting Failure Graph

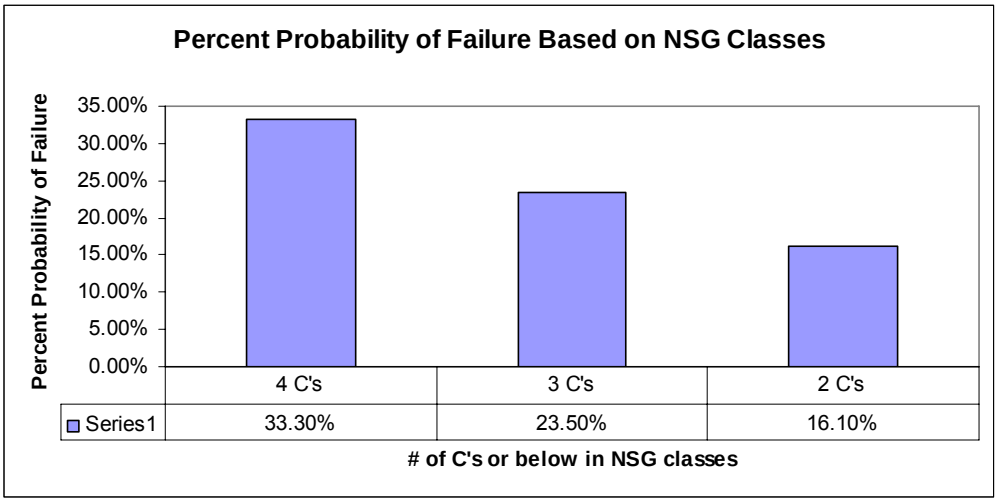

TABLE 4 – Correlation Data

Variables for Comparison	Correlation
NSG GPA vs. ATI avg. for passing students	0.678
NSG GPA vs. ATI avg. for failing students	0.809
NSG GPA vs. ATI CP for passing students	0.616
NSG GPA vs. ATI CP for failing students	0.009
ATI Avg.* Vs. ATI CP for passing students	0.578
ATI Avg.* Vs. ATI CP for failing students	-0.161

*ATI avg. here does not include ATI CP

Out of the 14 common statistical variables that we drew data from, which included preadmission testing, anatomy and physiology I&II, chemistry, microbiology, overall GPA, the NSG classes, and the ATI scores, only 6 of the variables were deemed statistically significant; they were NSG II, III, & IV and ATI II, IV, & CP. It was much

easier to predict passing students then it was to predict those who failed, because many of the failing students were unpredictable. Yet, the ATI CP seemed to separate those who were going to pass the NCLEX from those who were going to fail.

Since the ATI CP, the practice test for the NCLEX, was the most significant variable, correlations were based against it. Correlation data, shown in TABLE 4, relates and scores (range of 1 to -1) two different set of variable to show if one affects another. The NSG classes were averaged and given their own GPA. Since, these classes would have the greatest effect on the ATI scores, correlation values were forged. For the passing students a strong correlation between a good NSG GPA and a good score on the ATI CP was shown with a score of 0.616; yet, the failing students with a correlation value of 0.009 means that there was no correlation between the failing students NSG grades and their ATI CP score. This proved the unpredictability of the failing students; the correlation means that no matter their grades in the NSG classes they were going to do the same on the ATI CP.

A different conclusion was drawn in the correlation between the NSG GPA and the ATI avg. Both the passing students and the failing students showed strong correlations between their grades in class compared to their ATI scores. Meaning, good NSG scores predicted good ATI scores and vice versa.

An interesting correlation compared the ATI avg. (using just ATI I-IV, no CP) versus the ATI CP. Once again the passing students showed a strong correlation, meaning that if they did well on the early ATI tests they would do well on the ATI CP and therefore have a greater probability of passing the NCLEX. The failing students actually showed a negative correlation, which indicated that doing well on the early ATI tests corresponds to doing poorly on the ATI CP. This could show some discrepancy within their preparation for the ATI CP and which ultimately affects their NCLEX.

TABLE 3 along with FIGURE 3 illustrates one of the strongest predictors of failure. All 108 of the students used in this study took the NSG classes. Manually the amount of C’s a student received was counted. A student who received a C in all 4 NSG classes had a one in three chance of failing the NCLEX, a student receiving 3 C’s had a 10% increase in their probability of passing, and a student who received just 2 C’s 17% increase in their probability of passing the NCLEX. Interestingly, a student who received at least one A in their NSG classes had a 100% probability of passing the NCLEX. The data again supported the claim that it is easier to predict a success rather than a failure. Yet, the amount of C’s in the NSG classes are a strong indicator on the success of a student on the NCLEX.

The results of this investigation suggest that while several variables were very accurate in predicting success (grade in NSG, test averages on ATI), they were much less accurate in predicting failure. The most accurate combination was the score on the ATI CP and amount of C’s in the NSG classes; these predicted failures 50 percent of the time.

CONCLUSION

Predicting success or failure on the NCLEX remains an area of interest for nursing schools nation wide. There is no one set way to determine the correlation between a specific variable and a student's performance on the NCLEX. There have been multiple studies that have investigated the possibility of predicting NCLEX success based on a variety of pre-nursing, nursing school, and standardized testing grades. Similar to these other studies, the primary goal of this statistical analysis was to find any correlation between OLLSN students' grades and their performance on the NCLEX. With this data, OLLSN would be able to better monitor their students in order to improve the passing rate of students within the nursing program.

Analysis of the data revealed that predicting passing grades was much easier than predicting failing grades. This was true for a number of reasons, but mainly the sample size was the limiting factor. Only students with reported NCLEX scores were accepted for analysis. Therefore, this limited the data set to only 108 subjects, of which only 8 failed the NCLEX. Any sharp deviation in the failing data set had a dramatic effect on the overall statistics. For example, students who failed the NCLEX tended to have wide deviations in grades. In fact, one student performed well in class and the ATI tests but still failed the NCLEX. As a result, the statistics within the failing group could be skewed by one student. This can be seen with the correlation values found in TABLE 4, as a greater correlation between ATI scores and nursing GPA is evident in those with passing grades (n=100). Nevertheless, there are other factors that also affected the outcome of the analysis. Not all individual class data sets contained the same independent variables. Only similar ones could be selected from each class, which resulted in some students missing data for certain variables. For instance, the May 2008 class had no reported values for the ATI II test, which certainly would have impacted the results from the previous two classes. This again would result in the larger sample size, i.e. the passing grades, containing more accurate results.

In addition to the sample size and missing data, there were other factors that hindered the effectiveness of this investigation. All data was analyzed using Microsoft Excel 2003, a less than accepted tool in the field of statistics. Excel limited the ability to correlate the individual variables with the NCLEX outcome, as it would not accept non-numerical values, such as a pass or fail. Other studies of this type have used powerful statistical software, such as SPSSX Version 11.0, to generate the statistics that they needed. In this study, this was not a large problem as only a minor statistical analysis was necessary. Furthermore, it would be interesting to know the amount of time that students took between taking the ATI CP pre-test and the actual NCLEX. Ultimately, this could have affected the outcome of some students' performances. Other factors that could impact NCLEX results such as the total hours a week a student works while in nursing school, the amount of time spent preparing for the NCLEX, or age would be interesting to study if they could be recorded. Overall, the outcome of this study could be strengthened with the addition of more data as more classes take the NCLEX after attending OLLSN.