Admission Criteria as Predictors of NCLEX-RN Success in Associate Degree Nursing Graduates

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ADMISSION CRITERIA AS PREDICTORS OF NCLEX-RN SUCCESS IN ASSOCIATE DEGREE NURSING GRADUATES

By

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This manuscript is dedicated to my son, Rob.
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ABSTRACT

The current shortage of registered nurses in the United States has been well documented. It is a complex problem with no easy or short-term solutions. In fact, the problem is projected to worsen over the next ten to twenty years as the population ages, requiring more nursing care, and as nurses in the workforce age and retire.

To become registered nurses, students must successfully complete a Diploma, Associate Degree or Baccalaureate Degree program of study. After graduation from the nursing program, the students must pass the National Council Licensure Examination for Registered Nurses (NCLEX-RN) in order to enter the workforce as Registered Nurses.

Schools that prepare students to become registered nurses face a multitude of challenges as they work to fill the need for more nurses. Nursing faculty are currently in short supply and the problem will continue, since the majority of current nursing faculty are nearing retirement age. Classroom and clinical space are also in short supply as nursing programs increase enrollment in an attempt to stem the tide of the growing shortage. It is imperative that nursing programs utilize precious resources to the best advantage of the schools, the students and the communities they serve.

The first step in ensuring that the majority of nursing students eventually enter the workforce as Registered Nurses is the admission process. This retrospective study examined the admission criteria of an Associate Degree Nursing Program in the Southeastern United States to determine if admission factors for students who were successful on the NCLEX-RN examination differed from admission factors for students who were not successful. Two graduating classes (n = 77) were available for this study.

Findings from this study indicated that students with higher reading scores on a standardized nurse entrance examination were more likely to pass the NCLEX-RN. Students with a score of 70.8% and higher had a 68% chance of passing the NCLEX-RN on the first attempt as compared with a 32% pass rate for students with a score of 63.4% or lower on the reading portion of the nurse entrance examination. In addition to the reading scores, the number of attempts at prerequisite courses affected student NCLEX-RN success. Eighty percent of
students who passed all prerequisite courses with no repeat attempts passed the NCLEX-RN on the first attempt. With one repeat on any of the nine required courses the rate of passing fell to 58%.

This study indicated that admission factors may contribute to NCLEX-RN success after graduation from a nursing education program. Because of the relatively small sample size and the use of a single ADN program, further research is warranted to determine if the results can be replicated and if these findings will generalize to other nursing programs.
CHAPTER 1
INTRODUCTION

One of the unique aspects of schools that prepare students to become registered nurses (RN) is that graduates must take and pass the National Council Licensure Examination for Registered Nurses (NCLEX-RN) after graduation. It is critical to any nursing program that the admission requirements be appropriate for the program so that the best qualified students are considered. Theoretically, these highly qualified students would have the best chance of success on the NCLEX-RN. The purpose of this study is to determine if the admission and demographic variables of graduates of an Associate Degree Nursing program who pass the NCLEX-RN differ from those who do not pass the exam.

Statement of the Problem

The current nursing shortage is well documented and due to various factors. Although the nursing shortage has been under discussion for decades, the current shortage is described by many sources as being different from those of the past in scope and cause. The “graying of America” and the increasing health care needs of an older population is one factor. According to the Task Force on the Future of the Health Care Labor Forces, by the year 2030 the fraction of the United States (U.S.) population over sixty-five years of age will increase from 13 percent to 20 percent and it is projected that a total of three million nurses will be needed (Martin, 2001).

In addition to the aging of the general population, the nursing population itself is aging. The average age of registered nurses in the U.S. today is forty-five and, as more nurses retire without new graduates to fill the gap, the nursing shortage will be further exacerbated. Although enrollment in nursing programs is on the rise, the American Association of Colleges of Nursing (AACN) estimates that there are more than 11,000 qualified nursing school applicants who are turned away every year due to limited classroom and clinical space (AACN, 2005). There is also a current shortage of nursing faculty. The median age of full-time nursing faculty is fifty-one years (Wolf, Dunbar-Jacob, Greenhouse, 2006). The problem will be further compounded as faculty members retire if younger nursing instructors do not join the workforce.
Significance of the Problem

Because of the increasing need for nurses and the limited resources of nursing schools, it is essential that graduates of nursing programs be successfully able to enter the workforce by passing the NCLEX-RN in a timely fashion following graduation. One factor that plays a significant role in assuring a successful pool of potential nursing employees is the appropriate screening of applicants for potential admission to nursing programs. In order to admit students with the greatest chance of success, it is imperative that the admission criteria incorporate factors that relate to success in the program and with passing the licensure examination.

Research Questions

The overall research question explored in this study is, “Do the admission and demographic variables of graduates of an Associate Degree Nursing program who pass the NCLEX-RN differ from those who do not?” In this study, the following research questions will be addressed:

1. Are there differences between the demographic makeup of the two groups, namely, those who passed the NCLEX-RN on the first attempt and those who did not?
2. Are there differences in student status between the group that passed the NCLEX-RN on the first attempt and those who did not?
3. Are there differences in test scores between the group that passed the NCLEX-RN on the first attempt and the group who did not?
4. Are there differences in academic achievement between the group that passed the NCLEX-RN on the first attempt and the group that did not?

The licensure examination of interest for this study has been developed by the National Council of State Boards of Nursing, Inc. (NCSBN). The NCLEX-RN is used by State Boards of Nursing to assist in making licensure decisions. The purpose of licensure of new graduates is to protect the public safety by ensuring safe practice skills of newly licensed entry-level personnel.

Definition of Terms

The following terms were defined for this study:

NCLEX-RN was defined as the National Council Licensure Examination for Registered Nurses developed by the National Council of State Boards of Nursing to
provide an organization through which boards of nursing act together on matters of common interest affecting the public safety (NCSBN, 2004).

Graduate was defined as one who is eligible to sit for the NCLEX-RN by virtue of having successfully completed the program of study at a southeastern community college, and earned the Associate of Science Degree, Nursing.

Success was defined as achieving a pass score the NCLEX-RN on the first attempt as reported by the Florida State Board of Nursing.

Identifiable admission variables were those criteria that are available at admission to an Associate Degree Nursing program as recorded on student transcripts. These included:

Demographic variables are gender, age, race and county of residence.

Student status is defined as type of diploma and type of admission. Type of diploma was defined as high school diploma or General Education Diploma (GED). Type of admission was defined as early admission or dual high school/college enrollment, transfer from another college or university, first time in college student or returning student, level of highest college degree earned and prior licensure as a Practical Nurse.

Test scores are percentile grades on standardized state-wide college placement tests, Scholastic Aptitude Test (SAT) scores, and the Educational Resources, Inc. Nurse Entrance Test (ERI NET).

Academic achievement is defined as grade point average (GPA) on the best grades achieved on thirteen hours of prerequisite courses, completion of microbiology prior to admission to the nursing program and number of repeat attempts on prerequisite courses.

**Theoretical Framework**

Patricia Benner is a nursing theorist with a rich background in research and clinical practice. She believes that the clinical area offers a unique opportunity for the development of nursing knowledge. She asserts that clinical knowledge and skills acquisition had not been well documented (Tomey & Alligood, 2002). Benner adapted the Dreyfus Model of Skills Acquisition to nursing practice and developed her Theory of Novice to Expert. Benner states that not all of the elements of clinical decision making can be identified by theoretical or analytical strategies. Through observation and
interpretive description of actual nursing practice, she describes the embedded knowledge that nurses use to provide patient care. In *From Novice to Expert: Excellence and Power in Clinical Nursing Practice* (1984), Benner describes seven Domains of Nursing Care: The Helping Role; The Teaching-Coaching Function; The Diagnostic and Patient Monitoring Function; Effective Management of Rapidly Changing Situations; Administering and Monitoring Therapeutic Interventions and Regimes; Monitoring and Ensuring the Quality of Health Care Practices and Organizational and Work Role Competencies. Although not in use at the time of Benner’s writing, these seven domains are similar to the Categories of Client Needs utilized by the National Council of State Boards of Nursing (NCSBN) on the NCLEX-RN today. The four categories of Client Needs and their subsets are: Safe and Effective Care Environment, which is further subdivided into Management of Care and Safety, and Infection Control; Health Promotion and Maintenance; Psychological Integrity; and Physiological Integrity. Physiological Integrity is further subdivided into four subcategories: Basic Care and Comfort, Pharmacological and Parenteral Therapies, Reduction of Risk Potential, and Physiological Adaptation. Not unlike Benner’s method, these categories were developed by surveying recently licensed registered nurses regarding the clinical skills utilized during the first six months of employment. Although the terminology is different, Benner’s seven domains are nurse centered, focusing on nursing actions and roles, and the NCLEX-RN categories are client centered, focusing on client needs. Most of the skills described in each set relate to common goals.

For example, the first category of client needs described by the NCLEX-RN 2007 Test Plan is Safe and Effective Care Environment which includes the sub-categories of Management of Care and Safety and Infection Control. Some of the related content includes advocacy, collaboration with interdisciplinary team, delegation, establishing priorities and resource management. These activities correspond to the nursing actions described by Benner’s seventh domain; Organizational and Work-Role Competencies. Nursing actions in this domain include building a therapeutic team (collaboration), coping with staffing shortages (advocating for the client, setting priorities, delegation), and contingency planning for increased workload (resource management). The NCLEX-RN category of Psychosocial Integrity states “the nurse provides and directs nursing care that promotes and supports the emotional, mental and social well-being of the client and
family/significant others experiencing stressful events, as well as clients with acute or chronic mental illness” (p. 5). Under the domain of the Helping Role, some of the nursing actions listed by Benner include: the healing relationship, providing comfort and communication through touch, providing emotional and informational support to patients’ families, and guiding a patient through emotional and developmental change. Similar comparisons can be made among each of Benner’s seven domains and the NCLEX-RN categories.

Assumptions
For this study, the following assumptions were made:
1. The transcripts used in this study accurately reflect student information.
2. The transcripts were correctly redacted and coded.
3. All students whose records were included in the study received communication informing them of the study and the data that would be utilized for the study.
4. The college where the study took place has an interest in knowing about the relationship between admission criteria and student success on the NCLEX-RN.

Limitations
Limitations of this study are the relatively small convenience sample of students in an Associate Degree Nursing Program (ADN) at a community college in the southeastern United States. Results may not be generalizable to other programs. Limitations concerning the analysis of data will be discussed in Chapter 5.

Summary
The current nursing shortage is unlike shortages of the past and is expected to persist for many reasons. The shortage of nurses will impact health care in the United States as the population ages and demands on the system increase. It is imperative that the majority of graduates from nursing programs successfully pass the licensure examination and then enter the workforce as Registered Nurses.

The purpose of this study was to examine one aspect of the nursing shortage, namely, the entrance of newly graduated nurses into the workforce and more specifically the factors present at admission that may contribute to NCLEX-RN success.
This chapter described the problem and the significance of the problem. The research questions are stated and the operational terms are defined. The foundation of the study, the theoretical framework based on Patricia Benner’s Theory of Novice to Expert for nurses, was described. Assumptions made for this study were delineated and limitations were addressed.
CHAPTER 2
REVIEW OF LITERATURE

This chapter provides a review of literature related to the current nursing shortage in the United States, factors that impact student success in nursing programs, and the discussion of the licensure examination and student success on the licensure examination. The relationship to Patricia Benner’s Theory of Novice to Expert is discussed.

Nursing Shortage

According to Nevidjon & Erickson (2001), the current nursing shortage in the United States is different from past shortages and will require novel strategies to deal with the problem. Some of the contributing factors remain the same as in the past, such as greater employment opportunities and career choices for women. Although more men have been entering the field of nursing, females continue to dominate the field, making up 90% of the registered nurses in the United States (Buerhaus, Staiger & Auerback, 2000). In a report prepared by White and Miller, The Florida Center for Nursing reported in 2003 that “there is general agreement that the current shortage is different from the past due to a variety of factors and is either insufficient numbers or a misdistribution of nurses with inadequate skills and experiences with an imbalance of supply and demand” (p. 5).

Trends in health care and in the labor force generally indicate an ongoing and worsening problem. Health care trends that impact the shortage include decreased hospital stays, resulting in more acutely ill patients in hospitals and increasing numbers of those requiring home care. Factors within the labor force include the aging of nurses and nurse educators. It is predicted that forty percent of all nurses will be over 50 years of age by the year 2010. Shortages in ancillary and support labor personnel compound the problem.

In 1998, Buerhaus wrote of another looming shortage of registered nurses. He notes that after 1985, the average age of registered nurses began increasing dramatically. In fact, between 1984 and 1994 the proportion of RNs older than 35 years of age increased more than the proportion of workers over 35 in all other occupations. According to Buerhaus (1998), nurses who are older than 45 years of age work an average of 153 to 243 fewer hours annually than their counterparts who are younger than
25 years of age. In an article on the effects of retirement on the nursing workforce, Minnick (2000) states that a large cohort of “baby boomer” nurses born between 1948 and 1959 will start reaching prime retirement years in 2010. Buerhaus et al., in the Journal of the American Medical Association (JAMA), (2000), writes about the implications of aging registered nurses. He predicted the number of RNs per capita working full time would peak in 2007 and fall 20 percent below the required number by 2020.

Further compounding the shortage of nurses is the fact that, as older nurses reach retirement, there are fewer younger nurses entering the work force. The U.S. Department of Health & Human Services raises concerns over the declining general population of those eighteen to thirty years old and thus the ability to attract sufficient numbers of younger health care workers. Letvak (2002) suggests more attention should be focused on retention of older nurses since one in five nurses plan to leave the profession within the next five years. Buerhaus et al. (2000) additionally notes that two-year associate degree nursing programs seem to attract more second-career students in their mid to late thirties. Fifty-nine percent of entry-level graduates come from associate degree programs.

Buerhaus et al. also note factors that will place a greater demand on registered nurses and the health care system. The U.S. population as a whole is not only growing, but the proportion of older people is growing as well. According to the Nursing Institute, University of Illinois (Martin, 2001), the population in the United States over age sixty-five will increase from thirteen percent to twenty percent by the year 2030. People with chronic illnesses such as diabetes, hypertension and those infected with Human Immunodeficiency Virus (HIV) are living longer. Morbidity rates associated with obesity and abuse of tobacco, alcohol and drugs further increase the proportion of the population and the number of people requiring health care.

**Nursing Program Success**

In June of 2002, the California Community College Associate Degree Nursing (ADN) Programs Center for Student Success released its report on the Model Prerequisites Validation Study. This study was conducted in response to the growing concern of health care providers in California about the lack of qualified Registered Nurses. Although acknowledging that many contributing factors are beyond the control
of community colleges, the report notes that many ADN faculty believe that the high attrition rate among nursing students is one key factor. This study sought measures to be used in the student selection process that would improve program success. This was a longitudinal study following a five-year cohort of students from twenty consortium colleges in California. The variables examined in the study were divided into three categories, Dispositional, Institutional and Program Selection. Dispositional factors included grade point average (GPA) in specific prerequisite courses as well as college-wide GPA, the number of college terms completed, the number of repetitions of courses and background demographic factors. Institutional factors focused on prerequisite requirements of the colleges. These were the number of prerequisite courses, minimum required GPA, and the specific courses required by each program. Program Selection Variables included selection method (whether students were ranked by a point system or were chosen by lottery once minimum requirements had been met). Other admission criteria of several colleges included the number of allowed course repetitions, whether the college conducted interviews, required community service, or gave additional points for the number of times students had applied to the program. The results of the study with regard to program completion and demographic factors found females to be “somewhat more successful” than males (79% vs. 78%), and whites to be “most successful” (84%) in comparison with Hispanics (75%) and African Americans (57%). Under the category Institutional Factors, reading and chemistry grades were found to be most closely associated with program completion, followed by overall GPA and number of repetitions. For example, for a student with a college GPA of 2.0, and grades in Core Biology and English of 2.0 with no repetitions, the probability of program completion was 61%. With one repetition, the probability fell to 36% (Phillips, Spurling, & Armstrong, 2002).

Potolsky, Cohen and Saylor (2003) evaluated two factors relating to academic performance and the attrition rate for first semester nursing students. These factors were grades on prerequisite science courses and whether or not the students had attended optional, open tutorial sessions. Academic performance on the science courses was found to correlate significantly with nursing school performance in the first year. Specifically, a high positive correlation \(r = .77, p = .01\) was found between the average science course grade and the mean Pathophysiology grade, and a moderate correlation
(r = .60, p = .01) was found between the mean science course grades and the mean Pharmacology grades. The mean Pathophysiology grades and the mean Pharmacology grades were compared using t-tests between two groups of students, those attending four or fewer tutoring sessions and those attending five or more. The results related to the tutoring sessions were not statistically significant (p = .884 and p = .814, respectively). Demographic and background information on the participants was not included in this study.

**Licensure Examination**

Simply educating more nurses is not the solution to increasing numbers of nurses in the workforce. In addition to completion of a nursing program, graduates must pass a qualifying examination for licensure before they are able to practice. It is essential that the great preponderance of nursing graduates pass the NCLEX-RN in order to alleviate the nursing shortage.

The National Council of State Boards of Nursing (NCSBN) is an organization through which Boards of Nursing act together in matters of common interest, including the development of licensing examinations in nursing (NCSBN, 2004). Each jurisdiction in the United States requires candidates for licensure to pass an examination that measures the competencies needed to perform safely as an entry-level registered nurse.

Smith (2002) notes that the Council performs a practice analysis every three years to validate the content of the NCLEX-RN. The process for the 2005 practice analysis as reported by the NCSBN (www.ncsbn.org) included a panel of ten registered nurses, all of whom worked with or supervised registered nurses in the first six months of practice. This panel approved the categorical structure of the practice activities of new nurses. A survey was then developed that included practice activities, past activities and demographic information. This information is used to assist the NCSBN to evaluate the validity of the examination and guide content distribution for future examinations. The framework of Client Needs, composed of four major categories and their subsets, is utilized for the exam. As described in chapter one, the categories are Safe and Effective Care Environment, which is further subdivided into the four subcategories of Management of Care and Safety and Infection Control; Health Promotion and Maintenance; Psychological Integrity; and Physiological Integrity. Physiological Integrity is further subdivided into four subcategories: Basic Care and Comfort,
Pharmacological and Parenteral Therapies, Reduction of Risk Potential, and Physiological Adaptation. The respondents reported spending the most time in client care in the following categories: pharmacologic and parenteral therapy (16%), basic care and comfort (14%), safety and infection control (13%) and physiological adaptation (13%) (www.ncsbn.org).

The categories of client needs are similar to Benner’s domains of nursing practice and nursing competencies. Benner’s theory also supports the current NCSBN practice of validating the NCLEX-RN by surveying the practice of new RNs. Benner states that the domains and categories she describes were derived from nurses’ own descriptions of patient care episodes. “The strength of this method lies in identifying competencies from actual practice situations rather than having experts generate competencies from models or hypothetical situations” (p.44).

Schools of nursing must keep abreast of factors that may impact success on the examination in order to turn out graduates who are able to enter the nursing workforce. According to Wendt (2003), changes that followed the last practice analysis include items to test higher levels of cognitive ability. As a result, many items are written to test the synthesis level of cognitive processing. Changes to the examination may impact nursing curricula as well as admission criteria. In order for students to successfully pass the NCLEX-RN and enter the workforce, they need not only to be well prepared for the practice setting they are about to enter, they must also be able to convey that ability by examination whether it be pencil and paper or computer based. Educators, to prepare students, must keep abreast of current entry-level nursing practice and changes to the NCLEX-RN. Students must not only know and understand the material required in the nursing program, they must be prepared by the end of the program to synthesize the information and utilize it to solve problems and apply it to new situations. Ideally, students would have testing opportunities similar to the NCLEX-RN before they sit for that examination.

**Licensure Examination Success**

Many studies have attempted to identify factors that influence or predict success on the NCLEX-RN. Variables of interest have focused on admission requirements, program variables and the use of standardized tests. Standardized examinations have been developed by the National League for Nursing (NLN), Educational Resources, Inc.
(ERI) and Health Education Systems, Inc. (HESI). Many schools use these as part of the entrance requirements. In addition, ERI and HESI have standardized exit examinations that are utilized by many schools.

Yin and Burger (2003) studied admission variables that correlate with success in passing the NCLEX-RN examination in Associate Degree nursing students. In addition to demographic data, information was collected from academic records regarding grade point average (GPA) for high school and prerequisite college courses, GPA for non-nursing courses, and the number of college credit hours completed prior to entering the nursing program. College GPA was found to be the most important predictor of student success ($r = 0.15, p < 0.01$). “In addition, the overall GPA of natural science courses and the grade on introductory psychology also correlated significantly to the outcome” (p. 233).

Crow et al. (2004) studied program requirements and educational interventions that might correlate with NCLEX-RN success for students in Bachelor of Science in Nursing (BSN) programs. They also hoped to determine the best predictors of NCLEX-RN success utilized by BSN programs. Responses from 160 BSN programs were gathered for this national study. The study found that two admission criteria correlated significantly: standardized entrance examinations ($\chi^2 [1, n = 12] = 11.11; p = .00$) and SAT scores ($r = -0.4, p = .03, n = 34$). The National League for Nursing (NLN) examination was used by the majority of programs responding. Interestingly, the SAT score had an inverse relationship; the higher the SAT score required by the program, the lower the passing rate for that program. The authors were unable to explain this finding and report that it is not consistent with other studies. Because the data were collected by institution and not by individual students, the researchers were not able to examine other variables that might have explained this finding. This was also the case with demographic variables. The only demographic variable with significant correlation was race. The percentage of white students ($n = 143$) had a positive correlation ($r = .19, p = .02$) with NCLEX-RN success, while the proportion of Hispanic students ($n = 105$) had a negative correlation ($r = -.25, p = .01$). As with the SAT scores, the researchers were unable to determine whether individual differences of non-academic variables, such as English as a second language, hours worked or family demands, may have had a negative impact.
In addition to admission criteria and program variables, Reising (2003) studied the use of computerized testing, similar to the NCLEX testing format used in a BSN program at the author’s school of nursing. The study looked at two groups of students: Those who had been exposed to computerized testing during the nursing program and those who had not. The study, using chi-square analysis, found no significant differences between groups exposed to computer testing and those who were not, although the author reports intervening variables that may have clouded the results. During the time of data collection for this study, the NCSBN continued to refine the computer-based test and increased the passing standard for the exam.

Several other studies have attempted to identify whether nursing entrance examinations are predictive of program and NCLEX-RN success. Uyehara, Magnussen, Itano and Zhang (2007), in a study at the University of Hawaii, looked at predmission, within program and end of program variables with respect to program and NCLEX-RN success. A total of 280 students were included in the sample. Program success was defined as successful program completion within one semester of the expected graduation date. NCLEX-RN success was defined as passing the examination on the first attempt. The predmission data were collected on prerequisite GPA, cumulative GPA, and National League for Nursing (NLN) pre-nursing verbal, math, science, and composite scores and ethnicity. No significant correlations were found between predmission variables and NCLEX-RN success. Information on GPA and test scores was not reported. The demographic makeup of the sample was female 82.2% (n = 230), male 17.8% (n = 50), age range 20-47 years with a mean age of 24.63. The largest ethnic group was Filipino 31.43% (n = 88), followed by Japanese 20.0% (n = 56) and Caucasian 17.5% (n = 49). Hispanic students comprised 1.43% (n = 4) and African Americans 0.71% (n = 2) of the sample.

In 2006 Ellis reported on the use of the Educational Resources, Inc. (ERI) Nurse Entrance Test (NET) as a predictor of student retention through Level I nursing classes in a diploma program. According to the ERI NET Technical Report (2003), critical and analytical thinking are required for competent nursing practice. The ERI NET Critical Thinking Appraisal is designed to test the ability to “define the problem, select pertinent information for problem solution, recognize stated and unstated assumptions, formulate or select relevant and promising hypotheses, draw valid conclusions and judge validity of
inferences” (p. 31). The focus of Ellis’ study was the critical thinking portion of the ERI NET. Admission criteria for the first group of students included in this study consisted of a grade of “C” or better on prerequisite courses, a minimum GPA of 2.7, a composite score on the NET of at least 50 percent and an average of 50 percent on the critical thinking appraisal portion of the test. For the second group of students, the only change to the admission criteria was an increase in the standard for the NET. Students in Group 2 were required to score 50 percent or more on each portion of the critical thinking appraisal of the NET rather than an average of 50 percent as required for the first group. The results of this study showed that a significantly higher proportion of students was retained from Group 2 as compared with Group 1 ($\chi^2 = 6.488, df = 1, n = 137, p = .011$). Description of the demographic makeup of the two groups included only gender and marital status. Significant demographic differences were not reported.

Sayles, Shelton and Powell (2003) reported on the use of ERI NET and PreRN Examination as predictors of NCLEX-RN success in an Associate Degree Nursing Program. Data were collected on 68 students of one graduating class who passed the NCLEX-RN on the first attempt. Demographic data included gender, ethnicity and previous experience in the health care field. ERI NET and PreRN Examination scores were collected along with GPA, grades in nursing courses and number of repeated nursing courses. Variables found to be significant at the .05 level were ethnicity ($r = 0.263$), GPA on nursing courses ($r = 0.285$), the NET math ($r = 0.311$), reading ($r = 0.351$), composite score ($r = 0.405$) and the PreRN composite score ($r = 0.383$). The authors report that “minority students were less likely than their white counterparts to pass the NCLEX-RN” (p 119). The authors concluded that “as test scores improved, so did the likelihood of passing the NCLEX-RN” (p. 119). Numeric grades were not reported.

Several studies examined the use of standardized testing and student academic progression. Morrison, Free and Newman (2002), Newman, Britt and Lauchner (2000), and Nibert and Young (2003), all compared the accuracy of the HESI Exit Examination ($E^2$) in predicting NCLEX-RN success after graduation. All the authors reported a high degree of correlation with the HESI test scores and success on the NCLEX-RN examination.
Morrison et al. (2002) studied seven nursing programs at five schools of nursing that utilized the E² in their progression policy. Each program withheld graduation or permission to sit for the NCLEX-RN until a designated minimum score, set by the individual program, was met. The minimum scores were not reported. Chi-square analysis revealed the NCLEX-RN pass rates for the programs increased significantly for six of the seven programs after the progression policies were implemented: five schools at the .001 level and one at the .05 level.

Newman et al. (2000) studied the predictive value of the HESI E² and NCLEX-RN success. The sample included students from schools of nursing that had purchased the E² during the 1997-1998 academic year. The study included Diploma, ADN, BSN and Practical Nurse (PN) students. The results of that study showed that for RN students in the 90-99% range for NCLEX-RN success, the E² examination was 96.36% accurate in predicting success. For RN students in the low scoring range of 69% and lower, the E² was 44.32% accurate in predicting those students who would not be successful. In a follow-up study to Newman’s, Nibert and Young (2001) found the HESI E² to be 97.64% accurate in predicting NCLEX-RN success for RN students. Significant differences between Diploma, ADN, BSN and PN students were not found.

Daley, Kirkpatrick, Frazier, Chung, and Moser (2003) evaluated the value of the Mosby Assess Test and the HESI examination for prediction of NCLEX-RN success. In this case the HESI E² provided greater sensitivity than the Mosby Assess Test. Sensitivity was defined as the percentage of those predicted to fail the NCLEX-RN compared to the percentage of those who actually failed. The Mosby Assess Test (n = 121) was 85% accurate in its prediction while the HESI E² (n = 80) was 100% accurate in predicting students who would not be successful on the NCLEX-RN.

HESI, now a part of the Elsevier Publishing Company’s Evolve Reach, has also developed an admission exam: the Evolve Reach Admission Assessment or A². The test has been in use for five years. No published studies were found regarding use of the HESI A². Evolve Reach reports that two studies have been submitted for publication. The first study is the Use of the HESI A² to Predict Student Success. The abstract provided by Elsevier Review & Testing (personal communication 6/20/2007) describes this study of 68 ADN students and 69 BSN students who took the exam after admission to the nursing programs. The focus of the study was to identify academic weaknesses for
remediation. The study found the HESI A² accurately predicted student success in the nursing programs and could be used as part of the admission criteria; however, further study is needed.

The second unpublished study provided by Elsevier Review & Testing examined the relationship among HESI exam scores: the HESI A², the Mid-Curricular Exam (MC) and the HESI E². Two ADN programs were included with a total of 139 students. The results of the study showed the A² reading comprehension scores were significantly related to the E² scores ($p = .05$) and the E² score was 94.55% accurate in predicting NCLEX-RN success (personal communication 6/20/2007).

**Summary**

A review of the literature clearly indicates agreement among researchers and educators that the current nursing shortage is different from shortages of the past. It is multi-factored and will be deep and ongoing (Buerhaus, 1998; Florida Center for Nursing, 2003).

Factors that influence or predict NCLEX-RN success are of great interest to nurse educators. Many studies have attempted to identify preadmission and program variables that correlate with NCLEX-RN success with varying degrees of consistency. Yin and Burger (2003) found college GPA to be the most important factor. Crow *et al.* (2004) found nurse entrance examinations to be the best predictor of success. Uyehara *et al.* (2007) found no significant correlations between preadmission variables and NCLEX-RN success. Ellis (2006) found the Critical Thinking Appraisal portion of the ERI NET to be a predictor of student success through Level I nursing courses. Sayles *et al.* found ERI NET and PreRN scores to correlate positively with NCLEX-RN success. Daley *et al.* (2003), Morrison *et al.* (2002), Newman *et al.* (2000), Nibert *et al.* (2003) and Reising (2003) have studied the HESI E² and found a high degree of correlation between HESI test scores and NCLEX-RN success.

Studies also reported different results with regard to demographic information. Phillips *et al.* studied ADN programs in California and found females slightly more successful than males and whites more successful than Hispanics and African Americans. Crow *et al.* found BSN programs with higher percentages of whites had higher pass rates than programs with higher percentages of Hispanics. Uyehara *et al.* found no difference between ethnic groups in their largely Filipino and Japanese population. Sayles *et al.*
reported that white students were more likely than minority students to succeed at the NCLEX-RN.

This study further examined admission criteria and preadmission variables with respect to student success on NCLEX-RN and will ultimately add to the body of nursing knowledge.
CHAPTER 3
METHODOLOGY

This chapter describes the methodology applied to the study. The design, setting, sample, protection of human subjects, data collection, instrumentation and data analysis are discussed.

Design

This was a retrospective study utilizing academic transcripts and NCLEX-RN examination scores (pass/fail). A retrospective study is defined as one in which the researcher is interested in a present outcome and attempts to correlate the outcome with factors that have preceded it (Polit & Beck, 2004). The design is appropriate for this study because the present outcome of interest is a score of passing on the NCLEX-RN. The researcher attempted to identify the preceding factors of admission variables to an ADN program. Demographic and academic variables were gathered and compared to NCLEX-RN scores. Demographic data included gender, age, race and county of residence. Because the community college is charged with meeting the needs of its service area, county of residence is considered during the admissions selection process. Academic variables were high school status (diploma, GED, date awarded and name of high school); college student status [first time in college (FTIC), early admission/dual enrolled, returning student, transfer and award of a previous college degree]; scores on standardized tests (SAT/ACT and college placement tests); and Educational Resources Incorporated (ERI) scores and grades on prerequisite courses. Variables were examined for differences between the pass and fail groups.

Setting

The study took place at a community college in the Southeastern United States offering an Associate Degree in Nursing. The community college admits ninety students per year in a traditional full-time on campus day program.

Sample

The population for this study was all graduates of a single associate degree nursing program. A convenience sample of the graduates (n=77) who met the criteria for participation was obtained. These were from the graduating classes of April 2005, and December 2005.
Protection of Human Subjects

Permission was obtained from the Florida State University Institutional Review Board (IRB) and from the IRB of the participating community college. A copy of the application approval is in Appendix A. The research involved the collection and study of existing data, documents and records. Minimal risk to subjects was anticipated. Protection of the students’ privacy was preserved by appropriately coding the NCLEX-RN examination scores and the corresponding college transcripts. Letters were sent by the college to each graduate informing them of the study and instructing them to contact the Health Care Professions office if they did not wish to have their information included in the study. A copy of the letter is included in Appendix B. One student indicated they wished to be excluded from the study. Identifying information is stored separately in a locked file in the office of the participating Community College Nursing Program. Data collected are stored in a locked file in the office of the researcher.

Data Collection and Instrumentation

Data were collected by examining student transcripts for variables of interest. NCLEX-RN results as reported by the Florida State Board of Nursing were redacted and supplied to the researcher by the participating college. Appendix C contains the data collection tool that was developed by the researcher.

Analysis

Four research questions were formulated for this study. Statistical analysis was done using SPSS. The analytical design for each question is presented.

Research Question 1 addresses the demographic characteristics of the two groups: those who were successful on the NCLEX-RN on the first attempt and those who were not. Descriptive statistics were utilized to summarize characteristics of the sample. Frequency tables were used to identify characteristics of the sample. Crosstabulations were performed to identify characteristics of individuals who were successful and those who were not.

Research Question 2 compared student status between the groups. Type of high school diploma, college admission status, highest level of prior college degree and prior licensure as a Practical Nurse were compared using descriptive statistics. Crosstabulations were used to determine whether there were significant differences between the groups.
Research question 3 examined differences of scores on standardized tests between the two groups. These data were reported as percentile grades and was analyzed using t-test for equality of the means.

Research question 4 compared the academic achievement of the groups. This data included grade point average on a 4.0 scale, completion of microbiology prior to entering the nursing program and the number of attempts on prerequisite courses for each student. Crosstabulation analysis was used for the nominal data. The ratio data were analyzed using t-test.

Results of the analyses will be discussed in Chapter 4.

Summary

The purpose of this study was to describe the differences in admission factors between those nursing graduates who were successful on the NCLEX-RN on the first attempt and those who were not. This chapter described the methodology applied to each research question of this study.
CHAPTER 4
RESULTS

This chapter discusses the findings of this study. Both descriptive and inferential
statistics were utilized depending on the nature of the data collected and the
appropriateness to the research question and to the purpose of the study.

Description of the Sample

Demographic Characteristics

Research Question 1: This question inquired about the differences between the
demographic makeup of the two groups, namely, those who passed the NCLEX-RN on
the first attempt and those who did not. Variables of interest were gender, age, race and
county of residence. The sample consisted of all graduates of the Spring 2005 and Fall
2005 classes from a community college in the Southeastern United States. The study
sample (n = 77) was made up of 92.2% females (n = 71) and 7.8% males (n = 6). The
females were 68.8% Caucasian (n = 53), 18.2% African American (n = 14), 2.6% Asian
(n = 2), 1.3% Hispanic (n = 1) and 1.3% Native American (n = 1). The six males were
Caucasian. The age range of the persons in the sample was 19 years to 54 years with a
mean age of 31.3 years.

County of residence was included in the study, since applicants from the college’s
three-county service area are given an additional point towards acceptance to the
program. The majority, 68.8% (n = 53), were from the county of the college. Eight
(10.4%) were from the adjacent two counties served by the community college. Sixteen
(20.8%) were from other counties as shown in Table 4.1.

Crosstabulations with Pearson chi-square tests showed no significant differences
with respect to age, race, gender or county of residence between those who passed the
NCLEX-RN on first attempt and those who did not. SPSS adjusted for small numbers in
select cells of Crosstabulations.
Table 4.1
Demographic Characteristics of Those Who Passed on First Attempt and Those Who Did Not

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>Passed First Attempt (n = 52)</th>
<th>Did Not Pass First Attempt (n = 25)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female (n = 71)</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>Male (n = 6)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Years</td>
<td>32.06</td>
<td>29.68</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian (n = 59)</td>
<td>44</td>
<td>15</td>
</tr>
<tr>
<td>African American (n = 14)</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Asian (n = 2)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hispanic (n = 1)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Native American (n = 1)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>County of Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local (n = 53)</td>
<td>39</td>
<td>14</td>
</tr>
<tr>
<td>Adjacent Service Area (n = 8)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Other (n = 16)</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

**Student Status**

Research Question 2: Are there differences in student status between the group that passed NCLEX-RN on the first attempt and the group that did not? Student status was defined as type of diploma and type of admission. Type of diploma was defined as high school diploma or General Education Diploma (GED). Type of admission was defined as first-time-in-college (FTIC) student; early admission/dual high school/college enrolled; transfer from another college or university; and level of highest college degree earned prior to starting the nursing program. Because students returning to this
community college are given preference over other students, the category “returning student” was created. Prior licensure as a practical nurse was also included.

The makeup of this sample with regard to student status was 63.6% high school diploma (n = 49) and 3.9% GED (n = 3). For students who had transferred from another college or university, the type of high school diploma was not reported. The makeup of the sample with regard to type of admission was 23.4% early admission/dual high school college enrolled (n = 18), 31.2% were first-time-in-college students (n = 24), 61% had transferred from another college or university (n = 47) and 26% were returning to this institution (n = 20). The reader will note that the categories overlap: therefore, the total of the percentages exceeds 100.

Students with a college degree before entering the nursing program were comprised of 15.6% with an Associate Degree (n = 12), 2.6% with a Baccalaureate Degree (n = 2) and 1.3% with a Master’s Degree (n = 1). Sixty-two had no prior college degree (80.5%). There were sixteen (20.8%) licensed practical nurses in the sample.

When admission decisions are being made, students may fall into one of three categories: accepted, alternate or rejected. Alternates are generally called if a student who has been accepted to the program declines to attend. The admission process for this sample, however, was unique because the college obtained a grant to increase enrollment after the selection of applicants had been completed. With the late addition of twenty seats, applicants who had been designated as alternate choices were called to fill them. Therefore the category of “alternate” was used to indicate those students who might not otherwise have been admitted to the program. There were 59 (76.6%) students on the list for initial inclusion in the nursing program and 18 (23.4%) who were designated as alternates.

Crosstabulations with Pearson’s chi-square were run for each category of student status. No significant differences were found with respect to passing the NCLEX-RN on the first attempt for any of the above groups of students as shown in Table 4.2.
Table 4.2

Comparison of Student Status Between Groups

<table>
<thead>
<tr>
<th></th>
<th>Pass First Attempt (n = 52)</th>
<th>Did Not Pass First Attempt (n = 25)</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Diploma</td>
<td>Diploma (n = 49)</td>
<td>32</td>
<td>17</td>
<td>.002</td>
</tr>
<tr>
<td></td>
<td>GED (n = 3)</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>First Time In College</td>
<td>Yes (n = 24)</td>
<td>14</td>
<td>10</td>
<td>1.346</td>
</tr>
<tr>
<td></td>
<td>No (n = 53)</td>
<td>38</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Transfer</td>
<td>Yes (n = 30)</td>
<td>19</td>
<td>11</td>
<td>.395</td>
</tr>
<tr>
<td></td>
<td>No (n = 47)</td>
<td>33</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Early/Dual Enrolled</td>
<td>Yes (n = 18)</td>
<td>9</td>
<td>9</td>
<td>3.293</td>
</tr>
<tr>
<td></td>
<td>No (n = 59)</td>
<td>43</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Returning Student</td>
<td>Yes (n = 20)</td>
<td>16</td>
<td>4</td>
<td>1.915</td>
</tr>
<tr>
<td></td>
<td>No (n = 57)</td>
<td>36</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Alternate</td>
<td>Yes (n = 18)</td>
<td>13</td>
<td>5</td>
<td>.236</td>
</tr>
<tr>
<td></td>
<td>No (n = 59)</td>
<td>39</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>LPN</td>
<td>Yes (n = 16)</td>
<td>11</td>
<td>5</td>
<td>.014</td>
</tr>
<tr>
<td></td>
<td>No (n = 61)</td>
<td>41</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>College Degree</td>
<td>None (n = 62)</td>
<td>41</td>
<td>21</td>
<td>1.502</td>
</tr>
<tr>
<td></td>
<td>Associate (n =12)</td>
<td>8</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bachelor (n =2)</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Master (n= 1)</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Test Scores

Research Question 3: Are there differences in test scores between the group that passed NCLEX-RN on the first attempt and the group that did not? Test scores available for inclusion were college placement scores, SAT scores and Educational Resources Incorporated (ERI) Nurse Entrance Test (NET). Because not all students were required to take all tests, college placement and Scholastic Aptitude Test (SAT) scores were found to have too much missing data to be useful. Fewer than 25% of the sample reported college placement test scores and only 2.6% reported SAT scores. ERI NET included mathematics and reading. A comprehensive score was also reported. Sixty (78%) students took the ERI NET. Scores for the mathematics portion ranged from 35% to 97% with a mean of 82%; the reading scores ranged from 24% to 88% with a mean of 68.5%.

Independent samples t-tests were run to determine if there were significant differences in the means of test scores between those who passed the NCLEX-RN on the first attempt and those who did not. Of the scores reported, only the reading portion of the ERI NET showed significant differences. The mean score for students who passed the NCLEX-RN on the first attempt was 70.8%. The mean score for those who did not was 63.37%. The t-test for Equality of Means was significant with a t-score of 2.176 p = .039 as shown in Table 4.3.

Table 4.3
Comparison of ERI NET Mean Test Scores Between Groups

<table>
<thead>
<tr>
<th></th>
<th>Pass First Attempt (n = 41)</th>
<th>Did Not Pass First Attempt (n = 19)</th>
<th>t-Score</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>81.88</td>
<td>82.0</td>
<td>-.032</td>
<td>.974</td>
</tr>
<tr>
<td>Reading</td>
<td>70.83</td>
<td>63.37</td>
<td>2.176</td>
<td>.039*</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>76.49</td>
<td>72.79</td>
<td>1.202</td>
<td>.239</td>
</tr>
</tbody>
</table>

*Statistically significant at p < .05
Note: Only 60 (78%) students took the ERI NET
Academic Achievement

Research question four: Are there differences in academic achievement between the group that passed NCLEX-RN on the first attempt and the group that did not? To determine academic achievement, the researcher looked at grade point average (GPA) on nursing program prerequisite courses. The grade point average for admission to the nursing program is derived from the thirteen hours, out of a possible twenty-three, of prerequisite courses with the best grades. These classes were: anatomy and physiology I and II with the corresponding laboratories, general psychology, human development, nutrition, college composition and one of four mathematics courses. The mathematics courses were: college algebra, algebra for liberal arts (I or II) and statistics. Microbiology, including a laboratory experience, is a co-requisite course, so it was not included in the GPA calculations. Preference is given to students who complete microbiology before entering the nursing program. Chi-square statistics showed no significant differences ($\chi^2 = .098, p = .922$) in NCLEX-RN success on the first attempt between those who completed microbiology prior to enrolling (n = 56) and those who did not (n = 21). Also included in academic achievement was the number of attempts at the prerequisite courses. The community college has a forgiveness policy for repeating courses with a grade of “D”, “F” or “W” (withdrawal) or AW (academic withdrawal). Only the grade of the final attempt is included in the GPA. The total number of repeat attempts on all prerequisite courses was used.

Of the above variables, only number of attempts was found by an independent samples $t$-test for differences between means to be significant as shown in Table 4.4.

<table>
<thead>
<tr>
<th>Comparison of Academic Achievement Between the Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass First Attempt (n = 52)</td>
</tr>
<tr>
<td>GPA</td>
</tr>
<tr>
<td>Repeat Attempts</td>
</tr>
</tbody>
</table>

*Significant at $p < .05$

The number of repeat attempts for students in this sample ranged from zero to seven. Eighty percent of students who passed the prerequisite courses with no repeat attempts passed the NCLEX- RN on the first attempt. With one repeat attempt on any prerequisite
course, the rate of passing NCLEX-RN on first attempt fell to 58%. Students with four attempts had a 50% passing rate on the State Board Exam. One student had five repeat attempts and passed the examination on the first attempt; one student had 7 repeat attempts and did not pass the NCLEX-RN on the first attempt. There were no students in the sample with 6 attempts.

Summary

Of the demographic and academic variables available prior to admission to the nursing program, only two showed significant differences. One was the reading score on the standardized nurse entrance examination. The second was the number of attempts on prerequisite courses students needed to achieve or maintain the GPA required by the nursing program to be considered for admission.
CHAPTER 5
DISCUSSION

This study investigated admission variables in a community college ADN Nursing Program and the relationship with NCLEX-RN success. This chapter will provide discussion on the findings of the study. The differences in demographic characteristics, student status, test scores and academic achievement between students who were successful on the NCLEX-RN and those who were not will be discussed. The findings will be related to the review of current literature and the conceptual framework of Patricia Benner’s Theory of Novice to Expert which was published in 1984. Additionally, limitations and implications for future research will be presented. The findings of this study and their related implications for nursing education will also be presented.

The ultimate goal of any nursing program is to provide qualified registered nurses to support the profession. The shortage of registered nurses is a growing problem with no simple short-term resolution in sight. There are several contributing factors. More skilled nursing care will be required as our population ages. Another factor is the increasing numbers of nurses and nursing faculty nearing retirement age without comparable numbers of new nurses to take up the mantle. Classroom and clinical space is also limited as programs scramble to try to fill these gaps through increased enrollment and the opening of new nursing programs.

Programs that prepare students to become registered nurses take on a tremendous responsibility each time a student is admitted to the program. The nursing program is responsible for utilizing limited college resources wisely, for partnering with health care facilities to train students and ultimately staff those facilities. They have a responsibility to the student to offer the best educational opportunities to foster student success and assist that student in reaching career goals. Perhaps most important there is a responsibility to the community served by the nursing program to see that each graduate of the program will be a safe and capable practitioner. The foundation for reaching these goals and meeting these responsibilities lies first in the appropriate selection of the most qualified applicants.

To maximize the number of graduates entering the workforce and help ensure efficient utilization of resources, this study examined variables present at admission to
the nursing program and investigated differences between nursing graduates who were successful on the NCLEX-RN and those who were not.

In this study the researcher inquired about student information that was available to the college prior to admission to the program and that may portend later success on the NCLEX-RN. A review of the literature was done revealing the significance of the problem and admission variables found by other researchers to impact student success on the licensure examination. The conceptual framework of Patricia Benner’s Theory of Novice to Expert (1984) formed the foundation for this study. The NCLEX-RN is designed to test new graduates on the skills new nurses most often need in the first six months of practice. It is validated every three years and is support by Benner’s Theory of Novice to Expert (1984).

**Demographic Characteristics**

The student nurses in this sample were 76.62% (n = 59) Caucasian, 18.18% (n = 14) African American, 2.6% (n = 2) Asian, 1.3% (n = 1) Hispanic and 1.3% (n=1) American Indian. The racial makeup of the three-county area served by the college is 63.72% Caucasian, 32.58% African American, 0.73% Asian, 3.86% Hispanic and 2.4% other. In 2004 the United States Department of Health and Human Services (http://bhpr.hrsa.gov) reported the racial characteristics of nurses in the United States to be: 88.4% Caucasian, 4.6% African American, 3.3% Asian or Pacific Islander, 1.8% Hispanic, 0.4% American Indian/Alaskan Native and 1.5% two or more racial backgrounds. Fewer than 6% of nurses in the U.S. are men. Males in this study made up 7.8% of the sample. The age range of the sample was 19 to 54 years with a mean of 31.3 years. The racial makeup of the sample for this study is not as diverse as the population of the three county service area of the college, but is more diverse than the general population of registered nurses in the United States.

A review of the literature revealed mixed results as to the significance of demographics on NCLEX-RN success after graduation. Some studies did not report on demographic characteristics. Of those that did, three studies reported that minority students were less likely to be successful on the NCLEX-RN. In the California Community College Model Prerequisite Study (2002), Phillips et al., reported Whites “most successful” in comparison to African Americans and Hispanics. Crow (2004) noted that nursing programs with higher percentages of White students had higher
NCLEX-RN pass rates when compared to programs with higher percentages of Hispanic students. Sayles et al., stated minority students were “less likely” than White students to pass the NCLEX-RN. In contrast, Uyehara et al. (2007) found no differences in demographic characteristics of those who were successful and those who were not. Ellis (2006) reported only gender and marital status and found no differences between those who passed the NCLEX-RN on the first attempt and those who did not.

Unlike the studies described previously, this study found differences in demographic characteristics of the sample were not significant with respect to NCLEX-RN success after graduation and supports findings by Uyehara et al. (2007) who also found no differences in demographic characteristics between those who were successful and those who were not.

Although county of residence cannot be generalized to other colleges, it was included in the study because local residents receive priority consideration during the admission process. This is due to the college’s commitment to the community to fill local job vacancies. The possibility exists that a less qualified local student may be granted admission before a student from outside the service area. This may have a negative impact on NCLEX-RN success. Of the students in this study, 68.8% were from the local county, 10.4% were from the two additional counties served by the community college and 20.8% were from outside the three-county service area. The county of residence was not shown to be statistically significant with respect to NCLEX-RN success.

**Student Status**

As defined in Chapter 4, the category of student status included type of high school diploma, previous college experience or degree and/or licensure as a practical nurse. Early enrollment or dual high school/college enrollment were considered as was first time in college student or returning college student. It might be expected that a more mature student with proven success in college course work or experience in the health care field before entering nursing school would be more successful than a less experienced student. Of the seventy-seven students in this study, 19.5% had earned at least one college degree before entering the nursing program and 20.8% were licensed practical nurses.
No differences of significance in any of the student status measures were found. This may be indicative of the uniqueness of the nursing program used in this study and the profession of nursing. Nursing has been called “an art and a science” requiring nurses to be knowledgeable about a wide variety of content in both theoretical and practical domains. Benner (1984) writes “‘knowing how’ and ‘knowing that’ are two different things” (p 2). Nurses may learn skills (knowing how) without learning the scientific or theoretical basis behind those skills (knowing that). With practical application knowing how sometimes precedes the scientific formula; experienced nurses may not know why something works, but experience has shown that it does. Scientific investigation may follow as nurses attempt to prove that their hunches are valid. Conversely, scientific evidence may change nursing practice. A practice or belief may not be substantiated by rigorous scientific investigation and nursing practice will be changed by the evidence. Writing about clinical decision making, Benner goes on to state, “Not all of the knowledge embedded in expertise can be captured in theoretical propositions or with analytic strategies that depend on identifying all the elements that go into the decision” (p. 4). Students with success in other academic areas may not be as successful in blending the art and science, the knowing how and knowing that, required for the nursing profession.

The final category under student status was “alternate.” As described in Chapter 4, the college received a grant for the two semesters during which this study took place. Those who met minimum requirements but received fewer points towards admission were called to fill the new seats created by the grant. Eighteen (23.4%) students included in this study had been designated as alternates. Statistically significant differences were not found between the students who were given priority status towards admission and those on the alternate list. This is of interest because significant time and energy are spent ranking applicants once minimum qualifications are met. With no differences between the two groups the admission process could possibly be streamlined and many faculty hours saved by utilizing a random drawing for all qualified applicants rather than engaging in the present time-consuming ranking process.
Test Scores

Test scores for applicants that were available before admission include College Placement Tests (CPT) and SAT scores. College Placement Tests are standardized tests in reading, basic English, mathematics and algebra. These tests are used state-wide by community colleges. The college does not require all students to take and report all tests. Test scores are not reported for students who have transferred from another college or university or have a previous college degree. The reading and English tests are required for students with an SAT Verbal score of less than 440. The college placement mathematics and algebra tests are required for students with an SAT Mathematics score of less than 440. Test scores on the CPT determine if the student will be required to take non-credit developmental courses. In this study no significant differences were found between the test scores of nursing students who passed the NCLEX-RN on the first attempt and those who did not. The lack of significant findings between NCLEX-RN scores and test scores in this study may be due to the low number of students with college placement test scores (fewer than 25%) and SAT scores (only 2.6%). Another reason may be the amount of time that had passed between taking the placement tests and application to the nursing program. For low-scoring students who are placed in developmental courses as many as five years may pass before the academic requirements for the nursing program have been met. This time in developmental and prerequisite courses may allow the student to correct academic deficiencies before entering the nursing program and eventually be as successful as their higher-scoring counterparts.

The literature indicates other studies have found significant associations between NCLEX-RN pass rates and SAT scores and standardized entrance examinations. In 2004 Crow et al. reported the results of their survey of one-hundred sixty generic BSN programs in the Journal of Professional Nursing. They found significant correlations with SAT scores and standardized entrance examinations. Interestingly with the SAT scores an inverse relationship was found. Programs with higher SAT requirements had lower NCLEX-RN pass rates. The authors note that that finding is not consistent with other studies and they were unable to explain their finding. Standardized entrance exams scores were reported to have a positive correlation with NCLEX-RN success. The specific test names or required scores were not reported although the authors did state
that the National League for Nursing (NLN) entrance examination was used most frequently.

Uyehara et al. (2007) found that the NLN entrance examination scores were not significant in their study of BSN students which took place in Hawaii with a largely Filipino and Japanese sample. Ellis et al. (2006) examined the ERI Nurse Entrance Test (NET) as a means to increase retention in their diploma nursing program. The results of that study showed that increasing the required score from an average of 50% on each part to a minimum of 50% on each part increased the student retention rate. Sayles et al. (2003) found the ERI NET and the ERI Pre-RN to correlate positively with NCLEX-RN success in their ADN nursing program.

Most of the research available on the HESI examinations focuses on the use of the E² as a predictor of NCLEX-RN success and as a tool to focus remediation efforts prior to taking the NCLEX-RN. The HESI A² has become available within the past five years and published studies were not found. Abstracts from two unpublished studies were provided by the company that publishes the HESI tests, Elsevier Review & Testing (personal communication 6/20/2007). The first study indicated a positive correlation between A² scores and student success in the nursing program. The second study indicated the HESI A² scores were significantly related to scores on the HESI E², which was shown to be 94.55% predictive on NCLEX-RN success in that study.

The nursing program in this study does not administer an entrance examination; however, the ERI NET is currently administered to students during the first semester of the nursing program. It includes math and reading scores and a comprehensive score is also reported. Because licensed practical nurses enter the program and join the generic students in the third semester, ERI NET scores were not available for those students. ERI NET scores were available for 78% of the students in the sample. Of the three reported scores, only the reading score was found to be significant. Students with a reading score of 78% or higher had 60% passing rate on the NCLEX-RN as compared with a 32% passing rate when reading scores fell to 63.4% or lower. This finding is not unexpected since nursing programs typically require a great amount of reading from text books, research articles and other sources. Students with lower reading scores may not be able to cover the large amounts of material required within the time constraints of nursing school. Another factor related to reading scores may be test taking proficiency.
The pencil and paper NCLEX-RN allotted 1.25 minutes per question. The computer version allows 1.5 minutes per question. Students with lower reading scores may not have the reading speed and comprehension ability required to answer enough questions correctly within the allotted time frame.

Although studies utilizing entrance examinations vary in the type of test used, this study supports the research of Crow et al. (2004), Ellis (2006) and Sayles et al. (2003) who all found statistically significant benefits to using an entrance examination to predict program and/or NCLEX-RN success. Findings from this study support the utilization of an entrance examination as part of nursing program admission requirements. The NLN Entrance Exam and the ERI NET and Pre-RN have all been shown to have positive correlations with NCLEX-RN success. The HESI E² has been shown to be predictive of NCLEX-RN success and preliminary reports on the HESI A² show promise; however, more studies are needed on this relatively new examination.

When electing to utilize an entrance examination as part of the admission process many factors must be considered. Some schools admit students by random drawing after minimum criteria have been met while other schools use a point system admitting applicants who have the highest number of points from a variety of entrance requirements. Scoring criteria for entrance examinations need to be determined. Decisions must be made to determine if a minimum score will be used as a cut-off point excluding all applicants who fall below that score, or if the score will be part of a point system giving higher priority to those who score well. Another factor to consider is the practicality of administering the examination and the cost to the student or to the college. Some programs utilize complete packages from testing services and use an entrance examination from a company that also offers progression testing, remediation programs and NCLEX-RN review courses.

**Academic Achievement**

Academic achievement included grade point average on nursing prerequisite courses, completion of the nursing program co-requisite microbiology and the corresponding laboratory experience before entering the nursing program as well as individual grades earned in each of the prerequisite courses. Because the community college has a forgiveness policy for grades below a “D” including withdrawals, the number of attempts at the prerequisite courses was also studied.
Although several studies (Phillips et al., 2002; Potolsky et al., 2003; Yin and Burger, 2003) cite GPA and grades in science courses as correlating with NCLEX-RN success, this study found significance in only the number of attempts at prerequisite courses. This may be due to the college forgiveness policy for repeating classes in which poor grades were earned. Only the grade for the final attempt is utilized to determine GPA; therefore, when considered alone, the inflated GPA may not give an accurate picture of student performance. For example, one student was admitted to the program with a GPA of 3.46. This student however, had seven repeat attempts on the nine prerequisite courses, passing only three courses on the first attempt and repeating one course twice. This student’s GPA at the end of the nursing program fell to 2.69. The student did not pass the NCLEX-RN on the first attempt. With just one repeat attempt at prerequisite courses, as compared to no repeat attempts, the passage rate on the NCLEX-RN fell from 80% to 58%. This finding supports Phillips et al. (2003) who reported significant negative correlation with repeat attempts on prerequisite courses and nursing program completion.

Because of the open access philosophy of the community college, it is unlikely that the college or nursing program administration would support denying entrance to a student with one repeat attempt at a course, regardless of the reason. The number of repeat attempts however, could be utilized as a portion of the admission process point system. It should also be used by academic advisors when counseling pre-nursing students. Further research should examine the relationship between repeat attempts and the GPA. The community college philosophy of forgiveness and open access needs to be balanced in programs such as nursing that have rigorous progression and completion requirements before graduates can enter the workforce. One possible solution would be the use of a formula that would help balance the GPA and the number of attempts required by the student to meet the GPA standard set by the nursing program. The researcher divided the grade point average by the number of repeat attempts and found significant differences between the group who passed the NCLEX-RN and those who did not ($t = 2.096, p = .041$). Utilizing this or similar formula may give a more accurate picture of students’ academic performance.
Limitations

One limitation of this study was the inability to include more than two graduating classes from the nursing program. The reason for this limitation was a major curriculum change that took place just prior to this study. At the time of data collection, only two classes had graduated since the new curriculum had taken effect. With such a major change it was felt studying earlier classes would confound the results.

Another limitation was the amount of missing data in some of the variables. There are different criteria for admission to the college. For example, students admitted as high school graduates have different criteria from those transferring from another college. The area most affected by this different criteria was reported test scores. Although some studies report high school rank and test scores as significant with regard to NCLEX-RN success (Yin & Burger, 2003), this information was not available for transfer students or those entering the program with a previously earned college degree. Also with the wide age range in the sample of 19 to 54 years, and a mean age of 31.3, one would expect high school status to lose some significance as the number of years students had been out of high school increased. Another test score impacted by missing data was the ERI NET. This test is not given as a preadmission test at this institution, but instead is given during the first semester. Students admitted to the program as Licensed Practical Nurses enter the bridge program and join the generic students in the third semester and, therefore, do not take the ERI NET.

Strengths

Strengths of this study include two significant findings; the reading score of the ERI NET and the number of repeat attempts on prerequisite courses. These findings may be of value to the college as improvements to the admission process are made. Utilization of an entrance examination will not only help identify students with the greatest chance of success on the NCLEX-RN, but may be used to help direct remediation efforts for low scoring students prior to admission to the nursing program. The significance of repeat attempts on prerequisite courses can also help identify students with the greatest potential for success and can be used by academic advisors when counseling pre-nursing students. Students should be aware of the importance of focusing their best efforts on prerequisite courses in pursuit of the goal of ultimately joining the nursing profession.
The diversity of the sample with approximately 20% African Americans is another strength of this study. Fewer than 5% of registered nurses in the United States are African American. The finding of no difference in the racial/ethnic make-up between the groups is a positive finding and may help with recruitment efforts of minority students.

An event unanticipated by the researcher was the awarding of a grant to increase enrollment in the college nursing program. The impact here was that all applicants who met minimum requirements were accepted into the program. This may have confounded the admitting data; however, rather than limiting the study, the researcher was able to identify those who had been designated as alternates. Finding no difference in outcomes between the primary and alternate candidates supports the practice utilized by some institutions of admission by random drawing once minimum requirements have been met.

Not only will the community college at which the study took place benefit from these findings, similar community colleges may benefit from these findings as well. Other college nursing programs should examine the admission criteria with respect to student success.

Implications for Future Research

Because the NCLEX-RN is based on entry-level nursing practice and validated every three years, ongoing research on predictors of NCLEX-RN success is indicated as revisions to the examination are made. Individual schools should look at their specific criteria and the preadmission information available to them. If utilized, data regarding entrance examinations should be collected and correlated with NCLEX-RN success and admission criteria adjusted to ensure that students who are admitted will have the greatest chance of success on the NCLEX-RN.

The lack of other significant findings in this study may be a result of the relatively small sample size and missing data. Replication of this study using a larger sample size is needed to determine if findings from this study will be supported.

Nursing faculty should keep abreast of research findings regarding predictors of NCLEX-RN success and advocate for admission criteria that are predictive of success for students in their program. Individual prerequisite courses should be studied to determine whether grades on certain courses are more predictive of NCLEX-RN success than grades on others. The impact of repeat attempts on prerequisite courses on GPA and
NCLEX-RN success should also be examined. Use of standardized nurse entrance critical thinking tests and reading tests other than ERI should be explored by faculty. Student reading scores should also be studied further.

While beyond the scope of this study, factors that contribute to nursing student attrition rates need to be examined because of the nursing shortage. Future studies should focus on reasons students do not complete nursing programs. Factors may include variables identifiable at admission or those that may be anticipated at admission such as financial concerns, the number of hours spent working each week and family obligations. Other factors may be unexpected and unavoidable, such as illness or a death in the family. Research should also include possible strategies for dealing with these conditions if encountered.

**Implications for Nursing Education**

Nurse educators and administrators of nursing programs that prepare students to become registered nurses have an obligation to use limited resources wisely. The needs of the students, the community and the nursing program must be considered. It is imperative that each nursing program keep abreast of employment needs and educational trends that may impact student success. The first step is to ensure that the admission requirements of the nursing program reflect those attributes of the successful student.

Based on the findings of this study, the researcher recommends:

- the nursing program utilizes a nurse entrance examination as a part of the admission criteria
- the grade point average and number of repeat attempts at prerequisite courses are balanced to reflect a more accurate picture of academic achievement while maintaining the program and college philosophy of open access
- admission requirements ensure that all applicants meeting minimum requirements have the potential to be successful in the nursing program and on the NCLEX-RN
- student selection by a lottery system once minimum requirements are met
- continuation of this study with subsequent classes at the college
- replication of this study by other colleges
Conclusion

It is important that greater numbers of new nurses graduate and enter the workforce. Limited classroom and clinical resources must be utilized in the most efficient manner possible to meet the students’ needs. Admission and program requirements must reduce attrition and boost success on the NCLEX-RN (Crow, 2004; Phillips et al., 2002; Reising, 2003; Yin & Burger, 2003). Periodic evaluation by nurse educators is required to keep abreast of changes in entry-level nursing practice and examination requirements (Smith, 2002; NCSBN, 2007; Wendt 2003). Computer-based and standardized testing may be a useful tool for refining admission requirements, program progression and remediation (Crow et al., 2004; Reising 2003).

Once admission decisions are made, efforts must be made to reduce attrition and maximize the numbers of new nurses entering the workforce. In order to enter the workforce, new graduates must pass the NCLEX-RN. The examination is validated every three years to ensure that it reflects the practice activities of new nurses. The roles and competencies tested on the NCLEX-RN fall in line with Patricia Benner’s (1984) seven domains of nursing practice. The methodology of reviewing the current practice of new nurses is supported by her theory of skills acquisition. Benner maintains that new nurses should graduate at the level of Advanced Beginner. The NCLEX-RN attempts to test at this level with questions that require critical thinking as well as application and synthesis of concepts.

Findings from this study indicate that students with higher reading scores on a nurse entrance examination, the ERI NET, are more likely to be successful on the NCLEX-RN. Reading speed and comprehension are critical components for success in nursing school. The number of attempts a student has on prerequisite courses to reach an acceptable grade point average was also found to be significant. This information should not disqualify a student seeking admission to a community college program, but should be considered when ranking applicants for admission.

Nursing programs have an obligation to their students to foster success and to the public they serve to help mitigate the nursing shortage with highly qualified graduate nurses. Using admission criteria that are predictive of NCLEX-RN success will help ensure that students admitted to the nursing program will be successful. Colleges must utilize precious resources wisely, starting with the admissions process.
Office of the Vice President For Research  
Human Subjects Committee  
Tallahassee, Florida 32306-2742  
(850) 644-8673 · FAX (850) 644-4392

APPROVAL MEMORANDUM

Date: 9/22/2006

To: Carolyn Lytle  
6802 Waldon Circle  
Tallahassee, FL 32317

Dept.: NURSING

From: Thomas L. Jacobson, Chair

Re: Use of Human Subjects in Research  
Admission Criteria as Predictors of NCLEX-RN Success in Associate Degree Nursing Graduates

The forms that you submitted to this office in regard to the use of human subjects in the proposal referenced above have been reviewed by the Secretary, the Chair, and two members of the Human Subjects Committee. Your project is determined to be Exempt per 45 CFR § 46.101(b) 4 and has been approved by an accelerated review process.

The Human Subjects Committee has not evaluated your proposal for scientific merit, except to weigh the risk to the human participants and the aspects of the proposal related to potential risk and benefit. This approval does not replace any departmental or other approvals, which may be required.

If the project has not been completed by 9/19/2007 you must request renewed approval for continuation of the project.

You are advised that any change in protocol in this project must be approved by resubmission of the project to the Committee for approval. Also, the principal investigator must promptly report, in writing, any unexpected problems causing risks to research subjects or others.

By copy of this memorandum, the chairman of your department and/or your major professor is reminded that he/she is responsible for being informed concerning research projects involving human subjects in the department, and should review protocols of such investigations as often as needed to insure that the project is being conducted in compliance with our institution and with DHHS regulations.

This institution has an Assurance on file with the Office for Protection from Research Risks. The Assurance Number is IRB00000446.

Cc: Vickie Barth  
HSC# 2006.0674
APPENDIX B

SAMPLE INFORMED CONSENT
To: Member of the TCC Nursing Program Graduating class of Spring 2005

August 17, 2006

Re: Admissions research

A graduate student at the Florida State University, College of Nursing is planning to conduct research at Tallahassee Community College for the purpose of refining the admission process to the Nursing Program. She will be gathering background data, previous course grades and Licensing Exam outcomes. This information will be provided to the researcher by the College. It will be de-identified and coded so she can compare the data without having access to any names or a link to names.

If you do not wish to have your information used for this research, please contact Veronica Forehand, Office Manager, Health Care Professions in writing at the above address or via e-mail forehanv@tcc.fl.edu no later than September 16, 2007.

This information will be used to improve the Nursing Program admission process at TCC. Your cooperation with this research is appreciated.

Thank you.

Sincerely,

Lois L. Ewen, Ph.D., MSN, RN
Dean, Health Care Professions Division
To: Member of the TCC Nursing Program Graduating class of Fall 2005

August 17, 2006

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This information will be used to improve the Nursing Program admission process at TCC. Your cooperation with this research is appreciated.

Thank you.

Sincerely,

Lois L. Ewen, Ph.D., MSN, RN
Dean, Health Care Professions Division
APPENDIX C

DATA COLLECTION TOOL
Data Collection Tool

Demographic Information:

Gender:
(1)_____ Male
(2)_____ Female
_______ Age

Race:
(1)_____ White
(2)_____ Black
(3)_____ Hispanic
(4)_____ Asian/Pacific Islander
(5)_____ American Indian

County of Residence:
(1)_____ Leon
(2)_____ Gadsden
(3)_____ Wakulla
(4)_____ Other
(5)_____ Unknown

High School:
(1)_____ Diploma
(2)_____ GED
Date awarded: _________________
Name of High School_______________

Transfer
(1)_____ No
(2)_____ in state
(3)_____ out of state

Early admission/dual enroll
(1)_____ Yes
(2)_____ No
Returning TCC student
(1) _____ Yes
(2) _____ No

Student status:
First time college student
(1) _____ Yes
(2) _____ No

Previous college degree:
(1) _____ No
(2) _____ LPN
(3) _____ As
(4) _____ Ba
(5) _____ Ma
(6) _____ Do

Scores on College Placement Tests:
_____ Ss
_____ Ar
_____ Rc

ACT score
_____ En
_____ Ma
_____ Re
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Clast test
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_____ College **GPA on best 13 hours of prerequisite courses**

_____ College **GPA on best 13 hours of prerequisite courses (including A&P)**

**Microbiology**

| A=4, B=3, C=2, D=1, F=0 |

| MCB 2004 completed before adm to nursing: |
| (1) No |
(2) _____ Yes

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MCB 2004L completed before adm to nursing:
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(2) _____ Yes

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______ Overall college GPA at graduation

ERI scores
_____ Comp
_____ Math
_____ Reading

NCLEX:
(1) _____ PASS
(2) _____ FAIL

Number of attempts
1 _____
2 _____
3 _____

Alternate:
1. No
2. Yes
REFERENCES


BIOGRAPHICAL SKETCH

Carolyn Lytle graduated from Tallahassee Community College with an Associate of Science in Nursing in 1982, and from the University of Alabama, Birmingham with a Bachelor of Science in Nursing in 1986.

She worked as a Labor and Delivery nurse for sixteen years and spent several years as a staff nurse in Intensive Care and Post Anesthesia Recovery. She began her teaching career at Tallahassee Community College as an Adjunct Professor in 1995. In 2004 she was promoted to her current position of Assistant Professor in Nursing.

Carolyn currently lives in Tallahassee with her husband of thirteen years, Bruce and their eleven-year-old son, Rob.