Admission Policies and Attrition Rates in California Community College Nursing Programs

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Background

California is experiencing a critical shortage in Registered Nurses (RN) -- a shortage that is likely to increase in the coming years. Although much of the nation is also experiencing similar shortages, California will be hit harder than any other state in the nation because of the magnitude of the number of nurses needed and because of recent proposals to reduce patient/nurse ratios. California's nursing shortage is the result of many factors, and recent studies have identified them as:

- A growing and aging population whose needs for medical attention is increasing;
- An older registered nurse workforce, many of whom will soon retire;
- A complex managed care environment that limits spending on nursing care;
- Poor working conditions, especially in acute care facilities; and
- Anticipated changes in state law that will require lower patient/nurse ratios.

There simply are not enough nurses being trained to meet the demand. Rural counties, communities with high rates of poverty, and those that do not have RN education programs have the greatest difficulty in attracting nurses. Unless California's nursing education programs can produce additional graduates, or other solutions are found, the shortage could jeopardize public health.

Recent reports have offered varying projections of the RN shortage. In 1999, the California Strategic Planning Committee estimated that there would be a shortfall of some 25,000 RNs by 2006. A recent report issued in January 2001 by the California Workforce Initiative estimates that as many as 77,000 additional RNs will be needed by 2020. Currently, about 293,500 Registered Nurses have been licensed in California. Of these, over 275,000 maintain active licenses. About 83 percent of those with active licenses are currently working.

Nursing education in California

Roughly half of California's RNs were educated in California, with the remaining half being educated in other states and foreign countries. Nursing programs fall in to two types: pre-licensure, taken before licens-

ing as an RN, and post-licensure. Eighty-four percent of the roughly 5,200 graduates who completed pre-licensure programs attended public institutions, with 60% educated at community colleges, 23% at California State University campuses (CSU), and 1% at University of California campuses (UC). According to the Board of Registered Nursing, which approves RN programs, there are 71 associate degree nursing (ADN) programs (67 at community colleges), and 22 baccalaureate and masters degree RN programs (13 at CSU and 9 at independent colleges and universities).

UC Los Angeles and UC San Francisco offer masters and doctoral level nursing programs. These masters degree programs are designed for students who hold a baccalaureate degree but who may not be a licensed nurse. A small county-run program in Los Angeles also offers instruction leading toward RN licensure.

Many nursing programs are impacted and must turn away qualified applicants. A recent report indicated that in 1997, 44% of applicants to pre-licensure training programs in the CSU system were denied admission due to a lack of available space (352 potential students). At an October 30, 2001 Assembly Health Committee hearing, representatives from CSU testified that 11 of its 13 CSU pre-licensure nursing programs were impacted in 2000-2001. Most community college programs are also impacted. With licensure programs throughout the state nearly fully enrolled, there is limited ability to increase the number of nursing graduates.

Another part of nursing education is post-licensure programs. These programs are intended for students who are already a licensed RN, and are an important component of professional development and workforce retention. Post-licensure programs include RN to BSN programs, Nurse Practitioner programs, Nurse Anesthesia programs, Nurse-Midwifery programs, Public Health Nursing programs, and post-graduate MSN and doctoral programs.

AB 655

Recognizing the implications of the nursing shortage, the Governor signed in 1999 AB 655 (Scott). This legislation required the California Community Colleges, California State University, the University of California, and the Association of Independent Colleges and Universities to issue a report to the Governor and the Legislature recommending a plan for increasing the number of nursing graduates and for providing training to licensed nurses in prescribed areas of specialization. This report was released in June 2000. It noted that not only was there a need for more RNs to be prepared, but that all state-supported nursing programs should receive additional resources to increase the production of RNs. Recommendations made by the AB 655 report included:

- The State should develop a plan to recruit, prepare, and retain nurses, including providing necessary funding for nursing programs at all three public segments.

- Higher education, upon receipt of necessary resources, should enhance enrollment opportunities and progress to degree for students interested in pursuing nursing careers.

- The health care industry and higher education should find ways to expand delivery of pre-licensure RN nursing education and specialty education.

In response to this report, California's public colleges and universities have tried to increase the number of slots in and improving access to their nursing programs. While a limited amount of funding has been provided to expand programs, it has not been sufficient to meet future needs. In light of the tight state budget, it is unlikely that more money will be available for expanding these relatively high-cost programs. If the number of trained RNs is to increase, it will be necessary to explore ways of improving the admission processes to better identify students who will succeed, increase the proportion of students who graduate, and increase the proportion of graduates who pass the state exam for licensure. More than 500 additional nurses could be prepared each year for the workforce if attrition from Registered Nursing programs was reduced substantially, and if the pass rate of the state-licensing exam was increased to 90%.

Nursing workforce initiative

In January 2002, Governor Davis announced a $60 million, three-year initiative to address California's nursing shortage. The purpose of the initiative is to assist the health care industry by recruiting, training, and retaining qualified nurses, and to reduce the critical labor shortage in healthcare facilities throughout California. Although the details of the allocation of funds have not been completely finalized, the California Health and Human Services Agency prepared a concept paper that suggested how funds should be allocated. Some funds already have been allocated to local agencies. The paper identified several components of the Nursing Workforce Initiative:

- *The Nursing Training Enhancement Project.* This component provides $28 million for nurse training and enhancement projects. Approximately $24 million would be available over three years to support regional collaboratives that would provide training and support to eligible individuals who seek nurse training. The Enhancement Project also provides $3 million to test pilot projects that provide strategies for upgrading the skills of Certified Nurse Assistants, Licensed Vocational Nurses, Psychiatric Technicians, and Registered Nurses who are seeking to move into higher-skilled and higher paying positions. The Project also provides $1 million to fund workplace reform projects to assist employers in identifying strategies to help retain nurses already in the workforce.

- *Support for Increased Nurse Education Capacity.* This component provides $24 million over three years to increase the state's capacity to educate nurses. Resources from this component could be used to

develop contracts between the state and the segments of higher education for the purpose of funding additional nurse education enrollment capacity at community colleges and four-year universities.

- *Expanding the Central Valley Health Careers Training Program.* This component provides $6 million over three years to provide training to additional healthcare workers, primarily nurses and psychiatric technicians. The program, which would be based at West Hills Community College, would augment that campus's Caregiver Training Institute. Funding would expand the program to create a regional consortium of training institutions and health care providers to offer opportunities for on-the-job training and distance education.

- *Increased spending authority for the Health Professions Education Foundation.* The Foundation administers several programs that provide financial assistance to students who seek to become Registered Nurses. This component would allow the Foundation to receive a grant from the California Endowment to support scholarships for underrepresented and economically disadvantaged students from the Central Valley wishing to purse careers in nursing.

- *Implementation of Statewide Media and Outreach Campaign to Recruit Nurses.* The Nurse Workforce Initiative encourages that the healthcare industry should work with the State to develop a campaign targeted at middle and high school students. It would encourage these students to consider nursing as a profession. The campaign would also include a website specific to the nursing profession.

- *Standardizing Prerequisites.* This component would explore and support strategies to standardize nursing course prerequisites and other requirements in an effort to make it easier for students to transfer between community colleges, and to transfer between community colleges and four-year university nursing programs.

- *E-Applications.* This component would augment the Bureau of Registered Nursing online application process to allow first-time applicants to access and download the licensing application.

Addressing the nursing shortage by examining admission practices and attrition in California Community College nursing programs

The Governor's Nurse Workforce Initiative recognized the role that community colleges play in the education and training of state's nurse workforce. The Initiative's impetus was in part in response to a report released by the UC San Francisco Center for Health Professions titled *Nursing in California: A Workforce in Crises.* That report noted several factors that might have a negative effect on the number of students enrolling and graduating from community college nursing programs, including:

- Local governance allows community college districts to independently design their respective nursing curriculum which differs at each college;

- There is no standard core curriculum among the districts;
- Inadequate faculty resources are available to expand nursing programs;
- There were no standard prerequisites among colleges;
- Each campus has a different applicant selection method; and
- Prospective students receive inadequate information regarding programs.

The report also noted inconsistencies in admission processes, program content, and attrition rates among community college nursing programs. Recognizing the extent of these issues, the Governor signed SB 664 (Poochigian), Chapter 443, Statutes of 2001, which required the California Postsecondary Education Commission to conduct an analysis of community college admission procedures and attrition rates for their associate degree Registered Nursing programs. SB 664 required the Commission to submit findings and recommendations to the Governor and the Legislature by January 2003.

Issues addressed in response to SB 664

The California Postsecondary Education Commission developed a scope of study in response to SB 664, and sought independent researchers to assist the Commission. The California Policy Research Center of the University of California assisted the Commission in identifying qualified researchers. The researchers selected by the Commission demonstrated extensive knowledge regarding:

- The size, scope and governance of California Community College nursing education programs;
- Community college admission and retention practices;
- Community college data bases on nursing program admissions, enrollments, attrition rates, and degree completions; and
- The public policy issues surrounding the state's nursing shortage.

The study conducted for the Commission provided answers to important policy questions that the Commission requested to be addressed, including the following:

- What are the admission requirements and practices of community college nursing programs, and how do they differ from campus to campus? What are the prerequisites for admission, and how do they differ from campus to campus? What are the admission processes, and how do they differ from campus to campus?

- What role does lottery selection play in the admission process? How are these lotteries conducted? Are they fair in terms of student admission? Do lotteries allow for the identification of those students most likely to succeed in the program?

- How are students informed about the prerequisites for nursing programs? What outreach efforts are undertaken to attract a diverse pool of applicants? How are students advised regarding the differences in requirements among the associate degree programs offered by community colleges?

- What proportion of students admitted to community college nursing programs complete the program? How do success rates differ from campus to campus? What are the reasons for attrition? What support services are provided to assist students to complete programs? How many students use such services?

- What policies could be established to identify students who are most likely to complete a community college nursing program? What policies could be established to identify those students most likely to pass the Registered Nurse Licensing Exam?

- What policies could be established to increase the diversity of nursing students? What is being done to attract and retain underrepresented and socio-economically disadvantaged students? What support services, such as academic advising, tutoring, test preparation help, peer support groups, and mentoring are provided? What effect do such support services have on student retention?

- Are there other delivery systems, such as distance education, on-line instruction, etc. that could be used to expand access, expedite the admission process, and improve retention? Can facilities be better utilized to increase the number of students enrolled?

Executive Summary

CALIFORNIA is experiencing a critical shortage of nurses -- a shortage that is likely to increase in the coming years (Coffman & Spetz, 1999). Although much of the nation is also experiencing similar shortages, California's shortage is more severe than that of any other state in the nation (Bureau of Health Professions, 2002). Most analyses of the state's nursing shortage find that too few nurses are being educated to meet future demand (Coffman & Spetz, 1999; Sechrist, Barter, & Dechairo, 2000). Unless California's nursing education programs can produce additional graduates the nursing shortage could jeopardize public health.

Since 1994, California colleges and universities have graduated between 11,000 and 13,000 nurses per year, with AD programs accounting for about two-thirds of them. Although nursing students in California remain primarily female, the ethnicity of pre-licensure students and graduates is becoming more diverse and has begun to mirror the population in California.

California's nursing programs can increase the number of new nurses in two ways. First, they can create new positions in their programs for students so their entering classes are larger. Second, they can improve the ability of their students to complete their programs and pass the nursing board exam (the NCLEX). Public attention was brought to the problem of attrition from nursing programs after the Los Angeles Times reported that some nursing programs have attrition rates as high as 50% (Leovy, 1999). Unfortunately, there has been little research on attrition from nursing programs or, conversely, on successful programs.

Most community college nursing programs have more qualified applicants than admission slots. Community colleges that are oversubscribed use various admission strategies, such as lotteries and wait lists, to attempt to provide fair and equal access to all qualified students. Critics of these admission strategies question whether random approaches create unnecessary delays in admission of students and overuse of scarce resources to screen unsuccessful students.

This study, requested by the legislature through Senate Bill 664, examines admission policies and attrition rates in California community college RN programs. Specifically, we ask whether admission policies affect attrition, what other program characteristics affect attrition, and whether these things affect first-time pass rates on the national nursing board exam. Based on our predictive models, on-time completion, delay, and attrition rates are better in programs that have fewer students, various support programs for all nursing students, services specifically aimed at

diverse students, and lower shares of African-American and Asian non-Filipino students. Other researchers have found that students who achieve higher grades in certain prerequisites are more likely to complete nursing programs. First-time pass rates on the board exam are better in programs with more students, programs that do not have remedial support and similar programs, fewer African-American students, and fewer Filipino students.

Based on our analysis, we make eight recommendations:

1. Community college RN programs should standardize admission policies, including prerequisite requirements and methods for allocating slots in oversubscribed programs, to create a clear statewide admission practice. This standardization should result from a collaborative effort of the state's nursing programs, with guidance and coordination from the California Community College Chancellor's Office.

2. Community college RN programs should offer a share of their admission slots to students who perform most highly in prerequisite courses. Other criteria, such as previous work experience and community service, could also be considered to prioritize admissions. This standardization should result from a collaborative effort of the state's nursing programs, with guidance and coordination from the Chancellor's Office. The Chancellor's Office should commission a study in five years to determine the success of this strategy.

3. Community college RN programs limit number of units needed to graduate so the average student can complete the nursing program in two years. This limit should be established through a collaborative effort of the state's nursing programs, with guidance and coordination from the Board of Registered Nursing.

4. Community college RN programs, the Community College Chancellor's Office, and the Board of Registered Nursing should provide sufficient information to the public about nursing programs so the potential student can make informed choices about program selection.

5. Community college RN programs should offer ESL, a remedial support service, and a tutoring program. The legislature and Governor should provide nursing programs with additional funds for these support services.

6. Community colleges should provide realistic and specific training to faculty and students to improve the success of students from all ethnic groups. This training may include communication across cultures, strategies for identifying students who are having difficulty, counseling and mentoring techniques, and developing unbiased course material and tests. Ideally, such training should be offered to all faculty at community colleges, not just nursing faculty.

7. The Governor and Legislature should increase the amount of need-based financial aid available to nursing students, so fewer students have to work to support their studies.

8. The Governor and Legislature should target funding increases to programs that have high completion rates *and* high NCLEX pass rates. Additional funds also should be targeted to programs that have significant improvement in their completion and NCLEX pass rates.

Admission Policies and Attrition Rates in California Community College Nursing Programs

Introduction

California is experiencing a critical shortage of nurses—a shortage that is likely to increase in the coming years (Coffman & Spetz, 1999). Although much of the nation is also experiencing similar shortages, California's shortage is more severe than that of any other state in the nation (Bureau of Health Professions, 2002). California's nursing shortage is the result of many factors. These include:

- A growing and aging population whose need for medical attention is increasing;
- An older registered nurse workforce, many of whom will soon retire;
- A complex managed care environment that limits spending on nursing care;
- Poor working conditions, especially in acute care facilities; and
- Anticipated changes in state law that will require lower patient-to-nurse ratios.

Most analyses of the state's nursing shortage find that too few Registered Nurses (RN) are being educated to meet future demand (Coffman & Spetz, 1999; Sechrist et al., 2000). Coffman and Spetz (1999) estimated that state nursing programs need to graduate an additional 3,600 students per year between 2000 and 2010 and 5,000 more per year between 2010 and 2020 to maintain an adequate nursing workforce. Rural counties, communities with high rates of poverty, and those that do not have RN education programs have the greatest difficulty attracting nurses (Seago et al., 2001). Unless California's nursing education programs can produce additional graduates the nursing shortage could jeopardize public health.

Nursing programs fall into two categories: pre-licensure, taken before licensing as an RN, and post-licensure. In California, 93 colleges and universities prepare students at the pre-licensure RN level, 71 of which are associate degree programs. Sixty-eight of the associate degree programs are in publicly funded institutions, and these educate 60% of California's nursing graduates. RN education programs are independent of each other, and they have different prerequisites, graduation requirements, and curricula.

California's nursing programs can increase the number of new nurses in two ways. First, they can create new positions in their programs for students so their entering classes are larger. Second, they can improve the productivity of nursing programs – that is, the ability of their students to complete their programs and pass the nursing board exam (the NCLEX) in a short period of time. Public attention was brought to the problem of attrition from nursing programs after the Los Angeles Times reported that some nursing programs have attrition rates as high as 50% (Leovy, 1999). The limited amount of funding available in California to increase the number of nursing program slots leads us to turn to the productivity of programs as a way to increase the number of registered nurses. Recognizing the importance of this issue, the Governor signed Senate Bill (SB) 664 (Poochigian), Chapter 443, Statutes of 2001, which required the California Postsecondary Education Commission to conduct an analysis of state-funded nursing program admission procedures and attrition rates for associate degree RN programs. To answer the questions posed by SB 664 and CPEC, we analyzed data from numerous sources, using several different methods. Details about our data collection and analytical methods are provided in Appendix A.

The size and demographics of nursing programs

In the 2000-2001 academic year, over 12,000 students were enrolled in California RN programs, with approximately 7700 of these in community colleges. Most nursing students are between 25 and 35 years old, white, and female, although the gender and ethnic distribution of community college nursing students is moving closer to that of the state's population (Table 1). Forty-four percent of nursing students are white, and 13% are male.

TABLE 1: Racial/Ethnic Backgrounds of Pre-Licensure Nursing Students, 2000-2001

	Community college AD programs
Native American	0.94%
Asian non-Filipino	8.57%
African-American	10.09%
Filipino	11.43%
Hispanic	21.05%
White	43.80%
Other/unknown	4.11%

Source: BRN Annual School Report individual program data, 2000-2001

The average community college RN program has 117 students, with 26 programs having 100 or fewer students, 24 having 101 to 150 students, and 16 having more than 150 students. There has been a modest increase

in projected new enrollments in community college RN programs, from 4429 in 1999-2000 to nearly 5000 in 2002-2003. Graduations from community college RN programs were relatively consistent between 1996 and 2001; however, community college graduations were relatively consistent (Table 2).

TABLE 2: Graduations from AD Nursing Programs, 1995-96 Through 2000-2001

	Number of graduations from AD programs	Share of all graduates who were in AD programs
1995-1996	3,689	70.8%
1996-1997	3,366	71.6%
1997-1998	3,449	67.9%
1998-1999	3,556	70.6%
1999-2000	3,523	68.9%
2000-2001	3,799	73.4%

Source: BRN Annual School Reports.

More information about the size of nursing programs, the demographic characteristics of new students, the demographic characteristics of the student body as a whole, and the demographic characteristics of nursing graduates is provided in Appendix B, Tables B1 through B13.

Admission requirements and practices of community college nursing programs

Qualification for entry into a nursing program is based on minimal standards established by the program. Community college nursing program applicants must pass a selected set of prerequisite courses with at least a 2.0 grade point average to be qualified for admission to the program. In the last few years, most nursing education programs could not admit all qualified applicants due to space limitations (Coffman et al., 2001; Board of Registered Nursing, 2001). In 2000-2001, California community colleges received 10,021 applications for admission to nursing programs, but had only 6,670 slots available for new admissions.

Because there are more applicants than admission slots, nursing programs must decide which qualified applicants will enter their program. Two strategies can be used to allocate scarce admission slots: choosing the "most qualified" from the qualified applicants ("selective admissions"), or randomly selecting applicants from the qualified applicants. California's community college system operates under the philosophy that all qualified students should have access to the educational resources of the college. Thus, most nursing programs believe selective admissions are in conflict with the open access mission of community colleges. Most nurs-

ing programs have developed quasi-random methods of admission such as waiting lists, lotteries, and enrollments for those who arrive first on registration day.

Non-selective admission strategies

There is substantial variation in the way programs implement non-selective admission strategies. For example, some lottery programs use computer-generated random number lists and other lotteries draw names from a bag. Many observers view the lottery negatively because qualified students might wait for years for admission or never be admitted because they are not lucky in the lottery (Comins, 2000). Thus, some programs have modified their lottery to address this criticism. Some programs admit an applicant if he or she has not been lucky for 2 or 3 years. One program places an applicant's name into the lottery pool multiple times, adding an additional name each year, thus increasing the statistical possibility of being selected.

Wait lists, which increase a qualified applicant's priority for admission the longer they are on the list, and first-come first-served programs, which offer admission according to the order in which applications are received or the order in which students come to register for classes, are viewed more favorably than pure lotteries because all qualified students will eventually be admitted in these systems. The systems become very complicated when programs use a combination of methods to admit students. For example, a certain percentage of applicants may be taken from last year's wait list and the rest from the most recent applicants (a combination of first-come and wait list systems).

Selective admission strategies

Selective admission practices are employed by some community college nursing programs. Eight programs give admission priority to students who received higher grades in prerequisite courses, have previous health care experience, or performed community service. Most of these programs have created a point system, with additional points awarded for higher grades and other desirable factors. Five of these programs use combination admission systems, in which a share of their admission slots are given to the high-scoring applicants and the remaining are allocated according to a waiting list or lottery.

Nursing programs can increase the selectivity of their admissions by increasing the prerequisite and GPA requirements for admission. Community colleges are relatively unrestricted in determining the number and type of prerequisites and number and type of nursing courses in the curriculum. The number and type of prerequisites required for admission to nursing programs varies from 4 units to 27 units (Table 3). The types of prerequisites vary from 0 to 14 biology units and 0 to 7.5 anatomy or physiology units (Table 3). Some nursing programs list general education requirements as prerequisites and other do not. Seventy-one percent of colleges report having prerequisites in subjects other than science or math. In most cases, the additional prerequisite course is English.

At the present time, California's community college nursing programs are attempting to standardize prerequisites to their programs, as requested by Assembly Bill 2314. This is likely to be a difficult process, because there are a large number of programs that must agree to prerequisite standards, and each of these programs must negotiate with core science departments at their colleges to offer the types of prerequisite courses needed by the nursing programs.

TABLE 3: Range of Prerequisite Units Required for Admission to Community College RN Programs

	Minimum	Median	Maximum
Total units	4	13	27
Biology	0	4	14
Anatomy	0	4	7.5
Chemistry	0	0	5
Physiology	0	4	7.5
Mathematics	0	0	5

Source: SB664 Survey of Community College RN Programs, 2002.

Community college nursing programs require at least a 2.0 GPA for admission. Twenty-nine programs require greater than a 2.0 GPA, with 9 of these requiring higher than a 2.5 GPA. Eight programs reported requiring applicants take some form of standardized tests as part of the application process. In general, oversubscribed nursing programs do not have higher admission qualification requirements than do programs with ample capacity.

Appendix Tables B15 through B22 provide more information about prerequisites, minimum GPAs, and total units required for graduation from nursing programs.

The fairness of community college nursing program admissions processes

The intent of the admission process is to offer equal access to all qualified students. However, the system of selection into nursing program is haphazard and unkind to many students. Students, whether they are highly or minimally qualified, may not get into a nursing program for years, and some admissions practices make it possible for qualified students to never get a slot in the program. Some students apply to multiple nursing programs, but because the prerequisite courses vary by program, the applicant may need to take more prerequisites than necessary to apply to multiple programs. While the student waits for a slot, the student's life is on hold, or the student opts out of nursing and chooses another field. After the student is admitted to a nursing program, there is no guarantee the student will complete the program successfully. Many students who meet

minimum admission qualifications fail courses after starting the nursing program. This is detrimental to the individual and wasteful of the programs' scarce resources.

Attrition from nursing programs

Attrition from nursing programs is a recognized problem. Attrition is usually defined as departure from a nursing program without successful completion of the program, but also can be defined to include students who are delayed in their progress toward program completion. Leovy (Leovy, 1999) and Comins (Comins, 2000) report attrition rates in some community college programs as high as 50%, and attribute high rates primarily to the admission of minimally qualified students.

Besides successful completion of a program, attention must be focused on the ability of nursing program graduates to pass the California licensing examination, the NCLEX. Upon completion of a nursing program, students receive an interim license from the Board of Registered Nursing while they prepare for the board exam (the NCLEX). Program graduates who do not pass the NCLEX lose this interim license and can no longer work as RNs. It is important that nursing programs educate their students so that as many students as possible pass the NCLEX.

Completion, delay, and attrition rates

Based on BRN data, community college RN programs had an average 66% on-time completion rate for the cohort of students who should have completed in 2000-2001. The lowest reported on-time completion rate was 4.3%, and the highest was 100%. Programs reported an average attrition rate of 20%, with a minimum of no attrition and a maximum of 67% attrition. Delay rates, for students still enrolled in nursing programs, averaged 14.5%, with a minimum of 0% and a maximum of 77%.

Community College Chancellor's Office data are consistent with the BRN data. For the cohort of students entering nursing programs in the 1995-96 academic year, 64.1% of had received an award by mid-2002. The lowest award rate for a program with this entering cohort was 35.5%.

Appendix Tables B23 through B26 provide more information about completion, delay, and attrition rates.

NCLEX first-time pass rates

In order to practice as a Registered Nurse, a person must first successfully complete the National Council of State Boards of Nursing Licensing Examination (NCLEX). Without that, one is not a Registered Nurse, even if one has completed a nursing program. In California, new graduates are issued an interim permit to practice until they have attempted the first time and passed the NCLEX. If the new graduate does not pass the exam on the first attempt, the interim permit is revoked and the person cannot practice until they pass the examination. Thus, the percentage of new graduates who pass the licensing exam on the first attempt is crucial to the nursing workforce. As seen in Table 4, nursing programs have an average 84% first-time pass rate on the NCLEX. However, there is substan-

tial variation in the pass rate, with a minimum 25% first-time pass rate and a maximum 100% first-time pass rate. More information is available in Appendix Tables B27 through B29.

TABLE 4: Average and Range of On-Time Completion, Delay, Attrition, and NCLEX First-Time Pass Rates for Community College RN Programs, 2000-2001

	Minimum	Average	Maximum
On-time completion rate	4.3%	65.6%	100%
Delayed but enrolled rate	0%	14.5%	77.3%
Attrition rate	0%	19.9%	67.3%
NCLEX pass rate	25.0%	84.4%	100%

Source: BRN Annual School Report individual program data, 2000-2001.

Timing of attrition

The timing of attrition is important to assessing the impact of attrition on programs and students. If students leave programs early, such as during the first semester, they waste less of their time in an unsuccessful attempt to become nurses. Similarly, fewer college resources are spent on students who might ultimately fail. The average nursing student who started in the 1995-96 academic year spent 5.8 semesters in a nursing program before receiving an award, not including semesters spent taking prerequisite courses. Nearly 75% of successful nursing students complete the program in two years or less.

Among students who leave the community college without receiving an award, there is a wide range in the number of semesters they spend at the program before attriting. Twenty-five percent of students leave no later than the beginning of their second year in the program. However, 25% of students stay in the program at least 5 semesters before leaving unsuccessfully. Appendix Tables B29 through B31 provide more information. These data suggest that nursing programs spend a large amount of resources on a student's education before the student leaves the program.

What Affects Nursing Program Completion and Attrition Rates?

Factors cited by nursing program directors

In the SB664 survey, nursing program directors were asked to describe the reasons students leave their programs unsuccessfully. Based on their responses, the main reason students leave the nursing program unsuccessfully is that they must work to support themselves and/or family members while they are enrolled in the nursing program. The high level of employment of students leaves little time for them to concentrate on their studies and progress satisfactorily. The second commonly cited reason for attrition is that students are not sufficiently prepared academically when they begin the program and thus struggle with the coursework after admission. The former problem could be addressed with financial aid to nursing students, while the latter problem is more complex and not as

easy to solve. We will discuss solutions to the poor preparation of students later in this report.

General program characteristics and success of programs

Some characteristics of nursing programs affect the share of students who successfully complete the program and pass the NCLEX. In analyses presented in Appendix B, Tables B32 and B33, we found that smaller nursing programs have higher on-time completion rates and lower attrition rates, but they have lower NCLEX first-time pass rates. We find no differences in the success of nursing programs that are oversubscribed as compared to those with ample admission slots, or in programs that require more versus fewer units for graduation.

Admission policies and the success of programs

A recent study by the Center for Student Success modeled the predictors of student success in nursing programs using a longitudinal design (Phillips, Spurling, & Armstrong, 2002). The researchers used individual student data and examined a single cohort over a five-year period. They found that four factors were significant predictors of a student's eventual success in a nursing program: overall college GPA, English GPA, core biology (anatomy, physiology, microbiology) GPA, and the number of times a student repeated any of the core biology courses. They also found that a composite score created from these factors improved the completion rates for all ethnic groups.

Based on the findings of the Center for Student Success study, one would expect that programs with higher admission requirements and/or selective admission policies will have higher success rates. However, we do not find this to be true. Programs that reported they selectively admit at least a portion of their applicants do not have better on-time completion, delay, attrition, or NCLEX first-time pass rates. Programs that require more prerequisite units for admission also do not have better on-time completion, delay, attrition, and NCLEX first-time pass rates, nor do programs that have a higher minimum GPA for admission (relevant tables are presented in Appendix B, Tables B34 through B37). Thus, although individual student performance can be partially predicted by their academic history, overall nursing program performance is not affected by minimum qualification requirements or the use of selective admission policies. It is possible that we do not find statistically significant relationships between admission policies and program success because few programs use selective admission policies and thus it is difficult to detect statistical differences.

Some observers believe lotteries and other random admission strategies contribute to high attrition rates at some community college nursing programs. In multiple regression and correlation analyses, we found no association between the admission strategy employed by the college and student performance. Lotteries were not associated with higher attrition rates or lower NCLEX first-time pass rates. Conversely, selective admissions strategies were not associated with improved program success.

Student demographics and student success

Many policymakers are concerned that the demographic characteristics of the nursing workforce are very different from those of the California population as a whole (Coffman, Rosenoff, and Grumbach, 2002). One possible explanation for this is that some ethnic, gender, or age groups might have higher attrition rates or lower NCLEX first-time pass rates. Gender does not appear to be related to nursing program performance; nursing programs with higher-than-average shares of men did not perform differently than other programs. However, we identified significant differences between programs with high shares of particular ethnic groups and other programs. Our analyses found that programs with high shares of non-Filipino Asian and African-American students have lower on-time completion rates than average (see Appendix Tables B38 through B42). Programs with a high share of African-American students have a NCLEX first-time pass rate lower than the statewide average, and programs with a high share of Filipino students have lower-than-average NCLEX first-time pass rates.

Among students who complete their nursing program, Native Americans, Pacific Islanders, and African-Americans complete most quickly, averaging 5.4 to 5.5 semesters. White, Filipino, and Hispanic students require an average of at least six semesters. Among students who leave nursing programs unsuccessfully, Pacific Islanders leave on average within one year of starting the program. In contrast, the average African-American student does not attrit until they have completed 5.1 semesters. Whether these differences result from a greater willingness of some cultural groups to continue in an academic program when faced with difficulty or differences in how students are advised by program faculty and counselors is unknown.

There are numerous potential explanations for why nursing programs with high shares of students of African-American and Asian non-Filipino ethnicity perform more poorly than other programs. The most likely explanation is that community colleges with high shares of African-American and non-Filipino Asian students draw students whose high school preparation was poor. Thus, the students have more difficulty with the nursing curriculum and have poorer test taking ability. It is widely recognized that standardized tests such as the NCLEX have the potential to be biased against certain ethnic and cultural groups (Klisch, 1994; Wendt and Worcester, 2000). Thus, the organization that produces the NCLEX dedicates substantial resources in an effort to eliminate bias in the exam.

The effect of support services on program success

A variety of support services for nursing students are available, depending on the resources of the program and college. All but two programs that responded to the SB664 survey offer some support services such as tutoring, a skills lab, a computer lab, a learning resources center, or counseling or mentoring programs. Half of the state's nursing programs offer between two and four services. A full list of services available and related analyses are in Appendix B, Tables B43 through B50. Some nurs-

ing programs offer support services specifically aimed at diverse students; programs such as English as a second language instruction (ESL), ethnically-focused student organizations, and EOPS are offered by 62% of nursing programs. Most programs offer only one or two such services. We were unable to determine the degree to which students choose to use the support services available to them, or whether students prefer some services over others.

The number of support services offered by nursing programs is associated with higher average on-time completion rates, as seen in Table 5. Programs that offer at least two support services have substantially higher average on-time completion rates than do programs that offer no or only one service. Delay rates are lower for programs with two services as compared with those with no or one service, and delay rates are lower still for programs with three or more services. However, NCLEX pass rates do not appear to be related to support services.

TABLE 5: Average On-Time Completion, Delay, Attrition, and NCLEX First-Time Pass Rates for Community College RN Programs, by Number of Support Services, 2000-2001

	Number of support services					
	0-1	2	3	4	5-6	7-9
On-time completion	47.3%	68.0%	73.2%	65.4%	65.5%	64.0%
Delayed	26.6%	20.0%	9.0%	15.5%	11.1%	12.4%
Left program	26.1%	11.9%	17.8%	19.1%	23.3%	23.6%
NCLEX pass 2000-01	74.9%	79.4%	83.3%	82.3%	78.5%	78.8%
NCLEX pass 2001-02	82.4%	83.5%	85.0%	81.4%	82.9%	85.2%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.

Some specific services are associated with program success, even when controlling for other program characteristics that might affect program success. Tutoring programs, the presence of a learning resource center, and remedial support services improve on-time completion rates and attrition rates. Some services have the opposite relationships with program performance than expected. For example, counseling programs are associated with higher attrition rates. There are several possible explanations for this finding. Nursing programs that face high attrition rates might implement counseling programs to address the attrition. Thus, the nursing programs with counseling programs had higher attrition rates to being with, and the association between attrition and counseling is not causal. In this scenario, counseling programs could be improving attrition rates, but because the attrition rates were extremely high to begin with, the improvement is not detectable in a cross-sectional analysis.

Another possibility is that counselors help students who are having difficulty in a nursing program identify other options and leave the program. In this scenario, counseling has a causal effect on attrition. Other support services with contrary relationships to on-time completion and attrition rates are writing centers and libraries. Numerous support services have unexpected relationships with NCLEX first-time pass rates: remedial support programs, child care, EOPS for diverse students, tutoring for diverse students, and programs for diverse disabled students. More research needs to be done on the specific effects of each type of support service to identify those that are successful, and in which environments they are successful.

Table 6 presents nursing program on-time completion, delay, attrition, and NCLEX pass rates by the number of support services for diverse students offered by the program. Programs that offer one or more support service have higher on-time completion rates, and lower delay rates. Support services for diverse students do not appear to be related to attrition rates or NCLEX first time pass rates. ESL programs have the most significant effect on program success, being associated with both higher on-time completion rates and lower attrition rates.

TABLE 6: Average On-Time Completion, Delay, Attrition, and NCLEX First-Time Pass Rates for Community College RN Programs, by Number of Support Programs for Diverse Students, 2000-2001

	Number of support services for diverse students			
	None	1	2	3-4
On-time completion	60.6%	70.0%	66.5%	72.5%
Delayed	17.4%	10.8%	16.9%	8.5%
Left program	22.0%	19.1%	16.5%	18.9%
NCLEX pass 2000-01	81.4%	79.7%	80.1%	74.8%
NCLEX pass 2001-02	83.3%	81.5%	85.5%	83.4%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data.

Best practices of community college nursing programs

Programs with high success rates

Nine of California's community college RN programs have at least 90% of their students complete their programs on time. Many of these programs' students have demographic characteristics that make them more likely to succeed. However, we identified four programs whose student body is at least 37% nonwhite, and we have complete data for three of these programs. These three programs have several characteristics in common. All require at least four biology, four anatomy, and four physiology prerequisite units. One of these programs requires additional math and chemistry prerequisites units. All three programs offer support services for nursing students, and all offer ESL instruction for diverse students. One program also offers a skills lab and remedial education support. Another offers career planning services and financial aid aimed at

diverse students. The third offers remedial education for diverse students. The faculty ratios of the programs vary widely, from 6.9 students per faculty to 10.3 students per faculty. They also vary in size of nursing program enrollment.

Of these three programs with exceptionally diverse student bodies and high on-time completion rates, one has a relatively low NCLEX first-time pass rate. The two programs with high NCLEX first-time pass rates have several characteristics in common. They both have at least a 2.5 GPA required for admission, and they both use selective admission strategies to admit their students. They also have articulation agreements with their local California State University campus. Finally, they have higher-than-average student-to-faculty ratios, with at least 9.7 students per faculty.

The directors of all three of these programs made specific requests to increase their students' NCLEX first-time pass rate. First, all of them said they need to have students who are better prepared in math, reading and writing. Two of the directors said they need more faculty, and two said they need more financial aid for students so the students can work less while attending school.

Programs that have expanded nursing program slots

Nursing programs in California have been quick to respond to an increased need for registered nurses and have used a variety of creative methods to deliver nursing education. These strategies can increase the admission rates of nursing programs, and the most creative programs integrate financial aid with education. Campuses have used various methods of distance learning, offered courses at night and on weekends, and partnered with other facilities to increase the number of individuals who can be educated. Numerous community colleges have created programs with local hospitals to offer hospital employees RN education. The hospitals provide financial assistance to the nursing program and to students for these programs. Some of these programs are intensive, lasting only 18 months, and most of them offer pay to their employees while they are enrolled in the RN program.

Information for prospective students

Prospective nursing students need to access pertinent information about the programs to which they might apply. Neither US News and World Reports nor other agencies rate or rank pre-licensure nursing programs, particularly at the community college level. The only information akin to rankings are the NCLEX first-time pass rates for each nursing program, posted on the internet by the California Board of Registered Nursing. Prospective students cannot access comparisons of nursing program on-time completion and attrition rates.

Several general websites provide information about nursing as a career and how to become a nurse (www.nurse.ca.gov, www.cpec.ca.gov, and www.choosenursing.com, www.cccco.edu). The one notable exception is the California Board of Registered Nurses (http://www.rn.ca.gov/). Nursing programs also offer information on the internet, but web page

information varies among nursing programs and colleges. The information available is inconsistent, so prospective students cannot compare programs. Most programs list prerequisites, nursing courses, course schedules, and information about fees.

Conclusions and recommendations

Based on our analyses, we recommend that:

1. **Community college RN programs should standardize admission policies, including prerequisite requirements and methods for allocating slots in oversubscribed programs, to create a clear statewide admission practice. This standardization should result from a collaborative effort of the state's nursing programs, with guidance and coordination from the Chancellor's Office.**

   Admission practices vary widely across California's community college RN programs. The number of prerequisites, GPA required for admission, and methods for allocating slots are not standardized, and it is difficult for prospective students to determine the admission policies at the programs to which they might apply. Students who want to apply to multiple nursing programs often need to take more prerequisite courses than necessary, in order to meet the diverse requirements of programs. Students who are placed in lotteries might never receive a slot in a program. Standardized admission practices would be more equitable to students.

2. **Community college RN programs should offer a share of their admission slots to students who perform most highly in prerequisite courses. Other criteria, such as previous work experience and community service, could also be considered to prioritize admissions. This standardization should result from a collaborative effort of the state's nursing programs, with guidance and coordination from the Chancellor's Office. The Chancellor's Office should commission a study in five years to determine the success of this strategy.**

   The Center for Student Success study on student performance found that overall college GPA, English GPA, core biology GPA, and the number of times a student repeated any of the core biology courses were predictors of student success. Although we found no statistically significant relationship between programs that have selective admission requirements and program success overall, we did find that two of the three California programs with particularly diverse student bodies and extremely high on-time completion rates have selective admission practices. However, although the available research suggests that selective admissions *might* increase program success, we recommend that some share of nursing program slots be allocated on a first-come, first-served or waiting list basis. We make this recommendation to preserve some of the open-access benefit of community colleges. We recommend that further study of admission practices be

done five years after the implementation of a new system, to ensure that the new system performs well.

3. **Community college RN programs should limit number of units needed to graduate so the average student can complete the nursing program in two years. This limit should be established through a collaborative effort of the state's nursing programs, with guidance and coordination from the Board of Registered Nursing.**

   There is wide variation in the number of units required to graduate from RN programs., ranging from 62 to 95 semester units. However, the number of units required to graduate has no association with NCLEX first-time pass rates. Because requiring more nursing units is not associated with improved program performance, we recommend that some maximum be established to increase the speed with which students can graduate.

4. **Community college RN programs, the Community College Chancellor's Office, and the Board of Registered Nursing should provide sufficient information to the public about nursing programs so the potential student can make informed choices about program selection.**

   Students have few sources of information with which they can compare nursing programs. Students need to know about services offered by programs, program requirements, and program success in order to make the best choices for their education. These data should be available from a central source. The Chancellor's Office or the Board of Registered Nursing could put this information on their web sites.

5. **Community college RN programs should offer ESL, a remedial support service, and a tutoring program. The Governor and Legislature should provide nursing programs with additional funds for these support services.**

   These three programs were associated with improved program success in most of our analyses. Of the three, ESL instruction is most consistently advantageous in our statistical analyses. Nursing program directors frequently cited the poor preparation of nursing students in math, science, and English as a barrier to completion of their nursing program. Remedial support services can help address deficiencies in the basic preparation of nursing students. Of course, the ideal solution involves improving primary and secondary education so that all high school graduates are adequately prepared for their future studies.

6. **Community colleges should provide realistic and specific training to faculty and students to improve the success of students from all ethnic groups. This training might include communication across**

cultures, strategies for identifying students who are having difficulty, counseling and mentoring techniques, and developing unbiased course material and tests. Ideally, such training should be offered to all faculty at community colleges, not just nursing faculty.

This study finds strong associations between the ethnic and racial mix of a program's student body and the program's overall success. This suggests that there may be significant racial and ethnic characteristics affecting the success of nursing graduates. The most important factor is likely the high share of minority students who are not adequately prepared for postsecondary study. There may be other cultural barriers that must be addressed in a forthright fashion to increase the ability of nursing programs to graduate high shares of all types of students, and to increase the ability of these students to pass the NCLEX.

7. **The Governor and Legislature should increase the amount of need-based financial aid available to nursing students, so fewer students have to work to support their studies.**

   Nursing program directors frequently noted that a high share of their students work full-time while attending school, and that this employment affects their academic performance. Financial aid allows students to focus on their coursework, and thus can increase the productivity of nursing programs. Such financial aid should be based on the financial need of students. Currently existing programs, such as those administered by the Health Professions Education Foundation in the Office of Statewide Health Planning and Development, could efficiently increase the amount of aid available if given sufficient funding.

8. **The Governor and Legislature should target funding increases to programs that have high completion rates *and* high NCLEX pass rates. Additional funds also should be targeted to programs that have significant improvement in their completion and NCLEX pass rates.**

   California faces a large budget deficit and must spend its limited funds in the most efficient manner possible. Thus, we recommend that any additional state funds allocated to nursing education be targeted at the programs that can produce the most nurses in the shortest period of time. However, we also recommend that the state reward programs that may have had low success in the past but are improving their productivity.

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Appendix A Technical Details of the Analysis

Data collection

In order to better understand nursing education in California's community colleges, we collected current and historical data about associate degree nursing programs. These data were obtained from several sources, including a survey of community college nursing programs.

California Postsecondary Education Commission database

The California Postsecondary Education Commission (CPEC) collects data from California postsecondary institutions, including numbers of enrollments, first-time freshmen, transfer students, and degrees and certificates awarded. CPEC also collects information about faculty and staff, institutional finances, and eligibility study data. It also includes information on California's elementary and secondary schools, specifically enrollments and high school graduates.

Board of Registered Nursing Annual School Reports

The California Board of Registered Nursing (BRN) surveys nursing programs annually as part of the monitoring responsibility of the BRN mandated by law. Information collected includes number of enrollments, completions, available slots, and information about students and faculty. The BRN asks program directors to report the number of students who were enrolled in the cohort that should have graduated in the most recent year, the number who completed on schedule, the number who remained enrolled but are behind schedule, and the number who exited the program for reasons other than successful completion. Some data about applications and admissions to the nursing program also are collected. The BRN provided us with the summary reports from 1995-96 through 2000-01, and the individual school data from 2000-2001. The BRN obtained permission from all nursing programs in California to release these data; we appreciate the agreement of nursing program directors to assist in this study.

NCLEX First-Time Pass Rates Reports

The National Council of State Boards of Nursing provides individual schools and the BRN with reports on the number of people who pass the examination on the first attempt and subsequently. The BRN publishes these data for each nursing program in California on the internet.

California Community Colleges Chancellors Office database

The California Community Colleges Chancellors Office (CCCCO) collects data on all students enrolled in community colleges. This informa-

tion includes the courses in which students are enrolled, their success in the courses, and their progress though the community college system. Officials at CCCCO extracted cohorts of students who began nursing programs in the 1994-95 through 1999-2000 academic years. We identified a student as entering a nursing program according to the semester in which they took the first course in the nursing program. These first courses were identified from nursing program documents listing the courses nursing students take after admission to the program. Most of these documents are available on the college website and in the college catalogs. The extracted data included the semester/quarter in which each student took the first course in the nursing program, whether an award was received by the student, the semester/quarter in which the award was received, the last semester/quarter in which the student was enrolled at the college if they did not receive an award, the ethnic background of each student, the gender of each student, and the total number of units attempted by the student while in the nursing program. Some students who left the college may have transferred to another community college or four-year college; we cannot track students after they depart the nursing program they started. The CCCCO allowed us to analyze these data at their offices to create profiles of each nursing program.

College and program web sites

Most nursing programs in California provide information to the public about the requirements and curriculum of the nursing programs on the college's web site. We were able to find admission requirements, prerequisite courses, and nursing courses on these sites.

Survey of nursing program directors

There is no public data source that describes the admission practices, support programs, and practices that increase retention and graduation of students in the programs. We sent surveys to all the 68 community college directors of nursing asking about these issues. The initial survey was mailed in May 2002. We followed up by telephone in fall 2002 to collect data for all but two of the programs.

Methods for analyzing data

The data collected were analyzed in three ways. First, we examined the measures of central tendency including statewide averages, medians, and modes for information collected. We also describe the data by program type, ethnic background, gender and age of student. We include distributions by quartile of number of units and number of students.

The second method used to analyze the data was correlational analysis. Using a statistical program called Stata, we examined whether there were statistically significant correlations between characteristics of nursing programs. For example, we computed the correlation between the grade point average required for admission to a program and the attrition rate from the program. Pairwise correlations were computed for all variables

in our data. In this report, we discuss those most relevant to the questions posed by CPEC.

After completing the correlational analysis, we performed multivariate regressions to determine what institutional factors predict lower attrition rates, fewer delayed completions, and more successful first time pass rates on the NCLEX examination. We were interested in discovering what strategies the most successful nursing programs used. We computed the regression models for the semester programs only. All standard errors are robust to heteroskedasticity. It is important to recognize that these multivariate regressions do not demonstrate causal relationships between variables. They simply allow one to determine what relationships are important, controlling for other characteristics of nursing programs. More details about the multivariate analyses are provided in Appendix C.

This report does not provide information about specific nursing programs. The purpose of this report is to identify best practices of successful programs so that other programs might benefit. We acknowledge that there are differences among programs, but certain successful strategies may be adapted to fit many student and faculty groups, locations, and curricula.

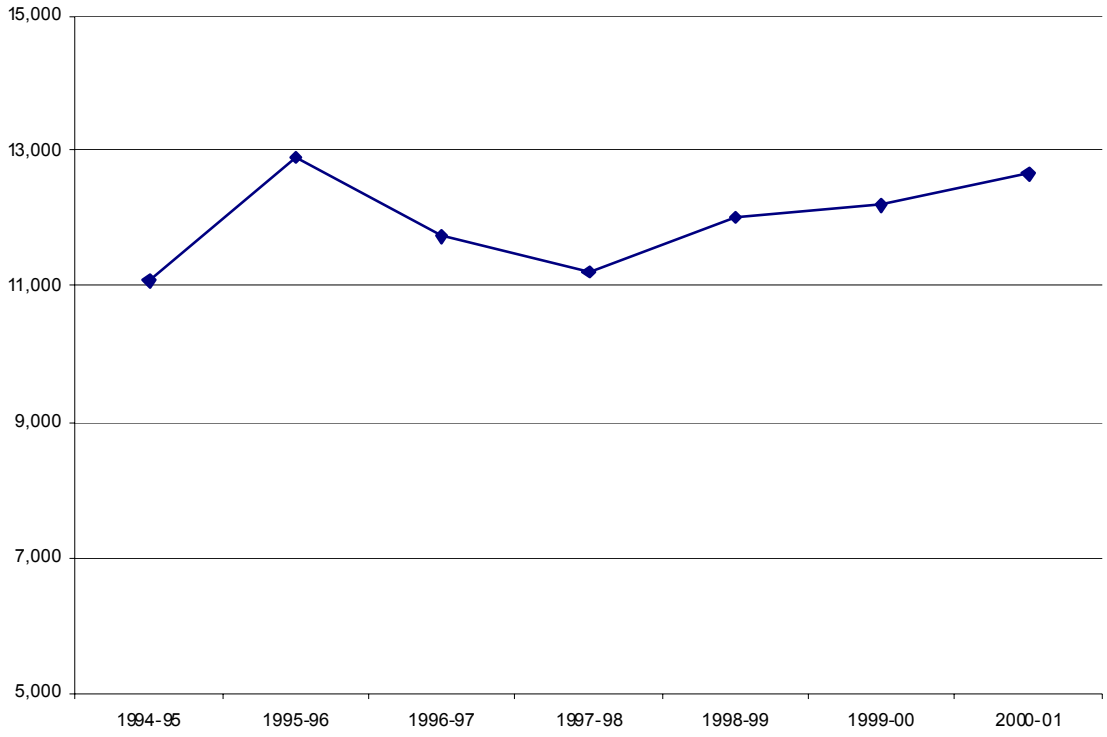
Appendix B Additional Tables and Figures

Table B1: Total statewide student census, 2000-2001

	All programs	BSN programs	AD programs	ELM programs
Total enrollments	12,665	4,235	8,236	190
State college/ university enrollments	10,155	2,390	7,706	59

Source: BRN Annual School Report individual program data, 2000-2001

Figure B1: Total statewide number of students in pre-licensure programs



Source: BRN Annual School Reports.

Table B2: Racial/ethnic backgrounds of pre-licensure nursing students, 2000-2001

	All programs	All AD programs	Community college AD programs
Native American	0.85%	0.93%	0.94%
Asian non-Filipino	12.25%	8.34%	8.57%
African-American	8.69%	10.33%	10.09%
Filipino	10.84%	11.59%	11.43%
Hispanic	18.89%	21.38%	21.05%
White	42.29%	43.35%	43.80%
Other/unknown	6.19%	4.08%	4.11%

Source: BRN Annual School Report individual program data, 2000-2001

Table B3: Gender of pre-licensure nursing students, 2000-2001

	All programs	AD programs	Community college AD programs
Female	87.31%	85.22%	86.75%
Male	12.69%	14.78%	13.25%

Source: BRN Annual School Report individual program data, 2000-2001

Table B4: Age of pre-licensure nursing students, 2000-2001

	BSN programs	AD programs	Community college AD programs
18-25	35.05%	29.36%	28.68%
25-35	32.91%	40.91%	40.74%
36-45	13.99%	18.83%	19.18%
46-55	4.39%	5.95%	6.11%
56+	0.79%	0.97%	1.03%
Other/unknown	13.00%	3.98%	4.27%

Source: BRN Annual School Report individual program data, 2000-2001

Table B5: Distribution of number of enrollments among AD nursing programs, 2000-2001

	Community college AD programs
Average	116.8
Standard Deviation	52.4
Median	113
Number with 50 or fewer students	5
Number with 51-100 students	21
Number with 101-150 students	24
Number with 151-200 students	11
Number with 201 or more students	5

Source: BRN Annual School Report individual program data, 2000-2001

Table B6: Projected first-year enrollments

	Total	BSN programs	AD programs	ELM programs
8/1/99 – 7/31/00	6,181	1,692	4,429	60
8/1/00 – 7/31/01	6,453	1,730	4,568	155
8/1/01 – 7/31/02	6,704	1,749	4,784	171
8/1/02 – 7/31/03	6,915	1,752	4,998	165

Source: BRN Annual School Reports

Table B7: Racial/ethnic backgrounds of newly enrolled students, 2000-01

	All programs	AD programs	Community college AD programs
Native American	0.74%	0.76%	0.80%
Asian non-Filipino	10.86%	8.65%	8.87%
African-American	9.20%	10.26%	10.09%
Filipino	11.42%	11.94%	11.50%
Hispanic	19.88%	22.44%	22.36%
White	42.52%	42.46%	42.90%
Other/unknown	5.37%	3.49%	3.48%

Source: BRN Annual School Report individual program data, 2000-2001

Table B8: Gender of newly enrolled students, 2000-2001

	All programs	AD programs	Community college AD programs
Female	86.06%	85.22%	85.61%
Male	13.94%	14.78%	14.39%

Source: BRN Annual School Report individual program data, 2000-2001

Table B9: Age of newly enrolled students, 2000-2001

	BSN programs	AD programs	Community college AD programs
18-25	37.02%	32.37%	31.42%
25-35	32.78%	38.74%	38.72%
36-45	15.07%	19.32%	19.68%
46-55	4.21%	5.34%	5.59%
56+	0.42%	0.55%	0.58%
Other/unknown	10.49%	3.68%	4.01%

Source: BRN Annual School Report individual program data, 2000-2001

Table B10: Graduations from Nursing Programs, 1995-96 through 2000-2001

	BSN programs	AD programs	Entry-level Master's programs	Share of graduates who were in AD programs
1995-1996	1,521	3,689	n/a	70.8%
1996-1997	1,336	3,366	n/a	71.6%
1997-1998	1,601	3,449	29	67.9%
1998-1999	1,447	3,556	35	70.6%
1999-2000	1,463	3,523	130	68.9%
2000-2001	1,277	3,799	102	73.4%

Source: BRN Annual School Reports

Table B11: Racial/ethnic backgrounds of nursing program graduates, 2000-2001

	All programs	AD programs	Community college AD programs
Native American	0.72%	0.80%	0.82%
Asian non-Filipino	10.63%	7.97%	7.93%
African-American	7.76%	8.94%	8.76%
Filipino	10.69%	11.09%	10.44%
Hispanic	19.83%	22.44%	22.18%
White	45.82%	45.07%	46.16%
Other/unknown	4.55%	3.70%	3.71%

Source: BRN Annual School Report individual program data, 2000-2001

Table B12: Gender of nursing program graduates, 2000-2001

	All programs	AD programs	Community college AD programs
Female	88.28%	87.46%	88.10%
Male	11.72%	12.54%	11.90%

Source: BRN Annual School Report individual program data, 2000-2001

Table B13: Age of nursing program graduates, 2000-2001

	BSN programs	AD programs	Community college AD programs
18-25	26.04%	23.28%	22.44%
25-35	40.27%	44.41%	43.79%
36-45	16.62%	21.28%	21.88%
46-55	5.09%	6.38%	6.75%
56+	0.79%	1.10%	1.17%
Other/unknown	11.19%	3.55%	3.97%

Source: BRN Annual School Report individual program data, 2000-2001

Table B14: Percent of Slots Filled vs. Slots Available

	BSN programs	AD programs	ELM programs
1996-97	93.5%	97.5%	n/a
1997-98	98.3%	96.5%	90.0%
1998-99	95.4%	94.4%	93.3%
1999-00	84.2%	96.1%	83.9%
2000-01	88.7%	94.6%	90.4%

Source: BRN Annual School Reports

Table B15: Average prerequisites required by community college RN program size

	100 or fewer students	101-150 students	151 or more students
Total units	14.4	14.6	12.1
Biology	3.8	5.0	4.2
Anatomy	4.1	3.9	3.4
Chemistry	1.1	1.2	0.8
Physiology	3.8	4.0	3.2
Mathematics	1.7	0.5	0.4
Other prerequisites required?	75%	71%	67%

Source: SB664 Survey of Community College RN Programs, 2002

Table B16: Average number of nursing program semester units and college semester units required for completion of community college RN programs, excluding quarter-system programs, 2002

	All programs	100 or fewer students	101-150 students	151 or more students
Nursing program units	42.4	44.8	40.2	41.9
Total campus units	77.5	79.7	77.8	73.8

Source: SB664 Survey of Community College RN Programs, 2002. One program is on a quarterly academic calendar and was omitted from this table.

Table B17: Range of nursing program semester units and college semester units required for completion of community college RN programs, excluding quarter-system programs, 2002

	Minimum	25^{th} percentile	50^{th} percentile	75^{th} percentile	Maximum
Nursing program units	36	39.5	41	44	63
Total campus units	62.5	72	78.1	83	95

Source: SB664 Survey of Community College RN Programs, 2002. One program is on a quarterly academic calendar and was omitted from this table.

Table B18: Minimum grade-point average for admission in community college RN programs

GPA required	All programs	100 or fewer students	101-150 students	151 or more students
2.0	36	13	13	10
2.1 to 2.5	20	10	6	4
Higher than 2.5	9	3	4	2

Source: SB664 Survey of Community College RN Programs, 2002

Table B19: Average number of nursing program semester units and college semester units required for completion of community college RN programs, excluding quarter-system programs, 2002

	All programs	100 or fewer students	101-150 students	151 or more students
Nursing program units	42.4	44.8	40.2	41.9
Total campus units	77.5	79.7	77.8	73.8

Source: SB664 Survey of Community College RN Programs, 2002. One program is on a quarterly academic calendar and was omitted from this table.

Table B20: Range of nursing program semester units and college semester units required for completion of community college RN programs, excluding quarter-system programs, 2002

	Minimum	25th percentile	50th percentile	75th percentile	Maximum
Nursing program units	36	39.5	41	44	63
Total campus units	62.5	72	78.1	83	95

Source: SB664 Survey of Community College RN Programs, 2002. One program is on a quarterly academic calendar and was omitted from this table.

Table B21: Admission requirements for oversubscribed community college RN programs

	Oversubscribed	Not oversubscribed
Total units	13.2	15.9
Biology	4.4	4.3
Anatomy	3.7	4.3
Chemistry	0.8	1.9
Physiology	3.5	4.2
Mathematics	0.8	1.3
Other prerequisites required?	70%	75%
2.0 GPA required	28	7
2.1-2.5 GPA required	14	6
Over 2.5 GPA required	5	4
Standardized tests required	12%	11.8%

Sources: BRN Annual School Report individual program data, 2000-2001; SB664 Survey of Community College RN Programs, 2002

Table B22: Admissions strategies used by oversubscribed community college RN programs

Type of admissions strategy	**Number of programs**
Lottery only	12
First-come first-serve only	1
Waiting list only	3
Other system only	6
Lottery and first-come first-serve	2
Lottery and waiting list	6
Lottery and other system	3
First-come and waiting list	14
Waiting list and other system	4
More than 2 methods	3

Source: SB664 Survey of Community College RN Programs, 2002

Table B23: Average on-time completion, delay, and attrition rates for all RN programs, 1998-1999 through 2000-2001

	On-time completion			Delayed but enrolled			Left program, incomplete		
	AD	BSN	ELM	AD	BSN	ELM	AD	BSN	ELM
1998-99	64%	81%	97%	17%	6%	0%	19%	11%	3%
1999-00	63%	80%	86%	15%	8%	7%	22%	11%	6%
2000-01	59%	84%	80%	20%	7%	17%	22%	9%	3%

Source: BRN Annual School Reports

Table B24: On-time completion, delay, and attrition rates for community college RN programs, by program size, 2000-2001

	All programs	100 or fewer students	101-150 students	151 or more students
On-time completion	65.6%	72.8%	61.4%	60.3%
Delayed but enrolled	14.5%	8.6%	19.1%	17.4%
Left program	19.9%	18.6%	19.5%	22.3%

Source: BRN Annual School Report individual program data, 2000-2001

Table B25: Average and range of on-time completion, delay, and attrition rates for community college RN programs, 2000-2001

	Average	Minimum	25^{th} percentile	50^{th} percentile	75^{th} percentile	Maximum
On-time completion	65.6%	4.3%	46.3%	71.7%	82.4%	100%
Delayed but enrolled	14.5%	0%	4.5%	10.2%	17.5%	77.3%
Left program	19.9%	0%	10.3%	16.7%	27.1%	67.3%

Source: BRN Annual School Report individual program data, 2000-2001

Table B26: Average and range of completion rates and semesters to completion for community college RN programs in 2002, cohort entering 1995-96

	Average	Minimum	25th percentile	50th percentile	75th percentile	Maximum
Share who receive award	66.2%	35.5%	58.6%	68.4%	77.9%	91.1%

One program operates on a quarter system and is excluded from this analysis.
Source: CCCCO database, 1995-96 entering cohort.

Table B27: Average and range of NCLEX first-time pass rates for community college RN programs, 2000-2001

	Average	Minimum	25th percentile	50th percentile	75th percentile	Maximum
1997-1998	87.2%	66.7%	82.1%	89.0%	92.3%	100%
1998-1999	84.3%	60.7%	77.0%	86.8%	91.3%	100%
1999-2000	84.8%	58.8%	79.3%	85.9%	91.0%	100%
2000-2001	81.6%	28.6%	77.5%	84.6%	89.5%	95.9%
2001-2002	84.4%	25.0%	80.3%	85.8%	91.0%	100%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B28: Average and range of NCLEX first-time pass rates for community college RN programs, 2000-2001

	Minimum	Average	Maximum
1997-1998	66.7%	87.2%	100%
1998-1999	60.7%	84.3%	100%
1999-2000	58.8%	84.8%	100%
2000-2001	28.6%	81.6%	95.9%
2001-2002	25.0%	84.4%	100%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B29: NCLEX first-time pass rates for community college RN programs, by program size, 1997-1998 through 2001-2002

	All programs	100 or fewer students	101-150 students	151 or more students
1997-1998	87.2%	89.8%	86.3%	88.0%
1998-1999	84.3%	81.1%	86.5%	86.1%
1999-2000	84.8%	84.8%	84.8%	85.1%
2000-2001	81.6%	77.2%	83.5%	82.3%
2000-2002	84.4%	81.8%	86.4%	84.1%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B30: Average and range of completion rates and semesters to completion for community college RN programs in 2002, cohort entering 1995-96

	Average	Minimum	25th percentile	50th percentile	75th percentile	Maximum
Number of semesters at campus	14.1	10.8	12.5	13.7	15.3	18.4
Number of semesters before entering program	8.2	5.3	7.0	7.7	9.2	12.2
Number of semesters in program	5.8	4.5	5.4	5.8	6.1	7.9

Source: CCCCO database, 1995-96 entering cohort

Table B31: Average and range of semesters in the nursing program for those completing and not completing community college RN programs by 2002, cohort entering 1996-97

	No award	Award received
Average	4.4	5.8
25^{th} percentile	3.8	5.4
Median	4.3	5.8
75^{th} percentile	5.0	6.1

One program operates on a quarter system and is excluded from this analysis.
Source: CCCCO database, 1995-96 entering cohort.

Table B32: On-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, by oversubscribed status, 2000-2001

	Oversubscribed	Not Oversubscribed
On-time completion	65.7%	64.0%
Delayed but enrolled	13.7%	17.7%
Left program	20.7%	18.2%
NCLEX pass 2000-01	82.7%	75.1%
NCLEX pass 2001-02	84.3%	82.0%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B33: Average on-time completion, delay, attrition, and NCLEX first-time pass rates, by units required to complete community college RN programs, 2000-2001

	On-time completion	Delay	Left program	NCLEX pass 2000-01	NCLEX pass 2001-02
Nursing units					
Less than 48 units	64.3%	14.5%	21.2%	80.9%	83.8%
48 or more units	70.7%	11.4%	17.9%	81.9%	88.7%
Total units					
83 or fewer units	65.4%	12.2%	22.4%	81.8%	85.3%
More than 83 units	67.7%	20.1%	12.1%	78.0%	79.5%

Sources: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002

Table B34: On-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, by selectivity of admissions process, 2000-2001

	Not selective	Selective
On-time completion	64.8%	70.4%
Delayed but enrolled	14.4%	15.0%
Left program	20.8%	14.5%
NCLEX pass 2000-01	81.4%	82.9%
NCLEX pass 2001-02	84.4%	84.5%

None of the differences in this table are statistically significant at the P<0.10 level. In pariwise correlation analysis, selectivity is not significantly correlated with school performance.
Sources: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002

Table B35: Average on-time completion, delay, attrition, and NCLEX first-time pass rates, by prerequisite requirements for community college RN programs, 2000-2001

	On-time completion	Delay	Left program	NCLEX pass 2000-01	NCLEX pass 2001-02
Total prerequisites					
0-16 units	66.0%	12.4%	21.6%	81.4%	84.0%
17 units or more	63.1%	18.9%	18.0%	81.2%	85.0%
Biology					
0-5 units	65.4%	13.7%	20.9%	80.7%	83.8%
6 units or more	62.0%	20.8%	17.2%	88.0%	89.8%
Chemistry					
0-3 units	66.7%	12.4%	20.9%	81.2%	84.5%
4 units or more	60.9%	19.4%	19.7%	81.6%	83.6%
Physiology					
0-4 units	65.9%	14.6%	19.5%	80.6%	83.8%
5 units or more	62.8%	13.3%	23.9%	83.5%	85.6%
Anatomy					
0-4 units	65.3%	14.6%	20.1%	81.1%	84.2%
5 units or more	64.6%	13.0%	22.3%	82.3%	84.7%
Mathematics					
0-2 units	64.7%	13.8%	21.4%	81.8%	84.4%
3 units or more	66.8%	15.7%	17.6%	79.7%	83.8%

Sources: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002

Table B36: On-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, by GPA required for admission, 2000-2001

	2.0	2.1 to 2.5	Higher than 2.5
On-time completion	65.3%	64.0%	71.9%
Delayed but enrolled	13.4%	15.6%	12.7%
Left program	21.2%	20.4%	15.4%
NCLEX pass 2000-01	82.4%	78.8%	80.3%
NCLEX pass 2001-02	83.5%	87.6%	82.9%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B37: Average and range of semesters at the community college before entering the nursing program for those completing and not completing community college RN programs by 2002, cohort entering 1996-97

	No award	Award received
Average	9.0	8.2
25th percentile	8.0	7.0
50th percentile	9.2	7.7
75th percentile	10.5	9.2

Source: CCCCO database, 1995-96 entering cohort

Table B38: Average on-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, for programs with high shares of nonwhite students, 2000-2001

	Top 25th percentile in share of students with these backgrounds			
	Asian non-Filipino	African-American	Filipino	Hispanic
On-time completion	58.0%	47.3%	64.1%	66.6%
Delayed but enrolled	14.3%	20.8%	12.6%	18.9%
Left program	27.7%	31.9%	23.3%	14.5%
NCLEX pass 2000-01	78.8%	71.1%	79.5%	81.9%
NCLEX pass 2001-02	83.3%	77.5%	82.6%	84.6%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B39: Average on-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, for programs with high shares of men and particular age groups, 2000-2001

	Top 25th percentile in share of students with these characteristics			
	Male	Age 18-25	Age 36-45	Age 46-55
On-time completion	72.2%	68.2%	67.1%	67.0%
Delayed but enrolled	9.5%	14.8%	15.7%	10.8%
Left program	18.3%	17.0%	17.2%	22.2%
NCLEX pass 2000-01	81.2%	74.4%	78.1%	83.7%
NCLEX pass 2001-02	80.8%	82.4%	82.7%	84.9%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B40: Correlations between on-time completion, delay, attrition, and NCLEX first-time pass rates, and student characteristics for community college RN programs, 2000-2001

	On-time completion	Delay	Left program	NCLEX pass 2000-01	NCLEX pass 2001-02
% Asian non-Filipino	-0.23	-0.05	0.39*	-0.06	0.06
% African-American	-0.41*	0.43*	0.16	-0.66*	-0.65*
% Filipino	-0.08	-0.00	0.13	-0.18	-0.00
% Hispanic	-0.00	0.11	-0.10	0.01	-0.10
% Male	0.15	-0.15	-0.06	0.07	-0.21
% Age 18-25	0.09	-0.11	-0.02	-0.07	0.09
% Age 36-45	-0.03	0.05	-0.01	-0.12	-0.17
% Age 46-55	0.20	-0.17	-0.12	0.23	0.20

* Statistically significant at 0.05 level.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B41: Award Percentage by Ethnicity-Averages for Students

Ethnicity	Percent Receiving an Award
Asian non-Filipinos	49.1%
African-American	50.7%
Filipinos	55.6%
Hispanics	58.8%
Pacific Islanders	60.0%
Native American	80.0%
White/Caucasian	71.6%

Source: CCCCO database, 1995-96 entering cohort

Table B42: Average number of semesters in the nursing program and at the campus for those completing and not completing community college RN programs by 2002, by ethnic group, cohort entering 1996-97

	Semesters in program		Semesters at college	
	No award	Award	No award	Award
Asian non-Filipino	3.9	5.7	12.9	13.5
African-American	5.1	5.5	13.7	13.1
Filipino	4.2	6.2	11.9	13.3
Hispanic	4.6	6.0	13.3	15.3
Native American	4.0	5.4	17.0	15.3
Pacific Islander	2.7	5.5	12.2	12.4
White	4.2	6.0	13.1	14.4

Source: CCCCO database, 1995-96 entering cohort

Table B43: Support services available in RN programs, by program size, 2000-2001

	All programs	100 or fewer students	101-150 students	151 or more students
Tutoring	51	19	18	14
Skills lab	26	11	10	5
Computer lab	25	5	10	10
Financial aid	24	11	8	5
Learning resource center	22	7	9	6
Counseling	18	4	9	5
Mentor program	15	6	5	4
Library	13	4	5	4
Math center	9	3	4	2
Disabled student support	8	2	6	0
Writing center	6	3	1	2
Teaching assistants	5	3	2	0
Health center	5	0	3	2
Remedial support	4	1	1	2
Child care	4	4	0	0
Study groups	3	1	0	2
EOPS	3	3	0	0
Learning assessment	3	1	1	1
Job placement	2	0	2	0
Career planning	2	0	2	0
Special resource center	1	0	0	1
ESL	1	1	0	0

Source: BRN Annual School Report individual program data, 2000-2001; SB664 Survey of Community College RN Programs, 2002

Table B44: Number of support services available in RN programs, 2000-2001

Support Services	All programs	100 or fewer students	101-150 students	151 or more students
None	2	2	0	0
1	4	2	1	1
2	11	4	2	5
3	13	4	5	4
4	14	8	6	0
5	8	3	4	1
6	7	2	0	5
7	2	0	1	1
8	3	1	2	0
9	1	0	1	0

Source: BRN Annual School Report individual program data, 2000-2001; SB664 Survey of Community College RN Programs, 2002

Table B45: Support services available for diverse students in RN programs, 2000-2001

	Number of programs with service
ESL	20
Student organizations	12
EOPS	7
Tutoring	5
Financial aid	5
Disabled student support	5
Learning resource center	2
Mentor program	2
Remedial support	1
Study groups	1
Child care	1
Counseling	1
Skills lab	1
Job placement	1

Source: BRN Annual School Report individual program data, 2000-2001; SB664 Survey of Community College RN Programs, 2002

Table B46: Number of support services for diverse students available in RN programs, by program size, 2000-2001

Support Services	All programs	100 or fewer students	101-150 students	151 or more students
None	26	13	8	5
1	20	9	5	6
2	15	2	7	6
3	2	1	2	0
4	2	1	1	0

Source: BRN Annual School Report individual program data, 2000-2001; SB664 Survey of Community College RN Programs, 2002

Table B47: Average on-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, by number of support services, 2000-2001

	Number of support services					
	0-1	2	3	4	5-6	7-9
On-time completion	47.3%	68.0%	73.2%	65.4%	65.5%	64.0%
Delayed	26.6%	20.0%	9.0%	15.5%	11.1%	12.4%
Left program	26.1%	11.9%	17.8%	19.1%	23.3%	23.6%
NCLEX pass 2000-01	74.9%	79.4%	83.3%	82.3%	78.5%	78.8%
NCLEX pass 2001-02	82.4%	83.5%	85.0%	81.4%	82.9%	85.2%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002

Table B48: Correlations between on-time completion, delay, attrition, and NCLEX first-time pass rates, and specific support services at community college RN programs, 2000-2001

	On-time completion	Delay	Left program	NCLEX pass 2000-01	NCLEX pass 2001-02
Counseling	-0.06	-0.18	0.28**	0.24*	0.09
Library	-0.19	-0.02	0.29**	0.01	0.13
Remedial skills	0.14	-0.03	-0.18	-0.21*	-0.02

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B49: Average on-time completion, delay, attrition, and NCLEX first-time pass rates for community college RN programs, by number of support programs for diverse students, 2000-2001

	Number of support services for diverse students			
	None	1	2	3-4
On-time completion	60.6%	70.0%	66.5%	72.5%
Delayed	17.4%	10.8%	16.9%	8.5%
Left program	22.0%	19.1%	16.5%	18.9%
NCLEX pass 2000-01	81.4%	79.7%	80.1%	74.8%
NCLEX pass 2001-02	83.3%	81.5%	85.5%	83.4%

Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data

Table B50: Correlations between on-time completion, delay, attrition, and NCLEX first-time pass rates, and services for diverse students at community college RN programs, 2000-2001

	On-time completion	Delay	Left program	NCLEX pass 2000-01	NCLEX pass 2001-02
ESL	0.25**	-0.14	-0.22*	0.14	0.06
Student organizations	0.05	-0.20	0.14	0.08	0.02
EOPS	0.08	0.02	-0.14	-0.16	0.17
Tutoring	-0.12	0.10	0.07	-0.17	-0.01
Financial aid	-0.02	0.05	-0.03	-0.01	-0.005
Disabled student services	0.06	-0.07	-0.005	-0.17	-0.21

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.

Appendix C

Multivariate Models Examining Nursing Program Success

In order to control for various characteristics of nursing programs and thus examine the independent effects of each characteristic, we estimated multivariate regression models. We examined four dependent variables: on-time completion rates, delay in completion rates, attrition rates, and NCLEX first-time pass rates for 2001. For each of these dependent variables the following procedure was used: we first regressed program census (number of students) and the race/ethnicity variables on each dependent variable. Each of the insignificant variables was successively dropped until the model was stable and all explanatory variables were significantly different from zero at the p=0.20 level. This successive addition and deletion process was used for other groups of variables. Gender was added to the model next, followed by the total number of prerequisite units. In the next step, the individual prerequisite subject fields were entered as a group. Variables that were added next in sequence were student-to-faculty ratio, oversubscribed status, whether the LVN license is required for admission, admission GPA, lottery/waiting list/first-come variables, nursing units and college units required to graduate, number of support programs, and number of programs for diverse students. We also estimated models for the binary variables of whether there are any support services for diverse students and for all the individual support services offered.

For the on-time completion equation, presented in Table C1, only percent Asian non-Filipino and percent African-American remained for race/ethnicity, and only biology prerequisite units remained in the prerequisite group. The fewer the number of students, the greater the percent of on-time completion. The number of general support programs was not significant, but number of programs for diverse students had a p-value of 0.205 so we decided to keep it in the model. Note that mentoring programs, skills labs, EOPS, diversity support clubs, and financial aid do not enter the equation. Also note that the introduction of support programs to the model counteracted the relationships between the percent Asian students and the percent African-American students and the completion rate. This indicates that the shares of students who are Asian and African-American are not associated with on-time completion rates, controlling for other important characteristics of programs. Finally, it is important to recognize the opposite of expected effect for the writing center. One explanation may be that these programs are established to address a problem; thus the support program is associated with a lower completion rate because it was created because completion rates were low. We are unable to determine a causal relationship with these data.

Table C1: Dependent variable: On-time completion rate

	Coefficient	Standard error	t-statistic	P-value
Number of students	-0.001**	0.0005	-2.49	0.017
% Asian non-Filipino	-0.217	0.358	-0.61	0.548
% African-American	-0.619	0.377	-1.64	0.108
% Male	-0.425	0.462	-0.92	0.363
Biology prerequisite units	-0.027**	0.009	-2.92	0.006
Tutoring program	0.125**	0.048	2.62	0.012
Learning resource center	0.128**	0.054	2.36	0.023
Writing center	-0.205**	0.070	-2.91	0.006
Remedial support service	0.184**	0.062	2.98	0.005
ESL	0.129**	0.049	2.63	0.012
Constant	0.908**	0.106	8.56	0.000
R-squared	0.528			
# Observations	53			

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Standard errors are robust to heteroskedasticity.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.

Table C2 presents the model for the share of students delayed in the nursing program. Among the race/ethnicity variables, only Asian non-Filipino and African-American were significant in the first iteration of the model development. As in the on-time completion model, these variables become insignificant when other program characteristics are controlled. Chemistry and physiology prerequisites were significant when they were initially brought into the model, but they also became insignificant when other variables were included. Counseling, math, writing, and ESL have significant relationships with delay rates. The fewer the number of students, the more nursing units to graduate, having ESL, and not having a writing center were related to lower nursing program delay rates. The contrary effect of the writing center could have several explanations. One could be the reverse-causation story described for Table 51. Another could be that programs that use resources to establish writing centers are diverting resources from other programs that would be more effective.

Table C2: Dependent variable: Delay rate

	Coefficient	Standard error	t-statistic	P-value
Number of students	0.001**	0.0003	2.15	0.038
% Asian non-Filipino	-0.275	0.252	-1.09	0.280
% African-American	0.363	0.281	1.29	0.204
Chemistry prerequisite	0.012	0.007	1.48	0.122
Physiology prerequisite	-0.006	0.010	-0.57	0.572
Total nursing units to graduate	-0.009*	0.005	-1.86	0.070
Counseling program	-0.047	0.030	-1.43	0.132
Math center	-0.103	0.062	-1.66	0.104
Writing center	0.142*	0.072	1.97	0.055
ESL	-0.044*	0.030	-1.84	0.072
R-squared	0.474			
# Observations	52			

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Standard errors are robust to heteroskedasticity.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.

Table C3 presents the model for attrition rates. This model is distinguished from the on-time completion and delay rate models by the continued significant relationship between the shares of Asian and African-American students and the attrition rate, even when controlling for other characteristics. Programs with higher shares of Asian and African-American students have higher attrition rates, and support services do not counteract these relationships. In fact, counseling programs and the availability of a library are also associated with higher attrition rates. Only learning resource centers have a significant negative relationship with attrition rates. Of course, as noted above, counseling programs may have been established to address high attrition rates, and thus the support program is associated with the high rate because it was created to try to solve the problem.

Table C3: Dependent variable: Attrition rate

	Coefficient	Standard error	t-statistic	P-value
Number of students	0.00005	0.0004	0.13	0.894
% Asian non-Filipino	1.10**	0.249	4.42	0.000
% African-American	0.284**	0.111	2.55	0.014
% Male	-0.224	0.235	-0.95	0.347
Biology prerequisite units	0.005	0.006	0.88	0.383
Learning resource center	-0.078**	0.037	-2.10	0.041
Counseling	0.103**	0.046	2.25	0.029
Library	0.068*	0.039	1.77	0.084
Remedial support	-0.081	0.055	-1.48	0.145
R-squared	0.524			
# Observations	54			

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Standard errors are robust to heteroskedasticity.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.

Table C4 presents the model for 2001 NCLEX pass rates. NCLEX pass rates from 2001 were used because they most closely match the BRN data from the 2000-2001 academic year. The higher the percentage of African-American and Filipino students, the lower the NCLEX pass rate on the first attempt, even controlling for other program characteristics. Unexpectedly, several support programs are related to lower first-time pass rates, and none were significantly related to higher pass rates. Again this may be because the programs were created to address a specific problem, such a low NCLEX pass rates.

Table C4: Dependent Variable: 2001 NCLEX first-time pass rate

	Coefficient	Standard error	t-statistic	P-value
Number of students	0.052**	0.021	2.48	0.017
% African-American	-55.885**	5.522	-10.12	0.000
% Filipino	-42.057**	13.55	-3.10	0.003
% Other ethnic group	11.027	18.480	0.60	0.554
% Age 56 or more	33.620	34.844	0.96	0.340
Counseling	3.890	2.514	1.55	0.129
Remedial support	-9.565**	1.577	-6.07	0.000
Child care	-3.944**	1.908	-2.07	0.045
EOPS for diverse students	-14.247**	3.030	-4.70	0.000
Tutoring for diversity stud	-6.623**	3.091	-2.14	0.038
Diverse disabled services	-7.696	3.482	-2.21	0.033
R-squared	0.800			
# Observations	53			

* Statistically significant at 0.10 level.
** Statistically significant at 0.05 level.
Standard errors are robust to heteroskedasticity.
Source: BRN Annual School Report individual program data, 2000-2001; BRN NCLEX data; SB664 Survey of Community College RN Programs, 2002.