Palomar College ADN Model Prerequisite Validation Study

Summary

Prepared by the Office of Institutional Research & Planning
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During summer 2004, Dr. Judith Eckhart, Department Chair for the Palomar College Nursing program asked the Office of Institutional Research and Planning (IR&P) to help her investigate the feasibility of implementing a prerequisites model for enrollment into Palomar's Associate's Degree in Nursing (ADN) program. Specifically, she was interested in testing the prerequisites model defined in "*The Associate Degree Nursing Model: Prerequisites Validation Study,*" study completed for the Chancellor's office by the Center for Student Success (CSS) and published on the CSS website (http://css.rpgroup.org/view_case.php?CaseID=179). Dr. Eckhart wanted to know if this model had potential to increase the program success rate of Palomar College Nursing students.

Overview of the CSS
Associate Degree Nursing Model: Prerequisites Study

Through a grant funded by the Community College's Chancellor's Office, researchers developed and validated a prerequisites model for Community College Nursing programs. The study described in this paper tests the applicability of the ADN Prerequisite Model for the Palomar Nursing program. Using historical data from 20 California Community Colleges, the CSS study identifies the four prerequisites deemed most effective in predicting ADN program completion. These prerequisites are:

1. Overall college GPA
2. English courses GPA
3. Composite GPA of core biology courses (Microbiology, Anatomy, and Physiology)
4. Number of repeated core biology courses

These prerequisites are combined in a formula to derive an overall predicted probability of successful program completion for each student. Nursing programs using this model can establish a threshold or minimum acceptable predicted probability as a cut score for acceptance into their program or placement on a wait list.

This method of selection is a departure from the current enrollment procedure in place in Palomar College's Nursing program. Currently, Nursing program candidates are required to have:
- C or higher in Intermediate Algebra (or tested at a higher level)
- Cumulative GPA of 2.5 or higher in the core Biology (Microbiology, Anatomy, and Physiology) classes. Anatomy classes must be taken

within 10 years of application, and Physiology & Microbiology within 5 years.

The overall cumulative GPA, number of core Biology class repetitions and English class GPA are variables in the proposed model not currently used as prerequisites in the Palomar College Nursing program enrollment process.

Conversely, math competency is currently used by the Palomar College Nursing program as a prerequisite, but is not considered in the proposed model.

The CSS study showed that implementation of the four prerequisites model increased the overall program completion rate for nursing students enrolled in the 20 programs studied. After reviewing the study, the California Community College Chancellor's Office has approved this model for consideration at all community colleges. However, each college has been advised to test the model with a historical sample of data prior to implementing it with incoming students. In other words, in accordance with Title V regulations, Community Colleges employing such a model should validate and test the model using their own student data.

In 2003, the Chancellor's office distributed a set of guidelines for testing and implementing the CSS Prerequisites Model. Specifically, this document, *"Advisory in Use of "Model Prerequisites" for Enrollment in Associate Degree Nursing Program (ADN)"* recommends that colleges test the validity of this model for local implementation by completing the following steps:

1. Using a set of historical data, test whether implementation of the Prerequisites Model will increase the successful completion rate of nursing students.
2. If the model increases completion rates, set an appropriate "cut score" for program or waitlist entry, and
3. Investigate whether implementation of the model will have an adverse impact on the admittance of any group of potential nursing students.

The study described here followed the guidelines set forth by the Chancellor's Office to determine whether Palomar should implement the ADN Model Prerequisites.

Methodology

Subjects

Identification of Cohorts

To accurately test the model, the guidelines contained within the *Advisory in Use of "Model Prerequisites" for Enrollment in Associate Degree Nursing Program (ADN)"* recommend using data from at least 60 former students. Approximately 30 students are

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admitted into the Palomar College Nursing program each semester. Entering students from the following four cohorts were used for this study: Spring 2000, Fall 2000, Spring 2001, and Fall 2001. We used these four cohorts for the following reasons:

1. Students from these cohorts had ample time to graduate.
2. Sufficient data existed for most of these students (such as data from other college transcripts) to populate the data fields required for the study.
3. The academic prerequisites for the Nursing program were the same for all of these students. Previous to 2000, the acceptable science GPA was slightly different.

Students were placed into a specific cohort based upon the term in which they first attempted Nursing I (NURS 117), the first class in the Nursing program at Palomar College. Students who failed or withdrew from NURS 117 and re-enrolled in the class in a subsequent semester were still assigned to the cohort of the semester in which they first attempted the class. In accordance with the instruction of the ADN Prerequisites Model study, no Licensed Vocational Nursing students (LVNs) were included in the study. LVNs were clearly flagged by the Nursing department and their removal was not difficult.

Final Sample Characteristics

The total number of eligible Nursing students in the four cohorts included in this study equaled 116. However, IR&P, working with the Nursing department, could obtain complete data sets for only 89 of these students. Data needed for a complete data set for each student often spanned transcripts from many colleges that are not routinely kept on file by the Nursing program staff after the students have graduated from the program. Due to the statistical analysis procedure employed in this study, we could use only those students with complete data set. Due to the removal of one "outlier" student[1], the final sample size equaled 88.

To ensure that the final sample accurately represented the students in the entire four cohorts (i.e., that we did not over or under sample Nursing program completers or non-completers), we looked at the successful completion rate of the entire cohort of Nursing students and compared it with the completion rate of the final sample. Of these 116 students who entered the Nursing program at Palomar College from Spring 2000 through Fall 2001, 96 completed the program successfully[2] and received an AA degree in Nursing. This represents a program success rate of 83%.

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[1] We removed one student from the data who had an academic history so erratic that it skewed the data in the entire study. This individual had taken college classes over 20 years ago and had failed and retaken many of the core biology classes a number of times. She had subsequently taken a long break from study and her current transcripts indicated mastery of core Biology classes.

[2] One student completed the program and passed the board exam, but did not receive an AA in Nursing. This was discussed with Nursing staff who suggested it was a rare, but allowable anomaly. This student was coded as successfully completing the Nursing Program for the purposes of this study.

Of the 88 students in our final dataset, 73 successfully completed the Nursing Program, representing an 83% success rate also. Although our sample is not a true random sample of the students who entered the Palomar College Nursing program in the Fall and Spring semesters of 2000 and 2001, it faithfully reflects the pass/fail ratio of the entire group. As such, we feel confident that this sample is predictive of the group.

The demographic characteristics (gender, age group, and ethnicity) of the final sample and the entire cohorts of Nursing students from which they were drawn are presented in the following tables.

Table 1: Gender Breakdown of Palomar College
Nursing Students Fall & Spring 2000-2001

Gender	Percentage in Study Sample	Percentage in Nursing Program Cohorts
Male	10.2%	9.5%
Female	89.8%	90.5%
Total	100.0%	100.5%

Table 2: Age Breakdown of Palomar College
Nursing Students Fall & Spring 2000-2001

Age Group	Percentage in Study Sample	Percentage in Nursing Program Cohorts
18-25	18.2%	17.2%
26-45	77.3%	77.6%
Over 45	4.5%	5.2%
Total	100.0%	100.0%

Table 3: Ethnicity Breakdown of Palomar College
Nursing Students Fall & Spring 2000-2001

Ethnicity	Percentage in Study Sample	Percentage in Nursing Program Cohorts
Asian/Pacific Islander	3.4%	3.4%
Black, Non-Hispanic	3.4%	2.6%
Filipino	3.4%	3.4%
Hispanic	17.0%	18.1%
Native American	1.1%	0.9%
White, Non-Hispanic	70.6%	70.7%
Unknown	1.1%	0.9%
Total	100.0%	100.0%

Procedures and Analysis

The nursing department provided historical data (by semester) identifying the students for inclusion in the study. Also, the department identified whether or not each student successfully completed the Nursing program.

The following four predictor variables or data points were derived for each student: Core Biology Prerequisite GPA, English GPA, Overall College GPA, and number of Core Biology classes repeated. IR&P compiled these data from the following three sources:

1. Unofficial Palomar College transcripts downloaded from the College's database.
2. Data entered into an Access database system maintained by the Nursing department.
3. Transcripts from other colleges and universities submitted to the Nursing department in support of an application to join the program.

In addition to the predictor variables, IR&P identified a number of demographic variables (age, gender, and ethnicity) in order to determine the presence and nature of any disproportionate impact. These data were obtained by matching the data set provided by the Nursing department to the College's student database.

Once predictor and demographic variables were identified, IR&P verified successful completion of the nursing program by matching the Nursing program's data set to the College's degree award files.

Application of the ADN Prerequisites Model

To test the applicability of the suggested prerequisite model, data from the 88 Nursing students in the final sample were loaded into the "*ADN Advisory Appendix B Revised Worksheet to Evaluate Effectiveness of Selection Model*" in Excel provided by the authors of the CSS's original study.

This worksheet enables three things:
1. It calculates a predicted probability of program success for each student in the sample based on a weighted combination of their overall GPA, English GPA, core Biology GPA, and number of core Biology class repetitions upon entering the Nursing program.
2. Based on the comparison of the predicted probability of success and actual program success the worksheet assists with the formulation of an appropriate cut score for entry into the nursing program or onto the waitlist. At each cut score, the worksheet generates an overall predicted program success rate.

3. The worksheet also provides an overall determination of disproportionate impact by gender, age group, ethnicity, and disability status for each cut score level.

The guidelines for evaluating the effectiveness of the proposed model advise ranking students in descending order by their predicted probability of success and visually comparing the predicted probability of success with actual program success for each student in the list. At the point at which the number of program failures begins to increase appreciably, it is advised to set a cut score. The cut score is the corresponding predicted probability of success of the student at the point in the list that you determine that the failure rate is too high.

Determination of a Cut Score

When the sample of Palomar College Nursing student was ranked, no definitive cut score emerged, although the fail rate appeared to start to climb at around 73% probability of passing[3].

The guidelines for testing and implementing this model suggested a cut score[4] of 70%. When applying a cut score of 70% to our data, the overall success rate increases from 83% to 87%, but there is considerable disproportionate impact to many groups of students. In the context of the Palomar College Nursing program (which admits approximately 30 students each semester), this 4 percentage point increase would equate to one additional potentially successful student per semester.

The following table shows the predicted outcomes for Palomar College Nursing students using the ADN Prerequisite Model based on cut scores of 65% to 75%.

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[3] See Appendix A for worksheet
[4] The score under which a program would not admit a student or add them to a waitlist. For example, a cut score of 70% would exclude all students who had less than 70% probability of succeeding based on their current weighed overall college GPA, English GPA, core Biology GPA, and core Biology repetitions.

Table 4: Predicted Overall Completion Rate Using the ADN Prerequisite Model

Cut Score	Predicted Overall Completion Rate (Note: current sample completion rate = 83%)	Base Percentage Point Increase	Potential Disproportionate Impact
65%	84%	1%	SOME
66%	84%	1%	SOME
67%	83%	(0%)	SOME
68%	84%	1%	SOME
69%	86%	3%	YES
70%	87%	4%	YES
71%	88%	5%	YES
72%	89%	6%	YES
73%	90%	7%	YES
74%	90%	7%	YES
75%	91%	8%	YES

The following table depicts the outcome if the ADN Prerequisite Model (using a 70% cut score) had been applied to the 88 nursing students in our sample.

Table 5: Impact of ADN Prerequisite Model on Former Palomar College Nursing Students

Advised Prerequisites (at a 70% cut score)	Palomar College Nursing Program		
	Successful	Unsuccessful	Total
Accepted	58	9	67
Rejected	15	6	21
Total	73	15	88

- If the advised ADN prerequisites had been in place, 24% of the previously accepted nursing students would not have been accepted into the Nursing program.
- The majority (71%) of students who would have been rejected from the Nursing program successfully completed it.

Determination of Disproportionate Impact

IR&P investigated the existence of disproportionate impact by reviewing predicted successful program completion rates by the following demographic variables: gender, age and ethnicity. Disproportionate impact on students with disabilities is typically assessed also, but in the absence of disability data on the Nursing students, that analysis was left out of the present study.

Title V regulations state that enrollment processes should not have a disproportionate adverse impact on any group of students over the traditional majority group. Following the guidelines for testing the advised ADN Prerequisite Model for Nursing programs, the data from the sample of former Palomar College Nursing students was entered into the worksheet provided by the authors of CSS study and disproportionate impact was identified for all cut scores at or above 65% (see Table 4).

For a cut score of 70%, the following groups of students were disproportionately affected by the ADN Prerequisite Model:

- Ethnicity - Asian, Hispanic/Latino, and "other"
- Gender - Males
- Age Group - 18-25, and 26-45.

In this worksheet disproportionate impact is calculated using the accepted procedure that deems disproportionate impact to occur when the selection rate of other groups is less than 80% of the majority group. However, these findings warrant further investigation as the "majority group" in this instance is the numerically best performing group in the sample and not necessarily the historically least disadvantaged majority group (e.g. White students) or the numerically largest group (e.g. Female Nursing students) as implied in the broader definition of disproportionate impact.

The "majority" is automatically selected regardless of sample size. The findings concerning the disproportionate impact on sub-groups of students within our small sample are vulnerable to the success or failure of a very small number of students and make it difficult to draw conclusions that could be generalized to a larger group. For example, the majority group for ethnicity (against which all other ethnic groups are assessed) for our sample was Black students. There was no adverse impact of the ADN Prerequisite Model on Black students in the study, as they all had a predicted success score of well above 70%, and were in no danger of being rejected from entering the Nursing program. The potential danger of taking this at face value is that there were only 3 Black students in the sample and there is no way of knowing if their academic preparedness is indicative of all Black students seeking admittance into the Palomar Nursing program. A similar situation exists for the determination of disproportionate impact on age.

To augment these findings using comparison groups with more intuitive validity, IR&P ran a series of Chi Square type analyses using the Fisher's Exact Test (as appropriate for small samples) using the following "majority" groups. The results of these analyses are tabled below.

- Ethnicity - White
- Gender - Female
- Age Group - 26-45

Table 6: Disproportionate Impact of Advised Prerequisites on Ethnicity
Using Chi Square

Ethnicity	Accepted to Nursing Program	Rejected from Nursing Program	Significant Difference[5] from Majority
Majority: White	85.5%	14.5%	N/A
Hispanic	46.7%	53.3%	Yes (p=0.003)
Asian/Pacific Islander	50.0%	50.0%	Approaching (*p*=0.063)[6]

Table 7: Disproportionate Impact of Advised Prerequisites on Gender
Using Chi Square

Gender	Accepted to Nursing Program	Rejected from Nursing Program	Significant Difference from Majority
Majority: Female	79.7%	20.3%	N/A
Male	55.6%	44.4%	Yes (*p*=0.032)

Table 8: Disproportionate Impact of Advised Prerequisites on Age
Using Chi Square

Age	Accepted to Nursing Program	Rejected from Nursing Program	Significant Difference from Majority
Majority: 26-45	76.5%	23.5%	N/A
18-25	68.7%	31.3%	No (*p*=0.363)

There is evidence that the proposed nursing prerequisites would have a negative disproportionate impact upon Hispanic students, perhaps Asian/Filipino and Pacific Islander students, students less than 26 years of age, and males. Due to the small sample sizes in many of the sub-groups of students upon which this is based, replicating these analyses with a larger sample of students would be advised to solidify the findings.

Further, these findings must be interpreted in the context of the enrollment procedure currently followed by the Palomar College Nursing program. Although we have identified areas of potential disproportionate impact with the ADN Prerequisite Model, we know nothing of the nature or existence of the disproportionate impact of the current enrollment criteria. Therefore, we have insufficient information to say whether

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[5] Using Fisher's Exact Test. See Appendices B, C, and D for statistical output and tables.
[6] Interpret with caution due to the very small sample of Asian students.

the ADN Prerequisite Model would serve to increase or decrease the disproportionate impact of the current enrollment process at Palomar College.

Testing of Palomar College's Own Model

The final stage of this study was to take the four advised prerequisites for Nursing programs outlined in the CSS study (overall college GPA, English GPA, core Biology GPA, and core Biology repetitions) to see what value they had as predictors of the success of Palomar College Nursing students, without the weights assigned to them by the ADN Prerequisite Model. The weights assigned to these variables by the authors of the CSS study were the product of their study of Community College Nursing programs across California, and these weights may not be optimal for predicting the success of Palomar College's Nursing students.

Simple correlations between the four predictor variables and successful completion of the Palomar College Nursing program indicated that only one of these variables had a statistically significant relationship with Nursing program outcomes at Palomar College. This variable was the number of core Biology class repetitions, which has a negative relationship with Nursing program success ($r (88) = -.265$, $p = .012$). Hence, the fewer repetitions of these classes (due to W of F grades typically), the higher the likelihood of success in the Nursing program (see Table 9).

Table 9: Correlations Between Advised Prerequisites and Successfully Completing the Palomar College Nursing Program

		Overall College GPA	Core Bio GPA	English GPA	Core Bio Class Repetitions
Nursing Program Success	Pearson Correlation	.119	.201	.139	-.265(*)
	Sig. (2-tailed)	.269	.060	.197	.012
	N	88	88	88	88

* Correlation is significant at the 0.05 level (2-tailed).

To test the predictive power of these variables, IR&P implemented an additional logistic regression model to determine appropriate predictor weights based on our local student data. This logistic regression model would establish its own weights and significance of each for the predictors.

Based on the sample of 88 former Palomar College Nursing students we ran the regression and found that the only variable used in the CSS model that made a contribution approaching significance to the prediction of Palomar College Nursing student success was the number of core Biology class repetitions[7].

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[7] See Appendix E for statistical output

Preliminary Findings

The following section summarizes what can be gleaned from IR&P's initial investigation of the potential applicability of the ADN Prerequisite Model to the Palomar College Nursing program. These are presented as preliminary findings as they are based on a sample of just 88 former Palomar College Nursing students. Although this was the largest sample possible at the time of testing the model, IR&P would advise augmenting the sample with the additional cohorts of nursing students to monitor the impact of a larger sample on our preliminary findings before considering implementing any new prerequisites.

Finding #1: The Palomar College nursing program enjoys a high success rate leaving limited room for improvement.

The thrust of the California Community College Chancellor's Office initiation of the statewide study into Nursing program prerequisites was to address the falling completion rate of Nursing students. Cause for their alarm was a completion rate that has slipped from 85% to 73% in recent years[8]. The first finding that emerged from our study was that the Palomar College Nursing program enjoys a far higher success rate than previously thought. At our initial meeting, staff from the nursing program reported a ballpark completion rate of around 70%. Once we removed LVNs, this rate jumped to 83%. This is an excellent success rate (both alone and when compared with nursing programs at other California Community Colleges) and leaves little scope for improvement.

Also, this study includes data from students who fail to complete for any reason. Due to the nature of the Nursing program and the faculty and staff's close tracking and in-depth knowledge of the experiences of all of their students, excellent data on the reason for program failure exists. When those students who fail for non-academic reasons are removed, the Palomar College Nursing program enjoys an 89% successful program completion rate.

Finding #2: Implementation of ADN Prerequisite Model based on the Chancellor's Office guidelines offers a small potential increase to the current success rate but contributes to disproportionate impact.

By implementing the ADN Prerequisite Model with a 70% cut score, the completion rate for the sample students tested went from 83% to 87%. In the context of the Palomar College Nursing program, this would increase the likely successful completers from 25 out of a starting class of 30 to 26 out of 30.

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[8] Advisory on Use of "Model Prerequisites" for Enrollment in Associate Degree Nursing Programs (ADN), Memo July 16, 2003, from Dona Boatright, Interim Vice Chancellor, Educational Services, California Community Colleges Chancellor's Office.

Our findings suggest that implementing the CSS model would have disproportionate adverse impact on a number of groups of students. Further investigation is warranted to determine whether this impact exceeds the current level of impact (should it exist) and plans would have to be made to minimize such an impact during the implementation of these prerequisites.

Finding #3: Appropriately revising the model to establish predictor weights based upon our own students does not serve to increase successful program completion rates.

After applying logistic regression model to our predictors, a more successful model did not emerge. Although significantly correlated with Palomar College's Nursing program success, number of Core Biology Class repetitions just approached significance as a predictor of program success.

Finding #4: The gain in program success rate through the application of the ADN Prerequisites Model results in the exclusion of entry to a substantial number of successful students.

The application of the ADN Prerequisites Model on former students served to deny Nursing program enrollment to many students who actually successfully completed the program. The cost-benefit ratio of the implementation of these prerequisites should be taken into consideration.

Finding #5: The number of core Biology class repetitions may be a helpful predictor of Nursing program success for Palomar College students.

The number of Core Biology class repetitions as a prerequisite for the enrollment into the Nursing program was the only proposed variable that showed any promise as a helpful predictor of Nursing program success at Palomar College. Testing this predictor with a larger sample of former students would serve to provide us with more evidence to determine whether the inclusion of this as a prerequisite would improve the success rate of future Palomar College Nursing students.

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Conclusions and Recommendations

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After following the guidelines published by the California Community Colleges Chancellor's Office for testing the ADN Prerequisites Model established by the CSS, it is clear that implementing the model may not serve to satisfactorily increase the completion rate of Nursing students at Palomar College without widespread potential disproportionate impact.

Although well within the guidelines for implementation provided by authors of the CSS study, we are conscious of our small dataset and the vulnerability of this to making sound predictions about future students. IR&P would recommend taking the

findings presented in this study as preliminary, and monitoring this situation with a larger sample to make our findings more robust. Further, IR&P would recommend evaluating the disproportionate impact that occurs with the current prerequisites set for entry into the Nursing program, and compare it with the potential disproportionate impact of the proposed prerequisites model.

ADN Prerequisite Study: Evaluation of the Effectiveness of the Selection Model at Palomar College
Cut Score set at 70%

Prior Completion Rate	83%
Cut Score Completion Rate	87%

Student	College GPA	Core Biology GPA	English GPA	Core Biology Repetitions	Computed Probability of ADN program Completion	Completion Status	Asian	Black	Latino/a	Other	White	Female	Male	18-25	26-45	over 45	Disability	Not Disabled
1	4	4	4	0	91%	y					X	X			X		n/a	n/a
2	3.81	4	4	0	90%	y					X	X			X		n/a	n/a
3	3.63	4	4	0	90%	y					X	X				X	n/a	n/a
4	3.62	4	4	0	90%	y					X		X		X		n/a	n/a
5	3.87	3.67	4	0	90%	y			X		X			X			n/a	n/a
6	3.66	3.67	4	0	89%	y					X		X		X		n/a	n/a
7	3.65	3.67	4	0	89%	y					X	X		X			n/a	n/a
8	3.55	3.67	4	0	89%	y					X	X			X		n/a	n/a
9	3.81	3.33	4	0	89%	y					X	X			X		n/a	n/a
10	3.76	3.33	4	0	89%	y					X	X			X		n/a	n/a
11	3.43	3.67	4	0	88%	n					X	X			X		n/a	n/a
12	3.17	4	4	0	88%	y					X	X			X		n/a	n/a
13	3.66	3.33	4	0	88%	y					X	X			X		n/a	n/a
14	3.65	3.33	4	0	88%	y					X	X			X		n/a	n/a
15	3.33	3.67	4	0	88%	y					X	X			X		n/a	n/a
16	3.8	3	4	0	88%	y					X	X				X	n/a	n/a
17	3.49	3.33	4	0	88%	y					X	X		X			n/a	n/a
18	3.68	3.67	3.5	0	88%	y					X	X		X			n/a	n/a
19	3.92	4	4	0.33	88%	y					X	X		X			n/a	n/a
20	3.36	3.33	4	0	87%	y					X	X			X		n/a	n/a
21	3.54	3	4	0	87%	y			X			X		X			n/a	n/a
22	3.75	3.67	3	0	86%	y					X	X		X			n/a	n/a
23	3.23	3.33	3.85	0	86%	y					X	X		X			n/a	n/a
24	3.54	3	3.67	0	86%	y					X	X		X			n/a	n/a
25	3.47	3.67	3	0	85%	y					X	X		X			n/a	n/a
26	3.45	3.67	4	0.33	85%	n					X	X				X	n/a	n/a
27	3.76	4	3.33	0.33	84%	y	X					X				X	n/a	n/a
28	3.62	3	3	0	83%	y					X	X		X			n/a	n/a
29	3.27	4	2.5	0	83%	y					X	X			X		n/a	n/a
30	3.28	3.33	4	0.33	83%	y		X				X		X			n/a	n/a
31	2.82	3.67	3	0	82%	y		X				X		X			n/a	n/a
32	3.16	3	3.15	0	82%	y					X		X	X			n/a	n/a
33	2.62	3.33	3.43	0	82%	y	X					X		X			n/a	n/a
34	3.25	3	3	0	81%	y					X	X			X		n/a	n/a
35	2.97	3.33	3	0	81%	y					X	X			X		n/a	n/a
36	2.94	3.33	3	0	81%	y					X	X		X			n/a	n/a
37	3.15	3	3	0	81%	y			X			X		X			n/a	n/a
38	2.84	3.33	3	0	81%	y					X		X	X			n/a	n/a
39	3.51	3.33	3.33	0.33	81%	n					X	X		X			n/a	n/a
40	2.7	3.67	2.85	0	81%	y					X	X		X			n/a	n/a
41	3.08	3	3	0	81%	y					X	X		X			n/a	n/a
42	3.07	3	3	0	80%	y					X	X		X			n/a	n/a
43	3.4	3.67	2	0	80%	y					X	X			X		n/a	n/a
44	3.29	3.67	2	0	80%	y				X	X	X		X			n/a	n/a

Student	College GPA	Core Biology GPA	English GPA	Core Biology Repetitions	Computed Probability of ADN program Completion	Completion Status	Asian	Black	Latino/a	Other	White	Female	Male	18-25	26-45	over 45	Disability	Not Disabled
45	3.54	3.33	2	0	79%	y					X	X			X		n/a	n/a
46	3.12	2.67	3	0	79%	y					X	X			X		n/a	n/a
47	3.57	3.33	3	0.33	79%	y					X	X			X		n/a	n/a
48	2.48	3.33	3	0	79%	y					X	X			X		n/a	n/a
49	2.72	3	3	0	78%	n			X			X			X		n/a	n/a
50	2.71	3	3	0	78%	y		X				X			X		n/a	n/a
51	2.87	2.33	3.33	0	78%	n			X			X			X		n/a	n/a
52	3.1	3.67	3	0.33	78%	y					X	X			X		n/a	n/a
53	3.19	4	2.5	0.33	77%	y					X	X			X		n/a	n/a
54	2.66	3	2.64	0	76%	y					X	X			X		n/a	n/a
55	2.29	3	3	0	76%	y					X	X			X		n/a	n/a
56	3.08	3	2	0	75%	y					X	X		X			n/a	n/a
57	3.06	3	2	0	75%	n					X	X			X		n/a	n/a
58	2.76	3	2.33	0	75%	y					X	X			X		n/a	n/a
59	2.75	2.33	2.89	0	75%	y					X	X			X		n/a	n/a
60	3.15	2.67	2	0	74%	y					X	X			X		n/a	n/a
61	2.84	3	3	0.33	73%	y					X	X			X		n/a	n/a
62	2.86	2	2.67	0	73%	n					X	X		X			n/a	n/a
63	3.11	3	3.67	0.67	72%	y					X	X		X			n/a	n/a
64	2.92	2	2.5	0	72%	n	X					X		X			n/a	n/a
65	3.04	2.33	2	0	71%	y					X	X			X		n/a	n/a
66	2.81	2	2.5	0	71%	y			X			X		X			n/a	n/a
67	2.71	2.67	2	0	71%	n			X			X			X		n/a	n/a
68	2.63	2.67	3	0.33	70%	n				X		X			X		n/a	n/a
69	2.75	3	2.5	0.33	69%	y	X					X			X		n/a	n/a
70	3.15	3	2	0.33	69%	n			X				X		X		n/a	n/a
71	2.42	2.67	2	0	69%	y					X	X		X			n/a	n/a
72	2.79	2.67	2.67	0.33	69%	y					X	X			X		n/a	n/a
73	2.82	3	2.33	0.33	69%	n			X				X		X		n/a	n/a
74	3	2.67	2.33	0.33	68%	y			X			X		X			n/a	n/a
75	2.54	2.33	2	0	68%	y			X			X			X		n/a	n/a
76	3.74	3.33	2	0.67	68%	n					X		X		X		n/a	n/a
77	3.03	2.67	3.33	0.67	67%	y					X	X			X		n/a	n/a
78	2.58	2.67	2.67	0.33	67%	y			X			X			X		n/a	n/a
79	2.8	2.67	2.33	0.33	66%	y					X	X			X		n/a	n/a
80	2.9	2.67	2	0.33	65%	y					X		X		X		n/a	n/a
81	2.47	2.33	2.57	0.33	64%	y					X	X		X			n/a	n/a
82	2.26	2	2	0	64%	y			X				X		X		n/a	n/a
83	2.99	2.67	2.66	0.67	62%	y					X	X			X		n/a	n/a
84	2.43	2.67	2	0.33	61%	y			X			X			X		n/a	n/a
85	2.52	2.67	3	0.67	61%	n					X	X			X		n/a	n/a
86	2.46	2	2	0.33	57%	y			X			X			X		n/a	n/a
87	2.88	2.67	3	1	56%	n	X					X			X		n/a	n/a
88	2.61	1.66	2.5	0.67	51%	y	X					X		X			n/a	n/a

Hispanic/Latino

ethnic2 * 70% or greater predicted success Crosstabulation

Count

| | | 70% or greater predicted success | | Total |
		Rejected	Accepted	
ethnic2	Hispanic	8	7	15
	White, Non-Hispanic	9	53	62
Total		17	60	77

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.578(b)	1	.001		
Continuity Correction(a)	8.442	1	.004		
Likelihood Ratio	9.204	1	.002		
Fisher's Exact Test				.003	.003
N of Valid Cases	77				

a Computed only for a 2x2 table
b 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.31.

Asian/Pacific Islander (this category includes Filipino students)

ethnic2 * 70% or greater predicted success Crosstabulation

Count

| | | 70% or greater predicted success | | Total |
		Rejected	Accepted	
ethnic2	Asian/Pac Isl	3	3	6
	White, Non-Hispanic	9	53	62
Total		12	56	68

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.740[b]	1	.029		
Continuity Correction[a]	2.612	1	.106		
Likelihood Ratio	3.694	1	.055		
Fisher's Exact Test				.063	.063
N of Valid Cases	68				

a. Computed only for a 2x2 table

b. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.06.

APPENDIX C
Disproportionate Impact Calculations - Gender

Gender * 70% or greater predicted success Crosstabulation

Count

		70% or greater predicted success		Total
		Rejected	Accepted	
Gender	F	16	63	79
	M	5	4	9
Total		21	67	88

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.542[b]	1	.019		
Continuity Correction[a]	3.769	1	.052		
Likelihood Ratio	4.732	1	.030		
Fisher's Exact Test				.032	.032
N of Valid Cases	88				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.15.

APPENDIX D
Disproportionate Impact Calculations - Age

Age_range * 70% or greater predicted success Crosstabulation

Count

		70% or greater predicted success		Total
		Rejected	Accepted	
Age_ range	18-25	5	11	16
	26-45	16	52	68
Total		21	63	84

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.412[b]	1	.521		
Continuity Correction[a]	.103	1	.748		
Likelihood Ratio	.397	1	.529		
Fisher's Exact Test				.532	.363
N of Valid Cases	84				

a. Computed only for a 2x2 table

b. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.00.

Logistic Regression of Advised Predictor Variables on Palomar College Nursing
Students' Successful Program Completion

Block 0: Beginning Block

Classification Table[a,b]

			Predicted		
			Nursing Program Success		Percentage Correct
Observed			Fail	Pass	
Step 0	Nursing Program	Fail	0	15	.0
	Success	Pass	0	73	100.0
	Overall Percentage				83.0

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	1.582	.283	31.158	1	.000	4.867

Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Bio_rep_index	6.202	1	.013
		Core_Bio_GPA	3.566	1	.059
		Overall_Coll_GPA	1.248	1	.264
		English_GPA	1.700	1	.192
	Overall Statistics		8.181	4	.085

Block 1: Method = Enter

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	7.500	4	.112
	Block	7.500	4	.112
	Model	7.500	4	.112

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	72.863[a]	.082	.136

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Classification Table[a]

			Predicted		
			Nursing Program Success		Percentage Correct
	Observed		Fail	Pass	
Step 1	Nursing Program Success	Fail	1	14	6.7
		Pass	1	72	98.6
	Overall Percentage				83.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Bio_rep_index	-2.253	1.165	3.740	1	.053	.105
	Core_Bio_GPA	.793	.769	1.064	1	.302	2.211
	Overall_Coll_GPA	-.413	1.037	.159	1	.691	.662
	English_GPA	.266	.538	.244	1	.622	1.304
	Constant	.084	2.275	.001	1	.971	1.088

a. Variable(s) entered on step 1: Bio_rep_index, Core_Bio_GPA, Overall_Coll_GPA, English_GPA.