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RESPIRATORY CARE PROGRAM DIRECTORS' PERCEPTIONS OF THEIR PROGRAMS' CONSISTENCY WITH NATIONAL ASTHMA AND COPD STANDARDS

Timothy B. Op't Holt, EdD, RRT, AE-C, FAARC

Abstract

Background: The ability of new respiratory care (RC) program graduates to function as asthma and COPD disease managers is uncertain. The research question is: to what extent is the material on the National Asthma Education Certification Board (NAECB) examination and the Global Initiative for Obstructive Lung Disease (GOLD) guidelines included in the curriculum of RC programs? **Methods:** A 93 statement survey consistent with the NAECB matrix and GOLD guidelines was sent to 228 RC program directors.

Results: Frequencies and percentages of 79 responses were reported. The data represented the percentage of respondents who indicated their curriculum included this information at the cognitive level only, at the cognitive and psychomotor skill levels, or neither. Of the responders, approximately 47% of the respiratory care programs responding taught the NAECB matrix and the GOLD guidelines at the cognitive level. Approximately 33% of responding respiratory care directors taught this content at both the cognitive and psychomotor levels. Some 19.6% of the programs did not teach at either level.

Discussion/Conclusions: A sample of RC education program curricula shows an overlap among the content of NBRC matrices, the NAECB matrix and GOLD guidelines. The depth of understanding of asthma and COPD expected by the NAECB and GOLD guidelines challenge RC educators. RC programs focus on the National Board for Respiratory Care (NBRC) examinations, but not the detail of the NAECB or GOLD. Continuing education would include asthma and COPD, patient assessment, assessing the patients' abilities to self-manage, and psychosocial and organizational issues.

Key Words: asthma, chronic obstructive pulmonary disease, education, Global Initiative for Obstructive Lung Disease, National Asthma Education and Prevention Program, National Asthma Education Certification Board.

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Respiratory Care Program Directors' Perceptions of Their Programs' Consistency with National Asthma and COPD Standards

Introduction

Asthma and COPD are leading causes of morbidity and mortality among the patients served by respiratory therapists.¹ COPD is the fourth leading cause of death in the United States.² Respiratory care curricula include content to prepare graduates to treat patients with these disorders. Despite an emphasis on the care of patients with these diseases, the president of the National Asthma Education Certification Board (NAECB) recently reported that 65% of respiratory therapists who attempt the Asthma Educator-Certified (AE-C) examination pass.³ No equivalent examination exists for those who care for patients with COPD. While graduates can perform the skills necessary to treat these patients during an exacerbation, their ability to function as asthma and COPD disease managers is suspect. Specifically, this refers to our graduates' abilities in patient teaching, assessment, spirometry, care planning, follow-up, medication delivery, plan of care evaluation, coordination with other health care providers, and providing information to third party payers. The material included in the survey instrument of this study was taken from the detailed content outline of NAECB examination for the AE-C credential⁴ and the report of the Global Initiative for Chronic Obstructive Lung Disease (GOLD).⁵ The research question was: to what extent is the material on the examination matrix of the NAECB and within the GOLD guidelines included at the cognitive and psychomotor levels in the curriculum of respiratory care programs?

Methods

A survey containing 93 statements (Appendix 1) was created to elicit responses from program directors about the extent to which their program curriculum included the content of the statement. Specifically, respondents were asked to indicate if their program included the content at the cognitive level only, at the cognitive and psychomotor skill levels, or neither. Respondents were posed two additional questions: 1) what clinical settings were used to obtain the knowledge and skills listed in the survey and 2) what personnel were incorporated into their program to teach this content. The survey was divided into four sections, consistent with the sections of the NAECB matrix and GOLD objectives. Section one (questions 1-22) concerned the asthma and COPD conditions - graduate preparation to discuss and explain these diseases in terms of definition, pathophysiology, symptoms, and triggers. Section two (questions 23-43) concerned patient and family assessment - assessment of the patient and family, obtaining a history, defining an exacerbation, and determining the patient and family's ability to learn and manage the disease. Section three (questions 44-80) concerned disease management - graduate preparation to manage the patient's disease, define and describe drugs and other therapeutic modalities, arrive at a treatment plan, provide instruction, and document all that is done by and for the patient and family. Section four (questions 81-93) concerned organizational issues - evaluation of the education and treatment program, community resource identification, public education, and providing information to third party payers. Respondents' written comments were solicited concerning inclusion of this information in the RC curriculum.

At the time of the survey, there were 304 institutions sponsoring respiratory care programs. Surveys were distributed to 228 program directors by selecting three out of four entries (a 75% sample) listed by the Committee for Accreditation of Respiratory Care (CoARC). Surveys were sent in March 2004. An additional request for responses was issued one week before the due date via the AARC Education Section listserve. No further effort was made to contact non-responders. The responses from the useable returns were transferred to scannable forms and the frequencies and percentages of each response were reported.

Data Analysis

Data were reported as percentages of respondents who indicated that the material in each question was covered at the cognitive level only, cognitive and psychomotor levels, or neither. Statements that had the verbs define, list, associate, differentiate, distinguish, or identify, were classified as cognitive statements.⁶ The verbs explain, teach, classify, describe, facilitate, and discuss were classified as psychomotor, implying that the graduate should be able to perform these functions in a patient care setting at a level higher than recall. That is, they should be able to apply this information in the presence of a patient or family members at the application or analysis level.

Results

By April 1, 2004, 79 useable responses were analyzed, representing a response rate of 34.6% of those surveyed, or 25.9% of the total number of institutions sponsoring RC programs. Geographically, 64.5% of respondents were from east of the Mississippi river, based on postmark (Table 1). Sixty-five percent of the programs in the country are located east of the Mississippi River, based on a count of CoARC accredited programs at the time

Table 1

Number of respondents by state

n of programs for each state listed	State
9	Texas
6	Ohio, Florida
5	California, Pennsylvania, New York
4	North Carolina, Illinois
3	Louisiana, Georgia, Tennessee
2	Kansas, Arkansas, Mississippi
1	Nevada, Colorado, North Dakota, South Dakota, Nebraska, Missouri, Michigan, Indiana, Alabama, West Virginia, Virginia, Maryland, Connecticut, Maine, Oregon, Arizona, New Jersey, Oklahoma, Kentucky
1	Unknown (no postmark)
79	Total

Table 2

Percentages of respondents indicating the presence of curriculum content in each content category at each cognitive and/or psychomotor skill level.

Percentage of respondents who indicated their curriculum includes this information at the (A) cognitive level, (B) cognitive and psychomotor levels, or (C) neither:

Section	A%	B%	C%
The asthma and COPD condition	65.7	24.2	10.1
Patient and family assessment	40.5	44.1	15.4
Disease management	44.9	36.5	18.6
Organizational issues	31.7	23.1	45.2
Total for all sections	47.0	33.4	19.6

of the survey. Thirty-four percent of the respondents were from Texas, California, and other western states. Two responses arrived late and were not included in the analysis.

Table 2 contains a summary of the survey results, by survey section. The results for each statement are indicated in Appendix 1. Column A of Appendix 1 lists the percentage of respondents who indicated the content was taught at the cognitive level. Column B lists the percentage of respondents who indicated the content was taught at the cognitive and psychomotor levels. Column C lists the percentage of respondents who indicated the content was not taught in their program.

Table 3 lists the clinical sites and personnel most frequently responsible for asthma and COPD education in addition to the usual clinical sites and program faculty. Other settings in which this content was taught included home care agencies, pulmonary rehabilitation programs, American Lung Association (ALA) and other asthma camps, cystic fibrosis clinics, nursing homes with ventilator-dependent units, and the clinical skills laboratory. Other personnel incorporated in the program to teach this material included an outpatient asthma education instructor, pharmacists, occupational and physical therapists, rehabilitation clinic personnel, local COPD organizations, ALA Open Airways instructors, and physician assistants. These are the personnel from whom students received their knowledge of additional medications, psycho-social aspects of care, and the more holistic approach to the patient with asthma or COPD. Only small percentages of programs used practitioners with the AE-C credential (14%), or family practice physicians (15%).

Comments regarding inclusion of this content in the curriculum included the lack of time available to include this material and the recognition by many that this material was important and should be included in some manner, even if it is post-graduation.

Discussion

Cumulative survey results

A summary of the survey results is in Table 2. The results of each section are discussed separately.

Table 3

Clinical sites and personnel responsible for asthma and COPD education.

Clinical settings utilized in respondent's programs to obtain the clinical skills listed in the survey	Number of respondents who cited these locations:
physician's office/specialist asthma/allergy/pulmonary clinic	45
general practice/family practice outpatient clinic	11
emergency department	61
inpatient hospital unit	75
government health department	7
Personnel who are incorporated into the program to teach these skills	Number of respondents who cited these personnel:
paid program faculty	75
practitioners with the AE-C credential	11
general/family practice physicians	12
specialty physicians	53
nurses/social workers/other allied health practitioners	32

Section One

The results from Section one (statements 1-22) demonstrated that most graduates knew the burden of asthma and COPD on society, but they had not been prepared to express it to the patient. Regarding patient teaching, 49-65% of programs prepared graduates with the knowledge of what to teach, yet 19-41% of programs actually provided the setting for the acquisition of the psychomotor skill of patient teaching in this content (statements 2-6). Most programs prepared their graduates to classify the severity of disease. However, the graduates apparently did not get practice in a clinical setting, since only 19% of programs responded affirmatively to the psychomotor query. Remarkably, 36% of programs prepared their graduates at only the cognitive level in explaining the significance of spirometry. While 51% of graduates were cognitively prepared to facilitate discovery of triggers in various environments, 19% actually conducted this activity, and 30% of graduates had no preparation in this area. Gastroesophageal reflux disease (GERD) and the benefits of allergy testing were discussed at the cognitive level, but little (5-8%) psychomotor/clinical preparation in these issues was performed; 23-28% of programs responded that their graduates had no preparation in these areas. Considering cognitive knowledge only, 66% of respondents' programs included all the content in this section. If those statements classified as cognitive only (due to their verbs) are removed from the mix, 22.1% of programs prepared their graduates with the cognitive information

and psychomotor skill to present necessary information to patients in the area of disease condition.

Section Two

Section two (statements 23-43) included content relative to patient assessment. Although 62% of respondents indicated that their graduates had cognitive knowledge of co-morbid conditions, these conditions were not discussed in 20% of respondents' programs. An important aspect of the classification of obstructive diseases is history-taking, which was addressed in statements 23-25. Responses indicated that 43-58% of programs prepared their graduates to obtain essential historical data at the psychomotor level. Classifying the severity of disease by obtaining information about the incidence of daily symptoms, high-risk symptoms, and the impact of disease on sleep, work and activity (statement 25) is critical to treatment decisions in both GOLD and National Asthma Education and Prevention Program (NAEPP) guidelines. That only 43% of respondents had graduates performing these skills is significant. Interviewing the patient will determine the severity and persistence of symptoms, the use of alternative therapies (herbs, acupuncture, hypnosis, etc.), and use of over-the-counter medicine (i.e. antihistamines, decongestants, Primatene[®]). Sixty-two percent of the respondents prepared their graduates at the psychomotor level in interviewing for these specific issues. Assessment of the needs of the patient and family (statements 35-39) was weak at the psychomotor skills level. Although cognitive materials were presented in the 48%-53% range in these five skills, only 19%-32% of programs presented these materials at both levels, so 18%-29% of programs did not present this material. Determining how the patient manages symptoms was presented at the cognitive level in 48% of programs, and at both levels in 30% of the programs. Twenty-two percent of programs omitted this material. This is important, since assessing the patient's ability to self-manage is central to the NAEPP. Similarly, 44% of programs prepared graduates to elicit patient and family goals and concerns about treatment at the cognitive level, 32% at both levels, and 24% of programs were not addressing this issue. These issues are important, since one of the goals of disease management is for the patient to be empowered to make personal decisions about managing symptoms and exacerbations.

Section Three

This section (statements 44-80) represented disease management. Greater than 25% of respondents left a number of patient management procedures out of graduates' preparation (see statements 54, 58, 63, 64, 65, 66, 69, 70, 71, 72, 75, 76, 77, and 78 in appendix 1). This material could be presented in a specialized course preparing therapists to be patient educators, or in a review course for the NAECP examination.

The remaining issues were presented at the cognitive level and to a lesser extent at the psychomotor level to prepare students for clinical practice. Clinical opportunities to actually perform patient teaching were limited or not available, or no time was allotted, as was mentioned by several respondents. Another reason some of these issues were not addressed related to absence of appropriate faculty. Respiratory care faculty may not be prepared to teach students the content described in the previous paragraph. Instead, pharmacists, nurses, social workers, and physicians may need to be involved to provide this information. However, programs are restricted by the unavailability of these resources.

Section Four

Section four (statements 81-93) discussed organizational issues related to patient teaching with an emphasis on evaluation of the asthma and/or COPD patient education program, use of external community resources, and providing information to third party payers. The majority of respondents' programs covered only two of these issues at the psychomotor level: standard infection control procedures (67%) and competence in BCLS (87%). Interestingly not all the respondents' programs prepared graduates at the psychomotor level in these two critical areas that are components of the NBRC matrix.

Greater than 25% of respondents omitted a number of procedures (see statements 81-84, 87-93) from graduates' preparation. These data should not surprise respiratory care faculty, since these skills are probably not performed by hospital-based therapists who provide the bulk of our clinical education. As in the discussion above, other professionals would have to be sought to provide information on these topics, suitable clinical sites would have to be located. These issues would require additional time, necessitating postgraduate or continuing education, or a reallocation of time and resources.

When asked where students obtain the skills in obstructive disease education/management, 57% of the respondents indicated that students had clinical experiences in a physician's office/specialist asthma/allergy/pulmonary clinic, 77% had emergency room experience, and 95% had inpatient hospital unit experience (Table 3). However, the survey did not ask how much time was spent in these areas, nor was it determined if activities other than treatment administration occurred. Possibly, the only activity in the emergency department and inpatient units was treatment administration. It may be that patient teaching/disease management was not emphasized, nonexistent, or performed by others not involved with student preparation. One respondent noted that inclusion of this material was, "a great idea, but difficult to assure psychomotor competency due to lack of appropriate clinical sites and clinical site emphasis." As with the hospital locations, students may be present in a physician's office and observe a physician performing a history and physical and prescribing a plan of care, but this experience may be little more than observational for the student, and for a relatively short time. In a physician's office, students should be expected to teach patients how to use medications, perform spirometry, construct care plans, and keep symptom diaries. There is a need for clinical experiences for students to do more than observe, but this requires additional physician and clinical instructor time.

Respiratory care programs provide much of the information needed by those who wish to work in obstructive disease education, but appropriate clinical experiences and emphasis on patient teaching are lacking. Most of the time spent in a respiratory care educational program must be devoted to preparing the graduate for NBRC therapist examinations, which emphasize hospital-based care. However, important issues not included on the NBRC examination matrices are included in the NAECB examination. Most of these issues were those where respondents indicated programs did not prepare graduates in the indicated issue, such as patient education program development and evaluation, providing information to third party payers, and reviewing patient self-medication strategies.

A review of the NBRC Certified Respiratory Therapist⁷ and Registered Respiratory Therapist⁸ examination matrices reveals that a large section of the content tested on the NBRC examinations is also on the NAECB examination. The difference is that the NBRC matrices cover a very broad content, specific to respiratory care mainly in acute care, while the NAECB examination covers asthma and the GOLD guidelines for COPD, in depth and over the full range of care settings. Given these observations, one may understand why only 65% of respiratory therapists pass the NAECB examination. When the president of the NAECB reported the respiratory therapist pass rate on the AE-C examination, she also observed that work experience trended with passing. Therefore, new therapist graduates lack the experience needed to pass the NAECB examination. Usually, one-two years of experience in asthma education are required.

Preparation of respiratory care students and graduates for obstructive disease education

To prepare for obstructive disease education, therapist graduates and programs have several options.

- Graduates may want to work in a hospital where the respiratory care department has an active patient education mission. Thus, part of their job description would be to provide disease management and patient education.
- Working in a respiratory care department that utilizes therapist driven protocols would provide the new graduate with the experience of up- and down-regulating care, patient assessment, and quality assurance.
- The graduate may attend one of the several asthma educators' workshops, such as those provided by the Association of Asthma Educators or the AARC.
- Respiratory care programs may provide elective or continuing education courses in obstructive disease management and utilize adjunct faculty to provide the depth of instruction consistent with the NAECB examination. Plus, RC programs could provide a clinical component where students would actually work in an asthma/allergy or pulmonary clinic. In these clinical settings, students would actually perform patient education, care planning and modification, assess patients' abilities to self manage, and get the necessary background in the social work aspects of the patient educator.

Limitations of this study

This study was limited by the issue of verb classification as cognitive and/or psychomotor. Perhaps the first two columns in Table 2 should be combined and no distinction be drawn about whether graduates are prepared at the cognitive and/or psychomotor levels, but rather that they were prepared to apply the information clinically. The data are self-reported, so each program director may have had a different interpretation of each statement. The reason for the high non-respondent rate was most likely the detail and length of the survey. The results of this study may be generalized only to the respondents' programs. Because this report was based on a 26% response rate, it is recommended that if a program decides to increase the competence in this area and obtain the necessary resources, that an analysis of its own curriculum be performed, based

on the NAECB matrix and GOLD guidelines. Further study may determine if there is a difference between associate and baccalaureate degree programs in the presentation of this content.

Conclusions

A survey of respiratory care program directors was conducted to determine the extent to which the material on the examination matrix of the NAECB and within the GOLD guidelines was included at the cognitive and psychomotor levels in the curriculum of respiratory care programs.

There are challenges to respiratory care programs when it comes to preparing graduates and practicing therapists to pass the NAECB examination, or to implement the NAEP and GOLD guidelines.

- The depth of understanding of asthma and COPD expected by the NAECB and outlined by the GOLD guidelines exceeds current NBRC expectations. Respiratory care programs are justifiably occupied with providing students with the breadth and depth of knowledge required to pass NBRC examinations, but not the detail required by the NAECB or GOLD. Elective courses and continuing education would include a deeper understanding of asthma and COPD, patient assessment, assessing the patients' abilities to self-manage, psychosocial issues, and organizational issues.
- The time needed to cover the additional issues presented in the NAECB matrix and GOLD guidelines exceeds the time available in most respiratory care programs. Respiratory care programs are already "full." Implementation of curriculum to cover the NAECB matrix may require continuing education, elective, or post-graduate offerings.
- There is a need for an increased number of clinical sites and time in clinical experiences to gain the skills required for obstructive disease management. The skills outlined cannot be gained by observation alone. Sufficient time must be allowed for observation, monitored practice, and independent care. Appropriate additional faculty must be obtained to teach those issues outside the content ordinarily presented by respiratory care faculty.
- Program directors may use the data herein to determine where gaps exist in their own curriculum in the event that they want to more thoroughly prepare their graduates for obstructive disease education.
- Faculty considering implementing any changes should consider the limitations of this study, to determine how they may affect their proposed changes.

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Appendix 1.

Asthma and Chronic Obstructive Pulmonary Disease Curriculum Survey with response rate by statement

Instructions:

1. Read each of the following statements
2. Indicate by filling-in the circle (with a pen or pencil) under the letter that most closely matches the extent to which the content in each statement is included in the respiratory care curriculum at your institution as:

- A. Cognitive only
- B. Cognitive and psychomotor
- C. Neither cognitive or psychomotor

3. Return the completed survey in the enclosed postage-paid envelope by March 21, 2004. There is content in the respiratory care program at my institution to enable graduates to:

	A %	B%	C %
1. Explain the burden of asthma and COPD on the patient and society <i>Teach patients and their families about Asthma and COPD to include:</i>	70.9	16.5	12.7
2. Normal anatomy and physiology	49.4	38	12.7
3. Alterations in anatomy and physiology in asthma and COPD	46.8	40.5	12.7
4. Long term effects of airway remodeling	64.6	19	16.5

RESPIRATORY CARE PROGRAM DIRECTORS' PERCEPTIONS OF PROGRAM

5. Processes in the lungs during exacerbation	53.2	35.4	11.4
6. Mechanisms of airway narrowing	51.9	34.2	13.9
7. Define asthma and COPD	83.5	16.5	0
8. Classify asthma and COPD severity	75.9	19	5.1
9. Explain terms used to define and classify asthma and COPD	82.3	13.9	3.8
10. Explain technical and medical terms related to asthma and COPD care	82.3	16.5	1.3
11. Explain the significance of spirometry	35.4	63.3	1.3
12. Explain the pathogenesis, pathology, and pathophysiology of asthma and COPD	74.7	22.8	2.5
13. List the signs and symptoms of asthma and COPD	69.6	30.4	0
14. Associate signs and symptoms with pathophysiology	60.8	39.2	0
15. Differentiate symptoms in infants, children, and adults	51.9	26.6	21.5
16. Describe the triggers and risk factors of asthma and COPD exacerbation	77.2	22.8	0
17. Describe how triggers are different for each patient	72.2	17.7	10.1
18. Facilitate discovery of triggers in various environments	50.6	19	30.4
19. Distinguish between an allergen and an irritant	74.7	8.9	6.5
20. Discuss the role of tobacco smoke in asthma and COPD development and exacerbation	79.7	20.3	0
21. Explain how physical conditions (i.e. GERD) can make control difficult	69.6	7.6	22.8
22. Discuss the benefits of allergy testing	67.1	5.1	27.8
<i>Obtain a medical history to include:</i>			
23. Signs and symptoms of obstructive disease	40.5	58.2	1.3
24. Assessment of high-risk signs and symptoms	39.2	57	3.8
25. The impact of obstructive disease on activity, work, and sleep	51.9	43	5.1
26. Interview the patient to determine the severity and persistence of symptoms	27.8	62	10.1
27. Identify the effect of comorbid conditions affecting disease control	62	17.7	20.3
28. Determine if any alternative therapies are in use	43	43.2	22.8
29. Determine if any over the counter medications are in use	50.6	30.4	19
30. Interpret the medical record for history, physical examination, and test results	34.2	60.8	5.1
31. Conduct a respiratory system physical examination	11.4	84.8	3.8
32. Observe and differentiate early and late warning signs of exacerbation	35.4	51.9	12.7
33. Explain the purpose, technique, and results of pulmonary function testing	20.3	75.9	3.8
34. Evaluate the reliability of pulmonary function testing	32.9	63.6	3.8
<i>Assess the needs of the patient and family, as applicable to determine:</i>			
35. Knowledge of the disease	50.6	31.6	17.7
36. Barriers to self-assessment and management	49.4	26.6	24.1
37. Readiness to learn	48.1	27.8	24.1
38. Coping strategies	53.2	24.1	22.8
39. The primary source of healthcare	51.9	19	29.1
40. Determine how the patient is managing their symptoms	48.1	30.4	21.5
41. Elicit the patient's and family goals and concerns about treatment	44.3	31.6	24.1
42. Utilize effective interviewing skills	20.3	74.7	5.1
43. Describe a multidimensional assessment of the patient and family	34.2	21.5	44.3
44. Summarize the current pharmacological management of asthma and COPD	63.3	35.4	1.3

RESPIRATORY CARE PROGRAM DIRECTORS' PERCEPTIONS OF PROGRAM

45. Identify quick relief and long term control drugs	60.8	39.2	0
46. Describe the side-effects of inhaled and systemic respiratory drugs	57	43	0
47. Explain how inhaled and systemic respiratory drugs work	57	41.8	1.3
48. Explain the dose, frequency and duration of respiratory drugs	58.2	41.8	0
49. Describe the expected actions of respiratory drugs	58.2	40.5	1.3
50. Describe the misconceptions about respiratory drugs	62	24.1	13.9
51. Demonstrate correct equipment assembly, drug administration, equipment cleaning, and troubleshooting of MDIs, DPIs, nebulizers, and spacers	3.8	94.9	1.3
52. Assess whether the patient/caregiver properly demonstrates equipment assembly, drug administration, equipment cleaning, and troubleshooting of MDIs, DPIs, nebulizers, and spacers, as needed	8.9	87.3	3.8
53. Recommend devices that will optimize drug delivery based on patient characteristics	32.9	63.3	3.8
54. Summarize potential risks and benefits of alternative and OTC drugs	55.7	12.7	31.6
55. Describe the indications for and administration of long term oxygen therapy	54.4	44.3	1.3
56. Explain the benefits of pulmonary rehabilitation	62	35.4	2.5
57. Describe the benefits and indications for noninvasive ventilation	46.8	51.9	1.3
58. Discuss the purpose of immunotherapy, allergic rhinitis therapy, and GERD medications in controlling asthma symptoms	59.5	6.3	34.2
59. Demonstrate breathing techniques a patient could use during an exacerbation	10.1	86.1	3.8
60. Assess the patient's breathing techniques to be used during an exacerbation	22.8	69.6	7.6
61. Describe strategies to use to manage exercise induced asthma	64.6	22.8	12.7
62. Describe the psychosocial, economic, and family factors placing the patient at high risk for inadequate disease control	73.4	11.4	15.2
63. Implement strategies designed to improve social support from families and significant others for the patient	49.4	7.6	43
64. Recognize the importance of culturally sensitive management approaches	55.7	7.6	36.7
65. Optimize patient and family coping strategies	46.8	3.8	49.4
66. Implement education strategies to allay concerns and dispel myths about treatment	45.6	20.3	34.2
67. Describe methods to encourage adherence to the treatment plan	55.7	20.3	24.1
68. Educate and counsel the patient and family triggers, trigger avoidance, and trigger control in their environments	50.6	35.4	13.9
69. Develop, implement, and evaluate an asthma or COPD management plan to include age appropriate communication skills and teaching methods	41.8	7.8	30.4
70. Recommend and facilitate appropriate environmental control strategies to control allergens	59.5	13.9	26.6
71. Integrate the management plan into the workplace, home, school, etc.	36.7	12.7	50.6
72. Describe the importance of various environmental control equipment (filters, dehumidifiers, vacuum cleaners) as appropriate	53.2	20.3	26.6
73. Instruct the patient/caregiver in the use of the peak flow meter, and symptom diary	6.3	92.4	1.3

RESPIRATORY CARE PROGRAM DIRECTORS' PERCEPTIONS OF PROGRAM

74. Reassess and revise the management plan as needed based on individual goals and outcomes	41.8	34.2	24.1
75. Teach and counsel the patient to effectively communicate with healthcare providers, caregivers, and patient educators	32.9	31.6	5.4
76. Encourage the patient to verbalize their partnership in self-management, describe how the plan is incorporated into activities of daily living, and to demonstrate their disease management skills	38	20.3	41.8
77. Regularly review how the patient decides to use their medications, seek care and implement early intervention in the event of exacerbation	39.2	19	41.8
78. Review the plan of care with the physician	27.8	41.8	30.4
79. Assess and clarify physician instructions to the patient and caregivers	32.9	46.8	20.3
80. Document educational assessments, interventions, and evaluations of outcomes	36.7	43	20.3
<i>Evaluate the disease management program by:</i>			
81. Establishing evaluation criteria	44.3	11.4	44.3
82. Evaluating patient outcomes	39.2	20.3	40.5
83. Developing patient satisfaction and quality of life questionnaires	32.9	6.3	60.8
84. Utilizing outcomes measures, such as hospital admissions and absences	41.8	11.4	46.8
85. Implement standard infection control procedures	27.8	67.1	5.1
86. Demonstrate competence in BCLS	8.9	87.3	3.8
87. Identify community resources that may be beneficial to the patient	48.1	16.5	35.4
88. Organize family support/education activities (i.e. smoking cessation)	35.4	24.1	40.5
89. Describe strategies to assist the patient with financial burdens	29.1	5.1	65.8
90. Outline criteria for referral to an asthma specialist or pulmonologist	32.9	8.9	58.2
91. Develop site specific documentation forms	19	11.4	69.6
92. Provide information to third party payers	25.3	5.1	69.6
93. Provide continuing education to health care providers and community groups	27.8	24.1	46.8
94. What clinical settings are utilized in your program to obtain the clinical skills listed above? (darken all that apply)			
<input type="radio"/> physicians office/specialist asthma/allergy/pulmonary clinic			
<input type="radio"/> general practice/family practice outpatient clinic			
<input type="radio"/> emergency department			
<input type="radio"/> inpatient hospital unit			
<input type="radio"/> government health department			
<input type="radio"/> other _____			
95. What personnel are incorporated into your program to teach this material? (darken all that apply)			
<input type="radio"/> paid program faculty			
<input type="radio"/> practitioners with the AC-E credential			
<input type="radio"/> general/family practice physicians			
<input type="radio"/> specialty physicians			
<input type="radio"/> nurses/social worker/other allied health practitioners			
<input type="radio"/> other _____			

Your thoughts and comments on including this information in the respiratory therapist curriculum: _____

THANK YOU!

PREDISPOSING, REINFORCING, AND ENABLING FACTORS OF ENROLLMENT IN A RESPIRATORY CARE EDUCATION PROGRAM

Michael E Anders, MPH, RRT

Abstract

Background: The U.S. Bureau of Labor Statistics projects a shortage of respiratory therapists.

Objective: To determine predisposing, reinforcing, and enabling factors influencing student enrollment.

Methods: A survey instrument elicited all new students' predisposing, reinforcing, and enabling factors associated with enrollment in our program over a three-year period.

Results: Of 67 new students, 82 percent were female and 37 percent were minority students. Fifty-six percent of the students had a predisposition to pursue a health career by high school, however 81 percent were unaware of respiratory care at that time, and 97 percent chose respiratory care while attending or after graduation from a college or university. Students learned about respiratory care primarily from (1) health professionals, (2) families, and, equally, (3) the Internet and a college recruiter or faculty. The most common referents to our program were (1) the Internet, (2) health professionals, and (3) a college recruiter or faculty. However, the primary factor associated with the students' decision to enroll in our program was direct clinical observation of the profession. The two most substantial barriers to enrollment were prerequisite courses and program costs.

Conclusions: Data from this study served as tool for the development of a marketing plan for student recruitment for our respiratory care education program and study findings suggests: (a) college students and graduates are our primary target groups; (b) communications with these target groups should emphasize opportunities to help people and obtain rewarding employment; (c) direct clinical observation appears to support the decision to enroll into our program; and (d) program faculty should help prospective students overcome barriers to enrollment, including prerequisite courses and program costs.

Key Words: Respiratory Care, Education, Enrollment, Student Recruitment

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Factors of Enrollment in a Respiratory Care Education Program

Introduction

A critical shortage of respiratory therapists exists today. The U.S. Bureau of Labor Statistics projected that employment of respiratory therapists will expand by 35 percent by the year 2012.¹ Aging "baby boomers," prevalence of chronic diseases, a widening gap in health disparities among our population, and scarcity of qualified applicants to respiratory care educational programs each contribute to the potential problem.^{2,3,4,5}

Concurrent with this projected shortage, the American Association for Respiratory Care advocates advanced-level credentialing and education to provide highly qualified respiratory therapists with critical thinking abilities.⁶ These abilities are integral to enhancing patient outcomes through respiratory therapist driven protocols and evidence-based respiratory care.

Academic programs in respiratory care must embrace the challenge of recruiting qualified students. An initial step in effective student recruitment is to conduct an assessment of current and past students.⁷ Such assessment provides data for the development of a coherent marketing plan that targets prospective students.

The purpose of this study was to assess predisposing, reinforcing, and enabling factors for student enrollment in a respiratory care educational program at an academic health science center.

Methods

Ethics

The University of Arkansas for Medical Sciences (UAMS) Institutional Review Board approved this study.

Study Participants

Study participants were newly enrolled respiratory care students ($n = 67$) in the advanced-level programs on the Little Rock and Texarkana campuses and the entry-level program on the Pine Bluff campus at the University of Arkansas for Medical Sciences enrolled over a three-year period. New students completed the survey on the day of orientation, just prior to the fall semester in 2002, 2003, and 2004.

Study Design

The study employed a cross-sectional design.

Key Definitions

Predisposing factors. Predisposing factors included knowledge, attitudes, beliefs, and values that facilitated or hindered the choice to enroll in our program.

Reinforcing factors. Reinforcing factors were external cues or incentives that provided a referral to either the profession or the program.

Enabling factors. Enabling factors were those factors that either facilitated or served as a barrier to the students' decision to accept admission and enroll in our program.

The investigator developed these operational definitions for the purpose of the study from conceptual definitions related to the educational and ecological assessment for health promotion planning.⁸

FACTORS OF ENROLLMENT IN A RESPIRATORY CARE EDUCATION PROGRAM

Instrumentation

To develop the survey instrument, the researcher used qualitative responses from a focus group of senior students, in which they responded to open-ended questions concerning their predisposing, reinforcing, and enabling factors associated with enrollment in our program. This information was then used in the development of the survey instrument.

The study used a self-administered survey with closed-ended questions to elicit predisposing, reinforcing, and enabling factors from newly enrolled students in our program. For each question, students selected a single response from a list of responses that best characterized their experiences and perceptions. Additionally, students had the option of selecting “Other” and to provide a written response.

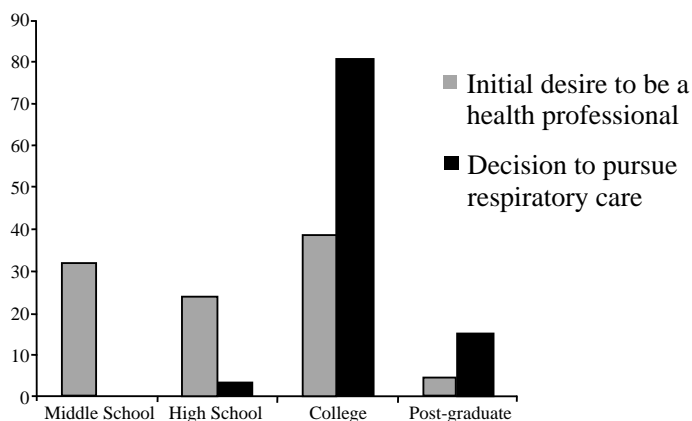
Table 1
Characteristics of the Study Participants

	Mean	SD	Range
Age	26.38	6.77	20-53
	Frequency	Percent	
Gender			
Male	12	17.9	
Female	55	82.1	
Race			
White	41	61.2	
Black	20	29.9	
Other	6	6.2	
Institution of origin*			
Four-year university	35	53.8	
Community college	30	46.2	
Student type			
Advanced-level	58	86.6	
Entry-level	9	13.4	
Predisposition toward respiratory care in high school			
Aware of profession	13	19.4	
Unaware of profession	54	80.6	
	Total: 67		

*Missing data = 2

Figure 1

Time that students had the general idea that they desired to be a health professional versus time that they made the decision to pursue a career in respiratory care.



Statistical Analysis

The study employed SPSS™, version 13.0 for Windows, statistical software to calculate descriptive statistics as proportions.⁹

Results

Demographic Characteristics

Sixty-seven students completed the survey. Table 1 presents the students' demographic characteristics.

Predisposing Factors

Thirty-two percent of the students had a general notion to pursue a career in health care by their middle school, and 56 percent, cumulatively, had such a notion by their senior year in high school (Figure 1). Eighty-one percent were, however, unaware of the respiratory care profession during their senior year in high school.

Ninety-seven percent of the students made their decision to pursue a career in respiratory care either during or after graduation from a college or university. Fifteen percent had already earned a baccalaureate degree when they made their respiratory care career choice.

The most important predisposing factors for choosing the respiratory care profession, in rank order, were: (1) a desire to help people (44 percent), (2) job opportunities and salary (30 percent), (3) job characteristics, including the importance of the profession (14 percent) and the diversity of responsibilities (5 percent) [Table 2].

Reinforcing Factors

The students learned about respiratory care from a variety of sources, in rank order: (1) health professionals, (2) families, and, equally, (3a) the Internet and (3b) a visit to their college campus by either a college recruiter or faculty. Primary referents to our program,

FACTORS OF ENROLLMENT IN A RESPIRATORY CARE EDUCATION PROGRAM

Table 2

Most Important Predisposing Reason for Choosing Respiratory Care

Predisposing Reason*	Frequency	Percent	Cumulative Percent
Desire to help people	28	44.4	44.4
Job opportunities and salary	19	30.2	74.6
Job Characteristics	14	21.9	96.5
Other	2	3.2	100.0
Total:	63		

*Missing data = 4

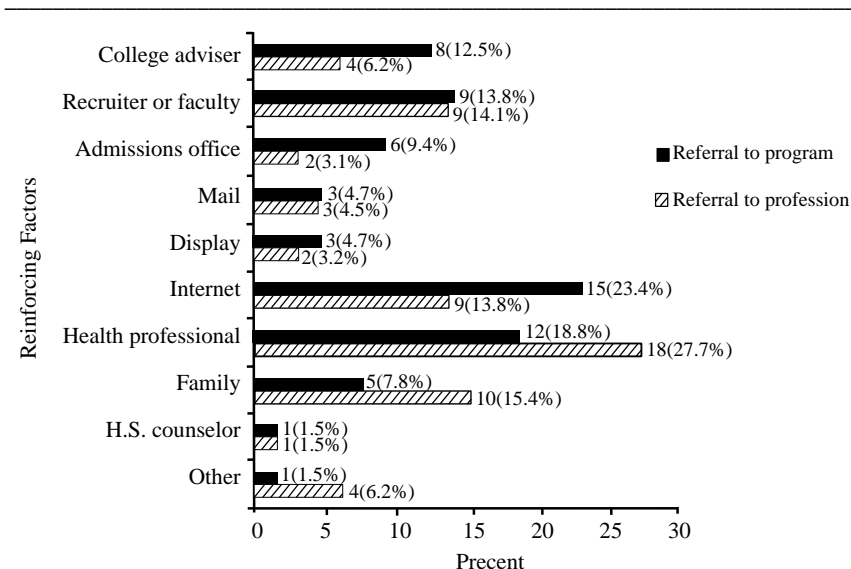
in rank order, were: (1) the Internet, (2) health professionals, and (3) college recruiter or faculty (Figure 2).

Enabling Factors

Factors that influenced students most in their decision to enroll in our program were: (1) direct observation of the profession and (2) the reputation of our academic health science center (Table 3). Eighty-two percent of the students visited our college Web site to learn about our program and initiate the admissions process (Table 4). Two primary perceived barriers to enrollment were: (1) prerequisite courses and (2) the cost of the program.

Figure 2

Reinforcing factors. Referents to profession and referents to program.



FACTORS OF ENROLLMENT IN A RESPIRATORY CARE EDUCATION PROGRAM

Table 3

Enabling Factors Related to Decision to Enroll in Program

Predisposing Reason*	Frequency	Percent	Cumulative Percent
Most Influential for Enrollment*			
Direct observation	28	43.8	43.8
UAMS reputation	17	26.6	70.4
Program faculty	6	9.4	79.8
Web site	5	7.8	87.6
Alumnus	4	6.3	93.9
Student	3	4.7	98.6
Location	1	1.6	100.0
	Total: 64		
Largest Barrier to Enrollment†			
Prerequisite courses	25	38.5	38.5
Costs	24	36.9	75.4
Location	7	10.8	86.2
Program length	4	6.2	92.3
Other	5	7.7	100.0
	Total: 65		

*Missing data = 3

†Missing data = 2

Discussion

Demographic Factors

Students were predominantly female; their mean age was 26 years; nearly half originated from community colleges; and more than one-third were minorities. This preponderance of females is consistent with the overall proportion among the 17 allied health academic programs in our college, but substantially higher than the proportion

Table 4

Web Site as an Enabling Factor

	Frequency	Percent
Application Decision		
Web site helped to enable decision to apply	55	82.1
Did not visit Web site during decision process	12	17.9
Admission Process		
Web site helped to enable admissions process	52	77.9
Did not visit Web site during admissions process	15	22.4
	Total: 67	

reported by LeGrand and Shelledy.⁷ Our proportion of minority students, mostly African-American, is nearly double the proportion of minorities in our state population.¹⁰ We were encouraged with this finding, in light of the Sullivan Commission Report, which described the lack of diversity in the health care workforce.¹¹

Predisposing Factors

Though a majority of the students had the notion to pursue a health career by their senior year in high school, few were aware of the respiratory care profession. However, raising awareness of the allied health professions among high school students may be an ineffective means to subsequently increase their interest in pursuing enrollment in health science related programs.^{12,13} Furthermore, the majority of respiratory care students initially choose a career other than respiratory care.¹⁴

Nearly all of our students decided upon the respiratory care profession either while attending or after graduation from a college or university. However, program administrative personnel of respiratory care educational programs often reported that they used high school recruitment activities as a recruitment method.¹⁵

The students' primary underlying reasons for choosing to become respiratory therapists were the desires to (a) help people and (b) secure employment with good salary and valued and diverse responsibilities. These results were consistent with those of previous studies.^{7,14}

Reinforcing Factors

Prominent among the reinforcing factors that directed students to either the respiratory care profession or our program were health professionals, the Internet, families, and visits to referral colleges and universities by a recruiter or faculty. The importance of health professionals as a source of references presents a challenge. It suggests that student recruitment is, to some degree, related to the job satisfaction and job opportunities of practicing respiratory therapists. Hospital downsizing and restructuring may have contributed to the declines in respiratory care educational program applicants seen in the recent past.

Only one student reported that either a high school counselor or teacher provided a referral to the profession; none reported that either a high school counselor or teacher provided a referral to our program. High school counselors' lack of time with individual students is likely a contributing factor.¹³

Enabling Factors

Direct observation. Direct observation of the profession at a clinical affiliate was the most influential enabling factor in the students' decision to enroll in our program. Historically, we have required clinical observation as a part of the application process to the program. As a result of the survey data, we encourage potential students to complete clinical observation in respiratory care prior to applying so they can see first hand what the profession is all about.

Web site. Most students indicated that our college's Web site was helpful in both the application and admissions processes. We are in the process of further enhancing the interactivity of our Web site.

Prerequisite Courses as a Barrier. Students cited prerequisite courses as the most difficult barrier to program enrollment. Targeted recruitment of students with either a major or

degree in science may help to overcome the barrier of prerequisite courses. Additional measures that might help are (a) earlier and more intense efforts to communicate with college students; (b) collaboration with community colleges in curriculum design; and (c) implementation of a longer program track that allows concurrent respiratory care program course enrollment with co-requisite science and/or general education courses.

Cost as a Barrier. Program cost was the second most common barrier reported by the students, despite the availability of several forms of financial assistance. Both the federal government and Arkansas have programs that forgive loans for qualified graduates. Moreover, several local hospitals provide contracts whereby they pay for program costs in return for subsequent employment. These data suggest that potential students need to be made more aware of financial aid options and services.

Study Limitations

The survey instrument and the study results have limited generalizability for other programs or student groups. There was not a formal evaluation of the validity and reliability of the instrument; however, focus group results and a literature review were the basis for development of the instrument, and the results were stable between years and between respective academic programs in our college. The use of self-reported data is another limitation due to the potential for recall bias.

Conclusions

The study results provided information needed in developing a comprehensive and effective strategic marketing plan for student recruitment for our respiratory care education program. Primary target groups for this plan are college and university students and graduates. Recruitment messages explicitly focus on the career opportunities and the ability to help people as a respiratory therapist. While it is difficult to assert cause and effect, since implementation of this marketing plan, we have seen an 88 percent increase in the number of applicants over the previous year.

Future studies should elucidate the outcomes of strategic marketing plans for student recruitment and evaluate such interventions as direct mail, email, and Web marketing.

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A Seven Year Review of Respiratory Care Education in Ohio

F. Herbert Douce, MS, RRT, NPS, RPFT

Abstract

Background: There is interest among some State agencies and respiratory care educational programs in statewide student enrollment and graduate outcome data. In many states there is no aggregate data available to permit program personnel or the general public to view trends in respiratory care education. This report provides a seven-year retrospective review of the trends in respiratory care education in Ohio. **Methods:** All nineteen respiratory care educational programs located in Ohio provided copies to the Ohio Respiratory Care Board (ORCB) of their 2003 Annual Report to the Committee on Accreditation for Respiratory Care (CoARC) and a 2004 supplemental report. Annual and seven-year statewide totals and averages were calculated and trends were identified. **Results:** A four-year decline in number of applications and a five-year decline in number of graduates reversed in 2004. For many programs, enrollments remained consistently below program capacity. Graduation rates varied widely among programs and averaged 69%. Attrition was common in many programs with a 26% average attrition rate statewide. Graduate outcomes were consistently positive with 95% job placement, 97% positive graduate and employer survey results, and 97% earning the CRT credential and state license. Although the pass rates on the advanced credentialing examinations were generally positive, the participation rate declined and the mean for the seven-year period approached 50%. **Discussion:** The declining trends in number of applications, number enrolled, percent capacity, and number of graduates reversed for 2004, but did not equal the peak year reflected in the class of 1999. This report provides a model for authorities in other states; it enables program directors to evaluate their relative statewide position on many program characteristics; and it provides the ORCB, state policy makers, and therapist educators and employers with valuable information for future planning. **Key Words:** Respiratory Care, Education.

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Seven Year Review of Respiratory Care Education in Ohio

Introduction

Some State governmental authorities have become interested in the persistent shortage of respiratory therapists and how schools are meeting the increasing demand for new graduates. In many states there are no statewide data on school outcomes, and policy makers are poorly informed on the respiratory care educational system in their states. Respiratory care program directors often can not evaluate objectively their program data and outcomes, if there are no statewide benchmarks. This review of respiratory care education in Ohio provides a model for authorities in other states and enables program directors to become better informed of the strengths and weaknesses of their programs. This report was provided to the Ohio Respiratory Care Board (ORCB) in December, 2004 in partial fulfillment of its obligations under Section 4761.03 of the Ohio Revised Code and under Ohio Administrative Code 4761-4-02, "Monitoring of Ohio Respiratory Care Educational Programs by the Education Committee of the Ohio Respiratory Care Board."

The purpose of this report was to construct an aggregate reference for the review of educational data on respiratory care education in Ohio. The ORCB, through the Board's Education Committee, is charged with monitoring educational policy and issues affecting respiratory care educational programs in Ohio. Some of the most pressing questions posed to the Board on a regular basis concern the trends involving the enrollment, attrition, graduation, and examination pass rates of students in Ohio's nineteen respiratory care programs. Until now, no aggregate data have been available to permit program personnel or the general public to view trends in respiratory care education in Ohio. This report provides a seven-year retrospective review of the trends in respiratory care education in Ohio.

Methods

The nineteen respiratory care educational programs accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP) located in Ohio were the population for this study. At the request of the ORCB, student enrollment and graduate outcome data were collected in the form of the Annual Report required by the Committee on Accreditation for Respiratory Care (CoARC). Because the CoARC Annual Report only included data for classes graduating from 1998 – 2003, and did not include data for 2004, the ORCB Education Committee requested supplemental data from programs for 2004 also due to the ORCB on September 1, 2004.

All nineteen respiratory care educational programs provided copies to the ORCB of their CoARC 2003 Annual Report and the 2004 supplement. With the 2004 supplement, the reports provided data for the seven-year period 1998 – 2004. Data provided in the CoARC Annual Report and the 2004 supplement included: number of applicants for enrollment, maximum enrollment, and actual enrollment; student attrition and causes of attrition; number of graduates; number of graduates employed in respiratory care related jobs within three months of graduation, and quality outcome measures of the program such as the results of graduate and employer surveys and licensing and credentialing examinations. All data are oriented to the year of graduation.

Program productivity was defined as the number of graduates, and the graduation rate was the number of students who graduated as a function of actual enrollment. Attrition rate was the number of students who did not graduate as a function of the actual enrollment. Program capacity was the maximum enrollment reported and percent program capacity was actual enrollment as a function of maximum enrollment.

These data were entered into a computerized statistical spreadsheet (Statistical Package for the Social Sciences, version 12.0, SPSS, Inc, Chicago, IL) and the following ratios and indices were calculated: applicant to program capacity ratio, percent enrollment of capacity, percent attrition to enrollment (attrition rate), percent graduates to enrollment (graduation rate), percent graduates placed in respiratory care jobs to graduates (placement rate), percent positive graduate and employer survey results, and credentialing examination pass rates. Annual and seven-year statewide totals and averages were calculated as appropriate and trends were identified. Seven-year averages were also calculated for each program.

Results

Demographics

There are nineteen accredited respiratory care educational programs in Ohio. These programs are known as respiratory care, respiratory care technology, respiratory therapy, and respiratory therapy technology. They are sponsored by nine state-supported community colleges, six state-supported universities, one state-supported technical college, one private four-year college, and one career center in consortium with Marshal Community and Technical College of Huntington, West Virginia. These programs are widely distributed statewide.

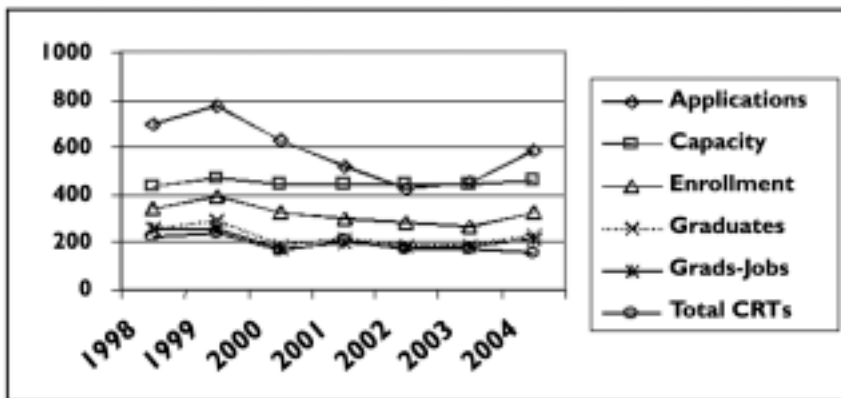
Sixteen programs award a two-year degree as an Associate Degree, Associate of Science degree, or an Associate of Applied Science degree. Three programs culminate in a four-year degree as a Bachelor of Science degree. Eighteen programs are accredited by CAAHEP via CoARC as “advanced” level programs and one is accredited as “entry” level.

Student Enrollment Data

Table 1 provides a summary of statewide totals and means for student data for 1998 – 2004, and Figure 1 depicts the seven-year trends. Except for the graduating classes of

Figure 1

Seven-Year Statewide Trends In Respiratory Care Student Data.



A SEVEN YEAR REVIEW OF RESPIRATORY CARE EDUCATION IN OHIO

Table 1
Statewide Totals and Means For Student Data For 1998 – 2004.

Student Data	1998	1999	2000	2001	2002	2003	2004	State Totals	State Means
Applications for Enrollment	694	767	623	517	425	453	582	4061	580
Program Capacity	434	469	442	443	444	442	454	3128	447
% Applications/Capacity	1.6:1	1.6:1	1.4:1	1.2:1	<1:1	1:1	1.3:1		1.3:1
Actual Enrollment	336	391	323	297	279	266	326	2218	317
% Enrollment/Capacity	77	83	50	67	63	60	72		72
Non-Academic Attrition	36	50	49	41	36	35	33	280	40
General Education Attrition	6	3	4	6	1	1	4	25	4
RT Course Attrition	42	52	52	39	37	28	43	293	42
Total Attrition	84	105	105	86	74	64	80	598	85
% Attrition/ Enrollment	25	27	33	29	27	24	25		26
Annual Graduates	256	285	185	208	186	184	232	1536	219
% Graduate/ Enrollment		76	73	57	70	67	69	71	69

RT – Respiratory Therapy

2002 and 2003, the number of applicants to respiratory care programs statewide exceeded program capacities. Applications for graduating classes would have generally occurred two years earlier, indicating that the number of applications to respiratory care educational programs declined during 2000 and 2001 and increased during 2002 for the graduating class of 2004. Program capacities statewide increased by twenty students during the seven-year period while actual statewide enrollment declined for four consecutive years for the graduating classes of 1999 to 2003, but increased for the class of 2004. Enrollment as a percent of capacity peaked at 83% in 1997 for the class of 1999, and enrollment was only 50% of capacity in 1998 for the class of 2000.

The seven-year statewide attrition rate was 26%. Almost 600 students of the 2218 enrolled did not graduate. Attrition occurred almost equally due to personal reasons or for poor academic performance in respiratory care courses. The seven-year graduation

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Table 2

Statewide Totals and Means For Student Data For 1998 – 2004.

Programs	Applicants	Capacity	Applicant to Capacity Ratio	Enrollment	% Enrollment /Capacity	Attrition Rate	Graduates Per Year	Graduation Rate
01	29.0	15.0	1.9:1	13.6	90	8	12.7	92
02	47.3	26.0	1.8:1	18.7	72	22	15.3	82
03	25.4	24.5	1:1	19.4	77	18	15.9	81
04	22.3	20.7	1.1:1	13.4	65	21	10.7	80
05	23.3	20.0	1.2:1	15.1	76	27	10.9	75
06	17.9	20.7	0.9:1	15.6	75	21	11.6	74
07	8.6	15.6	0.6:1	7.0	51	0	5.0	74
08	31.1	25.0	1.2:1	20.9	83	25	15.1	72
09	22.4	12	1.9:1	8.7	73	27	6.1	71
10	50.1	25.0	2:1	20.6	82	20	15.0	71
11	19.9	25.3	0.8:1	13.1	55	23	9.1	68
12	28.3	20.3	1.4:1	20.1	99	24	13.3	67
13	21.1	20.0	1:1	14.0	70	30	9.3	67
14	19.0	24.1	0.8:1	11.6	48	32	7.9	65
15	25.9	26.4	1:1	19.4	76	39	12.1	63
16	27.6	27.9	1:1	20.0	72	32	12.3	62
17	74.3	45.0	1.7:1	24.8	55	45	14.6	59
18	33.4	24.0	1.4:1	18.7	78	42	10.1	55
19	56.4	29.3	1.9:1	22.0	75	31	12.6	55
Statewide means (SD)	30.6 (16.7)	23.9 (7.8)	1.3:1 (0.6)	16.7 (6.3)	72 (21.0)	26 (15.0)	11.6 (5.0)	70 (17.2)

rate was 69%. The average number of graduates statewide was 219 annually; the number of graduates declined for four consecutive years from 1999 - 2003, and increased in 2004. It should be noted that the sum of the attrition rate and graduation rate do not equal 100%. These percentages were calculated independently and do not include student “stop-outs” from a prior class who may graduate in a later class.

For individual programs during the period 1998 – 2004, Table 2 includes the seven-year averages for student data in comparison to statewide means and standard deviations. Respiratory care educational programs are generally small with an average graduating class of 11.6 per year. On average, four programs graduated fifteen or more students annually, and five programs graduated less than ten. Fifteen programs have had enough applicants to meet their capacity; whereas, only 8 have had enough applicants to support competitive admission decisions. The percent enrollment to capacity varied widely among programs from 55% to 99%. The attrition and graduation rates also varied widely among programs with attrition as low as 0% and as high as 45% and graduation as low as 55% in two programs to a high of 92%.

Graduate and Outcome Data

Table 3 provides a summary of statewide totals and means for graduate and program outcomes data for 1998 – 2004. Graduate outcomes have been very positive and

A SEVEN YEAR REVIEW OF RESPIRATORY CARE EDUCATION IN OHIO

Table 3

Statewide Totals and Means For Educational Outcomes For 1998 – 2004.

Educational Outcomes	1998	1999	2000	2001	2002	2003	2004	State Totals	State Means
Annual Graduates	256	285	185	208	186	184	232	1536	219
Grads – RT Jobs	253	258	170	196	175	178	213	1443	206
Job Placement Rate	99	91	92	94	94	97	92		95
Percent Positive Graduate Surveys		97	97	95	99	94	100	100	97
Percent Positive Employer Surveys		98	97	96	97	94	97	NA	97
Total CRTs	222	241	161	205	168	169	150	1316	188
CRT Pass Rate		97	97	95	95	96	99	97	97
WRE									
Participation Rate		74	59	55	56	42	42	21	50
WRE Pass Rate		91	96	97	92	91	88	95	93
CSE									
Participation Rate		70	60	54	56	42	38	20	49
CSE Pass Rate		81	86	89	84	80	79	90	85

RT – Respiratory Therapy

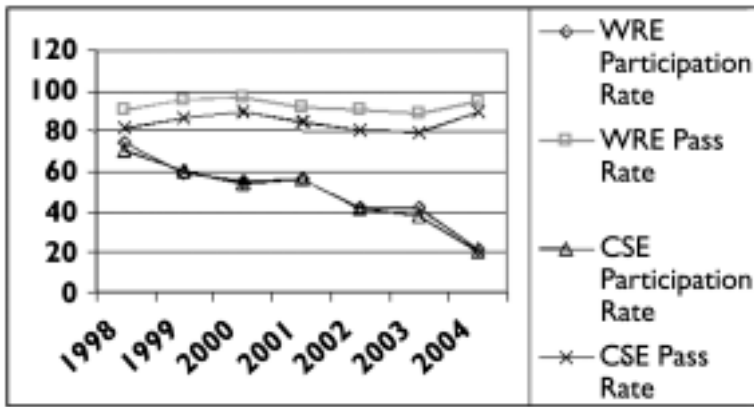
consistent. For the seven graduating classes of 1998 – 2004, 95% of respiratory care graduates were employed in respiratory care-related jobs within three months of graduation, 97% of graduates indicated satisfaction with their respiratory care education, 97% of employers indicated satisfaction with the knowledge, skills, and attributes of the graduates. Seven programs reported 100% positive graduate follow-up questionnaires, and eight programs reported 100% positive employer follow-up questionnaires. Ninety-seven percent (97%) of graduates passed the entry-level respiratory care credentialing examination qualifying them for the Certified Respiratory Therapist (CRT) credential and state licensing, and six programs reported 100% pass rates.

The participation rates of graduates on the two components of the Registered Respiratory Therapist (RRT) examination averaged approximately 50% and were declining (See Figure 2). For the graduates who attempt these examinations, 93% passed the multiple-choice written registry examination (WRE) for the credential RRT, and 85% pass the branching logic clinical simulation examination (CSE) for the RRT credential.

For individual programs during the period 1998 – 2004, Table 4 includes the seven year total number of graduates, total number of graduates employed in respiratory care-related jobs within three months of graduation, job placement rate, total graduates who have

Figure 2

Seven-Year Statewide Trends in Respiratory Care Graduate and Program Outcomes for RRT participation and pass rates.



WRE - Written registry Examination
 CSE - Clinical Simulation Examination

earned the CRT credential, the percent positive graduate and employer surveys, and the percent of graduates who have passed CRT, WRE, and CSE credentialing examinations.

Discussion

This report was possible only through the cooperation of the directors of Ohio's respiratory care programs. It was not the purpose of this report to compare individual programs, as there was no control for differences in program funding, faculty responsibilities, program and institutional missions, admission standards, or other variables that significantly affect the operation and performance of individual educational programs. Program directors were provided their program identification number, and with the data provided in this report, program directors can evaluate their relative statewide position on many program characteristics. The ORCB, state policy makers, and employers gained valuable information for future planning.

Almost all (18/19) of the Ohio programs are accredited as "advanced." "Advanced" in this context has historical origins and is relative to the 1972 accreditation standards of ten months of technical training for entry-level respiratory therapy technicians and twenty months of post-secondary education for advanced-level respiratory therapists.^{2,4} In 1998 the ORCB began requiring a minimum of an associate's degree for licensing,¹ and in 2000 CoARC accreditation requirements also changed to require an associate's degree for entry-level.³ Beginning in 2002, the NBRC required at least a two-year degree for entry level credentialing as a CRT.⁶ All two-year respiratory care educational programs in Ohio that were listed prior to 2000 by CoARC as "advanced" remain listed as "advanced."⁷

This report includes seven years of data, and all data in this report are oriented to the year of graduation. The program capacity, number of applications, the number initially

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Table 4

Seven Year Totals and Averages of Program Outcome Data for the Period 1998-2004

Programs	Total Graduates	Grads – RT Jobs	Job Placement Rate	Total CRTs	% + Graduate Surveys	% + Employer Surveys	CRT Pass Rate	WRE Pass Rate	CSE Pass Rate
01	88	86	97	86	100	100	100	99	97
02	107	105	98	102	93	94	99	87	88
03	111	94	89	89	100	100	83	86	72
04	75	71	95	72	100	100	98	96	75
05	76	73	96	67	91	99	90	80	86
06	81	80	99	82	98	100	99	98	89
07	35	34	98	NA	99	100	NA	100	100
08	106	83	92	89	98	96	99	95	85
09	43	41	94	30	90	85	85	88	63
10	105	101	94	96	99	94	96	95	96
11	64	60	94	54	100	100	100	87	78
12	93	86	92	82	100	92	96	89	84
13	65	65	100	64	96	95	100	100	98
14	55	52	94	47	100	99	99	90	88
15	85	80	94	72	85	90	100	92	68
16	86	79	90	82	98	96	96	NA	NA
17	102	100	99	98	99	96	100	98	96
18	71	68	96	60	100	100	99	94	83
19	88	85	96	44	92	100	100	96	87
Statewide means (SD)	80.8 (21.7)	75.9 (19.4)	95 (0.1)	73.1 (20.2)	97 (8.3)	97 (8.2)	97 (7.5)	93 (14.0)	85 (20.9)

enrolled, and the percent capacity would have occurred approximately two years prior to graduation. Attrition might have occurred at any time during the estimated two years of enrollment. During the seven years under study, the graduating class of 1999, who applied for admission and who enrolled in 1997, presents the largest program capacity, the greatest number of applications, the largest actual enrollment, the highest percent capacity, and the largest number of graduates.

For five years, from 1997 through 2002, program capacity for the graduating classes of 1999 through 2004, declined 3% in Ohio. For three years, from 1997 through 2000, the number of applications declined, then increased somewhat through 2002 for the class of 2004, but remained only 76% of the highest number reported for the class of 1999. For four years, from 1997 through 2001, actual enrollment declined, then increased in 2002 for the graduating class of 2004, but was only 83% of the largest entering class in 1997. Since 1999, the percent capacity and number of graduates have fluctuated, but the class of 2004 was filled at 13% less capacity than the class of 1999 and was only 81% of the class of 1999. Enrollment at less than capacity when applications exceed capacity may indicate admission selectivity and that many applicants were ill prepared or ill-suited for respiratory care education.

The declining trends in number of applications, number enrolled, percent capacity, and number of graduates have reversed, but do not equal the peak year reflected in the class of 1999. During this period, the demand for respiratory therapists in Ohio hospitals increased, the American Association for Respiratory Care (AARC) provided resources for recruiting students, and reports of programs closing in other states may be partially responsible for more aggressive and effective recruitment of students. The study of future classes will determine if and when respiratory care education in Ohio fully recovers to the peak year of 1999.

Over the seven year period of study the average attrition rate was 26% statewide; almost 600 students who enrolled in respiratory care educational programs in Ohio did not graduate. Approximately half of the observed attrition was due to non-academic causes such as financial, personal, and family obligations while the other half was due to academic failures in respiratory care courses. Admission criteria were not considered in this study, but the attrition rate indicates that many students were not academically prepared or they underestimated the rigor of a respiratory care education and the commitment necessary to be academically successful. As noted above, the attrition rate and the graduation rate did not always equal 100%, when there are students who temporarily withdraw with the intention of re-enrollment; these students "stop-out." The actual number of students who "stopped-out" is not identified in these data; these students are counted if they graduated or if they permanently withdrew.

The number of graduates employed in respiratory care-related jobs indicated both employers' demand for therapists and graduates' satisfaction with employment in the respiratory care field. The quality of the educational program was determined by surveying recent graduates and their employers using CoARC-designed questionnaires and graduate pass rates on licensing and credentialing examinations of the NBRC⁸. Over the seven year study period, the job placement rate, percentage of positive graduate and employer surveys, and CRT pass rates were consistently very positive, indicating overall success of graduates at entry level.

For the classes of 1998 through 2003, approximately 50% of graduates attempted the advanced-level credentialing examinations for the credential RRT and the overall trend was downward. The cause of this decline is not known, although it may be due to a lack of incentives provided by employers for achieving the RRT credential, the lack of confidence to pass the examinations, and the high cost of the RRT examinations. The precipitous decline to 21% for the class of 2004 was most likely due to recent graduation dates not allowing adequate time for graduates to attempt these examinations. The study of future classes will determine if participation in advanced credentialing continues to decline. The pass rate for graduates taking the WRE was above 90% for every year except 2003, but the pass rate for graduates taking the CSE portion of the advanced-level examination for the RRT credential did not exceed 90% passing during this period. Since the CoARC annual reports use examination results on the two components of the RRT credentialing examination, it was not possible to determine the actual percent of graduates who earned the RRT credential from the CoARC Annual Reports. Considering the relatively low

participation rate, it would not be prudent to conclude that new graduates are generally prepared as advanced practitioners.

Limitations

The data collected for this report were self-reported by the directors of Ohio's respiratory care educational programs and were not independently verified. During the data entry process it was noted in several cases that the number of satisfactory graduate and employer questionnaires or CRTs exceeded the number of graduates for individual years. This may be the effect of students who "stopped-out" being counted in a later class or reporting errors. One college reported 273 applicants for respiratory therapy for the class of 1998. The number was explained as applicants to the college, and the number was not included in this report. The CoARC annual reports use examination results on the two components of the RRT credentialing examination, but the report does not include the actual number of graduates who earn the RRT credential. This report does not consider the determinations by CoARC of each program's 2003 Annual Report's compliance with the "Thresholds of Success" since those determinations had not been made and were not available. Finally, this report does not include data on current enrollments nor future projections of graduates for the Class of 2005 or beyond.

Conclusions

All nineteen of the respiratory care educational programs in Ohio were accredited by CAAHEP through the review by CoARC, and all key program personnel were licensed in Ohio as physicians or respiratory care professionals. A four-year decline in applications and a five-year decline in graduates reversed with 232 graduates in 2004. For many programs, enrollments remained consistently below program capacity. Graduation rates varied widely among programs and averaged 69%. Attrition was common in many programs with a 26% average attrition statewide. Graduate outcomes were consistently positive with 95% job placement, 97% positive graduate and employer survey results, and 97% earning the CRT credential and being licensed. Although the pass rates on the advanced credentialing examinations were generally positive, the participation rate averaged only about 50% for the seven year period. While graduate outcomes were generally positive for all programs, there was significant variability in many program characteristics.

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WHAT INFLUENCES THE PERSISTENCE OF FOUR-YEAR ALLIED HEALTH STUDENTS?

Kathy Jones-Boggs Rye, EdD, RRT

Abstract

Background: The number of students who fail to persist to graduation in some allied health educational programs (e.g., respiratory care and medical technology) is of growing concern to educators. Non-persistence represents a waste of resources, and may have negative psychological impacts. Yet, there is little research identifying what influences the persistence of undergraduate four-year allied health students based on the theoretical models of undergraduate persistence. **Methods:** A logistic model of within-year persistence based on the research of St. John and associates is advanced and examined in this study using the 1996 National Postsecondary Aid Study (NPSAS:96). The statistical method utilized for analysis in this study is logistic regression. The variables of student background, aspirations, achievement, college experience, and price are examined. **Results:** Persistence decisions of four-year allied health professional students were significantly affected by three background, one high school achievement, four college experience, and one price variable. **Conclusion:** Findings indicate a positive influence on within-year persistence is related to the variables of being enrolled: 1) as a senior, 2) in an associate degree program, 3) as a full-time student, and 4) having low college entrance exam scores. Variables associated with lowering the persistence rate are: 1) being Hispanic, 2) having a mother with a college degree, 4) having a disability, and 5) working full-time. Four-year allied health students are sensitive only to price variables associated with current year loan amounts.

Key Words: Student Dropouts; Students, Health Occupations; Allied Health Occupations; Schools, Health Occupations; Logistic Models.

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What Influences the Persistence of Four-Year Allied Health Students?

Introduction

As funding for higher education becomes more tenuous, public expectations intensify. Society, politicians, administrators, educators, and students are more demanding of educational institutions. Increased accountability of colleges and universities is obligatory. Thus, many allied health education programs are pursuing strategies to maximize resources by reducing student attrition and refining their niche in academia.¹

Allied health education programs face the challenge of supporting the integrity of their curricula and at the same time maintaining student enrollment levels. "In the past, when enrollments in postsecondary education were high, retention was viewed as an ethical issue related to equal opportunity, equal access, and the maximization of human resources. Now that the traditional pool of students (18 to 20 years of age) has diminished, retention has also become a matter of institutional survival".² Predicting the success of students is difficult and student attrition has been shown to have an adverse impact on students, institutions, and Society.³ The examination of student persistence variables will be crucial to promoting retention.

The increasing health care needs of society and the health care manpower issues require a careful balance between enrollees and graduates be maintained. As the world population has increased, health care manpower issues are even more significant.⁴ A major challenge for allied health educational institutions is to produce health professionals with the knowledge, skills, and attitudes to thrive in the current health care climate. Therefore, it is essential to promote academic success and reduce the number of students who fail to persist in schools of allied health. These issues are also of vital interest to respiratory therapy educational programs.

Hedl⁵ studied student attrition and reported that 44% of all students admitted to a bachelor's degree allied health program for the period 1972 to 1986 failed to complete their program successfully. The reasons for withdrawal were varied (academic, personal/family reasons, transfer to another program or area, health problems, employment related, expectations, or unknown) and only 14% were for academic reasons. In the general college population, attrition rates are higher among certain minority groups, with both African Americans and Hispanics more likely to drop out than non-minority students.⁶ Other factors that have been identified as frequently leading to failure to persist are inadequate academic preparation, family and financial obligations, inadequate student ability to meet study demands, and wrong career choice.⁷

The high failure rate of students in allied health and respiratory care education programs is of concern to educators and administrators. Maintaining maximum levels of student persistence is crucial for a number of reasons. Non-persistence represents a waste of financial resources, both personal and institutional. Furthermore, dropping out of educational programs may have negative psychological impacts on students as well as their families, friends, and colleagues. Individuals without college degrees can expect to earn less money over their life spans than individuals who have degrees. Maximizing student retention and success through continued enrollment to graduation may equate to survival in today's competitive environment.⁸ Thus, it is important that educational institutions

reduce attrition and improve student degree attainment to satisfy the needs, wants, and goals of all of the stakeholders to whom allied health educational programs are accountable (e.g., communities, patients, employers, students).

Research Questions

The primary focus of this study was to determine the variables which influence within-year persistence/withdrawal decisions of four-year allied health students. Within-year persistence is defined as continued enrollment in a subsequent semester of an academic year at the same institution. This study examined the difference in effects of background, aspirations, achievement, college experience, and price on student persistence behavior. The following research questions were addressed:

1. How does background (age, gender, ethnicity, income, marital status, parents' education, financial independence, and disability) of allied health students affect within-year persistence?
2. How do educational aspirations (educational level aiming towards such as some college, undergraduate, or advanced degree) of allied health students affect within-year persistence?
3. How does achievement (high school degree or GED) of allied health students affect within-year persistence?
4. How does college experience (type of institution, GPA, enrollment status, and attendance patterns) of allied health students affect within-year persistence?
5. How does cost (amount of tuition and fees charged including financial aid received and net cost) of allied health programs affect within-year persistence?

Review of the Literature

Student institutional departure has long been of intense concern to educators, administrators, and society. The importance of personal relationships and their influence on student satisfaction are central to the conceptual framework of the Spady⁹, Tinto¹⁰, and Pascarella and Terenzini¹¹ models. These models of persistence bring cohesion and help to build a theoretical basis for persistence studies. Spady and Tinto's models address social and academic systems that shape student retention in higher education. Tinto's model further extends Spady's model to include longitudinal effects and the importance of daily interaction between faculty and students. Pascarella and Terenzini expand Tinto's work and develop a model emphasizing the importance of informal contact between faculty and students in influencing persistence decisions. Astin¹² and Cabrera et al¹³, are instrumental in the examination of the influence of finance on the persistence process. Cofer and Somers^{14, 15} compare different approaches to assessing the effect of debt on persistence and confirm that price coefficients change over time. Perna¹⁶ demonstrates the importance of considering not only whether students receive financial aid, but also whether they receive various types and combinations of aid.

Despite the plethora of research on undergraduate persistence, there is relatively little national data pertaining to the allied health or the respiratory care profession. The majority of allied health attrition and retention studies focus on single institutions.^{5,17,18} Only, Wells¹⁹ and Gupta² have conducted national research on the persistence of undergraduates in the health care professions.

Wells' research focused on the influence of student characteristics, financial aid, and prices or living expenses on allied health student persistence. Wells' found a positive influence on within-year persistence for African Americans, students with mother's whose education is at the lower levels, married students, high school experience of GED, financially independent students, those students who based college choice on lower living costs, and students with the aspiration of a vocational education. In addition, undergraduates in the health care professions were compared to all other undergraduates revealing that the health care professions' students were more price sensitive to differentials related to loans and changes in tuition differentials, as well as to financial aid packages that include work-study. Wells' research is significant in that it demonstrated that health professions students were less likely to persist than students with other majors.¹⁹

Gupta's study of data from the 1990 CAHEA Annual Report found the attrition rate for men (17.4%) to be significantly higher than the attrition rate for women (15.7%). African American students who are not of Hispanic origin had a significantly higher attrition rate (25.4%) when compared with all other categories of race and ethnic origin. Caucasians and Asian or Pacific Islander students had a significantly lower attrition rate (14.4% and 13%, respectively). Women were less likely to withdraw than African American men or white men.²

Gupta demonstrated that attrition rates may vary widely according to type of allied health discipline. The overall attrition rate was 15.7%. The highest attrition rates were found in educational programs for respiratory therapy technician (28.7%), surgical technologist (28.7%), and medical laboratory technician (24.2%). Men enrolled in respiratory therapy technician programs were more likely to be lost to attrition than women, while women enrolled in medical laboratory technician certificate programs were more likely to withdraw.²

Sources of Data

The National Postsecondary Student Aid Survey, 1995-96 (NPSAS:96) provides a national database to explore a range of research questions related to the persistence decisions of undergraduate students. The U.S. Department of Education describes the NPSAS:96 as a "comprehensive nationwide study to determine how students and their families pay for postsecondary education."²⁰ A national survey is conducted once every three years based on students enrolled in less-than-2-year educational institutions, community and junior colleges, 4-year colleges, and universities located in the United States and Puerto Rico. Information is collected on student demographics, family income, educational expenses, employment, educational aspirations, and how students plan to finance their education.

The sample for this study included 1,086 allied health students enrolled in four-year institutions. For the purpose of this study, only the undergraduate four-year allied health students were selected. Furthermore, students must have been enrolled during the Fall term of the 1995-96 academic year, between July 1, 1995 and June 30, 1996 for inclusion in the study.

NPSAS:96 does not include all of the information necessary to extend the "ideal" persistence model.²¹ For example, high school grade point average and rank in class,

which indicate high school experience, are not included in the data. Also there is a lack of data on emotional and psychological factors that have historically been examined in persistence research. The variables “background,” “aspirations,” “achievement,” “college experience,” and “price” were chosen for use in this within-year persistence model. These variables may not be the only variables that influence the probability of persistence within the 1995-96 academic year of four-year allied health students. Other variables not available in the NPSAS:96 database could also be influential.

Results

Logistic Regression was applied to examine within-year persistence. Significance levels were set at $p < 0.01$. The persistence rate was described as the Peterson's Delta P. The Delta P was calculated for each variable in the study and provided a measure of change in probability in the outcome variable that can be attributed to a unit change in a given variable. Three background, no aspiration, one high school achievement, and four college experience variables were significant (Table 1). A significant Delta P was interpreted as an increased probability of persistence or non-persistence of allied health students to the following semester.

Students with the background variable of being Hispanic were 21.4 percentage points (p.p.) less likely to persist than white students. Explanations that have been offered to explain the lower persistence rates of Hispanics include financial constraints, parental education, and barriers secondary to English as a second language. Race had no significant effect (3 p.p.) on persistence when comparing African American students to white students.

Students with disabilities were 27.5 p.p. less likely to persist than students who have no disabilities. Students with disabilities comprised 3.8% of the study's population, 3.3% of persisters and 5.0% of non-persisters. Students with disabilities represent nearly 10 percent of all college students and currently experience outcomes far inferior to those of their non-disabled peers. However, an interesting fact is that research shows that “they are more likely to obtain positive professional employment outcomes after degree completion than their peers.”²²

Students whose mothers attained a bachelor's degree were 17.4 p.p. less likely to persist than students whose mothers had no degree. While this result seems counter-intuitive, it confirms Wells' findings that students whose mother's education level is an advanced degree have a decreased probability of persistency by 8 p.p. Perhaps mothers who have not completed a college degree place more emphasis on the importance of education with their children as a way of improving their socioeconomic status. Additionally, students may be more motivated to persist as first-generation college students.

Gender, age, marital status, financial dependence, and income level were not significant for an improved likelihood of persistence in our sample of students, while previous allied health persistence research has shown a positive influence on within-year persistence based on African American ethnicity, marital status, financial status, and completion of the GED.¹⁹

Degree aspirations of an advanced or college degree had no significant positive or negative effect on these four-year allied health students. These findings differ from those of Wells' study which indicated that health professions students with aspirations for a

master's or advanced degree were significantly less likely to persist and those with the aspiration of a vocational education were significantly more likely to persist.¹⁹

Only the high school achievement variable of having low test scores (ACT less than 18 or SAT less than 900) as compared to student with average test scores (ACT between 18 and 22 and SAT between 900 and 1070) was significant for persistence to the next semester. Whether the student earned a high school degree or GED prior to their college experience had no significant effect on this population of students. The academic experience gained during two years of prerequisite courses prior to entering professional allied health programs likely mitigates the significance of high school achievement (tests scores, GED, etc.).

Three college experience variables were significant and positively associated with persistence. Students who were classified as seniors were 8.7 p.p. more likely to persist than freshmen. Full-time students were 13.2 p.p. more likely to persist than part-time students. Those students enrolled in associate degree programs at four-year institutions were 11.4 p.p. more likely to persist than those enrolled in baccalaureate programs. This could be due to the "learning community" effect that is present in many allied health programs. Students are generally admitted yearly and progress full-time through the program with the same cohort of students and faculty for many of their courses. This type of structure has been reported to promote more academic and social integration leading to a greater likelihood of persistence. Full-time enrollment is often required in allied health programs, thereby increasing the probability of within-year persistence of students enrolled in these fields.

Only one college experience variable, working full-time, was significant for non-persistence in four-year allied health professions students. Four-year college students who work full-time were 14.0 p.p. less likely to persist than students who work less than 35 hours per week. Working full-time likely allows less time for social and academic integration and commitment.

Cost variables included tuition and fees, grant, loan, and work-study amounts. In the total sample, the average tuition and fees was \$3,826, grant amount was \$1,032, loan amount was \$1,639, and work-study amount was \$7.20 per hour. Four-year students in this sample were not significantly responsive to grant or work-study amounts. Only the loan amount was significant and positively associated with within-year persistence. Students were 1.9 percent more likely to persist for every \$1,000 of student loans received. Neither tuition amounts nor accumulated debt were significantly associated with persistence behaviors of four-year allied health students.

The pseudo R² for the model was 0.2523. The model correctly predicts 96.82% of the persisters and 48.23% of the non-persisters for an overall prediction rate of 90.15%.

Conclusion

Obligations such as families and employment that may take way from membership in academic and/or social communities increase the potential for students to leave college.²¹ Furthermore, the overall differences in persistence to degree completion based on ethnicity may be at least partially due to the differences between groups in their ability test scores and socioeconomic status. Also, a lack of academic and social integration likely plays a dominant factor in student departure/withdrawal behavior.^{6,9,10,11,12,13,14,15,29,30,31,32,33,34,35}

WHAT INFLUENCES THE PERSISTENCE OF FOUR-YEAR ALLIED HEALTH STUDENTS?

Table 1

Analysis of Within-Year Persistence for Four-Year Allied Health Students

Variable	Beta Coefficient	Peterson's Delta P	
Background			
Black	-0.2334	-0.0301	
Hispanic	-1.2243	-0.2140	*
Other	0.2348	0.0255	
Over 30	-0.4495	-0.0624	
Under 22	-0.6889	-0.1034	
Gender	0.3710	0.0384	
Married	0.1662	0.0185	
Dependent	0.2475	0.0268	
Mother w/college degree	-1.0428	-0.1738	*
Father w/college degree	0.3216	0.0339	
High income	-0.0941	-0.0115	
Low income	-0.3441	-0.0461	
Disability	-1.4847	-0.2753	*
Aspirations			
Advanced degree	-0.8805	-0.1401	
College degree	1.0845	0.0863	
Missing aspiration	-1.1681	-0.2013	
High School Achievement			
High test scores	-0.1847	-0.0234	
Low test scores	0.9584	0.0798	*
GED	-2.4440	-0.5098	
No high school	-2.2507	-0.4645	
College Experience			
Sophomore	0.0437	0.0051	
Junior	0.8142	0.0715	
Senior	1.0913	0.0866	*
Full-time student	3.3476	0.1318	*
Live on-campus	0.1900	0.0210	
High GPA	0.6459	0.0603	
Low GPA	-0.7662	-0.1178	
No GPA	-1.0463	-0.1745	
Remediation	0.0150	0.0150	
Works full-time	-0.8821	-0.1404	*
Associate degree program	1.8844	0.1137	*
Certification program	0.7529	0.0676	
Public institution	-0.1598	-0.0201	
Price			
Tuition	-0.0001	0.0640 x 10 ⁻⁴	
Grant amount	0.1476	0.0166	
Loan amount	0.1712	0.0191	*
Work study amount	0.8992	0.0765	
High debt	-0.1831	-0.0232	
Medium debt	-0.3699	-0.0500	
Low debt	-0.752	-0.1151	

*Significant at $p < .01$

The analysis of the effect of financial aid on persistence of allied health students offers other perspectives. Four-year allied health professions' students are found to be sensitive only to increases in loan amounts. Tuition, fees and debt load had no significant effect. These findings are consistent with earlier research which demonstrates that the effect of tuition on students at four-year institutions has grown smaller and that financial aid has become more readily available to all students.^{15,21,23,35}

Admission procedures for allied health programs should include examination of background and experience variables that have been shown to predict persistence. Institutions should ask their incoming students about the character of their educational and/or occupational intentions and commitments. Furthermore, receipt of financial aid may alleviate some of the financial obligations associated with non-persistence. It may be necessary to appropriate more funds specifically for financial aid for allied health students in order to meet societal demands for a highly educated allied health workforce and ameliorate the shortage of qualified personnel.³⁶

Attrition of allied health and respiratory care students, in particular, are important problems which need attention. In order to lower attrition, we must continue to examine methods for promoting student persistence to include identification of variables that increase the probability of either student failure or student success. Understanding why allied health and respiratory care students fail to persist may provide a basis for effective retention efforts. Educational leaders must strengthen their attempts to identify those students who are risk for failure and the factors that contribute to student achievement. Coupling enhanced admission criteria with retention efforts may increase the probability of persistence to program completion, thereby reducing attrition and personnel shortages.

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CONTRACT LEARNING IN RESPIRATORY CARE CLINICAL EDUCATION

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Abstract

Introduction: Assessment of students' development outside the boundaries of the academic classroom can be challenging. Diminishing resources impact how often and when a student's abilities are assessed in the clinical environment and determined to be within the scope of acceptable practice by faculty. Use of learning contracts can provide a basis upon which a student's development can be assessed by their mentor/faculty advisor, as well as by them. **Methods:** This qualitative study explored the attitudes of 26 junior and senior respiratory care students enrolled in a clinical internship experience that required use of a learning contract at an academic health science center. At the conclusion of the internship experience, a survey with open-ended questions was administered. A three-step content analysis procedure was used to analyze the qualitative data. Subsequently a theoretical model was developed. **Results:** Findings demonstrated positive attitudes regarding the development of students' clinical competency. Findings further demonstrated that students were able to self-identify additional learning needs as they acclimated to the respiratory care culture. Students began to develop, expose, and promote their clinical strengths, thereby embracing those traditions that support a positive and professional respiratory care culture. **Conclusion:** The clinical learning contract was originally developed for use in guiding learning experiences of students during their clinical internships. The clinical learning contract has evolved into both an evaluation tool and evidence of student competency development.

Key Words: Students, Health Occupations; Schools, Health Occupations; Contract Learning; Clinical Education; Learning Strategies; Clinical Competence

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Contract Learning in Respiratory Care Clinical Education

INTRODUCTION

For decades, educators have tried a number of approaches for transitioning the learning process toward self-direction. As a result of these efforts, a process known as collaborative learning has evolved.¹ Collaborative learning seeks to match educational activities with the needs of individual learners. The spotlight shifts from the transmission of knowledge to the generation of knowledge in the collaborative approach.² Thus, students can be evaluated on the development of individualized learning activities and attention is focused toward the individual learner. Use of a learning contract is an approach through which a collaborative learning environment can be achieved.¹ This paper looks at the literature regarding the underlying principle of learning contracts,^{3,4,5,6,7} the use of learning contracts in respiratory care clinical education at a southern academic health science center, and an exploration of the attitudes of 26 junior and senior students enrolled in a clinical internship experience that required the use of a learning contract.

A Review of the Literature

The learning contract has been described as “a formal agreement written by a learner which details what will be learned, how the learning will be accomplished, the period of time involved, and the specific evaluation criteria to be used in judging the completion of learning.”³ Most definitions of the term “learning contract” include features of preference for the learner’s choice of activity, learning objectives or learning plans, and usually a concurrence between the learner and mentor, preceptor, or faculty member. Typically, the learning contract consists of five basic components: 1) learning objectives, 2) learning resources and strategies, 3) evidence of accomplishment of the objectives, 4) criteria and means for validating evidence, and 5) time lines for completing the objectives.^{4,5,6,7}

The learning contract should also establish the level of support which is to be provided by the mentor or faculty member, provide ample opportunities for independent learning, and make available a wide selection of resources to sustain the learning experience.^{8,9,10,11,12} Use of a written agreement or “contract” implies that the learning activities to be accomplished are important, legitimate and fair to all parties concerned.^{7,13} While the learning contract is not a legally binding document per se (other than as a requirement in the course syllabus), the use of the word “contract” alludes to the significance of the commitment all parties are making to work toward the goals outlined in the agreement.⁸

Contract learning is an ideal strategy to deal with wide differences among individual learners.¹⁴ Furthermore, this type of learning increases student motivation for learning and facilitates the development of mutual trust and respect between the educator and the learner, while providing for a more individualized approach to instruction and fostering self-direction in learning. Learning efficiency and the willingness to learn may be enhanced if what is to be learned and the methods for learning it have been agreed upon by the learner and the educator.¹⁵ Learners who have some flexibility in the selection of learning activities will take more responsibility for their own learning. If the desired outcome is lifelong learning, students must be motivated to develop strategies on how and where to find answers to problems, as well as to identify specific learning resources.¹⁶

Students who engage in self-directed learning (i.e., contract learning), have been found to “learn more deeply and more permanently than through other methods.”⁷

Advocates of the learning contract method of teaching/learning identify the benefits as individualization of the learning process, promotion of learner independence, and development of lifelong learning behaviors among students.¹⁷ It also promotes active participation of learners. Given the short half-life of professional knowledge in the health sciences field, it seems imperative that educators no longer strive to provide a defined package of knowledge. Opportunities to be self-directed within the security of academic milieu should facilitate the development of skills needed to assume responsibility for change.”¹⁸ Undergraduate courses in health care that are not designed to foster active involvement in learning and that do not encourage participants to take responsibility for their own learning independently of their instructor(s) may be lacking in the preparation of future health professionals.¹⁹

Implications for the application of learning contracts in the health care educational setting are found in the literature. Contract learning has been used successfully in a variety of health care professions including medical schools,^{19,20,21} nursing,^{17,22,23} and radiology technology.²⁴ Successful use of this educational strategy has been demonstrated at the undergraduate level, the graduate level, and during in-service and continuing education training.

Contract Learning in the Clinical Curriculum

The valid assessment of clinical skills and motivating students to develop lifelong learning behaviors was a growing concern to the faculty of the Cardio-Respiratory Care Program at the University of Arkansas for Medical Sciences (UAMS). Diminishing resources were impacting how often and when a student’s abilities were assessed in the clinical environment and determined to be within the scope of clinical practice by faculty. As a result, we opted to implement the use of learning contracts as a strategy to assess student clinical development both by their mentor/faculty advisor, as well as them.

Learning contracts were introduced in our clinical curriculum to provide individual students with the opportunity to focus on any identified areas of unsatisfactory or desired practice. The learning contract specified how each learner would acquire the knowledge and attitudes relevant to their selected learning experience. The clinical learning contract was then utilized both as a learning tool and as evidence of individual student’s development throughout their clinical experience. Steps in development of the learning contract included:

- 1) Self-evaluation of clinical learning needs. Students were encouraged to define the disparity between his or her current clinical abilities and the skills level at which he or she wanted to be at the conclusion of the semester.
- 2) Specifying learning objectives. Students were required to draft a minimum of three learning objectives that addressed their desired learning needs. These objectives could involve the achievement of cognitive materials, attitudinal/affective changes, or mastery of specific skills. The student would then negotiate the specific learning objectives with the faculty advisor.
- 3) Specifying learning resources and strategies. Next, a list of the precise resources that would be needed to establish the desired competencies and how those resources would

- be utilized was developed by the student in collaboration with his or her faculty advisor. From this point the student was instructed to search for clinical situations that could provide experience appropriate for meeting their desired learning objectives. The student was then matched with an experienced preceptor in the desired clinical facility.
- 4) Specifying evidence of accomplishment. The student was required to delineate a plan as to how he or she would demonstrate accomplishment of the proposed objectives. Examples of some of the methods proposed by students to demonstrate accomplishment included a) witnessed validation of skills competency by the faculty advisor, b) reflective analysis in a daily clinical journal, c) preceptor evaluation of the learner on the Respiratory Care Practitioner (RCP) Competency Inventory, and d) weekly preceptor evaluation.
 - 5) Review of the contract with the mentor/faculty advisor. The student and faculty advisor met for review of the final contract to ascertain that the student's individual learning needs were addressed in an optimal way.

Using reflective analysis, the student's daily journal of clinical activities was retrospectively deconstructed to generate an academic account of learning. Journals were emailed weekly to the faculty advisor for review and feedback. While the journal did facilitate an effective assessment of knowledge and attitude, we found that the level of psychomotor skill was difficult to ascertain by this method of evaluation. Psychomotor skills were best evaluated at the bedside.

The RCP Competency Inventory covers a wide range of skills pertinent to the successful respiratory care professional.²⁷ Clinical preceptors were asked to evaluate the learner using this document at the conclusion of the learning experience. The minimal acceptable standard on the RCP Competency Inventory was that two-thirds of the items were rated at "Frequently" or "Almost Always".

Lastly, individualized preceptor evaluation instruments were developed by faculty advisors based on each students' individual learning objectives. The clinical preceptors were asked to evaluate the learner using this document at least once weekly.

Students were provided traditional clinical experiences in Clinical Practicums I, II, and III. Both the Clinical Internship (completed in Summer I of the program as the student transitions from the junior to senior year of the professional program) and Clinical Practicum IV (completed in the final semester of the program) required use of a learning contract. The overall expectation was that the student would demonstrate entry-level competency by the summation of the Clinical Internship and registry level competency by the summation of Clinical Practicum IV. Competency levels were further verified by administration of the National Board for Respiratory Care (NBRC) self-assessment examinations (SAE). The Entry-Level SAE was administered at the conclusion of the Clinical Internship. The Written Registry SAE and the Clinical Simulation SAE were administered at the conclusion of Clinical Practicum IV. All students were required to pass these examinations to progress to the senior year or to meet all requirements for graduation.

METHODS

A qualitative study was conducted to explore the perceptions of 18 junior and 8 senior respiratory care students enrolled in a clinical experience that utilized the contract

learning method. Data was collected at the conclusion of the internship experience using a survey with three open-ended questions modeled after an instrument designed by Dunlevy & Wolf²⁸ which explored the clinical learning experiences of allied health students. Questions included: 1) Please describe the incident(s) during your clinical internship which were the most exciting/rewarding --- times when you felt that something significant happened to you as a learner. 2) What is the most important thing that you realized about yourself during your clinical internship? 3) What suggestions do you have for improving the clinical internship?

The open-ended survey questions were designed to indirectly explore respiratory care student attitudes concerning use of learning contracts in an attempt to avoid getting the “politically-correct” attitudes for a group of learners. In addition, the questions avoided using the word “learning contract” in the survey. However, the conclusions drawn from this research should be interpreted with the recognition that the attitudes depicted in this study may represent “the right thing for students to say” and may not represent the “original thought” of these students.

A three-step content analysis procedure was used to analyze the qualitative data. Content analysis of the survey data was then performed: First, the survey questions were transcribed. Next the transcripts were coded into data units. The primary researcher read through the transcripts to determine coding categories. (A code is a single word that best summarizes themes, concepts, or ideas which formulate an attitude.) An auditor reviewed the transcripts and developed a second, independent set of coding categories. The coding categories of the auditor were compared with the categories of the primary researcher to determine differences in coding. These differences were negotiated by the primary researcher and auditor until consensus was reached. A code book was developed to define and track each code category. The coding categories were combined, based on a common theme, into attitude patterns by both the primary researcher and auditor independently. Again, differences between the patterns were negotiated until consensus was reached.

Finally, the primary researcher wrote an informal memo of each emerging pattern. The attitude patterns were combined, based on common themes, into attitude trends. Use of this process helped to formulate, refine, and link concepts to create a clear description of three emerging attitude trends. Subsequently a theoretical model of the experience was developed.

Ethics

The concern of intimidation can arise when students and educators have an established relationship over a course of study in a professional program. Students may feel compelled to say only good things about their learning experiences or to participate in research even though they really do not wish to do so.²⁹ To neutralize those concerns, students were assured that their participation was entirely voluntary and that they could withdraw at any point without any questions. The surveys were not administered until the clinical courses were completed. Students were reassured that there were no right or wrong answers, that all information reported would be confidential, and that anonymity would be strictly preserved. No identifying information was declared on the survey instrument. All students freely chose to participate in the study.

FINDINGS

Three attitude trends were identified within the students' description of the maturation process that occurred during the contract learning experiences. These have been classified under the headings:

1) 'Empowerment' (attitudes related to building student confidence and competence); 2) 'Illumination' (attitudes related to identification of additional learning needs through self-evaluation); and 3) 'Respiratory Care Cultural Development' (attitudes related to making a difference, seeing results, and teamwork in the profession).

These attitude trends are for expressive purposes only. Not all students experienced the same process of maturation. Narrative descriptions portray a variety of experiences in the students' own words. While the transformation may not have been unequivocally identified, it tended to be towards empowerment, illumination, and respiratory care cultural development.

Attitude Trend of Empowerment: Students entered the course with a variety of perceptions. However, for the overwhelming majority the clinical courses were instrumental in facilitating a developing sense of confidence and self-esteem in the participants. Students emphasized their feelings of empowerment by comments such as, "I can work as a confident respiratory therapist and make sufficient suggestions for treatment." Still another related, "I was able to work independently with effectiveness and confidence." The empowerment attitude commonly shared by these students can best be summarized by the underlying feeling, "I can do it!"

Attitude Trend of Illumination: Students frequently described how they were enlightened through the process with regard to their continued learning needs. One student realized, "I need to develop my communication skills with patients and other health care professionals." Another found, "I want to sharpen my focus to ensure better patient care and time utilization." Other indications of increased self awareness included statements such as:

- "More clinical time is needed for me to feel more comfortable in stressful situations."
- "I realized that I was in charge of someone's life, and it was dependent on my knowledge...."
- "I was in the SICU and there was a certain diagnosis that I knew little about. I began searching the internet for treatment and discussed some things with a few nurses and physicians."

The clinical courses utilizing the learning contract for these students facilitated a process of building upon the clinical foundation by combining all of the classroom and clinical pieces and merging them into an added 'real world' experience. While students could have viewed Clinical Practicum IV as the 'culminating experience' to their education process, most came to the realization that respiratory therapists are expected to be life long learners.

Attitude Trend of Respiratory Care Cultural Development: Many students described a new appreciation of the respiratory therapy profession. These soon-to-be-graduates shared the opinion that respiratory care is rewarding and can serve as a vehicle to making a difference in patient outcomes. Students began to develop, expose, and promote their clinical talents, thereby embracing those traditions that support a positive and professional

respiratory care culture as evidenced by statements such as, "I will make a big difference in a lot of people's lives." "I realized why I got into the medical field, to help people."

Some students reported that the contract learning experiences provide individuals with the opportunity to see results. "When you are able to see how your patient improved with the care you helped to provide. When they were so critical you wondered about their ever going home and then to see them move out of ICU." Another shared, "To see the treatments I was giving them made them get well or better. It made me realize how important a RT is in the hospital." Essentially every student expressed a feeling of being rewarded by seeing their patients improve.

Students also described how the experience provided them with an abundance of real world experiences that up to this point had seemed rather elusive. One student related, "Every day of the internship was valuable to me. There were new experiences every day." Another student expressed the value of the experience in his/her own words, "You see what it is going to be like when you are working. You will learn how to manage your time and will see what really goes on in the unit during the day."

Students wrote about their feelings of reward that came from participating as a team member. "I consulted with the nurses and really felt involved with the patients' care." Other students became conscious of the importance of learning good teaming concepts. "When patients get into trouble (bradycardia and/or hypotensive), all the nurses and therapists work together to get the patient back if able." One student summarized this feeling well with the comment, "Just being a part of the health care team was the most exciting and rewarding experience."

The findings from the study suggest that the integration of the clinical contract into the curriculum to guide clinical learning experiences was beneficial for our students. Through this qualitative study, they have painted a portrait of their personal and professional development. We believe the experience will assist them as they embark on their careers as respiratory therapists and lead them to more a fulfilling professional life. Further research will be necessary to determine if the use of this strategy has the additional benefits reported by Renner, Stritter, and Wong²⁴ of increased job satisfaction, increased participation in professional continuing education activities, and increased involvement in professional organizations.

CONCLUSION

According to the views expressed by these respiratory therapy students, the clinical courses that based learning needs on each individual's needs or desires did have an affect on student maturation. Students reported an increased independence and competency level in their clinical practices. All students included in this study did report positive attitude patterns upon completion of clinical courses using contracted learning. However, it is possible that these students (who completed traditional clinical courses first) may have simply preferred the contrast of the learning contract method to the traditional method. The same attitudes could have come from the traditionally taught, more prescriptive portions of the clinical curriculum.

However, because of the differing learning needs of individual students, the use of the learning contract method appeared to provide a structure to accommodate all levels of

clinical readiness to learn. We believe that this strategy ultimately led to student reports of more self-direction in their learning, as well as developing mutual trust and respect between the preceptor, the healthcare team members and themselves. The clinical learning contract was originally developed for use in guiding learning experiences of students during their clinical internships. Subsequently they have become a valuable resource in ascertaining evidence of clinical competency attainment. The clinical learning contract has evolved into both an evaluation tool and evidence of the competency development of our students.

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