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Survey and Analysis of Baccalaureate and Graduate Respiratory Therapy Education Programs

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Introduction

The need for formal education of "inhalation therapists" was recognized in the late 1940's as oxygen therapy became an important part of clinical care. By 1950, national standards for schools were published.[1] Over the past 60 years, there has been a remarkable evolution of clinical services provided by respiratory therapy professionals. The increasing demands have been advanced by increasing complexity of clinical responsibilities, widened scope of care settings, changes in delivery-systems and exponential changes in biomedical technology.[2] More recently pressures for cost containment and higher quality patient care have become major factors.

For the most part, requirements of educational programs, accreditation standards, and the infrastructure of national credentialing and state licensing have followed an orderly and pragmatic approach to change. To date there has not been the need for a complete restructuring of the educational infrastructure which was required in this country to realign physician education in 1910 with the Flexner report.[3] A listing of major events is recorded in Table 1. Over the last ten years there has been increasing support for development of programs beyond associate-degree level. There was concern that respiratory therapy as a profession was falling behind in education when compared to the response of other allied health specialities challenged with similar demands.

In 2003 a steering committee of the AARC's Coalition for Baccalaureate and Graduate Respiratory Therapy Education (CoBGRTE) published a "White Paper."[4] This document addressed the rationale for advancing education levels and concluded that there was a growing need to increase the number of respiratory therapists with increased clinical training and education. That paper encouraged the AARC's support of: (1) traditional bachelors-degree programs; (2) associate-to-baccalaureate degree program articulation or bridge agreements with community colleges; (3) enhanced distance education opportunities for bachelor degree-level education; and (4) promotion of Master of Science degrees in respiratory care for the development of leadership in management, education, and research as well as sub-specialization. As part of the preparation of the document, a listing of existing 4-year and graduate level programs was developed.[4]

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Survey and Analysis of Baccalaureate and Graduate Respiratory Therapy Education Programs

The purpose of this paper is to review the changes which have occurred over the past six years since the CoBGRTE "White Paper." To accomplish this task, a survey was prepared by CoBGRTE to accomplish two primary goals: (1) prepare an updated national roster of programs, and (2) better identify the type of program (based on a range of academic and clinical models). Besides providing some assessment of progress, secondary objectives were to provide the most current information to potential students or practicing therapists, enhance program communication, and sharing of resources for programs considering advancing to the baccalaureate or masters level.

The 2009 CoBGRTE Survey

The initial task was to confirm the roster of current programs. The country was divided into zones and members of a CoBGRTE steering committee compared the roster with the current CoARC list of accredited programs. An updated roster was constructed.[5] The sur-

Table 1

Major events in respiratory care education and related infrastructure

1950–Standards for inhalation therapy schools (Barach AL, et al.)

1960–Registry credentialing system; written & oral exams given by Registry of Inhalation Therapists (ARIT-currently the National Board for Respiratory Care)

1963–Board of Schools (accreditation under AMA Council on Medical Education and Hospitals)

1967–Minimum length of education programs set at 18 months

1969–Establishment of certified inhalation therapy technician and examination system by American Association of Inhalation Therapy (AAIT-currently the American Association for Respiratory Care)

1970–Incorporation of Joint Review Committee for Respiratory Therapy Education (JRCRTE- currently Committee for Accreditation of Respiratory Care) replaces Board of Schools.

1970–Graduation from an AMA approved therapist program plus 62 semester hours of college credit required of all ARIT applicants

1971–Study of Accreditation of Selected Health Education Programs (SASHEP)

1977–AMA CME withdraws as overseer of allied health education, Committee on Health Education Accreditation (CAHEA) established

1986–JRCRTE Essentials support basis of accreditation on outcome of education

1994–CAHEA restructured to Commission on Accreditation of Allied Health Education Programs (CAAHEP)

1992-1993–AARC's Educational Consensus Conferences

2002–Agreement of NBRC, JRCRTE & AARC to set associate degree as minimum academic level for professional entry

2003–AARC published "white paper" Development of Baccalaureate and Graduate Degrees in Respiratory Care.

2008–AARC sponsors 1st "Creating a vision for respiratory care 2015 and beyond conference"

2009–AARC sponsors 2nd 2015 Conference "Educating the Future Respiratory Therapist Workforce – Identifying the Options"

2009–CoARC separates from CAAHEP and becomes the Commission for Accreditation of Respiratory Care

2010–CoARC New standards go into effect June 10, 2010, certified respiratory therapist (level 100) programs no longer eligible for accreditation

2010–AARC sponsors 3rd 2015 Conference to identify the education to prepare graduate therapists and the workforce in 2015 and beyond

vey was administered online (SurveyMonkey™) with data collected over six weeks during November and December of 2009. All 52 program directors of accredited respiratory therapy listed in the 2009 CoBGRTE roster of baccalaureate and graduate respiratory therapy programs were invited to participate in the survey when contacted to update their roster listing. E-mail and telephone follow-up by members of the CoBGRTE Steering Committee resulted in a 100% response rate with all program directors participating in the survey.

The AARC 2009 Human Resources Survey
of Respiratory Therapy Program Directors

In 2009 the AARC conducted a survey to review current personnel resources which included a review of respiratory therapy schools.[6] Survey sampling began with a listing of 359 accredited education programs provided by the Commission on Accreditation for Respiratory Care (CoARC). Program directors were invited by post card to participate and were directed to register an email address on a web page. Each registrant received an email from the electronic survey delivery system (SurveyMonkey™) with a link that directed each recipient to the survey where he or she submitted responses. The survey was available for 34 days from 3/12/09 to 4/14/09. "Of the 359 postcards mailed, 242 (67.4%) programs returned usable surveys in time for analysis. Nineteen postcards were returned with bad addresses, so the corrected response rate was 71.2% (242/340)."[6]

In this paper we will compare some of the results of the AARC and CoBGRTE surveys where it is appropriate but the reader should keep in mind the limitations of both surveys. The limitations of the AARC survey as included in the report's discussion section are:

"Those new programs that were operating, but not yet accredited, were not directly solicited to participate by a postcard. It is possible that directors of these programs could have become aware of the study and responded to the electronic survey, but it is more likely that these results may not generalize to these new programs as well as those in the sample. We did not receive a set of survey responses from another 116 programs. This was about one third of the population of accredited programs. It is possible, even probable, that programs that chose not to respond could have been different in systematic ways when compared to programs in the sample. For example, we did not receive a response from any programs in six states and the District of Columbia. The hypothesis that there was a non response bias in these results remains. Hence, we would urge caution in extrapolating these study results to programs that self-selected out of this sample."[5] The CoBGRTE survey was limited by some program directors who did not respond to all the questions.

Graduation Rates for Baccalaureate Respiratory Therapy Programs

Fifty-two baccalaureate programs produced 772 graduate therapists in 2009 which is 173 more then 2006 (Table 2). There was a 28.9% increase in graduates over four years. The number of baccalaureate students enrolled in 2009 was 905 with two programs not reporting. The larger entering class in 2009 may indicate that the number of baccalaureate graduates each year may increase in the future. The mean number of graduates produced by baccalaureate programs has increased from 12.5 (±7.1) in 2006 to 15.1 (±9.0) in 2009. The AARC 2009 survey of 242 program directors reported a 2009 graduation rate for registry-eligible graduates of 17.5 (±12.88) per program. The number of graduates reported in annual reports to CoARC by registry-eligible programs for 2008 was 6,767.[7] In 2009, it is projected from NBRC data for all new registry-eligible graduates taking the CRT exam, and those 401 programs graduated 7,165 students. The average graduating class size, for all registry-eligible programs, in 2009 was 17.9. This graduating class size was larger than average observed for baccalaureate programs.

Table 2
Baccalaureate Graduates 2006-2009 and Size of Entering Class in 2009(Ref CoBGRTE Survey)*

Year	N	Total	Mean (SD)	Median	Min	Max
2006	50	599	12.5 (±7.1)	11.5	2	39
2007	49	644	13.7 (±7.8)	12.0	1	39
2008	52	723	14.5 (±8.0)	14.0	3	32
2009	52	772	15.1 (±9.0)	13.0	1	36
2009 (admitted)	50	905	18.1 (±9.3)	19.0	3	43

From 2009 CoBGRTE Survey

The number of graduates added to the workforce by baccalaureate programs in 2009 was 772 (10.8%) and the associate degree programs contributed 6,393 (89.2%). If the entry-level becomes a baccalaureate degree in 2015 or 2020 than the 54 baccalaureate programs will need an average graduating class size of 133 therapists. With a mean graduate class size of 17.9, 346 new baccalaureate programs would be needed in the next decade to match the number of graduates produced by accredited programs in 2009. What are the alternatives? Should we increase graduating class size in addition to starting new baccalaureate programs? How large an increase is needed? In 2009 the graduating class size of baccalaureate programs ranged from 1 to 36. If 54 baccalaureate programs graduated an average class size of 40, the total added to the workforce each year would be 2,160, still 5,005 short of the total of 7,165 that graduated in 2009. If the graduating class size was 100 it would take a total of 72 baccalaureate programs to match the number graduates in 2009. Establishing 18 new baccalaureate and/or direct-entry masters programs over the next decade might be possible. The bigger question is whether baccalaureate educators will step-up and rethink their goals for the future, and increase class size to that seen in nursing, pharmacy, and physician assistant programs.

Teaching Evidence-Based Medicine and Research in a BSRT/MSRT program

Respiratory care has evolved from conducting limited, task-based, technical functions to performing an array of services that require more complex cognitive abilities and patient-management skills. Contemporary forces that are responses to this increasing complexity have moved health care toward a systematic approach for decision making, continuous quality evaluation, outcome-oriented and evidence-based practice. These forces now driving health care also drive respiratory care. Evidence-based medicine attempts to integrate pathophysiologic principles with clinical experience and valid current clinical research within the human context of individual patients.[8-10]

In addition to cognitive, psychomotor and professional behaviors, a key job skill now includes being able to evaluate research to determine whether findings are clinically valid. Research has become the lifeblood and cornerstone of the development of medical professions.[11,12] This competency allows therapists to stay well informed, maintain a healthy skepticism and develop a scientific approach as their critical thinking skills are applied in making clinical decisions. Recent conference proceedings have underscored this future trend.[13] The challenge for both educators and managers will be to facilitate development of research skills into formal curriculum and continuing education of current staff.[14]

Based on these trends, it appears only logical to incorporate research in the curriculum as respiratory therapists begin clinical-based education. Teaching research skills and conduct-

Table 3

Research skill-sets[15]

- Perform searches for medical literature using electronic methods
- Review literature related to specific clinical or practice areas
- Determine research question and hypothesis and appropriate practice-related outcomes
- Appraise research methods as to their ability to defend hypothesis
- Conduct research "project management" by outlining research plan
- Collaborate with a group in delegating project work and activities
- Conduct a pilot study
- Select statistical tests
- Write a research proposal appropriate for institutional board review
- Collect data and prepare a database
- Manipulate data with statistical methods appropriate for the approach
- Review results and synthesize information to determine research question
- Prepare an abstract for presentation or written report for submission

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ing research has long been a goal of graduate and medical schools.[15,17] Now by necessity, this strategy is becoming part of undergraduate education in health care.[18-21] A listing of desirable objectives for student research skills is presented in Table 3. To promote the development of this skill-set, the formal curriculum might contain the following elements and tactics: (1) liberal arts background with attention to professional writing; (2) problem-oriented approach which can be embedded into clinical courses; (3) courses in research design and applied statistics; (4) journal-club seminar and case reports; (5) group research projects.

There has been a significant movement which links writing skill development with learning across the curriculum and in the sciences.[22] Problem-based learning (PBL) covers a wide approach in terms of educational approaches and strategies. There is some evidence that PBL may be more effective as it is active, student-driven and fosters reflection.[23] Research and statistics courses need to be selected carefully; they may be more effective when applicable to clinical problems. There is general agreement that statistics is a vital and essential skill, necessary for students to be able to read, interpret, and integrate nursing research. There is less agreement on the teaching methodology.[24] However, there are a number of resources that are appropriate to undergraduate and graduate instruction.[25-27] In addition to formal curriculum, teaching research can be embedded into clinical practice, as well as on-line distance education, to maintain graduate's skills and also for clinicians who graduated without such training.[28, 29]

The journal club is a time-honored method in medical education that has been widely used in undergraduate and graduate physician training, as well as in nursing and respiratory care.[8,30-32]

Respiratory therapy education programs also have the potential to involve their students in direct application of evidence-based medicine as part of clinical practicum. By both observation and direct participation they can establish future patterns for their own practice. This illustrates the importance of the interrelationship between educational programs and clinical departments. Evidence-based practice taught in schools and applied at the bedside or with therapist protocols in clinical departments have a powerful impact on education.[33,34] The CoBGRTE 2009 survey asked nine questions about evidence-based teaching incorporated as an instructional strategy as well as approaches to include components of research in the curriculum (Table 4).

Table 4

Evidence-based Respiratory Care in Baccalaureate Curricula*

Type of Instruction	Response (%)
Undergraduate research course	42/52 (80.8)
Discussion of research in professional courses	41/52 (78.8)
Undergraduate research projects	38/52 (73.1)
Evidence-based medicine (EBM)	37/52 (71.2)
EBM best practice guidelines	28/52 (53.8)
Statistics course	27/52 (51.9)
Journal club	7/52 (13.5)
Graduate research course	3/52 (5.8)
Graduate research projects	3/52 (5.8)

*From CoBGRTE 2009 Survey

Types of Programs Offered by Colleges and Universities Listed in the CoBGRTE Roster

Baccalaureate Respiratory Therapy Programs

There currently is considerable variation in the overall design and curriculum plan of baccalaureate degree respiratory therapy programs. The factors which influenced program administrators reflect a number of elements. These might include: (1) tradition of previously established health care programs; (2) requirements of college or university systems; (3) pattern for articulation with local, state or regional educational institutions; (4) needs of the medical community of interest and (5) fiscal and medical resources.

The 2009 CoBGRTE survey identified six different types of program which would grant only a baccalaureate degree in respiratory care to their graduates. There were 45 programs in this group. There was some variation in exact title of the degree, often determined by institutional regulations. The survey questions asked program directors to identify the number of years students would typically require to complete pre-professional courses (liberal arts and course sciences required before entry into the clinical curriculum) vs. professional courses. The latter courses included; respiratory care didactic, laboratory exercises, clinical practicums and general medical-related courses, eg, general pharmacology or pathophysiology. Table 5 provides a summary of these data from 45 programs which identified the baccalaureate as the first professional degree.

At the time of the survey, there were 52 baccalaureate programs; 9 programs identified a specific and often separate track in which admission was limited to students with a previous associate degree in respiratory care. There were 7 baccalaureate programs that award the associate degree as the first professional degree. That group could then complete the upper-division general education and respiratory care curriculum. Several of those programs noted that this approach often incorporated on-line and/or distance education strategies. The potential for graduates from respiratory therapist programs to obtain a baccalaureate degree from the parent institution from which they attended was collected from 242 respondents of the 2009 AARC Human Resource Survey of Accredited Education Programs (Table 6).[6] The potential for graduates from respiratory therapist programs to earn a baccalaureate degree through an agreement with another institution, different from the one where they obtained their associate degree is also important (Table 7).

Table 5

*Baccalaureate Program Description by Academic Years**

Type of program n=46	Number (%)
1-year pre-professional 3-years professional	3 (6.5)
1.5 years pre-professional 2.5 years professional	1 (2.2)
2-years pre-professional 2-years professional	38 (82.6)
2 years pre-professional 1.5 years professional	1 (2.2)**
3-year pre-professional 1.5-years professional	1 (2.2)**
3-years pre-professional 1-year professional	2 (4.3)
4-years professional	2 (4.3)**

*From 2009 CoBGRTE Survey

**Denotes programs at institutions with more than one type of program

Table 6

*Potential for Respiratory Therapy Students to Earn Baccalaureate Degree**

Mechanism	Number (%) n=242
From Parent Institution	
Yes	71 (29.3)
No	171 (70.7)
No Response	0 (0)
Through Affiliation Agreement	
Yes	118 (48.8)
No	50 (20.7)
No Response	74 (30.5)

*From AARC 2009 Human Resource Survey of Educational Programs

Masters Degree in Respiratory Care

Currently there are 4 respiratory therapy programs that award masters degrees. 2 programs describe the degree as a Masters in Science (MS) in respiratory care; the other two describe the degree as Masters in Health Science with concentration in respiratory therapy. The 2009 CoBGRTE survey identified 22 programs that plan to start a Masters degree for respiratory therapists in the next 5 years (Table 8). Many of these programs are anticipating a need to

Table 8
Baccalaureate degree programs planning to start a master's degree program*

Start Date	Number (%) n=48
< 12 months	2 (4.2)
1-2 years	8 (17.7)
3-5 years	12 (25.0)
Not applicable	26 (54.2)

*From 2009 CoBGRTE Survey

prepare faculty for the expected increase in baccalaureate and masters degree programs for respiratory therapists.

Baccalaureate Program Clinical Rotations and Specialty Preparation

The CoBGRTE 2009 survey found that the mean amount of time spent on clinical rotations by 52 baccalaureate programs was 937.1 (±239.0) hours. Less time was dedicated to clinical practicum's for pediatric and neonatology with a mean 119.5 (±83.2) hours. Clinical rotations occurred in regional medical centers (those with a level III or IV neonatal ICU) 75.1% of the time (Table 9). Thirty-three programs indicated that they prepare students for the following National Board for Respiratory Care specialty examinations: neonatal pediatric specialist (30 programs), certified pulmonary function technologist (25 programs), registered pulmonary function technologist (17 programs), sleep disorder technologist (five programs). Also, 5 programs prepared students for the registered polysomnography examination. Most baccalaureate programs provide American Heart Association courses for their students to certify at different levels of cardiovascular life support. The course offered most often is basic life support (BLS), 50 programs (96.2%); followed by advanced cardiovascular life support (ACLS), 41 programs (78.8%); neonatal resuscitation program (NRP), 27 programs (51.9%); and pediatric advanced life support (PALS), 23 programs (44.3%).

Table 9
Clinical Rotation Time*

Type	N	Mean (SD)	Median	Min	Max
Total (hrs)	52	939.3 (±237.2)	975	315	1536
Neonatal and Pediatric (hrs)	50	119.5 (±83.2)	100	9	480
Regional Centers** (% of Total)	50	75.1 (±24.7)	81	5	100

*From 2009 CoBGRTE Survey
**Have a level III or IV Neonatal ICU

Summary

The 2009 CoBGRTE survey was able to provide the profession an updated roster of programs which provide baccalaureate and masters degrees in respiratory care. This should be of value to entering students as well as therapists in the work force who may be interested in further education. The survey tallied 52 programs for which the baccalaureate degree is awarded. Lack of specific national guidelines/requirements for curricular models, institutional or state regulations and efforts to meet local or regional needs has resulted in considerable variation in both titles of the degree and overall program curriculum design. The survey was able to identify and group the 4 year degree programs into 6 categories based on a range of factors. These included admission requirements (e.g., whether admitting students were required to previously have completed an associate degree RC program) as well as clinical practice including specialty tracks. The survey received information about 4 current masters-level programs but noted considerable interest in developing future programs; 22 programs intent to initiate a program at this level.

Future changes in medical practice and delivery systems have been forecasted based on a review of current information and reflections of the past.[13] These data suggest that for respiratory therapists to continue to provide high quality care, educational programs must be prepared to adapt. The need to provide graduates with more advanced skills, enhanced professional attributes and clinical competencies, will likely require some evolution in curriculum design as well as educational strategies and tactics.[35] The 2009 CoBGRTE survey identified existing programs that currently provide respiratory care education at the baccalaureate and masters degree level. The survey appears to corroborate a need for greater program length to promote delivering advanced curriculum with a research-orientation and allow more complete training in additional patient services including clinical specialization.

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Educational Strategies to Improve Quality of Life in Patients With COPD

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) has long been established as a leading cause of death worldwide. However, most research has concentrated on reduction of exacerbations often neglecting the aspect of health-related quality of life (HRQL). This study sought to evaluate the efficacy of two different educational interventions on patient's perceived HRQL. **Methods:** Subjects were given a specialized COPD educational guide to review and/or administered a home visit by the Respiratory Therapist. **Results:** Thirty-seven subjects were included, randomized to 1 of 4 cells either receiving no intervention aside from standard care, only the COPD guide, only the home visit, or both the COPD guide and home visit. Because of high attrition, 27 subjects were available for follow-up. Utilizing the St. Georges Respiratory Questionnaire as our primary outcome metric, only the home visit interventional group approached a statistically significant difference (p <.10) within the symptoms and activity domains. **Conclusions:** Based on the results of this small study, the concept of a home visit shows promise within the COPD patient population. The COPD educational guide may prove effective with additional reinforcement. Further research is needed to evaluate what effect simple educational intervention can have on a patient's perceived HRQL. As educators of future healthcare providers, it is the Respiratory Therapy faculty that must seek to train students in the art of relaying information to our patients.

Key Words: COPD education, home visit, patient education, health-related quality of life.

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13

Educational Strategies to Improve Quality of Life in Patients With COPD

Introduction

Chronic obstructive pulmonary disease (COPD) is currently the fourth leading cause of death worldwide, and according to the National Heart, Lung and Blood Institute, it is projected to be the third-leading cause of death in the United States by the year 2020.[1] The impact of COPD is extensive, placing a burden on the healthcare system and patient. This burden includes reducing the patient's health-related quality of life (HRQL) resulting in physical and psychological consequences for the individual.[1-3] The patient's burden from this chronic, degenerative disease is enormous due to functional disability, frequent troublesome symptoms, and negative impact on the quality of life (QOL).[4] Specifically, patients with COPD experience increasing deterioration of their HRQL, with greater impairment in their ability to work as well as declining participation in social and physical activities.[5]

Although QOL measures have been commonly assessed in clinical trials, the impact of COPD on symptoms, activities of daily living (ADL), and use of services in the latter stages of illness remains not well-defined.[6,7] HRQL, patient self-efficacy, and productivity impairment outcomes instruments such as patient-perceived QOL questionnaires are increasingly used in clinical studies. Although their use is established in several specialty areas, data from questionnaires are rarely used as an endpoint in studies with patients suffering from respiratory disease.[5]

According to current guidelines[8], patients with stable COPD are managed using a combination of smoking cessation, pharmacological therapy, education, pulmonary rehabilitation, nutritional interventions, vaccinations, oxygen therapy, and occasionally, elective surgery (e.g. bullectomy). There are few treatments other than oxygen therapy and smoking cessation that demonstrate improved survival; as a result, improving quality of life is considered a major goal in widely-recognized guidelines for the management of patients with COPD[3]. Interventions that provide education and practical support; assistance with ADLs, personal ambulatory aids, and medical equipment, have been shown to improve QOL, reduce hospitalizations, and have a beneficial effect on mortality.[9] Recent evidence reveals that disease-specific self-management can improve a patient's health status, and it is postulated that a patient's perceived HRQL can improve with simple educational intervention.[10-16]

Within the chronic illness population, there is mounting pressure to find cost effective ways to manage patients in whom recurrent hospitalizations are common[12]. With COPD being the only major cause of death that is increasing in incidence in the US, self-management is a growing need within the large group of patients with moderate to severe chronic lung disease. Even though nearly all treatments are aimed at symptom relief, there is a growing need for clinicians to individualize a self-management strategy.[13] Self-management, often referred to as self-care, includes; engaging in activities that promote health, building physiologic reserves, and preventing adverse sequelae of the disease. Part of the structure of self-care involves interacting with healthcare providers and adhering to recommended treatment protocols by monitoring personal physical status.[10]

Studies in asthma have shown that patient education programs which include self-management have successfully reduced the disease burden, and in addition to a marked reduction in healthcare costs, the patients perceive a better quality of life.[14] As of the turn of the century, however, only two studies had been done to evaluate the impact of patient education on patients with COPD.[17] Prior to 2004, no randomized control trials were available reporting the effect or the costs of patient education and self management in patients with COPD.[18]

Because of the physiologically limiting nature of COPD, which affects most aspects of a patient's life, teaching within this patient population should be intensive in order to improve functional ability, maintain residual functioning, and enhance quality of life.[19] Considering something as vital as correct use of a metered dose inhaler (MDI), several studies indicate that up to 90% of patients display poor technique when using their MDI.[20] A study by Williams et. al. showed that, in patients with asthma, although educational level was not related to proper MDI technique, inadequate literacy was strongly correlated with improper MDI use.[20,21] A recent study demonstrated that patients with COPD who view customized videotape instruction based on their disease level and psychological state, can show significant improvement in emotional functioning and coping skills, specifically in their ability to perform activities of daily living.[22] A 1-year follow-up randomized, controlled trial in 2004 revealed that education of patients with COPD improved outcomes and reduced healthcare costs in a 12-month follow up.[18] In 2009, Effing et. al. performed a Cochrane Collaboration systematic review of controlled trials (randomized and non-randomized) from 1985 to 2006 dealing exclusively with self-management education in patients with COPD. Their main objective was to assess the settings, methods, and efficacy of COPD self-management education programs on health outcomes and use of healthcare services. The studies showed a significant reduction in the probability of at least one hospital admission among patients receiving self-management education compared to those receiving usual care. The group also determined that statistically significant differences were observed on the disease specific SGRQ within the total score impact domain, but this difference did not reach clinically relevant improvement based on overall symptoms and frequency of exacerbations. There was a small but significant reduction in dyspnea per the Borg scale. No significant effects, however, were found either in number of exacerbations, emergency department visits, lung function, exercise capacity, or days lost from work.[23]

One cohort study suggested that non-specific home based interventions (HBI) have shown long-term cost benefits by reducing recurrent hospital stays in a range of chronic illnesses, except for COPD.[12] The concept of a more continuous HBI, however, known as hospital at home has been studied in several specialties to include patients with COPD. Although, the overall results did not reveal a major difference in general outcomes, patients receiving the home care reported a significant improvement in their QOL.[15] Simple inspiratory muscle strength training with home breathing exercises has shown promise in reducing some symptoms and improving the QOL in patients with COPD.[11]

Even though the description of an HBI remains vague and lacks standardization across the spectrum of diseased populations, asthma HBI remains well documented[24] as an effective way to alter environmental factors and improve self-efficacy. A recent pilot study in 2009 showed promise that a HBI, even in a high-risk group of adults with asthma, can help improve self-efficacy, self-perceived coping skills, and asthma QOL.[25] Because COPD is so prevalent, it

is vital that respiratory therapy students be trained in educational strategies dealing with this disease. Implementation of interventional action plans will allow both patients and students to reap the benefits in our efforts to reduce the burden of COPD.

Purpose

The purpose of this study was to determine if educational support, both through home visits and through educational reading material, would improve the perceived HRQL and health knowledge of patients with moderate to severe COPD. Specifically, we conducted a randomized trial of our educational guide and home visits, measuring disease-specific questionnaires to assess for improvement. Our target population for this study included only patients with a physician diagnosis of moderate to severe COPD.

Methods

After obtaining Institutional Review Board approval, sample subjects were recruited from our outpatient pulmonary clinic. The target sample population included adults ($\geq$ 18 years of age) with a confirmed spirometry and a physisian diagnosis of COPD, classified as moderate or severe per GOLD criteria.[8] The subjects level of literacy was evaluated by the Rapid Estimate of Adult Literacy in Medicine (REALM) assessment tool[26]; subjects needed to show a minimum 4th grade reading adult literacy level (REALM score of 19) to be included in the study. Subjects who had other additional diagnoses, including congestive heart failure and asthma, that would cause significant dyspnea were excluded. Those with a documented severe cognitive impairment or those unwilling to voluntarily enroll or unable to give informed consent were not considered for this study.

Before beginning the actual data collection, a pilot study was performed on a small group of randomly selected COPD patients in order to gauge the ease of understanding each questionnaire from a patient's perspective. The pilot study allowed us to estimate a time range of approximately 10-20 minutes needed for the duration of completing the interview with all cumulative questions. We also noted patients' self-reported difficulty understanding some of the questions. A few statements determined to be more complex within the knowledge section were altered (e.g. addition of simple word like "yellow or green" to describe color). A minimal number of descriptive-only words were added to assist the subject with explicit understanding of the more difficult words.

A non-blinded randomized clinical trial was conducted using a two-by-two factorial design. This design allows the testing of multiple hypotheses with a smaller number of participants.[27] Once informed consent was obtained in accordance with the IRB approved protocol, subjects were selected using randomly drawn letter cards in blocks of 4 to each potential cell to ensure even allocation. All subjects, regardless of which letter was drawn, received standard care to include; information regarding newly prescribed inhaled medication use, reinforcement education at the physician's request, including review of inhaler techniques, and specific indications of the medicines. We defined standard care as what the patient would normally undergo as a result of a clinic visit without the specific study interventions.

The study was designed to test two separate interventions - a standardized home visit and the COPD educational guide. The home visit, loosely modeled on Geriatric Resources for

Assessment and Care of Elders (GRACE) Intervention[28], reinforced disease management education and evaluated the subject's general health environment, ability to move about the home, overall layout of non-stationary objects, access to oxygen and local family or personnel assistance. An occupational therapy form for home evaluations was utilized at each home visit as a general guide. The following structure was followed consistently during the home visit: the PI encouraged the patient to summarize their ADLs, the PI and patient walked through the home together in order to visualize the entire living space, and respiratory medications were reviewed during the visit. Home visits were conducted within an approximate 30 mile radius of our clinic, to include Shreveport, Bossier City, Haughton, Greenwood, and Stonewall.

Educational intervention with written material utilized the educational booklet: *Living With COPD: An Everyday Guide for You and Your Family.* The development of this guide was modeled on a validated diabetes guide[29], and was funded via unrestricted educational grants by the American College of Physicians Foundation. The guide is specifically designed to be easily read by patients and their families in order to learn more about COPD and how to better self-manage the disease. Developed by patients, doctors, educators, and nurses, the guide includes six short chapters highlighting; how to live well with COPD, getting the most from your medicines, learning breathing exercises, being more active, planning for when your breathing gets worse, and freeing yourself from smoking. This concise reference includes color photographs of patients performing common ADLs along with explicit step-by-step instructions on respiratory medication use (i.e. MDI with spacer and DPI use). Smoking cessation and breathing techniques are also discussed within this patient-centered guide.

The educational video shown, sponsored by the American College of Physicians Foundation, was a customized 3 segment, medication specific, educational video reviewing proper use of the MDI with spacer, the DPI, and egg-type inhaler (i.e. Spiriva®). Each segment was separately viewable and timed at 1.5 to 3 minutes each. The approximate 7-minute video included inhaler technique instruction as well as showing patients using the devices and "teaching back" the proper technique.

Participants randomized to Group A received both the COPD guide-based education and the structured home visit, Group B received only the COPD guide based education, Group C only the home visit and Group D received neither intervention. All subjects, regardless of randomly assigned group, received the identical, conglomerated questionnaire (modified SGRQ, BCKQ, and self-efficacy questions) as part of the pre-test. The pre-test interview was performed by the primary investigator for each participant in the study. The pre-test was administered within the outpatient clinic by reading each question along with response choices aloud to each subject. This questionnaire included customized compilation of several instruments (questionnaires) as described in proceeding section.

Results

Primary outcome: Modified SGRQ

The main instrument used to evaluate the study subject's baseline perceived, health-related QOL was a modified English version of the SGRQ[2]. It is a questionnaire endorsed by the American Thoracic Society, and may be self-administered or administered via face-to-face in-

teraction, or by telephone interview. It requires approximately 10-15 minutes to complete. The SGRQ includes three sections with the following categories: symptoms, activity, and impacts. The SGRQ has been reported as having good test-retest reproducibility and internal consistency.[30] Section I of the scaling items uses a 5-point Likert scale, while Section II and III uses dichotomous 'yes' and 'no' choices. During the initial interview, subjects were administered a modified version of the SGRQ by face-to-face interaction. The words that were added were put in parenthesis at the end of each statement.

Utilizing the St. Georges Respiratory Questionnaire (SGRQ) as our primary outcome metric, only the home visit interventional group showed positive deviation toward a borderline statistical significant difference (p<.10) (i.e. improvement) within the symptoms and activity domains: a difference between groups of 2.8 (95% CI) within the activity domain and a 6.11 (95% CI) difference in symptoms domain. There was also more of a decrease (improvement) in overall SGRQ score in the instructional home visit group than the non-intervention group: 1.24 (95% CI) difference between groups. However, the COPD educational guide group showed a 4.4 (95% CI) difference (improvement) within the activity domain between groups, although only approaching borderline statistical significance (p<.10)

Integrity of each question was maintained, and small format changes, such as sequence of questions, were made to promote flow of the interview process. Using the SGRQ required an average of 10-15 minutes to complete with each subject. The PI focused on completing the questionnaire prior to expounding on any non-questionnaire-related subject questions that surfaced during the interview.

Secondary Outcomes: modified Bristol COPD Knowledge and COPD Self-Efficacy

During the initial interview, a modified version of the Bristol COPD Knowledge Questionnaire was also administered by face-to-face interaction. Sixteen questions from the Bristol COPD knowledge questionnaire (BCKQ) were extracted to assess a subjects understanding of their disease. Each question from the BCKQ has a single stem statement, a "true" option, "false" option, and "don't know" option which was included in order to avoid forcing the subject to guess the answer. Use of this instrument allows for quantifying the subject's knowledge of COPD using a single score. The BCKQ has been shown to provide good internal consistency and reliability and has furthermore displayed change in response to education.[31]

In addition to a modified SGRQ and shortened BCKQ, eleven questions from the COPD Self-Efficacy Scale (CSES) were included in the overall pre-test interview. Self-efficacy refers to the personal beliefs and convictions people have regarding whether they can successfully execute a particular behavior in order to produce certain outcomes. Self-judgments of efficacy have shown to partly determine which situations or activities a person will attempt and which situations or activities a person may avoid. The CSES is made up of a five-factor structure with good test-retest reliability and excellent internal consistency.[32]

Statistical Methods:

Prior studies have suggested that similar COPD populations have mean SGRQ scores of approximately 50 (± 15)[33,34], and interventions that are "slightly efficacious" are associated with a 4 point reduction on average; with each 4 point reduction in

SGRQ, the effect size moves from "slightly" to "moderately" to "very" efficacious. We estimated that 18 subjects in each arm would give approximately 80% power to detect a "very efficacious" (ie, 12 point reduction in SGRQ) effect, and 50% power to detect a "moderately efficacious" (ie, 8 point improvement in SGRQ) effect at an α = 0.05

Data Analysis:

Changes in questionnaire measures from baseline to follow-up were calculated as follows: difference = baseline – follow-up; thus a negative value for the difference is the result of a higher value at follow-up. Mean differences were relatively normally distributed (see appended SAS output), and groups were compared by mean change using t-tests. Analyses were implemented using the ANOVA procedure. Data analyses were performed using SAS version 9.1 (Cary, NC).

Demographics

Study subject baseline characteristics are illustrated in Table 1. Overall, 37 subjects were included after informed consent was obtained, although only 27 were maintained throughout the study. Ten were lost to follow-up: 2 through voluntary withdrawal and 8 were unable to be contacted by phone. The majority of our sample population did not graduate high school, and very few could read at above an 8th grade level according to the REALM. Subjects were somewhat more likely to be female. Nearly 90% or more of our sample population were current or past smokers or both. Subjects who received the COPD guide were more likely to be female, somewhat less likely to be insured, and had somewhat longer smoking history. Subjects were otherwise without substantial differences by study allocation.

Effect of COPD guide

The effect of the COPD educational guide is illustrated in Table 2. The only positive effect was observed within the activity domain of the SGRQ with the group receiving the COPD educational guide. No appreciable positive change in knowledge or self-efficacy was noted in the interventional group. The change in mean scores represented within the table did not approach a statistically significant effect (p < 0.05). A decrease in overall SGRQ as well as a decrease within each domain of the SGRQ was a desirable effect. An increase in the BCKQ and CSES was a desirable effect.

Effect of structured home visit

The effect of the structured home visit is illustrated in Table 3. A mildly positive effect was observed within each domain of the SGRQ in the group that received the HBI, except for the impact domain. There was a mildly positive effect in the BCKQ and CSES also. The change in mean scores represented within the table did not approach a statistically significant effect (p < 0.05). A decrease in overall SGRQ as well as a decrease within each domain of the SGRQ was a desirable effect. An increase in the BCKQ and CSES was a desirable effect.

Table 1
Subject baseline characteristics

			All (n=37)	Completed (n=27)	COPD Guide Y (n=14)	COPD Guide N (n=13)	Home Visit Y (n=10)	Home Visit N (n=17)
Demographics	Age		59.2 (8.3)	58.1 (8.4)	58.4 (8.7)	57.7 (8.3)	57.1 (7.4)	58.6 (9.1)
	Female		64.9%	59.3%	71.4%	46.2%	50%	64.7%
	Height (in.)		64.6 (3.7)	65.2 (3.8)	63.7 (3.4)	66.7 (3.6)	66.8 (2.7)	64.2 (4.0)
	Weight(lb.)		161.8 (53.2)	162.3 (52.0)	168.7 (58.4)	155.4 (45.5)	155.5 (43.8)	166.3 (57.2)
	Race	Caucasian	62.2%	55.6%	57.1%	53.9%	50%	58.8%
		African American	32.4%	37%	35.7%	38.5%	40%	35.3%
		Other	5.4%	7.4%	7.1%	7.7%	10%	5.9%
Socioeconomic status	Highest level of education		10.8 (2.4)	10.4 (2.5)	11 (2.0)	9.8 (3.0)	10.4 (3.1)	10.5 (2.3)
	REALM score		52.4 (16.2)	51.2 (17.3)	53.1 (18.0)	49.2 (17.0)	54.4 (18.1)	49.3 (17.1)
	Knowledge		9.1 (2.3)	9.1 (2.3)	9.1 (2.3)	9.2 (2.3)	8.8 (2.6)	9.4 (2.5)
	Self Q		8.04 (4.0)	8.07 (4.03)	9.1 (4.4)	6.9 (3.4)	9.2 (4.8)	7.4 (3.5)
	Insurance status	None/Free Care	40.5%	37%	50%	23.1%	30%	41.2%
		Medicare/ Medicaid	51.3%	63%	50%	76.9%	70%	58.8%
		Commercial insurance	2.7%	0%	0%	0%	0%	0%
Respiratory status	Smoking history	Current	40.5%	44.4%	42.9%	53.9%	50%	41.2%
		Former	48.7%	48.2%	42.8%	46.2%	50%	47%
		Never	10.8%	7.4%	14.3%	0%	0%	11.8%
		Pack years	62.5 (37.4)	59.2 (39.1)	67.9 (41.7)	51.3 (36.3)	59.7 (39.9)	58.9 (39.9)
	Disease severity	FEV1 (in liters)	1.17 (0.50)	1.21 (0.50)	1.18 (0.35)	1.24 (0.64)	1.47 (0.61)	1.10 (0.36)
		FEV1 (% predicted)	45 (15.8)	45.2 (15.7)	48.2 (12.8)	41.9 (18.3)	51 (18.1)	42 (13.6)
		SGRQ	60.9 (20.0)	66.4 (16.4)	60.0 (17.4)	73.1 (12.6)	65.2 (18.2)	67.1 (15.8)
		Duration of Diagnosis	4.6 (4.0)	4.8 (4.1)	3.9 (4.3)	5.7 (3.9)	5.7 (2.9)	5.4 (4.7)

Numbers in parenthesis represent SD of the average mean of each sub-group

Table 2

Effect of COPD guide on respiratory health and knowledge

		Received guide		Difference between arms* (95% CI)
		Yes (n=14)	No (n=13)	
Change in SGRQ	Overall	0.20	1.88	-1.7
		(11.66)	(6.42)	(-9.2 – 5.9)
	Activity domain	2.01	-2.42	4.4
		(13.8)	(10.71)	(-5.4 – 14.3)
	Impact domain	0.54	3.66	-3.1
		(16.97)	(13.19)	(-15.2 – 9.0)
	Symptoms domain	-4.71	2.98	-7.7
		(19.98)	(14.5)	(-21.6 – 6.2)
Change in knowledge	Bristol knowledge	-0.21	-1.33	**1.1**
		(1.48)	(1.50)	**(-0.1 - 2.3)**
	COPD self-efficacy	-0.64	-3.38	**2.7**
		(3.1)	(4.1)	**(-0.1 – 5.6)**

Values in bold are of at least borderline (ie, p<0.10) significance.

*A positive value represents an increase in the value of the outcome number (good for BCKQ & CSES; bad for SGRQ overall & domains)

** Values in parenthesis represent SD of each sub-group

Table 3

Effect of Instructional Home Visit on respiratory health and knowledge

		Received home visit		Difference between arms* (95% CI)
		Yes (n=10)	No (n=17)	
Change in SGRQ	Overall	1.79	0.55	1.24
		(8.76)	(9.9)	(-6.6 – 9.1)
	Activity domain	1.64	-1.16	2.8
		(12.3)	(12.6)	(-7.5 – 13.1)
	Impact domain	1.53	2.35	-0.8
		(13.9)	(16.1)	(-13.4 – 11.8)
	Symptoms domain	2.84	-3.3	6.11
		(17.1)	(18.1)	(-8.5 – 20.7)
Change in knowledge	Bristol knowledge	-1.56	-0.29	**-1.3**
		(1.74)	(1.31)	**(-2.5 - 0.0)**
	COPD self-efficacy	-2.0	-1.94	-0.1
		(3.65)	(4.02)	(-3.3 – 3.1)

Values in bold are of at least borderline (ie, p<0.10) significance.

*A positive value represents an increase in the value of the outcome number (good for BCKQ & CSES; bad for SGRQ overall & domains)

**Values in parenthesis represent SD of each sub-group

Discussion

This pilot study demonstrated that interventions are feasible in this population. The home visit, however, revealed that a number of our patients lived in a chaotic environment.

It was also revealed that our sample population averaged at or below 11th grade educational level coupled with an average 7th to 8th grade reading level (See Table 1). We propose that this has a profound effect on the efficacy of the COPD educational guide. Specifically, because the guide was only briefly reviewed with the patient and given for self-review, our study sample may be less likely to review the material compared to the home visit being more forced interaction. We did not observe a large statistically significant difference between groups in either the home-visit or COPD guide cells. This may be attributed to the issues of power and sample size studied. It may be that this population is not well positioned to learn from reading material (educational level, home situation, etc), or that the COPD instrument did not impact health/knowledge in our underserved, non-traditional population.

The home visit did not clearly demonstrate an improvement in either health status or knowledge; however, there was a general trend of modest size toward a positive effect, although not statistically significant. Again, this lack of statistical significance may be attributed to the issues of power and sample size studied. It may be that this population is not well-positioned to be significantly affected by a HBI due to living conditions or specific home environment of our underserved, non-traditional population.

The home visit, to the extent it did, showed a greater effect than the COPD guide. The HBI may prove better in this population as it is more structured and patients are guaranteed review of certain material due to direct interaction with an educator.

It is vital that students are trained early on in their respiratory therapy education to deal with patients with COPD. As COPD prevalence continues to rise, education of these patients will be of great importance. Furthermore if recent evidence has revealed that disease-specific self-management can improve a patient's health status and a patient's perceived HRQL can improve with simple educational intervention[10-16] how much more should we as educators prioritize teaching the "how-to" of educating our patients?

Conclusion

When designing this study we considered that no study evaluating the affect of education on QOL in patients with COPD exists. Although the study layout was intended to accommodate a lower number (n) while still allowing an effect to be observed, this was a pilot study with a limited number of subjects and high attrition rate. Some of the high attrition rate may be attributed to the general characteristics of the pulmonary patients traditionally seen in our outpatient clinic. A large percentage of the clinic patients are rural and non-local. Several subjects were removed from the study once they disclosed they lived more than one and one half hours drive from the clinic. Several subjects once consented were found to be illiterate, which excluded them from the study.

Because of the time restriction, limited number of subjects, and high attrition within this study, it was difficult to show a statistically significant effect. Although most data revealed a positive effect as a result of the home visit, the effect was small and did not reach statistical significance.

The HBI was especially challenging due to the overall environment in which patients were found during this study. When administering the post-intervention questionnaires within the interventional group that received the COPD educational guide, it was disclosed by 2 of 14 subjects that the guide was not read at all. In conclusion, although HBIs are feasible in such patients, more studies are needed to determine if they are of benefit.

Patient education does make a difference. As educators of future healthcare providers, it is important to train our students well in the art of educating their patients. Both student and patient will ultimately benefit from this increased expertise in the process of relaying information, along with heightened awareness of what effect education can have.

Abbreviations

ADL: Activities of Daily Living
BCKQ: Bristol COPD Knowledge Questionnaire
COPD: Chronic Obstructive Pulmonary Disease
CSES: COPD Self-Efficacy Scale
DPI: Dry Powder Inhaler
HBI: Home-Based Intervention
HRQL: Health-Related Quality of Life
IRB: Institutional Review Board
MDI: Metered Dose Inhaler
NHLBI: National Heart, Lung, and Blood Institute
PI: Principal Investigator
QOL: Quality of Life
REALM: Rapid Estimate of Adult Literacy in Medicine
RT: Respiratory Therapist
SGRQ: St. George's Respiratory Questionnaire

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Appendices

Appendix A. Modified St Georges Respiratory Questionnaire (English for the United States)

This questionnaire is designed to help us learn much more about how your breathing is troubling you and how it affects your life. We are using it to find out which things about your illness cause you the most problems, rather than what the doctors and nurses think your problems are.

1. How would you describe your health right now?

❐ Very good   ❐ Good   ❐ Fair   ❐ Poor   ❐ Very Poor

These next few questions will describe how often your breathing problems have affected you over the past 3 months:

Over the past 3 months:

2. I have coughed:

❐ Almost every day   ❐ Several days a week   ❐ A few days a month
❐ only when I have a breathing infection   ❐ Not at all

3. I have brought up mucus/phlegm:

❐ Almost every day   ❐ Several days a week   ❐ A few days a month
❐ only when I have a breathing infection   ❐ Not at all

4. I have had shortness of breath:

❐ Almost every day   ❐ Several days a week   ❐ A few days a month
❐ only when I have a breathing infection   ❐ Not at all

5. I have had breathing problems that made me wheeze:

❐ Almost every day   ❐ Several days a week   ❐ A few days a month
❐ only when I have a breathing infection   ❐ Not at all

6. How many times in the past 3 months have you suffered from severe or very unpleasant breathing attacks?
❐ More than 3 times   ❐ 3 times   ❐ 2 times   ❐ 1 time   ❐ None of the time

7. How long did the worst breathing attack last?
❐ A week or more   ❐ 3 or more days   ❐ 1 or 2 days   ❐ Less than a day

8. Over the past 3 months, in a typical/regular week, how many good days (with few breathing problems) have you had?

❐ No good days   ❐ 1 or 2 good days   ❐ 3 or 4 good days   ❐ Nearly every day was good

9. If you wheeze, is it worse when you get up in the morning (early)?
❐ No   ❐ Yes

Part 2
Sec. 1

10. How would you describe your breathing condition?
❐ The most important problem I have
❐ Causes me quite a lot of problems
❐ Causes me a few problems
❐ Causes no problems

11. Do you work right now (job)?
❐ My breathing problems made me stop working altogether
❐ My breathing problems interfered with my job or made me change my job
❐ My breathing problems do not affect my job

Sec. 2

These are questions about what activities usually make you feel short of breath these days.

Say either "True" or "False"

12. These days, I get short of breath:		
Playing sports or other physical activities	❐ True	❐ False
Walking up hills	❐ True	❐ False
Walking up a flight of stairs	❐ True	❐ False
Walking outside on level ground	❐ True	❐ False
Walking around the house	❐ True	❐ False
Washing or dressing yourself	❐ True	❐ False

Sec. 3

These are more questions about your cough and shortness of breath these days.

Say either "True" or "False"

13. These days:		
I get exhausted easy	❐ True	❐ False
My coughing or breathing disturbs my sleep	❐ True	❐ False
I am short of breath when I bend over	❐ True	❐ False
I am short of breath when I talk	❐ True	❐ False
Coughing makes me feel tired	❐ True	❐ False
Coughing hurts	❐ True	❐ False

Sec. 4

These are questions about other ways your breathing problems affect you these days.

Say either "True" or "False"

14. These days:		
Everything seems too much of an effort	❐ True	❐ False
Exercise is not safe for me	❐ True	❐ False
I have become frail because of my breathing problems	❐ True	❐ False
I do not expect my breathing problems to get any better	❐ True	❐ False
I feel that I am not in control of my breathing problems	❐ True	❐ False

I get afraid or panic when I cannot catch my breath ❏ True ❏ False
My breathing problems are a bother to my family, friends,
or neighbors ❏ True ❏ False

Sec. 5

These are questions about the treatment for your breathing.

Say either "True" or "False"

15. These days:
My treatment interferes with my life a lot ❏ True ❏ False
I have unpleasant side effects from my medication ❏ True ❏ False
I get embarrassed using my medication in public ❏ True ❏ False
My treatment does not help me very much ❏ True ❏ False

Sec. 6*

*These are questions about how your activities (things you do) might be affected
by your breathing problems.*

16. These days:
My breathing makes it difficult to do things such as walk up hills, carry things up stairs,
light gardening such as weeding, dance, bowl, or play golf ❏ True ❏ False
If I hurry or walk fast, I have to stop or slow down ❏ True ❏ False
If I walk up one flight of stairs, I have to go slowly or stop ❏ True ❏ False
Jobs such as household chores take a long time, or I have to stop to rest ❏ True ❏ False
I walk slower than other people my age, or I stop to rest ❏ True ❏ False
I cannot take a bath or shower, or I take a long time to do it ❏ True ❏ False
I take a long time to get washed or dressed ❏ True ❏ False

*2 questions were eliminated from this section

Sec. 7

We would like to know how your breathing problems usually affect your every day life.

Say either "True" or "False"

I cannot play sports or do other physical activities ❏ True ❏ False
I cannot go out for entertainment, recreation, or to have fun ❏ True ❏ False
I cannot go out of my home to do the shopping ❏ True ❏ False
I cannot do household chores (laundry, ironing, cleaning, etc.) ❏ True ❏ False
I cannot move far from my bed or chair ❏ True ❏ False

Please only choose one of what I will read next:

How does your breathing problems affect you?

It does not stop me from doing anything I would like to do ❏
It stops me from doing one or two things I would like to do ❏
It stops me from doing most of the things I would like to do ❏
It stops me from doing everything I would like to do ❏

Appendix B. Knowledge, Self-Management, and Self-Efficacy Questionnaire

COPD Education Study   Knowledge Questions

1. More than half of all COPD cases are ❐ True ❐ False ❐ Don't Know
   caused by smoking.

2. Breathlessness (getting short of breath) ❐ True ❐ False ❐ Don't Know
   is a normal response to exercise.

3. Coughing up phlegm/mucus is a common ❐ True ❐ False ❐ Don't Know
   symptom in COPD.

4. With chest infections phlegm/mucus ❐ True ❐ False ❐ Don't Know
   usually becomes colored (yellow or green).

5. In COPD the word "chronic" means it ❐ True ❐ False ❐ Don't Know
   is severe.

6. Breathlessness (getting short of breath) ❐ True ❐ False ❐ Don't Know
   can be made worse by eating large meals.

7. Clearing phlegm/mucus is more difficult ❐ True ❐ False ❐ Don't Know
   if you get dehydrated.

8. Bronchodilator inhalers can help ❐ True ❐ False ❐ Don't Know
   clear phlegm/mucus.

9. Clearing phlegm/mucus can be assisted by ❐ True ❐ False ❐ Don't Know
   doing breathing exercises.

10. Exercise should be avoided because it ❐ True ❐ False ❐ Don't Know
    strains the lungs or makes it harder to breathe.

11. Stopping smoking will slow down further ❐ True ❐ False ❐ Don't Know
    lung damage.

12. Stopping smoking is pointless because the ❐ True ❐ False ❐ Don't Know
    damage is done.

13. All bronchodilators act quickly ❐ True ❐ False ❐ Don't Know
    (within 10 minutes).

14. Both short and long acting bronchodilators ❐ True ❐ False ❐ Don't Know
    can be taken on the same day.

15. Using a spacer device will increase the amount ❐ True ❐ False ❐ Don't Know
    of drug deposited in the lungs.

16. Steroid inhalers can be used for quick relief ❏ True ❏ False ❏ Don't Know
   of breathlessness.

All questions were extracted/modified from the Bristol COPD Knowledge Questionnaire

Appendix B. Continued

COPD Education Study   Self-Management Questions

How sure are you of:

1. ... why you take each of your medicines?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

2. ... your ability to correctly take each of your medications?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

3. ... your ability to clear the mucus or phlegm out of your lungs?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

4. ... your ability to deal with your breathing if it gets worse?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

5. ... your ability to consistently exercise?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

COPD Education Study   Self-Efficacy Questions

How sure are you that you could manage breathing difficulty or avoid breathing difficulty:

1. ...when you become too tired?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

2. ... when you experience emotional stress or become upset?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

3. ... when you go up stairs too fast?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

4. ... when you become angry?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

5. ... when you exercise or physically exert yourself?
   ❏ Very sure   ❏ Fairly Sure   ❏ Just a Little Sure   ❏ Not Sure At All

How sure are you that you could manage breathing difficulty or avoid breathing difficulty;

6. ... when you feel distressed about your life?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

7. ... when you get an infection (throat, sinus, colds, the flu, etc.)?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

8. ... when you experience anxiety?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

9. ... when you overeat?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

10. ... when you are afraid?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

11. ... when you hurry or rush around?
❐ Very sure   ❐ Fairly Sure   ❐ Just a Little Sure   ❐ Not Sure At All

All questions were extracted/modified from the COPD Self-Efficacy Questionnaire

A Report on the Success of a Youth Oriented Tobacco Prevention Program

Lawrence Bryant, PhD, MPH, RRT
Stephen Morrison, SPT

Abstract

Respiratory therapists can play a vital role in mobilizing the community to educate our youth on the hazards of tobacco use. Empowering survivors, students, community partners, and educators with the means to communicate these hazards can play a significant role in tobacco control advocacy efforts. The purpose of this report is to discuss how Respiratory Therapy educators and Respiratory Therapy student advocates in a southern university Respiratory Therapy program created and marketed the beginnings of a dynamic, cost-effective, and integrative youth oriented tobacco awareness project. The establishment and implementation of specific project goals guided this project; they included: (1) develop an action plan to fulfill project deliverables, (2) dissemination of tobacco related quit line brochures, pamphlets, and flyers throughout our campus and the community at large, (3) galvanizing student groups to promote anti-tobacco messages through media outlets and, (4) development of recommendations and ideas for future funding opportunities. Recommendations from this project include: creation of a street team to improve circulation of Quit-line and tobacco cessation material, development of youth interactive PSAs, and the promotion of social networking strategies targeted toward youth. The formative stages of this marketing campaign have laid the ground-work for opportunities to stimulate student groups into action around the issue of tobacco control and elimination, and help prevent the initiation of smoking among our youth. *Key words: marketing, smoking, respiratory therapy, tobacco prevention, advocacy, youth.*

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A Report on the Success of a Youth Oriented Tobacco Prevention Program

Introduction

Early initiation of tobacco use is a serious health concern facing youth in the United States today. While rates of youth smokers dropped overall throughout the 2000s, nationally 25.7% of high school students still report that they currently use some form of tobacco; including, cigarettes, smokeless tobacco, or cigars[1]. At 23%, the state of Georgia parallels the national statistics[2]. Nationally, 10.7 % of these students reported smoking at least 10 cigarettes a day, whereas Georgia's figures are slightly lower at just over 7%[1,2]. Even worse, almost 50% of students either nationally or in Georgia have tried tobacco at least once.[1,2]

Even these casual users are at greater risk of developing addiction to tobacco products; a fact proven throughout the literature. As far back as 1971, one of the pioneers of youth tobacco addiction research, Dr. Michael Russell, describes youth tobacco usage when as little as four cigarettes can lead to regular dependent smoking.[3,4] In a 2007 study examining symptoms of tobacco dependence after brief intermittent use, DiFranza and colleagues found that the most susceptible youth can lose control of their habit within 2 days of first inhaling a cigarette.[4] Half of the 217 youth smokers in the study (30%) had lost control of their smoking within 30 days of first inhaling a cigarette.[4] Tobacco dependency, as defined by IDC-10 codes [4,5], was diagnosed in some subjects as early as 13 days after their first inhalation.[4] In another study, O'Loughlin et al state that 16.6% of study participants were classified as tobacco dependent after 3 months, despite low exposure to cigarettes.[6] National and local statistics underscore the seriousness of youth tobacco use; for example, 49.7% of high school students nationwide, and 56% of high school students in Georgia who regularly use tobacco have unsuccessfully attempted to quit.[2]

As these youth develop early addiction to tobacco products and eventually becoming lifelong users, they are also putting themselves at a greater risk of developing illnesses and diseases associated with tobacco use, such as lung cancer, COPD, and emphysema to name a few. Simply put, the earlier youth begin regular tobacco use, the sooner carcinogens and other damaging products in tobacco can affect their health. While the link between chronic tobacco use and the aforementioned diseases is well documented; a 1999 study by Wiencke and associates states that even the DNA of young tobacco users may be more susceptible to developing lung cancer due to exposure of tobacco smoke.[7] In fact, according to the most recent data from the government affiliated organization Campaign for Tobacco Free Kids, over 25% of the children who begin smoking in 2010 will die prematurely from their addiction.[8] As stated previously, early tobacco initiation among youth is a serious problem that demands the attention of respiratory therapists, anti-tobacco advocates and community organizations.

With the copious amount of evidence in favor of youth prevention programs, it seems clear that a substantial portion of resources should be dedicated to implementing such programs nationwide. While many programs do exist, such as the "*TRUTH*" campaign[9], many factors serve as impediments to their implementation beyond the pilot-study level. For example, acceptance by school administrators and school boards are oftentimes problematic and rife with bureaucracy. In the high pressure environment of today's school systems created by No Child Left Behind, many administrators are focused on producing improved

Table 1

Pertinent Term Definitions and Acronyms

_____

ICD-10: International Classification of Diseases, 10th revision

Survivor/tobacco survivor: A person who has lived through or is living with a tobacco related/caused illness, including, but not limited to: emphysema, COPD, lung cancer

PSA: Public service announcement

COPD: Chronic obstructive pulmonary disease

TSN: Tobacco Survivors' Network

TTAC: Tobacco Technical Assistance Consortium, an organization housed at Emory designed to assist tobacco prevention organizations with logistical issues and funding

Master Settlement agreement: A lawsuit settlement between the four largest US tobacco companies and the Attorney General's office of 46 states.

DCH: Georgia Department of Community Health

CDC: Centers for Disease Control and Prevention

ACS: American Cancer Society

CHOA: Children's Healthcare of Atlanta

Tweets: User posted messages on the social network website twitter.com

GASO: Great American Smoke Out, an American Cancer Society event designed to encourage smokers to quit

_____

achievement test scores.[10] This singular focus can often spell trouble for non-academic based initiatives, such as tobacco prevention programs, as administrators are reluctant to take time away from academic studies to include them in the curriculum.[10] Another huge issue is the fact that states are not utilizing Master Settlement moneys as promised to fund tobacco prevention and cessation programs at appropriate, or even minimal, levels.[11]

The Campaign for Tobacco Free Kids report, "A Broken Promise to our Children" details the funding provided to tobacco prevention and cessation programs across the United States. Only Colorado, Delaware, and Maine are funding these programs at the minimal level needed to sustain them.[11] By sharp contrast, Georgia is well below the funding levels of those states.[11] Georgia is listed in this report as funding tobacco prevention and cessation programs at just 5.3% of the minimum recommended by the CDC, spending approximately $2.2 M.[11] In light of these challenges and the evidence supporting our cause, the purpose of this report is to relate from our experiences how Respiratory Therapy educators, Respiratory Therapy student advocates and other student advocates in a southern university Respiratory Therapy program can create and market a dynamic, cost-effective, and integrative youth oriented tobacco awareness project. For the reader's convenience, Table 1 is a list of related terms, definitions, and acronyms used in the project.

Project background

The Tobacco Survivors' Network (TSN) is an anti-tobacco program housed at a southern university school of respiratory therapy[12] The TSN's primary demographic target has been tobacco prevention activities focused toward middle school, high school, and young college students.[13] During the spring of 2009, the Tobacco Technical Assistance Consortium (TTAC), housed at another southern university, announced the availability of grants to fund tobacco prevention awareness and cessation activities covering several specific areas. TTAC's

mission is to build and develop highly effective tobacco control programs on a community, state, and national level, such as the TSN. TSN principle investigator applied for and received a small grant to lead a youth oriented tobacco awareness Marketing Campaign.

The main purpose of this campaign was to market the Georgia Tobacco Quit Line, a toll-free hotline offering cessation information and support to tobacco users and increase community and student awareness of the hazards of tobacco use. The hotline has cessation services specifically targeting youth between the ages of 13 and 24. Out of this project came a series of activities and future recommendations, which have been offered to state officials as guidelines for future funding and potential duplication at other universities.

The researchers hope these recommendations will ultimately demonstrate to state officials how tobacco prevention and cessation funds could be properly utilized to have the maximum positive effect on youth. This project and the recommendations come at a crucial time, mainly because, in 2008 states began to receive bonus payments from the Master Settlement agreement.[11] It is vital to the future of tobacco cessation in Georgia that these funds be directed toward efficacious tobacco prevention and cessation programs that prevent the initiation of smoking among our youth.

Project Goals

With the leadership of the TSN staff and the project principle investigator, the Marketing Work-group developed strategies and recommendations that guided the activities of this project. Project goals included, (1) develop an action plan to fulfill project deliverables, (2) dissemination of tobacco related quit line brochures, pamphlets, and flyers throughout our campus and the community at large, (3) galvanizing student groups to promote anti-tobacco messages through media outlets and, (4) develop recommendations and ideas for future funding opportunities.

Membership reflected a wide range of community and student advocates, including: respiratory therapy students, area respiratory therapy department representatives, the Georgia Department of Community Health (DCH), the university Employee Health and Wellness Department, the university Health Promotion Department, the university Colleges Against Cancer student group, the university nursing school anti-tobacco advocates and community advocates. The workgroup met monthly via conference calls and face-to-face meetings to develop an action plan, share experiences in tobacco control efforts and to discuss strategies for marketing the Quit Line, as well as increasing awareness about tobacco. The work-group members chose to implement many of the recommendations put forth by the Centers for Disease Control in its report, "*Best Practices for Comprehensive Tobacco Control Programs.*" In this report, the CDC suggests that tobacco prevention and cessation programs include prevention efforts involving education, counter-marketing, administration and management strategies that can coordinate all tobacco control efforts.[14] These suggestions, along with previous tobacco prevention and cessation strategies utilized by the TSN, were the framework for this pilot project.

Activities Toward Project Goals

The project formally began in August 2009. What follows in this section is a brief description of all activities performed by the TSN pertaining to the TTAC project. The majority of time during August was spent creating a specific plan of action for the upcoming

fall and spring semester. Workgroup leader Dr. Lawrence Bryant collaborated with a key member of the workgroup, the Department of Community Health Communications (DCH), to create a formal document outlining a specific initiative called "*Kick it*". The overall idea behind the "*Kick It*" project is a student-led, "grassroots" effort designed to influence tobacco using students through positive peer pressure while remaining cost-effective. Some of the elements from this document help inform our activities.

In September, the implementation of the "*Kick It*" project and the promotion of the Quit Line began in earnest. The first event, a health fair, was held in joint collaboration with the University's Office of Student Health Promotions. This event took place in the university's student center courtyard where project staff members disseminated Quit-Line literature to students and guests as well as other tobacco cessation related pamphlets and giveaways. Additionally, Dr. Bryant helped to organize the Department of Respiratory Therapy's annual Respiratory Care Week for October. The month concluded with the first marketing workgroup conference call with newly assembled members of the workgroup. During this call, all members and their potential contributions to the project were identified. Project members also discussed strategies to achieve the goals of the project.

In October, the marketing group began to reach out to the community via the internet and print media to fulfill our goal of disseminating anti-tobacco messages and increasing awareness about the hazards. The first example of this was a feature article written by project principle investigator, Dr. Bryant, and published in the university's faculty newsletter, "The Villager." This article focused on Dr. Bryant's work in tobacco cessation and current activities promoting the Quit Line. Also, the Tobacco Survivors' Network (TSN) and marketing workgroup activities were prominently featured on the university's main homepage. This article focused on the TSN's work promoting the Quit Line. Additionally, project members established a relationship with a leading Atlanta entertainment publication "*In-Site Atlanta*", which allowed for the publishing of a PSA in their October issue. During the month project members continued to promote the Quit Line on the university's campus with print materials, including flyers, posters, and pamphlets. Project staff and respiratory therapy student advocates promoted the Quit Line as part of their Respiratory Care Week activities. TSN members gave material to area respiratory therapy departments to disseminate to patients and family members.

In terms of the overall project, November was the busiest month for the marketing workgroup. The month began with a workgroup conference call. The purpose of this call was to recap September and October's activities and to plan for the American Cancer Society's (ACS) Great American Smoke Out (GASO). Out of this call came several initiatives that will be discussed later in this section. In order to properly promote the University's GASO activities, the TSN website was completely redesigned to emphasize the Network's mission and upcoming events. A blurb promoting the GASO activities was also featured on the College of Health and Human Services homepage. Separate from the GASO activities, project members gave several tobacco awareness presentations during November.

The first presentation was given to employees at Children's Healthcare of Atlanta (CHOA) respiratory care department. This was an effort to reach out to CHOA staff and administrators about the Quit-Line and to increase awareness about the hazards of second hand smoke. The second presentation focused on the hazards of tobacco use, presented by Res-

piratory Therapy students to Atlanta area middle school students. The senior Respiratory Therapy students utilized materials received from the marketing workgroup in their presentations. Another presentation at a Medical Center in Atlanta was given to area middle and high school students to increase awareness about cigarettes, cigars and second hand smoke. Materials and information about the Quit Line were disseminated at this event.

Finally, Dr. Bryant was asked to address the university faculty senate on the topic of tobacco use on campus, second hand smoking, and making the university a smoke free campus. This is an initiative that has been in the works with state officials for some time. The presentation focused on how the *Kick-It* program and Quit-Line promotion could be incorporated into any plan to make any university a smoke free campus. In regards to the GASO activities, the marketing workgroup collaborated with several on-campus organizations to ensure success. The Office of Student Health Promotions was instrumental in setting up the framework of the day's activities. The main event was a GASO parade held on campus. This parade proceeded through the entire campus handing out Quit-line materials, tobacco cessation related giveaways and prizes. In conjunction with this parade, workgroup members handed out Quit-line materials and related information at a booth in the university's student plaza. There, students were given tobacco cessation information and urged to utilize the Quit-Line to help stem their smoking habits. Instrumental in the orchestration of this information booth were members of our university chapter of Colleges Against Cancer, the collegiate arm of the American Cancer Society (ACS).

Students were vital in reaching other tobacco using young adults because they responded better to their peers than perceived "authority figures" representing the workgroup. Additionally, during this period, students from another southern University conducted a comprehensive formal community needs assessment as a part of a course requirement. The purpose of this research project was to determine community norms related to smoking at our university. We incorporated questions related to quit-line usage in the survey.

Following the activity of November, December was the quietest month of the project, primarily due to student exams, colder weather preventing outside activities, and most importantly Winter Break. Despite this, project members continued to disseminate Quit Line materials on campus and to make plans for 2010. Project members convened for a December workgroup conference call. During this call, workgroup members recapped November's activities and discussed marketing ideas centering on taking advantage of New Year's resolutions to stop smoking. At this meeting, members discussed the Community Needs Assessment report done by Emory University students. A full community norm report was completed at the end of December by students from another university. An important finding was further need to increase anti-tobacco awareness around campus. The primary focus during January was collaboration with our University's School of Nursing. Workgroup staff worked with nursing school students to distribute Quit-Line materials throughout campus. This, as previously mentioned, was done with an eye toward capitalizing on student's resolutions to quit using tobacco for the New Year.

Future Recommendations

The overall purpose of this project was to examine the lessons learned from the workgroup over the six month period, and to create a series of recommendations. These recom-

mendations have been submitted to state officials to be reviewed and considered for future funding opportunities and possible continuation of current tobacco prevention/cessation efforts. The overall idea behind the following recommendations below is to recognize the limits in tobacco funding and the difficulty in reaching youth with an anti-tobacco message, yet establishing a dynamic and effective tobacco prevention and cessation program. Recommendation 1: To continue the current efforts describe within this article. These include dissemination of Quit Line materials and work with other tobacco cessation organizations, respiratory therapist and other student groups. Although funding did not allow for quantitative analysis of our efforts, their effectiveness has been clearly demonstrated through our interactions with youth smokers and tobacco cessation advocates. In the future we recommend the creation of a "street team" to improve the circulation of Quit Line and tobacco cessation information. Some of the biggest issues faced over the past few months were logistical challenges; having enough personnel to hand out information and work health fairs. This was primarily because most of the volunteers were respiratory therapy students, who were often busy with their demanding class schedules. A team of dedicated individuals and volunteers would help eliminate this problem.

Recommendation 2; As an adjunct to the street team idea, we will continue our existing collaborations with tobacco cessation oriented organizations, and continue identify new organizations that could be of benefit to Quit-Line marketing. Often times 2 organizations targeting the same population with similar work may not be aware of the other's existence. Building relationships with organizations similar to the marketing workgroup and the Tobacco Survivors' Network can lead to cross marketing, and ultimately resulting in reaching a wider audience. Several of the recommendations center on expanding the "*Kick It*" campaign previously discussed in this document. One such component would be a campaign of interactive public service announcements (PSAs). This would involve contest at local public schools and universities. Students would be challenged to create their own PSAs (video/print/audio/etc) focused on tobacco cessation. The winning entry would be voted on by peers. While the material currently in circulation has proven to be effective, we feel that we could achieve greater buy-in among students if they were personally invested in the campaign. Once the PSAs are created, they can be included in the overall marketing campaign. These PSAs can be branded on various products and giveaways (e.g., posters, key chains, and t-shirts) to be distributed at school events. Recommendation three: Recognition of the need to establish an effective social networking presence on the three major websites, Twitter, Facebook, and YouTube. Young adults spend a substantial amount of time on these websites, and any successful effort to reach them must include a plan to utilize them. Twitter, although relatively new, offers intriguing potential to directly target young smokers and cessation advocates. The website's search feature allows users to search for "tweets" (user posted messages) containing specific phrases. For instance, if a youth smoker posted, "I really wish I could quit smoking," an individual working the Quit -Line's Twitter page could search for and find this message via keywords, and reply directly with cessation information and the Quit-Line number. YouTube offers an ideal place to broadcast video PSAs, survivor videos, and other cessation oriented commercials. Facebook has been clearly established as the leader in social networking sites, but it offers a different promotional platform than Twitter. Facebook could best serve as a central hub for all tobacco cessation social networking efforts. A

Quit-Line Facebook page could link to the Quit Line, Twitter, and YouTube pages. Young smokers and cessation advocates could be encouraged to blog their experiences, thoughts, and ideas on the Facebook page.

Unfortunately, while many organizations are using social networking to promote a means to an end, there exists no definitive detailing on how to create an effective social networking presence. Creation of such a document would be a central tenet of any future continuation of Quit-Line promotion. While research and collaboration with other social networking users could be utilized, the primary resources used to create an effective social networking presence would be brainstorming, planning, and trial and error. Team members would need to take detailed notes of the entire process, including successes and failures. Ideally, once created this document could be used as a blueprint to duplicate the process again elsewhere. Once the entire "*Kick It*" campaign has been established and gained some momentum (i.e. PSAs/social networking sites created), project administrators should look to local media personalities, celebrities, and notable alumni of target schools to promote the project. Youth often look up to celebrities, and this holds true with promotion of health causes as well. Many notable Atlanta area celebrities (e.g. radio DJs, athletes, and musicians) are known for their community service work, especially targeting youth. We feel that the inclusion of local celebrities in the marketing of the Quit-Line and tobacco cessation in general could have a large impact on the statewide success of the project.

Discussion

Overall, the goals and objectives of our youth oriented tobacco prevention project have been realized. Strategies initiated and developed by the Marketing work-group have been instrumental in dissemination of tobacco related Quit-Line brochures, pamphlets, and flyers throughout our university and community. These strategies provided many opportunities to propel student groups into action around the issue of tobacco control and elimination. By promoting anti-tobacco messages through the media, our university outlets have provided opportunities to disseminate our message to a wider audience and culminated in campus and communitywide interest in our project.

Conclusion

The development and recommendations for future funding opportunities has provided the groundwork for a comprehensive student led project that could be duplicated in other similar settings. Because of limited resources it has been difficult to evaluate and assess the impact of our activities on our target population. However, this project has proven that much can be done with limited resources when respiratory therapists, student organizations and the community unite against tobacco, our common enemy.

We wish to express our appreciation in this report for the commitment, enthusiasm, and laudable efforts of our respiratory therapy students, department faculty, cancer survivors and community partners in making this project a success thus far. These committed people through the Survivorship Network of Georgia have laid a solid foundation for addressing the overall mission of the State's Tobacco Use Prevention Program; that is, to

reduce the use of tobacco and the burden it creates from related illness and disease in Georgia.

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Attitudes Toward Death Anxiety and Dying Among Respiratory Care Students: A Pilot Study

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Abstract

Background: The impact of death and dying experiences on students enrolled in respiratory therapy programs is of fundamental importance to respiratory care educators. Death anxiety instruments may be helpful in assessing student response to clinical experiences in death and dying circumstances. A search of the literature provided no resources pertaining to this subject relative to respiratory care education. **Purpose:** This study was designed to compare differences in respiratory therapy students' death anxiety scores before and following didactic instruction on death and dying and post clinical experience with patients in death and dying conditions. **Method:** Using the Collett-Lester Fear of Death Scale (CL-FODS), twenty-four, first-year baccalaureate respiratory therapy students were initially assessed for death anxiety. Students were provided didactic instruction that was followed by post-assessment using the CL-FODS. Following the first clinical rotation and when possible contact with patients and families in death and dying situations, students completed a post-clinical CL-FODS assessment. In addition, qualitative data was gathered by interviewing those students that did experience patients undergoing death and dying **Analyses:** A repeated measures ANOVA was used to examine mean differences between subject scores on the CL-FODS **Results:** Quantitative results indicated no significant difference between the means for pre and post didactic instruction and post-clinical scores. However, qualitative interviews revealed an impact on students following clinical experiences. **Conclusion:** Contrary to a literature review of other health professions, this study showed no significant difference in post-clinical death anxiety scores compared to pre- or post-assessment scores. Findings indicate the need for additional study of respiratory therapy students and their level of death anxiety assessment through longitudinal studies throughout the curriculum.

Key Words: Death anxiety; Death and dying; Collett-Lester Fear of Death Scale; respiratory therapy students

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Introduction

Dealing with the dying patient remains one of the most challenging experiences for health professionals. Belsky[1] defines death anxiety as "the thoughts, fears, and emotions about that final event of living that we experience under more normal conditions of life."[(p368)] Due to frequent contact with the death and the dying process, healthcare professionals have become the focus of related research during the last 2 decades. Studies of the attitudes of physicians, medical students, and nursing students are well represented in the literature.[2-10] While professional and popular literature often concentrate on the personal awareness of death anxiety and the fear of death, the question arises how one copes with death when exposed to it on a daily or weekly basis? Healthcare providers in the American culture must not only cope with death on a personal level, but they must simultaneously provide professional support to patients and families coping with the process.

Kübler-Ross[11] provoked a paradigm shift through her investigation of the death and dying process in her descriptive research documenting terminally-ill patients' and their families' reaction to the dying process. Her work provided healthcare professionals and the general public with a suggested sequential process connected to the dying experience. Through her collection of patient responses gathered through interview and film documentation, there emerged a repetitive sequence she coined as the "stages of death and dying."[11] As a result of her studies, Kübler-Ross purposed to teach professionals caring for dying patients how to be more effective in the midst of the physical and emotional processes preceding death. This systematic approach to the dying process prompted medical educational programs to better prepare healthcare providers in the care of terminally-ill patients and their families.[12-15] However, of growing interest for researchers are the effects of daily or weekly exposure to patient death and dying situations upon the healthcare professional.

In a study of hospice volunteers, Hayslip[16] found subjects scoring higher on communication apprehension with the dying differed from those scoring lower in three primary areas. Those scoring higher on the communication apprehension scale were "less likely to repress fears about their own deaths; more likely to express concerns over their own or another's dying; and more likely to have negative attitudes toward aging/death."[16(p257)]

The development of death-related anxiety of health professionals has been another area of interest in research. Campbell, Abernethy, and Waterhouse[5] suggested that individuals' attitudes about death may be developed prior to medical education and those individuals may have chosen a health professions career based upon already established death-related perspectives. Other research suggests that death-related attitudes of health professionals are developed as a result of medical training, occupational experiences, and individual reaction to specific situations in the healthcare setting.[17,18]

Respiratory therapists (RTs) represent a significant component of the healthcare team involved in critical and emergent care. Working on an individual basis with patients and their families, RTs provide modalities ranging from patient education and diagnostic testing to life-supporting interventions and termination of those systems. As a result, RTs often spend a large percentage of their time with patients who are experiencing the death and dying process.

Recent research studies suggest less than half of practicing RTs receive death and dying education either as a part of formal education or continuing education. [19,20] To date, the authors could not find studies that included death and dying education of respiratory therapy students prior to their first clinical rotation and the impact of death anxiety on their initial experience caring for patients in a death and dying state.

Death anxiety has been studied from several theoretical approaches. A review of the literature identifies multiple psychological theories associated with death anxiety, including self-realization theories, search-for-meaning theories, personal construct theory, denial and positive illusions theories, terror management theory, and illusions of self-control theory[21-24]. Upon closer study, there may be a substantial degree of theory overlap resulting in hypotheses derived from more than one theory. As a result, most research instruments developed for assessing death anxiety are constructed from an integration of several theoretical approaches in order to recognize the multidimensionality of death anxiety.[25]

The Collett-Lester Fear of Death and Dying Scale (CL-FODS) was initially developed in 1969 by Collett and Lester[26] to eliminate item contents commonly used in death and anxiety scales related to funerals and cemeteries. Additionally, the construction of the Collett and Lester survey distinguishes between self/others and between death and dying resulting in four separate subscales: Fear of Death of Self, Fear of Death of Others, Fear of Dying of Self, and Fear of Dying of Others. The original Collett-Lester instrument consisted of 36 statements with the request to rate each statement using a scale of +1, slight agreement; +2, moderate agreement; +3, strong agreement; -1, slight disagreement; -2, moderate disagreement; -3, strong disagreement. Although the original scale demonstrated test-retest reliability, validity, and correlation, a revision of the Collett-Lester scale was developed and introduced by Lester in 1993 in effort to simplify the unequal number of category items and resolve difficulties in scoring subscales (See Appendix A). The revised scale consists of 36-item in four categories utilizes a 5-point Likert scale, rather than the 6 point scale.[27,28]

The validity of the CL-FODS has been documented by a number of researchers in comparison studies with other fear of death scales. Studies by Bailis & Kennedy[29], Hayslip & Stewart-Bussey[30], Neimeyer[31], and Vargo[32] represent a small sampling of published works supporting the validity of the Collett-Lester scale. Additional studies reporting test-retest reliability[33], factor analyses[34,35], correlates for occupation[36-38], and correlates for illness and disease[39,40] support the research value of the CL-FODS in identifying death anxiety indicators.

By the nature of their job description, RTs are frequently confronted with the death and dying issues of patients and families. As first-responder of the healthcare team, RTs are involved in life-saving intervention procedures and often must confront their own beliefs about death and dying circumstances.

For health professions educators, preparing respiratory therapy students for patient death and dying encounters can be challenging. The expected impact of clinical experiences on students caring for patients in the midst of death and dying is intuitively significant. Seasoned therapists and educators realize the clinical circumstances of patients in death and dying situations can range from aggressive, abrupt intervention to palliative support with comfort measures. Students often find themselves suddenly thrust in the midst of a frenzy of activity, explosive patient or family emotions, or quieted and hushed circumstances. To date, a

study of respiratory therapy students and their attitudes toward death and dying could not be identified in the literature.

This study was designed to assess respiratory therapy students' level of death anxiety at several points in their respiratory therapy education: prior to instruction in the death and dying process, immediately following this instruction and following an extended clinical rotation. The revised Collett-Lester Fear of Death Scale (CL-FODS) was used as the pre- and post-assessment instrument. The research question addressed by this study was: Will the use of a teaching module on death and dying influence students' level of death anxiety as measured by pre-, post-assessment, and post-clinical experience using the CL-FODS. The null hypothesis states there will be no significant difference between the CL-FODS pre-assessment, post-assessment and post-clinical scores.

Methods

Investigators received Institutional Review Board (IRB) approval as a Category 1 (ii) exempt research study. Because death and dying content was already present in the respiratory care program curriculum, the research purpose of using the CL-FODS pre- and post-assessment was to measure the level of death anxiety prior to instruction, following instruction, and following a clinical rotation that exposed some of the students to a death and dying patient experience.

Instructional materials addressing death and dying in the respiratory care curriculum were developed from the Stanford Faculty Development Center's "End-Of-Life Care Curriculum for Medical Teachers"[41] module and Dr. Elizabeth Kubler-Ross's book of patient interviews describing the process of death and dying.[11] The death and dying instructional module presents the rationale for end-of-life training and includes US mortality statistics and a detailed descriptions of the common signs and symptoms during the last 48 hours before death. Class exercises include discussions relating to the symptoms of dyspnea, the 5 stages of death and dying, patient spiritual concerns, and the role of the respiratory therapist with a patient and family in the midst of death and dying. A consent form was developed and distributed according to standard IRB practices to 35 students enrolled in the first year of the baccalaureate respiratory care program. Due to the voluntary nature of the study, 24 students chose to participate and returned the signed consent form. Subjects had no previous work experience in respiratory care and had no prior hospital clinical experience. All students completed an introductory pre-respiratory care didactic theory course in the previous semester and were presently enrolled in a respiratory care didactic theory course, a respiratory care introductory instrumentation course, and a respiratory care pre-clinical course conducted in a lab on campus. During the pre-assessment and post-assessment semester, none of the students were enrolled in hospital-based clinical courses and none of the students had previous experience in respiratory therapy.

The pre- and post-assessment consisted of the identical CL-FODS 32 test items with 8 questions addressing "Your Own Death," 8 questions addressing "Your Own Dying," 8 questions addressing "The Death of Others," and eight questions addressing "The Dying of Others." The directions for the instrument ask the subject "how disturbed or made anxious are you by the following aspects of death and dying" followed by a 5-point Likert scale for responses to each of the 32 statements. The Likert scale was used to reflect the level of death

anxiety associated with each statement with 5 representing the highest level of death anxiety and 1 representing the lowest level of death anxiety. The maximum score for the CL-FODS representing the highest level of death anxiety is 160 points.

The post-clinical assessment consisted of the identical 32 statement CL-FODS instrument with an additional question asking "Did you have a patient death/dying experience in your clinical rotation this summer?" The post-clinical assessment was administered to the 24 subjects following a 5-week clinical summer semester rotation approximately 14 weeks after the CL-FODS post-test. The clinical rotation provided students with their first scheduled respiratory therapy clinical experience with 160 clinical contact hours in area healthcare settings. The clinical course includes standard respiratory therapy clinical training on general medical and surgical floors. According to routine clinical education rotation practices, clinical instructors sought emergent educational experiences related to cardiopulmonary resuscitation that occurred throughout the hospital. In addition, students were routinely exposed to end-stage, terminally-ill patients for whom it has been elected to not provide resuscitation efforts per physician directives. All students were certified in basic life support prior to the clinical experience.

During the initial assessment in the spring semester, students were instructed to read the directions and provide their response to the 32 item statements. All student responses were recorded on scanning answer forms. Following the administration of the pre-assessment, the death and dying teaching module was presented to all students in a lecture format. At the conclusion of the teaching module, the modified CL-FODS post-assessment instrument was administered and students recorded their responses on the provided answer forms.

Fourteen weeks later and following the regularly scheduled hospital clinical course, the 24 subjects were administered the 32 item modified CL-FODS post-clinical instrument with the additional question inquiring whether the student had a patient death/dying experience in the summer clinical rotation. Students recorded their responses on the provided scanning answer forms. Students who confirmed they had participated in a death and dying experience were contacted to participate in qualitative interviews.

Seven students were identified to participate in semi-structured interview sessions based on their experience with a death and dying event (Appendix B). In an attempt to limit interviewer counseling, one faculty member conducted all interviews and interview questions were not shared with any of the clinical instructors. Student responses were tape recorded and compared to interviewer notes to ensure accuracy of comments then transcribed by the interviewer. Transcribed data were entered into a matrix that was organized based on the interview questions. This form of data display allows for the identification of dominant themes. Due to the small number of students selected to participate in the qualitative interviews the data was much more manageable and themes were easily identified. Student names were removed from all notes to ensure anonymity.

Results

Repeated measures ANOVA was performed to examine the mean differences between the subject scores on the modified CL-FODS scores. Results of the ANOVA indicated no significant difference between the means among pre-, post-, and post-clinical assessment scores. The f value reported ($f = 0.844$, $p = 0.437$) confirms no significant difference between the

Table 1

Results of Analysis of Variance Comparing Differences Between Pre-, Post, and Post-Clinical Test Scores of CL-FODS

	Mean	**Standard Deviation**	**N**
Pre-Test	96.17	21.069	24
Post-Test	93.25	22.123	24
Post-Clinical Test	100.92	20.595	24

p.05 alpha
f = 0.844
p = 0.437
power = .186

pre-, post-, and post-clinical scores. As a result, the null hypothesis is failed to be rejected. Reported standard deviations assessment scores were large indicating the spread of scores was high. Results from ANOVA are presented in Table 1. Eight subjects confirmed they had a patient death and dying experience during their clinical rotation; however, due to this small number the scores from students who did experience patients with death and dying experiences and those that did not were not statistically compared.

Of the 8 students selected for interviews, only 7 provided an interview of which there were 3 Caucasians, 2 Hispanic, and 2 African-American females and no males. The age range for the students was 19- to 24- years old. Several dominant themes appeared during the interview sessions. The first theme identified was sadness for the patient and sorrow for family members. When asked about her thoughts on the death and dying event, one student, a 20-year-old Caucasian female, commented, "In my belief I think death is more of a celebration, but it was very sad. It was hard for the family." Another student, a 20-year-old African-American female, stated, "I was a little bit emotional. You try to figure out how you would deal with it. How would you feel if you were closer to that patient?" Another student, a 21-year-old African-American female, commented on her experience, "…when his [patient's] family came in, I think that was very eye opening…they were doing a lot of screaming and crying…it was very emotional. I think that was probably one of the most touching things."

Another theme identified in this study involved student attitudes toward the healthcare profession following a death and dying event. One student, a 21-year old African-American female, stated, "I can say due to this clinical experience that I know that this [clinical rotation] is something really serious and I have to remain focused and take my studying very serious." Another student, a 20-year-old Hispanic female, expressed her thoughts on the healthcare team members participating in the experience. She stated, "It made me respect those people, nurses, doctors, respiratory therapists that experience this every day. I respect them for staying strong and doing their job."

The final theme identified related to the discussion of the death and dying event with another person. The students were asked if they discussed the event with a non-healthcare provider and if they believed discussing the event with a healthcare provider would offer comfort. A 23-year-old Caucasian female student discussed the experience with her mother

and boyfriend who are not healthcare providers. She stated, "They didn't know what I was feeling." However, when asked if talking to a healthcare provider would help, she stated, "No I don't think so. Unless they were in that situation with me, I don't think they would." Another student, a 24-year-old Hispanic female discussed the event with her sister. The student commented that her sister was, "…freaking out for me saying 'Are you ok?'" When asked if she believed discussing the event with a healthcare provider would provide greater comfort, the student replied, "I think it's better because you all know what it's like to be in a hospital and work at a hospital. You would understand the process of it. We [students] would be able to relate more to you… and still be empathetic but still be able to keep going and keep working." A 19-year-old female student discussed the event with a non-healthcare provider and afterwards she commented, "It felt better. It kind of let me organize how I felt about it."

Discussion

As respiratory care clinicians and educators, a quick assumption may be made that instructional delivery of death and dying information and clinical experience with patients in death and dying states would likely have an impact on the death anxiety levels of first-year respiratory therapy students. Results of the quantitative portion of this pilot study showed no significant differences between the means of pre-, post-, post-clinical CL-FODS assessment scores. Factors that may have attributed to the lack of difference in pre-, post-, and post-clinical assessment scores may include the limited subject sample size and relatively small power of the study. Additionally, it is possible that the subjects did not experience an increased level of death anxiety due to previous life experiences, belief systems, or due to the preparedness provided by the teaching module.

The purpose of the interview portion of the study was to gain a better qualitative understanding of how death and dying experiences affect respiratory care students and if adjustments or sequencing of the curriculum might offer any benefits. Clearly, the students interviewed expressed an emotional response to their experiences. This response was triggered not only by the death of the patient, but also by the reaction of the patient's family. Although documented racial differences toward death and dying exist[40], the racial differences of the students did not appear to influence the response to the death and dying event. The phenomenon that seemed to elicit a recurrent response from the students was the bereavement experienced by the surviving family members. When family members experienced a difficult time dealing with the life/death event, the students indicated a strong feeling of sorrow for the family. Interesting, the experiences did not seem to evoke an increased anxiety regarding death in the interviewed subjects.

The subjective impact of gender on the death and dying experience could not be assessed in this study. Most of the students indicated a positive feeling toward the healthcare profession after experiencing the event. Negative attitudes toward healthcare could impact student motivation to excel in a health-related program and in some cases impact decisions to remain in the program. Most of the students shared their feelings with another person and indicated a certain level of comfort in discussing the event with either a healthcare provider or a non-healthcare provider. This finding indicates a need for addressing end-of-life issues with first year clinical students prior to entering the hospital setting and following any death and dying event.

Conclusion

The lack of current literature on the topic of death anxiety among health professions suggests the need for future research. Contrary to literature review, findings of this pilot study suggest the exposure of students to death and dying didactic information and death and dying patient clinical situations does not lead to an increased death anxiety score among respiratory care students. Further research is warranted with particular attention given to longitudinal assessment of CL-FODS scores as students matriculate through the respiratory care curriculum. The researchers chose a semi-structured interview format because of the uniqueness of this type of research. "Semi-structured interviews are conducted on the basis of a loose structure consisting of open ended questions that define the area to be explored…from which the interviewer or interviewee may diverge in order to pursue an idea in more detail."[43(p251)] The student responses during the interview process will allow better development of questions for future research.

The convenient sample representation of the student population enrolled in a baccalaureate respiratory care program may provide limitations to study results when generalized for other student groups, higher education settings, or academic disciplines. Additionally, a number of confounding variables may have inadvertently affected the outcomes of this pilot study. Clinical experiences vary from hospital to hospital. The chance-encounter for the student with patients in a death and dying situation may have influenced the post-clinical scores. The role of respiratory therapists in each of the 3 clinical affiliations with regards to first-responder responsibilities for resuscitation can vary in each institution. Permission for students to observe and participate in resuscitation events may vary between hospital sites and the impact of direct student participation as compared to observing resuscitation affect post-clinical scores. The authors acknowledge these variables are valid concerns and should be controlled providing the practicality and availability of clinical experiences for student learning.

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Appendix A. Revised Collett-Lester Fear of Death and Dying Scale

Collett-Lester Fear of Death and Dying Scale

<u>How disturbed or made anxious are you by the following aspects of death and dying?</u>
Read each item and answer it quickly. Don't send too much time thinking about your response. We want your first impression of how you think right now. Please use the scan form to record the letter that best represents your feeling.

<u>Your Own Death</u>	Very		Somewhat		Not
1. The total isolation of death	a	b	c	d	e
2. The shortness of life	a	b	c	d	e
3. Missing out on so much after you die	a	b	c	d	e
4. Dying young	a	b	c	d	e
5. How it will feel to be dead	a	b	c	d	e
6. Never thinking or experiencing	a	b	c	d	e
7. The possibility of pain/punishment during life-after-death	a	b	c	d	e
8. The disintegration of your body after you die	a	b	c	d	e

<u>Your Own Dying</u>	Very		Somewhat		Not
9. The physical degeneration involved	a	b	c	d	e
10. The pain involved in dying	a	b	c	d	e
11. The intellectual degeneration of old age	a	b	c	d	e
12. That your abilities will be limited as you lie dying	a	b	c	d	e
13. The uncertainty as to how bravely you will face the process of dying	a	b	c	d	e
14. Your lack of control over the process of dying	a	b	c	d	e
15. The possibility of dying in a hospital away from friends and family	a	b	c	d	e
16. The grief of others as you lie dying	a	b	c	d	e

<u>The Death of Others</u>	Very		Somewhat		Not
17. Losing someone close to you	a	b	c	d	e
18. Having to see the person's dead body	a	b	c	d	e
19. Never being able to communicate with the person again	a	b	c	d	e
20. Regret over not being nicer to the person when he or she was alive	a	b	c	d	e
21. Growing old alone without the person	a	b	c	d	e
22. Feeling guilty that you are relieved that the person is dead	a	b	c	d	e

| 23. Feeling lonely without the person | a | b | c | d | e |
| 24. Envious that the person is dead | a | b | c | d | e |

The Dying of Others	Very		Somewhat		Not
25. Having to be with someone who is dying	a	b	c	d	e
26. Having the person want to talk about death with you	a	b	c	d	e
27. Watching the person suffer from pain	a	b	c	d	e
28. Having to be the one to tell the person that he or she is dying	a	b	c	d	e
29. Seeing the physical degeneration of the person's body	a	b	c	d	e
30. Not knowing what to do about your grief at losing the person when you are with him or her	a	b	c	d	e
31. Watching the deterioration of the person's mental abilities	a	b	c	d	e
32. Being reminded that you are going to go through the experience also one day	a	b	c	d	e

Appendix B. Interview guide for assessing post-clinical student experience with patient in death and dying situations

Death/Dying Research Interview Guide

Age: _____   Gender: _____   Ethnicity: _____

#1. What were your thoughts prior to the death/dying experience?

#2. What were your thoughts during the death/dying experience?

#3. What were your thoughts the following day regarding the death and dying experience?

#4. Did you discuss the experience with anyone other than a healthcare provider (family, friends, etc.)? If so, how did it make you feel to discuss the experience?

#5. How has the experience affected your feelings of healthcare?

#6. What were your thoughts on the quality of care the patient received during the experience?

Critical Thinking Skills and Preferred Learning Styles of Respiratory Care Students

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Abstract

Background: As educators it is important to have an understanding of preferred learning styles of today's students. The learning style of a student will determine how well that person will comprehend and retain information. The development of critical thinking skills is also imperative for professional growth for students in a Respiratory Care program. Critical thinking skills are needed throughout the program as a student participates in clinical rotations, didactic course work, and pursues success on national credentialing exams. **Methods:** The purpose of this research project was to assess pretest and posttest differences in (1) critical thinking skills using the Watson-Glaser Critical Thinking Appraisal (WGCTA) and (2) learning-style preferences utilizing Kolb's Learning Style Inventory (LSI) for respiratory care students enrolled in a respiratory care applied pathology course. Critical thinking is taught in this course using clinical simulation exercises to practice information gathering and decision-making. **Results:** A t test analysis of pretest and posttest WGCTA scores revealed the changes were nonsignificant. The students did, however, show a slight increase in WGCTA mean scores. There were no significant changes in the preferred learning styles of the students. A majority of the students completing the study preferred the Diverging and Assimilating learning styles. **Conclusion:** Data revealed that a majority of the students tested preferred the Diverging and Assimilating learning styles. No significant changes in student's preferred learning style were noted following posttest measurements. As an educator it is imperative to incorporate a variety of teaching methods to suit the needs of all students. Also, our results indicate that critical thinking ability could potentially improve with repeated practice on clinical simulation problems.
Key Words: Critical thinking, learning styles, clinical simulations, Respiratory Care students, national board exams, professional growth

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Critical Thinking Skills and Preferred Learning Styles of Respiratory Care Students

Introduction

Critical thinking and decision-making skills represent an integral component of the duties of most healthcare providers. Similar to other medical specialties, respiratory care practitioners gather patient data, critically analyze the data, and make decisions based on this analysis. Critical thinking skills are a necessity in the daily job function of a respiratory care practitioner. The critical thinking skills needed by a respiratory care practitioner may be defined as the ability to prioritize, anticipate, troubleshoot, communicate, negotiate, make decisions, and reflect on experiences.[1] It is important to function in today's complex health care with effective reasoning skills to process and use information.[2] Mishoe[2] identified essential skills associated with critical thinking, such as being able to anticipate individual problems and identify a solution, sharing the solution with individuals and reflecting on the decisions. In addition, critical thinking skills are equally imperative for professional growth among respiratory therapy students. As students participate in clinical rotations, didactic course work, and pursue success on national credentialing exams they must possess a disposition for dynamic thinking. Hill[3] demonstrated a positive relationship between decision-making ability and critical thinking skills among respiratory care students. Maudsley and Strivers[4] addressed the critical thinking topic and cite several authors supporting critical thinking skill development is possible. With this in mind, it seems paramount for educational programs to explore avenues that facilitate the development of critical thinking skills and sound decision-making.

There are a number of assessments tools available to assess critical thinking skills. The 40-item Watson Glaser Critical Thinking Appraisal (WGCTA) is a test used to assess critical thinking skills in an educational context.[5] The WGCTA is made up of 5 sections or individual tests: (1) Inference- identifying what is true or false based on information given; (2) Recognition of Assumptions- recognizing unstated assumptions or assertions; (3) Deduction- determining the appropriate conclusion following given statements of information; (4) Interpretation- examining evidence and determining conclusions or generalizations based on data given; (5) Evaluation of Arguments- distinguishing between arguments that are strong and relevant and those that are weak and irrelevant to a particular issue.[5,6] "These tests are designed to measure a person's ability to recognize assumptions, to evaluate arguments, and to appraise inferences."[7]

The preferred learning styles among respiratory care students may impact critical thinking skills. It has been reported that upper level respiratory care students conform to learning styles that involve thinking or analyzing problems.[8] David Kolb defined learning as the process whereby knowledge is created through the transformation of experience.[9] Kolb recognized that an important area of academic competence for a college student is their learning style.[10] Assessing student learning styles during college years may identify students who are at risk for academic difficulty. The Learning Styles Inventory (LSI) developed by Kolb is a useful tool for examining a student's learning style preference. The Kolb LSI is one of the most common tests used today to assess learning styles.[8,11] Kolb's LSI classifies learning styles into one of four categories: (1) Converging, someone who relies heavily upon hypothetical-deductive reasoning to solve a problem, (2) Diverging, someone who relies heavily on brainstorming and generation of ideas, (3) Assimilating, a person who solves problems by inductive reasoning and ability to create theoretical models, and (4) Accommodator, someone who solves problems by carrying out plans and experiments.[12] Along with the learning styles, Kolb identified four learning cycles: Concrete Experience (CE), learning from feeling, (2) Reflective Observation (RO), learning from listening, (3) Abstract Conceptualization (AC), learning from analyzing, and (4) Active Experimentation (AE), learning by doing.[10]

The objective of this research was to assess changes in pretest and posttest scores in critical thinking skills using the WGCTA as well as any pretest and posttest change in preferred learning style using Kolb's LSI following clinical simulation practice.

Methods

This pilot study was a pretest and posttest quasi-experimental design. Students were recruited from RC 3311, Applied Pathology, in the Respiratory Care program at Texas State University– San Marcos, Texas. Applied Pathology is a required junior level course of studies for 3rd year students completing their Bachelor of Science in Respiratory Care. Institutional Review Board (IRB) review for the study was completed and approved by the Texas State University IRB. All students were required to provide informed consent and participation was completely voluntary. Students who did not wish to participate in the study were removed without any repercussions. Students who participated in the study received an explanation of the purpose of the study along with an assurance of anonymity of their results.

Pretest exams included a Registered Respiratory Therapist (RRT) clinical simulation exam along with the Kolb Learning Style Inventory questionnaire and Watson-Glaser Critical Thinking Appraisal. The pretest clinical simulation exam served as a baseline of the student's initial ability to pass a national registry exam. The Kolb LSI questionnaire determined the student's preferred learning style prior to receiving computerized clinical exam practice. The pretest WGCTA was used to determine the student's critical thinking skill level at the beginning of the research project. The RRT Examination is designed to objectively measure essential knowledge, skills and abilities required of advanced respiratory therapists. The examination consists of a multiple-choice section and clinical simulations. The written examination portion consists of 115 multiple-choice questions. The questions cover areas of recall, application, and analysis of patient information as well as equipment and therapeutic procedures. The clinical simulation portion consists of 11 patient simulation problems each simulating reality and clinical practice relevant to respiratory care. Students must pass the written section with a score of 70% and must achieve total percent passing scores with both information gathering (IG) and decision making (DM) sections to successfully complete the exam and to be recognized as a RRT.[13] This investigation utilized clinical simulation exams to not only prepare students for the RRT exam but also help develop critical thinking skills.

The Respiratory Care Department at Texas State University, San Marcos, Texas, utilizes clinical simulations within the curriculum. Students participating in this study were required to complete 18 clinical simulations. In order for the student to receive a passing score, the student must have earned a passing score of 85% in both the information- gathering and decision making sections of the exam.

After completion of pretest exams, clinical simulation exam exercises were utilized to develop information gathering (IG) and decision making (DM) skills. Students practiced specified clinical simulations until they reach a mastery score of 85% for both sections.

Upon completing clinical exam practice students took a RRT clinical simulation exam posttest along with a second Kolb LSI and WGCTA exam. Scores were analyzed to look for changes in preferred learning styles along with improved critical thinking skills and clinical simulation exam scores. Students who completed the study received detailed information identifying their individual learning style and critical thinking scores along with advice on ways to improve clinical simulation exam scores.

Results

Twenty-seven students participated in this pilot study. Of the 27 students, 59% of the students showed an improvement in the WGCTA. The Watson-Glaser Answer Document was scored with the hand-scoring key by the primary investigator to determine a raw score. Maximum raw score for the WGCTA is 40. Differences in pretest and posttest WGCTA scores were examined by calculating mean scores and repeated measures t test. Pretest analysis revealed a mean score of 23.9 (s = 3.66) and posttest mean score of 25.0 (s = 4.12). Repeated measures t test revealed that changes WGCTA scores following clinical simulation exam practice were non-significant (t = -1.568, p-value = .128). Of the 27 students participating in the research, 7 students were male. Of the male students, 5 showed improvements with an average score increase of 2 points. Eleven of the 21 females participating had an increase in score with average increase of 4.5 points. The remaining 9 females had a decrease in their average by points. The ethnic breakdown of the research group consisted of 16 Caucasian students, 9 Hispanic, 1 African American and 1 Asian. Of the Caucasian students 4 showed decreased scores by an average of 3 points and the remaining 12 had increased averages of 3.9 points. A majority of Hispanic students showed a drop in scores with 6 students decreasing scores by an average of 1.8 and 3 students showing improvement with averages 4 four points. The African American student and Asian student' individual results were excluded in this section so that all individual results remained anonymous.

The differences between pretest and posttest Kolb LSI scores were also examined by calculating mean scores and performing repeated measures t-test. There were no significant differences in pretest-posttest scores for Concrete Experience, Reflective Observation, Abstract Conceptualization, or Active Experimentation.

Discussion

This pilot study demonstrated the use of clinical simulations did not significantly change the student's preferred learning style for classroom information. However, a majority of the students completing the study preferred the Diverging and Assimilating learning styles. The Diverging learning style is associated with professions such as social work, nursing, and psychology.[10] The Assimilating learning style is associated with professions such as biology, physical sciences, and mathematics.[10]

As educators it is important to have an understanding of preferred learning styles of today's students. The learning style of a student will determine how well that person will comprehend and retain information.[11] A student's learning style will also influence his or her ability to gather information as well as interact with the teacher and their peers.[9,14] It is imperative for educators to have an understanding of learning styles in order to properly implement a variety of teaching methods within the classroom. Both the diverging and assimilating styles are consistent with critical thinking skill levels needed at the junior coursework level.

Although completion of the clinical simulations had no effect on the student's learning preference an improvement in critical thinking skills did occur from pretest to posttest. Critical thinking skills improved in 59% of the students tested. In a study by Shelledy et al.,[15] they discovered a significant relationship between critical thinking ability, respiratory care program GPA, and clinical course GPA. Shelledy utilized the WGCTA and a self-assessment clinical simulation problem obtained by the National Board of Respiratory Care (NBRC). In the study, it was discovered that there was a significant correlation between overall critical thinking ability and student information gathering scores on the clinical simulations.[15] This tends to show there is a relationship between information gathering, critical thinking and clinical problem solving.[15]

We used a repetitive practice style with this project. Students were required to repeatedly challenge each clinical simulation exercise until a cut-score was achieved. Utilization of clinical simulation practice with pre and post assessment of critical thinking skill has been addressed in the respiratory care literature. Shelledy et al.[16] utilized the WGCTA before and after completion of clinical simulation problems. Shelledy reported a weak but significant relationship between critical thinking and scores on clinical simulation problems in the DM section.[16] Shelledy also reported a moderate correlation between student's critical thinking ability and their scores on the pretest and post-test IG sections of the clinical simulation examination [16] Shelledy utilized clinical simulation problems in a "teach" mode where as our students were required to complete the clinical simulation practice in a "secure" mode. In addition, Shelledy investigated the relationship between general critical thinking and each section of a clinical simulation examination separately (i.e., information gathering section and the decision making section). [16] Our study was more concerned with repeated practice and the effects on critical thinking ability. There are some possible implications of the results from both studies. Shelledy demonstrated that students with high critical thinking scores performed better on the IG and DM sections of a clinical simulation examination. [16] Although repeated practice of clinical simulations has not been validated as a method to teach or attain critical thinking skills, our results did indicate that critical thinking ability could improve with repeated practice on clinical simulation problems. This information appears valuable to respiratory care educators when preparing students for national credentialing exams. Further research is needed to determine clinical simulation exams true impact in the development of critical thinking skills.

Respiratory Care students will not only use critical thinking skills in actual patient care, but will also use critical thinking skills to pass the Registered Respiratory Therapist (RRT) exam provided by the National Board of Respiratory Care (NBRC). By utilizing the WGCTA the researchers were able to determine the student's critical thinking skill levels before and after completion of a research project. Educators must make changes in the curriculum to improve students' decision-making skills, as well as develop strategies to improve critical thinking. Because of the increasing complexities of the health care environment and continuous changes in health care delivery, respiratory care students must be able to skillfully evaluate a variety of different patient scenarios. In order to become a successful practitioner, students must be able to produce reliable observations, make sound inferences, and offer reasonable hypothesis. With the introduction of therapist- driven protocols, respiratory therapists must independently evaluate the patient's condition and make decisions regarding the need for treatment. Effective critical thinking skills are needed by practitioners to process information about the patient's condition, make decisions about what therapy to initiate, assess the effectiveness of the treatment, and implement necessary changes to the treatment plan.[3] Respiratory therapists must have the ability to think about critical issues, or else no amount of skill will be helpful. Beckie et al[17] discovered the ability to think analytically underlies competent nursing practice, surely this applies also in the field of respiratory care.

Conclusion

At the conclusion of this pilot study it was determined that utilizing clinical simulation exams had no effect in changing preferred learning styles. It should be noted that our student population is composed of a variety of different learning styles and this pilot research did not have the intention of trying to change an individual student's learning style. Instead, it showed the need to incorporate a variety of teaching methods in order to accommodate all students. Using different methods and styles of teaching exposes learners to familiar and unfamiliar ways of learning that provides both comfort and tension during the learning process, giving learners multiple ways to learn the information.[18] The overall average of WGCTA scores did increase in posttest analysis leading researchers to believe that there was an increase in critical thinking skills. Although repeated clinical simulation practice has not been vali-

dated as a method to improve critical thinking ability, our students' posttest results did show improvements in this area. More research will be needed to determine true impact of repeated practice of clinical simulation exams in the development of critical thinking skills.

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Pilot Study of Respiratory Therapy Student Education Using an Advanced Human Patient Simulator for Critical Patient Management Scenarios

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Abstract

Introduction: We questioned the usefulness of training respiratory Ttherapy students using a model driven medical simulator. Our objective was to see if use of simulation improved student competency and self-confidence with management of airway emergencies in patients on mechanical ventilation. **Methods:** This pilot study took place at a Level I trauma center and utilized an adult human patient simulator system. Respiratory therapy students who had completed their critical care course participated. We utilized a prospective, within-group assessment at three points during training with the simulator. Measures included pre- and post-written simulation tests and self-confidence surveys. **Results:** Participants included 5 males and 8 females. Mean age was 22. The pre-test mean score was 61 ± 6 SD out of 76 possible points. One week mean post test score was 68 ± 2 SD, p = .01. One month mean test score was 64, ± 7 SD. There was no difference in the pre and post self-confidence survey scores. **Discussion:** There was a significant improvement in scores with the one week post-test, however this improvement was not evident with the one month post-test. The SD varied from 2 to 7 between week one and one month post-test, suggesting some students retained knowledge while others did not. Inadequate simulation repetition could have contributed to the drop in one month posttest scores and lack of improvement in survey scores.

Key Words: respiratory therapy education, medical simulation, model driven medical simulator, human patient simulator

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Pilot Study of Respiratory Therapy Student EducationUsing an Advanced Human Patient Simulator for Critical Patient Management Scenarios

Introduction

The use of simulation in medical and allied health programs has increased in recent years. Simulation training has evolved from simple models such as arterial blood gas training arms to sophisticated computerized manikin programs. Simulators provide a safe, controlled, and reproducible method of training. Students experiencing simulator training can demonstrate better learning transfer that can be carried over to the clinical environment, resulting in more efficient and safer patient care. Currently, there is no standard approach of optimal incorporation of simulation technology into medical and allied health programs, including respiratory therapy programs. This study evaluates the impact of adding a single, focused simulator training session to our standard teaching method for respiratory therapy students.

The utility of simulation technology in the aviation industry and the military is well documented. [1-11] However, only recently has the fidelity of simulation technology achieved a level that would allow its application in the complex, interactive, and dynamic field of medical education. One aspect of the growing use of simulations in allied health education is to simulate management of patients in a medical crisis. These situations require the student to respond to a series of high acuity, low frequency events in order to prepare them for an actual clinical situation.

Numerous disciplines have begun to use simulations as a mainstay in their curricula. Robust examples of effective use of simulation can be found in anesthesia, [12,13] emergency medicine, [14-20] care of the trauma victim, [21-25] critical care, [26-31] medical education, [32-36] pediatrics and neonatal critical care[37-39] and obstetrics and gynecology.[40, 41]

The new generation of medical patient simulators employ fully interactive physiologic functions. This enables students and practitioners the opportunity to assess the patient and clinical findings and formulate a treatment plan. The treatment plan can then be instituted and results of the intervention assessed. Inappropriate therapy can result in an undesired outcome while appropriate therapy will result in acceptable outcomes. In addition, the participant must be able to competently manage the patient or the model will not respond favorably (i.e., the patient dies), thereby reproducing the outcome of an actual patient.

Respiratory therapy students rarely manage critical airway emergencies with patients on mechanical ventilators during their clinical rotations. A research question arose focusing on applicability of a model driven medical simulation to provide these experiences. We hypothesized that using model driven medical simulator training that focused on emergency management of artificial airways, students would become more competent and confident in managing emergencies as evidenced by test scores and self-confidence surveys. We also proposed using pre and post-test scores to demonstrate improved competency. A secondary objective was to assess the level of student's self confidence managing airway emergencies in mechanically ventilated patients.

A PubMed literature search revealed limited literature on application of model driven medical simulator training to the educational coursework of respiratory therapy students. We explored if the addition of simulation training to the education matrix of respiratory therapy students provided a safe, controlled, and reproducible environment in which to learn.

Methods

This study was granted a waiver of HIPAA authorization by the institutional corporate compliance officer. Additionally, the study was granted "exempt from review" status by the Memorial Medical Center and the University of Pittsburgh Institutional Review Boards. No funding was required for this study.

This single-center pilot study utilized a prospective, within-group assessment at 3 points in time. The participant students served as their own control to evaluate the effect of medical simulator training via a test-retest method. This design is similar to that used by numerous authors.[14, 15, 18, 19, 23-25, 31, 41] The study took place over a period of 5 weeks.

This study took place at Memorial Medical Center, a level one trauma center in Johnstown, PA. Memorial Medical Center collaborates with the University of Pittsburgh at Johnstown (UPJ) to provide training for respiratory therapy students. The respiratory therapy program awards an associate degree in respiratory therapy after 2 years of professional education. Upon graduation, graduates are eligible to take the NBRC's Registry Exam in Respiratory Therapy. The students participating in this study were enrolled in the second year of their curriculum. At the start of the study, the students had completed a 4 credit hours course in critical care and a corresponding six-week clinical rotation that included caring for patients on mechanical ventilation.

The METI (Sarasota, FL) Adult Human Patient Simulator was used for this study. The simulator laboratory is housed at Memorial Medical Center. A physician who is board certified in critical care and has previous medical simulator expertise coordinates the simulator center.

For the purpose of this study, we used an acute tension pneumothorax, an obstructed endotracheal tube and a dislodged endotracheal tube as the three artificial airway emergencies. Content areas for the study included a general assessment of the patient and event, cardiopulmonary assessment of the patient, management of the event and reassessment of the patient. One week before the experience with the simulator, the students were administered a written clinical simulation pre-test that assessed their competency with management of the three artificial airway emergency scenarios. At this time, the students completed a five-item survey to assess their level of confidence with assessment and management of artificial airway and mechanical ventilator emergencies. (Figure 1)

The written clinical simulation tests were written by 2 program faculty and a medical physician board certified in trauma and experienced with medical simulation training. The simulator scenarios defined what was expected from the student in terms of patient assessment and management. Both the written clinical simulation tests and 3 simulator scenarios were internally validated as follows.

In order to validate the written simulation tests and assess for clarity of questions and ease in scoring, the tests were administered to 4 experienced respiratory therapists who were not investigators. Minor revisions were made based on their input.

Next, the simulator scenarios were validated by having 2 different registered respiratory therapists with critical care expertise perform the assessment and management steps in response to each of the 3 simulated airway/ventilator emergencies. These 2 therapists demonstrated competency with the assessment and management of each airway emergencies in the correct sequence as expected and defined by the authors.

Written clinical simulation test content paralleled the content provided in simulation scenarios. Each time that the students were tested, the order of the 3 airway emergencies was

Figure 1
Simulator Education Confidence Survey Items

I am comfortable with (non-emergency) patient respiratory system assessment

I am comfortable assessing a patient who is experiencing a ventilator emergency

I am comfortable independently managing a patient who is experiencing a ventilator emergency

I am comfortable as a team member managing a patient who is experiencing a ventilator emergency

I am comfortable reassessing response to treatment for a patient who is experiencing a ventilator emergency

changed. The introduction to each scenario was changed so that the student would not recognize which of the three airway management emergencies they were being tested on. The students' assessment of the event and the expected response remained the same for the simulator training as well as for each of the written clinical simulation examinations.

Finally, a standard 5 point Likert scale survey was created and revised by the investigators with input from a biostatistician. The purpose of the survey was to measure student's level of self-confidence with assessment and management of airway and mechanical ventilator emergency scenarios.

The study was introduced to the participants during a regularly scheduled class session. The primary investigator (PI) introduced the study to the students and following the explanation, the students were provided an opportunity to participate or not to participate in the simulator training and testing. No students had previous simulator experience, and no students declined to participate. During the study period no other simulator experience or clinical education involving artificial airways or mechanical ventilator emergencies occurred.

A week after introducing the study, the PI administered the written simulation pretest and the confidence survey to the participants. After the pre-test the students participated in an 8 hour medical simulator session in which standardized laboratory procedures were applied. Three pre-designed case scenarios that paralleled the pre and post-test content (acute tension pneumothorax, obstructed endotracheal tube and dislodged endotracheal tube) were reviewed during the HPS session. Before beginning the session, the students were introduced to the adult HPS and given a complete demonstration of its capabilities. They also observed a demonstration in which the RRT instructor assumed the role of the student. All critical steps of patient assessment (auscultation of breath sounds and pulse as well as pulse-oximetry and ventilator function) and necessary interventions were demonstrated. Next, the simulator and the ventilator were set up for the first critical emergency. Students entered the simulator lab one at a time and the instructor presented the scenario. The student proceeded to assess the situation and manage the patient accordingly. The instructor provided prompts when needed and suspended the scenario to corrected mistakes if necessary. Discussion and feedback were provided, and then simulation resumed until successfully completed. Each student was debriefed at the conclusion of the simulation, before leaving the simulator lab. The simulator experience concluded when the students successfully completed all 3 scenarios. The sim-

ulator training required presence of two investigators, the PI and a sub-investigator who was a registered respiratory therapist with expertise in simulator operation. The PI read the scenario and scored student responses while the sub-investigator managed the simulator. To eliminate inter-instructor variability, the same instructor and the simulator operator managed all simulator scenarios.

After 1 week and again at the end of a month following the simulator laboratory session, students were administered a written clinical simulation posttest that addressed critical steps of emergency management of the 3 focus content areas in the scenarios. In addition, 1 week after the simulator laboratory experience, the students completed the self-confidence survey.

The content of the simulator experience and all written clinical simulation tests evaluated the students' ability to assess, manage and reassess the 3 core artificial airway management emergencies. The simulated patient cases, underlying pathophysiology and required interventions for each of the 3 critical content areas were the same for all participants.

Only content from the first 2 of the 3 scenarios tested in the written post-tests was scored for statistical analysis. Experience has shown that by process of elimination, the students can identify the 3 emergency scenario being tested, resulting in positively skewed test results.

Data collected included age and gender of the participants, and scores of the pretest, 2 posttests and the pre and post laboratory simulator experience confidence surveys. All surveys and written clinical simulation tests were completed and submitted without recorded identities.

Statistical Analysis

Data was analyzed using the SPSS software package (Version 11.5, SPSS, Inc., Chicago, IL.) Categorical data was summarized by counts and percentages. Ranges, means and standard deviations summarized continuous data.

A Wilcoxen signed rank test was applied to the pretest and one week, and pretest and one month written posttest scores. A McNemar test was applied to the 5 item pre and post simulator experience confidence scale responses. Due to the dichotomous nature of the responses, the comfort scale questions were recoded (0, 1, or 2 = 0 and 4 0r 5 = 1). We used a McNemar test to compare pre to post simulator experience for these recoded comfort scale responses. All statistical tests were performed at the 0.05 significance level using two-tailed tests.

Results

All 13 students (5 males and 8 females) completed the study. Ages ranged from 17 to 27 with the mean age of 22. The mean written clinical simulation test scores significantly improved from the pretest to the one-week test (61 ± 6 SD and 68 ± 2 SD, respectively, *p = .01*). However, this improvement was not retained on the third testing at 1 month (64 ± 7

Table 1

Comparison of Written Test Scores

	N	Mean	SD	p
Pretest	12	61	6	
1 Week	10	68	2	.01
1 Month	12	64	7	NS

Table 2

Student Confidence Pre and Post Simulator Experience
(1 - 5; 5 = maximum)

	Mean Pre-Simulator	SD Pre-Simulator	Mean Post-Simulator	SD Post-Simulator
Respiratory assessment	4.36	1.2	4.31	1.11
Ventilator emergency assessment	3.55	1.13	3.69	.86
Independent management of ventilator emergency	3.00	1.0	3.00	.71
Team member managing ventilator emergency	4.18	1.25	4.08	.86
Reassess response to ventilator emergency treatment	3.82	1.08	3.77	.93

SD, $p = .22$). Results are summarized in Table 1. There was no difference in pre and post confidence survey scores (Table 2).

Discussion

We saw significant improvement from baseline pretest scores when compared with the one-week posttest scores. However, there was no difference in pretest and one-month test scores. The SD varied from 2 to 7 between 1 week and 1 month, which suggests that some students retained the knowledge while others did not.

An inherent strength with using simulation is allowing for repetition of the task, which can increase proficiency. A review by McGaghie and colleagues demonstrated a positive relationship with hours of use of high-fidelity simulation and learning outcomes in medical education.[42] However, the ideal amount of repetition has not been determined and medical literature continues to demonstrate variability in the effects of simulation repetition on learning outcomes. In our review, numerous authors simulated two to three scenarios[16, 20, 21, 23, 24, 28, 30, 36] while others used only 1 simulation scenario.[12, 22, 32, 33] Some groups applied simulator training for as long as 6 months [35] and 1 hospital offered over 1,500 simulator learning encounters in 1 year to maintain pediatric critical care competency.[38] Our design allowed only 1 opportunity to practice each of the 3 artificial airway emergencies which may explain inconsistent knowledge retention as well as lack of change in confidence level.

Another explanation of lack of change in confidence level may be attributed to students over-rating their confidence level with assessment and critical thinking skills prior to the simulator experience. Results summarized in Table 2 demonstrate that in areas of respiratory assessment, performance as a team member managing an airway emergency, and reassessment of response to airway emergency treatment, confidence levels, although not significant, decreased following the simulator experience. In the classroom setting students may have overrated their confidence level with managing emergency situations. The simulations may have prompted student self-recognition of limitations, resulting in more accurately assessed and lower post simulation confidence

scores. Increased ability to self assess one's limitations may actually be a benefit of simulator training.

Limitations to this study include small sample size further aggravated by inaccurate student coding of written clinical simulation tests and surveys. Three students did not follow coding instructions on their tests and surveys. Only 12 pretests, 10 one-week tests and 12 one-month tests could be analyzed. Only 11 pre-simulation confidence surveys were coded accurately, yet all 13-post simulation surveys were suitable for analysis. Inaccurate coding could be averted by pre-coding of tests and surveys by the research team. In addition, test scores could have been influenced by the practice effect. We could also have re-administered the self-confidence surveys with the one month written clinical simulation tests.

In conclusion, this research takes a valuable first look at application of medical simulator experience to respiratory therapy education. The results suggest improved student short-term proficiency with ventilator emergency management using simulation exercises. Intuition suggests that medical simulator training would complement didactic preparation in development of precise and quick critical thinking necessary for effective management of critical ventilator and pulmonary management situations. This pilot study should be repeated with a larger sample and a design that incorporates repeated simulation.

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The Relationship Between Respiratory Care Program Director Leadership Styles, Faculty Satisfaction, and Their Willingness to Exert Extra Effort

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Abstract

Background: Effective leadership styles among program directors of respiratory care programs are essential for program success and faculty productivity. There is limited research published about leadership styles of respiratory care educators. This study helps fill that void and will serve as a foundation for further research. **Purpose:** This study examined the leadership characteristics of respiratory care program directors to determine the relationship between the director's leadership style, faculty satisfaction, and their willingness to exert extra effort. **Method:** Program directors leadership styles were measured by the Multifactor Leadership Questionnaire (MLQ). Program director, faculty and program demographics were compiled with a researcher-designed questionnaire. CoARC accredited program directors (n=321) and their full and part-time faculty (n=172) received an e-mail requesting participation in the study with a web link to obtain demographic information. Faculty members received an e-mail from Mind Garden, Inc. with a web link to complete the MLQ. **Results:** The results found a significant relationship between faculty satisfaction (p < .001) and each of the following types of leadership: transformational, transactional, and passive/avoidant behaviors. Additionally, the results found a significant relationship between extra effort and transformational and passive/avoidant leadership behaviors (p < .001) and transactional leadership behaviors (p = .008). **Conclusion:** Although the results of this study are preliminary, they are supported by the research in other allied health professions and a parallel can be drawn. This study is the first step in understanding the leadership style of program directors in respiratory care and adds to the literature base of the faculty satisfaction in allied health programs. *Key words: transformational leadership, respiratory care, faculty satisfaction, and extra effort.*

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The Relationship Between Respiratory Care Program Director Leadership Styles, Faculty Satisfaction, And Their Willingness To Exert Extra Effort

Introduction

The future of respiratory care education may be challenged with the anticipated shortage of qualified faculty and retirement of current faculty and program directors. According to the American Association for Respiratory Care (AARC) 2009 Human Resource Survey, a critical shortage of educators is expected, with an anticipated two-thirds of all respiratory care program directors reporting that they will retire within the next 10 years.[1] To further complicate matters, the Bureau of Labor Statistics predicts the need for respiratory therapists to increase by 21% by 2018.[2] Furthermore, Dubbs also reported in that there has been a 24% increase in the number of students graduating from advanced-level programs.[1] In order to meet the demand for respiratory therapists and faculty, having an understanding of the desired leadership styles of program directors may assist with future recruitment of student and faculty. This paper, however, focuses only on program directors and their leadership style, utilizing Bass and Avolio's Full-Range leadership model with leadership behaviors that fall on a continuum ranging from transformational on one end to passive/avoidant on the other.[3,4]

Purpose

The purpose of this study was to determine leadership behaviors of program directors of accredited respiratory care programs in the United States. Specifically, the aim of this research was to (a) establish the relationship between the directors' leadership style and faculty satisfaction and (b) determine the relationship between the directors' leadership style and faculty willingness to exert extra effort.

Review of the Literature

There is limited research published regarding leadership styles of program directors in allied health. Transformational leadership theory has been studied in radiology, nursing, and occupational therapy programs.[5-11] However, there has been inadequate research on transformational leadership styles in respiratory care education. To provide some insight into the leadership style of program directors and faculty satisfaction and motivation, the transformational leadership model was used as a framework for this study. Currently, during this time of economic uncertainty, there is concern about the future direction of higher education, allied health programs and respiratory care. According to Bass, it's during these difficult times that transformational leaders will materialize.[4]

The difference between transformational and transactional leadership was first noted by Downton in *Rebel Leadership: Commitment and Charisma in a Revolutionary Process.*[12] Transformational leadership theory was taken to a higher level by Burns in his fundamental piece of work, *Leadership.*[13] Although Burns did not coin the term transformational leadership, he moved the concept forward when he suggested that the leader's purpose should be aligned with their followers and where effective leaders are evaluated by their ability to make social changes. It is essential for transformational leaders to engage their followers, focus on their intrinsic needs, and raise the follower's awareness.[20-22] The fundamental result of transformational leadership is the creation of mutual relationship between the leader and follower, which transforms followers into leaders and leaders into a driving force for change.

Transactional leadership is based on the assumption that people are motivated by reward and punishment. In general, transactional leadership means followers comply with the leader's expectations in exchange for a reward or to avoid punishment.[23] Transactional leaders use the notion of bartering or contingent reward with their followers for work and loyalty. Punishments may not always be mentioned, but are generally understood to be given if needed. [20-22]

In the Full-Range leadership model, Bass and Avolio describe transformational leaders as those whose charismatic behavior exert additional influence over their followers by expanding their goals, inspiring and motivating followers, and providing followers with the confidence to exceed expectations.[3] Transactional leaders are those who set goals, state and clarify desired outcomes, give feedback, and provide rewards for those who produce those outcomes. Additionally, the Full-Range leadership model describes two passive/avoidant behaviors: management-by-exception (passive) and laissez-faire. The first management-by-exception (passive) refers to leaders who fail to become involved until problems or issues arise. These leaders are considered passive or reactive to situations. The second, laissez-faire, is the absence of leadership which includes a lack of involvement, lack of decision making, and failing to respond to questions when needed.[18]

As early as the turn of the 20th century, organizations have been interested in studying worker's productivity and learning how to get the most productivity from their employees. Satisfaction generally describes how content a person is with their job and is influenced by numerous factors including working conditions, type of work, supervision, policies, level of responsibility, potential for advancement, salary, interpersonal relationships, recognition and empowerment.[19]

It is essential for program directors to understand the relationship between their leadership style and faculty satisfaction and their motivation to work harder. For the purpose of this study, faculty satisfaction refers to the degree to which they are satisfied with their program director's leadership style.[18] Faculty motivation to exert extra effort is the ability of the program director to influence the faculty to do more than expected, try harder, and increase their desire to want to succeed.[18] The method used to measure faculty satisfaction with their program director's leadership style and, their level of motivation was obtained from Avolio and Bass's *Multifactor Leadership Questionnaire* (5x-Short) (MLQ) .[18] The MLQ [18] does not measure job satisfaction but measures the level of the follower's satisfaction with the leader. The MLQ[18] also assesses the follower's level motivation to do more than expected, try harder, and succeed.

Methods

Research Design

A similar study on leadership styles of radiology program directors' by Shaver[5] was used as a framework to shape this study. With Palm Beach Community College Institutional Review Board approval, all accredited respiratory care program directors in the United States (n = 350) were invited to participate in this study. The directors' names and e-mail addresses were public and readily available on Commission on Accreditation of Allied Health Education Programs (CAAHEP) website.[20] The program directors were contacted via e-mail and received introductory information explaining the purpose of the study, requesting participation, and an internet web-based link to a researcher-developed survey. In order to increase the response rate, follow up e-mail request and phone contact were used to those program directors who did not respond to the initial invitational email.[21] A total of 78 program directors responded to the request to participate in the study.

As part of the web-based demographic survey process, program directors were asked to submit the names and e-mail addresses of their full and part-time faculty members. A total of 172 faculty names and e-mail addresses were obtained from program directors. The faculty were contacted by e-mail and sent introductory information explaining the study, requesting participation, and a web link to a researcher-developed survey designed to collect faculty demographics. Faculty self-selected as to whether or not they wished to participate in the research study by clicking on the web link to Survey Monkey and completing the researcher designed questionnaire or faculty had the option to remove themselves from the e-mail list by clicking a link at the end of the e-mail. A total of 53 faculty responded and completed the researcher-designed faculty demographic questionnaire.

The program faculty were sent an e-mail from Mind Garden, Inc., a publication company that provides reproducible assessments, collects and stores data for the researcher, inviting them to participate in the research study along with a web link to complete the MLQ.[18] Faculty self-selected as to whether or not they wanted to participate in the research study by filling out the survey or deleting the e-mail. A total of 151 faculty members completed the MLQ[18] portion of the study. In order to assure anonymity, Mind Garden, Inc. was responsible for coding and matching program directors and faculty participating in this study. The researcher did not have access to names of individual faculty members who completed the MLQ.

Instrumentation

Three survey instruments were used to gather data for this study. The first instrument was a researcher-designed questionnaire for the purpose of collecting program director demographics. The second instrument was a researcher-designed questionnaire for the purpose of collecting faculty demographics (see Appendix A and B). The third instrument used in the study was Bass and Avolio's MLQ.[18] The MLQ was used to measure the nine factors that compose the Full-Range leadership model. These factors include 5 transformational behaviors: idealized influence (attributed), idealized influence (behavior), inspirational motivation, intellectual stimulation, and individualized consideration, 2 transactional behaviors: contingent reward and management-by-exception (active), 2 passive/avoidant behaviors: management-by-exception (passive) and laissez-faire. Additionally, the MLQ[18] measured the following outcomes: follower's satisfaction with their leader, willingness to exert extra effort, and perceived leader effectiveness.   Due to the copyright of the MLQ, a copy of this instrument is not available in the Appendix.

Satisfaction with the leader was measured by answering 2 questions related to the satisfaction of leadership styles and the ways in which leaders work. Extra effort was measured by answering three questions related to motivation to do more than expected, motivation to try harder, and motivation to succeed. Leadership effectiveness was measured by answering four questions related to the work effectiveness of the unit, effectiveness of the unit when compared to other units, leader effectiveness in meeting job-related needs, and leader effectiveness in meeting the goals of the organization.[18]

To obtain the MLQ[18] scale scores, each of the 45 questions that are associated with the 9 leadership factors and the 3 outcomes were averaged by summing and dividing by each of the numbered scaled items answered. Furthermore, each leadership style score for transformational, transactional, and passive/avoidant styles was averaged separately to obtain a sin-

gle composite score by summing and dividing by the number for each of the scales that comprise the leadership style. Responses to the MLQ[18] were based on a 5 point Likert Scale (0 = Not at all, 1 = Once in a while, 2 = Sometimes, 3 = Fairly often, 4 = Frequently, if not always) .[18] The MLQ[18] has been tested and revised numerous times over the past 20 years, and is considered the benchmark measure used in transformational leadership research.[23]

Limitations

The following limitations for the study included:

1. Program demographic information collected was self reported by the program director and was limited to the accuracy of the information provided.
2. The program directors' response rate to the researcher-designed survey was a limitation due to the small sample size.
3. The faculty response rate to the researcher-designed survey and for the MLQ-R (5x-Short)[18] was a limitation due to the small sample size.

Results

The data obtained from the MLQ-R (5x-Short) [18] along with the researcher designed questionnaires, were analyzed utilizing Statistical Program for Social Science (SPSS) 16.0 computer software. To specifically answer the 2 research questions, descriptive statistics obtained from the regression procedure was used to describe the leadership styles of program directors. A multiple regression analysis was performed to determine which leadership styles were predictors of faculty satisfaction and willingness to exert extra effort.

Seventy-eight program directors of accredited respiratory care programs in the United States responded to the researcher-designed questionnaire for the purpose of collecting program director, institutional, and program demographics. The majority of the participants were male (55.1%, n = 43). The mean age of the program directors was 50.8 years with a range between 35 and 67 years of age. Program directors were asked to provide information regarding their attendance of formal leadership training. Overwhelmingly, most (88.5%, n = 69) reported that they had attended some form of leadership training whether it was from attending college and earning a degree, workshop, seminar, or a combination of the above. The majority of program directors had earned a master's degree (59%, n = 46) with half in the field of education (50%, n = 39). [21]

Participating program directors provided information regarding their institution. The majority of the programs were public (88.5%, n = 69) with a large number of the programs at the community college level (61.5%, n = 48). Program directors reported that the majority of the programs (75.6%, n = 59) had 1 or 2 full-time faculty members (not including themselves) and 1 to 3 part-time faculty members (38.5%, n = 30). Additionally, most of the programs offered an associate degree as the highest degree awarded (82.1%, n = 64). [21]

Fifty-three faculty members of accredited respiratory care programs in the United States responded to the researcher-designed questionnaire for the purpose of collecting demographic, educational, and professional information. The gender of the participants was nearly split with females holding a slight edge (50.9%, n = 27). The mean age of the faculty was 46.6 years with a range between 25 and 67 years of age. A small number (15.1%, n = 8) of the faculty reported that they held a doctorate degree with the majority reporting that they held a masters degree (39.6%, n = 21). Most of the faculty reported that their highest de-

gree obtained was in the field of respiratory care (35.8%, n = 19) with over one-half (52.8% n = 28) reporting that they had been in the field for over 20 years. The majority of the participants considered themselves to be full-time (71.7%, n = 38) with nearly all reporting that they work at an academic institution (i.e., college or university) (84.9%, n = 45). [21]

The first question, *what is the relationship between the directors' leadership style and faculty satisfaction with the leader?* a multiple regression analysis was performed using program director transformational, transactional, and passive/avoidant leadership style scores as perceived by their faculty to predict faculty satisfaction. This study found that simple correlations between faculty satisfaction with their program director and each of the predictors for transformational, transactional, and passive/avoidant leadership styles were significant (p < .001) (see Table 1).

Both transformational and transactional leadership behavior had a positive correlation with faculty satisfaction with the leader, while passive/avoidant behavior had a negative correlation with faculty satisfaction with the leader (Table 1).

A significant percentage (81%) of the variance in satisfaction with the leader can be predicted from the transformational, transactional, and passive/avoidant leadership behavior scores, R^2 = .817, F (3, 51) = 75.96, p < .001. Transformational leadership behavior predicted a significant amount of the variance in faculty satisfaction with the leader (p < .001) over-and-above the predictive accuracy afforded by transactional and passive/avoidant leadership behaviors (see Table 2).

In order to answer the second question, *what is the relationship between the directors' leadership style and faculty willingness to exert extra effort?* a multiple regression analysis was performed using program director transformational, transactional, and passive/avoidant leadership style scores as perceived by their faculty to predict faculty willingness to exert extra effort. This study found a correlation between faculty willingness to exert extra effort and each of the predictors transformational, transactional, and passive/avoidant leadership styles were significant with transformational and passive/avoidant leadership behaviors at (p < .001) and transactional leadership behavior (p = .008), (Table 3).

Both transformational and transactional leadership behavior had a positive correlation with faculty willingness to exert extra effort, while passive/avoidant behavior had a negative correlation with faculty willingness to exert extra effort (Table 3).

A significant percentage (60%) of the variance in faculty willingness to exert extra effort can be predicted from the transformational, transactional, and passive/avoidant leadership behavior scores, R^2 = .637, F (3, 51) = 29.778, p < .001.

Table 1

Correlations Among Leadership Behaviors and Faculty Satisfaction With the Leader

Variable	Satisfaction	Transformational	Transactional	Passive/ Avoidant
Satisfaction	1.000	.903*	.574*	-.602*
Transformational	.903*	1.000	.623*	-.687*
Transactional	.574*	.623*	1.000	-.487*
Passive/Avoidant	-.602*	-.687*	-.487*	1.000

*p < .05

Table 2

Contributions of Transformational, Transactional, and Passive/Avoidant Leadership Behaviors to the Model

Variable	t	p
Transformational	9.907	<.001*
Transactional	.270	.788
Passive/Avoidant	.456	.650

a. Dependent Variable: Satisfaction

Table 3

Correlations Among Leadership Behaviors and Faculty Willingness to Exert Extra Effort

Variable	Satisfaction	Transformational	Transactional	Passive/Avoidant
Extra Effort	1.000	.774*	.357*	-.440*
Transformational	.774*	1.000	.623*	-.687*
Transactional	.357*	.623*	1.000	-.487*
Passive/Avoidant	-.440*	-.687*	-.487*	1.000

* p < .05

Transformational leadership behavior predicted a significant amount of the variance in faculty willingness to exert extra effort, p < .001 over-and-above the predictive accuracy afforded by transactional and passive/avoidant leadership behaviors (see Table 4).

The means and standard deviations for the criteria variables, satisfaction with the leader and willingness to exert extra effort, along with the three predictor variables transformational, transactional and passive/avoidant leadership are shown in (see Table 5).

Discussion

The results of this study demonstrated that both transformational and transactional leadership behavior had a positive correlation with faculty satisfaction with the leader, while passive/avoidant behavior had a negative correlation with faculty satisfaction with the leader. These findings were similar to the findings as those established by Shaver, Archie, Chen, Chen et al., King, Nischan, Shieh et al. [5,6-11] The majority of these studies (Shaver, Chen, Chen et al., King, Nischan, Shieh et al.,) [5,6-11] found that transformational and to a lesser extent transactional leadership behaviors had a positive correlation to faculty satisfaction and laissez-faire behaviors had a negative correlation to faculty satisfaction.

However, these findings differed from Archie who did not find that the transactional model had a statistical significance in faculty satisfaction. [6] Additionally, these findings differed from Chen who found that nursing faculty in Taiwan were moderately satisfied with their jobs but felt that demographic factors and heavy workloads as opposed to the director's leadership style were possible reasons for faculty dissatisfaction. [7]

Additionally, the results of this study demonstrate that transformational and transactional leadership behavior had a positive correlation with faculty willingness to exert extra effort,

Table 4

Contributions of Transformational, Transactional, and Passive/Avoidant Leadership Behaviors to the Model

Variable	t	p
Transformational	7.641	<.001*
Transactional	-1.752	.086
Passive/Avoidant	1.295	.201

a. Dependent Variable: Willingness to Exert Extra Effort

Table 5

Descriptive Statistics for the Criteria and Predictor Variables

Variable	Mean	SD	N
Satisfaction	3.529	.592	55
Extra Effort	3.556	.523	55
Transformational	3.314	.514	55
Transactional	2.594	.406	55
Passive/Avoidant	.478	.496	55

Note. Adapted from dissertation[21]

while passive/avoidant behavior had a negative correlation with faculty willingness to exert extra effort. These findings were similar to the findings established by King who found that transformational and to a lesser extent transactional leadership behaviors had a positive correlation to faculty willingness to exert extra effort and laissez-faire behaviors had a negative correlation to faculty willingness to exert extra effort. [9]

Again, these findings differed from Archie who did not find that the transactional model had a statistical significance in faculty willingness to exert extra effort.[6] Additionally, these findings differed from Shaver who found that faculty willingness to exert extra effort correlated higher with transactional more than with transformational leadership behaviors.[5] Willingness to exert extra effort may be more associated with contingent reward for some people and may be more intrinsic for others as demonstrated in this study.

This study clearly shows that participating program directors have and use transformational leadership behaviors *fairly often* to *frequently, if not always* (M = 3.314) and that leadership style is related to faculty satisfaction, and willingness to exert extra effort. Faculties were satisfied *fairly often* to *frequently, if not always* (M = 3.529), and willing to exert extra effort *fairly often* to *frequently, if not always* (M = 3.556). Therefore, these leadership characteristics are an important part of the program directors' leadership style, and it is recommended that program directors continue to model transformational leadership behaviors.[21]

According to Bass and Avoilo's leadership theory, program directors tend to model the types of ethical and moral behavior that faculty and students would want to emulate. Transformational leader's place a priority of others needs over their own and to inspire and motivate others.[3] Program directors must have the ability to communicate a vision, provide clear expectations, and

exude enthusiasm in which followers want to help perform the task in order to get it done. Additionally, program directors need to be able to solicit new innovative and creative ideas from followers. These skills are necessary to help drive the future of the profession. The fundamental result of transformational leadership is the creation of mutual relationship between the leader and follower, which transforms followers into leaders and leaders into a driving force for change.[13]

This study's major limitation was small sample size along with the notion of nonresponse bias. Both of which may have inadvertently influenced the interpretation of the survey results. Low response rates decrease the statistical power of the data and increase the size of the confidence interval regarding the sample.[24] Additionally, low response rates challenge the perceived creditability of the study and undermine the actual generalizability of the study by producing misleading conclusions generated by nonresponse bias.[25] Furthermore, Rogelberg and Stanton also state that low response rates does not mean the data is biased nor discounted, especially when it examines a novel idea.[25]

In order to examine the possible affect of nonresponse bias on this study, a wave analysis was performed to determine whether late responders differed from responders. There was no significant correlation between the number of follow-up attempts made and transformational, transactional, and passive/avoidant leadership behaviors ($p > 0.05$). This provides further evidence, although not conclusive, that nonresponders would not be different from those that responded to the survey.

Conclusion

The future of higher education leaders in the field of respiratory care is uncertain. With many program directors having more than twenty years experience in the field of respiratory care and the anticipation of a significant level of retirements within the profession, encouragement of formal leadership training for future program directors is warranted. Program directors need to act as mentors and to help develop a follower's potential. Program directors transformational leadership behaviors establish mutual respect between themselves and faculty, which allows faculty to transform into future leaders. These future leaders will be the driving force of change in the respiratory care profession. According to this study, program directors do possess the leadership qualities necessary to provide for the needs and expectations of the community in which they serve.

Although the results of this study are preliminary, they clearly are supported by the current research in other allied health professions and a parallel can be drawn. This study is the first step in understanding the leadership of program directors in respiratory care and without a doubt adds to the literature base of transformational leadership in allied health programs.

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Appendix A
Program Director Questionnaire

Program ID_____

* For the purpose of this study the Respiratory Care Program Director is defined as the person responsible for the organization and administration of the program. Additionally they are responsible for curriculum development, program effectiveness, program evaluation, and program outcomes.

Directions: Please Answer each of the following questions by selecting the appropriate response for each item.

Section I: Personal Information
1. What is your gender?
          _____ Female
          _____ Male
2. What is your age?   _____ Years
3. Which of these best describes your ethnic background?
          _____ Asian or Pacific Islander
          _____ American Indian or Alaskan Native
          _____ Black, non-Hispanic
          _____ Caucasian (White), non-Hispanic
          _____ Hispanic
          _____ Other (please specify)_____
          _____ I would prefer not to say
4. What is your current title?
          _____ Program Director
          _____ Department Chair
          _____ Department Chair/Program Director
          _____ Other (please specify) _____
5. What is your current appointment status?
          _____ Permanent
          _____ Interim
          _____ Acting
6. How long have you been in your current position?
          _____ Less than six months
          _____ Greater than six months, but less than one year
          _____ Total number of Years
7. Are you responsible for programs other than Respiratory Care?
          _____ Yes
          _____ No
8. How long have you been a Registered Respiratory Therapist?
          _____ Less than 5 years
          _____ 5 – 10 years

_____ 11 – 15 years
_____ 16 – 20 years
_____ More than 20 years

Section II: Educational Background

1. Which of the following designates your highest academic degree obtained?

_____ Doctoral degree
_____ Masters degree
_____ Bachelors degree
_____ Associate degree

2. Which discipline is associated with your highest academic degree obtained?

_____ Respiratory Care
_____ Education
_____ Business
_____ Health Administration
_____ Other (please specify) _____

3. If you have participated in continuing or formal education in the area of leadership, please select all that apply:

_____ College degree
_____ College credit course(s)
_____ Workshop (one or two-day)
_____ Seminar (more than two days)

Section III: Institutional Information

1. Which of the following best describes your institution?

_____ Public
_____ Private
_____ For Profit

2. Which of the following best describes your institution?

_____ Research University
_____ University
_____ Baccalaureate College
_____Community College
_____Technical College

3. Which of the following best describes your institution's fall semester's Full Time Equivalent (FTE) enrollment status?

_____Less than 1,999
_____2,000 - 4,999
_____5,000 - 9,999
_____More than 10,000
_____I don't know

4. Upon completion of your institution's respiratory care program, which of the   following degrees does your graduate receive?

_____ Associate of Science
_____ Baccalaureate Degree
_____ Master's Degree
_____ Other (please specify) _____

Section IV: Program Information

* For the purposes of this study, a part-time or full-time faculty member is defined as any person that is employed by the educational institution or by a clinical affiliated institution whose responsibilities includes instruction in the classroom, and/or laboratory and/or clinical setting.

1. Number of full-time faculty members * (not including yourself):   _____
2. Number of part-time faculty members *:   _____
3. Total student capacity: _____
4. Average number of first-year students admitted annually:

_____ Less than eight
_____ 8 – 15
_____ 16 – 25
_____ 26 – 35
_____ More than 35

6. Three-year average NBRC Entry Level CRT Exam pass rate (the number of program graduates who pass the Entry Level CRT credentialing examination divided by the number of graduates who take the examination on the first attempt):   _____%

7. Three-year average NBRC Written Registry Exam pass rate (the number of program graduates who pass the Written Registry credentialing examination divided by the number of graduates who take the examination on the first attempt):   _____%

8. Three-year average NBRC Clinical Simulation Exam pass rate (the number of program graduates who pass the Clinical Simulation credentialing examination divided by the number of graduates who take the examination on the first attempt):   _____%

9. Three-year average program completion rate (the number of students initially enrolled divided by the number of students who complete the program):   _____%

10. Three-year average job-placement rate (number of graduates actively seeking employment in the respiratory care profession divided by the number of graduates employed in the respiratory care profession within 6 months of graduation):   _____%

11. Most recent CoARC accreditation action or award:

_____ 10 years
_____ 5 years
_____ 1 year
_____ Probation
_____ Other (please specify) _____

Faculty Contact Information

Please list the names and email addresses of faculty members associated with your program. Faculty members will be contacted and asked to complete the *Multifactor Leadership Questionnaire* (MLQ). The MLQ is designed to assess <u>your</u> leadership skills and your effectiveness as perceived by the faculty member. All responses will be kept confidential.

* For the purposes of this study, a full-time or part-time faculty member is defined as any person that is employed by the educational institution or by a clinical affiliated institution whose responsibilities includes instruction in the classroom, and/or laboratory and/or clinical setting.

Name:_____

Email Address:_____

Check One: Full-time   Part-time

Name:_____

Email Address:_____

Check One: Full-time   Part-time

Name:_____

Email Address:_____

Check One: Full-time   Part-time

Name:_____

Email Address:_____

Check One: Full-time   Part-time

Name:_____

Email Address:_____

Check One: Full-time   Part-time

Appendix B
Faculty Questionnaire

Program ID_____

Directions: Please Answer each of the following questions by selecting the appropriate response for each item.

Section I: Personal Information
1. What is your gender?
  _____ Female
  _____ Male
2. What is your age?   _____ Years
3. Which of these best describes your ethnic background?
  _____ Asian or Pacific Islander
  _____ American Indian or Alaskan Native
  _____ Black, non-Hispanic
  _____ Caucasian (White), non-Hispanic
  _____ Hispanic
  _____ Other (please specify)_____
  _____ I would prefer not to say

Section II: Educational Background
1. Which of the following designates your highest academic degree obtained?
  _____ Doctoral degree
  _____ Masters degree
  _____ Bachelors degree
  _____ Associate degree
2. Which discipline is associated with your highest academic degree obtained?
  _____ Respiratory Care
  _____ Education
  _____ Business
  _____ Health Administration
  _____ Other (please specify) _____

Section III: Professional Information
1. Which of the following best describes your affiliation with the respiratory care program?
  _____ Full-time
  _____ Part-time
2. Which of the following best describes your employer?
  _____ Academic institution (i.e., college, university)
  _____ Clinical education setting (i.e., hospital, clinic, rehab)
  _____ Other (please specify) _____
3. How long have you been a Registered Respiratory Therapist?
  _____ Less than 5 years
  _____ 5 – 10 years
  _____ 11 – 15 years
  _____ 16 – 20 years
  _____ More than 20 years

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