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Admission Criteria and Course Performance in an Undergraduate Respiratory Care Program: A Case for Non-Cognitive Measures

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Abstract

Introduction: Admission processes for health care programs traditionally focus on a student's cognitive ability. This unilateral approach to the evaluation of intelligence represents an incomplete understanding of a student's ability in a clinically-based program, such as Respiratory Care. Research has indicated non-cognitive characteristics are vitally important to the future success of working health care providers. The purpose of this research was to assess the relationships among admission criteria categorized according to Sternberg's Triarchic Theory and performance in a baccalaureate Respiratory Care program. **Methods:** In addition to cognitively-focused admission criteria, students applying to an undergraduate Respiratory Care program participated in a multiple mini-interview (MMI) to demonstrate non-cognitive skills described as essential to health care practitioners. Students were ranked by performance and selected for admission. Relationships among criteria classified according to Sternberg's Triarchic Theory and performance in foundational Respiratory Care courses were explored for significance. **Results:** Significant relationships among indicators of either componential, experiential, or contextual intellect and course performance were sporadic. However, significant correlations existed between MMI scores and performance in clinical practicum. **Conclusions:** Health care workers are required to demonstrate not only cognitive aptitude, but also the ability to apply new concepts in new contexts. However, most traditional admission practices overlook the value of non-cognitive ability. Clinically-focused undergraduate programming may benefit from incorporating non-cognitive measures into admission practices. The adoption of a revised MMI, in addition to a review of academic performance, may help to highlight contextual abilities inherent to the clinical environment that are often overlooked by traditional admission practices.

Key Words: Multiple-Mini Interview, Undergraduate Admissions, Respiratory Care, Intelligence, Non-Cognitive, Triarchic Theory of Intelligence

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Introduction

Respiratory Care (RC) students are required to demonstrate mastery of the field-specific knowledge inherent to the scope of the profession, as well as non-cognitive skills identified as essential to health care practitioners.[1-2] As described by Stanford Medicine, interpersonal, communication, critical, and analytical skills are all required to succeed as a new practitioner in a clinical environment that is both demanding and evolving (https://med.stanford.edu/, Accessed February 3, 2019).

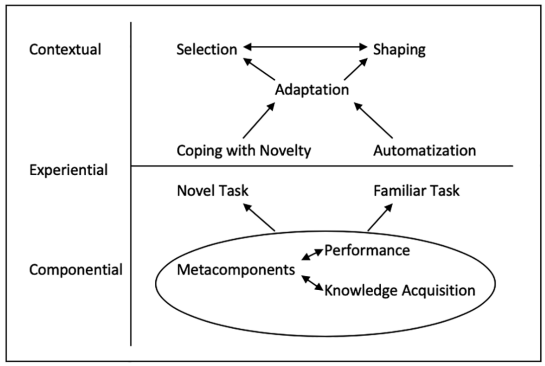
While there seems to be some momentum toward understanding the value of such skill in the academic setting, little research has been done on how to best address the utility of baseline non-cognitive skill in undergraduate health programs such as respiratory care.[1,3-4] Much of the available literature regarding the utility of non-cognitive ability relates to the graduate environment.[3-9] This lack of published evidence at the undergraduate level is concerning, given that most health care-specific fields require an entry-to-practice degree at this level. This gap in understanding may be due, in part, to a general lack of consensus about how best to evaluate such qualities upon admission as well as how well these skills are linked to performance in an entry-to-practice program.[1] Participation in a Multiple Mini-Interview (MMI) was incorporated by this particular undergraduate baccalaureate program to address the lack of consideration for non-cognitive abilities throughout the admissions process. Permission to use data pertinent to this study was granted by the institution's review board.

The overarching purpose of this investigation was to explore whether demonstration of non-cognitive ability, in this case performance on the MMI, was more significantly related to academic performance in the clinical environment than were other, more traditional types of admissions criteria. All admission criteria were categorized under the intellectual domains described in Sternberg's Triarchic Theory of Intelligence as either cognitive, experiential, or contextual.[10]

Triarchic Theory of Intelligence

The general understanding of "intelligence" is simply the ability to both acquire and apply knowledge and skill in a way that may be quantified using objective measures.[10-11] The Triarchic Theory of Intelligence, introduced by Robert Sternberg in 1984 argues that any study of the phenomenon of "intelligence" requires a much broader scope of understanding as to what skills are valuable.[10-11] To best capture the range of valuable skills, the Triarchic Theory asserts that there are three specific types of intellect: componential, experiential, and contextual.[10] Given this assertion, Triarchic Theory posits that knowledge is first acquired as a result of mental processes that help shape understanding and meaning.[10] As illustrated in Figure 1, once comprehension has been established, individuals must cope with novelty to adapt understanding to new contexts by selecting and shaping the information to fit the environment.[10-12] Within this process, types of intellect should not be considered superior to another, but rather complimentary and dependent upon the degree of investment the learner has with information.

Figure 1. Sternberg's Triarchic Theory of Intelligence[11, 13]



Componential intellect, or the ability to recall information in a static context, is a foundational requirement of learning new information and is often assessed through objective and summative measures.[10,13] However, over-reliance on such measures disregards the demonstration of other facets of intelligence, such as the ability to apply learned knowledge in dynamic settings or to develop novel applications of knowledge in a new context.[10,13-14] These abilities, referred to by Sternberg as experiential and contextual intellect, respectively, are arguably equally important indicators of student development.[10, 13-14] Describing intelligence as a multifaceted, non-linear phenomenon provides the framework for this investigation into a more holistic approach to student assessment in the admission process.

Multiple Mini-Interview

The MMI is best described as a structured, time-limited, interval station assessment.[3,8,12] This framework is such that a candidate moves through a series of focused stations with scenario-based questions and, in contrast to a traditional interview, interacts with only one interviewer.[7,8,15] Performance on each station is scored using a standardized measurement tool.[7,8,15] This format shows potential in the evaluation of students applying to health science programs because the stations can be adapted

to assess and discriminate between non-cognitive traits necessary for successful clinical practice.[8,16] The ability of the MMI to better evaluate non-cognitive skill can likely be attributed to this structure in that the evaluative focus shifts away from the testing operation to the candidate's response to the scenario. Measurement tools are designed to assess *how* the student responds to station prompts rather than whether the response was either "right" or "wrong."[7,8,15]This demonstration of adaptation (i.e., applying existing knowledge in a dynamic or new environment) is a more accurate reflection of both experiential and contextual intellect.[4,10,12-13,15,17] The structure and implementation of the MMI reveals reasonable reliability and may be used to predict not only academic success in health programming, but also on corresponding licensure exams.[3,18]

Methods

To explore the relationships between admission criteria and course performance, correlational analyses were conducted to explore the significance of the relationships between admission criteria and academic performance for a cohort of undergraduate RC students (Cohort C). Retrospective correlational analyses were also performed with two additional cohorts (A and B) to establish a baseline understanding of existing relationships among admission criteria and academic performance prior to the addition of the MMI. Important study methods will be addressed in two parts. First, the development and implementation of the MMI specific to Cohort C is described. Then the methods by which the admission variables were categorized and analyzed across the three cohorts is addressed (Tables 2 and 4).

Development and Implementation of the MMI

This study was conducted within a small Respiratory Care department, at a mid-sized metropolitan university. All students applying to the Cohort C admission cycle (N=35) were required to participate in the MMI as part of the new admissions process adopted by the department. Data from this study were analyzed to identify relationships among indicators of componential, experiential, contextual intellect, and performance in foundational first-semester courses within the program.

MMI Structure

The MMI station scenarios identified for use were selected to evaluate non-cognitive skills highlighted by industry leaders as lacking by students upon entry to the labor market: critical thinking, interpersonal skills, ethical judgment, time management, and self-appraisal.[19] The MMI format, structure, and measurement tool were derived from open source materials developed by the Michael G. DeGroote School of Medicine at McMaster University, available through the program website (https://mdprogram.mcmaster.ca, Accessed June 12, 2019), as well as sample MMI scenarios developed by the University of Calgary Medical School, also available on the program's webpage.[20] Complete examples of measurement instruments adapted for use in this study are included in Appendix A. Limited by both time and human resources, this program utilized three, eight-minute MMI stations designed to address one or two non-cognitive skills per station. This format allowed three applicants to cycle through the stations during one, half-hour time interval (Appendix B).

Applicants were cycled through each of the three stations to interact with a sole interviewer responsible for administering a scenario. This time-limited interaction with one interviewer is unique to the MMI and was designed to reduce the potential for interviewer bias, an issue common among traditional interview practices.[21]

Interviewer selection and preparation

Interviewers were identified who were intimately familiar with the requirements of the academic program and the respiratory therapy profession. The interviewers were briefed on the objective of the MMI process and informed of the structure of the assessment. Interrater reliability was addressed through pilot testing wherein individual interviewers were asked to evaluate a video-based scenario, using the measurement tool adapted for this particular program. Subscale scores on the pilot scenario were very similar for the three interviewers (15, 15, and 16) so no additional interviewer training was provided.[12] Interviewers were barred from reviewing any admission material related to applicants prior to conducting the MMI to limit the potential for interviewer bias.

Adapted MMI stations

The topic scenarios used in this study remained relatively unchanged from those used by the University of Calgary with the exception of editing the details to describe the field of Respiratory Care rather than medical school (Appendix A). Each of the non-cognitive attributes assessed in this study were selected to address key competencies identified as essential to successful clinicians.[1,16,19]

Measurement instrument

The measurement tool developed by McMaster University was amended for this study to include a set of subscales specific to each station (Appendix A). In addition to assigning a performance score using the subscales, interviewers were asked to differentiate students who scored similarly on the station using a ranking system. Candidate

performance was ranked on a scale of 1-35, with 35 being the best candidate. Interviewers were instructed to take notes during each interview and to review those notes when ranking students to differentiate subtle differences between students who may have scored the same on the more objective subscale.[12]

Analysis of Admission Criteria

Admission criteria across all cohorts were classified into three categories based on Sternberg's Triarchic Theory: componential, experiential, and contextual. Componential variables were those variables indicative of the ability to recall information in a static context (e.g., course grades) or acquire knowledge over a period of time.[10] Experiential variables were deemed those variables representative of an applicant's ability to gather and demonstrate understanding in dynamic environments.[10] Finally, contextual variables were those evaluations considered indicative of an applicant's ability to apply acquired knowledge to new contexts.[10] Total applicant score was a weighted combination of total file score (componential and experiential variables), essay score (experiential variable), and in the case of Cohort C, performance on the MMI (contextual variable). Table 1 illustrates the total point value and assigned weight of each set of variables.

It is important to note that some differences exist in which variables were included in the total file score across each of the three cohorts. Whether a student was a true freshman was not considered in either Cohort A or B. However, it was determined that these students were being penalized under the point system, due to the inability to accrue points through additional course work. To address this, true freshmen applying for admission to Cohort C were awarded up to 4 points. It was also determined that there was little evidence to justify additional points for having earned a degree prior to applying to this program. Therefore, the previous education of those students applying to Cohort C was not considered. Finally, Cohort C is the only cohort to have taken part in the MMI and therefore the only cohort to be considered evaluated on contextual intellect.

Performance on the MMI was evaluated by considering two values: total point value across each of the three stations and the combined ranking score assigned by each of the interviewers. The delineation of this variable was considered to investigate whether the subjective nature of ranking students had an impact on likelihood of admission.

Data specific to the application (i.e., transcript review and designation of some experiential variables) was recorded by the faculty member using a secure Excel spreadsheet formatted to calculate assigned weights to criteria. Coded essay scores were entered into the Excel spreadsheet by the administrative assistant responsible for the coding process. MMI scores and rankings were submitted to the same administrative assistant responsible for coding data and added after the results of each station had been made final. The Excel spreadsheet total score was then sorted in a descending pattern, indicating the top applicants.

Study Sample

Data points from each de-identified student profile across each of the cohorts regarding each admission variable were included in the analysis. Sample size for Cohorts A, B, and C varied slightly with samples of 21, 23, and 25, respectively (N=69).

Table 1. Applicant Scoring Distribution

Variable	Admission Criteria	Measurement	Point Value	Weighted (%)
Componential/Experiential	**File Score**		**24**	**45**
	Prereq course grades	4.0 scale		
	Cumulative GPA	4.0 scale		
	Calculated Math/Sci GPA	4.0 scale x 2		
	Healthcare Experience		0-2	
	Previous Education		1-3	
	Upper Division RC Courses		0-2	
	Field Exploration		0-2	
	Academic Load		0-3	
	True Freshman		<4	
Experiential/Contextual	**Essay Score**	3 point/reviewer	**9**	**5**
	MMI Performance		**165**	**50**
	Total MMI Score	20 points/station		
	Ranking Score	35 points/station		
Total			**198**	**100**

Identification of foundational courses

This study sought to explore the relationships between categories of admission criteria and performance, as indicated by final course grade, in four key courses: cardiopulmonary physiology (CP physiology), a foundational RC theory course (foundational RC theory), a foundational RC laboratory course (foundational RC laboratory), and an introductory clinical practicum course. These courses represent a range of demonstrable skills in each of the componential, experiential, and contextual domains.

Results

Relationships among variable groups and performance in select first-semester respiratory care courses for each of the cohort groups were explored using Pearson's bivariate correlational analyses. Results of these analyses are presented as *r* values and demarcated for significance levels of either 1 or 5 percent, two-tailed.[12] Statistical analyses were performed using International Business Machines™ (IBM) Statistical Packages for Social Science™ (SPPS) software version 24.0.

Table 2. Componential Admissions Criteria and Performance by Cohort Group

Foundational Course	Admission Criteria	A*	B†	C‡
CP Physiology	Anatomy Grade	.359	.586‖	.089
	Core Math Grade	.312	.128	.442§
	Cumulative GPA	.162	.343	.439§
	Math/Science GPA	.330	.564‖	.230
	Extra Science Courses	.018	.417§	.469§
	Academic Load	.153	-.090	.288
Foundational RC Theory	Anatomy Grade	.624‖	.365	.364
	Core Math Grade	.302	-.023	.728‖
	Cumulative GPA	-.228	.453§	.541‖
	Math/Science GPA	.527§	.328	.591‖
	Extra Science Courses	-.128	.102	-.373
	Academic Load	.238	.406	.354
Foundational RC Laboratory	Anatomy Grade	.575‖	.263	.176
	Core Math Grade	.338	.003	.462§
	Cumulative GPA	.008	.331	.269
	Math/Science GPA	.530§	.197	.335
	Extra Science Courses	.256	.066	-.391
	Academic Load	.267	.609‖	.098
Introductory Clinical Practicum	Anatomy Grade	.351	.084	.237
	Core Math Grade	.091	-.200	.331
	Cumulative GPA	-.267	.258	.267
	Math/Science GPA	.249	-.027	.307
	Extra Science Courses	-.076	.070	-.244
	Academic Load	.230	.713‖	-.158

* $N = 21$. † $N = 23$. ‡ $N = 25$

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

‖. Correlation is significant at the 0.01 level (2-tailed).

Componential Variables and Academic Performance

Indicators of componential intellect are often relied upon as the most indicative of future academic performance.[1] However, as is illustrated in Table 2, significant correlations between admission criteria classified as componential and academic performance in each of the four courses across all cohorts were sporadic, at best. The only significant relationship identified between any of the componential criteria and performance in the clinical environment was identified by the ability of students in Cohort B to carry a heavy academic load r (23) = .713, p =.000.[12] However, this relationship was not identified in either of the other cohort groups.

Experiential Variables and Academic Performance

Similar to the results of the correlational analyses of componential criteria and academic performance, Table 3 highlights that the relationships identified between admission criteria categorized as experiential and academic performance were overwhelmingly insignificant across all courses and cohorts. Whether students admitted to Cohort B had taken upper division RC courses as electives prior to admission to the program was the only variable significantly associated with performance across all cohorts. A significant relationship was identified with the foundational RC theory and RC laboratory courses, r (19) = -.543, p = <.011 and r (19) = -.552, p = <.009, respectively.[15] However, this finding was not consistent across either Cohort A or C.

Contextual Variables and Academic Performance

Cohort C was the only cohort subjected to the MMI and therefore the only cohort to have contextual data available. Performance on the MMI was the only variable included in this study, aside from the ability of students in Cohort B to carry a heavy academic load, r

Table 3. Experiential Admissions Criteria and Performance by Cohort Group

Foundational Course	Admission Criteria	A*	B†	C‡
CP Physiology	Essay Score	.187	-.186	.089
	Health Care Experience	-.171	.001	-.202
	RC Courses Taken Early	-.262	-.145	.104
	Previous Education	-.050	.353	—
	Second Semester Freshmen	—	—	.165
Foundational RC Theory	Essay Score	-.271	.176	.249
	Health Care Experience	-.543§	.069	-.364
	RC Courses Taken	-.079	-.503§	—.251
	Previous Education	.025	.009	—
	Second Semester Freshmen	—	—	.253
Foundational RC Laboratory	Essay Score	-.173	.084	.010
	Health Care Experience	-.552‖	.200	-.365
	RC Courses taken early	.077	-.443§	.045
	Previous Education	.140	.270	—
	Second Semester Freshmen	—	—	.291
Introductory Clinical Practicum	Essay Score	-.107	.204	-.346
	Health Care Experience	-.263	.142	-.361
	RC Courses taken early	-.009	-.148	-.157
	Previous Education	-.081	.180	—
	Second Semester Freshmen	—	—	.103

* N = 21. †N = 23. ‡N = 25

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

‖. Correlation is significant at the 0.01 level (2-tailed).

(23) = .713, p = .000, to be positively correlated with academic performance in the introductory clinical practicum course. Performance on the MMI, as measured by either the objective total score on the 3 stations or the more subjective ranking process, was significantly correlated with academic performance in the clinical environment, r (25) = .528, p = .007 and r (25) = .509, p = .009.[12]

Table 4. Contextual Admissions Criteria and Academic Performance

	MMI Total Score*	MMI Ranking Score *
CP Physiology	-.041	.016
Foundational RC Theory	.357	.448†
Foundational RC Laboratory	.336	.485†
Introductory Clinical Practicum	.528‡	.509‡

*N = 25
†. Correlation is significant at the 0.05 level (2-tailed).
‡. Correlation is significant at the 0.01 level (2-tailed).

Discussion

The skills required for success in an undergraduate RC program and other health-focused, clinically-based degrees are unique. In addition to being competitive concerning cognitive ability, future clinicians must also possess non-cognitive skills demonstrative of an ability to navigate a dynamic health care environment. However, the admissions processes of such programs often overlook an assessment of these non-cognitive skills. Results of this investigation highlight that a traditional approach to undergraduate admissions in RC may be inappropriate given that the overarching objective of many programs is to identify students able to demonstrate multiple facets of intelligence in a dynamic environment.

Componential Variables

Indicators of componential intellect are often measured objectively and are therefore heavily relied upon in assessing academic preparedness.[1,22] There lacks consistency among the significance of relationships across such variables and performance, specifically in both the practical-based laboratory course and the clinical course. The lack of significant relationships identified in these courses highlights the unreliability of componential variables to effectively evaluate skills required to both develop and apply knowledge in dynamic or new contexts.[10] These findings are consistent with the literature in that admission criteria, such as GPA, provide a limited scope in the evaluation of students for fit into programs with a heavy emphasis on contextual ability.[22] This may be because although traditional types of admission criteria, especially those regarding performance averages, may be indicative of learning patterns, any average of those patterns is heavily susceptible to the influence of outliers.[1] Additionally, the use of GPA as a measure of learning ability, both past and present, does not account for the influence of experience throughout the process of learning.[1,10] This may also explain the lack of significant relationships identified between the criterion "previous education" and performance in clinical programs like this one.

Experiential Variables

The fact that there were almost no significant relationships identified among criteria classified as experiential and performance in this program is a surprising finding. This is because it is often assumed that any type of experience in an area will provide some context for future learning about that environment.[10] Although it is not uncommon for programs to assign additional points to applicants for documented experience in some area related to the health field (e.g., Certified Nursing Assistant), the assumption that all experience is valuable overlooks an important function of the learning process. This being the transition from novelty experience to learner autonomization.[10] The transition to adaptation requires that an action be mastered such that the learner is able to apply relevant knowledge from one experience to a new context.[10] For example, it makes very little sense to assume that the ability of an applicant to write an essay about his or her experience as a Certified Nursing Assistant is indicative of that applicant's ability to apply knowledge learned in that environment to new contexts. Given both this finding and understanding of the relationship between applicant experience and academic potential, it stands to reason that both the type of admission criteria and weight assigned to evaluate this domain must be reevaluated.[23]

Contextual Variables

Contextual intellect was measured through the MMI. Although only one cohort participated in the MMI, the significant relationships highlighted in the results of this study provide a promising foundation for future investigations into the evaluation of contextual intellect as a criterion for admission to health-focused programs. According to Sternberg, contextual intellect underscores the ability of an individual to demonstrate higher-order learning processes.[10] Because the student is required to demonstrate his or her ability to apply learned knowledge to a new context, regardless of novelty, the MMI may be an optional way to assess whether a student has actually achieved a level of adaptation.[10] The utilization of substantiated measurement tools, like the one developed by

McMaster University, provides a much-needed balance to the current trend of reliance on objective measures to assess both fit and academic preparedness for success in a clinically-based respiratory care program and perhaps later, the workplace.

However, the finding that MMI ranking order was significantly related to academic performance identifies more questions regarding the use of interview-based admissions practices. Although the MMI used in this investigation utilizes both the structured format and well-trained interviewers described by Salvatori as enhancements to the psychometric properties of the measure, this type of assessment can be costly and will required additional study to better evaluate the validity of the measure.[23]

Limitations

This investigation was conducted on a small sample of students applying to a very specific program; as such, the results of this study may not be easily generalized to larger contexts. A larger sample size is recommended to produce more generalizable results. Data from ongoing admission cycles would also be beneficial to an investigation of how the MMI may be used as a measure of contextual intellect in an undergraduate RC program and, subsequently, how that measure is related to course performance. Additionally, resource limitations required that MMI stations be limited to three. Increasing the number of MMI stations would address concerns of interrater reliability and likely impact the overall significance of relationships among MMI score, rank, and performance.

It is likely that the extensiveness of interviewer experience in teaching, hiring, and training had some influence in the ranking of student performance on MMI stations. However, the degree of influence was likely mitigated by the objective measurement of candidates using the scaled MMI instrument to score students. Despite these limitations, the incorporation of more holistic admission practices should be a consideration for all programs that expect students to both acquire and apply knowledge in new and dynamic contexts, like the clinical environment.

Finally, this investigation was conducted through the lens of Sternberg's Triarchic Theory.[10] Although this theory has been amended since its conception, the framework was selected because the tenets best matched the mission and vision of this particular program. It is possible that this theoretical framework is not appropriate for adoption by all programs.

Conclusion

Although there seems to be some emerging interest in non-cognitive skill as an important aspect of student development, there remains some debate about how best to assess skills that are inherently difficult to quantify.[24] The generalized scarcity of non-cognitive evaluation in admission practices of health programs likely stems from a lack of consensus among such programs regarding desirable non-cognitive skills as well as effective methods for both assessment and evaluation of the process.[6,8,16,19]

It is clear that, in this case, traditional admission criteria were neither consistently nor significantly related to academic performance in key first semester courses. The addition of the MMI to evaluate the contextual intellect showed promise as perhaps a more relevant indicator of student fit for this particular program. The results of this inquiry support a shift in the paradigm of undergraduate admissions in clinically-focused health programs toward a more inclusive approach to student evaluation to address the wide variety in value of student ability.[24] Identifying admission processes to select students who best demonstrate both the ability to meet the cognitive rigors of a RC education as well as non-cognitive skills required to care for patients and operate as a team is essential to identify students well suited to the requirements of the profession.[1] Utilizing methods which are designed to identify contextual skills useful in a particular setting, in this case the clinical setting, programs may not only broaden the applicant pool, but may also be better able to identify those who will succeed.[26] Additional research involving more students, across additional cohorts, is required to identify best practices to ensure reliability and validity of the MMI in the admissions processes of undergraduate RC programs.

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Appendix A
INSTITUTIONAL MMI INSTRUMENT

(INSTITUTION) MULTIPLE MINI-INTERVIEW SCENARIOS
ADAPTED FROM UNIVERSITY OF CALGARY MEDICAL SCHOOL

STATION 1: INTERVIEWER NAME
Target: Ethics/interpersonal skill
STUDENT NAME: _____
INTERVIEWER INITIALS: _____
POTENTIAL CONFLICT OF INTEREST: Yes No
If "Yes," please explain: _____
_____
_____
_____

Every week your classmates gather at the local coffee house to review the lessons from that week. In the last month, everyone has been working on a major paper on Roman history, which accounts for 40 percent of the course grade. One of your classmates has copies of two of the papers that last years' students wrote for the same course. Your classmate has emailed copies of the papers to you and the other people in the group. What would you do in this situation and explain why?

Probing questions:

- Discuss what values and choices are relevant in this situation.
- What are the implications if you decide to read the papers from last year?
- What are the implications if you decline the offer to read the papers from last year?
- What would you do if one of the classmates decided to draw upon the material from the two papers in developing their submission? Please explain why?
- Do you have any additional comments before we end this discussion?

PLEASE USE THE FOLLOWING SCALE TO EVALUATE CANDIDATE RESPONSE:

Factor	Rank 1-4
Ability to understand and address the objectives of the scenario	
Communication skills displayed	
Strength of arguments presented	
Suitability for a career in Respiratory Care	
Overall performance	
TOTAL STATION SCORE	

1	2	3	4
Unsatisfactory	Satisfactory	Good	Excellent

Appendix A (cont.)

Factor considerations:

Ability to understand and address objectives of the scenario:

- Does the student ask multiple clarification questions?
- Does the student seem to understand the topic as it is presented?
- Does the student take a moment to consider the question?
- Does the student reply appropriately to the question?

Communication skills displayed:

- Does the student make eye contact while speaking?
- Does the student appear comfortable speaking with the interviewer?
- Does the student clearly articulate his or her arguments/opinions regarding the scenario?
- Does the student's response stay on "track" to answer the question posed?
- Does the student speak professionally and politely?

Strength of arguments presented:

- Does the student logically explain their rationale for their answer?
- Does the student appear calm when prompted?
- Does the student appear upset when prompted?
- Is the student able to logically present thoughts related to the scenario?
- Can the student successfully demonstrate rhetoric?

Suitability for a career in Respiratory Care:

- Is this person personable?
- Would this student be able to communicate effectively with patients?
- Would you let this student work with a loved one?
- Would you like to work with this student?
- Will this student be a good representative for the field?

Overall performance:

- Did this student appear engaged?
- Did this person appear confident/collected?
- Would you feel comfortable having this student in clinical/class?
- Do you feel that this student will be a good clinician?

STATION 2: INTERVIEWER NAME

Target: Critical thinking/time management/interpersonal skill/empathy

STUDENT NAME: _____

INTERVIEWER INITIALS: _____

POTENTIAL CONFLICT OF INTEREST: Yes No

If "Yes," please explain: _____

_____

_____

_____

In this scenario, you are a physician who provides full-service family medicine. It is late in the afternoon and you still have 4 patients left to be seen in the waiting room. You expect that you can comfortably see them and then head home. You are not on call; your medical partners will look after any of your patients that require medical assistance. You have promised your significant other that you will be home in time to attend a family event.

Just before seeing one of these 4 patients, the local nursing home calls to tell you that Mrs. Andrews' health is deteriorating dramatically. You have looked after Mrs. Andrews and her family for several years. Mrs. Andrews and her family had previously agreed to a Do Not Resuscitate (DNR) order so that when she got ill again, she would be allowed to die comfortably, but without intervention. The family is now questioning whether they made the correct decision and wants to discuss it with you as soon as possible.

How will you manage your time?

Appendix A (cont.)

Probing questions:

- What will you take into consideration and why?
- A professional ethics organization states that clinicians should set up priorities and manage time to balance patient care, practice requirements, outside activities, and personal life. Why do you think they recommend this?
- Why is time management critical for clinicians?
- What strategies do you think successful clinicians adopt to manage their time effectively?
- Do you have any additional comments before we end this discussion?

PLEASE USE THE FOLLOWING SCALE TO EVALUATE CANDIDATE RESPONSE:

Factor	Rank 1-4
Ability to understand and address the objectives of the scenario	
Communication skills displayed	
Strength of arguments presented	
Suitability for a career in Respiratory Care	
Overall performance	
TOTAL STATION SCORE	

1	2	3	4
Unsatisfactory	Satisfactory	Good	Excellent

Factor considerations:

Ability to understand and address objectives of the scenario:

- Does the student ask multiple clarification questions?
- Does the student seem to understand the topic as it is presented?
- Does the student take a moment to consider the question?
- Does the student reply appropriately to the question?

Communication skills displayed:

- Does the student make eye contact while speaking?
- Does the student appear comfortable speaking with the interviewer?
- Does the student clearly articulate his or her arguments/opinions regarding the scenario?
- Does the student's response stay on "track" to answer the question posed?
- Does the student speak professionally and politely?

Strength of arguments presented:

- Does the student logically explain their rationale for their answer?
- Does the student appear calm when prompted?
- Does the student appear upset when prompted?
- Is the student able to logically present thoughts related to the scenario?
- Can the student successfully demonstrate rhetoric?

Suitability for a career in Respiratory Care:

- Is this person personable?
- Would this student be able to communicate effectively with patients?
- Would you let this student work with a loved one?
- Would you like to work with this student?
- Will this student be a good representative for the field?

Appendix A (cont.)

Overall performance:

- Did this student appear engaged?
- Did this person appear confident/collected?
- Would you feel comfortable having this student in clinical/class?
- Do you feel that this student will be a good clinician?

STATION 3: INTERVIEWER NAME
Target: Self-evaluation/communication

STUDENT NAME: _____
INTERVIEWER INITIALS: _____
POTENTIAL CONFLICT OF INTEREST: Yes No
If "Yes," please explain: _____
_____
_____
_____

You are half-way through your first year of the Respiratory Care Program. Your school has a peer professionalism assessment program that requires six (6) of your classmates to assess you each year. You also do a self-assessment. The results of your performance evaluation done by yourself and your peers, as well as the class mean, are presented below.

Scoring Key:

Low		Neutral		High
1	2	3	4	5

Behavior	Score by Self	Score by Peers	Class average (N = 150)
Takes on extra work willingly to help out colleagues	5.0	4.4	4.8
Encourages communication and collaboration among colleagues	4.0	4.5	4.5
Manages conflict in a collegial and respectful manner	4.0	3.5	4.5
Displays empathy towards patients appropriately	4.0	3.8	4.8
Listens and responds to others receptively	5.0	4.8	4.2
Acknowledges limits of own knowledge or ability	4.0	4.0	4.6

Discuss your results with the interviewer.

Probing questions:

- Based on the results, what will you do differently?
- What other information might you seek to guide your academic development?
- How would you create an action plan so that next years' results will be different?
- How will you monitor your performance to ensure that you are making progress?
- Do you have any additional comments before we end this discussion?

Appendix A (cont.)

PLEASE USE THE FOLLOWING SCALE TO EVALUATE CANDIDATE RESPONSE:

Factor	Rank 1-4
Ability to understand and address the objectives of the scenario	
Communication skills displayed	
Strength of arguments presented	
Suitability for a career in Respiratory Care	
Overall performance	
TOTAL STATION SCORE	

1	2	3	4
Unsatisfactory	Satisfactory	Good	Excellent

Factor considerations:

Ability to understand and address objectives of the scenario:

- Does the student ask multiple clarification questions?
- Does the student seem to understand the topic as it is presented?
- Does the student take a moment to consider the question?
- Does the student reply appropriately to the question?

Communication skills displayed:

- Does the student make eye contact while speaking?
- Does the student appear comfortable speaking with the interviewer?
- Does the student clearly articulate his or her arguments/opinions regarding the scenario?
- Does the student's response stay on "track" to answer the question posed?
- Does the student speak professionally and politely?

Strength of arguments presented:

- Does the student logically explain their rationale for their answer?
- Does the student appear calm when prompted?
- Does the student appear upset when prompted?
- Is the student able to logically present thoughts related to the scenario?
- Can the student successfully demonstrate rhetoric?

Suitability for a career in Respiratory Care:

- Is this person personable?
- Would this student be able to communicate effectively with patients?
- Would you let this student work with a loved one?
- Would you like to work with this student?
- Will this student be a good representative for the field?

Overall Performance:

- Did this student appear engaged?
- Did this person appear confident/collected?
- Would you feel comfortable having this student in clinical/class?
- Do you feel that this student will be a good clinician?

Appendix B
Sample Day 1 Schedule for MMI Process

Time	Station 1	Station 2	Station 3
0900-0910	Candidate 1	Candidate 2	Candidate 3
0910-0920	Candidate 3	Candidate 1	Candidate 2
0920-0930	Candidate 2	Candidate 3	Candidate 1
0930-0940	Candidate 4	Candidate 5	Candidate 6
0940-0950	Candidate 6	Candidate 4	Candidate 5
0950-1000	Candidate 5	Candidate 6	Candidate 4
1000-1010	Candidate 7	Candidate 8	Candidate 9
1010-1020	Candidate 9	Candidate 7	Candidate 8
1020-1030	Candidate 8	Candidate 9	Candidate 7
1030-1040	Candidate 10	Candidate 11	Candidate 12
1040-1050	Candidate 12	Candidate 10	Candidate 11
1050-1100	Candidate 11	Candidate 12	Candidate 10
1100-1110	Candidate 13	Candidate 14	Candidate 15
1110-1120	Candidate 15	Candidate 13	Candidate 14
1120-1130	Candidate 14	Candidate 15	Candidate 13

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Bachelor's and Master's Respiratory Therapy Educational Programs and Their Relation to the AARC's 80% Goal: Recruitment and Enrollment Capacity Challenges

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Abstract

Background: The respiratory therapy profession aims to increase the educational level required for entry-to-practice to the bachelor's degree level. To learn how well respiratory therapy bachelor's and master's degree programs may be able to assist in this aspirational goal, recruitment and enrollment practices of CoARC bachelor's and master's degree accredited programs were explored. **Methods:** A quantitative exploratory survey was developed to learn about aspects of recruitment and admissions that may affect program enrollment capacity and written comments provided non-numerical responses on enrollment and recruitment strategies. This survey was emailed to 65 program directors in September 2018. Data were collected for academic years 2017 and 2018. **Results:** The findings reveal that 22 of 29 programs enrolled less than their full enrollment capacity and averaged ~ 68% of what programs are approved to admit per cohort. Recruitment practices are challenged by students' lack of awareness, and their lack of exposure on campus to advisors who promote respiratory therapy programs. A faculty presence at student functions on campus is considered a good recruitment strategy. Social media is useful as well. Most students are recruited from their state of residence, and are interviewed for admission. **Conclusions:** More research is needed to fully understand the challenges of reaching maximum enrollment to meet workforce demands with minimal degree requirements. A centralized application system to increase application yields and a robust social media recruitment plan to increase market branding should be examined. For long-term viability, bachelor's and master's degree programs must find ways to graduate as many students as possible for the respiratory therapy profession to reach its aspirational goals.

Key words: respiratory therapy education, entry-level bachelor's degree, entry-level master's degree, admissions, recruitment, enrollment

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Introduction

In 2015, the American Association for Respiratory Care (AARC) issued an aspirational goal that 80% of practicing respiratory therapists will have earned, or be actively working to complete a bachelor's degree by the year 2020.[1] This was a stretch goal but was believed to be a way to motivate the profession to meet future health care challenges.[2] To gauge progress, the 2017 AARC Human Resources (HR) Survey revealed that ~ 56% of practicing respiratory therapists have a bachelor's degree or higher, or are working to complete a bachelor's degree.[3] This was up from ~ 42% found in the 2014 AARC HR Survey.[3] In reviewing respiratory therapy educational data in relation to the AARC's goal, 15% (n=66) of the Commission on Accreditation for Respiratory Care (CoARC) approved programs offer bachelor's degrees, and just over 1% (n=6) offer masters-entry degrees for entry to practice. The number of graduates from these programs in 2015 and 2016 was 861 graduates.[4] Based on the HR surveys and graduation data, it appears unlikely that the 80% goal will be met in 2020.

The aim of this study was to understand more fully, why the AARC's 80% goal by 2020 is not probable. The purpose of this study was to explore what specific aspects of enrollment management affect the numbers of students entering bachelor's or master's degree programs. This requires more explanation than just looking at current AARC and CoARC reports. The second purpose of this study was to explore reasons that bachelor's and master's programs are not reaching their maximum enrollment. CoARC defines maximum annual enrollment capacity as the maximum number of new students that could be enrolled in a calendar year (defined as January 1 through December 31).[4] Research questions developed to address the need to understand are: What recruitment and admissions challenges do bachelor's and master's respiratory therapy education programs encounter? Moreover, what factors are contributing to bachelor's and master's respiratory therapy education programs not being able to enroll a full cohort? This is important to know, not only in relation to the AARC's 2020 goal but because the US Department of Labor, Bureau of Labor Statistics (BLS) projects a 23% increase in employment for respiratory therapists up to the year 2026.[5]

Methods

Research Design and Instrumentation

To determine what aspects of recruitment and enrollment may be affecting program capacity, a quantitative, non-experimental investigative survey was developed. Questions arose from a review of the known respiratory therapy education literature and from experience and knowledge of CoARC accredited respiratory therapy programs. Two content experts independently reviewed the survey for face validity. After IRB approval, the questions were loaded into a Qualtrics™ program and two respiratory therapy program directors piloted the instrument prior to distribution for clarity. After each survey question, a blank space was available to allow written comments and to provide additional information. See Appendix A for the survey questions used in the electronic survey. Questions were designed to gather aggregate information on bachelor's and master's program demographics, recruitment, and enrollment practices.

Sample and Data Collection

The target audience was program directors of bachelor's and master's respiratory therapy educational programs. A public list of CoARC accredited respiratory therapy programs obtained on September 8, 2018, included program director's names and email addresses. These program directors have direct knowledge of recruitment and enrollment practices of respiratory therapy programs and can provide needed information for this study. No degree-advancement programs, only entry to practice bachelor's and master's program director names were gathered. Sixty-five (n=65) program directors met inclusion criteria. An emailed invitation letter sent on September 10, 2018, included a web link to access a Qualtrics™ portal, which opened the survey. Two undeliverable emails were returned. Once the program director entered the portal, they assented to participate in the study. Answers provided were confidential as no names or codes were used. To maximize the response rate, email reminders were sent after one week, and after two weeks. The survey portal closed on September 24, 2018.

Data Analysis

Program directors were asked to provide data for academic years 2017 and 2018, only. Data were downloaded from the Qualtrics™ program into Microsoft Excel® and IBM SPSS® v25. Descriptive data were reviewed for accuracy and for outliers. One respondent only answered the question on location of the program and therefore was not included in the analysis. These data assisted in providing answers as a whole and were not separated by degree program. Data provided for questions related to the "range" of applications received and the range of students not qualified for admission. The median number was calculated for each respondent to use for comparisons when appropriate. For written and non-numerical qualitative responses, categories were noted via pattern recognition according to aspects of admissions and recruitment. These categories, or themes, assisted in explaining how

program directors addressed enrollment management in their programs.

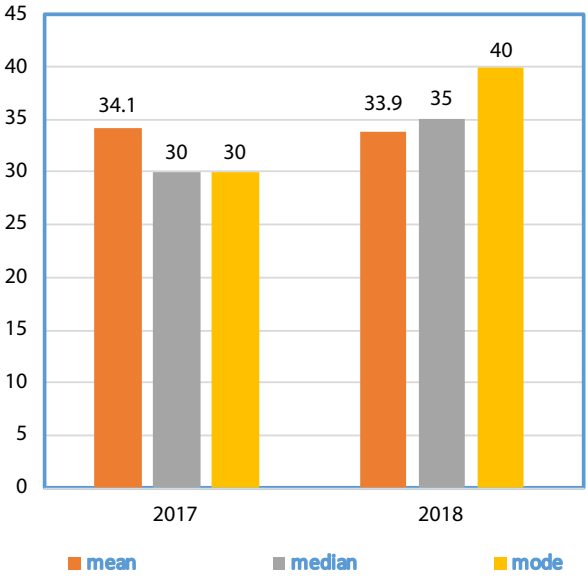
Results

Thirty respondents provided information for a 48% return rate. Geographic location of respondents included seventeen different states from across the United States. This represents 61% of the states that have a bachelor's and master's program. The number of personnel in the responding programs ranged from two FTEs to 10 FTEs, with a mean of 3.4 FTEs. Part-time instructors (PTIs) range from a high of 12 PTIs, but many program directors reported no use of PTIs for a mean of 2.9 PTIs overall. The majority of program directors indicated that their programs serve their local city, county, and state areas. Only 12 programs are reaching out to serve a national audience of students.

Admissions and Enrollment

Figure 1 depicts application data from academic years 2017 and 2018. The range of new applications received varied greatly among responding programs. In 2017, new applications ranged from 0 to 112 and in 2018 applications ranged from 6 to 78. The mean number of applications received was the same for both years at 34 applications. This is consistent with the mean number of applications for bachelor's programs (n=34), but less than master's programs (n=30) in 2016 as listed in the CoARC 2017 report.[4] Respondents report that approximately six applicants a year, on average, are not qualified for admission. A majority (73.3%) of the programs report interviewing candidates as part of the admissions process.

Figure 1. 2017 & 2018 Application Numbers



Respondents indicated that the approved maximum number of students they can admit, as a new cohort for both 2017 and 2018, was a mean of 26 students. This is also consistent with CoARC's 2016 report on maximum mean for bachelor's programs in 2016 (n=26), but lower at the master's level (n=19).[4] Figure 2 illustrates "enrollment capacity." Respondents report a wide range of newly enrolled students. Enrolled students ranged from 0 to 66 in 2017 and from 0 to 56 in 2018. The mean number of new students in 2017 was 20, and in 2018 it was 21. This is above the latest reported 2016 CoARC mean (n = 16, n = 13; bachelor's, master's respectively), but below the reported full enrollment mean from respondents of this study (n=26).

Figure 2. Enrollment Capacity

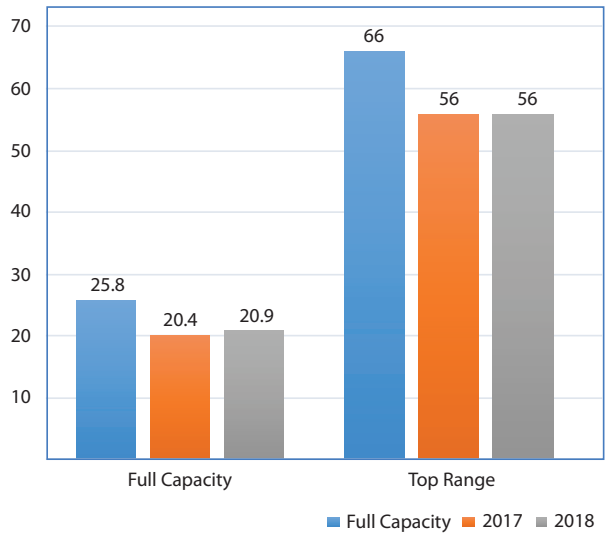


Table 1 presents comments by respondents when asked what might be contributing to lower enrollments. Comments were categorized by lack of awareness, program and clinical resources, constraints related to higher education, and competition. Lastly, participants were asked if their programs were interested in joining an application sharing service, such as a centralized application service. Of the 28 responses, 57.1% were interested (n=16), with 42.9% not interested (n=12).

Recruitment

To learn about recruitment practices, the survey requested written comments. Table 2 summarizes recruitment practices that work best for respondents. Comments were organized by faculty-driven recruitment, student-driven recruitment, curriculum, and social media methods. Table 3 lists the practices that respondents believe to be less successful recruitment strategies in their

Table 1. Factors Contributing to Low Enrollment

Lack of Awareness	Program and Clinical Resources	Constraints Related to Higher Education	Competition
"Lack of student awareness"	"Not enough clinical sites"	"Tuition costs"	"Competition with internal Health Science with no second admission required"
"Lack of exposure, need more campus and online presence"	"Limiting international student acceptances"	"Financial Aid"	"Competition with AS programs"
"Unknown profession"	"Lack of classroom space to expand"	"Lack of, or decrease in number of qualified students not able to pass pre-requisites"	"Competition with graduate programs, i.e. PT, PA & Nursing for advanced degrees"
"Lack of community awareness"		"University does not recruit, high turnover in admissions and advisement services on campus"	
"Lack of strategic plan for recruitment"		"Higher education changes with consolidation, mergers, etc."	
"New program"			
"Advisors do not promote RT programs"			

Table 2. Recruitment Strategies – Best Practices per Program Director

Faculty Related	Student Driven	Curriculum	Social Media
"Faculty attending Freshman orientation, transfer day, university open house, Preview Day"	"Declaring respiratory therapy as a Freshman"	"One-credit 'Introduction to Respiratory Therapy' course as prerequisite to RT program; taught online and face-to-face"	"Up-to-date and engaging web-site. To be successful, a strong media presence is important."
"Dedicated Faculty Advisor who interacts with Advise-ment Center"	"Student-led middle and high school visits to promote program to health/career exploration classes"	"MOU with AAS programs for completion of all prerequisites that leads to expedited admis-sions, if qualifies"	"Advising information posted to Facebook and Instagram, i.e., Info Sessions, Advisement Hours"
"Face-to-face Info Sessions and college career fairs with prospective students"	"RT Club, which promotes program on campus to friends and class-mates"	"Teach lower level A&P courses to get access to undecided students"	"Alumni network via social media with prospective students regarding the profession"
"Marketing to key stakehold-ers on campus to assist with recruitment"	"Providing personal referrals for faculty to contact"	"Instructional Pathways (also called Career-Pathway maps) that all advisors use in advising undecided majors"	"Paid web ads via AARC"
"Access to competitive gradu-ate programs (PA, PT, Pharm) to redirect to RT"		"MOU with graduate programs that require a bachelor's degree for admission (when MS in RT not offered)"	"Posting credentialing success on your website to increase your reputation"
"Simulation demonstration in Sim Lab"		"Providing tuition payment for entire program via bundled payment"	"Posting application online"
"Provide presentations to lower level undergraduate science classes, health professions club and advising meetings"			
"Access to pre-nursing stu-dents to redirect to RT"			
"Word of mouth"			
"Being visible on campus"			

Table 3. Less Successful Recruitment Strategies per Program Directors

Cross Campus Outreach	External Outreach
"Going to the Biology Building"	"Mass mailings, mass email blasts, Flyers"
"Working with the Nursing Department"	"HOSA recruits or HOSA events with large number of colleges present"
"Recruitment Tables on campus"	"High School Career Days"
"Allowing the University to recruit for you"	"Career Fairs"
"Open houses"	"Word of mouth"
	"Pamphlets"

programs. Comments were grouped as cross-campus outreach and external outreach. Two respondents were not sure what proved to be unsuccessful, one reported "N/A," one indicated that it was "difficult to recruit," and another post was difficult to categorize, "Low wages, no differential in wages." Respondents provided more comments for strategies that program directors believe foster recruitment (n=26) verses strategies that hinder recruitment (n=10).

Discussion

Findings at the time of this study resemble the last reported CoARC report in 2016 in terms of applications received.[4] However in 2017 and 2018, program directors participating in this study reported enrolled cohort sizes higher than the national average in 2016. Low enrollment is mainly due to students' lack of awareness about the profession and a lack of exposure (face-to-face or virtual) on campus due to advisors who do not promote the respiratory therapy program. According to these program directors, the best recruitment strategies result from a faculty presence at new student orientation and in advisement centers, conducting career fairs, teaching a respiratory therapy "intro" course as a pre-requisite or other lower-division course. Other strategies are memorandums of understandings with associate programs for fast-track admissions, student-led clubs on campus, a robust online presence, and a website that allows for online applications. Respondents stated most applicants are recruited from within their state of residence and are interviewed prior to admission. Lastly, respondents were asked if they might consider using a centralized application system (CAS™) in the future. Slightly more than half of the respondents indicated that they would be interested in CAS™ for admissions. No publications were found that could allow for comparison of recruitment and enrollment management in relation to this study.

In answering the research questions in relation to these findings, there are challenges in recruitment and admissions that program directors of bachelor's and master's degree programs must navigate. The findings also show that many bachelor's and master's degree programs are enrolling fewer students than the amount approved to enroll and therefore not at their maximum enrollment capacity. This author conducted an analysis of reported CoARC data by state and found that bachelor's and master's degree programs are at full capacity or at their maximum enrollment when 1,367 students are enrolled. However, the actual enrollment was 927 students or 67.8% capacity in 2016. "Lack of awareness" for the profession was reported as one reason for low enrollment. In a 2003 study of over 1800 students enrolled in six allied health programs, including respiratory therapy, the authors showed that practicing professionals are the most effective initial source of information. Prospective students are more inclined to enroll in allied health educational programs if they are encouraged to do so by a practitioner.[6] Of the most successful recruitment strategies provided in this study, 14 of the 26 responses involved an encounter with a faculty member, a current student, or an alumnus of their program. "Competition" was reported as a constraint for admissions in this study. Three responses were provided as "competition with AS programs," "competition with graduate programs," and "competition with internal Health Sciences with no second admission required." The reasons for competition being an impediment needs further investigation.

Interviewing candidates is an admissions criterion used by 76% of the respondents. Admissions to health-related professional programs are competitive and selecting candidates is critical for success. A meta-analysis of 19 articles by Goho and Blackman examined the effectiveness of academic admissions interviews. The authors found that the predictive power of interviews for "academic" success indicated a very small effect (0.06 at 95% intervals 0.03 – 0.08), and for "clinical" success a mean effect size of 0.17 (95% confidence interval 0.11 – 0.22), indicating a modest positive predictive effect.[7] Gaps in the literature exist in the practicality and significance of interviewing respiratory therapy students prior to enrollment.

Social media serves as one of the primary means of communication in today's society. While this study did not focus specifically on social media recruitment strategies, respondents did include "online info sessions," "an engaging website," "advising information posted to Facebook and Instagram," and "posting credentialing success to increase reputation" as part of their recruiting

strategies. There is a growing body of literature on social media and student recruitment. A Google Scholar search provides more than 16,000 hits using the search terms "Social Media and Student Recruitment" with limiting the search to articles since 2015 and eliminating articles that include "patients." Respondents in this study believe there is a problem with knowledge and recognition of the respiratory care profession. "Posting application online" was reported by one respondent as a successful recruitment strategy. A robust social media strategy may be a tactic in branding one's message and to assist in eliminating the "lack of awareness" that results in low enrollment.

The CAS™ has proven to be successful in the disciplines that utilize this technology as over 7,000 programs rely on CAS™ to reach their enrollment goals.[8] These disciplines include medicine, nursing, public health, business, engineering, and many others. The CAS™ allows a student to apply to multiple degree programs on one campus, or to multiple programs across multiple campuses, by submitting a single application for admissions. Evidence from participating schools suggests programs that use CAS™ may expect an overall increase in applications of 10% or more, but individual increases will likely vary.[9] Currently, five universities are using Allied Health CAS™ for their respiratory therapy admissions.[10] Program directors should investigate to determine if this form of technology is a good strategy for their program.

Conclusions

Twenty-two of the 29 responding programs enrolled fewer students than their maximum CoARC approved number in both 2017 and 2018. The 2017 CoARC report asserts that many programs are not at full capacity. This study, despite the 48% response rate, compares well and is in agreement with the latest CoARC data available. This study did not review data for degree advancement programs only entry-to-practice bachelor's and master's degree programs. Relating these results to the AARC's goal of 80% of practicing respiratory therapists who will have earned, or are actively working to complete a bachelor's degree by the year 2020, it can be established that the 80% goal will not be reached. In this study, only two programs enrolled over 40 students per cohort. Not enough new respiratory therapists will enter the workforce by 2020 to increase the percentage from 56% to 80%, despite any practicing respiratory therapists who are completing degree advancement programs. Furthermore, the pipeline for more respiratory therapy graduates is weak given that other disciplines at four-year colleges and universities have cohort sizes of 40 or more students per year in their nursing, physical therapy, and occupational therapy programs.[11,12]

Limitations

With only a 48% return rate, it is difficult to know how other program directors would describe their admissions and recruitments successes and challenges. Answers provided were anonymous so no follow-up to those who did not respond occurred. The small response rate does not allow for generalizations to all bachelor's and master's programs as no statistical tests of significance were performed. More discussion is needed within the profession and among program directors to overcome the challenges in meeting enrollment capacity.

Future Research

Research focused on the outcomes of personal influences in directing potential students to respiratory therapy educational programs is needed. In addition, the efficacy of various forms of social media in recruiting potential students to the respiratory therapy profession should be reviewed. Strategies in this study that were not viewed as being successful recruitment approaches need further examination. Both quantitative and qualitative study methods identifying characteristics of large bachelor's and master's degree programs (> 40 students) may be beneficial to programs that need evidence in order to expand. Lastly, research is needed to ascertain if the respiratory therapy profession will be able to graduate enough new respiratory therapists to meet the projected workforce demand for respiratory therapists in 2026.

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Appendix A

Survey questions:

1. How many applications did you receive for cohort year 2017? Please enter a number or range.
2 How many applications have you received for cohort year 2018? Please enter a number or range.
3. Approximately, how many non-qualified applications have you received for cohort 2018? Please enter a number or range.
4. Do you interview applicants prior to making admissions decisions?
5. What is the maximum number of students allowed by CoARC per cohort?
6. How many students were admitted at the start of cohort 2017?
7. How many students do you plan to admit for the 2018?
8. If you are not at full capacity, what might be contributing to your lower enrollments?
9. What recruitment strategies work best for your program?
10. What recruitment strategies proved to be unsuccessful for your program?
11. How many faculty FTEs are employed in your program?
12. How many part-time instructors are employed in your program?
13. What state is your program located?
14. What regions are you educating students for: county, state, several surrounding states, the entire country (select all that apply)?
15. Would your program be interested in participating in an application sharing service, such as a computerized application service?

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Exploring Why Respiratory Therapists Leave Practice: A Thematic Qualitative Analysis

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Abstract

Background: Previous studies of job satisfaction and career intention among respiratory care practitioners (RCPs) have adopted quantitative methods and no study has focused on RCPs who have actually left practice. **Purpose:** A qualitative study focused on discovering themes that underlie the decisions of RCPs who leave the practice of respiratory care. **Methods:** One-on-one interviews were carried out on a sample of former RCPs (n = 11) that are no longer in practice. Data were analyzed thematically. **Analysis:** The data were reviewed using a theoretical thematic approach informed by two-factor and self-determination theory. **Results:** Analysis of qualitative data resulted in the identification of three superordinate themes: Tensions between personal needs and the needs of others, workplace realities, and physical and mental strain. Findings: Themes emerging within the context of personal and others needs were opportunity, respect, family responsibility, and availability. Themes revealed within the context of workplace realities were 12-hour shifts, workloads, and salary. Within the context of physical and emotional strain, RCPs described physical/somatic complaints, stress, and burnout symptoms.

Key words: Qualitative methods, thematic analysis, career change, burnout, two-factor theory, self-determination theory, job satisfaction, RCPs

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Introduction

Workers in health care have reported high levels of dissatisfaction with their current jobs.[1-4] In addition to job dissatisfaction, burnout in health care workers, characterized by physical and emotional exhaustion, cynicism, and withdrawal is a widespread problem that can affect the health of frontline health care personnel.[5-6] Persistent levels of dissatisfaction and burnout can lead to consideration of career alternatives.[1, 7]

The research literature provides limited in-depth analysis concerning how former RCPs arrived at the decision to leave practice. The loss of RCPs from the profession is a concern, as the demand for respiratory therapists is projected to increase by 23% (much faster than the average for all occupations) between 2016 and 2026 creating additional pressure on hospital systems to attract and retain staff.[8] Understanding the career perspectives of these health care professionals is necessary if the profession is to maintain adequate resources of trained and qualified RCPs to meet anticipated employer needs.

Job satisfaction

Job satisfaction, dissatisfaction, and workplace motivators have been studied from the perspective of two-factor or motivator-hygiene theory.[9] According to the theory, motivators (e.g., job accomplishment, recognition) enhance workers' satisfaction and hygienes (e.g., company policies, benefits) tend to only affect job dissatisfaction.

Job satisfaction may also be understood from the perspective of need fulfillment and well-being represented by self-determination theory (SDT).[10] SDT posits human beings have an innate desire to be proactive, productive, and engaged. People have the potential and desire to grow and develop based on a combination of their psychological needs and the conditions that allow those needs to be met, nurtured, and directed.[10] When basic needs such as recognition and support are met, workers have the ability to adapt, develop, and thrive; when needs are unmet, dissatisfaction and dysfunction can ensue.[11]

Job satisfaction is an important predictor of leave intent. High levels of job dissatisfaction have been found to exist among RCPs. Results from an Association for Respiratory Care (AARC) employment study indicated nearly 20% of RCPs were unsatisfied with their jobs.[12] State survey data from California indicated only 66% of RCPs were satisfied with their jobs;[13] results from survey data in New York revealed 37% of RCPs were planning to leave the field within the next 5 years.[14] Job satisfaction has been found to be strongly influenced by various external (workplace related) and internal factors (personal experiences, beliefs, values).

The practice of respiratory care can create moral and ethical challenges for RCPs. Participation in end-of-life activities in regard to care for terminally ill patients may create a morally complex and stressful environment for RCPs.[15] The presence of moral distress without appropriate support affects job satisfaction, creates stress, and may lead to the development of burnout.

Burnout and Health

The construct of burnout is associated with occupational stress. Workers experiencing burnout are characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment.[16] Job dissatisfaction and constant stress can lead to the development of professional burnout, a syndrome affecting one's efficacy in the job and intent to continue in a profession.[12]

Estimates of burnout levels vary among professions. Worldwide levels of burnout in nurses range from 10 to 70% of the workforce and, among physicians, roughly 4 in 10 show at least one symptom of burnout.[17] RCPs with increased levels of burnout have been found to experience increased absenteeism along with a greater desire to leave the profession.[18] In a study of burnout among a combined sample of ICU nurses and RCPs, 54% of the cohort showed high to moderate scores on emotional exhaustion, 40% of the sample scored high to moderate in depersonalization, and nearly 41% scored low on personal accomplishment.[19]

Associations between job satisfaction, stress, and burnout are well described in the literature. Job satisfaction has been shown to have a significant and positive correlation with mental and physical health. Job satisfaction was found to most strongly correlate with mental and psychosocial factors (e.g., burnout, depression, anxiety, self - esteem, and general mental health) and less strongly with subjective physical illnesses such as headaches and digestive complaints. [20]

Purpose of the Study

The purpose of the research was to identify the themes that underlie the decisions of RCPs who have changed careers. Another goal of this study was to determine if personal health influenced the decision to make a career change. An additional purpose of the study was the need to explore the link between burnout and change decisions of the RCPs in the study group. In addition to the desire to capture broader themes, the study was also designed to attempt to answer the following: (1) Why did participants elect to change careers instead of changing jobs? (2) What was the effect of job dissatisfaction on the change decision? (3) What internal factors influenced career change

decisions? (4) What external factors influenced career change decisions? (5) How was the change decision related to concerns for personal health? (6) How did professional burnout affect the decision?

Methods

Procedure

Following Institutional Review Board (IRB) approval, participants were recruited from a 5-year cohort (2012 to 2017) of respiratory care graduates from a small liberal arts university in North-Central Texas. Graduates were contacted initially via email to determine study eligibility and interest. Three inclusion criteria were used to determine eligibility: (1) registered respiratory therapist; (2) licensed (current or prior) and; (3) no longer working as a respiratory therapist. Snowball sampling was also used to reach potential study participants who were not reachable via email; such subjects were contacted via Facebook.

Participants were emailed a consent form describing the purpose of the study, procedure, and their rights as participants. An incentive was provided to study participants in the form of a gift card as a gesture of appreciation and as compensation for the time required by the study. Signed consent forms were obtained from all study participants; each participant completed the interview and follow-up components of the research.

Qualitative thematic analysis was selected as an appropriate methodology for the study, as it is applicable to a variety of qualitative study designs. The data were approached from a theoretical thematic perspective. In contrast to an inductive method of data analysis, theoretical analysis focuses coding efforts on specific research questions that tend to be more analyst and theory driven.[21] Such an approach was believed to be appropriate as the study was oriented towards examining career change through the lens of two-factor and self-determination theory.

Instrument

A semi-structured interview approach was used for this study. Development of the interview guide was informed by a review of research literature relating to the phenomenon of career exit; two-factor theory and SDT theory influenced the development of research questions and the final version of the interview guide. The interview guide included five questions designed to address the following: (1) demographical information, (2) reasons for career exit (i.e., external and internal factors), (3) health and burnout effects, (4) current status and reflection, and (5) conclusions (Appendix A). Questions 2-5 contained follow-up questions to enrich the descriptions of the career change process. Face and content validity of the instrument was established through pilot testing the interview guide with three individuals known to have affected a career change from respiratory care.

Data Collection

The interview was conducted informally via telephone. The data collection method for this research was a combination of open-ended and semi-structured interview questions. All interviews were audiotaped, transcribed, and rendered anonymous via consecutive numbers.

The interview began with basic demographic and general information questions such as, "How long did you practice as an RCP?" before moving to questions addressing the central research topics. As needed, the interviewer used follow-up questions during the initial interview to further clarify responses. Data collection continued until no new information was forthcoming (e.g., content saturation). Saturation was achieved after 10 individual interviews; a final participant was interviewed in order to confirm initial themes and redundancy.

Data Analysis

Consistent with qualitative thematic methodology, the data were first transcribed, then the transcripts were read and re-read.[21] Queries, hunches, and possible follow-up questions were identified during this step. After thorough review of a transcript, features of the data were coded into smaller segments and a code book was developed for data segments. Data segments were reviewed and collated; codes were then grouped into potential themes and the process was repeated for all transcripts. All initial coding and thematic analyses were conducted by the author. Two outside examiners were used to review codes and themes. Thematic review was conducted, and a tentative thematic map of the analysis was generated. Connections between categories and the perceived strength of the connections were then evaluated in the context of current research. Review of final themes was conducted by the researcher and confirmation of the final thematic map was provided by study participants and independent reviewers.

Rigor was established via the use of outside analysts, member checks, and multiple theories.

Results

A total of 11 participants were interviewed for the study (Table 1). A majority of participants were female (73%), married (73%), working in other careers (73%), or currently enrolled in college coursework (27%). The average age of participants was 27.5 and average length of practice in the respiratory care profession was 3.7 years. All interview participants were self-described as Caucasian.

Table 1.Participant demographic information

Participant	Gender	Age	Experience	School	Status	Occupation
1	Female	28	2 years	No	M	Parent
2	Male	25	2 years	Yes	S	Student
3	Female	27	3 years	No	S	Teacher
4	Female	26	3 years	No	S	Nurse
5	Female	28	6 years	No	M	Marketing
6	Female	32	6 years	No	M	Marketing
7	Female	26	3 years	Yes	M	Health specialist
8	Female	26	4 years	No	M	Teacher
9	Female	28	5 years	Yes	M	Student
10	Male	27	2.5 years	No	M	IT specialist
11	Male	29	4 years	No	M	Public safety

Note: Experience (as a RCP), School (enrollment), Status (M – married, S – single)

Every study participant had experience in large medical center-based respiratory care while students. Greater than 70% of the sample had been employed by large health service providers at some point in their careers. Sixty-three percent of the participants currently reside in small- to medium-size communities in North-Central Texas.

Data analysis resulted in the identification of three superordinate themes: (1) tensions between personal needs and the needs of others, (2) workplace realities, and (3) physical and emotional strain. The model below (Figure 1) presents the various themes that are believed to have influenced career change decisions in the study group.

Figure 1. Final Thematic Map of Career Change

Theme 1: Tensions between personal needs and the needs of others

Participants discussed how decisions to leave practice were determined by the need to provide effective parenting for children and to create a sense of a more normal home life. In this context, a career in respiratory care was not considered to be undesirable or unpleasant, rather, the demands of the workplace in regards to work schedule placed young families in a position where difficult choices had to be made:

Participant 1: "After we had a child, we decided it was very important during those years when she wasn't in school for me to be at home."

Participant 5: "The reason I decided to leave respiratory was more of a family decision. I have a child and she is kind of getting to the age where she getting into activities and holidays and birthdays, that sort of stuff are becoming a bigger deal to me and my husband."

Participant 7: " ... thinking about my home life obviously, growing a family and still being able to accomplish the things I wanted at home without being impeded too much by work."

Other participants felt a career in respiratory care provided unsatisfactory support for personal development in the areas of opportunity, autonomy, and respect for professional competence – critical features for job and career satisfaction. Professional respect in this context was generally believed to be in regard to how respiratory therapists felt they were treated by other health care professionals. Although perceptions of reduced opportunity for RCPs was expressed by more than 90% (10 of 11) of interviewees, perceptions regarding job opportunity may be affected somewhat by location, as a number of participants had elected to remain in smaller communities for the sake of family connection.

Opportunity for participants was viewed as the ability to move into positions of more authority within the context of the hospital/medical center environment. Interestingly, professional opportunity did not necessary imply moves into management, but into positions imbued with

more responsibility for clinical decision making:

Participant 1: "But, I also feel that, locally, the options for the kind of work I would like to do in RT are kind of limited."

Participant 2: "I wanted a little more authority and, I guess, a little more respect overall and more responsibility … what I didn't like was … the respect from other clinical professions. The nurses will do respiratory procedures on their patients and they seem very controlling … you are constantly having to prove yourself. It gets kind of old."

Participant 8: "That was part of why I left too, because I didn't feel respected. You know it's kind of hard to say, but being a manager or director just never really appealed to me."

Participant 9: "If there were other opportunities that didn't include management, I would absolutely stay a respiratory therapist.… I am very much interested in working at the bedside … if there were broader options, I would love to stay in the field."

Theme 2: Workplace realities

Participants described the features of day-to-day life in respiratory care and the challenges regularly encountered in professional practice. Chiefly, participants most frequently mentioned pay, workloads, and schedules as features providing challenge to sustaining a respiratory care career. In regards to pay, participants noted the following:

Participant 1: "What I didn't like was the pay, if the pay was increased, if the job demands were different, I might have stayed."

Participant 2: " ... what I didn't like was the pay…."

Participant 4: " … and then there was the pay issue … what I was making, an LVN with an associate's degree was making about the same thing."

Participant 9: "The job is really stressful, physically demanding, and it's getting to be not worth the paycheck."

Workloads generated the following comments from participants:

Participant 1: " … it did get pretty crazy at times – almost unbearable – because you had so much work you couldn't get it all done, and not enough people to help."

Participant 7: "I know where I was working, we were really short-staffed and so our workload was probably twice what an average therapist should have."

Participant 9: "So, we could never, ever, get enough FTEs [full-time equivalents] to really fill every shift appropriately, so everybody was always behind schedule."

As previously noted, 12-hour shifts create hardship for families. The 12-hour work schedule was also found to be unpopular with more than 80% of study participants:

Participant 3: " … if the schedules could be changed to 8-hour shifts, a normal work schedule. It is hard to have a life because you don't know if you will get called in – working the holidays was a big deal to me too."

Participant 4: " … it's always 12-hour shifts pretty much … if a family comes along, there is no way to try to make it work – no 8-hour shifts."

Participant 5: "I told my manager I wouldn't leave if I could have a more favorable schedule."

Participant 6: " … it was strictly not having the care for my kids that I needed. We worked 12-hour shifts and I needed to be able to pick up my children."

Participant 8: " … But eventually I think I would have just left because of the hours … I've never been a fan of the 12-hour shifts."

Theme 3: Physical and emotional strain

Participants expressed how their need for a profession that was less physically demanding, produced lower stress, offered fewer health risks, or was better aligned with personal physical or emotional capabilities guided their decision to leave practice.

Participant 1: "It was stressful … I would cry every day before I went to work."

Participant 2: "Walking in the hospital, being on my feet so much was becoming hard for me. Specifically, for my knee … past surgeries made it necessary to find something less physically demanding, because in the future I'm probably going to need a knee replacement."

Participant 3: "I felt emotionally drained … the everyday dealing with death was hard for my personality. I felt like in order to maintain my sanity I needed to separate from it … my emotional well-being is what made me make the ultimate decision."

Participant 7: "I suffer from migraines pretty bad and we were always so short-staffed and … I would work extra. So working 6, 12-hour shifts a week wasn't the greatest for me, I suffered from migraines a lot."

Participant 8: " … I was always exhausted especially when I was working 5 nights a week. I mean … I think I burned myself out by working too much. I mean, I just always felt tired."

Participant 9: "You have a high stress job. It was just getting to the point where I was having a hard time separating my social life and life outside the hospital from my work … it felt like we were always running short, and it was just exhausting. I got sick, it seemed like, gosh, once a month with something respiratory related.… As an RT you really don't have what is considered light duty. When you're young and strong it's not that big a deal, but in this career path … I'm thinking, do I really want to be sprinting a half mile across the hospital when I'm 45?"

Discussion

The purpose of this research was to identify the themes that appear todescribe the reasons why RCPs leave clinical practice. Career change decisions are rarely made on the basis of one unique feature related to a career: The questions developed for this study are focused on areas relating to career change that tend to overlap, thus, for clarity, discussions relating to the research questions are combined to enhance readability.

Career Change/Change of Employer and Job Satisfaction

For the majority of participants in this study, the decision to change careers, rather than seek employment with another employer or in another area of respiratory care practice, was based on limited local opportunity for more satisfying employment in respiratory care; or, the inability of the jobs within the profession to satisfy personal or family needs. Such findings are supported by the job satisfaction/career intent research. The positive effects of opportunity and recognition and support within a job or career are features of the two-factor theory of job satisfaction and SDT.[9-10]

Participants in this study were disappointed by the options afforded by a career in respiratory care. A majority believed opportunity for career progression was limited and external reinforcements like pay and other benefits were lacking. Family concerns in regard to childcare-friendly work schedules were identified by some study subjects as a primary reason for leaving practice. Placing family needs above one's own need for career satisfaction is not an uncommon theme in the health care research literature.[13, 22] Addressing the needs of workers with childcare responsibilities can be problematic creating mismatch of personal and organizational goals. When competing job opportunities present themselves to such workers, the decision may be made to exit professional practice.[23]

Internal and External Factors Affecting Career Change

The participants in this study consistently described feeling disrespected and undervalued in their respiratory care careers. Unappealing aspects of a career in respiratory care align well with two-factor and SDT.[9-10] In two-factor theory, internal factors relating to job satisfaction are constructs like job recognition and a sense of accomplishment. Similarly, SDT posits constructs associated with feelings of relatedness, competence, and autonomy constituted basic psychological needs; when those elements are provided, individuals become more productive and engaged. It became clear when reviewing interview transcripts, RCPs in this study group did not experience persistently high levels of job satisfaction, nor did it appear basic psychological needs were being met.

In earlier studies focused on job satisfaction and career intent among RCPs certain internal factors such as, the quality of supervision, advancement opportunities in the workplace, and recognition by nurses and physicians had an effect on job satisfaction.[18,24] More recent work showed internal factors, primarily a lack of advancement opportunity and limited use of participative decision-making, caused job dissatisfaction.[13] Opportunity for professional growth has also been shown to be important for career retention among RCPs.[14]

External factors relating to job satisfaction are related to features of a job or career not easily controlled by the individual such as policies, procedures, and benefit structures.[9] Comments elicited from participants described salaries, heavy workloads, and unfavorable work schedules as features that affected their decision to leave practice. In a number of studies focused on RCPs, salary and benefits often feature as a major reasons why respiratory therapists leave practice.[12-14] Workloads and schedules are also frequently associated with RCP job dissatisfaction and career change.[12-13] Interestingly, in the nursing literature reviewed for this study, workloads, schedules, and quality of supervision were also found to affect job satisfaction and career change decisions;[1-2, 25] however, salaries and advancement opportunity do not feature as prominent drivers of career change decisions.

Concern for Personal Health and Burnout

In this study, participants reported a range of physical and psychological complaints similar to those reported for other health care workers. Study participants described feelings of physical and mental discomfort brought about by heavy workloads and long hours on their feet, and emotional pain experienced as a result of daily exposure to death and disease. Other participants recounted feelings of chronic fatigue, poor diets, and lack of exercise as a result of shift work, stress, and over scheduling. Stressful workplaces lead to feelings of job dissatisfaction and can lead to career exit.[20,26]

Occupational stress may result from structural or personal issues relating to the job, situational aspects beyond the worker's control, or internal characteristics influencing how a person responds to job demands.[27-29] For example, in this study, participants 2, 3, 7, and 10 reported, respectively, physical complaints (knees), emotional concerns, migraine headaches, and anxiety. Participant 1 expressed concern that she might bring home a contagion that could infect her newborn child, and participant 9

discussed how she was chronically ill during her first few years of practice. A majority of participants described the environment inhabited by RCPs as stressful and unsatisfying. The presence of chronic stress and dissatisfaction with one's work life can lead to feelings of professional burnout and a desire for career change.[16]

Burnout has been identified in RCPs with elevated levels resulting in increased absenteeism from work and increased leave intent.[18] Emotional exhaustion, depersonalization and reduced levels of accomplishment have also been demonstrated in RCPs who frequently work in the intensive care setting.[19] Only two participants in this study referenced burnout as a possible reason for leaving the profession, however, based on frequent descriptions of being exhausted, overloaded, and stressed one might speculate that burnout was more prevalent than reported. Workplace demands, such as heavy workloads and an excessive number of work hours, are associated with emotional exhaustion. Inadequate resources, like reduced levels of staff, have been shown to affect levels of depersonalization.[30] In this study, a majority of participants expressed the belief that the profession was plagued by heavy patient loads and chronic understaffing, thus, symptoms expressed by persons interviewed for this study could be considered signs of burnout.

Limitations

In the current study, the career change process is presented from the perspective of a fairly homogenous group of participants. A second limitation resides with the researcher, a former professor of all participants. Study subjects may have been less forthcoming in regard to true feelings concerning their reasons for career exit in order to maintain a sense of collegiality with the interviewer.

Recommendations

A larger study including associate degree prepared RCPs would be useful, as this study only includes recently graduated RCPs holding the bachelor's degree. Ideally, a study made up of a larger sample of RCPs from a variety of geographical locations reflecting the two levels of preparation and representative of various age and experience levels would be performed to establish appropriate quantitative conclusions. For qualitative researchers interested in this issue, an analysis of the themes relating to career change from an inductive rather than theoretical orientation might provide for a richer description of the data. Similarly, examining the data at a latent (interpretive) level of analysis would allow researchers to view the data from the perspective of underlying assumptions or beliefs that might inform sematic content. Analysis of the deeper meaning of key words like respect and opportunity could provide practical guidance for persons interested in improving the clinical practice of respiratory care.

Conclusions

Consistent with previous studies of job satisfaction and career intention, various internal factors relating to work in clinical respiratory care practice appeared to exert the most influence on RCPs who exited the career. Job stressors relating to the environment (i.e., external factors) surrounding health care work and health concerns also affected career change decisions in the study group. The findings generated by this study were found to be supported by previous work examining job satisfaction and career intention in RCPs. Fresh insights were gained in regard to the effects of perceived lack of respect and opportunity for professional growth in respiratory care practice. Additionally, discussions with study participants allowed for a greater understanding of the effects of work schedules on family life. Many former RCPs expressed a lack of desire to move into management, a common route for career progression. They expressed regret that the profession did not appear to afford them the opportunity to remain at the bedside in a role with more responsibility and autonomy in clinical decision-making.

It is believed this study has implications for respiratory care administrators and educators. During participant interviews it became clear that the day-to-day realities of clinical practice took a physical and emotional toll on the participants. Health care providers during the early part of their careers tend to experience more burnout and stress than their colleagues with more practice time.[18, 22, 31-32] Department managers should consider trying to buffer some of the challenges new practitioners might face via mentoring programs, regularly scheduled one-on-one or group discussions, and career guidance. Such approaches might provide a healthy outlet for reviewing stressful events or provide a conduit for dispensing ideas relating to career longevity. Educators should clearly explain to potential students the workplace realities experienced by RCPs and allow ongoing students the opportunity to discuss elements of the career that might seem overwhelming or frustrating. Early engagement with students on issues known to affect new practitioners provides a frame of reference offering the hope that workplace challenges can be dealt with creatively and productively, thus promoting more career satisfaction and, ultimately, career retention.

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Appendix A
Questionnaire

Warm up question: In what area are you working now? How long have you been there?

I. Demographic information
   1. Age?
   2. When graduated?
   3. Currently enrolled in school?
   4. How long in practice?
   5. Current occupation (e.g., specific career, or title)?
   6. Family questions (i.e., married, children, etc.)?

I

I. Can you describe why it was that you decided to leave respiratory care?
   1. Tell me about the details that formalized the decision for you.
   2. Describe the process that you used in deciding that you needed to change your career rather than change your employer.
   3. Describe the features you liked and did not like about your job.
   4. Could you explain your personal feelings in regards to respiratory care work?

III. Tell me about how you felt when you were trying to decide if you needed to make a career change.
   1. How would you describe your health when working as a respiratory therapist?
   2. How did health concerns influence your decision to leave practice?
   3. How would you describe your health currently?
   4. What were your feelings about yourself when working as a respiratory therapist?
   5. What were your feelings about your future when you worked as a respiratory therapist?

IV. We have just discussed how the decision to change careers affected you. Thinking back, can you explain how your feelings either physical, mental, or emotional affected your ultimate decision?
   1. How are you feeling now about the decision to change careers?
   2. Can you describe anything that could have been changed with you personally that would have affected your decision?
   3. Any changes within the respiratory care profession that would have affected your decision?

V. Conclusions
   1. The main portion of the interview is now complete. Is there anything you would like to add that would enhance our understanding of the processes you used in making your decision?
   2. I will transcribe the audiotape and review the transcription with you later this week.
   3. Thank you for taking the time to talk with me today.

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Exploring Death Coping Strategies of Respiratory Therapists Who Work in Neonatal Intensive Care Units: A Pilot Study

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Abstract

Introduction: Students and new graduate respiratory therapists often have questions and concerns related to how to cope with the loss of infant patients. Learning how to cope with the loss of a patient is not something that can be learned from a textbook. This qualitative study sought to discover coping strategies used by respiratory therapists to deal with the dying and death of patients in NICU's. **Methodology:** Participants were selected through convenience sampling of respiratory therapists who worked in NICU's in Texas. Inclusion criteria for the study were respiratory therapists who had worked full time in a NICU for at least one year and had experienced the loss of an infant patient or patients. Semi-structured 20-30 minute interviews were conducted with participants in person or on the phone. The interviews were recorded and transcribed. Open-ended questions were asked to each participant. The analysis of data for this qualitative study used an emergent strategy, to allow the method of analysis to follow the nature of the data itself. Data was analyzed using a thematic coding approach and constant comparison. **Results:** Emerging themes were: (1) Separation, (2) Acceptance, (3) Support, and (4) Experience. **Conclusions:** From this study, students, new graduate respiratory therapists, and other health care providers may better understand how to cope with the death of an infant patient. Organizations and educational institutions may be able to use the information to promote critical reflection and facilitate awareness of coping strategies.

Key words: coping, death, dying, respiratory therapist, Neonatal Intensive Care (NICU), grief, emotions, qualitative

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Introduction

In hospitals every day, health care providers walk in not knowing what their day will hold. In the NICU, every minute a neonate is stable is a sigh of relief. Respiratory therapists begin working with their tiny patients from the moment they enter the world until, sometimes, the moment they leave it. The days, weeks, and months spent with these neonates establishes an intimate relationship between the infant, their families, and the team of health care professionals. The vast majority of infants in the NICU are admitted for a "trial of therapy," agreed on by their physicians and parents. If the infant does well, then all is well; if they do poorly, then how will they die?[1] Respiratory therapists are part of this health care team tasked with caring for these infants and their families, providing care and support at an intimate, stressful and often emotional time. They must draw upon a range of coping strategies in order to manage the personal and professional impact of this care. The death of an infant triggers a cascade of intense emotions and multiple layers of loss and grieving within the family.[2] Health professionals who provide care leading up to and following the death of an infant are a supportive presence in the midst of providing end-of-life care. They must navigate the situation carefully in order to guarantee families are supported effectively.[3] This is an enormous burden for health care professionals who often experience emotional, physical, and moral distress arising from end-of-life care.[4-5]

Each health care provider approaches end-of-life care with variations in knowledge, philosophy, experience, and specific roles. The impact of a patient's death can have a profound effect upon health care providers, in a personal way.[6] Health care providers may suppress grief or moderate its display in social interactions at work in order to meet the needs of the organization and care for patients.[7] Researchers have noted differences among health care professionals in relation to palliative care, its impact, and the need to consider the distinct needs of each discipline.[8-9] Hopkinson et al stated, "nurses caring for dying patients emphasized potential harm of becoming emotionally involved and in order to sustain personal well-being they must find coping strategies."[10]

Health care providers need to be able to cope with losing a patient. In a study conducted on how NICU nurses cope with death, some found comfort through spiritual support.[11] While spiritual support is not helpful for everyone, it can be important as they grieve the loss of a patient. The use of religious beliefs and resources may aid in coping and alleviate stress for those working closely with dying patients.[3] Peer support has also shown success for health care professionals dealing with the loss of a patient. They confide in peers that have also been through the death of a close patient, since they themselves know personally what the tragedy can cause. There is a bond between health care providers, particularly when they have worked together for a long time, since they deal with suffering and death. It is therapeutic to be able to confide in each other.[11] Skilbeck and Payne found that nurses cope with grief-related distress though disclosing, concealing, and containing emotions.[12] Health care providers may also turn to family when they experience mourning. When providers turn to partners or family members, they may experience additional support by sharing emotional sentiments with trusted loved ones free of judgement or resentment.

The purpose of this study was to gain a deeper understanding of how respiratory therapists cope with the death of a patient. A search of the literature surrounding coping mechanisms of NICU respiratory therapists revealed that research in this area is scarce. Limited research was found on the social, physiological, and mental effects of caring for terminally ill infants, as well as how they internalize this type of patient care. In a study by Brown-Saltzman et al, authors noted that practicing respiratory therapists encountered substantial experiences with end-of-life care, which resulted in stress related to dealing with death and dying issues.[13] Students and new respiratory therapists often find themselves thrown into a fury of code situations with patient and family emotions, and are encouraged not to express their emotions. The goal of the study was to explore coping strategies used by NICU respiratory therapists to deal with death. Information from this study may help students, new graduate respiratory therapists, and other health care providers understand coping strategies used to deal with the death of an infant patient.

Methods

Study Design

The conceptual framework for this study was the assumption of social constructionism that acknowledges that meaning is shaped by our interactions with others, and people construct knowledge between them in their daily interactions in the social world.[14] A qualitative approach seeks comprehensive understanding of social processes. In this case, researchers explored how respiratory therapists working in a NICU constructed and coped with the death of a patient. This interpretive inquiry necessitates an inductive, qualitative approach given the complexity of interpersonal and emotional phenomenon. The methods for this qualitative study were based on obtaining data through semi-structured interviewing, and the narrative accounts of a convenience sample of respiratory

therapists who worked in NICUs in Texas. Researchers, who were undergraduate students and faculty members from a public liberal arts university, sought out volunteers at clinical affiliates who fit the inclusion criteria. Inclusion criteria for the study included respiratory therapists who have worked in a NICU for at least one year. The research question addressed by this study was: How do respiratory therapists who work in NICUs cope with the death of a patient?

Participants

Sampling in this qualitative research was purposive.[15] Ten participants were selected through convenience sampling of respiratory therapists working in NICUs located in a Texas. Qualitative analyses typically require a smaller sample size than quantitative analyses. A typical sample size for a qualitative study is between five to twenty-five individuals, all of whom have had direct experience with the phenomenon being studied.[16] Participation was voluntary and they did not receive compensation for participating in the study. Inclusion criteria for the study included respiratory therapists who had worked full time in a NICU for at least one year and had experienced the loss of an infant patient or patients. In addition, participants had to agree to a recorded interview lasting thirty minutes to one hour and agree to a follow-up phone call for clarification purposes if necessary.

IRB Considerations

IRB approval was obtained. Participants were not identified by name or by the institution in which they worked. It was important for participants not to feel as though their job was in jeopardy because of something they said in the interview. Recordings and notes were kept secured in a locked area that could only be accessed by the researchers. Participants signed an IRB consent form prior to participating in the study. Interviewees were also told if they were uncomfortable with any of the questions asked, to let the investigator know immediately and they would move to the next question. Participants were also given the choice to end the interviews at any time.

Instrumentation and Data Collection

The method for data collection was semi-structured interviews that were audio recorded and transcribed. Eleven open-ended questions were prepared and used to guide the interviews (appendix A). The semi-structured interviews lasted approximately 20- 30 minutes and were conducted individually. All interviews, except for one, were conducted in person. Additional questions for clarification such as "Can you expand on that issue?" or "How did that make you feel?" were also asked during the interviews. Prior to the interview demographic information was obtained. Demographic information that was collected included age, years of experience working in a NICU, and level of NICU they worked in.

The researchers had a relationship with most participants, as they were clinical preceptors that the researchers knew. The researchers encouraged participants to give a full description of their coping experiences, including their thoughts, feelings, images, sensations, and memories, along with descriptions of the situations in which the experiences occurred. The researchers listened closely as participants described their experiences related to losing a NICU patient and how they coped with the loss. As interviews were carried out, trends, themes, and patterns were identified in responses from the participants. Inferences based on the newly acquired information were continuously made. Throughout the data collection process, the researchers corresponded with participants and tried to obtain details to provide an enhanced understanding of their personal experiences. The data-gathering process continued until a continuous feedback loop between data, data analysis, results, and conclusions occurred. At this point information saturation in sampling was obtained.

Data Analysis

The study explored the experiences of respiratory therapists who work in NICUs, therefore the data analysis was thematic and interpretive. The interview recordings were transcribed by the investigators. Open coding, which is a process of matching codes with common themes and relationships, and selective coding allowed the investigators to choose core categories or themes that emerged from data.[17] Various means were used to identify and develop an overall description of how respiratory therapists who work in NICUs cope with the loss of patients.

The primary strategy that was utilized in this study to ensure validity was the provision of rich, thick, detailed descriptions so that anyone interested in transferability would have a framework for comparison.[17] Participants verified the transcripts. This is one method by which the validity of the study results was ensured.[18] The participants were notified on the consent form that the researchers might contact them after the interview to clarify their answers or comments.

Results

Five participants were female and four were males. The ages of the participants ranged from 29-61 years. Participants had practiced as respiratory therapists ranging from 1-33 years and had worked in Level I – IV NICUs ranging from 1-29 years. The study had representation of respi-

ratory therapists who worked in different level NICUs in Texas. All participants met the inclusion criteria and all were willing to be interviewed. They gave their time willingly and were interested in participating, regardless of the lack of incentives or compensation. Participants seemed interested in the researchers' goals and the purpose of the study. As the researchers asked questions and interviews went on, participants seemed more at ease and opened up further. Participants expressed their feelings, offered feedback, and discussed how their experiences may help others. They appeared to be open and honest in their responses. The transcription resulted in 24 single spaced pages of data. Open coding resulted in five pages of identified codes. Interpretation of the emerging themes enabled the investigators to draw meaning from the data, leading to understanding about the participants' experiences. The list of themes is compiled in Table 1 and discussed below:

Table 1. Emerging Themes

Theme 1	Separation
Theme 2	Acceptance
Theme 3	Support
Theme 4	Experience

Separation

Eight out of ten participants felt that it was important to separate work from home life and to avoid emotional attachment to patients. They sought to suppress and contain grief by using an emotionally detached approach separating work from their home life, although participants stated it is difficult not to get attached to patients." In addition, they try to leave work at work. Here are some of their comments on separation:

> "You have to be compassionate with patients but, you also don't want to get too attached because it is a lot harder."
>
> "It is hard because some patients are in the NICU for like six months, but you kind of have to be subjective and not get attached to every one of them. Your job is to make them better, not to bond with them, even though it is hard."
>
> "I try and separate work and home stuff because if not I'd probably be depressed all the time about sick babies."
>
> "I always try to separate it and never take stress from work home or from home to work. On my days off I like to hunt, fish, do outdoor activities and not think about work. I remove myself from the situation and go for a walk, if I can."
>
> "I developed an attitude, this is my job, and I try not to let it affect me too much. I keep it at work when I go home. There has been times where it has affected me more. I usually don't dwell on it."

Acceptance

Another theme identified was acceptance. Eight participants mentioned accepting the circumstances is a large aspect of coping and patient care. Participants stated that they rationalized that the team provided the highest quality of care possible and the patient is no longer suffering. Some participants struggled with acceptance during particular circumstances. The following are comments made by study participants on acceptance:

> "I will definitely be sad, but I usually look at their quality of life versus their quantity of life. I can usually make peace knowing that their quality of life was not the best."
>
> "If it was something really long and drawn out and the neonate was in pain than it is easier to see the patient go because you know they are in a better place."
>
> "I get attached to patients and families, at times I feel like I am the bad guy pulling the tube. I have excused myself, gone, and cried in a closet. Then I accept I did my best and move on to caring for other patients."
>
> "If it was something like an airway issue or something that happened acutely it is a little more difficult."
>
> "You always question yourself, 'Am I doing what I am supposed to do? Am I taking care of this kid to the best of my ability even when their prognosis is poor?' but you have to trust your skills and accept that you did the best you could no matter the result."

Support

Support was the most helpful coping mechanism for all ten participants. All participants interviewed reported having some type of support system including family, friends, coworkers, and spiritual guidance. Six of the participants stated that the support of their institutions through formal or informal debriefings was very beneficial. It was also mentioned that after code blue scenarios in which the infant passed away, many participants spoke with their fellow co-workers. Four participants found support through friends and family. Here are a few of their comments on support:

> "Usually we have a debriefing with a pastor. It helps to talk about it. I appreciate pastoral care

praying with us. They pray individually with us and as a group."

"Debriefings with us allow us to come together as a group and really talk about what happened."

"I have had a couple of codes where a patient passed away. Other practitioners came over and talked to us and we debriefed and talked about the situation. This helped to get closure and it felt like the team was supporting you and that you can work though what went on with the baby and how we could have done some things better. If, even if the result would have been the same, if the situation would have been better or run a little smoother. I feel like those moments really helped a lot."

"My boyfriend is also a respiratory therapist so it is good to have someone to talk to who can relate to what I am feeling instead of having to internalize it."

"I have a great wife, great kids, great friends, just a great overall support system."

"I sometimes talk to my wife about patients I lost, she was a NICU nurse."

Experience

All ten participants overwhelmingly stated that having experience over time working in the NICU and adapting to the challenges of caring for critically ill patients has helped their coping skills to evolve. Participants stated that many new therapists are nervous and perhaps do not understand how to handle the gravity of the situation as it is unfolding. According to three participants:

"You learn to have better coping mechanisms with each situation you are involved in. It never becomes easier but you learn how to deal with death better. I can tell you one of the best experiences that I have had was with a physician that was clueless on how to tell the parents that the patient passed away. It taught me what not to do."

"I feel like I handle the situations a little better now, but I think if I ever got to the point where it didn't affect me at all then I probably shouldn't be doing this anymore."

"Seeing them die is always hard, but if you can learn how to identify the disease process sooner, then with the next patient you have, you can be quicker to jump on it."

Often new therapists question whether they did everything correctly. With experience, respiratory therapists learn what coping skills work best for them and utilize these new resources to comfort both themselves and those around them during trying situations. Here are some statements by participants on how experience helps:

"When I first worked in the NICU it emotionally drained me to the point where I went home at night and would sometimes cry. Over time, the way we took care and the way we deal with children who are not going to make it changes. Like, having the mom hold her baby while they pass makes me feel like we did everything possible and gives me closure in spite of the outcome."

"Experience has helped me learned that I don't have control over everything and there is only so much can do."

"With experience I have learned how to get my emotions out in a controlled fashion. I use to bottle everything up inside. Now I know it is important to talk about things right away. I also try to distress by refocusing my energy. I like to do yoga, exercise, or color a picture in honor of the patient I lost."

Limitations

There were several limitations to this pilot study. One limitation to this study was the use of convenience sampling of respiratory therapists who worked in Texas and the results cannot be generalized to respiratory therapists working in all NICUs. In addition, qualitative research does not provide the breadth that a quantitative study with a larger sample size would. Investigation triangulation and participant verification of transcripts was done to insure validity.

Bias and Assumptions

Since convenience sampling was used, the researchers recognized the potential for bias. Researchers were passionate about the subject, and recognized that they may have assumptions that need not influence the interviews and analysis. During the study, the investigators put aside their assumptions and maintained a neutral stance. Researchers also asked colleagues not included in the study to review the results and conclusions to look for signs of bias.

Discussion

The interpretive approach to this research facilitated the exploration of themes associated with how respiratory therapists working in NICUs cope with the death of a patient. The researchers examined the content of the

interviews. In addition, researchers observed emotions and interactions during the interviews. This helped to provide information about how particular frameworks of meaning can generate ambivalence and contradiction. Nine participants had similar coping strategies. From the study, researchers found the coping strategies used by respiratory therapists who work in NICUs are separation, acceptance, support, and experience. A qualitative nursing study on how nurses cope with caring for dying people found similar themes (relationships, resources, and experience).[19] Through the acknowledgment of coping strategies, promotion of emotions related to grief in the workplace can be associated with wellness, not weakness. Coping with the loss of a neonatal patient was characterized as emotionally difficult and participants believed that by separating home and work, they were better able to manage emotions such as grief. In addition, they learned to accept that they did the best job that they could for their patients. Moreover, professional norms of self-control came with experience. Finally, although participants sometimes sought to prevent grief through limiting emotional attachments, this could conflict with self-identities as caring individuals. They found support from family, friends, coworkers, and spiritual guidance. Many participants agreed that with experience of working in the NICU and adapting to the challenges of caring for critically ill patients, over time participants were able to develop their coping mechanisms and overall better patient care. Coping strategies helped participants to better handle the stress and emotional toll of losing patients. Similar results (support, separation, and experience) were found in a study of nurses caring for families coping with perinatal loss.[20] One participant from the study stated, "There is nothing that takes the place of experience. You just have to do it to feel comfortable."[20]

From this study, researchers are able to provide recommendations or suggestions to students and new graduate respiratory therapists. All participants interviewed plan to continue their careers as NICU therapists in the future. Often students, new graduate respiratory therapists, and other health care providers are hesitant to learn about or work in NICUs. They do not understand how it is possible to deal with the loss of a neonate. Greater attention should be directed to the organizational and professional context that influences grief experiences as well as how to cope with loss. One participant stated, "Death is part of the health care industry and you have to find your own coping mechanism to deal with it."[21] Less than half of all respiratory therapists receive education about issues related to patient death and dying.[22]

Conclusion

Information from this study may help students, new graduate respiratory therapists, and other health care providers understand coping strategies used to deal with the death of an infant patient. Organizations and educational institutions may be able to use the information to promote critical reflection and facilitate awareness of coping strategies. It is important to promote awareness that emotions related to the grief of the loss of an infant patient are normal, and that coping strategies are essential to the mental and fundamental wellbeing of respiratory therapists. Very little research has been done in regard to how respiratory therapists cope with the loss of a neonatal patient, or how to better prepare future practitioners for these situations. Similar studies in different geographical areas and large-scale quantitative studies are warranted.

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Appendix A

Interview Protocol

General Introduction: Thank you for your willingness to participate in this study. The interview should take approximately thirty minutes. There are several questions we have prepared for this study. I may ask additional questions for clarification such as, "Can you expand on that issue?" or "How did that make you feel?" If you are uncomfortable with any of the questions I ask, please let me know immediately and I will move to the next question. You may choose to end the interview at any time. Your responses will help to provide insight into coping strategies used by respiratory therapists who work in neonatal intensive care units (NICUs). Please understand that your identity will be kept confidential, and your responses to any of the questions will not be reported in a way that could reveal who you are or the institution that you are employed by. Do you have any questions before we begin?

I would like to ask you a few questions about your experiences with the loss of a neonatal patient and how you cope:

1. What motivated you to work with critically ill neonates?

2. What challenges have you encountered when providing care for terminally ill neonatal patients?

3. How does the death of a neonate affect you?

4. Do your experiences of the death of a neonate influence your patient care?

5. Does the emotional stress of your job affect your personal life? If so, how?

6. What are your current coping strategies?

7. What specific coping strategies do you utilize at work vs. home?

8. What support, if any, do you have at home? Work?

9. Have your coping strategies evolved throughout your career?

10. What are your future plans regarding your place of work? (Do you plan to continue working in the NICU?)

11. Is there anything else you would like to add?

Concluding Remarks:
Thank you again, for your time and willingness to participate in this study. I will be reviewing my notes from the interview and may contact you again if I or the other researchers have further questions. If any questions arise do not hesitate to contact me. Here is my email address:

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A Descriptive Study on the Communication Skills of First-Year Undergraduate Respiratory Therapy Students

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Abstract

Background: The age-old adage of "communication is key" holds true when health care professionals effectively treat patients and work together appropriately in teams. Specifically, in RT education, students are taught the value of interpersonal communication skills; however, it is unknown how much formal communication training RT students receive. This may result in a lack of standardization in how team members work together, which can directly affect patient outcomes and health care costs. The purpose of this pilot study was to describe the impact of evaluation and feedback on face-to-face communication skills in undergraduate RT students. **Methods:** First-year RT students completed self-evaluations of interpersonal communication skills using a standardized inventory. Students were evaluated on both clinical and communication skills by program faculty during the first semester in preparation for clinical rotations. Clinical preceptors also completed evaluations that included an assessment of communication skills. Change in communication skills over time was assessed. **Results:** 18 students were enrolled in the study. Overall, self-assessment scores increased from their baseline to their final assessment. However, only changes in sending clear messages ($p = 0.020$) and giving and getting feedback ($p = 0.011$) had a statistically significant improvement from baseline to final. Faculty comments showed trends in improved verbal communication skills, but revealed a need to focus on nonverbal, patient education, building rapport, empathy, and understanding. Preceptor comments showed trends in improved verbal and nonverbal communication skills and building rapport with patients. Check-offs had few significant changes in communication skills, while clinical evaluations had significant changes in all categories. **Conclusion:** Specific training and customer service experience may lead to higher proficiency in communication. It may be necessary to implement formal interpersonal communication training early in RT education programs to realize meaningful improvements.

Key Words: interpersonal communication, respiratory therapy education, communication feedback

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Introduction

An emerging challenge in health care practice and education is development and adoption of good communication skills.[1-6] There are several contributing factors to this problem, such as the structure of health care itself and a population that is widely dependent on technology and the internet. In health care, skills and competency checks are major focal points of training, and more often than not communication skills are not as intensely examined. Effective communication is an essential skill for health care professionals to achieve successful patient outcomes. In order to effectively communicate with patients, health care providers must realize the value of communication from both parties involved. One-way communication often results in undesirable conclusions and attitudes. Previous research has found a connection between communication and health outcomes of patients, and communication has been found to be the key of a good provider-patient relationship[1]. Accurate diagnosis, understanding of health issues, treatment compliance, and recovery processes are all being influenced by the interactions between the provider and the patient. Communication also plays a vital role in daily interventions for patients, such as prevention, treatment, rehabilitation, and education. Likewise, communication is also necessary to persuade patients to adopt healthy behaviors, such as smoking cessation and an active lifestyle. All health care professionals should be held to the same standard, with the expectation that they can not only communicate across professions but can also communicate effectively with their patients.

Studies[2-6] have shown that good communication skills of health care professionals are essential for quality care and patient safety. Many medical errors happen when medical decisions made were inappropriate, and this may be due to an inability to obtain a complete health story of a patient by the provider. Unnecessary medical errors may be avoided if providers practice effective interpersonal communication with patients. Often when there is a miscommunication in health care, there is a cost associated with it. In 2010, the cost of health care in the United States exceeded $2.7 trillion, with more than 20% of that being considered wasteful.[7] Wasted money can be due to various reasons, but a major source is provider miscommunication and lack of patient compliance to medication regimens. Non-adherence often stems from a lack of effective patient education and leads to hospital readmissions. Adherence to medication regimens are especially important for people with COPD and asthma, whose outcomes improve significantly with the used of inhaled therapies.[7]

The Joint Commission[8] (TJC) identified an increase in readmission rates for Medicare and Medicaid patients, and the Patient Protection and Affordable Care Act allows for the Centers for Medicare and Medicaid Services (CMS) to take action against hospitals with unacceptably high readmission rates by imposing financial penalties. In addition, TJC[8] also acknowledges findings that 80% of serious medical errors involve miscommunication during the hand-off between medical providers. A study by CRICO[9] found that, on average, malpractice cases cost hospitals $354,000 per case, and when medication mistakes are involved that number rises to $453,000 per case. They also identified three top contributing factors to these cases: failure to monitor the patient's medication regimen (44%), inadequate patient/family education regarding medication risks (23%), and miscommunication among providers regarding the patient's condition (14%). The increasing cost of health care and the price of miscommunication make it crucial to prepare students to be competent in skills related to their field, as well as effective communicators.

Another problem in health care today is that information can be sent or received via different routes of communication, and the current trend in using mobile devices to transfer information may have a negative impact on communication skills. The traditional current undergraduate health care student population comprises students predominantly from Generation Y, the largest cohort group since the baby boomers.[6] Their interpersonal communication skills could be greatly affected by technology and electronic devices. As the uses of modern technology and electronic devices are becoming more common, this generation views them as a necessity, rather than a tool of convenience. According to Pearson et al.,[2] Generation Y relies on their cell phones for communication because they are not comfortable communicating face-to-face with people. Health care is a social environment where face-to-face communication is the largest level of social dimension. College students are using the Internet for communication more than ever before, and this could contribute to the lack of refined, intimate, in-person communication skills necessary to be successful in any profession. Integration of technology is a necessity and is seen more in health care today and will likely continue to grow. However, it is possible to be proficient in communication over computer or even phone but struggle with face-to-face verbal communication.

Multiple studies have been performed to identify the deficit in communication skills training among health care students. One of the major calls for reform in communication education comes from the argument that there are no standards or regulations on what aspects

of communication should be taught. Many terms can be used interchangeably and the strategies for effective communication can vary across different educational programs.[10]

While it is important for students to develop communication skills, a tool for assessing such skills is also a vital aspect of this education. The American Academy on Physicians and Patients (AAPP) concluded that communication with patients is the core of clinical skills for practicing medicine.[11] The AAPP found that there are 3 methods for assessing communication: a) checklists of behaviors observed throughout interactions, b) patients experiences reflective as a survey, c) and exams by either oral, essay, or multiple choice. The evaluation of communication can also be done by clinical preceptors while students are doing their clinical rotations. However, there is a need to standardize the clinical preceptor evaluation to establish inter-rater reliability and to minimize observer bias. In addition to having observers assess the students, a self-assessment, such as the Interpersonal Communication Skills Inventory,[12] enables students to identify their strengths and weaknesses in four aspects of interpersonal communication skills. This assessment highlights four key aspects of communication, namely sending clear messages, listening, giving and getting feedback, and handling emotional interactions.[13]

There is a lack of studies to describe the interpersonal communication skills of respiratory therapy students as they progress through their academic program. Respiratory therapists need to be able communicate effectively not just with interprofessional team members, but also interpersonally with patients and their family members. The purpose of this pilot study was to describe the impact of evaluation and feedback on face-to-face communication skills in undergraduate RT students.

Methods

This pilot study was Institutional Review Board approved and was a descriptive observational study. There were several extraneous variables including students' prior communication experience and self-confidence that were measured and included in the interpretation of the data. The study population included all first-year respiratory therapy students enrolled in an undergraduate respiratory therapy program at a Midwestern university.

For this study, a demographic questionnaire was administered during the first day of class to gauge the amount of prior communication experience for each student. Additionally, the Interpersonal Communication Skills Inventory Self-Assessment[12] check-off forms (Figure 1) and preceptor evaluations (Figure 2) were gathered at various points in the year (Table 1).

Instrumentation

The communication assessment portion of the skills check-off form (Figure 1) was adapted from the Competency Outcomes Performance Assessment (COPA) and Health Communication Assessment Tool (HCAT) developed to assess the student nurse's health communication skills. The reliability and validity of the HCAT and COPA were previously established.[3-4] Additionally, the skills check-off forms were completed by the same two faculty members every time to enhance the inter-rater reliability of the data collection.

Similarly, the Interpersonal Communication Skills Inventory Self-Assessment[12] highlighted communications skills that, while not identical, mirror the communication skills assessed with the HCAT and COPA. These include sending clear messages, listening, giving and getting feedback, and handling emotional interactions. This self-assessment asked students to rate themselves on various communication skills that have been previously deemed important in health care. Scores for each section were then totaled and compared over time.

The preceptor evaluations (Figure 2) were completed by preceptors who had been with the student for the entirety of their clinical experiences, ensuring inter-rater reliability. Additionally, each preceptor had completed the AARC Clinical PEP: Practices of Effective Preceptors program[14] ensuring similar training and making the student experiences as similar as possible. The skills check-offs, preceptor evaluations and Interpersonal Communication Skills Inventory Self-Assessments were completed at varying points of the year, with varying levels of clinical experience (Table 1).

Figure 1. Communication Skills Check-off Form (adapted from HCAT and COPA)

INTERPERSONAL COMMUNICATION:					
Competence Level:"	1	2	3	4	5
1. Non-verbal communication					
2. Educates patient about a procedure/treatment					
3. Verbal expression					
4. Empathy and understanding					
5. Establishes rapport with patient					

Competence Level Scale: 1=poor, 2= fair, 3= average, 4=good, 5= excellent

Figure 2. Preceptor Communication Assessment Form

INTERPERSONAL COMMUNICATION:			
Competence Level:"	1	2	3
1. Non-verbal communication			
Courteous (considerate, polite, kind)			
Controls stress (maintains composure, contains emotion in a stressful situation)			
Confident in abilities (self-assured, poised, not arrogant)			
Appropriate eye contact, proximity to patient, gestures and body language; actively listens; control of nervousness			
2. Educates patient about a procedure/treatment			
Utilizes resources, seeks help from appropriate people/places, thoughtfully responds to patient inquiry			
Able to educate patient on therapies with ease and at level of patient's understanding/health literacy level			
3. Verbal expression			
Has personable demeanor (likable, friendly, warm)			
Communicates concisely and appropriately (succinct and direct reporting of patient condition, not verbose, communicates appropriate information, applies confidentiality, uses appropriate medical terminology)			
Tactful (diplomatic, thoughtful, judicious)			
Has sense of humor when appropriate (witty, able to put people at ease using humor)			
Courteous (considerate, polite, kind)			
Appropriate verbal tone, lack of medical jargon, easily heard by patient			
4. Empathy and understanding			
Compassionate (empathetic, sympathetic)			
Tolerant (accepting, patient, non-judgmental)			
Sensitive to and respect for the personal needs of others (sympathetic, understanding, insightful, perceptive, considers modesty)			
Tactful (diplomatic, thoughtful, judicious)			
5. Establishes rapport with patient			
Has personal demeanor (likable, friendly, warm)			
Has sense of humor when appropriate (witty, able to put people at ease using humor)			
Courteous (considerate, polite, kind)			
Honest in interaction with patients and staff (displays integrity, forthright, sincere, applies discretion)			
Meets patients' needs appropriately, follows up care with questions ("Do you need anything else," "Can I get anything for you?"), returns call light to patients			

Competence Level Scale: 1=unsatisfactory, 2=satisfactory, 3=outstanding

Table 1. Schedule of Assessments and Clinical Experience Over Two 16-Week Semesters

Week of RT Curriculum	Assessment Performed	Clinical Experience
Autumn Semester Week 1	Baseline Self-Assessment	First day of the program, preclinical
Autumn Semester Week 2	Week 2 Checkoff	Preclinical
Autumn Semester Week 4	Week 4 Checkoff	Preclinical
Autumn Semester Week 10	Week 10 Checkoff	Preclinical
Autumn Semester Week 10	Week 10 Clin Sim	Preclinical
Autumn Semester Week 10	Self-Assessment 2	Last day of class prior to starting basic therapy clinicals, preclinical
Autumn Semester Week 14	Mid-Evaluation from Preceptor Autumn Semester	After three weeks of basic therapy clinicals
Autumn Semester Week 16	Self-Assessment 3	After five weeks of basic therapy clinicals
Autumn Semester Week 16	Final Evaluation from Preceptor Autumn Semester	After five weeks of basic therapy clinicals
Spring Semester Week 3	Mid-Evaluation from Preceptor Spring Semester	After eight weeks of basic therapy clinicals
Spring Semester Week 5	Final Evaluation from Preceptor Spring Semester	After 10 weeks of basic therapy clinicals
Spring Semester Week 5	Final Self-Assessment	After 10 weeks of basic therapy clinicals

Data Collection Procedures

Students received a study recruitment letter and were asked to sign an informed consent, allowing use of their demographic survey, interpersonal skills inventory self-assessment responses, as well as grades and written feedback on the skills check-off forms and clinical preceptor evaluations. These responses, grades and feedback were collected and placed into a de-identified electronic database.

Data Analysis

This study used descriptive statistics including frequency distribution tables, means, standard deviations, and ranges to show the baseline, preclinical, midpoint, and final self-assessed communication scores from the students. This was done for each of the four sections of the self-assessment: a) sending clear messages, b) listening, c) getting/giving feedback, and d) handling emotional experiences. Four paired t-tests were used to see what changes occurred between the baseline to preclinical, preclinical to midpoint, midpoint to final, and baseline to final self-assessments, specifically. In addition, descriptive statistics were used to calculate percentages to assess any change in the students' communication skills in the check-offs (Week 2 check-off to Week 10 check-off, Week 4 check-off to Week 10 Clin Sim) (Table 1).

Four paired t-tests were used to assess change in the students' communication skills according to their clinical preceptor evaluations (Midpoint 1st semester to Final 1st semester, Final 1st semester to Midpoint 2nd semester, Midpoint 2nd semester to Final 2nd semester, and Midpoint 1st semester to Final 2nd semester). This was done for each of the five areas of interpersonal communication skill, namely 1) non-verbal communication, 2) educates patient about a procedure/treatment, 3) verbal expression, 4) empathy and understanding, and 5) establishes rapport with patient. Five of the 20 mean communication scores resulted in a normal distribution; the remaining 15 mean communication scores have a distribution curve that is skewed to the positive end of the scale. The null hypothesis is that there is no change in the preceptor assessed communication skills. Alpha level was set at a prioi at 0.05.

Qualitative data was collected from the faculty and clinical preceptor feedback provided in evaluations given to the students. The evaluations were analyzed and trends in the written feedback were identified.

Results

Sample Demographics

This study was conducted with 18 first-year undergraduate RT students. All students were in good academic standing at the time of the study. For additional subject demographics see Table 2.

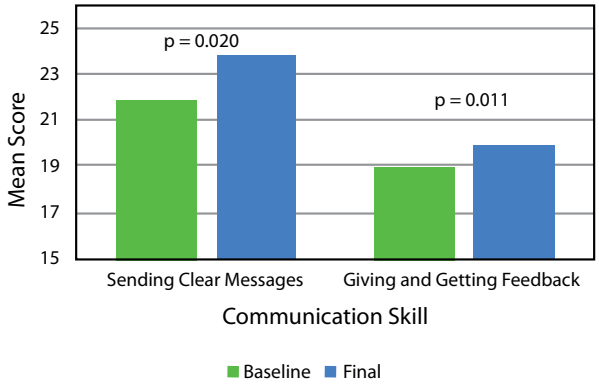
Table 2. Population Demographics

First-Year Undergraduate RT students	
Mean Age (years)	21.1
Gender (%)	72.2% Female 27.8% Male
Race (%)	55.6% Caucasian/non-Hispanic 16.7% African-American 22.2% Asian 5.5% Others
Previous Customer Service Experience (%)	83.3%
Previous Customer Service Training (%)	66.7%

Self-Assessed Communication Skills

Throughout the study, students indicated that they felt certain areas of their communication skills were improving. In the four communication skills measured in the self-assessment, only sending clear messages and giving and getting feedback showed a significant change from baseline self-assessment to the final self-assessment. Mean scores for listening and handling emotional interactions showed little to no change between self-assessments (Figures 3 and 4).

Figure 3. Comparison of Baseline to Final Self-Assessments



(All other changes in self-assessed communication skills were not statistically significant.)

Table 3: Mean Scores for Faculty-Assessed Week 2 and Week 10 Communication Skills

Interpersonal Communication Skills	Week 2 Check--off Mean (SD)	Week 10 Check-off Mean (SD)	p-value
Non-Verbal Communication	2.94 (0.41)	3.17 (0.51)	0.104
Educates Patient About a Procedure/Treatment	3.06 (0.41)	3.06 (0.80)	1.000
Verbal Expression	3.11 (0.58)	3.06 (0.63)	0.749
Empathy and Understanding	3.28 (0.57)	3.61 (0.50)	0.029*
Establishes Rapport with Patient	2.83 (0.70)	3.22 (0.80)	0.110

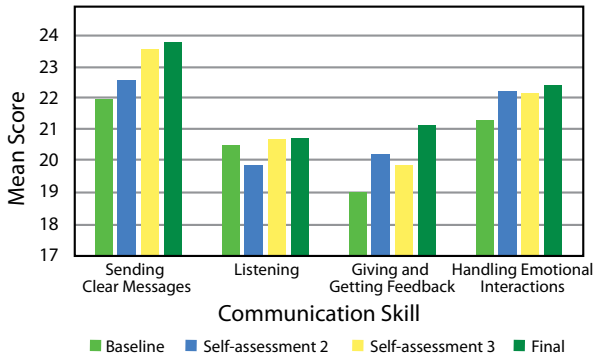
*=statistically significant difference

Table 4: Mean Scores for Faculty-Assessed Week 4 and Week 10 Clin Sim Communication Skills

Interpersonal Communication Skills	Week 4 Check--off Mean (SD)	Week 10 Clin Sim Mean (SD)	p-value
Non-Verbal Communication	2.94 (0.53)	2.94 (0.72)	1.000
Educates Patient About a Procedure/Treatment	2.94 (0.87)	3.11 (0.67)	0.507
Verbal Expression	3.06 (0.63)	3.33 (0.68)	0.236
Empathy and Understanding	3.11 (0.83)	3.39 (0.60)	0.172
Establishes Rapport with Patient	3.17 (0.78)	3.56 (1.09)	0.168

*=statistically significant difference

Figure 4. Self-Assessed Interpersonal Communication Skills



Faculty-Assessed Communication Skills

Faculty-assessed communication scores showed an increase in percentage of students who ranked good or better between Week 2 Check-off and Week 10 Check-off (Table 3). This increase was noted in all communication skills except for verbal communication which remained the same. A larger than 25% increase in those ranked good or better was noted for empathy and understanding, and patient rapport. Similarly, for the Week 4 Check-off to the Week 10 Clin Sim, there was an increase in percentage of students who ranked good or better in all communication skills except for patient education, which remained the same (Table 4). A larger than 25% increase in those ranked good or better was noted for verbal communication. Additionally, as indicated in the written feedback, faculty observed that empathy and understanding fluctuated depending on the complexity of the patient's medical conditions. When there were more clinical skills for the student to demonstrate, empathy and understanding started to decline.

Preceptor-Assessed Communication Skills

Throughout the first semester, significant changes were seen in all five communication skills (Figure 5). Additionally, at the first semester final assessment, empathy and understanding reached its maximum value and remained there until the end of the study. Students continued to improve through the midpoint evaluation of the second semester of clinicals. Non-verbal patient education and verbal showed a statistically significant increase in mean scores from the final 1st semester evaluation to the midpoint 2nd semester evaluation. Empathy and understanding and patient rapport had a slight increase or remained the same and were not statistically significant (Figure 6). From midpoint second semester to the final second semester preceptor assessment there were drops in mean scores across all categories except for empathy and understanding which remained the same. Only the decrease in the patient education mean from 3.0 to 2.89 was statistically significant. When comparing the first preceptor assessment to the final one, there were significant changes in all categories except building rapport with the patient, which was approaching significance with a p-value of 0.055 (Figure 7).

Figure 5. Preceptor-assessed communication skills over the first 5 weeks of basic therapy clinicals

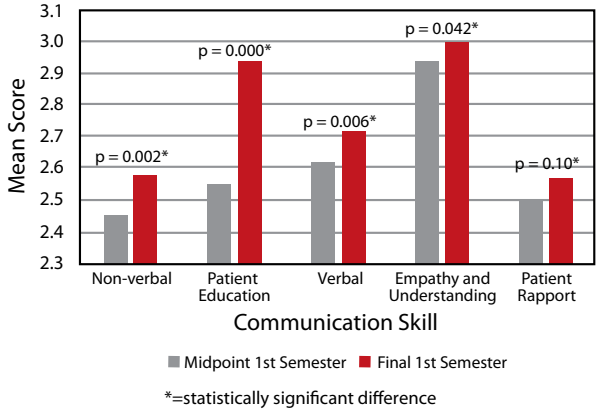


Figure 6. Preceptor-assessed communication skills over weeks 5-8 of basic therapy clinicals

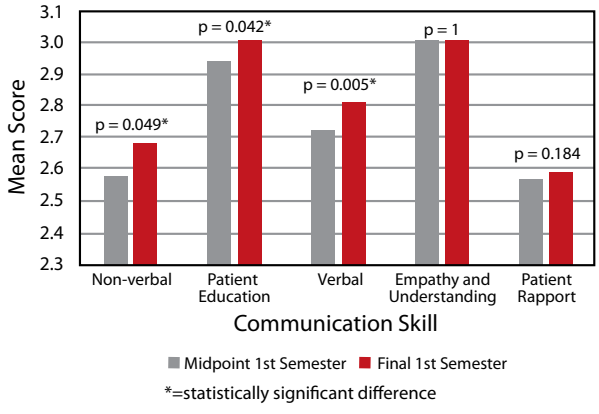
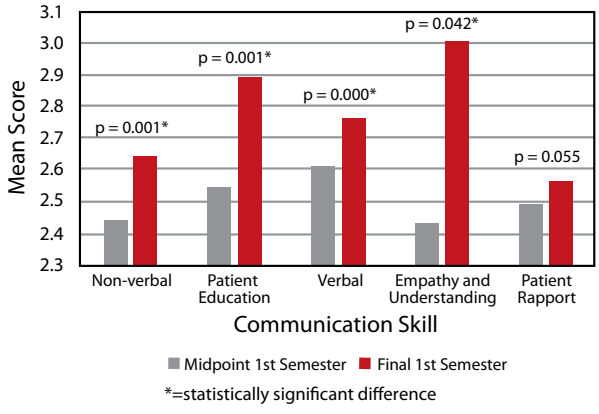


Figure 7. Preceptor-assessed communication skills over 10 weeks of basic therapy clinicals



The following trends were identified throughout faculty and preceptor comments. Nerves were noticeable to begin the year but changed to enthusiasm towards the end. While the first-year students had strong communication skills, they needed to speak louder to the patients. Additionally, it was noted that patient education regarding the therapy being administered was consistently lacking, but the ability to instruct the patient on the procedures improved. Building rapport with patients improved through the year, and confidence was noticeably improved at the end of the year. Lastly, when in the check-off setting it was observed that empathy and understanding fluctuated depending on the complexity of the patient's medical conditions. When there was more for the student to think about, empathy and understanding started to decline.

The null hypothesis was retained for empathy and understanding and patient rapport in the final 1st semester to midpoint 2nd semester; for non-verbal, verbal, empathy and understanding, and patient rapport in the midpoint 2nd semester to final 2nd semester; and for patient rapport in the midpoint 1st semester to final 2nd semester. The null hypothesis was rejected for all 5 communication skills in the midpoint 1st semester to final 1st semester; for non-verbal patient education and verbal in the final 1st semester to midpoint 2nd semester; for patient education in the midpoint 2nd semester to final 2nd semester; and for non-verbal, patient education, verbal, and empathy and understanding in the midpoint 1st semester to final 2nd semester (Figures 5-7).

Discussion

Study results show that certain areas of communication skills of the undergraduate respiratory therapy students had significant improvement over their first year in the program. Also, areas of communication skills that the students were weak in were identified. These likely warrant more attention from an educational perspective.

Although there is a lack of literature to describe the communications skills of respiratory therapy students, there are a few studies with similar findings. Schofield and Honore[15] explained that the current generation of undergraduate students often struggles with communication skills. This is consistent to what we have found in this study. Based on the results for self-assessment at baseline, week 2 check-off, and preceptor evaluation at midpoint 1st semester, there was still much room for improvement in multiple areas of their communication skills. In addition, Berger[1] reported that the modern technologies and the use of social media have made a negative impact on face-to-face communication as people became more strongly attached to their mobile devices and as a result, focus less on their audience when they are communicating. Although investigation of the impact of technologies

on communication skills was not included in this study, the results show that the students' rapport with patients was one of the weakest areas in their communication skills. Pearson et al[2] also reported that the reliance on cell phones is a reason why people are uncomfortable communicating face-to-face with people. The trends in faculty and preceptors' comments show a similar situation, where the students were nervous when communicating face-to-face during the check-off sessions and clinical rotations at the beginning of the program.

Middlewick et al[16] explained how scenario-based learning allows nursing students to explore more effective communication strategies. The investigators observed that the nursing students developed morality, and also discovered the importance of provider-patient rapport and interaction. In this study, a similar teaching approach was used where the students were tasked to react in simulated scenarios during their check-offs. There were noted improvements in the students' empathy and understanding as well as patient rapport from Week 2 to Week 10 check-off, with significant improvement in empathy and understanding from Midpoint 1st semester to Final 1st semester and from Midpoint 1st semester to Final 2nd semester clinical preceptor evaluations.

Strong empathy and understanding were also a trend seen in the faculty and preceptors' comments. Even though the improvement in building rapport with patients throughout the study were not significant, it was approaching significance. The faculty and preceptors also commented that the students' ability to build rapport with patients had improved over time. As such, students' skills in building rapport with patients might show a significant improvement with more time.

The increasing cost of health care and the price of miscommunication make it extremely important to prepare students to enter the health care field.[7] According to the results of our study, these skills may be best developed in a clinical setting. This is likely due to a number of reasons: students have a role model in their clinicals, check-offs are not a natural setting for effective communication, and check-offs are higher stress due to grading. Additionally, little change in communication skills may have been due to the short amount of time that passed between check-offs and the lack of clinical experience at the time of the check-offs. In this study, the majority of the students had prior customer service training and even more had past customer service jobs. This type of experience cannot be relied on when sending students into the health care field every year, thus increasing the importance of ensuring the development of quality communication skills in preparing future health care providers.[1, 7-8]

In the future, this study could be modified to observe changes in communication throughout the entire respiratory therapy program. Additionally, communication among the interprofessional team could be observed. Future research could also include providing a communication training program for an interprofessional team and examine the amount of medical errors and, as a result, the potential amount of cost savings for this group compared to a control group.

Limitations

This pilot study contained a few limitations of note. First, a sample of convenience was used. Because of this, the results gathered cannot be generalized across all respiratory therapy programs. Additionally, students started with varying customer service backgrounds and training. While some had no previous training, others had short informal or extensive formal training. Lastly, the study was performed in a short time span, and there may have been more significant changes had the study been performed for a longer time and followed the students through the end of the program.

Conclusion

A health care communication training program should be implemented in the first semester of the respiratory therapy educational curriculum. This training program should include the basics of communicating effectively with patients, as well as other health care professionals, with an emphasis on giving and getting feedback, patient education, and listening. In addition, the students' communication skills might benefit from more time in a clinical setting. Increasing students' exposure to patients, under the guidance of a trained preceptor, could potentially increase their confidence and could provide additional circumstances in which the student could practice their interpersonal communication in a low-risk, monitored situation, and then receive the appropriate feedback. Ultimately, improving communication skills in students will translate into decreased health care costs, a reduction in medical errors, and better patient outcomes.

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Evaluation of the Effects of a Brief Educational Module About Electronic Cigarettes on Undergraduate Health Professional Students' Knowledge, Attitudes, and Self-Efficacy: A Pilot Study

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Abstract

Background: Research continues to emerge on the safety and health effects of e-cigarettes. There are public misconceptions about e-cigarettes and health care providers are among the first to be trusted to answer questions and provide evidence-based information. Students training to become health professionals should be prepared to discuss e-cigarettes. The purpose of the study was to examine the effects of viewing a brief e-cigarettes educational module, on health professional students' knowledge, attitudes, and self-efficacy in providing information on e-cigarettes. **Methods:** Following IRB approval, 115 students in senior health professions programs from Respiratory Therapy, Nursing, Medical Dietetics, and Health Sciences participated in the study. Students took a pre-survey, viewed a seven minute online educational video, and completed a post-module survey. Data analyses included descriptive statistics and Wilcoxon signed-rank tests. **Results:** Although participants had received minimal education about e-cigarettes in their curricular content, they reported that they were exposed to questions both in and outside of their programs. Previously, their typical sources for e-cigarettes information were from advertisements, peers, and social media. Wilcoxon sign-rank tests analyzing differences after viewing the module indicated that students' knowledge increased and attitudes improved significantly in most cases. **Conclusions:** Although students previously indicated a lack of training, they indicated exposure to e-cigarettes. Health professions programs are challenged to provide updated content on emerging topics such as e-cigarettes. Brief online educational modules with an overview of evidence-based research may address this need. Overall, this pilot study supports the use of a short e-cigarettes education module to increase students' knowledge and improve attitudes and self-efficacy of counseling patients about e-cigarettes.

Keywords: e-cigarettes, vaping, health care provider advice, smoking cessation, brief education

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Introduction

E-cigarette use has dramatically increased since introduction to United States markets in 2006.[1] According to the Surgeon General, e-cigarette use reflects a public health epidemic in younger adults and adolescents, increasing by 900% during 2011-2015.[2] E-cigarettes are often perceived as a safer alternative to combustible cigarettes by the user.[3] E-cigarettes are often used as a smoking cessation aide or to decrease cigarette consumption, to relieve symptoms of nicotine withdrawal, and to continue smoking with perceived reduced health risks when compared to combustible smoking.[4,5] However, there may be misunderstandings about the safety of e-cigarettes, especially as compared to conventional combustible cigarettes.

Research on the safety and health effects of electronic nicotine delivery systems, or e-cigarettes, continues to emerge.[6-9] E-cigarettes have been found to contain formaldehyde, acetaldehyde, acrolein, nickel, chromium, and lead, and are not FDA approved for use in smoking cessation.[6] Strength of the evidence related to e-cigarette safety, health effects, use in cessation, and addictive potential varies from "conclusive" to "no evidence."[6] Based on the dearth of conclusive research and the population's misperception of e-cigarettes, there may be confusion or misinformation about the evidence-based findings that accompany the use of these novel products, necessitating an intervention.

Clinical practice guidelines for brief tobacco dependence interventions suggest screening for tobacco use, advising the user to quit, exploring the risks related to continued use, and arranging for assistance.[10] Brief interventions for tobacco dependence counseling by clinicians are also recommended and associated with increased quit rates.[10-12] In order to be proficient at counseling for health behavior change, educators may foster knowledge and skill attainment to develop self-efficacy for counseling.[13] At the time of this study, there were minimal comprehensive reviews available to summarize and synthesize the research available about e-cigarettes.[7-9] According to the literature on health behavior, a brief education module may provide a platform for updating current evidence, addressing misperceptions, and increasing self-efficacy in providing health information.[14-15] However, there currently are no studies specifically exploring educational interventions for health care providers about e-cigarettes.

Health care providers are relied upon by patients and clients to be the experts in the evidence-based findings of their respective fields. Students training to become health professionals should also be prepared to address current issues and trends in health behavior because they may have the opportunity to influence patient care and peers. The purpose of this descriptive study was to examine the effects of viewing an evidence-based e-cigarette educational module on health professional students' knowledge, attitudes, and self-efficacy in providing information to patients about e-cigarettes.

Methods

Following Institutional Review Board (IRB) approval, undergraduate students at a large, Midwestern University in upper-level health professions programs from Respiratory Therapy, Nursing, Medical Dietetics, and Health Sciences were invited to participate. Researchers visited the students in their respective classes and invited them to participate in a paper survey that explored their knowledge, attitudes, and self-efficacy for providing e-cigarette information.

Participants were then sent the link to view a seven-minute, brief educational module which included a synthesis of evidence-based research on e-cigarettes at the time and an online link to a post-module survey instrument. The seven-minute online educational video: 1) informed students of current research about the health effects of e-cigarettes, 2) illustrated e-cigarettes prevalence, and 3) addressed common public misperceptions. The module was based on experts' review of the current evidence at the time.

The survey instrument included 21 items and consisted of questions that explored current knowledge and attitudes toward e-cigarette use, self-efficacy, and the students' educational preparation about e-cigarettes as well as demographic data. Items measuring the concepts of knowledge, attitudes, and self-efficacy were adapted from previous studies by Pepper and colleagues.[11-12] The survey instrument was reviewed by a panel of experts in health behavior education and research methodology. The instrument was also field tested with students at the educational institution who were not in the study.

Data from pre- and post-survey instruments were matched and entered into a database and data analyses included descriptive statistics and non-parametric statistical analysis. Wilcoxon signed-rank tests were conducted to compare the pre-test and post-test knowledge, attitudes, and self-efficacy items on the survey. The medians and inter-quartile range for each survey item were also reported.

Results

Demographics

Table 1 describes the sample characteristics of the participants, health professions program, age, gender, and the participants' exposure to e-cigarettes. Out of 115 participants, 64.5% were from health sciences, 3.5% from nursing, 9.6% from medical dietetics, 12.2% from respiratory therapy, and 11.2% from other programs which included radiological sciences and health information management. The age of participants ranged from 19 to 36 with a mean age of approximately 21. Approximately three-fourths (76%) identified as female, and 18% had tried smoking themselves. Nearly one-fourth of the participants had interacted with e-cigarettes to some extent in the past 7 days.

E-cigarettes Education

The students indicated that they had received e-cigarettes information from advertisements, peers, and social media. Table 2 indicates both the source and quantity of information health professional students receive about e-cigarettes. Health professional students received very minimal education about e-cigarettes in their curricular content; nearly 64% percent of participants reported that there was no information provided at all in their respective curricula. Very few students (9%) indicated that they had adequate material and content about e-cigarettes in their program.

While participants reported that they were likely to be exposed to questions about the devices both in and outside of their health profession programs, they had received very minimal education about e-cigarettes and counseling concepts in their curricular content. There was little to no information available about e-cigarettes in programmatic content for the majority of programs; only 21.2 % of participants received program content about counseling, while a mere 10.4 % of the participants reported they had received training about e-cigarettes.

Knowledge, Attitudes, and Self-Efficacy for Counseling about E-Cigarettes

Most participants (80%) believed training about e-cigarettes is important. While most students stated they had no curricular coverage of e-cigarettes, students indicated it was vital to be informed on the topic. Pre- and post-intervention results were compared using Wilcoxon signed-rank tests (see Table 3). All of the items indicated a statistically significant change from pre to post with the exception of one.

Discussion

Knowledge

At the time of this study, there was a dearth of evidence on the health effects of e-cigarettes. Health care professional students participating in the pilot study indicated a gap in knowledge about e-cigarettes. There may be variation in the extent of health care professional e-cigarette curricular content, however, students in the study felt it was important to be informed. The brief intervention had an effect on knowledge, attitudes, and self-efficacy for counseling. The utility of a brief

Table 1. Participant Description

	n	Percent
Program Type		
Health Sciences	73	64.5%
Respiratory Therapy	14	12.2%
Medical Dietetics	11	9.6%
Nursing	4	3.5%
Other	13	11.2%
Gender		
Female	87	75.7%
Male	28	24.3%
Tried Smoking?		
Yes	21	81.7%
No	94	18.3%
Have you interacted with e-cigarettes in the last 7 days?		
Yes	26	22.6%
No	89	77.4%
Have you received program content on counseling?		
Yes	24	21.2%
No	89	78.8%
Have you received training about e-cigarettes?		
Yes	12	10.4%
No	103	89.6%

Table 2. Sources and Amount of Information About E-Cigarettes

	None at all	Some	Moderate amount	A great deal
Curriculum	63.6%	25.9%	5.9%	4.6%
Peers	37.3%	30.9%	20.9%	10.9%
Advertisements	21.4%	44.5%	25.9%	8.2%
Social Media	26.8%	40.9%	23.6%	8.7%

Table 3. Pre and post comparisons (n=115)

	Pre median rank (IQR)	Post median rank (IQR)	p-value
Attitudes			
Health professionals should get specifice-cigarette training.	5 (5,6)	6 (5,7)	<.001
Understanding e-cigarettes helps me to discuss quitting with individuals.	5 (4,6)	6 (5,6)	.091
It is important for me to have a strong knowledge on the topic (of e-cigarettes).	5 (5,6)	6 (5,7)	.042
Confidence			
I am confident speaking to an individual about e-cigarettes.	3 (2,4)	5 (4,6)	<.001
I am confident speaking to other health professionals about e-cigarettes.	3 (2,4)	5 (4,6)	<.001
Knowledge			
I understand the facts about the health effects of e-cigarettes.	3 (2,5)	5 (5,6)	<.001
E-cigarettes are approved for smoking cessation.	4 (2,4)	1 (1,2.25)	<.001
E-cigarettes will help to decrease the health problems caused by cigarettes.	4 (2,5)	2 (1,4)	<.001

Rankings on the scale ranged from (1) "strongly disagree" to (7) "strongly agree."

educational module on this emerging topic suggests that educational programs may address the challenge of updating knowledge on the topic. Subsequently, the brief educational module is easily updated as the scientific evidence continues to evolve.

Attitudes

The findings from this study are reflective of those found in similar explorations of physicians and nurse practitioners.[11,12] This demonstrates that students' attitudes toward e-cigarettes improved after a short educational module, which corroborates other studies about the malleability of knowledge and perceptions following a brief education module.[14-15] A possible explanation for why there wasn't statistically significant change from pre to post in the attitude item related to the importance of understanding e-cigarettes to discuss quitting is because this item was not likely to change based on the content of the e-cigarettes brief module.

Students reported receiving the vast majority of their information from social media, advertisements, and peers, which is an issue that persists.[16] These findings also suggest that program curricular content should address these misconceptions from non-credible sources. This further supports the use of a brief educational module to update student knowledge and address attitudes. Finally, colleges and universities should foster students' abilities to critically analyze source quality and identify valid sources of information.

Self-Efficacy

As seen in this study, implementing a brief educational module into the curriculum can change students' knowledge and attitude toward e-cigarettes. Not only did the student attitude change, their self-efficacy in discussing e-cigarettes significantly increased. Counseling patients in tobacco dependence has been linked to improved abstinence rates from tobacco use.[10] This suggests that increased self-efficacy for counseling patients about e-cigarettes may then translate to more informed patients about the evidence-based findings regarding the use and/or abstinence from e-cigarettes. This improved self-efficacy for counseling patients about e-cigarettes is likely to also translate to addressing societal misperceptions of the safety of e-cigarettes and the reality that there is much that we still have yet to learn about the long-term health effects of use. Relative to this concern, in studies of physician perceptions and advice, the lack of definitive evidence to endorse the use of e-cigarettes has led physician participants to either not positively endorse e-cigarette use or individualize advice about using e-cigarettes as the research continues to emerge.[17-18]

Utility of a Brief E-Cigarettes Educational Module

This pilot study demonstrates that a module as brief as seven minutes may increase health care students' knowledge, and improve attitudes and self-efficacy. Informing students from health care professions most likely to interact with e-cigarettes users will help bring needed awareness to the general public about the emerging health effects of e-cigarettes. The use of a brief educational module provides educational programs the opportunity to frequently update content in an area such as e-cigarettes where research is emerging.

Limitations

This pilot study of convenience was based on voluntary participation of students in the health professions. The participant responses were self-reported and only respondents who completed both the pre- and post-surveys were included in the analyses. Future research should expand this exploration beyond the large Midwestern University for which this study was conducted.

Conclusions

While students indicated exposure to e-cigarettes in their professional settings as well as outside of their programs, they did not feel sufficiently informed on the subject. Health professions programs are challenged to provide updated content on emerging topics such as e-cigarettes. Our brief online educational module with an overview of evidence-based research improved students' knowledge, attitudes, and self-efficacy to address this challenge. Overall, this pilot study supports the use of a brief e-cigarettes education module to increase students' knowledge, and improve attitudes and self-efficacy in counseling about e-cigarettes.

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Interdisciplinary Cricothyrotomy Training for Respiratory Therapy Students: A Pilot Study

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Abstract

Background: A cricothyrotomy should be performed emergently in the event that a patient cannot be intubated or ventilated by other means. Typically, physicians are trained in the procedure, but respiratory therapists do not undergo skills training. Our study aims to evaluate whether training for respiratory therapy students on the proper indications, technique, and evaluation of the procedure will improve their competency, communication, and coordination in the event that they need to assist in an emergent cricothyrotomy. **Methods:** Respiratory therapy students were given PowerPoint® slides to review on their own time, followed by didactic training led by Emergency Medicine physicians and a Respiratory Care faculty member. The procedure was demonstrated on a cricothyrotomy task trainer with a physician performing the procedure and the respiratory faculty assisting. The students then performed the procedure on the task trainers in pairs. Pre- and post-training questionnaires were used to evaluate knowledge of the indications, contraindications, equipment, incision site identification, and self-reported understanding of the procedure. **Results:** Students scored higher on their post-test, following the education and training, compared to their pre-test (5.88 vs. 5.00, p=.04). **Conclusions:** Practice-based learning for respiratory therapy students in the proper technique for the cricothyrotomy procedure may improve their competency, communication, and coordination when assisting with the procedure in an emergent cricothyrotomy.

Keywords: cricothyrotomy, airway management, difficult airway, clinical competence, low cost simulation, emergency medicine

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Introduction

Cricothyrotomy is a temporary, emergent procedure that is indicated only after it has been determined that there is no other way to establish an airway.[1-2] This is a skill that must be performed competently and expeditiously.[2] Recent literature has demonstrated a number of ways to provide that education including cadavers, animal models, human simulators, and simulation models.[3-6] Simulation-based education can at least supplement, if not replace, more classical classroom education.[5] However, much of this educational innovation targets physicians and physicians in training (emergency medicine, surgery, and anesthesiology).[3-6] Residency programs tend to focus specific cricothyrotomy education on the skill itself as opposed to performing the procedure as a team endeavor that could include other non-physician members of the team.[6]

Recognizing that medical errors in emergencies may be team errors, one study described the development of an Emergency Airway Response Team that included physicians, nurses, and respiratory therapists.[7] This team-based simulation education improved team dynamics, knowledge levels, and confidence.[7] Therefore, while the procedure is usually performed by an emergency physician, trauma surgeon, or anesthesiologist, success can be increased with a team-based approach with a team that is trained to assist with instruments, lighting, exposure, and suction. Additional physicians, respiratory therapists (RTs), physician assistants, and nurses may be asked to assist in this capacity. While knowledge of the indications for the cricothyrotomy procedure is likely part of a respiratory care (RC) student's curriculum, their exposure to the actual procedure is not typically part of their skills training as it does not fall within the respiratory therapist's scope of practice (AARC Position Statement: Respiratory Care Scope of Practice, https://www.aarc.org/wp-content/uploads/2017/03/statement-of-scope-of-practice.pdf). Since RTs have a significant presence in the Emergency Department (ED) and in particular a significant role in airway management, it could be beneficial to incorporate this type of training in their curriculum in order to improve competency, communications, and coordination when time is of the essence.

Methods

Objective

The objective of the study was to determine whether a lecture and simulation-based cricothyrotomy educational intervention improves respiratory therapy students' understanding of the cricothyrotomy procedure.

Design

The study was approved by the University of Toledo Social Behavioral and Educational Institutional Review Board (IRB). It was a prospective study involving a convenience sample of RC students enrolled in their final semester of the Bachelor of Science in Respiratory Care degree program. On the day of the skills training, attendance was optional and not recorded. Participation in the training had no impact on course grades. The RC students (n=17) received their usual education regarding cricothyrotomy in previous coursework devoted to airway management (typically > 0.5 hours). In addition, several days before the skills station, the students received a PowerPoint® package based upon current emergency medicine textbooks.[8-9] The PowerPoint® slideshow outlined the procedure, its indications, contraindications, and complications. The skills station consisted of cricothyrotomy task trainers (Simulaids Cricothyrotomy Simulator®), scalpels, endotracheal tubes, hemostats, syringes, and 14-gauge needles. The student learning objectives were to:

1. Identify the anatomical location for the cricothyrotomy incision.
2. Identify the equipment needed for the cricothyrotomy procedure.
3. Identify indications and contraindications for the cricothyrotomy procedure.
4. Differentiate between a pediatric cricothyrotomy and an adult cricothyrotomy.
5. Identify possible complications associated with the cricothyrotomy procedure.
6. Appropriately assist a physician in performing the cricothyrotomy procedure.

On the day of the session, the students completed a questionnaire assessing their current state of knowledge regarding the procedure. Then, a review of the cricothyrotomy procedure was provided by a team of emergency medicine (EM) and RC faculty. Emphasis was placed on the role RTs can play in assisting a physician with the procedure and preventing or correcting any complications. Next, the students reviewed the topographical anatomy on themselves and their peers. Following that, the faculty demonstrated the teamwork required to complete a cricothyrotomy successfully. Immediately afterwards the students, working in teams, were allowed to assist and perform the procedure on the cricothyrotomy models (pediatric and adult procedures). The faculty from both disciplines were available to assist, demonstrate, and answer any questions. Finally, at the termination of the class (~ 2 hours), the students were asked to complete a post-session test and evaluation of the training session. The pre- and post-test content questions were identical

(see Appendix A), and the post-test included additional questions on satisfaction and demographics (see Appendix B). Statistical Package for Social Sciences (SPSS®) version 25 (IBM®, Chicago, IL) was used to analyze the quantitative data. A paired samples t-test was performed to compare the mean scores of the pre- and post-tests.

Results

There were eight test questions on the pre- and post-tests. The mean pre-test score was 5.00 and the mean post-test score was 5.88 (p=.04) (Table 1). The test results indicated that the students' post-test scores increased on six questions. Additional remediation was required to address two questions.

In terms of subjective assessment, the students rated their confidence and comfort level in assisting with the procedure using a Visual Analog Scale (VAS) from 1 (no confidence/inadequate) to 6 (very confident/very adequate). After completing this program, 100% of the students reported more confidence in their ability to assist (VAS: 4-6; 35.3% "very adequate"). Regarding the ability to assist with complications, 100% reported more confidence (VAS: 4-6; 35.3% "very adequate"). Fifteen (88.2%) reported more confidence in locating the cricothyrotomy landmarks on the neck (VAS: 4-6; 29.4% "very confident"). Finally, sixteen (94.1%) reported they were confident in their ability to secure the endotracheal tube in place (VAS: 4-6; 47.1% "very confident").

Discussion

This pilot study demonstrated not only that a cricothyrotomy skills education, comprised of both didactic and simulation-based training, improved competency among RC students, it also increased their confidence level. Based on these positive quantitative results, it is feasible not only to add this type of education to the RCcurriculum, but to expand this education with more advanced simulation models (cadaveric, human simulators, etc.) within a multidisciplinary framework. It is reasonable to consider RTs with this type of enhanced education as vital to the emergency health care team when performing cricothyrotomy. In fact, because of considerable airway knowledge, RTswould be ideal assistants during this procedure.

Cricothyrotomy is a high-risk, low-frequency procedure representing only 0.45% of ED airway management procedures.[10] Predictably, there is an ongoing effort to develop and evaluate various models to improve success rates and lower complication rates.[3, 10-11] This model was straightforward and relatively inexpensive compared to more exotic varieties. However, it served the principal purpose of heightening the RC students' awareness of the procedure and their potential role in the ED. The authors

Table 1. Pre-test and post-test questions and responses (n=17)

Question	Pre-test		Post-test	
	Correct	Incorrect	Correct	Incorrect
The location for a cricothyrotomy is	14	3	15	2
One medical condition for which a cricothyrotomy may be indicated is	13	4	17	0
A surgical cricothyrotomy may be performed on babies as young as one year of age using the same technique as for adults	12	5	6	11
A sound that could suggest a cricothyrotomy may be indicated in the near future is	15	2	17	0
The basic instruments needed for an emergency cricothyrotomy are	3	14	10	7
Locating the cricothyroid membrane is easier on men than women	9	8	17	0
A longitudinal midline incision through the skin and subcutaneous tissue is advised since it is less likely to cause a major hemorrhage	11	6	13	4
The incision through the cricothyroid membrane is vertical.	8	9	5	12
	Mean		Mean	p
Pre- and post-test mean comparison (out of 8)	5.00		5.88	0.04
			T	df
			2.20	16

believe practicing the procedure in a simulated session enhances textbook knowledge of the procedure. This is true for RTs as well as registered emergency nurses and emergency physicians and residents.

This pilot study suggests cricothyrotomy simulation is feasible and valuable, and the authors propose further research into a more robust simulation design. The authors feel that the complete process should include further sessions, which could include another debriefing where the faculty reviews the quiz results with the students in order to provide further clarification if needed. Step three could then be another skills session in 3-6 months from the date of the initial one and study knowledge retention and skill performance. Finally, step four would be a hospital-based or ED-based initiative. An interdisciplinary team should be selected to participate in these emergency simulation exercises, which could include both didactic and realistic scenarios. The scenarios should depict events that may include an airway emergency and difficult airway, such as lye poisoning, smoke inhalation, foreign body obstruction, tracheitis, angioedema induced by angiotensin converting enzyme (ACE) inhibitors, etc.

The authors recommend members of emergency response and difficult airway teams, such as physicians, nurses, and RTs, to be included in such trainings, as these professionals are most likely to respond to an airway emergency of the magnitude that will require a cricothyrotomy. These interdisciplinary simulations could hone crisis leadership skills, team coordination, and interprofessional communications that would be vital in such extreme circumstances.

Limitations

One limitation of this study was that despite faculty from both RC and EM providing interprofessional education, it did not involve interaction between RC students and EM residents. Now, with evidence that this educational concept is feasible, future simulation exercises could include the development of cricothyrotomy scenarios that would embrace the involvement of EM residents, nursing, physician assistant, and RC students. Therefore, an additional objective within the original study design would be to provide a platform for all sets of students and EM residents to learn with, from, and about each other. Despite this, the participating students still gained knowledge, confidence, and physician contact time in learning from the EM faculty.

A second limitation is that with this pilot program, the budget for cricothyrotomy models did not allow for models that are as realistic and sophisticated as has been proposed in previous studies.[3, 10-11] Most notably was the reuse of skins, which made the location of the incision very obvious for each subsequent attempt. Nevertheless, the session succeeded in enhancing the awareness of the RC students as to the issues associated with the procedure and their potential role in such an emergency. Should this program expand to include an interdisciplinary cohort of students and residents, or practicing medical professionals, then an exploration of further budgetary options would be instituted.

Conclusion

The addition of a cricothyrotomy didactic and simulation session to the RC students' curriculum can increase their knowledge of the technique as well as serve as a precursor to the more in-depth multidisciplinary teamwork interaction required in such a high-risk procedure.

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Appendix A
Pre-Test

Participant ID:_____

1. The location for a cricothyrotomy is
    1. Between the hyoid and thyroid cartilages
    2. Between the cricoid and thyroid cartilages
    3. Between the thymus and hyoid cartilages
    4. Between the trachea and cricoid cartilage

2. One medical condition for which a cricothyrotomy may be indicated is
    1. Botulism
    2. Guillain-Barré Syndrome
    3. Oropharyngeal angioedema
    4. Asthma

3. A surgical cricothyrotomy may be performed on babies as young as one year of age using the same technique as for adults.
    1. True
    2. False

4. A sound that could suggest a cricothyrotomy may be indicated in the near future is
    1. Wheezes
    2. Rales
    3. Rhonchi
    4. Stridor

5. The basic instruments needed for an emergency cricothyrotomy are
    1. Hemostat, iris scissors, and endotracheal tube
    2. Scalpel, forceps, and tracheostomy tube
    3. Mosquito hemostats, scalpel, suction catheter
    4. Scalpel, endotracheal tube, and hemostat

6. Locating the cricothyroid membrane is easier on men than women.
    1. True
    2. False

7. A longitudinal midline incision through the skin and subcutaneous tissues is advised since it is less likely to cause a major hemorrhage.
    1. True
    2. False

8. The incision through the cricothyroid membrane is vertical.
    1. True
    2. False

Appendix B
Post-Test

Questions 1-8 from the Pre-test also included.

Participant ID:_____

9. After completing this training, do you feel you can adequately assist in the performance of a cricothyrotomy?
   1-Inadequate 2 3 4 5 6-Very adequate

10. After completing this training, do you feel you can adequately assist with a major complication during a cricothyrotomy?
    1-Inadequate 2 3 4 5 6-Very adequate

11. After completing this training, do you feel confident in locating the cricothyroid membrane?
    1-No confidence 2 3 4 5 6-Very confident

12. After completing this training, do you feel confident in securing the cricothyrotomy tube?
    1-No confidence 2 3 4 5 6-Very confident

Demographics

13. What is your profession or program of study?

    _____

14. What is your age in years? _____

15. To what gender do you identify? _____

16. Prior to this exercise, have you performed a cricothyrotomy procedure?
    1. Yes
    2. No

17. Prior to this exercise, have you assisted with a cricothyrotomy procedure?
    1. Yes
    2. No