

STUDENTS' ATTITUDES TOWARDS PATIENT SMOKING STATUS DURING  
ENROLLMENT IN A PULMONARY REHABILITATION PROGRAM

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by

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## **ACKNOWLEDGEMENTS**

To my family, professors, and peers: I owe my success to those who have supported me in my endeavors and for that I am eternally grateful.

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## ABSTRACT

The harmful effects of nicotine products are well documented, especially cigarettes. Due to the addictive nature of nicotine, it is often difficult for people who smoke to quit successfully without the help of cessation education and pharmacological assistance. It is imperative that students understand how tobacco affects the body, their role in smoking interventions, and the role that pulmonary rehabilitation plays in smoking cessation. This study was performed to understand the attitudes of students in the healthcare fields associated with pulmonary rehabilitation regarding enrollment into a pulmonary rehabilitation program with patients who smoke. An email was sent to two department heads of the colleges/universities from each of the healthcare professional groups that stated the purpose of the study and a request to forward the email to the student body. Colleges/universities which house these professions were asked to participate if they had a baccalaureate degree program, total student population > 5,000, were a public university, and presence within Texas. Results were obtained from a subject pool of 114 participants, the majority of which were from the fields of respiratory therapy (n = 58) and physical therapy (n = 51). As age increased, students were less likely to allow patients who smoke to enroll in a pulmonary rehabilitation program (18-22: 78.6% agree/strongly agree; 23-27: 65.5% agree/strongly agree; 28-32: 66.7% agree/strongly agree; 33-37: 62.5% agree/strongly agree; >37: 53.8% agree/strongly agree). Females were more likely to agree/strongly agree with allowing a patient who smokes to enroll in a pulmonary rehabilitation program (72.5% > 47.8%). Students that

are current smokers (75% agree/strongly agree) and those that quit 1-3 years ago (88.9% agree/strongly agree) were more likely to allow patients who smoke to enroll in a pulmonary rehabilitation program. Those that were more likely to allow patients who smoke to enroll in a pulmonary rehabilitation program were 18-22 year old females who previously smoked 1-3 years ago.

**CHAPTER I: STUDENTS' ATTITUDES TOWARDS PATIENT  
SMOKING STATUS DURING ENROLLMENT IN A PULMONARY  
REHABILITATION PROGRAM**

**Introduction**

The harmful effects of nicotine products are well documented, especially cigarettes.<sup>1</sup> Due to the addictive nature of nicotine, it is difficult for people who smoke to quit, often taking years to fully quit smoking.<sup>2-6</sup> There are several smoking cessation aids available to those who are addicted, including behavioral therapy, nonpharmacological therapy, nicotine replacement therapy, and pharmacologic therapy.<sup>5-7</sup> Pulmonary Rehabilitation (PR), in particular, is especially useful for people who smoke, as it includes education and assistance with smoking cessation for those who have chronic obstructive pulmonary disease (COPD) or lung cancer due to tobacco smoking.<sup>8-9</sup> Smoking cessation is the best way to slow disease progression in COPD.<sup>7</sup>

Because smoking cessation is so important in treating COPD and lung cancer, it is vital that people who smoke receive the most education and treatment possible to quit smoking. The best way to ensure this is by allowing people who smoke to enroll in a PR program and receive smoking cessation education and therapy.<sup>9</sup> It is important to note that the best way to provide assistance for these people is making sure that healthcare students receive a full education about tobacco use, as preparing the future generation of healthcare workers will shape the care that we can provide for the older generations that need it.<sup>10</sup>

This study attempts to describe the thoughts and attitudes that healthcare students have towards allowing people who smoke to enroll into a PR program. These attitudes

will determine whether people who smoke will be able to receive the care they need in order to successfully quit smoking. It is vital that educators understand students' perceptions about people who smoke and, ultimately, educate them on the importance of PR enrollment for people who smoke and need assistance.

### **Methods**

This qualitative study was granted approval from the Texas State Institutional Review Board (approval number: 2017469). Students from the following healthcare professions were asked to participate: nursing, occupational therapy, respiratory therapy, physical therapy, speech therapy, allopathic/osteopathic medicine, and social work. Colleges/universities which house these professions were asked to participate if they had a baccalaureate degree program, total student population > 5,000, were a public university, and located within Texas. Institutions were assigned random numbers and were selected from a table of random numbers.

An email was sent to two department chairs or deans of the colleges/universities from each of the healthcare professional groups that stated the purpose of the study and a request to forward the email to the student body. The email contained a hyperlink to a survey that consists of nine questions. If no response had been received within seven days of the preliminary email, a second email was sent reminding the subject of the study. If no response had been received within 9 days of the original email the department chair was called and asked to allow their students to participate. Should the subject not respond to any attempt at communication or refuse to participate, another institution was chosen at random. The interviewers followed a script for all emails and phone calls to ensure continuity between the subjects. The subjects were informed that, by clicking the

hyperlink in the email, they were providing consent to the study. The subjects were asked the questions of a developed survey (Figure 1). The validity of the survey was confirmed using content and criterion validity.

**1. Have you read the consent form attached to the email and agree to participate in this survey?**

- a) Yes
- b) No

**2. Which of the following represents your age category?**

- a) 18-22
- b) 23-27
- c) 28-32
- d) 33-37
- e) Over 37 years

**3. What is your gender?**

- a) Male
- b) Female

**4. What is your ethnicity?**

- a) Hispanic or Latino Origin
- b) American Indian or Alaskan Native
- c) Asian
- d) Native Hawaiian or Other Pacific Islander
- e) Black or African American
- f) White
- g) Two or more races

**5. What is your area of study?**

- a) Nursing
- b) Respiratory therapy
- c) MD/DO
- d) Physical therapy
- e) Occupational therapy
- f) Nutrition
- g) Social work

**6. Are you a current or former user of any of the following tobacco or nicotine products?**

- a) cigarettes
- b) pipe
- c) cigars
- d) smokeless tobacco
- e) vape/electronic cigarette
- f) hookah
- g) other \_\_\_\_\_

**7. If you are a former tobacco user how long ago did you quit?**

- a) less than 1 year
- b) 1-3 years
- c) 4-5 years
- d) 6-10 years
- e) greater than 10 years

- f) current tobacco user
- g) not a former tobacco user
- 8. Pulmonary rehabilitation is defined as an evidence-based, multidisciplinary, and comprehensive intervention for patients with chronic respiratory diseases (i.e. Emphysema, Chronic Bronchitis, Asthma) who are symptomatic and often have decreased daily life activities. How much do you agree with this statement: It is acceptable to allow a patient who is a current smoker to enroll in a pulmonary rehabilitation program?**
  - a) Strongly agree
  - b) Agree
  - c) Neither agree nor disagree
  - d) Disagree
  - e) Strongly disagree
- 9. If there is anything else you would like to add, please provide your input here.**
  - a) This question is open ended.

Figure 1: Questionnaire for Healthcare Students – This is a list of questions that the healthcare students of the professions associated with pulmonary rehabilitation were asked to answer.

## Results

A total of 114 responses were received, the majority of which were subjects from the fields of respiratory therapy (n = 58) and physical therapy (n = 51). Responses were also received from nursing students (n = 2), medical students (n = 1), and nutrition students (n = 2). The percentages of different demographics' opinion on allowing a patient who smokes to enroll into a pulmonary rehabilitation program was based on their answer for question 8 in Figure 1. A student was deemed in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program if they answered “agree” or “strongly agree”.

78.6% of students aged 18 to 22 years old (n = 28) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 65.5% of students aged 23 to 27 years old (n = 56) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 66.7% of students aged 28 to 32 years old (n = 9) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 62.5% of students aged 33 to 37 years old (n = 8) were in favor of

allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 53.8% of students aged >37 years old (n = 13) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Figure 2 shows the percentage of students that favor allowing a patient who smokes to enroll into a pulmonary rehabilitation program by age category.

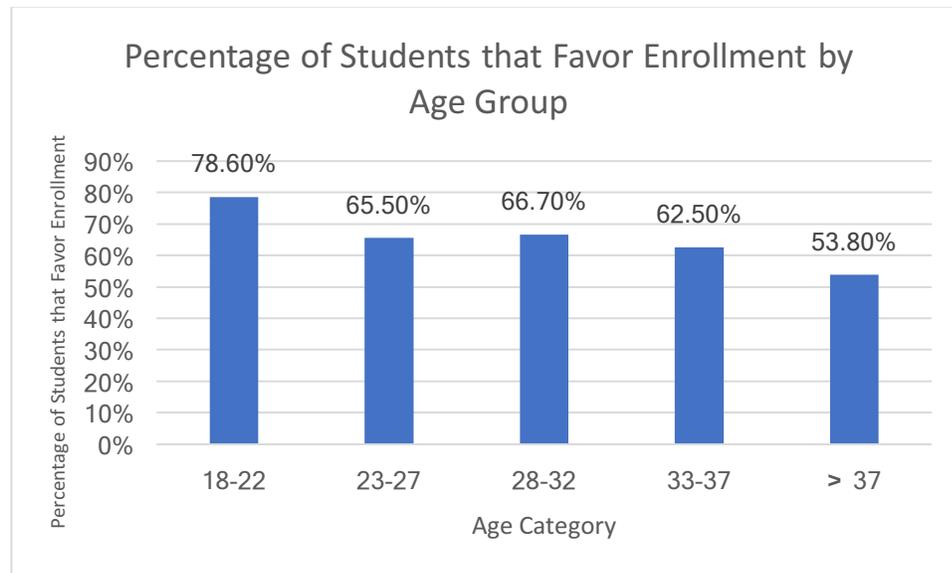


Figure 2: Percentage of Students that Favor Enrollment by Age Group – This graph shows the percentage of students that favor allowing a patient who smokes to enroll into a pulmonary rehabilitation program by age category.

Males (n = 23) were 47.8% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Females (n = 91) were 72.5% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

70% of Hispanic/Latino origin students (n = 30) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 100% of American Indian or Alaskan Native students (n = 1) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 72.7% of Asian students (n = 11) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 50% of Black or African American students (n = 4) were in favor of allowing a

patient who smokes to enroll into a pulmonary rehabilitation program. 67.7% of white students (n = 62) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. 83.3% of students with two or more races (n = 6) were in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

Nursing students (n = 2) were 100% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Respiratory therapy students (n = 58) were 70.7% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Medical students (n = 1) were 0% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Physical therapy students (n = 51) were 66.7% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Nutrition students (n = 2) were 50% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

Students who have smoked cigarettes (n = 13) were 84.6% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who smoked cigars (n = 1) were 0% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who used smokeless tobacco (n = 4) were 50% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who used vapes or electronic cigarettes (n = 1) were 0% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who smoked hookah (n = 7) were 71.4% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students without a smoking history (n = 78) were 71.8% in favor of allowing a patient who smokes to enroll into a

pulmonary rehabilitation program. Overall, students who had a history of nicotine use (n = 26) were 69.2% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

Students who had quit using nicotine products < 1 year ago (n = 4) were 50% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who had quit using nicotine products 1 to 3 years ago (n = 9) were 88.9% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who had quit using nicotine products 4 to 5 years ago (n = 3) were 66.7% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who had quit using nicotine products 6 to 10 years ago (n = 3) were 33.3% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who had quit using nicotine products > 10 years ago (n = 2) were 50% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students who currently use nicotine products (n = 4) were 75% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Students without a history of using nicotine products (n = 79) were 70.9% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Overall, students with a history of using nicotine products (n = 25) were 68% in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

Students who expressed agreement in allowing a patient who smokes to enroll into a pulmonary rehabilitation program expressed the following phrases: disagreement in withholding care, a need for increased cessation education, an increase amount of interaction would increase the chance of quitting, time is needed to quit using nicotine

products, and the requirement of patients to provide proof of adhering to cessation. Students who expressed disagreement in allowing a patient who smokes to enroll into a pulmonary rehabilitation program expressed the following: quitting should be a prerequisite to enrollment, treating these patients would be a waste of time, and treating these patients would be waste of resources.

### **Discussion**

Due to the small sample size, it is hard to determine if the results reveal any meaningful information regarding ethnicity and major; However, conclusions may be drawn from age, gender, and a history of nicotine use.

As the students age increases, the percentage of those in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program decreases. This may be due to generational differences in the perception of nicotine use as a social norm. Young adults aged 21-29 years report the highest rates of cigarette use, and young adults aged 18-25 years report the highest use of multiple tobacco products as well as use of smokeless tobacco.<sup>11-12</sup> As such, young adults may view nicotine use as relatively normal compared to older generations who have a lower percentage of nicotine use.

Males were much less likely than females to favor allowing a patient who smokes to enroll into a pulmonary rehabilitation program. This decrease in favoring allowing a patient who smokes to enroll into a pulmonary rehabilitation program may be explained by the higher incidence of masculine gender roles within the male population. These gender roles tend to be less empathetic than feminine gender roles, and as such, there would be a decrease in empathy towards allowing a patient who smokes to enroll into a pulmonary rehabilitation program.<sup>13-14</sup>

Respiratory therapy students and physical therapy students had approximately the same percentage of those in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program. This finding may be explained by the fact that both respiratory therapy and physical therapy students learn about the importance of pulmonary rehabilitation during their schooling as they are both involved in the care of a patient enrolled in pulmonary rehabilitation.

Students with a history of smoking cigarettes had a higher percentage of those in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program; However, the percentage of those in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program were approximately the same between students with a history of nicotine use and students without. The increase in favoring allowing a patient who smokes to enroll into a pulmonary rehabilitation program seen in students with a history of cigarette may be explained by the recognition of the addiction patients have who are currently smoking. This recognition may increase their empathy towards patients who smoke enrolling into a pulmonary rehabilitation program.

Students that had quit using nicotine products 1 to 3 years ago were more likely to favor allowing a patient who smokes to enroll into a pulmonary rehabilitation program than other groups in this demographic; however, the percentage of those in favor of allowing a patient who smokes to enroll into a pulmonary rehabilitation program were approximately the same between students with a history of nicotine use and students without. The increase in favoring allowing a patient who smokes to enroll into a pulmonary rehabilitation program seen in students who have recently quit using nicotine

products may be explained by an increased feeling of empathy towards the difficulty in quitting.

Students who expressed agreement in allowing a patient who smokes to enroll into a pulmonary rehabilitation program expressed the following phrases: disagreement in withholding care, a need for increased cessation education, an increase amount of interaction would increase the chance of quitting, time is needed to quit using nicotine products, and the requirement of patients to provide proof of adhering to cessation. The students who expressed concern for withholding care may have made this choice based on the Hippocratic oath. Those who expressed concerns for interaction time may have already been educated on how nicotine is addictive, and how it takes multiple tries for a person to fully quit.

Students who expressed disagreement in allowing a patient who smokes to enroll into a pulmonary rehabilitation program expressed the following: quitting should be a prerequisite to enrollment, treating these patients would be a waste of time, and treating these patients would be waste of resources. The students who expressed quitting should be a prerequisite for enrollment may not have known that pulmonary rehabilitation can be a tool for cessation education and therapy. Those who expressed that treating the patients would be a waste of time/resources may not have known the importance of quitting in slowing disease progression.

One of the limitations to the study was the small sample size. Due to the small sample size, this data may not reflect the population of healthcare students. Only students in Texas were asked to participate, so this data doesn't reflect the attitudes healthcare students have about allowing a patient who smokes to enroll into a pulmonary

rehabilitation program outside of Texas. Future studies should explore the relationship between favoring allowing a patient who smokes to enroll into a pulmonary rehabilitation program and familial nicotine use. Another subject for future study would be to describe the relationship between a student's level of knowledge about nicotine and their attitude on allowing a patient who smokes to enroll into a pulmonary rehabilitation program.

In conclusion, the group of students that were the most likely to favor allowing a patient who smokes to enroll into a pulmonary rehabilitation program were 18 to 22 year old females who had previously smoked 1 to 3 years ago. More studies need to be performed in this area of research with a larger sample size to determine the attitudes students have on allowing a patient who smokes to enroll into a pulmonary rehabilitation program. Future studies should include questions about familial nicotine use and the level of knowledge the students possess about nicotine. In understanding a student's perceptions about allowing a patient who smokes to enroll into a pulmonary rehabilitation program, healthcare professors may be able to more accurately teach students about why it is important to accept patients who smoke into a pulmonary rehabilitation program.

## **CHAPTER II: NICOTINE AND TOBACCO EDUCATION FOR HEALTHCARE STUDENTS**

### **Introduction**

It is important that students in the healthcare field understand the treatment options for a patient who uses nicotine products and their role in treatment so that they may provide the best care possible to those who need cessation assistance.<sup>10</sup> Pulmonary rehabilitation consists of several different therapies: education about medication, education about smoking cessation, education about disease management, strength training, flexibility training, endurance training, and behavioral therapy.<sup>9</sup> Students need to understand that tobacco use is an addiction that often requires education and pharmacological assistance to quit, which are included in a pulmonary rehabilitation program.<sup>2,4</sup> Healthcare workers must not deny a patient from enrolling into a pulmonary rehabilitation program because of their smoking status. Healthcare students need to be educated on the effects tobacco has on the body, the different roles that each field has in treatment, and treatments options available to people addicted to nicotine products. In improving the education for students on tobacco products, the treatment of tobacco cessation will be improved within healthcare.

### **The Effects of Tobacco and Nicotine**

According to the CDC, cigarette smoking causes more than 480,000 deaths each year in the United States, which is nearly one in five deaths.<sup>1</sup> Tobacco use can cause cancer almost anywhere in the body and is the cause of several chronic diseases.<sup>1,15</sup> The cardiovascular, respiratory, immune, renal, and reproductive systems are especially effected by nicotine.<sup>1,15-16</sup>

Smoking a cigarette immediately causes hemodynamic changes: heart rate, blood pressure, and contractility increase.<sup>15</sup> This reduces blood flow to the coronary and cutaneous arteries and increases blood flow to skeletal muscle.<sup>15</sup> Persistent nicotine stimulation can contribute to coronary vascular disease and produce acute myocardial ischemia.<sup>1,15</sup> When coronary vascular disease is present, myocardial function worsens. Nicotine also changes endothelial cell function and structure.<sup>15</sup> The arteries undergo atherosclerosis, or hardening and narrowing.<sup>1,15</sup> This narrowing will increase systemic vascular resistance and makes the heart work harder to pump blood throughout the body. The result of atherosclerosis is hypertension and an increase in the incidence of cardiovascular disorders.<sup>1,15</sup> The myriad of other cardiovascular diseases that can occur with smoking include the following: increased clot formation, increased incidence of stroke, reduced blood flow to the legs and skin, aortic rupture, and acute myeloid leukemia.<sup>1,15</sup> After one year of quitting smoking, the risk of heart attack drops dramatically and within two to five years, the risk of stroke becomes the same as nonsmokers.<sup>1</sup>

The respiratory system is greatly affected by cigarette smoking. The inhaled gas is responsible for nine out of ten lung cancer deaths and eight out of ten chronic obstructive pulmonary disease (COPD) deaths.<sup>1</sup> Cigarette smoking increases the risk of developing lung cancer by approximately 25 times in both men and women.<sup>1,15</sup> Other cancers that can arise from smoking tobacco include tracheal, bronchial, oropharyngeal, and esophageal.<sup>1</sup> With COPD, the person can develop emphysema or chronic bronchitis, although, these two disease pathologies are often combined in a patient with COPD.<sup>1,15,17</sup> In emphysema, the patient's alveolar walls will be destroyed, creating large sacs of air.<sup>15</sup>

This has many consequences: gas exchange will be decreased between the alveoli and capillaries and air within the large sacs will be trapped so that the patient will be unable to exhale all the gas in their lungs.<sup>15</sup> With chronic bronchitis, the patient will have persistent inflammation of the bronchial tree causing increased sputum production.<sup>15</sup> Both the inflammation and increased sputum production will decrease the airway lumen size, making it harder for the patient to breathe. Tobacco use can also increase the chance of developing pneumonia and secondary tuberculosis.<sup>15</sup>

Nicotine impairs signal transduction in the lymphoid system resulting in decreased immune response.<sup>15</sup> The T-cell population is decreased due to the arrest of the cell cycle and macrophage response becomes dysfunctional.<sup>15</sup> Macrophage response is the first line of defense against tuberculosis, and with dysfunctional macrophage activity, the incidence of tuberculosis increases.<sup>15</sup> The migration of inflammatory cells and fibroblasts to an inflamed site is reduced, causing decreased wound healing and increased risk of infection in nicotine exposed individuals.<sup>15</sup> People who smoke have an increased chance of developing rheumatoid arthritis.<sup>1</sup> There is also increased risk for gum infection in people who smoke which may lead to tooth loss.<sup>1</sup>

The risk of chronic renal disease is increased in people who smoke.<sup>15</sup> This is due to an impaired response to increased systemic blood pressure in the kidneys, resulting in increased albumin excretion in urine, decreased glomerular filtration rate, and increased incidence of renal artery stenosis.<sup>15</sup> People who smoke have an increased mortality for end stage renal disease.<sup>15</sup> Cancer can also form within the kidneys and bladder, resulting in impaired function of the renal system.<sup>1,15</sup>

Tobacco use affects both the male and female reproductive systems.<sup>1,15</sup> It reduces fertility in both sexes and cervical cancer is increased in females.<sup>1,15</sup> In males, nicotine use causes a decrease in testosterone levels and erectile dysfunction.<sup>15</sup> In females, nicotine use causes a variety of problems: decreased blood flow to the oviducts resulting in decreased fertilization, anovulation or irregular menstrual cycles caused by a hypoestrogenic state, and deleterious effects on fetal outcome.<sup>15</sup> There is an increased incidence in ectopic pregnancy, intrauterine growth restriction, preterm delivery, low birth weight, still birth, miscarriage, mental retardation, orofacial clefts in infants, and sudden infant death syndrome.<sup>1,15</sup> Maternal and grand maternal smoking has shown an increase in the incidence of pediatric asthma.<sup>15</sup>

As well as the above-mentioned problems with smoking, there are several other problems associated with smoking. There is an increased risk of cancer in the colon, rectum, liver, pancreas, and stomach.<sup>1,15</sup> There is an increased risk for broken bones in women past their child bearing years compared to women who have never smoked.<sup>1</sup> Smoking can increase the risk of developing cataracts and age-related macular degeneration.<sup>1</sup> The risk for developing diabetes is 30-40% higher for active smokers compared to nonsmokers.<sup>1,15</sup>

While there are several documented problems associated with smoking, there are no benefits that have been proven with nicotine use. It is imperative that students understand what is effected in people who smoke so that they may not only treat those problems, but also educate people who smoke on the dangers of nicotine use.

## **The Roles of Different Healthcare Professions**

There are several different professions involved in the process of smoking cessation, particularly in the setting of pulmonary rehabilitation. Such positions include the following: allopathic/osteopathic doctors, nurses, respiratory therapists, physical therapists, occupational therapists, dieticians, and social workers. The interdisciplinary team approach is vital to ensuring that a patient who smokes has all the help they need in order to quit smoking.<sup>17-18</sup>

Doctors are important in the processes of encouraging smoking cessation, prescribing medications that aid in smoking cessation, and referring a patient to pulmonary rehabilitation.<sup>19</sup> Doctors can also participate in pulmonary rehabilitation by overseeing the treatment of patients enrolled in their program by modifying and controlling their plan of care.<sup>19</sup> The plan of care may include smoking cessation education, disease management education, and an exercise regimen.<sup>19</sup>

Nurses are involved in all stages of disease progression in a patient that has pulmonary disease, from prevention to end-of-life care.<sup>10</sup> Because of this, it is especially vital that nurses understand the importance of smoking cessation. Primary care nurses are important in that they can provide education and materials to aid in smoking cessation.<sup>20</sup> Nurses within the intensive care unit are able to further educate patients on the importance of smoking cessation, as well as education on the ill effects of tobacco use.<sup>20</sup> These nurses are also able to provide education to the patient about pulmonary rehabilitation once the patient is discharged from the hospital.<sup>19-20</sup> Nurses are also involved in pulmonary rehabilitation programs, often educating patients on smoking

cessation and disease pathologies.<sup>19</sup> They can also inform patients on different methods to help with smoking cessation.<sup>20</sup>

Respiratory therapists are involved in the education of pulmonary diseases, medication education, and therapeutic exercises and breathing techniques for patients with dyspnea.<sup>19</sup> They educate patients about different medications that aid in smoking cessation and the harmful effects of tobacco use.<sup>19</sup> They also administer tests to determine the severity of the disease, such as spirometry or the six-minute walk test.<sup>19</sup>

Physical therapists coordinate with doctors to ensure that the patient is receiving the exercise and strength training they need within a pulmonary rehabilitation program.<sup>19</sup> They help the patient with muscle training, flexibility, and endurance training.<sup>19</sup> In helping the patient with physical exercises, they can perform more activities of daily living and improve their quality of life.<sup>8,17-19,21</sup>

Occupational therapists help patients learn techniques to make activities of daily living easier.<sup>19</sup> They help patients in pulmonary rehabilitation learn new methods or shortcuts so that they may conserve energy throughout the day.<sup>19</sup> Occupational therapists, along with physical therapists, help patients so that they may perform more activities of daily living and, ultimately, improve their quality of life.<sup>19</sup>

Dieticians are responsible for ensuring the patient's diet is appropriate for their condition.<sup>19</sup> They work with the patient to create nutritional goals and educate them on the importance of a proper diet.<sup>19</sup>

Social workers are involved with discharging a patient from the hospital, as well as assessing needs for home services.<sup>19</sup> They work with third-party payers to help patients obtain any benefits they need, as well as provide counseling.<sup>19</sup> It is important that social

workers assess if a patient is living in a deprived area, as patients in more deprived areas are less likely to complete pulmonary rehabilitation.<sup>9</sup>

In understanding the different roles that each member of the healthcare team encompasses, students will be able to better understand the importance of their own role and how to incorporate their knowledge in treating the patient. It is important that every member of the healthcare team is involved in managing either smoking cessation or disease management in a patient who uses tobacco products.

### **Treatment Options Available to People Addicted to Nicotine Products**

Treatment for people addicted to nicotine products consists of two main categories: nonpharmacologic therapy and pharmacologic therapy.<sup>7</sup> Nonpharmacologic therapy consists of any treatment that attempts to change behaviors around smoking.<sup>22</sup> This can include education and individual or group counselling.<sup>22</sup> Pharmacologic therapy is used to decrease nicotine intake with different drugs.<sup>5,7,22</sup> These drugs can replace their nicotine intake or change the brain chemistry to reduce nicotine induced cravings.<sup>5,7,22</sup> The best method for adherence is to combine both nonpharmacological and pharmacological therapy rather than just one method alone.<sup>5,7</sup> It is also important that the therapies chosen are best for the individual patient and that the patient is involved in deciding their therapy options.<sup>22</sup>

Education about nicotine products and their affects can happen anywhere: the ICU after a major health event, an appointment with a primary physician, or during pulmonary rehabilitation. The language used in educating a patient should be basic rather than technical, as most people do not use medical jargon in everyday language.<sup>22</sup> Any

questions the patient has should be answered, and the education should be treated like a discussion rather than a lecture.<sup>22</sup>

Counselling is another nonpharmacological therapy available to people who use nicotine products.<sup>22</sup> Counselling can be either in an individual or group setting.<sup>22</sup>

Counselling is a way for patients to talk about their addiction and their journey through cessation without fear of judgement or shame. During enrollment of pulmonary

rehabilitation, participants enjoy being around people with similar conditions as them.

These participants typically purchase gym memberships at the same location as the rehabilitation site so that they may continue using the equipment with the same people.

This sense of comradery is very important in motivating people to continue exercising and pursuing tobacco cessation.<sup>22</sup> The nonpharmacologic support systems in place for

people who use tobacco products are important in helping patients pursue cessation from tobacco products.<sup>22</sup>

Pharmacologic therapy consists of nicotine replacement therapy (NRT), bupropion, and varenicline. Table 1 organizes the different pharmacological therapies available to patients undergoing smoking cessation.

Nicotine replacement therapy, as the name implies, replaces the patient's nicotine intake with another form of nicotine that can be controlled and weaned.<sup>5,7</sup> Forms of NRT include lozenges, gum, the patch, inhalers, and nasal spray.<sup>22</sup> If a patient is using only NRT as their pharmacological agent to aid in smoking cessation, it is recommended that a long acting NRT be used with a short acting agent NRT.<sup>5</sup> The long acting NRT (the patch) will aid in decreasing cravings throughout the day and short acting NRT (lozenges,

gum, inhaler, and nasal spray) can be used when the patient experiences cravings not satisfied by the long acting NRT.<sup>3,5</sup>

Bupropion and varenicline act in different ways to reduce cravings within the brain.<sup>5,22</sup> Bupropion is a selective inhibitor of dopamine and noradrenaline reuptake.<sup>5,22</sup> Varenicline is a partial agonist of neuronal nicotinic acetylcholine receptors.<sup>5-6,16,22</sup> Both of these medications increase the odds of cessation success compared to a placebo in people who want to quit.<sup>5</sup>

Table 1: Pharmacological Agents Used to Aid in Smoking Cessation – Table describing the generic name, trade name, dosages, techniques, and adverse effects of pharmacological agents used in smoking cessation therapy.<sup>23</sup>

Generic Name	Trade Name	Dose	Techniques	Adverse Effects
Gum (NRT)	Nicorette Zonnic	OTC 2 mg 4 mg	<p><b>1<sup>st</sup> cigarette ≤30 minutes after waking: 4 mg</b>  <b>1<sup>st</sup> cigarette &gt;30 minutes after waking: 2 mg</b></p> <p>Weeks 1–6: 1 piece q 1–2 hours            Weeks 7–9: 1 piece q 2–4 hours            Weeks 10–12: 1 piece q 4–8 hours</p> <ul style="list-style-type: none"> <li>• Maximum, 24 pieces/day</li> <li>• Chew each piece slowly</li> <li>• Park between cheek and gum when peppery or tingling sensation appears (~15–30 chews)</li> <li>• Resume chewing when tingle fades</li> <li>• Repeat chew/park steps until most of the nicotine is gone (tingle does not return; ~30 min)</li> <li>• Park in different areas of mouth</li> </ul> <p>No food or beverages 15 minutes before or during use</p> <ul style="list-style-type: none"> <li>• Duration: up to 12 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• Mouth/jaw soreness</li> <li>• Hiccups</li> <li>• Dyspepsia</li> <li>• Hypersalivation</li> <li>• Effects associated with incorrect chewing technique:               <ul style="list-style-type: none"> <li>• Lightheadedness</li> <li>• Nausea/vomiting</li> <li>• Throat and mouth irritation</li> </ul> </li> </ul>

Generic Name	Trade Name	Dose	Techniques	Adverse Effects
Lozenge (NRT)	Nicorette Lozenge Nicorette Mini Lozenge	OTC 2 mg 4 mg	<p><b>1<sup>st</sup> cigarette ≤30 minutes after waking: 4 mg</b>  <b>1<sup>st</sup> cigarette &gt;30 minutes after waking: 2 mg</b></p> <p>Weeks 1–6: 1 lozenge q 1–2 hours  Weeks 7–9: 1 lozenge q 2–4 hours  Weeks 10–12: 1 lozenge q 4–8 hours</p> <ul style="list-style-type: none"> <li>• Maximum, 20 lozenges/day</li> <li>• Allow to dissolve slowly (20–30 minutes for standard; 10 minutes for mini)</li> <li>• Nicotine release may cause a warm, tingling sensation</li> <li>• Do not chew or swallow</li> <li>• Occasionally rotate to different areas of the mouth</li> <li>• No food or beverages 15 minutes before or during use</li> <li>• Duration: up to 12 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• Nausea</li> <li>• Hiccups</li> <li>• Cough</li> <li>• Heartburn</li> <li>• Headache</li> <li>• Flatulence</li> <li>• Insomnia</li> </ul>
Transdermal Patch (NRT)	NicoDerm CQ	OTC 7 mg 14 mg 21 mg	<p><b>&gt; 10 cigarettes/day:</b></p> <ul style="list-style-type: none"> <li>• 21 mg/day x 4–6 weeks</li> <li>• 14 mg/day x 2 weeks</li> <li>• 7 mg/day x 2 weeks</li> </ul> <p><b>≤ 10 cigarettes/day:</b></p> <ul style="list-style-type: none"> <li>• 14 mg/day x 6 weeks</li> <li>• 7 mg/day x 2 weeks</li> </ul> <ul style="list-style-type: none"> <li>• Rotate patch application site daily; do not apply a new patch to the same skin site for at least one week</li> <li>• May wear patch for 16 hours if patient experiences sleep disturbances (remove at bedtime)</li> <li>• Duration: 8–10 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• Local skin reactions (erythema, pruritus, burning)</li> <li>• Headache</li> <li>• Sleep disturbances (insomnia, abnormal/vivid dreams); associated with nocturnal nicotine absorption</li> </ul>
Nasal Spray (NRT)	Nicotrol NS	Rx 10 mL/mg (aq)	<p>1–2 doses/hour (8–40 doses/day)  One dose = 2 sprays (one in each nostril)  Each spray delivers 0.5 mg of nicotine to the nasal mucosa</p> <ul style="list-style-type: none"> <li>• Maximum: <ul style="list-style-type: none"> <li>• 5 doses/hour or</li> <li>• 40 doses/day</li> </ul> </li> <li>• For best results, initially use at least 8 doses/day</li> <li>• Do not sniff, swallow, or inhale through the nose as the spray is being administered</li> <li>• Duration: 3–6 months</li> </ul>	<ul style="list-style-type: none"> <li>• Nasal and/or throat irritation (hot, peppery, or burning sensation)</li> <li>• Rhinitis</li> <li>• Tearing</li> <li>• Sneezing</li> <li>• Cough</li> <li>• Headache</li> </ul>

Generic Name	Trade Name	Dose	Techniques	Adverse Effects
Oral Inhaler (NRT)	Nicotrol Inhaler	Rx 10 mg cartridge 4 mg ii	6–16 cartridges/day Individualize dosing Initially use 1 cartridge q 1–2 hours <ul style="list-style-type: none"> <li>• Best effects with continuous puffing for 20 minutes</li> <li>• Initially use at least 6 cartridges/day</li> <li>• Nicotine in cartridge is depleted after 20 minutes of active puffing</li> <li>• Inhale into back of throat or puff in short breaths</li> <li>• Do NOT inhale into the lungs but “puff” as if lighting a pipe</li> <li>• Open cartridge retains potency for 24 hours</li> <li>• No food or beverages 15 minutes before or during use</li> <li>• Duration: 3–6 months</li> </ul>	<ul style="list-style-type: none"> <li>• Mouth and/or throat irritation</li> <li>• Cough</li> <li>• Headache</li> <li>• Rhinitis</li> <li>• Dyspepsia</li> <li>• Hiccups</li> </ul>
Bupropion SR	Zyban	Rx 150 mg sustained-release tablet	150 mg po q AM x 3 days, then 150 mg po bid <ul style="list-style-type: none"> <li>• Do not exceed 300 mg/day</li> <li>• Begin therapy 1–2 weeks prior to quit date</li> <li>• Allow at least 8 hours between doses</li> <li>• Avoid bedtime dosing to minimize insomnia</li> <li>• Dose tapering is not necessary</li> <li>• Duration: 7–12 weeks, with maintenance up to 6 months in selected patients</li> </ul>	<ul style="list-style-type: none"> <li>• Insomnia</li> <li>• Dry mouth</li> <li>• Nervousness/difficulty concentrating</li> <li>• Nausea</li> <li>• Dizziness</li> <li>• Constipation</li> <li>• Rash</li> <li>• Seizures (risk is 0.1%)</li> <li>• Neuropsychiatric symptoms (rare)</li> </ul>
Varenicline	Chantix	Rx 0.5 mg, 1 mg tablet	Days 1–3: 0.5 mg po q AM Days 4–7: 0.5 mg po bid Weeks 2–12: 1 mg po bid <ul style="list-style-type: none"> <li>• Begin 1 week prior to quit date</li> <li>• Take dose after eating and with a full glass of water</li> <li>• Dose tapering is not necessary</li> <li>• Dosing adjustment is necessary for patients with severe renal impairment</li> <li>• Duration: 12 weeks; an additional 12-week course may be used in selected patients</li> <li>• May initiate up to 35 days before target quit date OR may reduce smoking over a 12-week period of treatment prior to quitting and continue treatment for an additional 12 weeks</li> </ul>	<ul style="list-style-type: none"> <li>• Nausea</li> <li>• Sleep disturbances (insomnia, abnormal/vivid dreams)</li> <li>• Constipation</li> <li>• Flatulence</li> <li>• Vomiting</li> <li>• Neuropsychiatric symptoms (rare)</li> </ul>

## **The Role of Pulmonary Rehabilitation for Smoking Cessation and Pulmonary Health**

In treating a patient with COPD, pulmonary rehabilitation is one of the most effective therapies for the patient.<sup>8,17</sup> PR improves exercise capacity, reduces dyspnea, improves quality of life, and reduces anxiety and depression.<sup>8,17-18,21</sup> PR may also be an effective therapy prior to lung resection surgery in increasing forced expiratory volume in 1 second (FEV<sub>1</sub>).<sup>24</sup> It is effective for all patients regardless of age and socioeconomic deprivation.<sup>8-9</sup> Patients can be referred to a pulmonary rehabilitation program from primary and secondary care physicians, with most referrals coming from secondary care physicians.<sup>8</sup>

Pulmonary rehabilitation consists of several different therapies: education about medication, education about smoking cessation, education about disease management, strength training, flexibility training, endurance training, and behavioral therapy.<sup>8,18</sup> The education is typically done by nurses or respiratory therapists and it focuses primarily on medication use and disease management. Smoking cessation education and therapy is available to patients who are current smokers enrolled in the program.<sup>8</sup> Strength training, flexibility training, and endurance therapy are typically completed with the assistance of physical therapists and occupational therapists. Behavioral therapy is completed with social workers or psychologists and can be in an individual or group setting.

Because pulmonary rehabilitation has a strong education component, it is important that patients are enrolled when they are in need to extensive rehabilitation, regardless of their smoking status.<sup>18</sup> Once enrolled in a pulmonary rehabilitation program, a patient will be able to receive the education and medications necessary for

smoking cessation.<sup>8</sup> A patient who smokes should not be turned away, rather, they should be encouraged to enroll due to the major impact the program can have on their health-related quality of life.<sup>18</sup>

### **Conclusion**

Students who are involved in the healthcare team within a pulmonary rehabilitation program need to understand that patients who smoke often need assistance in quitting. Due to the addictive nature of nicotine, patients often need both nonpharmacological and pharmacological therapy when pursuing smoking cessation.<sup>2,4</sup> It is important that healthcare students understand the effects of nicotine and tobacco, their role in the treatment of a patient enrolled in a pulmonary rehabilitation program, and the treatment options available to patients who smoke. In understanding all of the facets of tobacco use, students will be able to better care for patients who smoke and, ultimately, help them have a better health-related quality of life.<sup>10</sup>

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