



## Research Article

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# Inpatient Smoking Cessation – A Quality Improvement Project

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### Abstract

**Objective:** The goal of this project was to explore inpatient, smoking-cessation strategies to mitigate smoking-related hospitalizations.**Background:** Cigarette smoking is the leader in the preventable cause of death in the US. Evidence-based inpatient smoking cessation programs are needed to reduce unnecessary smoking-related healthcare spending.**Methodology:** A quality improvement project was developed which included implementing the Modified Fagerstrom test for nicotine dependence to hospitalized smokers in a large, non-profit, 669 bed setting.**Results:** There were 659 patients who were receptive to receiving smoking cessation information and participating in the smoking cessation, quality improvement project. Using reliable tools to collect and measure data effectively will identify nicotine dependence.**Conclusion:** This lack of smoking cessation coaches is a huge barrier to implementing a productive tobacco cessation program. Hospital administration can implement smoking cessation hospital-wide protocols to identify smokers upon admission to minimize exorbitant healthcare smoking related costs and readmissions.**Keywords:** Smoking cessation; Healthcare dollars; COPD; Nicotine replacement

### Introduction

Habitual cigarette smoking is the leading cause of death worldwide and a preventable modifiable risk factor for lung cancer, chronic obstructive lung disease, coronary heart, stroke, and diabetes [1]. Cigarette smoking is the leader in preventable disease and death in the United States (US) and is the cause of death for more than 480,000 US citizens (Centers for Disease Control and Prevention, 2019) [2]. The US healthcare system

spends greater than \$300 billion annually on cigarette smoking related illnesses. Direct medical care of adults can cost up to \$175 billion and up to \$151 billion for lost productivity due to early deaths [3]. Cigarette smoking accounts for as many as eight out of ten Chronic Obstructive Pulmonary Disease (COPD) related deaths. Nicotine dependence is the main constraint, which needs to be controlled during the process of quitting tobacco [4]. There is a need for smoking cessation education during a hospital admission, which will allow for a plan to be prepared for smoking cessation and promote smoking cessation success.

Alabama is ranked 11<sup>th</sup> in the nation for the number of active smokers [5]. In 2014, the Affordable Care Act implemented tobacco cessation treatment as a required preventative service with no copay in the out-patient setting [6]. Online smoking cessation campaigns reach great numbers and are inexpensive; however, it is not effective in reducing smoking prevalence. Alabama’s Tobacco Quit Line invests \$1.44 per smoker, compared with the national average of \$2.10 [7]. In-patient smoking cessation needs to be on the forefront of preventive medicine and education needs to occur during the hospital admission for shortness of breath, acute myocardial infarction, and/or acute hypoxic respiratory failure. During this critical time, the patient will be most agreeable to plan to quit cigarette smoking.

Nicotine is responsible for the addiction and is in all tobacco-based products [8]. A person’s degree of nicotine dependence is associated with his or her continuous tobacco abuse behavior despite being educated on the known health risks [8]. Lifetime quit rates for addicted smokers are only 3%–7% with nicotine replacement therapy and the current on-line smoking cessation programs [8]. There is a strong push from healthcare legislation to address nicotine addiction, improved smoking cessation programs, and educating smokers on the harm of nicotine addiction. The treatment of tobacco dependence is advancing with modernizations in medication approval and concentrating on new tools for support delivery in real time.

Healthcare change is emerging over ongoing tobacco abuse and decreasing the number of readmissions to the hospital directly impacting patient outcome, hospital revenue, and the Advance Practice Nurse (APN) reimbursement. Given the impact of healthcare on the United States economy, implementing an inpatient tobacco cessation program to offer intense quit support before the patient is discharged home from the hospital is essential to decreasing tobacco abuse related hospital readmissions [9]. The tobacco counseling session will allow for recognition of the severity of nicotine dependency and the readiness for the patient to quit smoking. Smoking cessation and halting the co-morbidity disease processes will benefit the patient and the healthcare system.

**Project Purpose and Objectives**

Hospital admission with a cardiac related diagnosis provides a great opportunity to teach a patient about smoking cessation as he or she is highly motivated to quit smoking; however, there is a lack of inpatient smoking cessation education prior to hospital discharge [10]. The purpose of this project was to demonstrate that in-patient smoking cessation education would prepare the patient for a serious attempt to quit smoking incorporating the following objectives: (a) using a validated tool to evaluate the level of nicotine dependence, (b) addressing any disparities in the literature on in-patient smoking cessation programs, (c) fostering the growth of cognitive-behavior meditations for self-management of nicotine

dependence, (d) verbalizing an understanding of therapeutic regimen by the patient, (e) improve quality of life, and (f) save healthcare dollars.

**Methodology and Design**

This local healthcare system had a 40 % COPD readmission rate in November 2018 and there were approximately 90 in-patient smokers daily. This healthcare facility did not have an in-patient smoking cessation program, nor an out-patient program offered locally. Without a smoking cessation program in place, the in-patient smokers did not have a resource to assist them with smoking cessation.

A 5-day Tobacco Cessation Specialist course was attended, and board certification as a Tobacco Treatment Specialist was obtained. A team of smoking coaches was named the Tobacco Cessation Team (TCT) with a mission to address the gaps in smoking cessation programs in healthcare. This team also addressed a smoking cessation program to halt disease processes and to prevent smoking related readmissions. The TCT consisted of experienced health care providers who adopted the Modified Fagerstrom Nicotine Dependence Test (MFNDT) test to evaluate the level of tobacco dependency in hospitalized patients on the telemetry floor (See Table 1). This DNP and Dr. Percy applied to the Internal Review Board at Mobile Infirmiry Medical Center IRB and was granted approval to do a quality improvement project titled Inpatient Smoking Cessation Program.

|  |               |          |
|--|---------------|----------|
| How soon after you wake up do you smoke your first cigarette?                | 5 min or less | 3 points |
|  | 6-30 minutes  | 2 points |
|  | 31-60 minutes | 1 point  |
|  | 60+ minutes   | 0 points |
| Do you find it hard to refrain from smoking in places where it is forbidden? | Yes           | 1 point  |
|  | No            | 0 points |
| What cigarette would you hate most to give up?                               | First Morning | 1 point  |
|  | Any other     | 0 point  |
| How many cigarettes per day do you smoke?                                    | 10 or less    | 0 points |
|  | 11-20         | 1 point  |
|  | 21-30         | 2 points |
|  | 31 or more    | 3 points |
| Do you smoke more during the first hours after waking?                       | Yes           | 1 point  |
|  | No            | 0 points |
| Do you smoke if you are so ill you can't get out of bed?                     | Yes           | 1 point  |
|  | No            | 0 points |

≥6 indicates a high level of dependence

**Table 1:** Modified Fagerstrom Nicotine Dependence Test.

**Sample and Setting**

The healthcare system for this project included four outpatient facilities, more than 30 medical clinics, three acute care hospitals, and two rehabilitation hospitals. However, the system does not have a clinic to contribute to treatment of smoking cessation. An assessment was performed using the Strength, Weakness, Opportunity and Threat (SWOT) analysis (Lewis, 2011). The focus of the SWOT analysis was to recognize the

goal of the project and identify internal and external factors that impacted the goal attainment. Factors seen as weaknesses included not enough smoking coaches to educate smokers on cessation opportunities. Opportunities are patient education and a smoking cessation support group.

This author’s healthcare system was founded in 1910, which includes five hospitals and more than 30 medical clinics serving more than 11 counties. The main hospital, where this quality improvement project is being implemented, has 669 beds, five intensive care units, and a comprehensive cardiovascular program. The vision of this organization is to be the community’s first choice for healthcare by respecting a mission statement of LIFE, which represents Life, Integrity, Family, and Excellent service. The author’s healthcare system does not currently have an inpatient tobacco cessation program to aid patients who are active smokers. There are approximately 100 smokers on the inpatient census daily who would benefit from smoking cessation education and assistance to quit smoking and improve present and/or future quality of life. A list was configured in the electronic medical record, which adds or deletes patients’ names as patients are admitted to and discharged from the facility.

**Modified Fagerstrom Nicotine Dependence Test**

The MFNDT is a comprehensive self-reporting tool which estimates nicotine dependency based on an individual’s physiological and behavioral habits. The two most influential questions in determining nicotine dependence are how early in the morning a person has his or her first cigarette and the number of cigarettes smoked in 24 hours [11]. The MFNDT is a valuable tool

for predicting smoking cessation separate from respiratory distress, anxiety, and heart disease [12]. Scores of 0 as no dependency, 1–3 as low dependency, 4–6 as moderate dependency, and 7–10 as severe dependency can be given to participants after taking the MFNDT. The modified scale revealed a Cronbach  $\alpha$  value of 0.725 and a test–retest reliability of the scale showed a satisfactory Spearman’s rank correlation coefficient value of 0.730 ( $P > 0.05$ ). The significant inverse correlation between FTND score and smoking prevalence and higher FTND scores among current smokers supports those remaining smokers may be severely dependent. Less dependent smokers may quit more easily, and more dependent smokers may need more intensive treatment [11].

**Harris-Moore Smoking Cessation Chart**

The Harris-Moore Smoking Cessation Chart (HMSCC) was developed by the smoking cessation team as a guide for recommendations to assist a patient in starting a smoke cessation journey (See Table 2). The MFNDT score rates a nicotine dependency level as high, moderate, low to moderate, or low. The HMSCC describes a level of dependency with corresponding pharmaceutical and/or nicotine replacement therapy. The chart also had a cessation plan that suggested the frequency of the follow up phone call after discharge depending on the level of nicotine dependence. A place on the chart was allocated for the patient’s name, phone number and best time of day for a phone call. The member of the TCT reviewed the plan with each participant and set up the timing of the next session either on the phone or in person starting.

| Dependence Level | Nicotine Replacement   | Cessation   |
|------------------|--|---|
| <b>High</b>      | <ul style="list-style-type: none"> <li>• Chantix starter pack</li> <li>• Chantix 12-week Rx with option to extend another 12 weeks</li> <li>• Nicotine Patch 21 mcg &amp; taper</li> <li>• None</li> </ul> | <ul style="list-style-type: none"> <li>• Quitter’s Circle</li> <li>• Follow-up phone call or text message exchange Q week</li> <li>• Quitter’s support group monthly</li> </ul> |
| <b>Moderate</b>  | <ul style="list-style-type: none"> <li>• Chantix starter pack</li> <li>• Chantix 12-week Rx with option to extend another 12 weeks</li> <li>• Nicotine Patch 21 mcg &amp; taper</li> <li>• None</li> </ul> | <ul style="list-style-type: none"> <li>• Quitter’s Circle</li> <li>• Follow-up phone call text message exchange Q 2 weeks</li> <li>• Quitter’s support group monthly</li> </ul> |

|                        |  |   |
|------------------------|--|---|
| <b>Low to Moderate</b> | <ul style="list-style-type: none"> <li>• Chantix starter pack</li> <li>• Chantix 12-week Rx with option to extend another 12 weeks</li> <li>• Nicotine Patch 21 mcg &amp; taper</li> <li>• None</li> </ul> | <ul style="list-style-type: none"> <li>• Quitter’s Circle</li> <li>• Follow-up phone call text message exchange Q 2 weeks</li> <li>• Quitter’s support group monthly</li> </ul> |
| <b>Low</b>             | <ul style="list-style-type: none"> <li>• Nicotine Patch 21 mcg &amp; taper</li> <li>• None</li> </ul>  | <ul style="list-style-type: none"> <li>• Quitter’s Circle</li> <li>• Follow-up phone call text message exchange Q 4 weeks</li> <li>• Quitter’s support group monthly</li> </ul> |

**Table 2.** Harris-Moore Smoking Cessation Chart.

**Smoking Cessation Education**

The TCC would give each smoker a Quitting Smoking for Life booklet. The literature in this booklet was engaging and gave a fresh look with self-reflection prompts to engage the smoker and assist each smoker with a personal quitting action plan. The encouraging tone introduced the smoker easy ways to be successful with his or her smoking cessation journey. The three most essential elements to discuss with a smoker who has the desire to quit are the following: (a) understand the dangers of smoking and why quitting is essential, (b) how to make the change and bust through smoking cessation barriers, (c) identify personal coping strategies to overcome nicotine cravings and smoking triggers.

Each smoker was given information on The Alabama Tobacco Quitline for additional tobacco cessation coaching and information. Pfizer pharmaceuticals and American Cancer developed the Quitter’s Circle which is an online community designed to assist smokers with cessation barriers using educational, social, and financial support. Smokers can add family and friends to their circle and start a support group. Resources are available to connect with a healthcare provider and financial support to assist with the cost of a quit attempt.

**Nicotine Replacement Therapy**

The smokers were offered Nicotine Replacement Therapy (NRT) to assist them with smoking cessation and managing nicotine cravings along with withdrawal symptoms. In the 55 and older age group, NRT is 53%–68% more effective in assisting smokers with cessation when compared to a non-NRT group [13]. NRT comes in three doses consisting of 7 mg, 14 mg, 21 mg patches. The nicotine dependency score guided the smoking coach to advise the smoker of the initial dose of the NRT. The team did discover that if the person smokes more than one pack of cigarettes a day, 21 mg patches may not provide the replacement that is needed to decrease nicotine cravings. In the future, more research is needed to determine if initially adding a 7 mg or a 14 mg Nicotine patch to a 21 mg patch would provide the NRT necessary to allow smoking cessation to be successful in a smoker who smokes greater than a

pack per day.

**Varenicline**

Varenicline (Chantix) is manufactured by Pfizer Pharmaceuticals, and it assists smokers in the cessation process as a nicotine receptor agonist and is one of seven first-line medications recommended to increase long-term smoking abstinence [14]. After a clinical trial was completed to evaluate the neuropsychiatric effects of Varenicline was found to be low, the US Food and Drug Administration (FDA) removed the black box warning in December 2016 that advised the possibility of serious mental health side effects. A healthcare provider, who prescribes Varenicline, should always warn a smoker about he or she could possibly have vivid nightmares. The FDA did advise in 2011 that Varenicline may marginally increase cardiovascular risks in persons with a diagnosis of cardiovascular disease; however, habitual nicotine exposure could produce the same outcomes.

The 25-54 year age group has a higher success rate with using Varenicline when compared to using NRT [13]. Smokers, in the primary care setting, who are prescribed varenicline are more successful with smoking cessation for up to four years when compared to those who used NRT by itself [14]. Healthcare providers can prescribe Varenicline one mg twice a day and double the chance of the smoker’s success with cessation.

**Action Plan**

A list of admitted smokers was created within the electronic medical record, which allowed for the list to be automatically updated as smokers were admitted and discharged. There are approximately 100 patients on the in-patient smoker list daily. The TCT divided the patients who currently smoked and were admitted to the telemetry floor daily. Each member of the TCT had a goal to see five or six smokers a day between existing patient-oriented tasks. The member or coach of the TCT went to the smoker’s bedside and asked him or her to voluntarily participate in the smoking cessation project. An information sheet was given to the patient explaining the project, it was voluntary, and that he or she

could leave the project at any time. The MFNDT was given to each participant and a nicotine dependency score was given. The HMSCC was used to determine the frequency and type of tobacco cessation coaching needed according to the nicotine dependency level. The smoking cessation chart was then used to determine if the participant wished to have nicotine replacement therapy and/or pharmaceutical therapy initiated.

A comparison of collected data was performed, including active smoker nicotine dependence using the MFNDT, HMSCC, and 30-day readmissions, for three months following implementation compared to the previous years' data during the same three months. The outcome of this project was aimed at reducing less than 60-day active smoker readmissions and increasing successful smoking cessation attempts.

## Results

Over the course of the 3-month pilot study period, the TCT interviewed 1010 patients for smoking cessation. Out of 1010 patients evaluated, 102 were inappropriate to participate in the smoking cessation project due medical condition declining requiring transfer off the pilot unit. Two hundred and forty-nine declined to participate in the project and were not interested in discussing a quit attempt; however, were agreeable to receive printed education regarding smoking cessation. Ninety percent of the 249 advised that they had been smoking since childhood and didn't have a desire to stop and planned to continue smoking regardless of health risk. The other 659 patients were very receptive to receiving smoking cessation information as well as to participate in the study. Each of the 659 participants were evaluated for a smoking cessation intervention based upon the MFNDT score earned which determined their nicotine dependence level as being either high, moderate, low to moderate or low. The nicotine dependency levels were scored as the following: (a) 302 high, (b) 299 moderate, and (c) 58 low to moderate. Based upon the score, the TCT collaborated with the patient to determine nicotine replacement and cessation options using the HMSCC. Twenty percent of the participants agreed to Chantix as their nicotine replacement choice. Fifty five percent agreed to nicotine patches 21 micrograms tapering doses. After receiving nicotine

replacement options 25 percent of the participants decided to just quit smoking without replacement assistance (See Table 3).

All participants were agreeable to receiving accountability phone calls or text messages per the HMSCC recommendations. An alert was sent to each participant's primary care provider through the electronic medical record to advise them of the smoking cessation plan. Fifty-two percent of the participants were able to download and follow the quitter's circle app instructions prior to discharge. There were some barriers noted to utilizing the Quitter's circle app which included access to a smart phone and electronic literacy levels being below what was required to follow instructions with the app.

Out of the 659 participants who agreed to be in the study, only 104 were able to be contacted for follow-up after discharge from the hospital. The follow-up text message or phone call was a timely task for the TCT members, and each participant was given three phone calls or text messages to respond before the participant was deleted from the project. The 104 participants were given the MFNDT at two weeks and four weeks and these scores were compared to the in-patient score. The average MFNDT score reduction was 3% at two weeks and 4% at four weeks. The participants were being followed by his or her PCP in the out-patient setting if needed during their smoking cessation process. Another phone call was made to the 104 participants at 12 weeks, and it was noted that eight had quit smoking.

January 1, 2019, through May 30, 2019, during the implementation phase 264 COPD patients were admitted to the hospital and 50 patients were readmitted within 30 days of discharge. The average of the readmissions over the 5 months during the implementation phase was 15.2% (mean= 15.2, SD=2.16). January 1, 2020, through May 30, 2020, a year after the implementation phase, 210 COPD patients were admitted to the hospital and 34 of those were readmitted within 30 days after discharge (See Table 3). The average of readmissions over the 4-month period was 7.8% (mean=7.8, SD= 3.34). A statistically significant decrease in COPD 30-day readmissions from 2019-2020 was found. The *f-ratio* value is 17.22013. The p-value is .00321. The result is significant at  $p < .05$ . (Significance set as  $p < 0.05$ , 95% confidence interval (See Table 4).

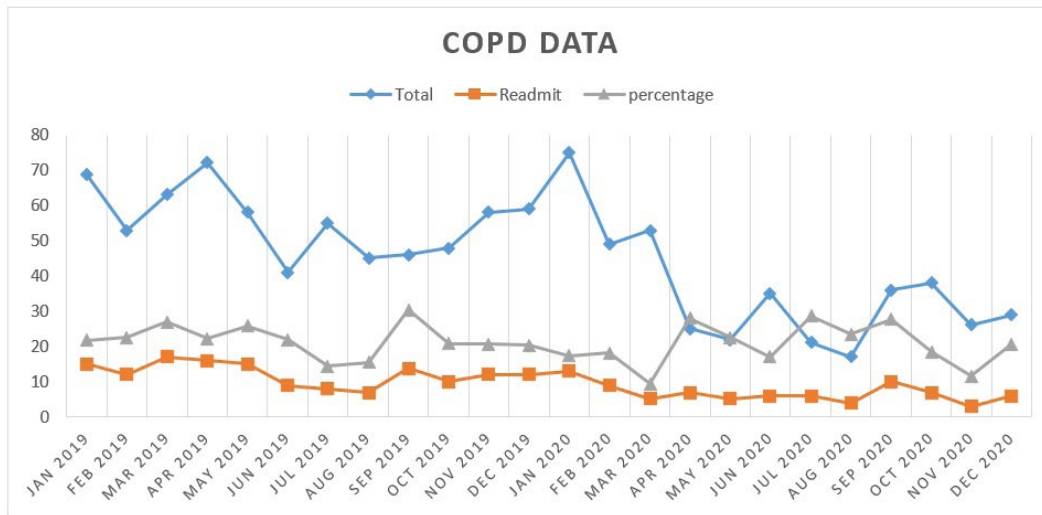


Table 3: COPD Data January 2019 to December 2020.

| Comparing COPD 30 Day Readmissions During a 5 month Period Using One-Way Anova                                 | Jan-May 2019 | Jan-May 2020 | Total  |
|--|--------------|--------------|--------|
| N  | 5            | 5            | 10     |
| $\sum X$   | 76           | 39           | 115    |
| Mean   | 15.2         | 7.8          | 11.5   |
| $\sum X^2$   | 1174         | 349          | 1523   |
| Standard Deviation   | 2.1679       | 3.3466       | 4.7199 |
| Result Details   |              |              |        |
| Source   | SS           | df           | MS     |
| Between-treatments   | 136.9        | 1            | 136.9  |
| Within-treatments  | 63.6         | 8            | 7.95   |
| Total  | 200.5        | 9            |        |
| The <i>f</i> -ratio value is 17.22013. The <i>p</i> -value is .00321. The result is significant at $p < .05$ . |              |              |        |

Table 4: Anova comparing 30-day readmission.

## Discussion

Assistance from trained smoking cessation coaches should be available to in-patient smokers who do not have access to local specialist clinics. This pilot study showed that patients that smoke are interested in assistance with cessation. The TCT did find that more healthcare providers are necessary to meet the needs of the number of daily in-patient smokers. If more staff could be trained as TTS and more in-patient smokers could be educated and assisted with smoking cessation, this author believes that there would be an increase in smoking cessation success, decrease in COPD exacerbations, decrease in hospital 30-day readmissions, decrease in healthcare dollars spent, and increase in a patient’s quality of life.

Since the first Surgeon General’s report was released in the 1960’s, cigarette smoking has declined from 40 % of the US population to under 15% of smoking adults. Despite the decrease in smokers nationally, smoking is still the leading cause of preventable deaths

currently in the US. The US Department of Health and Human Services (HHS) states that the dissemination of evidence-based smoking cessation practices should be implemented to promote smoking cessation to current hospitalized smokers. Hospital administration plays an integral role in implementing and mandating policies hospital-wide to assist providers in providing adequate care for current in-patient smokers [15].

Hospital administration can implement smoking cessation protocols to identify smokers upon admission to minimize exorbitant healthcare smoking related costs and readmissions. Smoking cessation protocols can be integrated into Electronic Health Records (EHR) to help identify smokers more easily upon hospital admissions [15]. Approved FDA smoking cessation pharmacology and behavioral modification counselling are cost-effective methods that can be implemented to inpatient to facilitate smoking cessation. Hospital administration can also deliver mass-media campaigns to shed awareness on tobacco control programs offered in their facility [15].

Smoking cessation reduces the risk of cardiovascular morbidity and COPD exacerbations and hospital readmissions. Smoking cessation also reduces the risk of developing twelve different types of cancer. Most insurance companies cover the implementation of smoking cessation programs within the hospital setting. Mitigating the risk for these disease processes will reduce the unnecessary spending of healthcare dollars on smoking-related chronic illnesses. By implementing these strategies, hospital administration plays an imperative role in increasing the likelihood of successful smoking cessation goals and minimizing unnecessary health facility spending on smoking-related readmissions [15-21].

## Conclusion

Cigarette smoking is the leader in the preventable cause of death in the US and there is a need for smoking cessation education during a hospital admission. In-patient tobacco counseling sessions will allow for the cessation process to begin and determine the smokers out-patient needs based upon his or her nicotine dependency score. More staff training is needed so in-patient smokers can be educated about smoking cessation strategies to decrease COPD exacerbations, in hospital 30-day readmissions, and healthcare dollars spent on this global issue. Using reliable tools to collect and measure data effectively, such as the MFNDT and the HMSCC will identify in-patient smokers and provide the TCT information to effectively direct patients to appropriate outpatient smoking cessation counselling facilities.

## Limitations

Limitations to this project included the small sample size and single-center population. The minimal availability of ancillary staff to assist the TCT in contacting patients limited the number

of smokers that could be educated and given smoking cessation counseling. Much of the loss of participant follow-up after discharge is due to the lack of coaches to make the phone calls. The follow-up needs to be simplified to involve a survey or a message through the hospital patient portal to allow more time for coaches to provide further smoking cessation education if needed. After this project, the hospital affiliated patient access chart was initiated to assist the bridge from in-patient to out-patient smoking cessation program which increased the opportunity for TCT members to communicate with smoking cessation patients in a timely fashion.

## Sustainability

The use of the grant funding is allowing staff to attend Tobacco Treatment Specialist (TTS) Training and become TTS certified. This will allow for more tobacco coaches to reach the smokers who are admitted and give these patients the tools necessary to be successful in their tobacco cessation journey.

## Funding

This author applied for a grant and was awarded \$20,000 to send additional staff to a Tobacco Treatment Specialists Conference and become board certified.

## Conflicts of Interest

None

## References

1. Branstetter S, Horton W, Mercincavage M, Buxton O (2016) Severity of nicotine addiction and disruptions in sleep mediated by early awakenings. *Nicotine & Tobacco Research*. 18: 2252-2259.
2. Center for Disease Control and Prevention (2021b) What is COPD?
3. National Institute of Health (2020) Tobacco, Nicotine, and E-Cigarettes Research Report.
4. Rahman A, Nik Mohamed MH, Mahmood S (2021) Evaluating nicotine abstinence, smoking cessation, reduction, and its relapses among electronic cigarettes single and dual Malaysian users: A one-year observational study. *Journal of Pharmacy & Pharmaceutical Sciences*. 24: 200-209.
5. Center for Disease Control and Prevention. (2021a). Current Cigarette Smoking Among Adults in the United States.
6. Lemaire RH, Bailey L, Leischow SJ (2015) Meeting the tobacco cessation coverage requirement of the patient protection and affordable care act: State smoking cessation quitlines and cost sharing. *American Journal of Public Health*. 105: S699-S705.
7. Alabama Public Health (2019) Tobacco prevention and control.
8. Harris C (2018) Tobacco smoking, e-cigarettes, and nicotine harm. *Proceedings of the National Academy of Sciences of the United States of America*. 115: 1406-1407.
9. Baker CL, Ding Y, Ferruffino CP, Kowal S, Tan J, et al. (2018) A cost-

- benefit analysis of smoking cessation prescription coverage from a US payer perspective. *ClinicoEconomics and outcomes research CEOR*. 10: 359-370.
10. Pack Q, Priya A, Lagu T, Pekow P, Rigotti N, et al. (2017) Smoking cessation pharmacotherapy among smokers hospitalized for coronary heart disease. *JAMA Intern Med*. 177: p1525-1527.
  11. Hu Y, Xie J, Chang X, Chen J, Wang W, et al. (2021) Characteristics and predictors of abstinence among smokers of a smoking cessation clinic in Hunan China. *Front Public Health*. 9: 615817.
  12. Lindberg A, Niska B, Stridsman C, Eklund B, Eriksson B, et al. (2015) Low nicotine dependence and high self-efficacy can predict smoking cessation independent of the presence of chronic obstructive pulmonary disease: A three year follow up on a population-based study. *Tobacco Induced Diseases*. 13: 2-8.
  13. Chang P, Shiu M, Yuan Y, Chang H, Su P, et al. (2019) Comparative effectiveness of Varenicline and nicotine replacement therapy for smoking cessation in older and younger smokers: A prospective cohort in Taiwan. *Nicotine & Tobacco Research*. 21: 149-155.
  14. Taylor GMJ, Taylor AE, Thomas KH, Jones T, Martin RM, et al. (2017) The effectiveness of varenicline versus nicotine replacement therapy on long-term smoking cessation in primary care: a prospective cohort study of electronic medical records. *International Journal of Epidemiology*. 46: 1948-1957.
  15. U.S. Department of Health & Human Services (HHS) (2020) Smoking cessation: A report of the Surgeon General - Key findings.
  16. Bricker JB, Mull K, Kientz JA, Vilardaga RM, Mercer LD, et al. (2014) Randomized, controlled pilot trial of a smartphone app for smoking cessation using acceptance and commitment therapy. *Drug and Alcohol Dependence*. 143: 87-94.
  17. Ekpu V, Brown A (2015) The economic impact of smoking and of reducing smoking prevalence: Review of evidence. *Tobacco Use Insights*. 14: 1-35.
  18. Lopez-Campos J, Tan W, Soriano J (2016) Global burden of COPD. *Respirology*. 21: 14-23.
  19. Lunde P, Nilsson BB, Bergland A, Kværner KJ, Bye A (2018) The effectiveness of smartphone apps for lifestyle improvement in non-communicable diseases: Systematic Review and Meta-Analyses. *Journal of Medical Internet Research*. 20: e162.
  20. Nguyen H, Silva J (2016) Use of smartphone technology in cardiology. *Trends in Cardiovascular Medicine*, 24: 376-386.
  21. Picciotto M, Kenny P (2021) Mechanisms of nicotine addiction. *Cold Spring Harb Perspect Med*. 11: a012112.