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Brief Report

Nicotine Dependence: Identification and Recommendations

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Abstract

According to the U.S. Department of Health and Human Services, cigarette smoking is responsible for approximately 480,000 deaths per year in the United States [1]. This number represents 17.8% of all deaths of those above 35 years of age [2]. Tobacco use is responsible for approximately six million deaths per year across the globe [3]. In 2017, 47.4 million U.S. adults used tobacco products including cigarettes, cigars, cigarillos, smokeless tobacco, pipes, water pipes, hookahs, or electronic nicotine delivery systems [4]. Electronic nicotine delivery systems, better known as e-cigarettes, are electronic devices that deliver nicotine by heating up a nicotine-containing liquid [5]. Nurse practitioners can be influential in the prevention and identification of nicotine dependence and can provide adequate treatment. The purpose of this article is to define nicotine dependence, explain the mechanism of action nicotine, discuss the pathology of nicotine and tobacco use, review the assessment of clients who use tobacco, discuss the various treatment interventions available, and provide implications for practice.

Nicotine Dependence

Nicotine dependence is a mental health disorder defined by the Diagnostic and Statistical Manual- 5 (DSM-5) as a "Problematic pattern of tobacco use leading to clinically significant impairment or distress [6]." To make the diagnosis of nicotine dependence, clients must experience two symptoms within a 12-month period [6]. There are 11 specific symptoms that meet this diagnostic criterion. These symptoms include the increased use of tobacco or increased time spent than what was originally intended, a persistent desire to decrease use or quit tobacco use, spending a significant amount of time to obtain or use tobacco, using tobacco in hazardous situations, or continued use despite knowledge of health hazards [6]. Other symptoms include experiencing a craving for tobacco, tobacco use interfering with role obligations, continued use despite having social or interpersonal problems because of the use of tobacco, and decreasing social, occupational or recreational activities because of tobacco use [6]. Clients experiencing tolerance, needing increased amounts of tobacco to achieve the desired effect, also fulfills the DSM criterion, as does withdraw symptoms when use of tobacco is decreased [6].

Mechanism of Action

Nicotine found in tobacco, and in other formulations, is highly addictive and was found to be as addictive as cocaine and heroin [7]. This addiction is thought to be caused by stimulation of the reward center, the mesolimbic-dopamine pathway, which results in improved cognitive function and mood enhancement [8]. Repetitive stimulation of the GABAergic neurons results in a desensitization of this pathway, decreasing its inhibitory effect on dopamine [9].

Pathology

Nicotine use has multiple systemic effects in the human body and contributes to the development of multiple chronic diseases. Nicotine has been implication in lung, gastrointestinal, pancreatic and breast cancers [7]. The cardiovascular system is affected by nicotine due to its sympathomimetic action, resulting in increased heart rate, blood pressure, and cardiac contractility [7]. Nicotine use has been associated with decreased tone of the colon, decreased gastric motility, and the development or worsening of Gastro Esophageal Reflux Disorder [10,11]. In the lungs, nicotine use results in a decrease of elastin in the lung parenchyma and

increases alvelolar volume, which may develop into COPD [12]. It also stimulates the vagal reflex resulting in bronchoconstriction, further decreasing ventilation [12]. In addition, the ocular, renal, and reproductive systems are all negatively affected by nicotine use [13-15].

Assessment

By understanding the criteria for identifying and diagnosing nicotine dependence, providers can employ assessment techniques to help identify clients suffering from the ailment. Screening for tobacco use is vital to identification of clients who may have nicotine dependence. An ideal method for providers to employ with clients is the 5As, which refers to asking patients about their tobacco use, advise them to quit, assess their readiness to quit, assist them in planning quitting, and arranging for follow up (Table 1) [16]. This method has been effective for providers in helping their adult, pregnant, and adolescent clients quit smoking [16-18]. Smokers who are not willing to quit should receive at least one of two evidence-based motivational treatments: motivational interviewing or discussion of smoking cessation medications with a plan to gradually decrease use (Table 2) [19].

Ask- Identify and document patient's current tobacco use status for every patient at every encounter.
Advise- Encourage every tobacco user to quit.
Assess- Ask the patient if they are ready and willing to quit.
Assist- If the patient is ready and willing to quit, assist them in developing a plan to help them succeed in quitting.
Arrange- Schedule a follow up appointment or phone call within the first week after the scheduled quit date.

Table 1: Five Major Steps to Intervention (The "5 A's"). Internet Citation: Five Major Steps to Intervention (The "5 A's"). Content last reviewed December 2012. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/tobacco/5steps.html

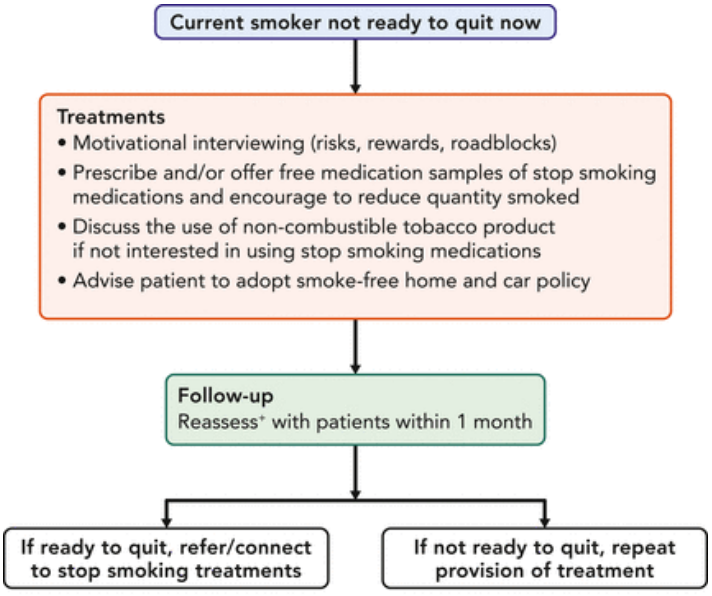

Table 2: Expert Consensus Decision Pathway on Tobacco Cessation Treatment [19].

Treatment Recommendations

Most literature recommends a combination of non-pharmacological and pharmacological interventions to treat nicotine dependence. The most effective and well-studied non-pharmacological intervention is the use of behavioral therapy. Behavioral therapy can foster motivation for the client to quit smoking, and will provide for more frequent office visits, which can help ensure pharmacologic adherence [20]. Intensive and formal behavioral therapy is recommended over general counseling and support [21]. Intense behavioral therapy is defined as four sessions

within a 12 weeks' period, with each session lasting at least 10 minutes [22]. Behavioral therapy can be performed by the provider or a dedicated office staff, and in individual or group settings [22]. In addition, the use of printed self-help materials, telephone helplines, automated text messaging, and smart phone applications can all be beneficial to help clients quit (Table 3) [23,24].

American Lung Association: Offers patients a summary of reasons to quit, describes health risks, and provides possible methods to help them quit. https://www.lung.org/stop-smoking/i-want-to-quit/
American Cancer Society: Offers information about health risks, medications, counseling, smart phone applications, and discusses methods of quitting. This organization also provides a phone number to call (1-800-227-2345) to assist patients in getting help finding a phone counseling program in their state of residence. https://www.cancer.org/latest-news/how-to-quit-smoking.html

Table 3: Resources for Patients.

Pharmacologic therapy is a highly recommended method to help clients quit smoking. There are multiple options for pharmacotherapy and providers should be aware of the differences between each prescribed option. Nicotine replacement therapy and varenicline are considered primary treatment options and are the recommended medication treatment options [22]. Bupropion also has evidence to support its effectiveness but must be used with caution.

Nicotine Replacement Therapy

Nicotine Replacement Therapy (NRT) is designed to decrease nicotine withdrawal symptoms when clients are attempting smoking cessation [25]. NRT is available in various formulations including a nicotine patch, gum, inhaler, spray, tablets, and lozenge [26]. Using a combination of more than one form of NRT increases the likelihood of successful cessation [26]. When prescribing NRT, providers should be aware that the blood levels of nicotine are significantly lower than smoking cigarettes, even when using combination therapy [27]. NRT use also does not increase the likelihood of cardiovascular disease or acute events, making its use safe for most clients [28].

Varenicline

Varenicline is a non-nicotinic partial agonist of the nicotinic acetylcholine receptor, which competes with nicotine at the receptor site by inhibiting its binding [29]. Varenicline is the most-effective pharmacotherapy option for smoking cessation when used as monotherapy [30]. This medication also helps reduce the frequency of urges and decreases withdraw symptoms of nicotine withdrawal [31]. According to the FDA, varenicline administration should start one week before the intended quit date and should follow a one-week titration schedule: 0.5 mg once daily for 3 days, then 0.5mg twice per day for 4 days, then 1mg daily for the remainder of treatment [32]. Clients should continue to take varenicline for 12 weeks [32].

Varenicline has been extensively studied to confirm its safety and to identify risk of adverse events. Common side effects of this medication include insomnia, nausea, and abnormal dreams [22]. Despite several case reports of increased rates of psychiatric complications with the use of varenicline, a systematic review and meta-analysis did not find increased rates of depression or suicidal ideation in those without prior psychiatric comorbidities [33]. For those with a history of neuropsychiatric symptoms, there is a higher likelihood compared to those without a history of neuropsychiatric events, of recurrence of these symptoms when taking varenicline [34].

Bupropion

If NRT or varenicline are ineffective or cannot be used to help a client with smoking cessation, bupropion is another option that may be effective [22]. Bupropion is an antidepressant medication that is acts on both dopaminergic and noradrenergic systems and is believed to reduce the reinforcing properties of nicotine [35]. Since bupropion is an antidepressant, it may be useful for clients who suffer from depression and nicotine dependence [36]. Bupropion can also be used in combination therapy with NRT or varenicline [37]. Safety must be at the forefront of the provider's decision to start bupropion as a treatment option. Bupropion is known to decrease the seizure threshold and therefore should be used with caution for those with a history of seizures [38]. Common side effects to bupropion include vivid dreams, insomnia, irritability, thirst, dry mouth, and the immediate-release form results in an increased risk of seizures [39]. Bupropion can also increase blood pressure, so avoiding use in patients with an underlying hypertensive disorder or history of heart disease is recommended [40].

E-Cigarettes

E-cigarettes were designed as an alternative to the traditional cigarette as a method to stop smoking. E-cigarettes do not contain tobacco and are commonly flavored, which is why many people may believe they are better than cigarettes [41,42]. The liquid usually contains propylene glycol and glycerol, and may contain nicotine, making their use worrisome for providers. Hartmann-Boyce and colleagues found, in a Cochrane review, that e-cigarettes help smokers to stop smoking compared to placebo [41]. Another study showed that e-cigarettes were more effective for smoking cessation than nicotine-replacement therapy [43]. However, the development and distribution of e-cigarettes are not regulated, opening the door for inconsistencies in the various brands of products, which may include additives and potential toxins in the vapor [42]. In addition, e-cigarette use has been implicated as a risk factor for future cigarette use in young adult and non-smokers [5]. Therefore, it is essential for providers to assess for the use of

e-cigarettes during every patient encounter, especially given the popularity of these devices.

Implications for Practice

Nurse practitioners are at the forefront of patient care and are often the first healthcare professional clients encounter. Given the prevalence of cigarette smoking in America, and around the world, nurse practitioners should screen for nicotine dependence in every encounter. Screening every patient will immediately identify those who smoke, and will allow the provider to offer education, recommendations and support of cessation at the point of care. Assisting clients with nicotine dependence can decrease the negative outcomes associated with smoking including COPD, heart disease, stroke and lung cancer [44]. Medication, psychotherapy, and e-cigarettes are effective and accessible methods to helping clients successfully cease nicotine use. Collaborating with other physical and mental health professionals will support the patient and garner success in quitting [45]. In addition, there are multiple online resources for providers and patients to help them throughout the process (Table 4).

CDC's Health Care Professionals: How You Can Help Patients Quit This website offers multiple resources for various healthcare providers including dentists, mental health providers, primary care providers, pharmacists and vision specialists. https://www.cdc.gov/tobacco/campaign/tips/partners/health/index.html
Smokefree.gov offers a plethora of resources for healthcare professionals including printed handouts, smart phone applications, research articles, and government reports.
Agency for Healthcare Research and Quality: This web page offers smoking cessation evidence and research, and provides resources for healthcare practices. https://www.ahrq.gov/evidencenow/heart-health/smoking/index.html

Table 4: Provider Resources.

Conclusion

Nicotine dependence contributes to millions of deaths around the world every year, making this a global health issue. Nicotine use contributes to a variety of health conditions and increases healthcare costs. Nurse practitioners must play a dominant role in the prevention, identification, and treatment of nicotine dependence to reduce the burden this disease causes to those around the globe.

References

1. U.S. Department of Health and Human Services (2018) The Health Consequences of Smoking-50 Years of Progress: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.
2. Ma J, Siegel RL, Jacobs EJ, Jemal A (2018) Smoking-attributable Mortality by State in 2014, U.S. American Journal of Preventive Medicine 54: 661-670.
3. Prasad S, Kaisar MA, Cucullo L (2017) "Unhealthy smokers: scopes for prophylactic intervention and clinical treatment." BMC neuroscience 18: 70.
4. Wang TW, Asman K, Gentzke AS, Cullen KA, Holder-Hayes E, et al. (2018) Tobacco Product Use Among Adults - United States, 2017. MMWR Morb Mortal Wkly Rep 67: 1225–1232.
5. Bhalerao A, Sivandzade F, Archie SR, Cucullo L (2019) "Public Health Policies on E-Cigarettes." Current cardiology reports 21: 111.
6. American Psychiatric Association (2013) Diagnostic and Statistical Manual of Mental Disorders. 5th (Edition) Arlington, VA: American Psychiatric Association.
7. Mishra A, Chaturvedi P, Datta S, Sinukumar S, Joshi P, et al. (2015) "Harmful effects of nicotine." Indian journal of medical and paediatric oncology: official journal of Indian Society of Medical & Paediatric Oncology 36: 24-31.
8. Mansvelder HD, McGehee DS (2002) Cellular and synaptic mechanisms of nicotine addiction. J Neurobiol 53: 606–617.
9. Vezina P, McGehee DS, Green WN (2007) Exposure to nicotine and sensitization of nicotine-induced behaviors. Prog Neuropsychopharmacol Biol Psychiatry 31:1625–1638.
10. Kadakia SC, De La Baume HR, Shaffer RT (1996) Effects of transdermal nicotine on lower esophageal sphincter and esophageal motility. Dig Dis Sci 41: 2130–2134.
11. Chu KM, Cho CH, Shin VY (2013) Nicotine and gastrointestinal disorders: Its role in ulceration and cancer development. Curr Pharm Des 19:5–10.
12. Monica G, Stockley R. (2016) "Pathophysiology of emphysema and implications." Chronic Obstructive Pulmonary Diseases 3: 454-458.
13. Suñer IJ, Espinosa-Heidmann DG, Marin-Castano ME, Hernandez EP, Pereira-Simon S, et al. (2004) Nicotine increases size and severity of experimental choroidal neovascularization. Invest Ophthalmol Vis Sci 45: 311-317.
14. Halimi JM, Philippon C, Mimran A (1998) Contrasting renal effects of nicotine in smokers and non-smokers. Nephrol Dial Transplant 13: 940-944.
15. Leslie FM (2013) Multigenerational epigenetic effects of nicotine on lung function.Leslie FM BMC Med 11: 27.
16. Schauer GL, Wheaton AG, Malarcher AM, Croft JB (2016) Health-care Provider Screening and Advice for Smoking Cessation Among Smokers with and Without COPD. Chest 149: 676-684.
17. Gorzkowski JA, Kaseeska KR, Wright M, Harris DL, Shone L, et al. (2016) Implementation and Impact of the 5As Tobacco Counseling Intervention with Adolescents in Pediatric Practice. Journal of Adolescent Health 58: S49-S49.
18. King BA, Dube SR, Babb SD, McAfee TA (2013) Patient-reported recall of smoking cessation interventions from a health professional. Preventive Medicine 57: 715-717.

19. Barua RS, Rigotti NA, Benowitz NL, Cummings KM, Jazayeri MA, et al. (2018) 2018 ACC Expert Consensus Decision Pathway on Tobacco Cessation Treatment: A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents. Journal of the American College of Cardiology 25: 3332-33650.

20. Hollands GJ, McDermott MS, Lindson-Hawley N, Vogt F, Farley A, et al. (2015) Interventions to increase adherence to medications for tobacco dependence. The Cochrane database of systematic reviews 23: CD009164.

21. Stead LF, Kolipillai P, Fanshawe TR, Lancaster T (2012) Combined pharmacotherapy and behavioural interventions for smoking cessation. Cochrane Database Syst Rev 10: CD008286.

22. Shields PG, Herbst RS, Arenberg D, Benowitz NL, Bierut L, et al. (2016) Smoking Cessation, Version 1.2016, NCCN Clinical Practice Guidelines in Oncology. Journal of the National Comprehensives Network: JNCCN 14:1430-1468.

23. West R, Raw M, McNeill A, Stead L, Aveyard P, et al. (2015) Healthcare interventions to promote and assist tobacco cessation: a review of efficacy, effectiveness and affordability for use in national guideline development. Addiction 110: 1388-1403.

24. Haskins BL, Lesperance D, Gibbons P, Boudreaux ED (2017) A systematic review of smartphone applications for smoking cessation. Translational Behavioral Medicine 7: 292-299.

25. Schnoll RA, Goelz PM, Veluz-Wilkins A, Blazekovic S, Powers L, et al. (2015) Long-term Nicotine Replacement Therapy: A Randomized Clinical Trial. JAMA Internal Medicine 175: 504-511.

26. Cahill K, Stevens S, Perera R, Lancaster T (2013) Pharmacological interventions for smoking cessation: an overview and network meta-analysis. The Cochrane database of systematic reviews 31: CD009329.

27. Benowitz NL, Jacob P, Savanapridi C (1987) Determinants of nicotine intake while chewing nicotine polacrilex gum. Clinical Pharmacology and Therapeutics 41: 467-473.

28. Meine TJ, Patel MR, Washam JB, Pappas PA, Jollis JG (2005) Safety and effectiveness of transdermal nicotine patch in smokers admitted with acute coronary syndromes. The American Journal of Cardiology 95: 976-978.

29. Coe JW, Brooks PR, Vetelino MG, Wirtz MC, Arnold EP, et al. (2005) Varenicline: an alpha4beta2 nicotinic receptor partial agonist for smoking cessation. Journal of Medicinal Chemistry 48: 3474-3477.

30. Cahill K, Stead LF, Lancaster T (2012) Nicotine receptor partial agonists for smoking cessation. The Cochrane database of systematic reviews 18: CD006103.

31. Hajek P, McRobbie H, Myers Smith K, Phillips A, Cornwall D, et al. (2015) Increasing Varenicline Dose in Smokers Who Do Not Respond to the Standard Dosage: A Randomized Clinical Trial. JAMA Internal Medicine175: 266-271.

32. Burke MV, Hays JT, Ebbert JO (2016) Varenicline for smoking cessation: a narrative review of efficacy, adverse effects, use in at-risk populations, and adherence. Patient preference and adherence 10: 435-441.

33. Thomas KH, Martin RM, Knipe DW, Higgins JPT, Gunnell D (2015) Risk of neuropsychiatric adverse events associated with varenicline: systematic review and meta-analysis. BMJ: British Medical Journal 350: h1109-h1109.

34. Anthenelli RM, Benowitz NL, West R, St Aubin L, McRae T, et al. (2016) Neuropsychiatric safety and efficacy of varenicline, bupropion, and nicotine patch in smokers with and without psychiatric disorders (EAGLES): a double-blind, randomised, placebo-controlled clinical trial. Lancet, The 387: 2507-2520.

35. Cinciripini PM, Minnix JA, Green CE, Robinson JD, Engelmann JM, et al. (2018) An RCT with the combination of varenicline and bupropion for smoking cessation: clinical implications for front line use: Combo varenicline and bupropion for cessation. Addiction 113: 1673-1682.

36. Stapleton J, West R, Hajek P, Wheeler J, Vangeli E, et al. (2013) Randomized trial of nicotine replacement therapy (NRT), bupropion and NRT plus bupropion for smoking cessation: effectiveness in clinical practice. Addiction 108: 2193-2201.

37. Rose JE, Behm FM (2014) Combination Treatment with Varenicline and Bupropion in an Adaptive Smoking Cessation Paradigm. American Journal of Psychiatry 171: 1199-1205.

38. Hughes JR, Stead LF, Lancaster T (2007) Antidepressants for smoking cessation. The Cochrane database of systematic reviews 24: CD000031.

39. Wang SM, Han C, Bahk WM, Lee SJ, Patkar AA, et al. (2018) "Addressing the side effects of contemporary antidepressant drugs: a comprehensive review." Chonnam medical journal 54: 101-112.

40. Bupropion: serious cardiovascular events (2014) WHO Drug Information 28: 455.

41. Jamie HB, McRobbie H, Bullen C, Begh R, Stead LF, et al. (2016) "Electronic cigarettes for smoking cessation." Cochrane Database of Systematic Reviews 9.

42. Sugerman DT (2014) e-Cigarettes. JAMA 311: 212-212.

43. Peter H, Phillips-Waller A, Przulj D, Pesola F, Smith KM, et al. (2019) "A randomized trial of e-cigarettes versus nicotine-replacement therapy." New England Journal of Medicine 380: 629-637.

44. Center for Disease Control and Prevention (2019) Smoking and tobacco use.

45. Chad DM, Richardson DL, Loewen JM, Vanheest LC, Brumley-Shelton A, et al. (2017) "An Interdisciplinary Response to a Tobacco Cessation Case Vignette." Journal of Smoking Cessation 12: 153-164.