CE

1.0 ANCC Contact Hour

Tobacco Use, Tobacco Cessation, and Musculoskeletal Health

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It is widely known that the physiological impacts of nicotine from cigarette smoking are harmful to almost every organ of the body, cause various diseases, and negatively impact the overall health of individuals. When it comes to musculoskeletal health and the specialty of orthopaedics, cigarette smoking has a significant influence on negative outcomes. This article discusses the impact of cigarette smoking and nicotine on the musculoskeletal system and the role of the orthopaedic nurse in educating patients on the importance of smoking cessation to improve musculoskeletal health and meet quality measures that serve to improve patient outcomes and lower healthcare costs.

The detrimental effects of cigarette smoking have been expressed to the public for many years, especially when it comes to the influence of cigarette smoking on the development of cancer, various illnesses, decreased life expectancy, and preventable deaths. However, most individuals are not aware of the negative effects of cigarette smoking on the musculoskeletal system; therefore, educating patients about these negative effects is an important role of the orthopaedic nurse and should be a priority focus when it comes to delivering patient education (American Academy of Orthopaedic Surgeons, 2010). It is important for orthopaedic nurses to be knowledgeable of the negative impacts of cigarette smoking on the musculoskeletal system and how patient education related to smoking cessation can meet quality measures that serve to improve patient outcomes and lower healthcare costs. This article focuses on the mechanism of impact on the musculoskeletal system that results from cigarette smoking, how the negative impacts of cigarette smoking contribute to undesirable patient outcomes and increased healthcare costs, and the role of the orthopaedic nurse in the delivery of patient education related to tobacco use and smoking cessation as it relates to quality improvement in healthcare.

History of Tobacco Use

Tobacco production and use can be traced back centuries ago among the American Indians, who utilized it for various religious and medicinal purposes. In 1492, Christopher Columbus was presented with dried tobacco leaves from the American Indians when he discovered America. Sailors eventually took tobacco leaves back to Europe and soon the tobacco plant was being grown across Europe. In the 17th and 18th centuries, the harmful effects of tobacco use were becoming more widely known. In 1964, the U.S. Surgeon General released a report related to smoking and health that lead to more reporting of health hazards resulting from smoking tobacco (Burns, 2007).

Significance of Tobacco Use

Since the release of the U.S. Surgeon General's report related to the health hazards of smoking in 1964, more than 20 million Americans have died as a result of tobacco-related illnesses (U.S. Department of Health and Human Services, 2014). Tobacco use is considered to be the largest cause of preventable deaths and diseases in the United States, with close to 480,000 Americans dying each year due to illnesses that are related to tobacco use (U.S. Department of Health and Human Services, 2014).

In the United States, illnesses that are related to smoking tobacco generate a cost of more than $300 billion yearly, including direct medical care of $170 billion and lost productivity of more than 156 billion (U.S. Department of Health and Human Services, 2014). Therefore, addressing tobacco use with the goal of reducing illness, disability, and death due to tobacco use is an objective of Healthy People 2020 (Office of Disease Prevention and Health Promotion, 2016). The Health People 2020 tobacco use objective consists of three key areas: the prevalence of tobacco use, health system changes, and social and environmental changes (Office of Disease Prevention and Health Promotion, 2016).

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Systemic Physiological Impact

Cigarettes are a smoke-related tobacco product that contains an addictive substance called nicotine. The nicotine is also responsible for the physiological responses of the body that lead to cigarette smoking's negative impacts on the musculoskeletal system. The various physiological responses related to nicotine consumption include an increased heart rate and blood pressure, hyperglycemia, increased amount of free fatty acids in the blood plasma, increase in the blood level of catecholamines, and reduction in coronary blood flow (Benowitz, 1988; Dani & Heinemann, 1996; Mishra et al., 2015).

Impact on the Musculoskeletal System

The systemic physiological responses of nicotine can serve to impact the musculoskeletal system by having damaging effects on the soft tissues and bone structure. The introduction of nicotine into the body serves to stimulate the sympathetic nervous system, which leads to a disruption in the vascular system while promoting the premature death of cells (Lee, Rakesh, Berimann, & Doughterty, 2013). In addition, nicotine impacts the immune system in a negative manner by decreasing the normal function of white blood cells, reducing the normal physiological response of antibodies in the presence of an invading antigen, and impairing the normal function of neutrophils. These systemic physiological responses to nicotine serve to reduce blood supply and lead to hypoxia of the tissues, which can ultimately result in a decrease in bone mineral density, an impaired healing process, in addition to an increased incidence for infection of the soft tissues, bones, and joints that make up the musculoskeletal system. Decreased bone mineral density further impacts the musculoskeletal system negatively by increasing the risk for fractures.

Tobacco use and nicotine can also impair healing following a fracture due to decreased activity of osteoblast and decreased formation of bone that can lead to delayed union or nonunion of a fracture (Lee et al., 2013). Active cigarette smokers who undergo surgical fixation of a fracture are twice as likely to develop a surgical site infection of the soft tissue and they also have a 3.7 greater chance of developing osteomyelitis (Higgins, Klatt, & Beals, 2010). Impaired healing correlates with poor outcomes and an increased incidence of disability due to impaired musculoskeletal functionality.

A decrease in bone mineral density secondary to cigarette smoking can also increase the incidence of osteoporosis, degeneration of intervertebral discs and tendons, tendon rupture, decreased muscle mass and strength, and increase in muscle pain. These conditions can lead to chronic pain states that negatively impact the patient's quality of life and can contribute to a depressed mood and overall decline in physical function. This can also have a negative impact on the patient's family members and caregivers.

The detrimental impact of cigarette smoking does not cease in the presence of a musculoskeletal injury or chronic degenerative process. It is in the presence of these conditions that a domino effect begins to take place because cigarette smoking can delay the healing of soft tissue injuries and fractures and influence further degeneration of the musculoskeletal system. Research studies have found that even 5–7 days of smoking cessation before undergoing any type of musculoskeletal surgery can have a more favorable influence on postoperative healing, and long-term smoking cessation can have a positive influence on bone metabolism (Abate, Vanni, Pantalone, & Salini, 2013). The effects of smoking tobacco are also thought to be reversible, to a certain degree, following cessation of smoking tobacco (Carballosa, Fernandez-Fidalgo, & Cheung, 2014). These points serve to stress the importance of patient education related to tobacco cessation.

Patient Education

One of the vital roles of orthopaedic nurses is the delivery of patient education related to healthy lifestyle behaviors that support a well-balanced musculoskeletal system, with the negative impacts of tobacco and tobacco cessation being the most important topics of patient education among patients who are active tobacco users. When educating patients on aspects related to the promotion of health and wellness lifestyle behaviors, orthopaedic nurses should be mindful of assessing for the presence of fulfillment of a patient's basic needs before promoting patient education related to smoking cessation. If a patient's basic needs are not met, the successful adaptation of healthy lifestyle behaviors may be less likely to occur (Smith-Temple, 2014).

According to Maslow's (1943) hierarchy of needs, there are specific foundational lower level needs that are considered to be basic and essential for all patients. Two of the lower level needs include physiological needs and safety. Examples of physiological needs include items that are vital for survival such as air, water, food, and sleep. Safety needs keep patients secure from harm and include shelter, employment, and stability (Smith-Temple, 2014). Addressing the lower level needs serves to support higher level needs such as patient esteem, self-respect, and self-actualization, which may serve to promote the successful adoption of healthy lifestyle behaviors (McLeod, 2016). Figure 1 displays the Maslow's hierarchy of needs pyramid, with the most basic needs being the base of the pyramid and the higher level needs being at the top.

Before delivering patient education related to the negative impacts of tobacco use on the musculoskeletal system and tobacco cessation, the orthopaedic nurse might find it beneficial to obtain patient history related to the length of time they have been actively using tobacco and how much tobacco they use one a daily basis such as how many cigarettes they smoke per day and what types of tobacco products they use such as cigarettes, smokeless tobacco in the form of chewing tobacco, snuff, or dissolvable tobacco products. It is also helpful to know whether they have tried to quit smoking cigarettes or stop using tobacco products in the past. This background information provides the nurse with

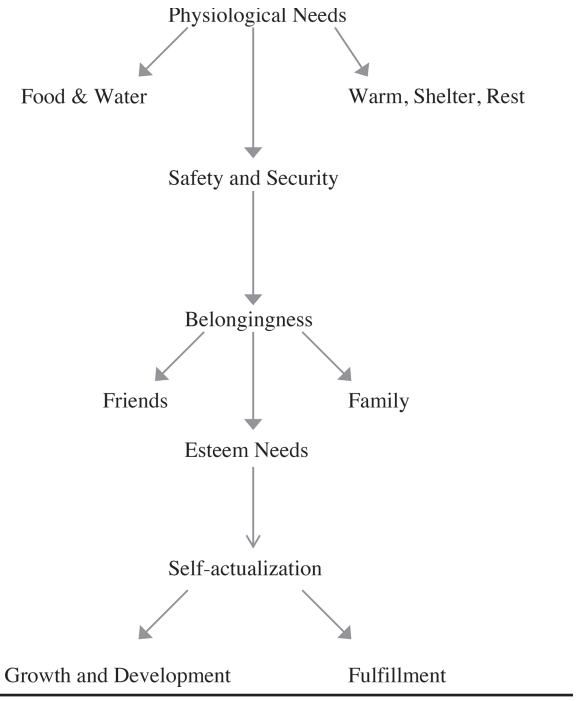

Figure 1. Schematic diagram of Maslow's hierarchy of needs.

more data related to a patient's use of tobacco products in general and the previous desire to quit using tobacco products.

Patient education related to the negative health impacts of tobacco use and the benefits of tobacco cessation among orthopaedic patients should also involve a collaborative approach. For example, patients who receive education from two or more healthcare practitioners may more than double the odds of successful cessation of smoking (Dino, Ohtake, Pignataro, & Swisher, 2012). Involving physical therapists (PTs) and physical therapy assistants (PTAs) in the collaborative effort of educating patient on the importance of smoking cessation can be beneficial because the practice patterns of these professionals allow for ample opportunities to educate patients about the harmful impacts of cigarette smoking and the components of successful smoking cessation. Patient visits with PTs and PTAs are frequent and very personalized, which allows for the building of rapport and patient-centered guidance for each patient. This can be beneficial when providing ongoing support for patients who are participating in tobacco cessation efforts (Dino et al., 2012).

Tobacco Cessation Resources

Being familiar with smoking cessation resources allows orthopaedic nurses to better inform patients of the various approaches available to assist with smoking cessation. Through a collaborative effort, the U.S. Department of Health and Human Services, National Institutes of Health, and the National Cancer Institute developed a comprehensive web-based resource called Smokefree.gov. This resource provides individuals with free resources related to building skills for smoking cessation preparation and support during smoking cessation through text messaging technology, in addition to the ability to individualize the smoking cessation experience by developing a personalized quit plan and the option for live help messaging. The Smokefree.gov web-based resource also provides individuals with information about available apps that can be used to further support tobacco cessation.

The American Lung Association (2016) provides individuals with online resources related to smoking cessation. These resources provide patient education related to the reasons for and benefits of smoking cessation, how to approach smoking cessation, miscellaneous facts about smoking cessation, and questions and answers related to smoking cessation. There is also a blog related to smoking cessation and the ability to communicate with an expert about lung health.

The Centers for Disease Control and Prevention (2016) also provides materials related to tobacco cessation for individual state tobacco control programs. These materials cover best practices related to smoking cessation, health system changes that promote and support smoking cessation, and information about available smoking cessation quitlines. Many individual states have smoking cessation programs, so it is important for orthopaedic nurses to be knowledgeable to their state's resources related to smoking cessation.

Approaches for Tobacco Cessation

It is important for orthopaedic nurses to focus on prevention when it comes to tobacco cessation. However, it is vital for orthopaedic nurses to be familiar with tobacco cessation approaches that focus on the patient's readiness to quit, the changes needed to support successful tobacco cessation, and counseling interventions such as cognitive behavioral therapies that are often more successful at achieving long-term tobacco cessation, especially among patients who are active cigarette smokers. Cognitive behavioral therapies coupled with nicotine replacement pharmacotherapies can double the quit rates of cigarette smokers (Fiore, Jaén, & Baker, 2008). Simply asking a patient who actively smokes whether he or she is interested in quitting can pique the patient's interest in beginning a smoking cessation program.

When it comes to tactics related to approaches for smoking cessation, orthopaedic nurses may find various intervention models beneficial such as the Five A's Model and the Transtheoretical Model also known as the Stages of Change Model (Prochaska, DiClemente, & Norcross, 1992). The Five A's Model provides the orthopaedic nurse with five actions that can be used to approach the topic of smoking cessation with a patient, in addition to assisting the patient with an approach to smoking cessation (Agency for Healthcare Research and Quality, 2012). The Stages of Change Model educate the orthopaedic nurse on the various statements a patient might say that will allow the orthopaedic nurse to know what stage of change related to smoking cessation that the patient is in. Table 1 shows the aspects of the Five A's Model and the Stages of Change Model.

Table 1. Five A's Model and Stages of Change Model

Five A's Model[a]:
- **Ask** the patient about smoking tobacco: amount and frequency
- **Advise** the patient to quit smoking tobacco
- **Assess** the patient's willingness to attempt quitting
- **Assist** the patient in his or her attempt to quit smoking tobacco
- **Arrange** for follow-up related to the patient's attempt to quit

Stages of Change Model[b]:
- **Precontemplation—**"I no desire to quit now."
- **Contemplation—**"I do have concern but I am not ready to quit at this point."
- **Preparation—**"I am now ready to quit smoking tobacco."
- **Action—**"I have quit smoking tobacco."
- **Maintenance—**"I quit smoking tobacco over 8 months ago."

[a]Data from Larzelere and Williams (2012).
[b]Data from Campbell et al. (2013).

Quality Measures and Improvement Activities Related to Tobacco Cessation

In 2010, the implementation of the Patient Protection and Affordable Care Act, also known as the Affordable Care Act, introduced the beginning of many quality improvement initiatives to assist with reforming the U.S. healthcare system from the aspects of cost and quality (U.S. Department of Health and Human Services, 2015). One of the ways value will be achieved by decreasing costs and improving quality is by integrating quality measures and improvement activities into various payment structures. This also involves a shift from a fee-for-service model to a valued-based model, which has led to the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) with an additional approach being the Quality Payment Program (QPP) that consists of alternative payment models and the merit-based incentive payment system (MIPS) (Centers for Medicare & Medicaid [CMS], 2016a).

The MIPS portion of the MACRA QPP contains specific quality measures and improvement activities that relate to tobacco use and tobacco cessation. Providers will be rewarded incentive payments if they document certain quality measures and improvement activities during a patient's encounter. Many of these quality measures and improvement activities may be documented and carried out by the orthopaedic nurse; therefore, it is crucial for the orthopaedic nurse to be mindful of these specific quality measures and improvement activities related to tobacco use and tobacco cessation.

The MIPS quality improvement measures related to tobacco use and tobacco cessation as they relate to orthopaedics include the following (CMS, 2016b):

- Preventive care, screening, and cessation intervention as it relates to tobacco use
- Smoking abstinence as it relates to anesthesiology
- Tobacco use and help with quitting among adolescents

The quality improvement activities as they relate to tobacco use and cessation among orthopaedic patients include the following (CMS, 2016c):

- Regular engagement among MIP eligible clinicians or groups in the integration of preventive and treatment-related interventions related to the screening and cessation of tobacco use
- Use of certified electronic health record to capture patient-reported outcomes related to tobacco use among individual patients

These MIPS quality improvement measures and activities serve to highlight cigarette smoking among patients in a way that allows clinicians to capture data related to the prevention, use, and cessation of tobacco that can be reported to obtain incentive payments and avoid negative payment adjustments when it comes to being reimbursed for providing patient care.

Implications for Orthopaedic Nurses

Orthopaedic nurses are the first line of defense when it comes to the delivery of patient education. It is important for orthopaedic nurses to be knowledgeable of the negative impact tobacco use has on the musculoskeletal system. Having this knowledge allows the orthopaedic nurse to better educate patients regarding the rationales for why tobacco use should be avoided or discontinued. Providing patients with rationales for specific lifestyle recommendations related to the prevention and cessation of cigarette smoking can allow the patient to better understand the fundamental reasons behind the recommendations, which may serve to further influence successful implementation of both tobacco prevention and cessation-related strategies. Orthopaedic nurses are the patient's direct link to learning more about healthy habits that support a well-balanced musculoskeletal system.

The purpose of this article was not to discuss secondhand smoking. However, orthopaedic nurses must keep in mind the percentage of the population that does not actively smoke cigarettes but is routinely exposed to secondhand smoke, such as nonsmoking adults, children, and infants. Secondhand exposure to cigarette smoking is harmful to many body systems when it comes to negatively impacting normal function, healing, and resilience to fighting infections. Patients who are regularly exposed to secondhand cigarette smoke can also be educated on the harmful impacts of cigarette smoking with hopes that they will not actively participate in cigarette smoking and will educate the active smoker on the reasons to stop smoking cigarettes.

Conclusion

It is important for orthopaedic nurses to be knowledgeable of the harmful effects of cigarette smoking on the musculoskeletal system, especially when it comes to educating patients about the importance of smoking cessation. To promote positive patient outcomes and minimize the incidence of complications, patient education regarding the impact of cigarette smoking should be a high priority among orthopaedic nurses. In addition, being familiar with successful cigarette smoking cessation approaches and available cigarette smoking

cessation resources may serve to be beneficial for orthopaedic patients who are active cigarette smokers.

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