

## ***Information Statement***

# **Tobacco Use and Orthopaedic Surgery**

*This Information Statement was developed as an educational tool based on the opinion of the authors. It is not a product of a systematic review. Readers are encouraged to consider the information presented and reach their own conclusions.*

While the overall incidence of tobacco use has declined in recent years, an estimated 17 percent of all adults in the United States—over 42 million—currently smoke cigarettes, comprising approximately 20% of all adult men and 15% of all adult women. Smoking prevalence is highest in younger age groups (between 18-20% of adults 18-64) and lowest in people age 65 and over (9%). A higher percentage of adults living below the poverty level report regular cigarette use (29%), compared to those living above the poverty level (16%). Adults who report having a disability are also more likely to smoke (23%) than are adults reporting no disability (17%). Most adult smokers start as children, with nine out of every 10 having tried their first cigarette before age 18.<sup>1</sup>

It is well understood that smoking cigarettes leads directly to many serious medical illnesses that are responsible for significant health care costs and higher mortality rates every year. Regular cigarette use has long been known to be a leading cause of cardiopulmonary disease, including; coronary artery disease, stroke, peripheral vascular disease, and COPD. Smoking also has known carcinogenic effects and is a leading risk factor for multiple types of cancer including: lung, bladder, cervix, oropharynx, colon, and esophagus. Pregnant patients may present with orthopaedic conditions. There are also adverse effects on the pregnancy in pregnant patients who smoke.

More than 16 million U.S. adults are estimated to be living with a smoking-related disease, costing over \$300 B/yr. including: \$170 B/yr. for direct medical care and \$156 B/yr. in lost productivity.<sup>4</sup> The Centers for Disease Control and Prevention (CDC) estimates that cigarette smoking in America accounts for approximately 480,000 adult deaths per year, including 41,000 deaths related to second-hand smoke (3). The CDC also estimates that based on current incidence of youth tobacco use, nearly 5.6 million of today's children—or 1 of every 13—will die prematurely, due to smoking. Smokers lose, on average, more than ten years of life expectancy relative to non-smokers.<sup>3</sup>

Cigarette smoking not only affects the quantity and quality of the smoker's life, but also the lives of people who are exposed to second-hand smoke. Even small amounts of involuntary exposure to cigarette smoke can increase a non-smoker's risk of cardiopulmonary disease and cancer. Second-hand smoke exposure in non-smokers leads to a 25-30% increased risk of heart disease and stroke causing nearly 34,000 premature deaths from heart disease and 8,000 deaths from stroke each year.<sup>5,6</sup> Second-hand smoke increases the risk of lung cancer by 20-30% leading to more than 7,300 deaths annually.<sup>5,6</sup> For infants and children, exposure to second-hand smoke is a leading cause of asthma attacks, respiratory and ear infections, and sudden infant death syndrome (SIDS), and a direct contributor to preventable infant and child deaths in the U.S.<sup>5,6</sup>

Decades of advocacy by many anti-smoking organizations including the American Cancer Society and American Lung Association have made the U.S. public much more aware of the harmful effects of tobacco products and smoking on overall health. During the past decade, increasing evidence has emerged regarding the harmful effects of tobacco products and smoking on the musculoskeletal health.

***The American Academy of Orthopaedic Surgeons joins other health organizations in promotion of avoidance and cessation of all tobacco product use and cigarette smoking, due to the harmful impact on musculoskeletal health, as well as overall health.***

Tobacco exposure, both directly through smoking and passively through second hand smoke inhalation, has been shown to have detrimental musculoskeletal effects including:

- Increased bone loss and lower bone mineral density (BMD) compared to non-smokers and former smokers, suggesting a benefit to cessation. Bone loss appears to increase directly with increased exposure to tobacco smoke.<sup>7</sup>
- Increased risk of osteoporosis-related fractures including hip and vertebral fractures. Fracture risk appears to increase directly with increasing tobacco exposure.<sup>7,8,9</sup>
- Nonunion of diaphyseal (humerus, femur, tibia) fractures - both open and closed.<sup>10-11</sup>
- Increased adverse surgical events following surgical treatment of open tibia fractures including delayed union, non-union, and reconstructive soft tissue flap failures.<sup>12</sup>

People who smoke are also at increased risk for other musculoskeletal problems compared to non-smokers including:

- Increased chronic musculoskeletal pain including neck and low back pain.<sup>13-15</sup> This risk appears to be highest in young adults who smoke daily.
- Increased rotator cuff tears and shoulder dysfunction<sup>17</sup> with lower healing rates and poorer outcomes following rotator cuff repair.<sup>18</sup>
- Increased incidence of inflammatory, auto-immune diseases such as rheumatoid arthritis and systemic lupus erythematosus which can cause devastating musculoskeletal system injuries including fractures and joint destruction.

Smoking negatively influences the outcome of orthopedic patients following surgery including:

- Increased risk of adverse surgical events following total hip and knee replacement, including impaired wound healing, surgical site and deep wound infections, and pneumonia.<sup>19-21</sup>
- Increased 30-day post-operative morbidity and/or mortality including increased ventilator needs, myocardial infarction, cardiac arrest, stroke, sepsis, and death.<sup>22-24</sup>
- Increased risk of nonunion and decreased patient satisfaction following lumbar spine fusion. This risk is reduced in patients who quit smoking preoperatively.<sup>25</sup>
- Increased blood loss and need for transfusion following lumbar spine surgery.<sup>26</sup>
- Increased risk for recurrent herniation and reoperation following lumbar disc surgery.<sup>27-28</sup>

Smoking cessation prior to surgery appears to benefit orthopedic patients undergoing surgery. Non-smokers face the lowest risk of adverse surgical events following elective surgery, but even people who quit smoking weeks or months before surgery appear to reduce their risks, particularly if they do so one year or more pre-operatively.<sup>24-25</sup> Longer-term cessation also appears to help reduce fracture risks although an optimal cessation time period has yet to be identified.<sup>29</sup>

***The AAOS recognizes active tobacco smoking is a significant surgical patient safety risk factor for adverse peri-operative surgical events. Orthopaedic patients who are active smokers can reduce their risk of adverse surgical events by ceasing cigarette use prior to surgery. Orthopedic surgeons are uniquely positioned to engage patients regarding these risks and provide education about the benefits of tobacco cessation supported by local smoking cessation programs to improve safety and outcomes following orthopedic surgery.***

As U.S. health care delivery shifts to a value-based system, roles of the orthopedic surgeon are evolving to improve patient safety and the quality of surgical care. In 2007, the Centers for Medicare and Medicaid Services (CMS) introduced the Physician Quality Reporting System (PQRS) based upon quality measures reported by the physician for reimbursement under Medicare Part B. Quality Measure #226 reports office screening of adult patients for tobacco use and provision of counseling supporting smoking cessation. This measure can be incorporated into orthopedic practice and reported to CMS representing efforts to increase the safety of orthopaedic care. The 2018 Merit-based Incentive Payment System (MIPS) program will incorporate PQRS measures to increase tobacco use screening and smoking cessation programs use among in orthopedic patients.

Nearly 7 out of every 10 adult smokers in the U.S. report that they want to quit, and many smokers attempt to do so without specific intervention programs (30). More than half of all adult smokers have sought professional advice for smoking cessation, most frequently occurring in older patients and patients in poorer overall health (31). Younger, healthier patients may seek and receive less interventional support, leading to preventable future harm. Smoking cessation prior to age 40 reduces the risk of dying from smoking-related disease by 90% (3), underscoring the need for early, effective cessation interventions. Patients are also more likely to receive counseling about cessation if they are already diagnosed with a respiratory condition, heart condition, smoking-related cancer, or diabetes than they are otherwise (31). Orthopedic providers have a unique opportunity to initiate conversations about tobacco cessation with many younger, otherwise healthy, smoking patients who may not yet know the harmful impact of tobacco use on the musculoskeletal conditions for which they seek treatment.

Several nicotine-replacement products are available to help patients quit, including over-the-counter nicotine patches, gum, and lozenges, as well as prescription patches, inhalers, and nasal sprays. Pharmacologic treatments are also available, including non-nicotine prescription medications, such as bupropion SR (Zyban) and varenicline tartrate (Chantix). The use of electronic cigarettes—providing a vaporized form of nicotine—has rapidly increased in recent years, among smokers trying to quit, as well as non-smokers seeking a cigarette substitute. E-cigarettes are readily available and currently unregulated. While specific evidence regarding the effects of e-cigarettes on musculoskeletal health and surgical outcomes is evolving, concerns are raised about their safety. Many of the known, harmful health effects of tobacco smoking are potentiated by nicotine, also the primary component in e-cigarettes.

***Many smoking patients will require a multi-disciplinary team approach to smoking cessation, including group counseling or behavioral therapy. Orthopedic team members can play a powerful role in improving patient health and reducing adverse events by advising patients of the significant risks of smoking and encouraging total smoking cessation.***

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