



# Adolescent and Young Adult Tattooing, Piercing, and Scarification

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Tattoos, piercing, and scarification are now commonplace among adolescents and young adults. This first clinical report from the American Academy of Pediatrics on voluntary body modification will review the methods used to perform the modifications. Complications resulting from body modification methods, although not common, are discussed to provide the pediatrician with management information. Body modification will be contrasted with nonsuicidal self-injury. When available, information also is presented on societal perceptions of body modification.

Tattoos, piercings, and scarification, also known as “body modifications,” are commonly obtained by adolescents and young adults. Previous reports on those who obtain tattoos, piercings, and scarification have focused mainly on high-risk populations, including at-risk adolescents.<sup>1</sup> Tattooing and piercing of various body parts no longer is a high-risk–population phenomenon, as evidenced by growing numbers of adults and adolescents not considered at risk who have tattoos and multiple ear and body piercings. The Pew Research Center reports that in 2010, 38% of 18 to 29 year olds had at least 1 tattoo, and 23% had piercings in locations other than an earlobe.<sup>2</sup> Of those with tattoos, 72% were covered and not visible.<sup>2</sup> Scarification is the practice of intentionally irritating the skin to cause a permanent pattern of scar tissue; data are not currently available on the prevalence of scarification in the United States.

Although body modifications have become a mainstream trend, they still may be associated with medical complications and, among adolescents, may also co-occur with high-risk behaviors. This first clinical report from the American Academy of Pediatrics on tattooing, piercing, and scarification discusses the history of these methods of body modification, educates the reader on methods used, reports on trends in associated adolescent and young adult risk behaviors, differentiates between nonsuicidal self-injury (NSSI) and body modifications, and educates the reader about how to anticipate and prevent potential medical complications. The report analyzes the literature about societal acceptance of people with body modifications and perceptions that

## abstract

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might potentially interfere with adolescents' and young adults' educational and career plans. Finally, guidance is provided to pediatricians and, through the pediatrician, to parents and adolescents and young adults about safety and regulations regarding body modification should they wish to obtain tattoos, piercings, or scarification.

### **HISTORY OF BODY MODIFICATION: TATTOOING, PIERCING, AND SCARIFICATION**

Although interest in body modification has increased recently, history teaches us that body modifications are not new. Archeologists have found evidence of tattoos, piercings, and scarification as far back as 2000 BC, when they were largely used as a form of art or to identify group membership, such as a religious group or tribe. Although mostly used to describe loyalty, interests, and lifestyle choices, body modification had also been used to label criminals, slaves, and convicts.<sup>3</sup>

Although in the late 20th century, most tattoos were on men, ranging from the stereotypical tattooed sailors and motorcycle bikers (eg, The Hells Angels in the 1960s) to 1980s gang members, now, tattoos are collections of colorful ornamentations for both women and men. Surveys of the US population have shown an increase in the prevalence of tattoos over time.<sup>4,5</sup>

### **EPIDEMIOLOGY**

Harris Poll data from 2016 found that 3 in 10 US adults had at least 1 tattoo, up from 20% in 2012.<sup>6</sup> Differences were found by geographic region, with tattoos being more prevalent in the West (27%) versus the East (28%), Midwest (27%), and South (32%).<sup>6</sup> Tattoos were also more prevalent among adults in their 30s compared with those younger and older,<sup>6</sup> although another national

probability sample of adults found higher tattoo rates among younger versus older cohorts.<sup>4</sup> Evidence on sex differences in tattooing also varies, with tattoo prevalence among women ranging from 22% to 23% and prevalence among men ranging from 19% to 26%.<sup>4,6</sup> Among those with a tattoo, most (86%) have never regretted getting one, and 30% said it makes them feel sexier. Other feelings attributed to having a tattoo included feeling rebellious (25%), attractive or strong (21%), spiritual (16%), healthier (9%), more intelligent (8%), and athletic (5%).<sup>6</sup>

Estimates of tattooing and piercing among adolescents range by data source and age group. One early study among high school students from 8 states found that 10% had tattoos, and 55% expressed interest in tattooing.<sup>7</sup> In this sample, tattoos were commonly obtained around the ninth grade, but there were reports of tattooing as early as age 8 years.<sup>7</sup> Among adolescent clinic samples of youth 12 to 22 years of age, tattooing ranged from 10% to 23%, and body piercing (other than the earlobe) ranged from 27% to 42%,<sup>8,9</sup> with higher rates of tattooing and body piercing among girls versus boys and older versus younger adolescents.<sup>8,9</sup> Harris Poll data revealed that 22% of youth 18 to 24 years of age reported having a tattoo,<sup>6</sup> but estimates were as high as 38% among young people 18 to 29 years of age on the basis of Pew Research Center findings.<sup>2</sup>

Findings are comparable among subsequent samples of private university and college students, of whom 23% had a tattoo and 51% had a body piercing.<sup>10,11</sup> Male athletes were more likely to be tattooed than male nonathletes, and although women were more likely to have a piercing than men, there was no difference by sex for tattooing.<sup>10,11</sup> Of students with current piercings, high-ear cartilage (53%) was the most common visible piercing, followed

by navel (38%), tongue (13%), and nipple and genital (9%) piercings.

A survey conducted among college freshmen from Italy found that many students undergoing tattooing and/or piercing were unaware of the associated health risks.<sup>12</sup> Although most (60%) students knew about HIV-related risks, less than half knew about possible infection with hepatitis C (38%), hepatitis B (34%), tetanus (34%), or about noninfectious complications (28%).<sup>12</sup> These findings have similarly been reported in a sample of medical students who had undergone piercing.<sup>13</sup>

Scarification is the practice of intentionally irritating the skin to cause a permanent pattern of scar tissue. Studies have been conducted among international communities describing high rates of scarification, yet no studies on scarification have been reported from the United States.<sup>14,15</sup> In the 1990s and 2000s, there was some renewed interest in scarification as a movement to revive indigenous rituals from around the world, embracing a more authentic or spiritual body experience.<sup>16</sup>

### **DECLINING STRENGTH OF ASSOCIATIONS WITH RISK BEHAVIORS**

Although in the past, body modification was often associated with adolescent high-risk behaviors, current data have not consistently reported this association. In a retrospective analysis from 2007 to 2008, tattoos were associated with alcohol and drug use, violence and weapons carrying, sexual activity, eating disorders, and suicide.<sup>17</sup> However, the scientific link between tattooing and risk behaviors is less consistent today.<sup>1</sup> As with any adolescent or young adult, for those with piercings and tattoos, it is advised that the pediatrician conduct a careful adolescent psychosocial history with targeted behavioral

interventions to assist in decreasing risk behaviors.<sup>18</sup>

## **BODY MODIFICATION IS NOT NSSI**

It is important to be able to distinguish normal body modification from body modification that is more dramatic or intense as part of NSSI syndrome, which is described in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* as follows: “over the past year, the person has for at least 5 days engaged in self-injury with the anticipation that the injury will result in some bodily harm without suicidal intent.”<sup>19</sup>

NSSI differs from body modification because NSSI often is impulsive or compulsive and may be associated with mental health disorders, including psychotic disorders, personality disorders, and anxiety disorders.<sup>20</sup> Estimated prevalence rates for NSSI in 2008 for adolescents were between 14% and 24%. It can include cutting, scratching, burning, and hitting oneself. Individuals who hurt themselves report injuries to many different body parts.<sup>21</sup> The individual who engages in self-injury expects to get relief from a negative emotion, deal with a personal issue, or create a positive feeling.<sup>19</sup>

Importantly, NSSI is clinically concerning because of an association with mental health disorders, whereas body modification such as tattooing, piercing, and/or scarification does not have these associations and is more socially acceptable.<sup>19</sup> Intention is the most important differentiator and can be discerned with careful clinical interviewing.<sup>18</sup>

## **PERCEPTIONS OF COMMUNITY AND POTENTIAL EMPLOYERS ABOUT TATTOOING AND PIERCING**

Public opinion of the relationship between having a tattoo and deviant behavior is changing. In 2008,

among those with and without tattoos, 29% believed that people with tattoos were more likely to do something most people consider deviant, whereas 24% believed this in 2012.<sup>6</sup> From another survey regarding technological and social changes, 40% of respondents said that more people getting tattoos has been a change for the worse, 45% of respondents said that it has made no difference, and only 7% said this has been a change for the better. As might be expected, older Americans are far more likely to negatively view this trend; 64% of those 65 years and older and 51% of those 50 to 64 years of age said more people getting tattoos has been a change for the worse. A majority of those younger than 50 years (56%) said the tattoo trend has not made much of a difference.<sup>22</sup>

The age differences are larger among women than men. Of women aged 50 years and older, ~6 in 10 (61%) said more people getting tattoos have been a change for the worse, compared with 27% of younger women. The gap is smaller among men; 51% of men aged 50 years and older said more people getting tattoos has been a change for the worse, compared with 30% of younger men.<sup>2</sup>

Although societal acceptance of tattoos and piercings has increased, there still may be repercussions when seeking employment or educational opportunities. In a 2014 survey of nearly 2700 people, 76% thought that tattoos and/or piercings had hurt their chances of getting a job, and 39% thought employees with tattoos and/or piercings reflect poorly on their employers.<sup>23</sup> One executive career coach wrote that 37% of human resource managers cite tattoos as the third physical attribute likely to limit career potential (nearly piercings and bad breath were the top 2).<sup>24,25</sup> Consequently, adolescents and young adults contemplating body

modification may be well advised to make sure that the tattoo or piercing is not visible in typical work attire.

## **TATTOOING**

### **Methods**

A multitude of videos on YouTube and other Internet video repositories exist for the reader to view and learn about safe and acceptable methods of tattoo placement. After selecting or designing the art to be transferred via tattoo, it is stenciled or drawn on the skin. The skin is cleansed with antiseptic, and a thin layer of ointment (such as petroleum jelly) is placed on the site. Professional tattoo artists use a motorized, electric-powered machine that holds needles and can puncture the skin up to several thousand times per minute. The needles are dipped into the ink and then puncture the skin at a depth of a few millimeters, where the pigment reaches the dermis layer. Any blood or serosanguineous fluid is wiped away during the procedure. After completion, another antiseptic is applied, and the tattoo is covered. After 24 hours, the dressing is removed and the tattoo remains open to air, and the skin is kept moist by applying antibiotic ointments, thick skin cream, or vitamin E oil several times daily. If cleansing is necessary, the skin is blotted and not rubbed. Tattoos generally take 2 weeks to heal; sun exposure should be avoided or sunscreen should be used, and swimming, direct shower jets, or soaking in water should be avoided. Clothing that might adhere to the tattoo site should not be worn.<sup>3</sup>

The inks of tattoos are a mixture of inorganic and synthetic organic pigments and diluents. They are considered cosmetics by the US Food and Drug Administration. Metal salts are commonly used as pigments; aluminum, cadmium, chromium, cobalt, iron, mercury, nickel, silicon, and titanium are a few of the metallic elements in

tattoo pigments.<sup>26</sup> Although the concentration of metals in tattoo ink is low, metals are emerging as a class of human carcinogens. Cutaneous exposure over a lifetime may result in adverse events. Risk is modified by bioavailability, cellular uptake, metal interactions, protein binding, bone sequestration, and excretion. Age, sex, genetic variance, and other factors also appear to influence potential toxicity.<sup>27</sup>

Unfortunately, many tattoos are placed by amateurs, which makes the process much riskier. In these cases, antiseptic processes may not be followed, leading to potential skin infections and transmission of bloodborne illnesses, such as hepatitis C or HIV. Prison tattooing is usually painful because of the use of typically blunt instruments that are available. The generally poor quality and obvious visual location tends to stigmatize prisoners on release and may limit their chances of obtaining employment (see the previous section about public and employer perceptions as well).<sup>28</sup> The pigments are not standardized and may also contain more toxic materials as well as contamination.<sup>27</sup>

### Permanent Makeup

Permanent makeup has become an increasingly popular form of tattooing. Permanent makeup advertisers talk about the advantages of being waterproof, not smearing, time saving, and hassle free. Some people choose permanent makeup because of physical limitations, such as visual impairments or arthritis of the hands or shoulders. Cosmetic tattooing can also be an adjunctive to reconstructive surgery, such as nipple reconstruction after a mastectomy or breast reduction surgery. It is also used to cover scars, birthmarks, alopecia, and vitiligo. Cosmetic tattooing also may be attractive to patients who have allergies to conventional cosmetics.<sup>29</sup>

The method of tattooing is similar to what is discussed previously.

### Henna and Temporary Tattoos

The henna plant contains the pigment lawsone; in the skin, it interacts with keratin to give a reddish-brown color (sometimes known as “red henna” to distinguish from “black henna,” which is red henna mixed with paraphenylenediamine [PPD]). Red henna is commonly used in Islamic and Hindu societies, especially for celebrations such as weddings and religious ceremonies. The henna powder is mixed with a variety of materials depending on the artist and the region. They may include essential oils, such as lemon or eucalyptus, the dried powder of indigo plant leaves, lemon or beet root juice, tannin from tea leaves, dried coffee, charcoal powder, turpentine, PPD (discussed later), or even animal urine. Henna also has been used in different ways for medicinal purposes beyond the scope of this report.<sup>30</sup>

The paste is applied to the skin and remains for 30 minutes to 6 hours; the longer the exposure, the darker the color. At that point, there will be an orange stain, which will darken over the next 2 to 4 days. A temporary tattoo will usually last for 2 to 6 weeks, until the outer layer of skin exfoliates.<sup>30</sup>

### Complications

The rate of complications from having tattoos placed is not known. However, with the large number of tattoos placed every day and few reports of complications from clients who receive tattoos, the rate is likely low. Most of the relevant medical literature are case reports or reports of local clusters of infection. Reported complications of tattoos are inflammation, infections (bacterial and viral), neoplasms, and rare reports of vasculitis. Inflammation is caused by sensitivity to tattoo pigments leading to focal edema,

pruritus, papules, or nodules at the site. Pathologically, the reactions include lichenoid, eczematoid, sarcoidal, and pseudolymphomatous reactions as well as foreign-body granulomas. Preexisting conditions can lead to other reactions; psoriasis, systemic lupus, and sarcoidosis may demonstrate the Koebner phenomenon, leading to new lesions at the site of the tattoo. Even temporary henna tattoos have been associated with inflammatory reactions.<sup>31</sup>

Infections are a potentially more serious complication of tattooing. Tattooing can lead to infection caused by contaminated tattoo ink or needles; inadequate disinfection of the skin to be tattooed, resulting in resident bacterial contamination during the tattooing process; and, secondarily, during the healing process, when injured tissue causes pruritus.<sup>32</sup> Unfortunately, the real frequency of local infections after tattooing is unknown. Infections may be superficial pyogenic infections, deep or severe pyogenic infections, atypical mycobacterial infections, systemic or cutaneous viral infections, or (rarely) cutaneous fungal infections. Systemic viral infections from bloodborne pathogens include hepatitis C, hepatitis B, and HIV. Superficial pyogenic infections are usually related to *Staphylococcus aureus* or *Streptococcus pyogenes*, with common patterns of pustules or papulopustules along the tattoo lines. Infections are typically present 4 to 22 days after tattooing. Infections range from cellulitis and small pustules to larger abscesses that require surgical incision and drainage. Management is similar to other skin pyogenic infections. More severe pyogenic infections remain rare, but there are case reports of endocarditis, spinal abscess, erysipelas, gangrene, and amputations.<sup>33</sup>

There are many case reports of patients who have acquired nontuberculous mycobacteria (NTM) infections after receiving tattoos.<sup>34,35</sup> The infection usually is caused by contamination of the ink or equipment with nonsterile water.<sup>36</sup> Infections with *Mycobacterium chelonae* and *Mycobacterium abscessus*, which are rapidly growing bacteria, have occurred from the contamination of either inks or diluents. NTM infections range from mild inflammation with lesional rash, papules, or nodules to severe abscesses requiring extensive and multiple surgical débridements. NTM infections may require a minimum of 4 weeks of treatment with 2 or more antibiotic agents.<sup>36</sup> Examples of antibiotic agents that have been used, with variable success and sensitivities, are amikacin, ciprofloxacin and moxifloxacin, clarithromycin, minocycline, tigecycline, cefoxitin, imipenem, trimethoprim-sulfamethoxazole, and linezolid.<sup>35</sup> Antibiotic sensitivity is important in designing a treatment plan.<sup>37</sup> Consultation with an infectious disease expert for suspected NTM infection in a tattoo is warranted.

Another case report described *Herpes compuncturum* that developed 3 days after tattooing; it was concluded that this was a secondary infection in a patient in whom *S aureus* also was detected. Antibiotic therapy, antiviral therapy, and pain management resolved the rash.<sup>33</sup>

Bloodborne pathogens may occur after tattooing. Tattooing is associated with hepatitis B transmission, especially in teenagers with other high-risk behaviors.<sup>38</sup> Tattooing also is associated with higher rates of hepatitis C transmission.<sup>39</sup> HIV transmission associated with sharing tattoo needles or reusing tattoo inks has been reported.<sup>40</sup> If tattoos are placed in licensed parlors, infections are less likely to occur after tattooing

than if they are placed by unlicensed individuals.<sup>41</sup>

There have been case reports of neoplasms associated with or after tattoo placement. Keratoacanthoma, squamous cell carcinoma, basal cell carcinoma, and leiomyosarcoma have been described occurring in areas of the skin with tattoo pigmentation. It is not known whether this is a coincidence or a causal effect. Tattoos placed over melanocytic nevi can make it difficult to monitor to ensure there is no malignant transformation, and both nevi and melanoma have been reported in previously tattooed skin.<sup>31</sup>

Rarely, there have been cases reported of acute cutaneous vasculitis in tattoo recipients occurring 10 to 14 days after placement. The following symptoms were typical: chills, arthralgia, myalgia, and purpuric rash. Treatment is similar to the treatment of other vasculitides.<sup>33</sup>

Researchers in one review article discuss toxicologic risks of tattoo ink, including phototoxicity, substance migration, and the possible metabolic conversion of tattoo ink ingredients. Also reviewed are the potential risks associated with cleavage products formed during laser-assisted tattoo removal.<sup>42</sup>

### **Henna and Black Henna Temporary Tattoos**

Red henna is relatively safe. From a population perspective, at least half of the population of India has been exposed to henna in their lifetimes with negligible reported immediate hypersensitivity reactions.<sup>43</sup> When they have occurred, it is not certain whether sensitivity is caused by the lawsone pigment, another component of the henna leaf, or the mixture of components. There is more concern for hairdressers who use henna in dyes because it may be an occupational hazard.<sup>30</sup> Treatment is similar to that of other hypersensitivity reactions.

The structure and redox potential of lawsone is similar to naphthalene, a potent oxidant of glucose-6-dehydrogenase (G6PD)-deficient cells. Topical application of red henna may cause hemolysis in children with G6PD deficiency. The hemolysis can be life threatening, with symptoms of pallor, lethargy, jaundice, anemia, vomiting, tachycardia, poor peripheral perfusion, and shock.<sup>30</sup>

Black henna contains the chemical PPD. No natural black henna exists. PPD is added to accelerate the dyeing and drying process (to 30 minutes), to strengthen and darken the color, to enhance the design, and to make the pattern last longer. These methods stain the skin black and have an appearance more like a real tattoo. Black henna is available worldwide, lasts several weeks in the skin, and offers an alternative to permanent tattoos. It is painless, and because the skin is not punctured, there is no risk of introducing local or bloodborne pathogens. However, there is a slight (2.5%) risk of allergic reactions from skin sensitization. Once sensitized, patients may experience allergic contact dermatitis from hair dyes that contain PPD. There are also reported cross-reactions to other hair dyes, dyes used in textiles, rubber chemicals, and local anesthetics. Some reported reactions were severe, requiring hospitalizations, especially in children. Most reactions were at the site, but generalization can occur. It takes several weeks for reactions to subside despite topical and sometimes oral corticosteroid therapy.<sup>30</sup>

### **Tattoo Removal**

The current increasing popularity of tattoos in the United States has concomitantly spurred an increased interest in tattoo removal, although tattoo removal is not new. Egyptian mummies dating to 4000 BC have evidence of attempted tattoo removal. Ancient Greek authors described the use of salt abrasion

or a paste that also contained garlic and cantharidin to remove tattoos. Relationships, social status, and aesthetic tastes may change. Not all tattoos are placed intentionally; penetration of exogenous pigments can occur from road dirt from an accident, graphite in pencils, or gunpowder, and many people may want these unintentional tattoos removed.<sup>44</sup> Adolescents may overestimate the effectiveness of tattoo removal when having one placed and should be instructed that tattoo placement is permanent, and it is expensive and sometimes difficult to remove them.<sup>3</sup> Tattoo removal techniques can be categorized as mechanical, chemical, ablative, and selective.<sup>44</sup>

“Q-switched” lasers are the current state-of-the-art tattoo removal method. The laser wavelength is adjusted to match the absorption pattern of the different color pigments. The Q-switched laser pulse is delivered over nanoseconds with extremely rapid heating as high as 900°C (1652°F), leading to fragmentation of tattoo pigment particles. Immediately after the pulse, the epidermis appears white because the formation of gas as water in the skin is vaporized. An acute inflammatory infiltrate surrounds the pigment and debris from fragmented cells. Tattoo particles can be found in regional lymph nodes. Phagocytosis and clearance of fragmented pigment particles ensues. Free pigment is intracellular again within 4 weeks. Subsequent treatment should be performed after at least 4 weeks. One single-session laser treatment is available. Longer intervals may reduce the risk of permanent pigmentary changes to the skin.<sup>44,45</sup> It is important to have the requisite training in the use of the Q-switched laser for tattoo removal; the literature notes case reports of significant burns within tattoos after treatment, leading to scarring and poor outcomes.<sup>46</sup> In one case

described in a report, the patient elected to have another tattoo placed to hide the burned area.<sup>47</sup>

Other methods that are less commonly used for tattoo removal include mechanical and chemical removal techniques. Mechanical methods include dermabrasion (which is variably effective) and excision with or without grafting (mostly for small tattoos; the predicted scar remaining would have to be acceptable to the patient). A number of chemical methods have been used with dermabrasion or as monotherapy. Imiquimod has been applied, with or without tretinoin, with mixed results. These techniques often result in hypo- or hyperpigmentation, or scarring, with varying effectiveness.<sup>44</sup>

Although laser removal may be the best way to remove a tattoo, the time, needed treatments, and cost should not be underestimated. One case report noted a 29 year old patient with 2 large, multicolored tattoos on his arms and chest who presented for removal. After 47 treatments, there was significant improvement.<sup>48</sup> There is no cost regulation of laser tattoo removal, and price per sq in per treatment can be anywhere between \$49 and \$300 depending on the location of the removal service. There are also standards published that involve the skin type and complexion of the individual, the colors involved, and complexity of the pattern adding up to a clinical score known as the Kirby-Desai score. A tattoo that is 15 sq in and is estimated to have 8 sessions based on this Kirby-Desai score could cost \$5880, assuming a cost of \$49 per sq in.<sup>49</sup>

## **PIERCING AND STRETCHING**

### **Methods**

A multitude of videos on YouTube and other Internet video repositories exist for the reader to view and learn about safe and acceptable methods

of body piercing, some of which take the observer through the steps, including infection control practices. Most body piercing jewelry consists of rings, hoops, studs, or barbell-shaped ornaments. The size and shape of jewelry is determined by the body site pierced and personal preferences. Jewelry is not always interchangeable between piercing sites. In particular, jewelry designed for ear piercing may not be suitable for another part of the body because of the length of the post or the pressure exerted by the clasp.<sup>50</sup>

Most body piercing jewelry is made of metal, usually stainless steel, gold, niobium, titanium, or alloys. Gold often is combined with nickel or other metals to make alloys that have improved hardness and durability. Nickel in gold-filled or gold-plated jewelry is associated with a high prevalence of reactivity in people who are nickel sensitive. Those who are getting a piercing should pay careful attention to the studs or clasps on earrings; jewelry with a high karat rating commonly is paired with less expensive gold-plated studs or earring backs. Niobium and titanium are light-weight elemental metals that rarely produce an allergic response. Other features to consider in body piercing jewelry include the ease of removal (in case of trauma or radiographs), surface smoothness, and its capacity to withstand autoclaving and cleaning.<sup>51</sup> Surgical stainless steel rarely causes allergic skin reactions; however, not all stainless-steel products are nickel free.<sup>52</sup>

Although earrings may be sterilized before use, most piercing guns are not sterilized between procedures. Ear piercing systems using disposable, sterile cassettes are available but are not always used.<sup>51</sup> Because body piercing salons are unregulated in many states, some physicians may choose to perform body piercing procedures in their own office settings.

The lips, cheeks, and midline of the tongue are popular sites for oral piercings. Perforation of lingual blood vessels can cause bleeding and hematoma formation. Edema frequently develops after a tongue piercing, so a longer barbell is recommended initially.<sup>53</sup> Switching to a shorter barbell reduces the damage to the dentition and gingiva. Of note, beaded jewelry may become trapped between the teeth.

The ear is the most universal site for body piercing. Multiple ear piercings have gained approval, especially high piercing through the cartilage of the pinna. The nose can be pierced in the fleshy nares or through the cartilaginous septum. Septal piercings usually are performed in the inferior, fleshy part of the septum and not through cartilaginous tissue. The navel or periumbilical area is a popular self-piercing site. Navel rings and subsequent scarring are more problematic in overweight patients and in the latter stages of pregnancy as abdominal girth expands.

Wearing a curved barbell instead of a ring until the navel piercing has healed may reduce irritation and scarring. Friction from clothing with tight-fitting waistbands and subsequent skin maceration may account for the delayed healing and increased infection rates of navel piercings. Careful placement of jewelry and avoidance of rigidly fixed jewelry may minimize these problems. Before nipple and areolae piercings, men and women should be counseled about the lengthy time required for complete healing and the risk of delayed infection (see Table 1). Genital piercings anecdotally have been reported to enhance sexual sensitivity. Genital piercing sites in men include the penile glans, urethra, foreskin, and scrotum; sites in women include the clitoral prepuce or body, labia minora, labia majora, and perineum.<sup>54</sup>

Dermal piercing, also known as microdermal piercing or single-point

**TABLE 1** Approximate Healing Times for Body Piercing Sites<sup>51</sup>

Site (Piercing Name)	Time to Heal
Clitoris	2–6 wk
Coronal ridge (dydoe)	6–8 wk
Earlobe and auricle	6–8 wk
Eyebrow	6–8 wk
Glans penis (ampallang)	3–9 mo
Labia majora	2–4 mo
Labia minora	2–6 wk
Lip	6–8 wk
Navel	Up to 9 mo
Nipple	2–4 mo
Scrotum (hafada)	2–3 mo
Tongue	3–6 wk
Urethral meatus (Prince Albert)	2–4 wk

piercing, is defined as piercings placed into a flat surface of the body. The jewelry has an entry point and an exit point, but dermal piercing has just one end that can be seen on the surface of the skin. The second end is studded into the dermal layer of the skin. This variant of piercing has gained a lot of popularity because it can be placed on most flat surfaces of the body, and designs can be created by putting together multiple dermal piercings or combining with tattoos. They may be difficult to remove and may occasionally require surgical removal.<sup>55,56</sup>

### Complications

No reliable estimates are available regarding people who have experienced complications related to body piercing. Importantly, adolescents and young adults with increased vulnerability to infection (eg, patients with diabetes mellitus or who are taking corticosteroids) and those taking anticoagulant medications may be at greater risk of complications from body piercing. However, multiple adverse outcomes associated with body piercing have been reported, including infection, pain, bleeding, hematoma formation, cyst formation, allergic reaction, hypertrophic scarring, and keloid formation.<sup>51,57–60</sup>

Infection severity ranges from local infections (impetigo and cellulitis)

to more severe infections, including osteomyelitis, toxic shock syndrome, and bacteremia. Life-threatening infections as a result of complications associated with body piercing include septic arthritis, endocarditis, and hepatitis B. With any piercing, there is the danger of infection, including hepatitis B or C virus and tetanus.<sup>41,61</sup> Body piercing as a possible vector for HIV transmission has been suggested, although no cases have been reported.<sup>62,63</sup>

A serious consequence of oral piercing is airway compromise from trauma, tongue swelling, or obstruction by jewelry.<sup>64</sup> Securing an adequate airway or endotracheal intubation can be challenging when a patient has a tongue barbell.<sup>57,65</sup> If lingual jewelry cannot be removed easily or expeditiously, precautions should be taken during intubation to ensure that jewelry is not loosened and aspirated or swallowed. Removal of oral and nasal jewelry also is recommended before nonemergency surgical procedures. Chipping or fracturing of teeth is the most common dental problem related to tongue barbells.<sup>66</sup>

Although there is a risk of infection because of the vast amounts of bacteria in the mouth, the infection rate is low. Oral rinses (eg, Listerine; Johnson and Johnson Consumer Companies Inc, New Brunswick, NJ) or the application of nonprescription cleansers (eg, Gly-Oxide Liquid Antiseptic Oral Cleanser; GlaxoSmithKline Consumer Healthcare, Philadelphia, PA) may be recommended prophylactically after an oral piercing.<sup>67</sup>

Ludwig angina is a rapidly spreading oral cellulitis and has been reported as a complication of tongue piercing.<sup>68</sup> Treatment involves maintaining an adequate airway, the administration of systemic antibiotic agents, and surgical drainage of abscesses.

Of people with ear piercings, up to 35% had one or more complication (eg, minor infection [77%], allergic reaction [43%], keloid formation [2.5%], and traumatic tearing [2.5%]).<sup>69</sup> Auricular perichondritis and perichondrial abscess typically occur in the first month after piercing, especially during warm-weather months.<sup>70</sup>

Auricular perichondritis presents as painful swelling, warmth, and redness in a portion of the auricle that often spares the earlobe. Acute tenderness on deflecting the auricular cartilage helps distinguish this deeper perichondrial infection from a superficial skin infection. Minor infections can progress to perichondritis, abscess formation, and necrosis with or without systemic symptoms. The most common pathogens (ie, *Pseudomonas aeruginosa*, *S aureus*, and *S pyogenes*) often respond well to fluoroquinolone antibiotic treatment (eg, ciprofloxacin or levofloxacin).<sup>71,72</sup> Alternative options for hospitalization will depend on the pathogen and might include clindamycin, ceftazidime, and cefepime.

If an abscess is present, surgical incision and drainage often are necessary. Once an abscess develops, good cosmetic preservation of the auricular cartilage is difficult to maintain.

Prolonged wearing of heavy jewelry also may result in an elongated tract or bifid deformity of the earlobe.

People with atopic dermatitis or allergic metal contact dermatitis are at increased risk of developing minor staphylococcal or streptococcal skin infections.<sup>73</sup>

Superficial earlobe infections tend to have a benign course and respond well to local treatment, including warm, moist packs and application of over-the-counter, topical antibiotic ointment (eg, bacitracin [Polysporin and Neosporin; Johnson and

Johnson Consumer Companies Inc, New Brunswick, NJ]). Treatment with mupirocin ointment or oral antistaphylococcal antibiotic agents may be warranted.<sup>61</sup> Oral antibiotic agents, such as the first-generation cephalosporins (eg, cephalexin or cefadroxil and penicillinase-resistant penicillins), are appropriate treatment options for more extensive but uncomplicated skin and soft tissue infections. Alternative antibiotic agents (ie, clindamycin or trimethoprim-sulfamethoxazole) may be more appropriate in communities that have higher rates of methicillin-resistant *S aureus* cases. Guidelines for the treatment of methicillin-resistant *S aureus*, according to the Infectious Diseases Society of America, also suggest doxycycline or linezolid might also be appropriate.<sup>74</sup> An earring can be replaced, or the ear can be repierced 6 to 8 weeks after resolution of local swelling and tenderness.<sup>51</sup>

The earlobe is a common site for hypertrophic scarring and keloid formation. In addition to aesthetic concerns, patients with keloids may have itching and tenderness. Treatment options for keloids include surgical excision, intralesional corticosteroid injections, cryosurgery, pressure dressing, radiation, and laser therapy.<sup>75,76</sup>

Contact dermatitis resulting from nickel exposure is common. Contact sensitivity to gold and localized argyria, a skin discoloration resulting from silver salts, also have been described.<sup>77,78</sup> Avoidance of the metals that trigger a reaction and the application of topical corticosteroids hasten the resolution of allergic dermatitis.

Occasionally, inflammation or infection result in such significant swelling that an earring should be removed. The pierced hole can be maintained, if desired, by inserting a ring made from a 20-gauge Teflon catheter with silicone tubing into the hole while the surrounding skin

heals.<sup>79</sup> Similarly, a loop fashioned from nylon suture material may keep a piercing intact during the healing process.

Earrings can also become embedded in the earlobe, a complication common in persons with thick, fleshy earlobes that are pierced with spring-loaded guns.<sup>80</sup> Piercing guns exert high pressure on the soft tissue of the earlobe and cannot be adjusted for varying tissue thickness. Embedding may be prevented by using longer earring posts with adjustable backings. If gentle probing fails to locate an embedded earring, a small incision under local anesthesia (without epinephrine) may be necessary to locate and remove the earring or backing. Any suspected infection should be treated.<sup>80</sup>

Trauma to the pierced external ear is common. Lacerations to the ear may occur after falls, motor vehicle crashes, contact sports, person-to-person violence, or accidental pulling of an earring. The simplest laceration occurs when an earring is pulled through the earlobe, especially if the original earring hole was close to the periphery. All wounds should be cleaned and repaired within 12 to 24 hours. A simple earlobe tear can be sutured under local anesthesia. If the hole has closed, the earlobe can be repierced in an unscarred area after ~3 months.<sup>81</sup>

Various closure techniques have been described in the literature. More complex lacerations of ear cartilage should be referred to subspecialists for repair.<sup>82</sup>

Pointed earring posts may cause pressure sores or postauricular skin irritation when worn during sleep. The removal of jewelry at bedtime is indicated if switching to a different earring style does not resolve the problem. Parents of infants or young children with pierced ears should be informed of the risk of aspiration and ingestion of earring parts. In such



situations, earrings with a locking back or screw back are advisable.<sup>83</sup>

A localized infection of the earlobe may not be easily differentiated from allergic contact dermatitis unless there is purulent drainage or a high index of suspicion.<sup>78</sup>

Piercing the nasal cartilage can cause significant bleeding and lead to septal hematoma formation that often is accompanied by infection. Other potential complications that may result in cosmetic deformities include perichondritis and necrosis of the cartilaginous nasal wall. Infection requires aggressive treatment with antibiotic agents that have good coverage against *Staphylococcus* species that commonly colonize the nasal mucosa. Mupirocin is effective and offers excellent coverage against Gram-positive cocci. Fluoroquinolones have the advantage of excellent skin penetration and added coverage against *Pseudomonas* species.<sup>84</sup>

Nasal jewelry has the potential to be aspirated or swallowed. Rings placed in the nostril or septum also can migrate forward or be pulled out. As with ear piercing, the studs or backings of the jewelry may become embedded and require surgical removal.<sup>84</sup> Abscess formation has been reported after nipple piercing.<sup>85</sup>

There are case reports of cellulitis and spread of infection around a breast implant after a piercing.<sup>86,87</sup> However, little information is available about nipple piercing after breast implantation or chest wall augmentation. The effects of nipple piercings on lactation are not clear, but jewelry or scar tissue could impair latching on or block a milk duct and adversely affect an infant's ability to breastfeed. Nipple piercings should be removed to avoid aspiration by the infant during lactation.

Jewelry inserted through the glans penis may interrupt urinary flow. Paraphimosis (ie, the inability to

**TABLE 2** Potential Complications of Body Piercings<sup>51</sup>

Piercing Site	Potential Complications
Ear	Allergic reaction, auricular perichondritis, embedded earrings, infection, keloid formation, perichondral abscess, and traumatic tear
Genitals (women)	Allergic reaction, compromise of barrier contraceptives, infection, and keloid formation
Genitals (men)	Frictional irritation, infection, paraphimosis, penile engorgement, priapism, recurrent condyloma, urethral rupture, urethral stricture, and urinary flow interruption
Mouth	Airway compromise, altered eating habits, gingival trauma, hematoma formation, increased salivary flow, infection, injury to salivary glands, interference with radiographs, loss of taste, Ludwig angina, pain, permanent numbness, speech impediments, tooth fracture or chipping, and uncontrolled drooling
Navel	Bacterial endocarditis <sup>a</sup> , frictional irritation, infection, and jewelry migration and rejection
Nipples	Abscess formation, bacterial endocarditis <sup>a</sup> , breastfeeding impairment, and infection
Nose	Infection, jewelry swallowing or aspiration, perichondritis and necrosis of the nasal wall, and septal hematoma formation

<sup>a</sup> In patients with moderate- to high-risk cardiac conditions.

replace a retracted foreskin) has been associated with urethral and glans piercings in uncircumcised men.<sup>88</sup> The foreskin may be reduced manually after a penile nerve block. If this maneuver is unsuccessful, the prepuce can be injected with hyaluronidase to allow the edematous fluid to dissipate.<sup>89</sup>

Penile rings also can cause engorgement and priapism (ie, persistent erection), requiring emergency treatment to preserve erectile function. Women with genital piercings can develop bleeding, infections, allergic reactions, keloids, and scarring.<sup>90</sup>

It is advisable that sexually active people with genital piercings be counseled that jewelry may compromise the use of barrier contraceptive methods. Condoms may be more prone to break, and diaphragms may be more easily dislodged during sexual activity when 1 or both partners have genital piercings. Avoiding jewelry with sharp edges and using looser-fitting condoms or double condoms may help avoid some of these problems.<sup>91</sup>

From a unique study on urban teenagers and their knowledge of piercing complications,<sup>92</sup> 33% of all subjects reported knowing someone

who has had a medical or health problem related to body piercing; they most commonly reported infections (74%), bleeding (30%), allergic reactions (26%), and bruising and keloids (19% each) (see Table 2). Among those subjects with body piercings, 12% reported having had personal experiences with health problems related to the piercing, including infections, bleeding, bruising, and allergic reaction. Interestingly, those who got their piercings in a body-piercing shop were far more likely to report having had an infection (18.4%) than those who got pierced elsewhere (1.9%).<sup>92</sup>

Adolescents were asked to estimate the percent chance of having a piercing-related health problem. The perceived risk for piercing by a professional (34%) was lower compared with a nonprofessional (73%). Neither those with a piercing nor those who had a problem with a piercing perceived risk any differently. Those who had pierced themselves perceived much less risk from piercing by a nonprofessional (50%) than those who had been pierced but not by themselves. Those with piercings of the face (nose, eyebrow, lips, and chin) tended to perceive less risk for face piercing (41.5%) compared with those

without (49.7%). In the analysis of perceived risk, there were no effects of race, sex, or age.<sup>92</sup>

In a recent review from 2012, similar complications were confirmed, including systemic infections (such as viral hepatitis and toxic shock syndrome) and distant infections (such as endocarditis and brain abscesses).<sup>58</sup> It was recommended that body piercers have their clients complete a medical and social history to identify conditions that may predispose them to complications. Piercing candidates should choose a qualified practitioner to perform their piercings.<sup>58</sup>

One small study of children and adults with congenital heart disease found no cases of endocarditis after ear piercing, although only 6% of the patients received prophylactic antibiotic treatment.<sup>93</sup>

There have been recent reports of bacterial endocarditis after nipple and navel piercings in patients with surgically corrected congenital heart disease. It is important for physicians to know about planned piercings so they can consider antibiotic prophylaxis in patients with moderate- or high-risk cardiac conditions,<sup>94–96</sup> although the American Heart Association guidelines on endocarditis prophylaxis do not specifically mention the need for antibiotic agents in people contemplating ear or body piercings.<sup>97,98</sup>

### Stretching Methods

Ear stretching is a modification practiced by and originating from indigenous peoples. Tribes in various countries in Africa, Eurasia, America, and other indigenous lands have practiced the ritual of ear stretching for cultural, religious, and traditional purposes. Ear stretching is a ritual that has been practiced by people all over the world since ancient times. Bone, horn, wood, and stone were

generally carved for ear stretching, but other organic materials that had the right shape naturally, from shells to teeth and claws, were also used.

Many cultures have practiced stretching, including ancient Egyptians (eg, King Tutankhamen), Buddhists from Nepal, Mursi tribal women of Ethiopia, and the African Maasai from Kenya and Tanzania. Stretching is also apparent in the Easter Island heads. Historically, the practice has been used for the purpose of tribal status, to scare enemies in war, and for beauty purposes. It has been and still is a common practice for both men and women. For men, it has been used historically to indicate the standing members of a specific tribe. The bigger the stretching, the higher the ranking the man had. As for women, ear stretching is more for decorative purposes and also signifies when a girl has reached womanhood. These practices are still important and used today by many tribes and cultures.<sup>50</sup>

Stretching, in the context of body piercing, is the deliberate expansion of a healed piercing for the purpose of wearing certain types of jewelry. Ear piercings are the most commonly stretched piercings, with nasal septum piercings, tongue piercings, and lip piercings and lip plates following close behind. Although all piercings can be stretched to some degree, cartilage piercings are usually more difficult to stretch and more likely to form hypertrophic scars if stretched quickly. Dermal punching is generally the preferred method for accommodating larger jewelry in cartilage piercings.<sup>50</sup>

Stretching should be performed in small increments to minimize the potential for damaging the healed piercing or creating scar tissue. In North America, most stretching methods go up by a single, even-sized gauge increment at a time. Stretching to 2 gauge, or 6 mm, is considered the

point of no return, and the hole will not close to a standard piercing size if the “plug” is removed.

The typical jewelry worn in a large, stretched piercing is a plug, sometimes incorrectly referred to as a gauge, which refers to the sizing system used in the United States. It is solid, usually cylindrical, and may be flared out at one or both ends (saddle shaped) or kept in place by o-rings fastened around the ends. A variation on this is the flesh tunnel, which is shaped in the same way but is hollow in the middle. Claw-, talon-, and spiral-shaped pieces are also commonplace. Ear weights in varying degrees of size are also worn, commonly made from silver or bronze, although other metals, such as copper or brass, are occasionally used. However, some people are easily irritated by some metals; therefore, care should be taken when metal jewelry is worn. Ear cuffs (such as the gold ones used in South Indian provinces) or wrapped bead work (common among the Maasai of East Africa) are other options, although these are not usually seen in modern Western contexts.<sup>50</sup>

With both body piercing and stretching, the system of gauges and inches is used in gauge size notation, which was originally meant for wire thickness determination. A gauge number denotes a thickness on a standardized scale, which, for most purposes, starts at 20 gauge (0.03 in or 0.81 mm). This is most often used for the nose and ear post studs. Importantly, as the gauge number decreases to 0 gauge or even 00 gauge, the thickness of the piercing increases.<sup>50</sup>

### Regulation of Tattooing and Piercing

Although no reliable estimates exist for the frequency of complications, the risk of adverse effects can still be reduced by ensuring sanitary tattoo parlors, needles, and inks; comprehensive training of artists;

and strong infection-control practices. Individual states have regulated tattooing for decades to address public health concerns. States did not have any common standards until 1999, when the National Environmental Health Association published *Body Art: A Comprehensive Guidebook and Model Code*.<sup>99</sup> This was an interdisciplinary collaboration of academics, public health professionals, professional organizations, physicians, environmental health experts, and body art practitioners. The model provided detailed recommendations for and guidelines on sanitation and infection control. Artist training should include competence in sterilization procedures, anatomy, and infection control. As of 2012, 41 states each had at least one statute in place regulating tattooing. The remaining 9 states delegate authority to local-level and individual jurisdictions within those states. Even with these regulations, 72% of states do not effectively regulate sanitation, training and licensing, and infection control. Training and licensing was the least consistently regulated topic. Pediatric health care providers are recommended to learn about regulations in local states or jurisdictions.<sup>100</sup>

Similarly, there has been considerable debate about adolescents who are minors obtaining tattoos and parental consent requirements (Table 3). At least 45 states have laws prohibiting minors from getting tattoos. Thirty-eight states have laws that prohibit both body piercing and tattooing on minors without parental permission. Each state varies on legislation of body piercing and tattooing.<sup>101</sup> It has been a challenge for states to keep pace with the new body art forms. Almost every state has laws addressing some aspect of body art. Nevada has no laws addressing body art; Maryland has limited laws. In New Hampshire, body piercing is

**TABLE 3** Body Piercing and Tattooing of Minors: Consent and Physical Presence Requirements by State<sup>101, 102</sup>

Type of Procedure	Outright Prohibition	Consent Required	Parental Presence Required
Tattooing	Alaska, California, Georgia <sup>a</sup> , Iowa <sup>b</sup> , Idaho <sup>c</sup> , Illinois <sup>a</sup> , Maine, Minnesota, Mississippi, New Hampshire, New York, North Carolina, Oklahoma, Rhode Island, South Carolina <sup>d</sup> , Tennessee <sup>e,f</sup> , Washington, Wisconsin <sup>a</sup> ( <i>n</i> = 17)	Alabama, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Hawaii, Indiana, Kansas, Kentucky, Louisiana, Michigan, Missouri, Montana, Nebraska, New Jersey, North Dakota, Ohio, Pennsylvania, South Dakota, Texas <sup>f</sup> , Utah, Vermont, Virginia, West Virginia, Wyoming ( <i>n</i> = 28)	Arizona, Arkansas, Indiana, Kansas, Louisiana, Nebraska, North Dakota, Ohio, Pennsylvania, Rhode Island, Virginia, Wyoming ( <i>n</i> = 12)
Body piercing	Idaho <sup>g</sup> , Mississippi, South Carolina ( <i>n</i> = 3)	Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Michigan, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Utah, Virginia, Wyoming ( <i>n</i> = 35)	Arizona, Arkansas, Indiana, Kansas, Louisiana, Nebraska, New Hampshire, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, Tennessee, Texas, Virginia, Wyoming ( <i>n</i> = 16)

<sup>a</sup> The prohibition does not apply when the tattooing is performed by a physician or licensed technician under a physician's supervision.

<sup>b</sup> Prohibition applies only to unmarried minors.

<sup>c</sup> Prohibition for those younger than 14 years, consent required for ages 14–18 years.

<sup>d</sup> Prohibition for those younger than 18 years, consent required for ages 18–21 years.

<sup>e</sup> Prohibition for those younger than 16 years, consent required for ages 16–18 years.

<sup>f</sup> Tattooing is allowed only for covering up an existing tattoo.

<sup>g</sup> Prohibition for those younger than 14 years, consent required for ages 14–18 years.

not permitted on a person younger than 18 years without consent of that person's parent or legal guardian. The consenting individual needs to be physically present at the time of piercing, provide evidence of status as parent or legal guardian, and sign a document that provides informed consent. Penalties for violators are fines, prison time, or both; most of these laws define violators as the person who performed the tattoo or piercing. Pediatric health care providers are encouraged to educate themselves about laws related

to minors obtaining tattoos and piercings in their states.<sup>101</sup>

## SCARIFICATION

### Methods

Scarification involves cutting, burning, or branding words or images into the skin. Although many people who have scarification have it done by amateurs, professional practitioners of this type of body modification use a variety of methods. The purpose is to create a

permanent body modification. Some practitioners will also use methods that enhance scar formation, such as scraping off scabs or irritating the wound with materials such as iodine, citrus juice, or toothpaste. In some traditional cultures, ash or clay is packed into the wound to encourage hypertrophied scars. There are many methods in use, including the following: hot and cold branding (the latter with liquid nitrogen), moxibustion (placing incense on the skin and allowing it to burn until it's extinguished in the skin), cutting with a scalpel, thermo- and electrocautery, and laser branding.<sup>103</sup>

### Complications

Scarification does not produce consistent results and does not always produce the outcomes desired. Infection is a possible complication of any of these methods. Scarification artists may not be as experienced with these processes perhaps because of less demand for this method.<sup>3</sup> Additionally, keloids may be a complication (essentially, keloid formation is the complication of any of these body modification methods). There are emerging treatment strategies for keloid scars, but the best strategy is prevention. People who have had keloids or have family members with keloids should be informed that the outcome of scarification is uncertain.<sup>104</sup>

### Regulation of Scarification

Although not as regulated as tattooing, the amount of state regulation regarding scarification is increasing. As of February 2014, 4 states prohibit scarification, and 16 other states' legislation could be interpreted as regulating or prohibiting scarification. Eleven other states have some regulation as part of body art practice. Nineteen states do not address scarification.<sup>104</sup>

## ADVICE FOR PEDIATRICIANS

### General Issues

1. Pediatricians should recognize the difference between voluntary body modifications and the impulsive NSSI syndrome; and
2. As with all adolescent decisions that involve significant consequences, it is recommended that adolescents speak with their parents, guardians, or other responsible adults before having tattoos placed.

### Tattoos and Henna

1. Adolescents and their families should be informed that tattoos are permanent and that removal is difficult, expensive, and only partially effective;
2. Pediatricians should advise adolescents with a history of keloid formation to avoid body modifications that puncture the skin. The outcome is uncertain whenever there is trauma to the skin resulting in scar;
3. Pediatricians should advise their adolescent patients to assess the sanitary and hygienic practices of the tattoo parlors and tattoo artists. This would include observing the use of new, disposable gloves; the removal of the new needle and equipment from a sealed, sterile container; and the use of fresh, unused ink poured into a new, disposable container with each new client;
4. Pediatricians should advise adolescents to seek medical care if there are signs and symptoms of infection. Normal skin and soft tissue infections should be considered first, but if there are any unusual features, prompt evaluation by a dermatologist is recommended. If there is confirmed mycobacterial infection,

consultation with an infectious disease specialist is warranted;

5. Lesions that appear to grow and/or change within a tattoo are an indication for evaluation for neoplasms;
6. Pediatricians should inform families of the risk of hemolysis with red henna temporary tattoos for children or others with a positive G6PD deficiency. Black henna temporary tattoos should be avoided because of the significant rate of sensitization;
7. It may be advisable for pediatricians to familiarize themselves with local laws and regulations related to tattooing to inform families should pediatric patients be interested in having tattoos placed; and
8. Adolescents should be counseled about the implications on job placement and maintenance and education if the tattoos are at all visible.

### Piercings and Stretching

1. Rinsing with nonprescription oral cleansers or the topical application of cleansers is recommended to prevent infection after oral piercing;
2. Antibiotic agents with good coverage against *Pseudomonas* and *Staphylococcus* species (eg, fluoroquinolones) are advised when treating piercing-associated infections of the auricular cartilage;
3. At clean piercing establishments, the piercer should be observed putting on new, disposable gloves and removing new equipment from a sterile container;
4. Adolescents contemplating a tongue piercing should be advised of the high incidence of tooth chipping associated with these piercings;
5. Pediatricians play an important role in promoting injury

prevention by recommending that all jewelry be removed during contact sports to avoid endangering the wearer and other players. Jewelry that interferes with mouth guards or protective equipment should be removed before play. Nipple jewelry should be removed before breastfeeding;

6. It is important for pediatricians to understand local laws and regulations related to piercing to inform families should pediatric patients be interested in having a piercing; and
7. Adolescents should be counseled about the implications on job placement and maintenance and education if the piercings are at all visible.

### Scarification

1. Teenagers with a personal or family history of keloids should be cautioned about the risk associated with scarification and other body modification processes; and
2. Infections resulting from scarification may be treated similar to other skin and soft tissue infections, with standard topical or systemic antibiotic agents.

## RESOURCES FOR INFORMATION ABOUT TATTOOS AND BODY PIERCINGS

### Tattoos

#### Web Sites

Alliance of Professional Tattooists Inc: [www.safe-tattoos.com](http://www.safe-tattoos.com);

About.com Tattoos: [tattoo.about.com](http://tattoo.about.com);  
US Food and Drug Administration. Think Before You Ink: Are Tattoos Safe? <http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm048919.htm>;

US National Library of Medicine. Piercing and Tattoos: <https://medlineplus.gov/piercingandtattoo.s.html>; and

Healthy Children: <https://www.healthychildren.org/English/ages-stages/teen/Pages/Tattoos.aspx>.

#### Books

Nagle J. *Why Do People Get Tattoos and Other Body Art?* New York, NY: Rosen Publishing; 2011;

Baily D. *Tattoo Art Around the World.* New York, NY: Rosen Publishing; 2011; and

Spalding F. *Erasing the Ink: Getting Rid of Your Tattoo.* New York, NY: Rosen Publishing; 2011.

### Body Piercings

#### Web Sites

Association of Professional Piercers: [www.safepiercing.org](http://www.safepiercing.org);

US National Library of Medicine. Piercing and Tattoos: <https://medlineplus.gov/piercingandtattoo.s.html>; and

Healthy Children: <https://www.healthychildren.org/English/ages-stages/teen/Pages/Body-Piercing.aspx>.

#### Books

DeBoer S. *Body Piercing Removal: Healthcare Professionals Handbook.*

Dyer, IN: Peds-R-Us Medical Education; 2013 (includes DVD). Available at: [www.peds-r-us.com](http://www.peds-r-us.com).

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### ABBREVIATIONS

G6PD: glucose-6-dehydrogenase  
NSSI: nonsuicidal self-injury  
NTM: nontuberculous mycobacteria  
PPD: paraphenylenediamine

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