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The goals targeted by Healthy People 2020 are to prevent the mortality associated with melanoma and “increase the proportion of people who participate in behaviors that reduce exposure to UV irradiation and sunburns”.¹ Since only 9.3 percent of adolescents reported using protective measures against skin cancer, it is an important takeaway to comprehend that the behaviors to decrease UV exposure will not have an immediate outcome.¹ Ideally, with increased awareness and lifestyle modification, there can be a favorable decrease in the incidence and mortality from skin cancer.

Adolescents need to prevent sun damage and skin cancer. Melanoma represents approximately 1 percent of all cancers, but is the most common fatal skin cancer in the United States, causing more than 9,000 annual deaths and contributing to millions of dollars in yearly health care costs for treatment.^{2,3} Healthy People 2020 included skin cancer due to the high incidence of melanoma. All skin cancers have the same basic risk factor of ultraviolet (UV) radiation exposure. There is a strong public health need as it is widely known that keratinocyte carcinomas, better known as non-melanoma skin cancers (NMSC), are the most common type of cancer in the United States.⁴ This category mainly refers to basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), but is also comprised of other keratinocyte-derived skin cancers, such as Merkel cell carcinoma and other more rare cutaneous neoplasms.⁵ Although they are typically not life-threatening, they can cause disfigurement, pain, and increased health care costs.

Melanoma originates from damage to melanocytes that reside in the basal layer of the skin epidermis.⁶ Squamous cell and basal cell carcinomas occur when the damage is to the squamous epithelial keratinocytes and the keratinocytes in the basal layer of epidermis, respectively.⁶ Survival for melanoma depends on the lesion thickness. Many providers follow the TNM classification that takes into account Breslow's depth, mitotic rate, number of lesions, and lymph node involvement to estimate prognosis.^{7,8} Breslow's measures the depth of the lesion from the stratum granulosum of the epidermis to the furthest point of extension into the skin.⁷ If it is greater than 4 mm, then the 10-year survival rate is approximately 30 percent.⁹ The mitotic rate correlates with ulceration, which typically occurs with thicker lesions, and leads to poor outcomes.⁸

Both UVA and UVB causes damage, but UVB is more mutagenic than UVA and is strongly correlated with basal cell carcinoma.⁵ UV radiation causes "DNA damage, gene mutations, immunosuppression, oxidative stress and inflammatory responses", contributing to skin aging and wrinkles.¹⁰ Additionally, the pathogenesis surrounding UV radiation and skin cancer is important to note as it mutates the p53 tumor suppressor genes, which are responsible for repair of DNA or apoptosis.¹⁰ Ultraviolet radiation inhibits the safety mechanism of apoptosis that is in place to prevent carcinomatous changes. UV exposure causes damage and additionally prevents the normal process of restoration to the cell's DNA.

It is essential for all populations to comprehend the risk factors, characteristics, and treatment for the NMSC and melanoma. The fundamental risk factors include skin types I and II, history of chronic sun exposure, previous diagnostic or therapeutic radiation, outdoor

occupations, family history, and increasing age.⁷ Ultraviolet exposure is the most common cause of basal cell and squamous cell carcinomas.^{7,9} The most frequent locations are in sun-exposed areas, particularly the face for BCC and the legs of women for SCC.^{7,9} Metastasis can occur with SCC locally to the site of origin and melanoma to other body systems; fortunately, BCC does not metastasize.⁷ Squamous cell cancer metastasis rate is 3-4 percent overall.⁷ Within the three most common skin cancers there are different subtypes and clinical presentations.⁶ Because carcinomas are tumors of abnormally proliferating cells and morph into a range of diverse-appearing neoplasms, it is critical to get yearly full skin exams by a dermatologist or primary care provider if you have risk factors.

There are several misconceptions regarding ultraviolet exposure. In 2009, up to 15 percent of adolescents in grades 9 through 12 report using indoor tanning methods.¹ One such misconception is that indoor tanning is safer than natural UV exposure. In fact, tanning beds produce UV radiation at a higher level than sunlight UV radiation.^{11,12} Another misconception is the belief that indoor tanning will have a protective effect against future sunburns. It actually has a detrimental effect and can cause more sunburns.^{12,13} An additional fallacy is that tanning beds are highly regulated and calibrated correctly. In truth, there is low compliance with safety regulations and the US does not have any limitations on total amount of UV radiation exposure.^{3,11} Oregon has legislation, OR 333-119-0090 and HB 2896, preventing minors from participating in indoor tanning methods, with an exception when there is a doctor's note.¹⁴ This is a small step, and future research may be prudent to gauge its impact. Developing an educational program that reinforces this guidance may dispel mistaken beliefs. It can also

promote adherence to adopting optimal sun protection and theoretically reduce the morbidity and mortality associated with skin cancers.

Ideally, high school aged adolescents would develop the needed strategies to prevent skin cancer before the cumulative damage can occur. There are increasing rates of NMSC and melanoma, and not just for older Americans.^{15,16} Since 1973, melanoma rates have increased each year by 2 percent in pediatric patients.¹⁷ A population-based study showed that there is an increasing incidence of non-melanoma cancer in men and women under the age of 40, with “a disproportionate increase in basal cell carcinoma in young women”.¹⁵ Sun-protective behaviors are simple choices to prevent long-term outcomes. The consequences of increased sun exposure over a lifetime will result in wrinkling, discoloration, age spots, and the potential eventuality of skin cancer detection and treatment.

Adolescents as a target group will have a lower amount of exposure to UV radiation and lesser extent of skin damage thus far in their lifetime, as compared to older adults. Adolescents start building habits and behaviors that will continue into adulthood. An education goal is to increase awareness that may promote lifestyle changes. The US Preventative Services Task Force (USPSTF) recommends counseling patients with fair skin, aged 10-24 years, in ways to diminish ultraviolet radiation exposure and decrease risk of skin cancer.¹⁸ It is less likely that many high school teenagers will know strategies to decrease UV radiation and skin cancer risk. In order to best understand the reasons to avoid inappropriate amounts of exposure, it is paramount that they understand the in-depth mechanism in which UVA and UVB radiation causes keratinocyte and melanocyte deterioration.

There is a strong cultural influence regarding the social construct of tanned skin and its association with attractiveness. This age group is highly conscientious of their appearance and show a desire to fit in with trends. Scars, disfigurement, and pain may accompany skin cancer development. This thought can be used to create cognitive dissonance by having the audience realize that UV exposure can cause sun spots, wrinkling, and undesirable skin damage in later years.² As adults, they will have the right to make an informed choice on whether to follow recommendations made by health care providers. By starting the flow of information to high school students, they might be more proactive in reducing modifiable risk factors of UV exposure and sunburns.

There is much data to support the topic and target audience selection. The Oregon State Cancer Registry shows the incidence of melanoma has increased 7.1 percent between 2006 to 2010. It additionally breaks down the incidence and mortality by county. In Douglas County, where the presentation will be held, there is no statistically significant change in incidence nor mortality for melanoma between 2001-2005 and 2006-2010.¹⁹ For Douglas County, the incidence was 36 per 100,000 in 2001-2005 and 34.7 per 100,000 in 2006-2010. This shows a higher incidence rate as compared to Oregon totals of 24.7 per 100,000 in 2001-2005 and 25.9 per 100,000 in 2006-2010.¹⁹ Douglas County had the top incidence rate in Oregon for 2001-2005, and third most in 2006-2010, slightly below Crook County at 37.6 and Deschutes County at 36.3 per 100,000.¹⁹ These statistics support an opportunity to decrease incidence and mortality of melanoma by increasing efforts in public health education regarding skin cancer. The population of Douglas County under the age of 18 is 19.4 percent.²⁰ Targeting this

demographic will be beneficial to prevent the incidence and mortality surrounding skin cancers, as it is well known that the risks increase with age.²¹

The most effective interventions are to practice sun-safe strategies, such as wearing protective clothing, hat and sunglasses, seeking shade, avoiding peak UV radiation times, abstaining from sunbathing, applying sunblock, and avoiding indoor tanning.^{3,4,18,22} The USPSTF recommends that clinicians provide counseling to fair-skinned 10- to 24-year-old patients on ways to diminish ultraviolet radiation exposure and decrease risk of skin cancer.¹⁸ It is not prudent to solely rely on counseling by primary care clinicians, as their scope of practice includes other topics during a patient visit. A large barrier is in how the education is disseminated and the implementation of sun protective strategies.²³ Public health initiatives are vital to achieving the Healthy People 2020 goal. Education and execution of the aforementioned methods could also be dispersed by parents, communities, and schools, allowing policies to be in place to reinforce the sun-safe behaviors.³ Such initiatives include the Practice Safe Skin project in providing sunscreen dispensers to local parks in Boston, Massachusetts.⁴ Another is the SunSmart City project in Montclair, New Jersey that provides shade in public parks and increasing public awareness such as incorporating sun safety education in schools.⁴ Effective educational programs provide and stimulate audience integration of material.²³

Interventions like daily sunscreen application and reapplication, wearing hats and protective clothing, and avoiding tanning beds are practices that can be made on an individual basis. It is also imperative to make well thought-out decisions when participating in sun-safe behaviors. For example, when choosing a sunblock, the individual should keep in mind the need

for broad-spectrum ultraviolet coverage, meaning it blocks both UVA and UVB. The application method can also provide controversy. Many choose an aerosolized spray for convenience, yet the spray-on sunblock often does not adhere as well to skin as lotion sunblock.²⁴ Examples of the easy choices such as substituting spray tans for tanning beds or adding a wide-brimmed hat to a beach outing can make a significant improvement in healthy lifestyle choices. There are some interventions in the research such as planting more trees and making available sunscreen dispensers at public parks that would be better suited for a parks and recreation government group.

I chose skin cancer awareness and prevention because skin cancer is a world-wide occurring health problem. Previous generations did not know of the harmful effects of sun damage. My mother had BCC on her lip and many of her siblings also have experienced basal cell carcinoma. My grandmother had melanoma on her chin requiring surgery and lymph node biopsy, resulting in facial disfigurement. The suntan lotion advertisements promoted tanning rather than today's message of sun block lotions. However, even today commercial advertising that promote tanning still exist and influence our youth. As a future health care provider, it is important to impart some knowledge and bring forth cognizant awareness to decelerate this public health problem. The preventative measures can be fluidly incorporated into daily routines and can become lifetime habits for reducing their risks of developing skin carcinoma.

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