**Getting smart about skin screenings: Observations from beach screening events**

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**Background:**

The incidence of melanoma has increased steadily in the United States over several decades, doubling in the years between 1982 and 2011.1,2 The incidence of melanoma, currently at 19.7/100,000 person years, is projected to continue to rise.3 This tumor is responsible for the majority of skin cancer related deaths, totaling approximately 9000 person per year.3 Without intervention, the annual cost of treating new melanomas in the United States is projected to increase from $457 million in 2011 to $1.6 billion in 2030.3 These costs and associated mortality of melanomas can be reduced through public health measures. In Rhode Island, melanoma incidence has increased 86% compared to an increase of 64% in the national population since 1987 (infographic). More concerning, mortality rates from melanoma in Rhode Island have increased 4% compared to 0% in the national population since 1987 (infographic). The Center for Disease Control’s Community Preventive Services Task Force recommends community-based public health programs in combating the rise in melanoma, using educational, environmental, and policy interventions.4,5 Skin cancer screenings by dermatologists in at-risk populations may help to facilitate the diagnosis and mortality of melanoma through early detection.

**Methods:**

The Comprehensive Cancer Center of Rhode Island, Miriam and Newport hospitals has been conducting skin cancer screenings at beaches throughout the state of Rhode Island for over a decade. In 2015, 2016, and 2017, the Partnership to Reduce Cancer in Rhode Island, Rhode Island Department of Health, Lifespan, Women & Infants, Brown Dermatology, and American Cancer Society sponsored free skin cancer screening at Rhode Island beaches. Data from the past 3 years (2015, 2016, and 2017) are available. All screenings took place during peak UV flux hours, 12:30pm to 2:30pm, in July or August. In 2015 and 2016, 5 screening events took place each year. In 2017, eight screening events took place. All screeners were dermatologists. Media outreach for both events including announcing the screenings on the local nightly news, as well as overhead announcements at the beach on the day of the event itself.

From 2015 to 2018, follow-up calls were made to patients who were given referrals during the initial beach screenings. For the 2015 and 2016 cohorts, initial follow up calls were made 1 to 2 months after the initial screening. For the 2017 cohort, initial follow up calls were made 1 to 2 months and up to 6 months after the initial screening, due to difficulty contacting patients. The purpose of the calls was twofold: to ensure the patient was able to obtain a follow up appointment with a dermatologist and assist the patient if necessary; and to determine the outcome of their follow up visits. For the 2015 and 2016 cohort, if unable to reach the patient during the first call, one or two more attempts were made. For the 2017 cohort, if unable to reach the patient during the first call, two more attempts were made for all patients. Additional calls were also made if needed to ensure a patient secured an appointment or if the patient gave permission to follow up once they had determined the outcome with their provider.

**Results:**

In 2015, 433 people were screened, with 17% (n=73) referred for additional screening at a dermatologist’s office or biopsy. The majority of those screened were non-Hispanic whites (92%), females (61%), with ages between 41-65 years old (40%). Further demographics information is presented in Table 1. Of the 433 people screened, 46 were referred for additional screening or biopsy at a dermatologist’s office. These people were reached by phone for a follow-up phone call. Of these, 3 individuals indicated that they were diagnosed with melanoma and 3 individuals indicated they were diagnosed with keratinocyte carcinoma (basal or squamous cell carcinoma [BCC, SCC]). The number needed to biopsy for melanoma and keratinocyte carcinoma was 1:23 and 1:23, respectively.

In 2016, 516 people were screened, with 13% (n=66) referred for a biopsy. The majority of those screened were non-Hispanic whites (93%), females (59%), with ages between 41 and 65 years old (45%). Of the 516 people screened, 79 were referred for additional screening or biopsy at a dermatologist’s office. These people were reached by phone for a follow-up phone call. Of these, 4 individuals indicated they were diagnosed with melanoma and 6 individuals indicated they were diagnosed with keratinocyte carcinoma. The number needed to biopsy for melanoma and keratinocyte carcinoma was 1:20 and 1:13, respectively.

In 2017, 511 people were screened, with 33% (n=167) recommended for referral to a dermatology and 12.5% (n=64) recommended for a biopsy. The majority of those screened were non-Hispanic whites (86%), females (52%), with ages between 41 and 65 years old (52%). Of the 167 people recommended for referral, 93 were reached by phone for a follow-up call. Of these, 2 individuals indicated they were diagnosed with melanoma (out of the 3 presumptively diagnosed with melanoma, and 1 of these individuals was not able to be reached within 3 follow-up attempts). 5 individuals indicated they were diagnosed with keratinocyte carcinoma (out of the 20 presumptively diagnosed with KC). The number needed to biopsy for melanoma and keratinocyte carcinoma was 1:47 and 1:19, respectively.

**Discussion**

Skin cancer beach screenings conducted in 2015 and 2016 showed an increased in the number of participants screened. Several people were referred for more comprehensive screening or biopsy. Of these, 3 individuals, 4 individuals, and 2 individuals reported being diagnosed with biopsy-confirmed melanoma in 2015, 2016, and 2017, respectively.

The American Academy of Dermatology guidelines do not specify what type of individuals should receive physician skin examinations (PSE) or how often individuals should receive screening.12 This confusion involving how screening should be implemented needs to be addressed. Many skin cancer deaths are caused by malignant melanoma (MM), where most deaths are related to a patient’s delay in diagnosing the disease. Currently, skin cancer has the highest incidence among cancers and the rate of MM incidence has increased more than any other cancer except lung cancer.7 Fortunately, if MM is detected early, there is a high chance of cure.10

Emerging evidence suggests that skin cancer screening can be effective at early detection of skin cancer. In Germany, a year-long statewide program called SCREEN led to a 50% reduction in mortality through the detection of skin cancer.3 A comprehensive review by the Journal of American Academy of Dermatology evaluated several screening programs both in the US and abroad. In the study, most screening programs led to a reduction of incidence in thick melanoma and a higher incidence of thinner melanomas, reducing mortality due to skin cancer.7

In our study, we developed a screening program of high-risk individuals present on a sunny day at a beach in 2015, 2016, and 2017. A skin cancer screening program poses several advantages and disadvantages. The main benefit and primary goal of a screening program is the early detection of MM. In addition to detecting MM early, the initial screening program requires a simple, inexpensive, noninvasive visual inspection. One potential downfall of the program, however, is increase in unnecessary public health and patient costs and resources if the biopsies result in false positives. Therefore, the goal of the study is to determine whether the positives of screening for melanoma outweigh the negatives.

The number needed to biopsy (NNB) and the number needed to treat (NNT) are statistics that can be used to weigh the benefits of a cancer screening program. Wilsonet al., which evaluated 1240 biopsies suspicious of cancer, had a NNT of 15 for melanoma.13 This value was low compared to another study conducted in Australia, which evaluated 10,612 lesions and had an NNT of 30 for melanoma.5 In contrast, our study had a NNB of 13, 20, and 47 for melanoma detection each year of the study.

Several limiting factors in our study may have contributed to potential discrepancies in our data. First, screening was done at a beach during noon. Therefore, due to the location and time, our study population had a higher risk for skin cancer. Additionally, in 2016, information about the screening program was announced via the news the night before. Therefore, the study may have selected for individuals who already had concerns for skin cancer and came to the beach specifically for free screenings. Both options may have contributed to lower NNB values. Finally, follow ups for biopsies were self-reported by patients. This may have contributed to unreported diagnoses of melanoma. Overall, more studies must be conducted on screening programs to evaluate their efficacy in terms of cancer prevention. Due to our lower NNB value, our study provides additional evidence to support the importance of regular screening to detect melanoma. The low number of melanomas and keratinocyte carcinomas detected limit any statistical analysis for significance.

The skin cancer screening program, created through a partnership between The Partnership to Reduce Cancer in Rhode Island, The Rhode Island Department of Health, Brown Dermatology, and Lifespan Community Health Institute, has positively impacted the health of Rhode Island residents through referral to dermatologists for evaluation of suspicious lesions and diagnosis of skin cancer.

**Table 1:** Characteristics of all individuals screened in 2015 and 2016

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2015** | **2016** | **2017** |
| Total screened | 433 | 516 | 511 |
| Referred by skin exam at dermatologist’s office |  |  | 32% |
| Referred for biopsy only |  |  | 12.5% |
| Age, mean (years)  <19 years  19-40 years  41-65 years  >65 years  Unidentified | 10.6%  32.6%  39.7%  12.0%  5.1% |  | 6.6%  19.1%  51.2%  23.1% |
| Gender, female | 61% |  | 52% |
| Ever in engaged in indoor tanning, yes | 37% |  | 37%  (n=187) |
| Ethnicity  Non-Hispanic White  Hispanic/Latino  African-American/Black  Asian  Mixed  Unidentified |  |  | 86.5%  5.7%  2.0%  2.0%  0%  1.0% |

**Table 2:** Characteristics of individuals referred for additional screening or biopsy in 2015 and 2016

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2015** | **2016** | **2017** |
| Age, mean (years)  <19 years  19-40 years  41-65 yearsd  >65 years  Unidentified |  |  | 3.9%  1.7%  56.1%  23.3%  0% |
| Gender, female |  |  | 53% |
| Ever in engaged in indoor tanning, yes |  |  | 47% (n=85) |
| Ethnicity  Non-Hispanic White  Hispanic/Latino  African-American/Black  Asian  Mixed  Unidentified |  |  | 87.2%  5.5%  1.7%  1.1%  0%  0.4% |
| Diagnosis  Melanoma  SCC  BCC  Other  Not known |  |  | 1/180  3/180  1/180  8/180  109/180 |

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