

Results of a Large-Scale Head and Neck Cancer Screening of an At-Risk Population

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Summary: Objective/Hypothesis. To determine whether a community-based head and neck cancer screening could be an effective method to detect positive findings of head and neck cancer in at-risk populations.

Study Design. Survey-based study with a nonexperimental intervention component.

Methods. Five hundred sixty-eight adults were screened for oral and laryngeal cancers by otolaryngologists and oral and maxillofacial surgeons during three National Association of Stock Car Auto Racing race weekend events. A pre-screening survey collected demographic information, relevant medical history, and information regarding risk factors for head and neck cancers, including current or past tobacco use, alcohol consumption, and chemical exposures. Signs and symptoms of head and neck cancer were documented during the screening.

Results. Forty-three percent of participants with a history of smoking had abnormal findings. A Pearson chi-square indicated that the proportion of males who evidenced positive findings was significantly ($P < 0.05$) higher than the proportion of females who evidenced positive findings. For every pack of cigarettes smoked per day, an individual was 1.95 times more likely to evidence abnormal findings even after controlling for alcohol use, family history of cancer, personal history of head and neck cancers, sex, age, and occupation.

Conclusions. This study is the first to document the results of a large-scale head and neck cancer screening of a population of people known to be at risk of head and neck cancers. The study demonstrates the feasibility of developing and implementing large-scale community-based head and neck cancer screenings, as are often seen in the early diagnosis and education of signs, symptoms, and risks for other cancers.

Key Words: Head and neck cancers—Community-based screening—Tobacco cessation.

INTRODUCTION

Head and neck cancers are among the 15 most common cancers according to the National Cancer Institute Cancer Trends Progress Report, 2008 Update,¹ accounting for 2.8% of all new cancers each year. In 2008, 35 310 new cases of oral and pharyngeal cancers and 12 250 new cases of laryngeal cancer were reported. These numbers represent an increase of 13.9% ($n = 30\,990$) and 28.8% ($n = 9510$), respectively, from 2006. The estimated number of deaths from oral-pharyngeal ($n = 7590$) and laryngeal cancers ($n = 3670$), however, stayed relatively constant from 2006 to 2008.^{1,2}

Head and neck cancers are responsible for \$3.2 billion dollars in health care expenditures and approximately 4.4% of all cancer treatment expenditures. Yet, in several large surveys of adults in two distinct regions of the United States, more than 15% of the respondents had never heard of head and neck cancers, and 40% knew very little about it. The most disturbing finding was that only 19% of the respondents reported having had an oral examination within the last 12 months.^{3,4}

Although there is a lack of knowledge in the general public of the risks of head and neck cancers, there is an even more alarming lack of information regarding these cancers in health care

professionals. Four hundred forty-eight nurse practitioners in the state of Florida, an area with one of the highest oral cancer rates in the country, were surveyed regarding their knowledge of oral cancer and their use of oral cancer screenings for their patients. Only 30% of the nurse practitioner respondents thought their knowledge about oral cancer was current, and less than 30% of respondents reported that oral cancer examinations were completed in their clinical practices.⁵

To increase awareness and knowledge of head and neck cancers, the Head and Neck Cancer Alliance (HCNA), formerly the Yul Brynner Head and Neck Cancer Foundation, has sponsored Oral Head and Neck Cancer Awareness Week (OHANCAW) in April each year since 1998. During this week, the organization encourages an international effort by health care workers to offer free head and neck cancer screenings. A large media campaign highlights the week by promoting education of early warning signs of head and neck cancers and by warning about the dangers of tobacco and alcohol. In 2009, the HCNA reported screening of 2800 people in 62 sites around the United States and internationally.⁶ Despite this success, a recent study indicated that none of the participants screened in a large office-based head and neck cancer screening during OHANCAW expressed any knowledge of the Yul Brynner Foundation or the OHANCAW.⁷

Screenings

Community-based screenings are often used for large-scale outreach to encourage early detection of other medical conditions and cancers (eg, colon-rectal cancer screenings, diabetes screenings, and blood pressure screenings). In community-based screenings, individuals must take the initiative to participate in the screening and then to follow-up with their

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physicians after the screening, if necessary. Although there are several reports of large-scale community-based oral cancer screenings in Japan⁸ and Malaysia,⁹ there are no reports of community-based screenings for oral or laryngeal cancer in the United States.

A study in India examined the effectiveness of screenings in reducing mortality from oral, head, and neck cancers.¹⁰ In the study, 29 102 people were screened once per year for 3 years. There were 5145 cases with positive findings in the oral-visual screenings; 63% of those with positive findings complied with recommendations for pursuing further medical follow-up. Their findings indicated that oral cancer visual screenings reduced mortality in high-risk tobacco and alcohol users. They suggested that oral cancer screenings could prevent up to 37 000 deaths per year in India and should be a part of routine medical care. A limitation of the study is that no data were collected concerning whether individuals who received a positive finding followed up with a physician.

Further in the literature, there is only one report of a large office-based screening for oral and laryngeal cancers that occurred in the United States.¹¹ In this office-based screening, 4911 people were assessed for oral and laryngeal cancers. Although diagnosis of cancer was rare in the screening (less than 3%), more than 70% of the participants were sent for further work-up because of abnormal findings. A limitation of the study was that the actual rate of follow-up was not reported, and a description of what constituted abnormal findings was not reported.

Little is known about the effectiveness of screening for head and neck cancers in a community-based environment. There are no studies documenting the effectiveness of head and neck cancers screenings in reducing morbidity and mortality in the United States. However, studies confirm that survival rates of head and neck cancers are closely related to the extent of cancer progression and the stage of cancer at diagnosis. The multistep carcinogenesis model states that there is molecular progression of head and neck cancers from early stages of hyperkeratosis to dysplasia, to cancer *in situ*, and finally progressing to invasive carcinoma.¹² Early detection of hyperkeratotic lesions may prevent the progression of the cells to invasive carcinoma. Given that early detection greatly increases survival rates, it is surprising that the National Guidelines Clearinghouse (NCG), a web-based resource for physicians to remain up-to-date on guidelines for screening, evaluating, and treating many health conditions, provides no U.S. initiative for screening of head and neck cancers: "The U.S. Preventive Services Task Force concludes that the evidence is insufficient to recommend for or against routinely screening adults for oral cancer." Instead, the NCG provides guidelines from the Scottish Intercollegiate Guidelines Network for the diagnosis and treatment of laryngeal cancer, a socialized medicine health care system quite different from that of the U.S. third-party payer system.^{13,14}

There have been dramatic improvements in surgical techniques and medical therapies to treat head and neck cancers; yet, survival rates for head and neck cancers have not improved in the last 30 years.¹⁵ Health care disparities in treatment seeking, insurance coverage, and time of diagnosis in lower

socioeconomic groups are believed to be the cause of stagnant survival rates.¹⁶

Community-based screenings provide the opportunity for large-scale access to health care and health care education outside the hospital system, for their ability to reach large numbers of people and for their educational impact. The importance of education is unmistakable and may be a method to improve early detection. Studies have found that high-risk populations often lack information concerning the signs, symptoms, and causes of oral cancer, and that high-risk individuals are often not willing to participate in screenings.^{17,18} Therefore, free community-based screenings designed specifically for high-risk populations may be a more effective method of targeting people at risk of head and neck cancers.

The demographics of National Association of Stock Car Auto Racing (NASCAR) fans indicate that they are at high risk of head and neck cancers with the increased incidence of smoking or smokeless tobacco use. Market research indicates that NASCAR fans smoke at a rate 28% higher than the general public.¹⁹

The overall purpose of this study was to determine whether a community-based head and neck cancer screening could be an effective method to detect positive findings in an at-risk population. Associated with this purpose were two aims: (1) examine the demographics and incidence rates of a population at risk of head and neck cancers; and (2) determine the factors that predict a positive screening in this population.

MATERIALS AND METHODS

Study design

Emory University Institutional Review Board approval was obtained. This study was survey based with a nonexperimental intervention component. Haphazard sampling was used to recruit the study sample from a community sample identified as at risk of developing head and neck cancers.

Participants

Five hundred sixty-eight male and female participants, aged 18–73 years, were screened for oral and laryngeal cancers during three NASCAR race weekend events at Atlanta Motor Speedway (Hampton, GA). Forty-one percent of the participants were females and 59% were males. The average age was 44 years, with an age range of 18–73 years.

Instruments

Participants were given an initial survey to complete before being screened. The survey collected demographic information; relevant medical history information concerning the participant and their family; and information regarding risk factors of head and neck cancers, including current or past tobacco use, alcohol consumption, and chemical exposures.

Screenings were completed by 45 otolaryngologists or oral and maxillofacial surgeons during a 15-minute examination of the oral cavity, including buccal mucosa, tongue, and gums; aural canal; nasal cavity; and pharyngeal and laryngeal cavities using indirect laryngoscopy with a laryngeal mirror.

The examination findings were documented by the health care professional carrying out the cancer screening. The screening procedures were a preliminary procedure to detect the most characteristic signs or symptoms of head and neck cancers that may require further investigation.²⁰ The signs and symptoms defined as abnormal and requiring further investigation included a lump or sore that has not healed in the head and neck; a chronic sore throat; odynophagia; dysphagia; dysphonia; white or red patches on the gums, tongue, or lining of the mouth; a swelling of the jaw; bleeding in the mouth; bleeding through the nose; pain in the upper teeth or problems with dentures; swelling under the chin or around the jaw or pain that does not go away in the face, chin, or neck; and unexplained ear pain.²¹

Environment

The screenings were held in the vendor area of Atlanta Motor Speedway (AMS). AMS is the largest spectator facility in the state of Georgia. It is an 870-acre facility, 20 miles south of Atlanta. Outside the track was an area known as the vendors' area, where NASCAR corporate sponsors advertised and distributed samples of their products in large interactive exhibits. Approximately 200 000 people navigate the vendors' area during each NASCAR race event weekend. The screening tent was strategically located in the vendors' area for maximum exposure.

The screening tent was approximately 15 feet wide by 45 feet long and was subdivided into six private screening rooms. This allowed for a confidential atmosphere to conduct the oral, head, and neck cancer screenings. Outside the screening rooms was a check-in desk, approximately 15–20 chairs for people to use to complete the screening survey, and a private area to consent to the research.

Analysis

Pearson chi-square analyses were used in the presence of frequency data; where appropriate, independent-sample *t* tests were used to test for significant differences among groups. Finally, logistic regression analyses were used to determine which factor(s) were significant predictors of positive findings.

RESULTS

Forty-three percent of the screened participants were daily alcohol users, and 54% had a history of smoking tobacco. Twenty-eight percent of the sample members were current tobacco smokers, and 13% used smokeless tobacco. Results of the screenings indicated that 43% of the participants with a history of smoking had abnormal findings and were instructed to contact their physician for follow-up.

A Pearson chi-square indicated that the proportion of males who evidenced positive findings was significantly ($P < 0.05$) higher than the proportion of females who evidenced positive findings. Independent-sample *t* tests indicated that those individuals who evidenced abnormal findings were significantly older ($M = 47.44$, standard deviation [SD] = 12.18, $t(457) = -2.21$, $P = 0.08$) and smoked significantly more packs of cigarettes per day ($M = 0.96$, SD = 0.80, $t(412) = -4.70$, $P < 0.001$) than those participants who did not evidence

abnormal findings ($M = 43.97$, SD = 13.26 and $M = 0.54$, SD = 0.69, respectively).

Logistic regression analyses indicated the only significant predictor ($P < 0.05$) of the presence of abnormal findings was tobacco use. Specifically, for every pack of cigarettes smoked per day, an individual was 1.95 times more likely to evidence abnormal findings even after controlling for alcohol use, family history of cancer, personal history of head and neck cancers, sex, age, and occupation.

DISCUSSION

Gourin et al⁷ noted that most of the individuals who participate in hospital-based screenings are not representative of the high-risk populations and, therefore, do not add to the body of literature to support early detection through head and neck cancer screenings. Studies in the literature document the lack of knowledge regarding head and neck cancers in both the lay public and in the health care system. The literature continues to support disparities in diagnosis, morbidity, and mortality of head and neck cancers, all believed to be because of lower socioeconomic status with lack of insurance, increased incidence of at-risk behaviors, and later diagnosis leading to less optimal outcomes.

This study is the first to document the results of a large-scale community-based head and neck cancer screening of a population of people known to be at risk of head and neck cancers. The study demonstrates the feasibility of developing and implementing large-scale community-based head and neck cancer screenings, as are often used in the early detection of other cancers and to educate the public regarding signs, symptoms, and risk of cancer. Furthermore, results from this study suggest that community-based head and neck cancer screenings may be an effective intervention for delivering health care services to disparate populations. John Niederhuber, MD, Director of the National Cancer Institute writes:

*While we have made progress in reducing the burden of cancer in this country, we must accelerate our efforts, including making a special effort to reach underserved cancer patients in the communities where they live.*²²

To date, there are no known studies documenting the effectiveness of head and neck cancer screenings to reduce morbidity and mortality in the United States. There is evidence, however, that individuals who initiate participation in community-based screenings and follow-up with their physicians based on screening results, have improved health outcomes.²³ In a study of follow-up behavior after community-based diabetes screenings, a very high percentage of participants who were found to have high glucose levels during a community-based screening followed up with their physicians for further diabetes testing.²⁴

CONCLUSION

Results from this study indicate that a large-scale community-based head and neck cancer screening can effectively be implemented in nonmedical venues. This information is important for

