Athletic Trainers' Knowledge and Perceptions of Testicular Cancer and Testicular Cancer Prevention Practices

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ATHLETIC TRAINERS' KNOWLEDGE AND PERCEPTIONS OF TESTICULAR CANCER AND TESTICULAR CANCER PREVENTION PRACTICES

by

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ABSTRACT

Context: Collegiate male athletes have a higher risk of testicular cancer due to their age group, an increased risk of testicular contusions, and a lack of secondary prevention education. As the athletic training profession increases emphasis on evidence-based practice, it is important for athletic trainers to understand testicular cancer and testicular-self examination as it is outlined within their scope of practice. A general understanding of testicular cancer and the prevention techniques will be important for athletic trainers to promote awareness and health behavior practices. Objective: To examine the athletic trainers' actual knowledge, concern, perceived responsibility, training, feeling of embarrassment, and professional/personal practices. Design: Cross sectional survey. Participants: 249 randomly selected athletic trainers employed in collegiate settings. 65.6% of the respondents reported being between the ages of 21 and 35 years old. Intervention: Actual knowledge, concerned, perceived responsibility, trained, embarrassed, and personal and professional practice behavior scores served as dependent variables. Main Outcome Measures: A Pearson correlation coefficient was calculated between participants' actual knowledge, perceived responsibility, and concerned scores. Two one-way MANOVAs were conducted to determine if there was a difference in actual knowledge, perceived responsibility, and concerned scores that was dependent upon participants' age and gender. Results: Athletic trainers in collegiate settings had a fairly high actual knowledge of testicular cancer ($\overline{X}$=7.62±1.42 out of 10). Athletic trainers reported that they should be concerned about testicular cancer in male athletes ($\overline{X}$=7.26±.167 out of 10). Athletic trainers had a low feeling of

responsibility suggested by their reported score ($\overline{X}$=3.93±0.18 out of 10). A weak correlation (r(169)=.199, *P*<.009) was found between the actual knowledge and perceived responsibility scores, and between the actual knowledge and concerned scores (r(169)=.285, *P*<.001). A medium to strong correlation (r(169)=.486, *P*<.001) was found between the concerned and perceived responsibility scores. Athletic trainers reported a decreased feeling of training about testicular cancer and testicular self-examination ($\overline{X}$=2.28±2.10 out of 10). Also, athletic trainers reported ($\overline{X}$=2.71±2.42 out of 10) that they were not embarrassed to discuss testicular cancer. Athletic trainers reported performing either a testicular self-exam or breast-self examination on themselves ($\overline{X}$=76%). Conclusions: College athletic trainers have a low feeling of embarrassment, adequate knowledge, and a high feeling of concern regarding testicular cancer, but report a low feeling of perceived responsibility and training. Key Words: Testicular Cancer, Testicular Self-Exam, Athletic Training, Knowledge, Concern, Responsibility, Trained, Embarrassed, Personal Practices

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INTRODUCTION

According to the American Cancer Society, 7,920 new cases of testicular cancer (TC) will be diagnosed in 2013, and 370 of those people will die from TC.[1] TC treatment is extremely successful if diagnosed before the overgrowth of cancer cells beyond the testicular tissue. Literature reports that 5-year survival rates exceed 95% and suggest that a delay in diagnosis is connected to higher metastatic spread, and consequently higher rates of morbidity and mortality.[2] When a diagnosis is delayed, experts report that common reasons are lack of education, failure to practice testicular self-examination (TSE) monthly, and embarrassment due to male masculinity. Lantz et al. proposed that men have an increased feeling of masculinity and independence which causes them to withhold from seeking help because they feel embarrassed.[3]

Nearly half of all TC cases occur in men who are between the ages 18-34 years old.[1,3] While all ethnic populations are vulnerable to TC, white men are five times more likely to be diagnosed with TC than African American men and more than three times more likely than Asian American and American Indian men. An undescended testicle, also called cryptorchidism, is the primary risk factor linked to TC. Additional risk factors include: contusions caused by athletic competition; Klinefelter's syndrome; and men who have previously had TC or who have had family members with TC.[1,4]

Collegiate male athletes have a higher risk of TC due to their age group, an increased risk of testicular contusions, and a lack of secondary prevention education.

Health belief models suggest that nurses are the primary health care provider for men regarding information/education about TC. While nurses are excellent and qualified health care professionals, certified athletic trainers (ATs) are the primary healthcare provider for collegiate athletes. ATs are uniquely positioned to provide education in the athletic setting by communicating with the athletes during practice, treatments, and while traveling to competitions. They create a bond with the patient that is stronger than any other health care provider. Research suggests ATs are positioned to play a key role in prevention and intervention through education about TC.[5,6]

ATs can help educate male athletes about primary and secondary prevention practices for TC. Primary prevention is defined as a series of activities directed to improve general well-being, while also including specific protection against TC.[1] Primary prevention practices for TC include using protective equipment to defend the athlete from testicular contusions and ensuring that cryptorchidism was resolved at an early age. Secondary prevention practices focus on early TC diagnosis and impeding the development of TC. The use of the TSE has been recommended as a secondary prevention practice.[1] Monthly TSE can lead to early detection of TC, thus decreasing the opportunity for TC to metastasize to other organ systems and cause death.[5,6]

TSE is not just a tool to detect early stages of TC, but should be used to increase bodily self-awareness and to raise informed decision-making (IDM) among men. By increasing IDM among men and making them further self-aware of their bodies they may in turn feel more comfortable discussing men's health issues with others.[8] With increased athlete education about primary and secondary prevention, along with IDM,

the morbidity and mortality rate from TC among collegiate athletes may decrease significantly.[8]

PURPOSE

This study purpose was to investigate the opinions, actual knowledge, and athlete education practices regarding TC and TSE among ATs in the collegiate setting. Sub-objectives were to understand how the above factors may be influenced by an athletic trainers' gender and age. The study conclusions will be used to educate ATs and athletes about current and best practice models that ATs can use for TC education.

LITERATURE REVIEW

CANCER

The body contains trillions of living cells that grow, divide, and die during the span of a lifetime. During our youth, normal cells divide and reproduce quickly to allow an increase in growth. As we age to adulthood, cells divide primarily to replace damaged or dead cells. Cancer can be defined as cells within a part of the body that reproduce rapidly and out of control. Deoxyribonucleic acid (DNA) is included in every cell, and provides the direction for cell function. Cancer affects the cell by manipulating the DNA. This reprogramming causes the cell to keep producing new cells that the body may require at the time. The newly formed cancer cells have the same DNA that causes rapid unwanted cell production. While traditionally the damaged DNA cell would die and be replaced by another cell, the cancer cell does not die; it continues to reproduce. Damaged DNA that causes cancer can be inherited, but more often, cancer is caused by environmental exposure. Cigarette smoking is an example of exposure to an environmental hazard that causes cancer.[1]

Cancer cells begin to travel throughout the body by entering the lymphatic system or bloodstream. This is defined as metastasis.[1] As cancer cells travel to other locations of the body, they imbed themselves and begin to reproduce, form new tumors, and replace healthy tissue. No matter where the cancer cells travel and develop tumors, the type of cancer is always named after the original location where the cancer cells formed. Not all tumors that are formed are cancerous; these non-cancer tumors are defined as benign tumors. Though non-cancerous, they still pose a threat to the

patient because they grow very large in size and compress surrounding healthy organs and tissues.[1]

Testicular Cancer

If TC is found in the initial early stages of development it is one of the most curable cancers.[1-3,5,6,9-11] TC can develop in one or both of the testicles. The testicles are a part of the reproduction system and contain several types of cells, which may also develop into one or multiple types of cancer. Testicular neoplasms, and abnormal tissue tumors, are divided into two broad diagnosis categories. One category, non-germ tumors (non-GCT), account for 10% of TC. The second classification is germ cell tumors (GCT) that accounts for 90% of TC. Seminomas and non-seminomas are the most prevalent types of GCT.[1,9]

Seminomas

Developed from sperm-producing cells, the two types of seminomas are classic seminomas and spermatocytic seminomas. Classical seminomas are present mostly in males between the ages of 25 to 45 years old. Spermatocytic seminomas are extremely rare due to the slow growth and less tendency to spread to other parts of the body. Studies have shown the average age of spermatocytic seminoma is 65 years old. The diagnosis of a seminoma is performed by analyzing a blood test for an increase of a protein called human chorionic gonadotropin (HCG). HCG has been considered a tumor marker protein for particular types of cancer, and is relied on as a diagnostic tool that suggests further investigation is needed.[1]

Non-seminomas

The majority of tumors in males in their late teens and early thirties present with a combination of two of the four different types of non-seminomas. Each of the four types is considered to be equally dangerous, and thus receive the same type of aggressive treatment. Embryonal carcinomas present about 40% of the time. These tumors grow and spread throughout the body in a rapid uncontrollable manner. Yolk sac carcinomas, most commonly found in children, take their name after their yolk sac shape that resembles an early human embryo. Yolk sac tumors present problems in adults if they are found to be “pure”, which is defined as not being combined with any other non-seminomas. The third type is a choriocarcinoma; an extremely rare and aggressive strand of cancer. They traditionally pair with other non-seminomas and spread rapidly to distant organs of the body, including the brain, lungs, and bone. Teratomas are the last type and have three variations of germ cell formation. The first is a mature teratoma, which typically are benign and can be cured with surgery. Immature teratomas are poorly developed cancers that grow quickly and metastasize outside the testicle. The third type, teratoma with malignant transformation, is incredibly rare. These types of cancers develop outside of the testicle into muscle tissue, glands of the lungs or intestines, or the brain.[1]

Carcinoma in situ

Carcinoma in situ (CIS) is a non-invasive form of GCT. This type of cancer can develop into an invasive form of germ cell cancer within about five years of forming. When the CIS becomes invasive, the cancer will travel through the lymph nodes or the

blood to other parts of the body. The difficulty with CIS lies in the diagnosis because CIS typically cause no noticeable signs or symptoms. CIS must be diagnosed by having a testicular biopsy. Once confirmed, the recommended course is observation, as many experts disagree on the best treatment. If there is no delay in diagnosis and no metastases, the tumor can be removed. Once the GCT has spread throughout the body the removal of the tumors becomes difficult due to the multiple locations.[1]

Secondary Testicular Tumors

Secondary testicular tumors start in another location then spread to the testicle. The most common secondary testicular tumor is lymphoma. Testicular lymphoma are primarily seen in men older than 50 and the prognosis is dependent on the stage of lymphoma. Leukemia, most often seen in adolescents, can also potentially form as a tumor in the testicle.[1]

Risk Factors for TC

Undescended Testicle

An undescended testicle, also called cryptorchidism, is the primary risk factor linked to TC. Cryptorchidism is diagnosed when one or both testicles fail to descend through the abdomen wall and into the scrotum before birth. Testicles fail to descend completely down to the scrotum before birth in about 3% of children. This testicle may remain within the abdomen, or may descend within the first year of life. If the testicle fails to descend within the first year, surgical intervention is required. An orchiopexy is

preferred to bring the testicle down to the scrotum. This is linked to TC because undescended testicles have been reported in 3 out of every 4 TC cases.[1,4,5,6,11,12,13]

Personal and Family History

Men who have previously had TC, or who have had family members with TC, have elevated risk.[1,4] If a previous family member was diagnosed with TC, it may increase the chances of inheriting the GCT cells. While most men do not have family history of the disease, 3% of TC cases are found to occur within families.[1,3,4]

Congenital Abnormalities/Klinefelter's Sydrome

Abnormal development of the testicular system has been linked to an increase risk of testicular cancer. Klinefelter's syndrome has been theorized to be a precursor for TC. This syndrome causes the body to have an extra X chromosome that increases the risk of developing TC.[4]

Signs and Symptoms of Testicular Cancer

Patients with TC typically present with a lump on the testicle or report that one testicle is swollen and larger. This lump can be found by the physician or through routine TSE. While this lump can cause pain, typically patients report that it is painless. Men also complain of feeling a heaviness or dull ache toward the lower portion of the abdomen and scrotum. A sudden buildup of fluid has also been linked to TC.[3,4,9] If the cancer has reached the lymph nodes in the abdomen, the patient may complain of low back pain. Shortness of breath, chest pain, or consistent cough is a sign that the

cancer cells have reached the lungs. In atypical cases, if the TC reaches the brain the patient may complain of headaches. Only one in four men will present with any of the multiple symptoms, even if the cancer has metastasized to other organs. [1,5,6,9] Since the majority of men do not display significant or multiple symptoms, the practice of monthly TSE is vital to insure early detection and diagnosis.

Diagnosis of TC

Marty & McDermott report that most TC have an outstanding prognosis when diagnosed and treated in the early stages.[10] However the longer the period before diagnosis, the more advanced the disease becomes, and effective treatment becomes problematic.[10,11] When a diagnosis is delayed, experts report that common reasons were lack of education, lack of signs or symptoms, failure to practice TSE monthly, and embarrassment due to male masculinity.[2,3,5,7,11]

The primary diagnostic tool is blood testing for tumor marker proteins. Most TCs secrete above average amounts of specific tumor marking proteins into the blood. A test tumor is likely when proteins such as alpha-fetoprotein (AFP) and human chorionic gonadotropin (HCG) are found. While an enzyme called lactate dehydrogenase (LDH) is also secreted in high amounts, it can increase with conditions other than cancer. Seminomas will often raise HCG levels but not the AFP into the blood. Non-seminomas may raise the AFP and/or HCG, suggesting that when the AFP is present the tumor has a non-seminomas component. If the tumor is small in size, it may not secrete high

levels of these proteins at all. If these proteins are not elevated, the tumor will likely not be diagnosed.[1]

The computed tomography (CT) scan is used to produce detailed cross-sectional images that help diagnose TC. CTs are primarily used to determine the stage of the cancer. CTs also determine if the cancer has spread to the lungs, lymph nodes, liver, or other organs. The patient may be required to receive an intravenous (IV) injection of a contrast dye that helps outline abnormal locations of tumors in the body.[1]

Magnetic resonance imaging (MRI) scans are used to aid in the diagnosis of soft tissue abnormalities. Just like a CT, a contrast dye may be used to recognize abnormalities. MRI scans are utilized particularly for examining the brain and spinal cord for GCT.[1]

Treatment of TC

The medical and research community have made substantial advances in the treatment of TC. Currently, the three treatment options are surgery, radiation therapy, and chemotherapy. These three options all offer different approaches, and must be considered in accordance with the stage of disease. Doctors have a better understanding of the surgical methods that create the best outcome for the patient. Chemotherapy and radiation treatments have become refined and distinguished to treat various types of TC.[1,9,14]

Radical Inguinal Orchiectomy

This surgical method is the removal of the testicle that contains the cancer. The physician is careful to remove the cancer within the testicle; not allowing the cancer cells to dislodge and reach the blood stream. This is the initial recommended treatment for all stages of TC.[1]

Retroperitoneal Lymph Node Dissection

This surgery is dependent on the type and stage of the cancer. The removal of lymph nodes is an extremely dangerous procedure due to their location and the duration of surgery. The surgery is technically difficult because caution must be taken by the surgeon to not disrupt the peritoneal, Gerota's fascia, or the fibrous strands in the abdominal wall during the nodal dissection. Depending on the surgery method selected, the average length of surgery is 5.25 hours. This surgery should be considered carefully by each patient and physician due to the technical difficulty and time associated with the dissection.[1,14]

Radiation Therapy

An alternative to a retroperitoneal lymph dissection is the use of high-energy rays to destroy the cancer cells or slow down the reproduction rate. Radiation is effective to treat seminoma types of cancers. It has also been shown to be effective following an orchiectomy when directed towards the lymph nodes within the abdomen. When directed toward the abdomen, radiation may kill smaller amounts of cancer within the lymph nodes that may or may not be able to be recorded through CT scans.[1]

Chemotherapy

Chemotherapy for TC is a systemic therapy method that requires the injection of a medication into a vein. Systemic therapy can be defined as the use of medication entering the bloodstream and circulating the body to reach and destroy cancer cells. This particular type of therapy proves useful to destroy lingering cancer cells that may have broken off from the primary tumor. Chemotherapy is primarily used to treat cancer that has metastasized outside the affected testicle(s) or to decrease any risk of cancer returning once a radical inguinal orchiectomy has been performed. Chemotherapy is not the recommended treatment for TC if the tumor location is localized within the testicle.[1,10]

Prevention of TC

Many risk factors for TC are unavoidable. Risk factors such as cryptorchidism, congenital abnormalities, and a family history of the disease make prevention difficult. One primary prevention technique that is recommended to decrease the risk of TC is treating an undescended testicle before puberty through a surgical procedure known as an orchiopexy.[9] Athletes are also recommended to prevent testicular contusions by wearing properly fitting protective equipment when engaging in contact sports.[5,6] The U.S. Preventative Services Task Force's feels there is inadequate evidence to support the use of TSE screenings as a secondary prevention strategy for TC. However, research regarding the effectiveness and validity of TSE screening has yet to be concluded. TSE is not just a tool to detect early stages of TC, but should be used to increase body awareness and to IDM among men. By increasing body self awareness

and IDM men may in turn feel more comfortable discussing men's health issues with others.[8]

Medical History

Another secondary prevention technique is the use of medical history questionnaires and pre-participation examinations. Zientek and Dewald reported that 67.4% of athletic trainers are not asking male athletes questions about TC on their medical history forms or incorporating it into a pre-participation exam.[5,6] The use of a complete medical history questionnaire including family history of TC, personal history of TC, and associated risk factors of TC may help identify men who are most at risk.

Testicular Examination

According to Barling and Lehmann, 83% of their participants did not perform the recommended monthly TSE exam.[15] Best et al. documented that less than 15% of their participants knew about TSE, and only 3% report monthly practice.[16] Health care professionals are encouraged to perform testicular screenings frequently to aid in an early diagnosis since most patients are not utilizing TSE.[11,17] In addition, the American Cancer Society suggests that men incorporate a TSE monthly.

The optimal time for a TSE to take place is following a bath or shower; this allows the skin of the scrotum to be relaxed. The patient should examine each testicle separately looking for any sign of abnormality. The patient should hold the testicle between the thumbs and fingers of hands, allowing the testicle to glide between the

fingers. The patient should be observant for any hard lumps or nodules. A change in size, consistency, or shape should be noted and taken into consideration when reporting findings to a physician.[1,10,13]

Masculinity as Determinant Factor Affecting Illness-Reporting Behaviors

The ultimate goal of ATs must include tools to empower athletes to assume responsibility for personal health behaviors. This is difficult at times, especially with athletes because they have a high level of masculinity that can influence the likelihood to under report symptoms. The sex role/illness behavior hypothesis, explained by Lantz et al., proposes that males under report their symptoms.[3] This hypothesis suggests that among individuals who have identified a problem, women are more likely than men to report illness behavior, perceive and document symptoms, receive health-care benefits, experience soreness and disability, and practice preventive health behaviors. Research suggests that males view the need for help as a sign of weakness.[3,10,18] This perceived weakness can correlate to a delayed diagnosis. Research also shows that males fail to seek treatment for an average of three months after recognizing significant symptoms.[3,10] This may be due to embarrassment, fear of cancer, fear of death, and/or procrastination.[3,10,11,13,18] Males take a passive role in the pursuit of health care information and rely on friends, family, or web online access for health information.[3,19]

Athletes, particularly those who are 18-35 years old, feel the need to live up to the masculinity stereotype often seen in athletics. They remain reluctant to seek care due to embarrassment about looking foolish, castration fears, possibility of cancer, and

having the genitals handled and examined by a health care professional. The concern of castration is listed as primary reason men have delayed seeking care. Athletes may have increased fear of castration because they shower and change in open locker rooms; they perceive a high probability that they would be identified as different.[11,18,19]

Effective TC Education Practices

While many athletes may not specifically understand TC and TC prevention they are optimistic and eager to learn.[7] Educating an athlete can be accomplished in multiple ways. Interventions to promote TSE include visual diagrams used to help reinforce techniques and national TC awareness campaigns. Marty & McDermott supported the use of pamphlets as the simplest, most cost-effective, and time-efficient strategy to educate men.[10] The American Cancer Society also supports educational pamphlets and publishes fact sheets that explore TSE in an effort to promote the practice.[1] Providing handouts that athletes can pick up and read at their own leisure is an excellent way to promote secondary prevention education.

Men who do not wish discuss these issues face-to-face or do not have access to educational handouts can seek a personal tailored message. These personalized messages can be sent via text message or email to a cell phone, computer, or tablet by TC advocates who promote men's health.[7,19] There are abundant opportunities to educate young athlete about TC and TSE, and should be encouraged with every opportunity. Cronholm et al. suggested promotion through media exposure. Live sporting events and television may be used to reach adolescent male populations.[2]

Rovito et al. also concluded in his research that the knowledge of TC among men has improved within recent years partly due to increased media exposure.[7]

Health Belief Models

A majority of young men are unaware of TC. The lack of TC awareness and training on how to perform a TSE has resulted in 82.8% of the male population not practicing TSE.[5,6] Frameworks known as health belief models (HBM) were developed in the 1950s by the U.S. Public Health Services in an effort to increase education and understand why people fail to adopt primary and secondary preventative health care techniques. The HBM focuses on increasing patient education and is helpful for changing health behaviors.[13] The HBM is composed of the following components: perceived seriousness of the condition, perceived susceptibility to the condition, perceived success rate of treatment, and perceived barriers to treatment. The perceived seriousness is the individual's belief about the severity of a disease. For example, the flu would not seem severe to an otherwise healthy athlete, but the flu may be life-threatening for an eighty year old patient. Therefore the elderly patient is more likely to engage in preventive behaviors and seek treatment for the flu. Also, if the patient understands that their risk of contracting a condition is higher, they are more likely to do something to prevent it from happening. People must also feel that there is a benefit from practicing a new health behavior. They must perceive that if they adopt a healthy behavior practice then it will decrease the risk of developing the condition. People will often only adopt new health behaviors if they foresee a positive outcome because of it. Lastly is perceived barriers, this is the patient's evaluation of what

obstacles must be overcome in order to adopt a new health behavior. This requires a person to break old behavior habits and believe that the benefits of the new health behavior will outweigh the sacrifices they must make.[20]

Rosella proposed a HBM for TC that focused on nurses as primary advocates of TC and TSE. The HBM proposed focused on an increase in TC education and TSE practices. In order for this HBM to be successful, there must be an increase in the four criteria for HBMs. First, the patient needs to feel that obtaining TC would be severe and life threatening. Second, the patient must perceive that they are susceptible to TC. Third, the patient must believe that increasing the practice of TSE will result in early detection. Fourth, the patient must decide that the obstacle they must overcome is worth it. If those conditions are satisfied, he is more likely to practice healthy behavior practices such as TSE.[13]

The Role of the Athletic Trainer

The National Athletic Trainers' Association (NATA) describes athletic training as an allied health profession dedicated to the prevention of disease and physical trauma. ATs collaborate with other health care professionals to provide injury prevention, illness prevention, and wellness protection to athletes. Athletes rely on ATs for information and treatment of a variety of injuries and illnesses, including those that are general medical in nature. In fact, the Commission on Accreditation of Athletic Training Education (CAATE) requires ATs to be competent and proficient in "Prevention and Health Promotion" (PHP). Under the PHP principles, PHP-2 calls for ATs to "identify

modifiable/non-modifiable risk factors and mechanisms for injury and illness". PHP-3 content area states ATs should be able to "identify modifiable/non-modifiable risk factors and mechanisms for injury and illness".[21] Additionally, PHP-5 states that the AT is required to "explain the precautions and risk factors that are associated with physical activity in persons with common congenital and acquired abnormalities, disabilities, and diseases".[21]

Deward & Zientek discovered that 91% of certified athletic trainers did not teach male athletes about TC/TSE. Further, they questioned the reasons why ATs were choosing to neglect TC education. Within the same study, 28% of ATs reported a history of working with an athlete who has TC, but only 8% of those ATs were teaching TSE procedures.[5,6,17] Deward & Zientek concluded that even though ATs were knowledgeable of preventative techniques they rated TC to be "of little concern". They also proposed that educating ATs should be established and implemented to prevent future ATs from having a decreased outlook on TC.[6]

Literature suggests that ATs may feel that TC is of little concern, and that it is not their responsibility to provide TC information.[6,17] Dewald reported that 51.7% of ATs are not concerned about TC. In an open survey, 91% percent of ATs failed to list one of the multiple risk factors for TC.[5,6] ATs reported feeling that information on cancer is typically received at a hospital or local clinic venue with an informational speech coming from a primary care physician in a white coat. The thought of having athletic trainers as the primary source of information may not be apparent to practicing ATs. Other ATs

may feel they are not obligated or even is out of their scope of practice to provide prevention techniques such as TSE. [5,6,17]

METHODS

SUBJECTS AND RECRUITMENT

The participants for this study were 249 randomly selected certified ATs who are currently employed in college athletic departments as categorized by the NATA membership database. The 249 participants' email addresses were obtained through the NATA student research program. Data was collected via an online collection site (Qualtrics, Provo, UT). Participants were invited to complete the study through announcements and reminders sent via email. The research proposal was evaluated by the University of Central Florida Institutional Review Board and approved as exempt from regulation. Regardless, participants were provided information regarding study procedures, risks and benefits, and their completion of the questionnaire served as their consent to participate. Participant recruitment took place during the spring of 2014. Data were collected and analyzed during the spring of 2014. The inclusion criteria required the participants to be currently employed (not-retired or unemployed) within a collegiate setting. Participants had to report a sport/clinical responsibility during the last 3 years. ATs practicing in clinics, high schools, professional sports, or any setting other than the collegiate setting at the time of the questionnaire were also excluded. Athletic training educators who had not had a sport/clinical responsibility within the past 3 years were excluded from participation. Participation was contingent upon access to a reliable computer, laptop, tablet, or mobile device that could access the internet.

QUESTIONNAIRE DESIGN

The questionnaire examined TC and TSE opinions, actual knowledge, and current athlete education practices of ATs. The categories and content for question selection were modeled after the studies on ATs and TC that were performed by Dewald and Zientek.[5] The 33-question questionnaire contained a Likert section using an 11-point scale (0-10), with lower scores indicating disagreement and higher scores indicating agreement. The Likert section included paired questions assessing the following: general concern for TC in athletes; perceived level of responsibility for athlete education; relative importance of education for different age groups; perceived training to educate athletes; and embarrassment regarding the topic of TC. The questionnaire also contained 10 questions that assessed the actual TC knowledge of athletic trainers. The questionnaire included yes and no questions about TC practices that allowed the participant to choose statements of explanation using drop down selections. The participants also reported demographic information related to gender, age, race/ethnicity, region, credential, athletic division and personal or family history of TC.

QUESTIONNAIRE RELIABILITY AND VALIDITY

Scores were created for concerned (1 question), perceived responsibility (2 questions), training (2 questions) and embarrassment (2 questions). Reliability estimates were calculated for the paired Likert question scores. Cronbach's Alpha values for perceived responsibility score, training score, and embarrassed sores were .834, .854, and .867 respectively. Content validity for the actual knowledge section was established by using at least two evidence-based resources.

STATISTICAL ANALYSIS

The results were analyzed using SPSS version 21 (SPSS IBM, New York, U.S.A). Independent variables used for the analysis were age (8 levels), and gender (2 levels). Dependent variables used were actual knowledge score, perceived responsibility score, and concerned score.

Frequencies were calculated for personal and professional behaviors, gender, age, college division setting, and district affiliation. Descriptive statistics were used to calculate means and standard deviations for actual knowledge scores, concerned scores, perceived responsibility scores, trained scores, and embarrassed scores. The actual knowledge scores were calculated using the true/false responses. If responders answered the question correctly they received one point, and if they answered incorrectly they received zero points for the question. Therefore, a total score for actual knowledge was calculated using 1 point for each correct response. Pearson correlation coefficients were calculated between participants' actual knowledge score, perceived responsibility score, and concerned score. Two one-way multivariate analysis of variance tests were conducted to determine if there was a difference in actual knowledge score, perceived responsibility score, or concerned score that was dependent upon either the participant's age or gender. The initial alpha level was set at $P \leq .05$.

RESULTS

RESPONSE RATE AND PARTICIPANT DATA

Initially 1,000 email addresses were randomly selected from the NATA database of collegiate ATs. An email was sent requesting participation, and a reminder was sent out approximately 2 weeks following the initial email. There were 249 responses (n=249, 25%). Of the 249 responses, 33 were excluded because they did not have a sport/clinical responsibility within the previous 3 years. Of the 216 that remained eligible, 182 completed the Likert Scale questions. There were 175 ATs who completed the knowledge assessment, and 174 ATs (17%) completed the practice questionnaire. There were 169 participants who completed demographics as well as experience and education. Therefore, the data analysis included the 169 participants (17% of recruited participants) who completed all the questions. Results are generalized to collegiate ATs who practice within the collegiate setting.

Of the 169 participants who participated, 80 (47.3%) were male and 89 (52.7%) were female. The ages of participants were broken into categories: 20 participants (11.8%) were between 21-25 years old, 58 (34.3%) were between 26-30 years old, 33 (19.5%) were between 31-35 years old, 13 participants (7.7%) were between 36-40 years old, 15 (8.9%) were between 41-45 years old, 9 (5.3%) were between 46-50 years old, 9 (5.3%) were between 51-55, and 12 participants (7.1%) were 56 years old or older. Of the 169 responders, 146 (86.4%) affiliated themselves with Caucasian (non-Hispanic) race/culture and 23 (13.6%) affiliated themselves with one of the other options

which included; African-American (non-Hispanic), Asian/Pacific Islanders, Latino or Hispanic, and Native American. Respondents came from a range of NATA Districts including; 12 (7.1%) from District 1, 14 (8.3%) from District 2, 24 (14.2%) from District 3, 29 (17.2%) from District 4, 24 (14.2%) from District 5, 3 (1.8%) from District 6, 7 (4.1%) from District 7, 18 (10.7%) from District 8, 27 (16%) from District 9, and 11 (6.5%) from District 10.

ACTUAL KNOWLEDGE SCORE

The mean score (n=169) on the actual knowledge section was 7.62 ± 1.42 out of 10 possible points. This indicates that overall, certified athletic trainers are relatively knowledgeable about TC, risk factors, signs, and symptoms. Descriptive statics for actual knowledge scores by gender and age are reported in Table 1.

The Shapiro-Wilks Test of normality indicated non-normality (*P* = <.001), however all other indices suggested that normality was a reasonable assumption including skewness (-.649), kurtosis (.979), histogram and Q-Q plots.

CONCERNED SCORE

Overall, participants reported that they “mild” to “strongly agree” that collegiate athletic trainers in collegiate settings should be concerned about TC among the male athletes they care for. The mean concerned score was 7.26 ± .167 out of 10. Descriptive statics for concerned scores by gender and age are reported in Table 2.

The Shapiro-Wilks Test of normality indicated non-normality (*P* = <.001), however all other indices suggested that normality was a reasonable assumption including skewness (-.487), kurtosis (.018), histogram and Q-Q plots.

PERCEIVED RESPONSIBILITY SCORE

Overall, participants reported that they "somewhat disagree" to "neither agree nor disagree" that it is a collegiate athletic trainers responsibility to teach male athletes about TC and TSE techniques. The mean perceived responsibility score was 3.93 ± 0.18. Out of the 151(87%) athletic trainers who selected they do not teach their male athletes about TC, 76 participants stated they feel it is not their responsibility. Descriptive statics for perceived responsibility scores by gender and age are reported in Table 3.

The Shapiro-Wilks Test of normality indicated non-normality (*P* = <.001), however all other indices suggested that normality was a reasonable assumption including skewness (.339), kurtosis (.058), histogram and Q-Q plots.

TRAINED SCORE

Overall, participants reported that they "strongly disagree" to "somewhat disagree" that collegiate athletic trainers are trained to teach male athletes about TC and TSE techniques. The mean trained score was 2.28 ± 2.10. Descriptive statics for trained score by gender and age are reported in Table 4.

The Shapiro-Wilks Test of normality indicated non-normality (*P* = <.001). Other indices also indicated non-normality including skewness (.902), kurtosis (.236), and abnormal histogram and Q-Q plots. The trained score had high skewness and the histogram appeared to indicate non-normal data. Therefore the trained score is being reported as descriptive information but will not be used in further analysis.

EMBARRASSED SCORE

Overall, most participants reported that they "strongly disagree" to "neither agree nor disagree" that collegiate athletic trainers are embarrassed to teach male athletes about TC and TSE techniques. The mean embarrassed score was 2.71 ± 2.42. Descriptive statics for trained score by age and gender are reported in Table 5.

The Shapiro-Wilks Test of normality indicated non-normality (*P* = <.001). Other indices also indicated non-normality including moderate skewness (.817), kurtosis (-.099), and abnormal histogram and Q-Q plots. The embarrassed score also had high skewness and the histogram appeared to indicate non-normal data. Therefore the trained score is being reported as descriptive information but will not be used in further analysis.

PERSONAL AND PROFESSIONAL PRACTICE BEHAVIORS

Of the reporting ATs, there were 129 ± 0.43 (76%) who reported performing secondary prevention techniques such as TSE or breast-self examination (BSE) on themselves. 56% of ATs stated they have had a male athlete bring a TC concern to

them. Participants were asked to report whether they ask male athletes TC questions on medical history questionnaires during a pre-participation examination. There were 54 participants (32%) who reported “yes”, 98 participants (58%) reported “no”, and 17 (10.1%) reported “I am not sure”. The “no” and “I am not sure” responders were grouped together, and therefore 115 ± 0.61 (68%) of responders are assumed to not ask testicular history questions at the pre-participation examination.

ATs were also asked if male athletes were questioned about their family history of TC on their medical history questionnaires. There were 47 (27.8%) who reported “yes”, 104 (61.5%) reported “no”, and 18 (10.7%) reported “I am not sure”. The “no” and “I am not sure” responders were grouped together, and therefore 122 ± 0.18 (72.2%) of responders are assumed to not ask athletes about a family history of TC at the pre-participation examination.

CORRELATIONS

A Pearson correlation coefficient was calculated between participants’ actual knowledge, perceived responsibility, and concerned scores to determine whether MANOVA was appropriate. A significant but weak positive linear relationship was found ($r(169)=.199$, $P<.009$) between the participants actual knowledge and perceived responsibility scores. A significant but weak positive linear correlation was identified ($r(169)=.285$, $P<.001$) between the participants actual knowledge and concerned scores. Participants with a higher actual knowledge score reported higher levels of TC concern and also reported feeling a greater perceived responsibility to incorporate TC

and TSE education into their athletic training practice. A medium to strong positive correlation was found (r(169) = .486, P<.001) between the responders concern and perceived responsibility scores, indicating a significant linear relationship between the two scores. Participants with a higher concerned score tended to have a report a higher feeling of perceived responsibility with TC and TSE.

INDEPENDENT VARIABLE: AGE

A one-way MANOVA was calculated to test the hypothesis that there was a difference in actual knowledge scores, concerned scores, and perceived responsibility scores between aggregated age ranges (21-25 years old, 26-30 years old, 31-35 years old, 36-40 years old, 41-45 years old, 46-40 years old, 51-55 years old, and 56 years or older). Box's Test of Equality of Covariance Matrices did not indicate significance (40.561, *P* = .703). No significant multivariate main effects were found (Λ=.866, $F_{21,457}$=1.122, *P*=.321, $ń_p^2$=.0.47). The power to detect the effect was .809.

INDEPENDENT VARIABLE: GENDER

A one-way MANOVA was calculated to test the hypothesis that there was a difference in actual knowledge scores, concerned scores, and perceived responsibility scores between genders. Box's Test of Equality of Covariance Matrices indicated significance (13.059, *P* = .046). However, given the equal cell sizes and large N, MANOVA is robust to violations of this assumption. No significant multivariate main effects were found (Λ=.985, $F_{3,165}$=.835, *P*=.476, $ń_p^2$=.015). The power to detect the effect was .229.

DISCUSSION

COMPARISON WITH PREVIOUS LITERATURE

Previous studies of TC and TSE have reported a general lack of concern, knowledge and perceived responsibility among ATs. Dewal reported that 97% of ATs do not educate their male athletes about TC, 90% of ATs were not teaching their male athletes about TC, 67.4% of ATs were not asking male athletes TC history questions during the pre-participation exams, and 68% of ATs were also not asking male athletes TC history questions during their pre-physical examination.[5] Similar responses are found within this study, suggesting that ATs continue to ignore the use of PPE to gain vital TC information.

Male athletes continue to seek TC information from ATs. A study released by Dewald and Zientek in 1996 reported that 45.3% of ATs have had a male athlete bring a testicular concern to them.[17] Results of this study showed that 56% of ATs have had a male athlete bring a testicular concern to them. This information suggests that during the professional career of an AT they will more than likely have a male athlete approach them with a testicular concern.

ATs professional practice of TC education needs improvement, but the personal practices among ATs seems to have increased. In 2006, Dewal reported that 62.6% of ATs were performing TSE or BSE techniques on themselves.[5] Of the reporting ATs in this study, 76% stated they perform TSE or BSE. Therefore, there seems to be increased personal awareness that has not translated to professional awareness.

PREVENTION AND HEALTH PROMOTION CONTENT AREA

The prevention and health promotion content area 2 (PHP-2) states that ATs should be able to "identify and describe measures used to monitor injury prevention strategies (eg, injury rates and risk, relative risks, odds ratios, risk differences, numbers need to treat/harm)."[21] PHP-3 content area states ATs should be able to "identify modifiable/non-modifiable risk factors and mechanisms for injury and illness".[21] Additionally, content area 5 states ATs are to "explain the precautions and risk factors associated with physical activity in persons with common congenital and acquired abnormalities, disabilities, and diseases." [21] These PHP content areas are very broad and vague. None explicitly states that ATs should be knowledgeable about TC and competent with TSE techniques. As the primary health provider for athletes in the collegiate setting, ATs should be knowledgeable about what conditions may affect the athletes they are responsible for. Therefore, it should be the responsibility of the AT to understand TC and be competent to teach about TSE.

THE PROFESSIONAL RESPONSIBILITIES OF THE AT

ATs are required to operate under the direction and protocol of a physician and often serve as an extension of the physician. In a collegiate setting, ATs are often the first and only medical provider an athlete will interact with. An athlete will only communicate with the team physician if the AT feels a referral is warranted. Therefore, ATs are in the unique position to educate athletes at risk for TC, just as nurses are able to in a non-athletic setting. In fact, because the day to day interactions are more frequent and on a deeper level than would be typical of a nurse, an AT can be an even

stronger advocate. Dewald and Zientek agree that ATs should be the primary advocate for men's health in athletics because of the unique relationship and exposure opportunities with the patient.[17]

The current 5th Edition Athletic Training Education Competencies include Prevention and Health Promotion and all athletic training students receive education about general medical conditions, which should include TC. However, some ATs were educated before the requirement that all athletic training education programs include these competencies.[21] Though it is clear that some older ATs may not have received formal education on TC, if an AT has embarked on a career in collegiate athletics they are expected to have a certain level of understanding of the condition and prevention practices. Therefore, collegiate ATs should make themselves responsible for the information they may not have received if they graduated long ago.[22]

CONCERNED AND NOT EMBARRASSED

Participants in this study reported that they "mild" to "strongly agree" that ATs in collegiate settings should be concerned about TC among the male athletes they care for. The mean concerned score was 7.26 ± .167 out of 10, suggesting that collegiate ATs have a high concern for TC and TSE among the male athletes they provide care for. In fact, 76% of the ATs reported that they perform TSE or breast self-examination (BSE) on themselves. This seems to be a clear statement of concern among ATs, but suggests that the concern is personal but not professional. Also, most participants reported that they "neither agree nor disagree" to "strongly disagree" that collegiate ATs

are embarrassed to teach male athletes about TC and TSE techniques. The mean embarrassed score was 2.71 ± 2.42, suggesting that ATs are not embarrassed to talk to male athletes about TC and TSE. The high concern, and low embarrassment scores suggest that there must be barriers that are keeping collegiate ATs from educating male athletes about TC and TSE.

POSSIBLE BARRIERS

Out of the 151(87%) athletic trainers who selected they do not teach their male athletes about TC, 76 participants stated they feel it is not their responsibility. Participants reported that they "somewhat disagree" to "neither agree nor disagree" that it is a collegiate ATs responsibility to teach male athletes about TC and TSE techniques. The mean perceived responsibility score was 3.93 ± 0.18 suggesting ATs have little feeling of perceived responsibility to teach male athletes about TC and TSE. One hypothesis is that the lack of perceived responsibility is because ATs do not consider TC and TSE within their scope of practice despite the inclusion of prevention and health promotion as key competency content areas in the profession.

ATs also reported that they "strongly disagree" to "somewhat disagree" that collegiate athletic trainers are trained to teach male athletes about TC and TSE techniques. The mean trained score was 2.28 ± 2.10, suggesting that ATs feel they lack knowledge about TC and how to perform a TSE. The hypothesis that ATs lack knowledge of TC and TSE is interesting given the relatively high mean knowledge score

of 7.62 ± 1.42. Good knowledge, but concern about whether they are trained well enough, points to a lack of confidence among ATs.[23-25]

Though the ATs in this study reported a lack of embarrassment, the literature suggests there is some embarrassment among ATs and that ATs are timid to approach athletes about sensitive health concerns. The degree of embarrassment depends on the gender of the athlete and AT. Drummond et al. reported overall that ATs feel less competent in treating groin areas, addictions, and urinary disorders. Drummond et al. also reported that females and males are more comfortable providing care to the same sex.[23,26] This could suggest that when a personal bond is made, and ATs of the same gender provide care, a low feeling of embarrassment may be reported.

COLLEGIATE ATHLETIC TRAINERS' BEST PRACTICE MODEL

An analysis of the respondents' university professional practices identified that only 54 (32%) reported asking male athletes testicular history questions on a medical history questionnaire, while 115 (68%) reported no or unsure. The implementation of one or two questions on a pre-participation examination (PPE) may identify athletes who are at risk of TC.

According to the HBM, when the four criteria exist, the patient is more likely to increase the practice of health behaviors. An AT can play a pivotal role in the TC education and TSE promotion. The use of a PPE is an excellent chance to educate the athlete in the four criteria listed under the HBM. Athletes who report for their physical exam can be educated about TC as well as the risk factors and ramifications of TC.

Additionally, athletes can be educated about TSE and what they should do if they detect a mass, bulge, or lump on the testicle. Finally, they should be made aware that if TC is found early, prognosis is good. All of the above can be given to the athlete in a pamphlet, lecture or individual format.[1,5,6,10,13]

Education of TC and TSE should not be limited to the PPE. While education during a physical exam is a step in the right direction, the education of TC and TSE should be reinforced in all settings. The education begins with the ATs understanding the risk factors, population at risk, and prevention practices. As defined under the ATs scope of practice, educating the athlete is a health care provider's responsibility. This education can start with the PPE but should be ongoing. Of the reported ATs, 56% stated they have had a male athlete bring a TC concern to them in the past. ATs should expect an athlete to bring a testicular concern to them during their professional career, and ATs should be ready with information.

CONCLUSION

The participants in this study had a high concern, low feeling of embarrassment, and good knowledge of TC and TSE. The responses suggest that ATs do not perceive that it is their responsibility and they may lack confidence in their level of knowledge, despite evidence to the contrary. These may be two barriers that are preventing ATs from adding TC and TSE education into their professional practice.

Overall, ATs are the primary healthcare professionals for collegiate athletes and are the source of referral to a team physician if one is needed. A study by Rosella

called for nurses to be the primary TC and TSE educators in non-athletic settings however ATs should serve in this capacity for collegiate athletes.[13] ATs should accept their role as a healthcare provider who is uniquely positioned to provide TC and TSE education including, but not limited to, integration of TC and TSE education into the PPE process.

APPENDIX A: SURVEY

START HERE

Instructions: **Please mark only one answer for each of the questions below.**

1. **Are you currently a practicing athletic trainer in the collegiate setting who has had sport/clinical responsibility during the last 3 years?**
   If Yes – Qualtrics continues.

   If NO – Qualtrics thanks them for their time.

Please answer the following questions according to your beliefs about testicular cancer. <u>If you are not currently assigned a sport/clinical responsibility, provide the best answer you would give as if you were assigned a sport/clinical responsibility at this time</u>.

Use a scale of 0 – 10.

Using a scale of 0-10, please tell us how much you agree or disagree with the following statements where 10 means you strongly agree with the statement, 5 means you neither agree nor disagree with the statement, and 0 means you strongly disagree with the statement.

OPINIONS ON TESTICULAR CANCER AND TESTICULAR SELF-EXAMINATION

	0	1	2	3	4	5	6	7	8	9	10
Athletic trainers in collegiate settings should be concerned about testicular cancer among the male athletes they care for.											
It is a collegiate athletic trainer's responsibility to teach male athletes about testicular cancer.											
It is more important to teach male collegiate athletes about testicular cancer than it is to teach male high school athletes.											
Athletic trainers in collegiate settings are trained to teach male athletes about testicular cancer.											
It is embarrassing for athletic trainers in											

collegiate settings to teach male athletes about testicular cancer.											
It is a collegiate athletic trainer's responsibility to teach male athletes about testicular self-examination (TSE) techniques.											
Athletic trainers in collegiate settings are trained to teach male athletes about testicular self-examination.											
It is more important to teach male collegiate athletes about testicular cancer than it is to teach male professional athletes.											
It is embarrassing for athletic trainers in collegiate settings to teach male athletes about testicular self-examination.											

This series of questions is designed to allow the researcher to estimate your <u>actual knowledge</u> of TESTICULAR CANCER AND TESTICULAR SELF EXAMINATION (TSE).

<u>Please do NOT consult outside resources such as books, notes or other people when answering these questions.</u>

True/False

1. White males aged 15-34 years old are most susceptible to testicular cancer.
2. Testicular cancer is the most common form type of cancer in young men.
3. If the testicles hurt or ache, in addition to lower abdominal pain, it could be a sign of testicular cancer.
4. Testicular cancer is the most curable kind of cancer when early detection is established.
5. The delayed seeking of medical attention is the primary factor in the deaths attributed to testicular cancer.
6. A risk factor for testicular cancer is undescended testicles.
7. A risk factor for testicular cancer is family history of testicular cancer.
8. Protecting the athlete from repeated trauma to the scrotal area is form of primary prevention.
9. Testicular examination should be performed a minimum of once per month by either the athlete or a primary care physician.
10. Exercise increases the risk of testicular cancer.

KNOWLEDGE OF TESTICULAR CANCER AND TESTICULAR SELF-EXAMINATION

1. Does your college/university ask your male athletes testicular history questions on your medical history questionnaire?
    a. Yes
    b. No
    c. I am not sure
2. Does your college/university ask your male athletes about their family history of testicular cancer on your medical history questionnaire?
    a. Yes
    b. No
    c. I am not sure
3. Do you educate your male athletes about testicular cancer?
    a. Yes
        i. If yes: Check all that apply. Smart Question (system should allow more than one response)
            1. Because it is important
            2. Because I was trained to do it
            3. Because it is my responsibility
            4. Because I do not believe they already know about testicular cancer
    b. No
        i. If no: Check all that apply. Smart Question (system should allow more than one response)
            1. Because it is not important
            2. Because I do not know how
            3. Because it is not my responsibility
            4. Because I believe they already know about TC
    c. I do not work with male athletes
4. Have you ever had a male athlete bring a testicular concern to you?
    a. Yes
    b. No
    c. I have never worked with male athletes
5. Were you ever taught about testicular cancer?
    a. Yes
        i. If yes, by whom/when? Click all that apply. Smart Question (system should allow more than one response)
            1. By someone working at my middle school/junior high school
            2. By someone working at my high school
            3. By someone working at my college – not athletic training related

4. By someone working at my college – athletic training program related
5. By someone working in the athletics department
6. By my parent/guardian
7. By my primary care physician
8. By another health care provider

b. No

6. Were you ever taught about testicular self-examination?
    a. Yes
        i. If yes, by whom/when? Click all that apply. Smart Question (system should allow more than one response)
            1. By someone working at my middle school/junior high school
            2. By someone working at my high school
            3. By someone working at my college – not athletic training related
            4. By someone working at my college – athletic training program related
            5. By someone working in the athletics department
            6. By my parent/guardian
            7. By my primary care physician
            8. By another health care provider
    b. No
7. Do you perform either breast self-examination (BSE) or testicular self-examination (TSE) on yourself?
    a. Yes
        i. If yes: On average, how many times do you perform BSE/TSE each year? (Use whole numbers only.)
    b. No

DEMOGRAPHIC QUESTIONS

1. Which of the following best describes your current collegiate setting?

☐ Division 1

☐ Division 2

☐ Division 3

☐ NAIA

☐ Other (please describe - _____)

2. Which of the following credentials have you held in the past or do you presently hold?

- ☐ ATC
- ☐ PT
- ☐ PA-C
- ☐ MD
- ☐ CSCS
- ☐ EMT-B, EMT-I, and/or EMT-P
- ☐ CCRN, RN, MSN or related nursing credential
- ☐ Other (please describe - _____)

3. Which district are you affiliated with?

- ☐ District 1: CT, ME, MA, NH, RI, VT
- ☐ District 2: DE, NJ, NY, PA
- ☐ District 3: DC, MD, NC, SC, VA, WV
- ☐ District 4: IL, IN, MI, MN, OH, WI
- ☐ District 5: IA, KS, MO, NE, ND, OK, SD
- ☐ District 6: AR, TX
- ☐ District 7: AZ, CO, NM, UT, WY
- ☐ District 8: CA, NV, HI, Guam
- ☐ District 9: AL, FL, GA, KY, LA, MS, TN
- ☐ District 10: AK, ID, MT, OR, WA

5. To which racial or ethnic group(s) do you most identify? If you consider yourself bi-racial, you may pick two answers.

☐ African-American (non-Hispanic)

☐ Asian/Pacific Islanders

☐ Caucasian (non-Hispanic)

☐ Latino or Hispanic

☐ Native American

☐ Other (please describe - _____)

7. Have you had a personal history or a family history of testicular cancer?

☐ Yes

☐ No

8. What is your gender?

☐ Male

☐ Female

9. What is your age?

☐ 21-25 years

☐ 26-30 years

☐ 31-35 years

☐ 36-40 years

☐ 41-45 years

☐ 46-50 years

☐ 51-55 years

☐ 56-60 years

☐ 61-65 years

☐ > 65 years

THANK YOU!!!

APPENDIX B: TABLE 1

Table 1. Actual Knowledge Scores (n=169)

Variable	Mean (SD)
Age (X=7.62 ± 1.42)	
21-25 years old	7.80 (1.20)
26-30 years old	7.71 (1.28)
31-35 years old	7.39 (1.17)
36-40 years old	7.46 (1.27)
41-45 years old	8.07 (1.94)
46-50 years old	7.33 (1.87)
51-55 years old	7.78 (1.20)
≥56 years old	7.17 (2.17)
Gender	
Male (X=7.46 ± 1.57)	
21-25 years old	7.75 (1.16)
26-30 years old	7.44 (1.31)
31-35 years old	7.28 (1.23)
36-40 years old	7.56 (1.24)
41-45 years old	8.29 (2.43)
46-50 years old	7.13 (1.89)
51-55 years old	7.00 (1.41)
≥56 years old	7.40 (2.27)
Female (X=7.75 ± 1.26)	
21-25 years old	7.83 (1.27)
26-30 years old	7.81 (1.27)
31-35 years old	7.53 (1.13)
36-40 years old	7.25 (1.50)
41-45 years old	7.88 (1.55)
46-50 years old	9.00 (0.00)
51-55 years old	8.40 (0.55)
≥56 years old	6.00 (1.41)

APPENDIX C: TABLE 2

Table 2. Concerned Score(n=169)

Variable	Mean (SD)
Age (X=7.26 ± 2.17)	
21-25 years old	6.40 (2.23)
26-30 years old	7.05 (2.01)
31-35 years old	7.30 (1.86)
36-40 years old	8.00 (2.08)
41-45 years old	7.67 (2.58)
46-50 years old	7.11 (3.41)
51-55 years old	7.78 (1.99)
≥56 years old	8.00 (2.17)
Gender	
Male (X=7.26 ± 2.34)	
21-25 years old	7.25 (1.98)
26-30 years old	6.19 (1.72)
31-35 years old	7.33 (2.25)
36-40 years old	8.22 (1.79)
41-45 years old	7.00 (3.27)
46-50 years old	6.75 (3.45)
51-55 years old	8.25 (2.36)
≥56 years old	8.20 (2.15)
Female (X=7.26 ± 2.03)	
21-25 years old	5.83 (2.29)
26-30 years old	7.38 (2.04)
31-35 years old	7.27 (1.33)
36-40 years old	7.50 (2.89)
41-45 years old	8.25 (1.83)
46-50 years old	10.0 (0.00)
51-55 years old	7.40 (1.82)
≥56 years old	7.00 (2.83)

APPENDIX D: TABLE 3

Table 3. Perceived Responsibility Scores (n=169)

Variable	Mean (SD)
Age (X=3.93 ± 2.30)	
21-25 years old	4.15 (2.33)
26-30 years old	3.99 (2.31)
31-35 years old	3.79 (2.17)
36-40 years old	3.38 (2.75)
41-45 years old	3.60 (2.00)
46-50 years old	3.67 (2.51)
51-55 years old	4.92 (2.62)
≥56 years old	3.92 (2.30)
Gender	
Male (X=4.04 ± 2.53)	
21-25 years old	4.19 (2.52)
26-30 years old	4.19 (2.54)
31-35 years old	3.75 (2.19)
36-40 years old	4.11 (2.97)
41-45 years old	3.64 (2.73)
46-50 years old	2.94 (2.59)
51-55 years old	4.13 (3.01)
≥56 years old	5.30 (2.68)
Female (X=3.84 ± 2.09)	
21-25 years old	4.13 (2.31)
26-30 years old	3.92 (2.25)
31-35 years old	3.83 (2.23)
36-40 years old	1.75 (1.32)
41-45 years old	3.56 (1.27)
46-50 years old	5.00 (0)
51-55 years old	4.70 (0.97)
≥56 years old	3.00 (1.41)

APPENDIX E: TABLE 4

Table 4. Trained Score (n=169)

Variable	Mean (SD)
Age (X=2.28 ± 2.10)	
21-25 years old	1.70 (1.19)
26-30 years old	2.28 (2.20)
31-35 years old	2.35 (2.15)
36-40 years old	2.58 (2.24)
41-45 years old	1.70 (2.00)
46-50 years old	2.89 (2.61)
51-55 years old	2.06 (1.61)
≥56 years old	3.25 (2.55)
Gender	
Male (X=2.69 ± 2.10)	
21-25 years old	2.19 (1.41)
26-30 years old	2.94 (2.17)
31-35 years old	2.64 (2.23)
36-40 years old	3.33 (2.25)
41-45 years old	2.86 (2.41)
46-50 years old	2.25 (1.89)
51-55 years old	1.13 (1.31)
≥56 years old	3.10 (2.41)
Female (X=1.92 ± 2.05)	
21-25 years old	1.38 (0.93)
26-30 years old	2.02 (2.19)
31-35 years old	2.00 (2.05)
36-40 years old	0.88 (1.03)
41-45 years old	0.69 (0.70)
46-50 years old	8.00 (0.00)
51-55 years old	2.80 (1.52)
≥56 years old	4.00 (2.05)

APPENDIX F: TABLE 5

Table 5. Embarrassed Scores (n=169)

Variable	Mean (SD)
Age (X=2.71 ± 2.43)	
21-25 years old	2.30 (2.44)
26-30 years old	2.81 (2.20)
31-35 years old	2.76 (2.44)
36-40 years old	3.42 (2.88)
41-45 years old	2.13 (2.21)
46-50 years old	2.83 (3.14)
51-55 years old	2.61 (2.30)
≥56 years old	2.71 (3.11)
Gender	
Male (X=2.54 ± 2.50)	
21-25 years old	1.38 (1.69)
26-30 years old	2.31 (1.44)
31-35 years old	2.67 (2.63)
36-40 years old	3.11 (2.95)
41-45 years old	2.43 (2.64)
46-50 years old	3.19 (3.16)
51-55 years old	2.63 (3.04)
≥56 years old	2.65 (3.30)
Female (X=2.86 ± 2.36)	
21-25 years old	2.92 (2.72)
26-30 years old	3.00 (2.42)
31-35 years old	2.87 (2.26)
36-40 years old	4.13 (3.01)
41-45 years old	1.88 (1.90)
46-50 years old	0.00 (0.00)
51-55 years old	2.60 (1.92)
≥56 years old	3.00 (2.83)

APPENDIX G: TABLE 6

Table 6. Mean Scores for Likert Section[a] (n=169)

Questions Used for Likert Section	mean (SD)
Athletic trainers in collegiate settings should be concerned about testicular cancer among the athletes they care for.	7.26 (2.18)
It is a collegiate athletic trainer's responsibility to teach male athletes about testicular cancer.	4.33 (2.35)
IT is more important to teach male collegiate athletes about testicular cancer that it is to teach male high school athletes.	3.88 (2.51)
Athletic trainers in collegiate settings are trained to teach male athletes about testicular cancer.	2.36 (2.31)
It is embarrassing for athletic trainers in collegiate settings to teach male athletes about testicular cancer.	2.63 (2.46)
It is a collegiate athletic trainer's responsibility to teach male athletes about testicular self-examination (TSE) techniques.	3.54 (2.62)
Athletic trainers in collegiate settings are trained to teach male athletes about testicular self-examination.	2.21 (2.19)
It is more important to teach male collegiate athletes about testicular cancer than it is to teach male professional athletes.	2.62 (2.53)
It is embarrassing for athletic trainers in collegiate settings to teach male athletes about testicular self-examination.	2.79 (2.70)

[a] 0 = strongly disagree, 5 = neither agree nor disagree, 10 = strongly agree

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