Doctor of Nursing Practice Project

Titled

# Increasing Testicular Self-Examination Practices in Male College Students

By

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Degree

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Dedicated to:

My family and friends for their constant support.

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## Abstract

**Title**: Increasing Testicular Self-Examination Practices in Male College Students

**Background**: Testicular cancer is the most diagnosed solid malignancy in young men between ages of 15 and 35 (Avcil & Altinel, 2018). A significant number of males attending colleges and universities in the United States have limited or no current knowledge of testicular cancer and screening practices (Tosun, Gul, & Arikan, 2020).

**Problem**: Lack of knowledge of testicular cancer and practice of testicular self-examinations.

**Purpose**: The evidence-based health promotion project aimed to increase testicular self-examination practices in male college students and increase their knowledge of testicular cancer. The main purpose was to investigate if an educational intervention along with the Ball Checker© mobile reminder application was beneficial to increase self-reports of testicular self-examinations and increase knowledge of testicular cancer.

**Theoretical Model(s**): Pender's Health Promotion Model and the Model for Evidence-Based Practice Change.

**Methods**: Surveys were modified with approval from the Center for Advocacy for Cancer of the Testes International containing basic questions about testicular cancer and testicular self-examinations. After male college students completed a pre-interventional survey, an educational intervention was executed explaining signs and symptoms, diagnosis, and incidence of testicular cancer. The educational intervention also discussed how to perform routine testicular self-examinations and how to implement the Ball Checker© mobile reminder application to help sustain exam practices. After the educational intervention was completed, an immediate post-interventional survey was administered to evaluate the subject's newly obtained knowledge of testicular cancer and practices. A follow-up survey was administered 45 days later to evaluate

retained knowledge of testicular cancer, testicular self-examinations, and the use of the Ball Checker© mobile reminder application.

**Outcomes**: Data was analyzed using the 2 tailed t-tests analysis tool in Excel. The sample size consisted of 10 male college student volunteer participants (n=10). De-identified results from the pre-interventional survey displayed a lack of knowledge of testicular cancer and how/when to perform testicular self-examinations. Immediately after the educational intervention and implementation of the Ball Checker© application, pre- and post-interventional survey comparative quantitative data analysis revealed a statistically significant increase in knowledge of testicular cancer signs and symptoms *(p*=0.43) and common causes of testicular cancer (*p*=0.43). Qualitative findings revealed most participants did not have any previous testicular self-exam training. At 45 days post-educational intervention, 100% of participants reported that they continued to use the Ball Checker© reminder mobile application to help sustain the practice of testicular self-examination practice.

**Conclusions**: The initiated educational intervention along with the Ball Checker© reminder mobile application did increase the knowledge of testicular cancer and the practice of males performing testicular self-examinations. Community-based program development relating to testicular self-examination screenings and wide deployment is encouraged to promote the early detection of testicular cancer in males. Testicular self-examination educational programs can be implemented in schools, colleges, and male prominent businesses to promote testicular self-examination practices and increase knowledge of testicular cancer.

*Keywords*: testicular cancer, testicular self-examinations, testicular self-exam, testicular health, male college students

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Increasing Testicular Self-Examination Practices in Male College Students

Testicular cancer is the most diagnosed cancer in males between the ages of 15 and 35 accounting for about 2 percent of all male malignancies (Avcil & Altinel, 2018). Many males attending colleges and universities in the United States have limited or no current knowledge of testicular cancer and screening practices (Tosun, Gul, & Arikan, 2020). The American Cancer Society and the Testicular Cancer Society highly recommend that males perform testicular self-examinations for early detection of testicular cancer, including feeling the scrotal area for lumps or other abnormalities and contacting their primary care provider for any concerning findings. Advocating for testicular self-examinations will allow males to develop better health-promoting techniques and increase awareness of testicular cancer.

The American Cancer Society estimates that 1 in every 250 males will develop testicular cancer in their lifetime and claims that early identification and intervention of testicular cancer are needed for a favorable prognosis. Knowing there is a high risk of death if untreated, males are encouraged to screen themselves once monthly preferably while taking a shower (American Cancer Society, 2023). Educating young male adults on the importance of performing testicular self-examinations for the early detection of testicular cancer will increase awareness and promote positive health-changing behaviors (Ustundag, 2019).

**Testicular Cancer Overview**

The American Cancer Society estimates that 9,910 new cases of testicular cancer will be diagnosed and that 470 deaths will occur from testicular cancer in 2023. Although the average age of diagnosis is 33, testicular cancer is most common in young to middle-aged men (American Cancer Society, 2022). Testicular cancer originates in the testes contained in the scrotum at the base of the penis. Testicles provide two main functions in the male reproductive

system, producing male hormones (testosterone) and sperm. 90 percent of testicular cancers are germ cell tumors (American Cancer Society, 2023).

A diagnosis of testicular cancer is typically considered after a man finds a lump or other abnormal change on one of his testicles. Common signs of testicular cancer may include swelling in the scrotum, a lump on either testicle, pain or discomfort in the scrotum, or a dull ache or heaviness in the scrotum (Cleveland Clinic, 2022). Further workup to confirm a diagnosis of testicular cancer is performed after a thorough past medical history review, physical exam, ultrasound, and biopsy if warranted. Other diagnostic tests used for testicular cancer include computed tomography, X-rays, and magnetic resonance imaging (Cleveland Clinic, 2022).

Treatment options for males diagnosed with testicular cancer vary depending on staging (1, 2, 3, or 4) and advancement (localized or distant). Professionals who specialize in the treatment of testicular cancer include radiation oncologists, urologists, and medical oncologists. Treatment options for testicular cancer may also include orchiectomy (removal of the testicle), radiation therapy, chemotherapy, and stem cell transplants. Like other forms of cancer, treating advanced cases of testicular cancer can become very expensive for patients, which supports the fact that early detection is critical (American Cancer Society, 2023).

The Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation all encourage males to practice testicular self-examinations for the early detection of testicular cancer. All societies provide similar guidelines which include: performing testicular self-examinations monthly after taking a bath or shower, palpation of the scrotum for lumps or other abnormalities, and contacting their healthcare provider if they have any concerns. Each cancer society also provides resources for males that lack knowledge of testicular cancer and testicular self-examinations.

Resources may include survival stories of individuals that have completed treatment for testicular cancer, information on how to contact a provider specializing in testicular cancer, and the latest information relating to testicular cancer and treatments.

**Purpose and Goals of Project**

The purpose of the evidence-based health promotion project was to increase the practice of performing testicular self-examinations for the early detection of testicular cancer in college males. Increasing the practice of testicular self-examinations would allow males to identify testicular abnormalities early and obtain the appropriate treatment. There is a significant knowledge gap among males attending colleges and universities; they are unaware of the presenting symptoms of testicular cancer, and the importance of performing testicular self-examinations (Tosun, Gul, & Arikan, 2020).

Medical students and those in other healthcare-related majors also lack knowledge of testicular cancer screenings and self-examinations (Gutema et al, 2020). The goal of this project was to evaluate whether education regarding the importance of testicular cancer and testicular self-examination with a reminder mobile application would increase testicular cancer knowledge and practice of self-screening practices.

**Clinical Question**

The clinical question for the evidence-based practice health promotion project was: *In male college students, how does testicular self-examination education with a reminder mobile application, as compared to no education, improve knowledge of testicular self-examination practices over a period of 45 days?*

**Health Promotion**

According to the New York State Cancer Registry (2022), death rates of testicular cancer are significantly increasing in men in their early and mid-twenties (Appendix A, Figure 1). Men between the ages 20 and 24 had an incidence rate of 11.1 out of 100,000 men and a mortality rate of 1.2 out of 100,000 men: a typical college-age group. The incidence rate and mortality rate increase as males become older until their mid to late thirties. The New York State Cancer Registry also recorded deaths and cases per year with the year 2018 having the highest amount of testicular cancer cases and 2019 having the highest most recent number of deaths related to testicular cancer (Appendix A, Figure 2). The survival rate of localized testicular cancer (cancer that has not spread from the testicles) is 99%. Survival rates decrease as cancer spreads with a regional spread of 96% and a distant spread of 73%. Although there is no known prevention method for testicular cancer, early detection, and awareness are the best methods to identify common symptoms (American Cancer Society, 2023).

The Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation all continue to advocate for routine testicular self-examinations for the early detection of testicular cancer. Testicular self-examinations are free and simple to perform. Physicians and other clinicians are also encouraged to both educate males about testicular cancer and promote the practice of testicular self-examinations (Testicular Cancer Society, 2023). Sixty-two percent of males at the highest risk for testicular cancer do not know how to perform testicular self-examinations (Testicular Cancer Foundation, 2022). Most testicular cancers are usually detected by men themselves or by their partners (Testicular Cancer Society, 2023). Men who practice routine testicular self-examinations are promoting health promotion and incorporating the latest evidence-based

practice into their health routine. Samples of current general testicular self-examination guidelines are presented in Appendix A, Figures 3 and 4.

## Theoretical Framework

### *Health Promotion Model*

Pender's Health Promotion Model (HPM) was the guiding conceptual framework for this evidence-based project. The HPM is a nursing model that was designed by Nola Pender in 1982 to promote health-changing behaviors after identifying patients' negative health habits. The model suggests that people can change health habits and seek to regulate their behavior. The HPM relates to the clinical problem addressed in this project because it allows individuals to recognize and change their maladaptive behaviors to learn a new, health-promoting behavior. Health promotion relates to the proposed intervention by promoting individuals to practice advocating for their health and learn recommended health-promoting techniques. Pender's HPM's purpose was to educate nurses on how to recognize maladaptive behaviors in a specific patient population and provide them with new health-promoting behaviors through behavioral counseling (Pender, 2011). The HPM is supported by three roots including one philosophical root (Reciprocal Interaction World View) and two theoretical roots (expectancy value theory and social cognitive theory). The Reciprocal Interaction World View is a philosophical idea that views humans holistically and that humans can interact in their environment to shape it and meet their goals. Expectancy value theory and social cognitive theory support the idea that individuals participate in goals they believe are obtainable and that have valuable outcomes. The social cognitive theory also claims that individuals can only change their behavior if they change how they think (Pender, 2011).

Five key concepts set the foundation for Pender's HPM including person, environment,

nursing, health, and illness. A person is defined as a biopsychosocial organism that is shaped and influenced by its environment. The relationship between person and environment is continuous creating life experiences that influence individuals' health behaviors. The environment is defined as the social, cultural, religious, and physical aspects the individual is involved in. The environment may influence how a person develops, but the environment can also be changed by the person. A person's environment can influence the positive or negative health behaviors the individual practices. Nursing is a concept in which a nurse or other healthcare worker works in collaboration with the person to define and create health-promoting behaviors to provide positive patient outcomes. Health relates to the person's individual goals. Goals may include satisfying relationships with others, performing self-care, and other aspects that promote independence or improve an individual's health. Illness is defined as either an event or condition that obstructs a person from practicing health-promoting behaviors. An illness does not always have to be a specific pathogen or medical condition. Illnesses can relate to relationships, education, finances, or other aspects that restrict a person from improving their health (Pender, 2011)

The HPM is composed of three main aspects including individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Pender, 2011). Individual characteristics and experiences include a person's prior related behaviors or behaviors that participated in before the health-promoting behavior was introduced. Personal factors including biological, psychological, and sociocultural are also evaluated before the health-promoting behavior is introduced. General characteristics are needed to analyze if their age, race, ethnicity, and socioeconomic status influenced prior behaviors before the health-promoting behavior was introduced. Once individual characteristics and experiences have been collected and analyzed, behavior-specific cognitions and affect are needed to evaluate how the individual

is reacting to the new proposed behavior. The HPM takes into consideration the person's perceived benefits of action, perceived barriers to action, perceived self-efficacy, activity-related effect, interpersonal influences, and situation influences. Understanding how the individual views the benefits and barriers of the new behavior will influence if that individual incorporates that new behavior into their lifestyle. Self-efficacy, subjective feelings, family, peers, and aesthetics are also aspects to consider in evaluating if an individual is willing to learn and incorporate the new proposed behavior into their lifestyle. After objective and subjective information is collected before the new proposed behavior is introduced, a commitment to a place of action is performed which is formally introducing the new health-promoting behavior. The new behavior is typically introduced as an educational intervention teaching the individual how to perform the new behavior and why the new behavior is suggested. The new behavior comes with strategies to ensure that the individual performs the behavior correctly and that the behavior sustains. Once the new proposed health-promoting behavior has been introduced, immediate competing demands and preferences may occur. The individual may not agree with the new proposed behavior because of their culture, religion, family, or other interpersonal or situational influences. Alternative behaviors and ideas are recorded and evaluated to see if there are aspects of the proposed behavior that needs restructuring. The final aspect of Pender's HPM is the behavioral outcome which is evaluating the health-promoting behavior. Health-promoting behavior is defined as the desired behavioral endpoint. After the new proposed health-promoting behavior has been introduced and implemented, individuals will incorporate that new behavior into their lifestyle and remove their prior maladaptive behaviors (Pender, 2011).

Pender's HPM idea is to define a maladaptive practice in the community and develop a health-promoting behavior to resolve the maladaptive behavior. The HPM supports the idea that

individuals continually seek to improve their health and individuals prefer to regulate their behaviors. Pender's HPM understands that humans are influenced by numerous factors including culture, religion, family, and finances impact an individual's health. The theory supports the idea of self-initiated reconfiguration meaning that the individual must be actively involved in the proposed new behavior to promote behavioral change. Prior behaviors including interpersonal and situational influences are needed to evaluate if a proposed new behavior will be considered. Individuals with positive affect toward the new behavior are more likely to integrate the behavior into their lifestyle. Commitment to the new behavior is unlikely when there are competing demands and influences suggesting alternative behaviors. Individuals are more willing to practice a new proposed behavior if it still gives them autonomy, see others performing or promoting the behavior, and have positive emotions about the new behavior (Pender, 2011). An overview of Pender's model can be found in Appendix, A Figure 5.

*Model for Evidence-Based Practice Change*

The Model for Evidence-Based Practice Change was the guiding evidence-based practice model for this project. The Evidence-Based Practice Change model allows the clinician to first identify a clinical problem and interventions that will improve patient care outcomes (Melnyk & Fineout-Overholt, 2019). There are six steps in this model each detaining aspects needed to capture the best evidence-based intervention and implement the intervention into clinical practice. The model integrates evidence-based research into the clinical setting focusing on quality improvement, interprofessional teamwork, and strategies to promote the new practice (Melnyk & Fineout-Overholt, 2019).

The first step in the Model for Evidence-Based Practice Change is identifying a practice problem. The problem becomes the focus of developing possible interventions and defining what

the positive patient outcome should be after implementing the intervention. The process starts with collecting internal and external data magnifying the practice problem and what current resolutions evidence-based literature recommends. After obtaining a literature-based foundation, the clinical question composed of a specific population, intervention, comparison, outcome, and time frame is created defining the practice problem and the proposed intervention. The clinical question or PICOT question is the foundation for all remaining steps (Melnyk & Fineout-Overholt, 2019).

Step two includes locating the best evidence and using that evidence to support the proposed intervention. Necessary steps in this process include identifying types of evidence, planning the search for evidence, and performing a literature review of the best evidence. Types of evidence may include evaluating clinical practice guidelines, critical appraisal topics, expert reports, and systematic reviews. The types of evidence can be obtained from various sources including databases, books, and journals. Planning the search for evidence is completed by performing a systematic review capturing the search strategy, inclusion and exclusion criteria, and integrating a synthesis table. Keeping all relevant information together using a data management tool is vital to secure relevant information. Ensuring that all included research aligns and supports the proposed clinical question is critical for step 3 (Melnyk & Fineout-Overholt, 2019).

Step 3 is critically analyzing the evidence through critical appraisal tools. Critical appraisal tools judge the strength of evidence ensuring that all included articles are relevant and necessary for the evidence-based practice project. Synthesizing the evidence, and assessing the feasibility, benefits, and risks of implementing the new proposed practice are also included in this step to provide strong support for why individuals should consider implementing the new

change in their lifestyle. The proposed intervention should be supported by a strong literature background consisting of recent articles from varying sources. Also, the proposed intervention should outline benefits and risks to allow viewers to see if the new practice change is feasible and appropriate to implement in the clinical setting (Melnyk & Fineout-Overholt, 2019).

Step 4 includes designing the practice change including identifying needed resources, defining the proposed practice change, and designing the implementation process. Discussing the needed resources for the new proposed intervention is vital to display what materials, equipment, cost, or personnel will be needed to ensure that the practice change is successful. A clear description of the new practice should be displayed as a protocol, guideline, and care plan that is supported by the evidence synthesis that was completed in step 3. Designing an appropriate implementation process is necessary to display the proposed guideline to the specific patient population. The implementation process can be in the form of an educational session, reminder system, or educational materials. After creating and designing the practice plan, an evaluation plan needs to be created to evaluate the success of the intervention. Results from the evaluation plan should include baseline data and outcome indicators that will need to be collected post-intervention in step 5 (Melnyk & Fineout-Overholt, 2019).

Step 5 is implementing and evaluating the evidence-based practice change. The step starts by implementing the pilot study based on the implementation plan that was designed in step 4. After the intervention is completed, feedback is necessary to see if the specific patient population adopted the new practice change. Feedback will also be used to see if there are adjustments needed in the implementation plan. Once the pilot study has concluded, the evaluation plan that was designed in step 4 is used to assess the success of the intervention. The postintervention data is compared to baseline data to see if outcomes were similar or if the new

practice change was rejected. Sometimes the new practice change needs to be adapted to better align with the current patient population depending on their interpersonal or situational influences. Once a final decision on the post-interventional outcome is made, conclusions and recommendations are created prompting step 6 (Melnyk & Fineout-Overholt, 2019).

Step 6 is the final step in the Model for Evidence-Based Practice Change which includes integrating and maintaining change in practice. The step starts with sharing recommendations about the new practice with relevant individuals or organizations. If the proposed intervention was successful, then it would be beneficial to share that intervention with other organizations so they can adopt the new change. Once recommendations have been made, then incorporating the new practice into a standard of care would be necessary to help sustain the proposed intervention. After the intervention is concluded and recommendations have been completed, it is still important to monitor and reevaluate outcome indicators as necessary. The data from ongoing monitoring will be used to evaluate if further refinements to the original design are needed or if there is a need for a new evidence-based project. The last aspect of this step is disseminating information about the evidence-based project either through a presentation at professional conferences or through publication (Melnyk & Fineout-Overholt, 2019). An overview of the Model for Evidence-Based Practice Change can be found in Appendix A, Figure 6.

## Review of the Literature

### *Search Strategy*

A search strategy was created to review the current literature for the best patient care outcome. Inclusion and exclusion criteria were created to secure articles relevant to testicular cancer management and testicular self-examinations. Critical appraisal tools included the rapid critical appraisal questions for randomized clinical trials and systematic reviews. A synthesis

table was also completed to organize all relevant literature outcomes. Databases included in the search strategy included CINAHL, Cochrane Library, Embase, Pubmed, and PsycInfo (see Appendix A, Table 2). Endnote was the reference management system used for this search strategy. A Prisma flow chart was also created to display how the search was completed (see Appendix A, Figure 13).

Keywords included in the search were *testicular self-examination, self-efficacy, men, and testicular self-exam*. Boolean phrases were used to support the search strategy, understanding the focus is on self-examinations, not a physician or advanced practice providers examining the patient. Only studies written in English were included in the search strategy. International studies were also included in the literature search. Databases were searched in the month of September 2020 and then again in February 2022. Publication dates range from years 2016 to 2022 allowing the most recent and relevant research to be included. The minimum age range for included studies was 18 understanding the focus is on the adult male population including those attending colleges or universities. All articles included in the search strategy related to the goals of the project focusing on increasing self-reports of testicular self-examinations. Each article focused on the problem, population, evidence-based intervention, or concept.

Other inclusion criteria included full-text articles, quantitative or qualitative studies, systematic reviews, randomized or nonrandomized samples, meta-analysis, testicular cancer awareness, and testicular self-examinations. Duplicates of articles were removed and not included in the search strategy. Exclusion criteria included: books, dissertations, lack of full-text option, articles published before the year 2016, and other articles that did not support the clinical question.

The database search resulted in a total of 100 searches. After a review of all available

literature, 25 articles were selected and critically appraised. All included articles supported the proposed clinical question and met all inclusion criteria. The remaining unselected articles did not meet the inclusion criteria and did not support the proposed clinical question.

*Critical Appraisal and Evaluation of Evidence*

A critical appraisal of all 25 articles was completed to evaluate strengths limitations, and implications relating to the clinical question of this project. Two rapid critical appraisal forms were used to assess the validity, reliability, and applicability of each article derived from Melnyk and Fineout-Overholt (2019). The first rapid critical appraisal form was used for systematic reviews and meta-analyses of clinical interventions while the second form was used for randomized clinical trials. See Appendix A, Figures 7 and 8.

Each rapid critical appraisal tool contained questions to further evaluate the value and relevance of each article. The rapid critical appraisal forms ensured that each article presented in this project magnified the clinical issue of lack of awareness of testicular cancer and supported the practice of testicular self-examinations. After completing the rapid critical appraisal of the articles, a synthesis table was created to further appraise the literature (Appendix A, Table 1). The synthesis table separates each article into a chart displaying the framework, outcomes, strengths, and limitations.

An evaluation of the overall levels of evidence with rationale was also completed using the Hierarchy of Evidence (Appendix A, Table 3). Appendix A, Figure 9 displays the overview of the levels of evidence. The Hierarchy of Evidence graded all literature included in the search study from I to VII. The highest and strongest level of evidence included a systematic review of randomized controlled trials. Lower levels of evidence included randomized controlled trials, control trials without randomization, case-control or cohort studies, a systematic review of

descriptive or qualitative studies, descriptive or qualitative studies, and expert opinions. The levels of evidence contained in this literature review include: 5 level 1, 1 level 2, 2 level 3, 11 level IV, 1 level 5, and 5 level 6.

Most articles consisted of case-control or cohort studies understanding that the proposed intervention is primarily focused on the male biological sex. Two articles included a mixed-gender population. Findings of the studies displayed that most females learn testicular cancer and testicular cancer screenings from their male partners reinforcing the concept that males need to know how to perform testicular self-examinations (Braga et al., 2017; Uyar, Yıldırım, & Kemal 2019). Five articles were systematic reviews to help create an overview review of what testicular cancer is including prognosis, diagnosis, etiology, and recommended screening methods. Qualitative or descriptive studies were used to help assess health beliefs of testicular self-examinations and provide a better description of how males feel about screening themselves for testicular cancer.

After determining each article's level of evidence, the literature was appraised by using the Grading Recommendations Assessment, Development, and Evaluation (GRADE) system that can be found in Appendix A, Figure 10. The GRADE system is used to evaluate the quality of evidence for each outcome. Ratings are ranked from "high" to "very low" (Ryan & Hill, 2016). The ratings are based on the specific article's design, inconsistencies, indirectness, and variables (Ryan & Hill, 2016). Results from the GRADE are provided in Appendix A, Table 4 displaying 13 "high" articles, 10 "moderate", and 2 "low" quality grades of evidence.

Another tool used to appraise the strength of each article was the Strength of Recommendation Taxonomy (SORT) provided in Appendix A, Table 4. The SORT tool uses a rating system of A, B, or C to determine the strength of each body of evidence. Appendix A,

Figure 11 provides the algorithm used for determining the strength rating with results displaying 2 of level A, 16 of level B, and 7 of level C. Articles determined to have an A value have significant support from clinical trials and evidence-based research while articles with a level B value may have some inconsistencies.

Articles determined to have a C value are recommended based on opinion, consensus, or ideal practice (Ebell, et al., 2004). The SORT tool also provides an appraisal recommendation that rates each article from 1-to 3. The algorithm is displayed in Appendix A, Figure 12. 1 is considered the highest quality of evidence while 3 is considered the lowest quality of evidence (Ebell, et al., 2004). The levels of evidence displayed for the current literature review resulted in 5 level 1, 13 level 2, and 7 level 3.

*Appraisal of General Testicular Self-Examination Guidelines*

The Appraisal of Guidelines for Research and Evaluation II (2017) was completed for the general guidelines of testicular self-examination practices. The evaluation tool was implemented to evaluate the general guidelines of testicular self-examinations proposed by the Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation. The evaluation tool includes several domains used to evaluate guidelines including scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability, and editorial independence. Questions in each domain are scored from 1 to 7 with 1 valued “strongly disagree” and 7 valued “strongly agree”. The overall ranking of the general guidelines of testicular self-examinations resulted in 6 out of 7.

The testicular self-examination guideline is a health promotion screening technique allowing men to understand their testicular health and be mindful of what is considered

abnormal. The current recommendation provides a clear scope and purpose in raising awareness of testicular cancer. The guidelines also provide a clear target audience and allow opportunities for healthcare providers, spouses, or peers to participate. Although research is limited in promoting the practice of testicular self-examinations, several reputable cancer societies highly recommend that men perform testicular self-examinations for the early detection of testicular cancer including the Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation.

The United States Preventative Services Task Force (USPSTF) also states that testicular cancer has the highest cure rate in the early stages and is often found by either men themselves or by their partners (2011). All included testicular cancer societies including USPSTF agree that early detection will allow a favorable prognosis. The USPSTF is clear and can be understood by clinicians and men with limited medical knowledge. Instructions on how to perform testicular self-examinations are simple and direct. The guideline even includes pictures allowing men to easily see how to perform the screening. Practicing routine testicular self-examinations can be applied in clinical settings such as primary care physician offices or reproductive health clinics (Testicular Cancer Society, 2022).

**Synthesis of Evidence**

A synthesis table of current literature including major findings and outcomes was created to organize the literature search (Appendix A, Table 1). All literature in the synthesis review relates to the purpose and goal and supports the practice of testicular self-examinations. Implementing an educational intervention to help promote testicular self-examinations for the early detection of testicular cancer will help promote health-changing behaviors (Ustundag, 2019). Randomized and nonrandomized controlled trials magnified the lack of awareness of

testicular cancer and the essentially nonexistent use of testicular self-examinations. Descriptive studies discussed the attitudes, beliefs, and emotions related to testicular cancer and testicular self-examinations.

*Diagnosis, Treatment, and Prevention*

Current literature supports the fact that testicular cancer is the most common malignancy in young adult males (Avcil & Altinel, 2018). Although the cause of testicular cancer is not fully understood, a family history of testicular cancer and men born with cryptorchidism are risk factors for the disease (Boarin et al., 2019). Traditionally, a diagnosis of testicular cancer is completed after a full medical history and physical exam of the testicles (Akers, 2018). Testicular cancer may have overlapping symptoms with other benign tumors including hydrocele, testicular torsion, varicocele, or epididymitis (Akers, 2018). Imaging using ultrasound technology or computed tomography (CT) are common methods to help identify tumors related to testicular cancer (Akers, 2018).

Treatment for testicular cancer may include surgery, chemotherapy, or radiation depending on clinical presentation and staging (Akers, 2018). An orchidectomy (removal of the testicle) may also be needed for the treatment of testicular cancer (Akers, 2018). A patient who completes an orchidectomy will need supportive underwear and have lifting restrictions to help promote healing (Akers, 2018). Common chemotherapies used for treatment include cisplatin and carboplatin (Akers, 2018). Although these chemotherapies are effective for treatment, they may cause sexual dysfunction or infectability (Akers, 2018). Radiation using high-intensity X-rays is also used to remove cancer cells in the scrotum (Akers, 2018). Radiation for testicular cancer is usually composed of short fractions with potential complications including nausea, retrograde ejaculation, and bleeding (Akers, 2018).

The incidence rate of testicular cancer is increasing according to Boarin et al., (2019) and the New York State Cancer Registry (2022). It is estimated that 1 in every 250 males will develop testicular cancer in their lifetime displaying a need for an educational testicular self-examination intervention for the early detection of testicular cancer (American Cancer Society, 2023). The American Cancer Society also estimated that 9,910 new cases of testicular will be diagnosed with 470 deaths occurring in 2023.

Although there is no prevention for testicular cancer, the Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation have all provided general guidelines on how to perform routine testicular self-examinations for the early detection of testicular cancer. Untreated testicular cancer can result in death (Testicular Cancer Society, 2022). Performing testicular self-examinations starting at the age of 14 will allow men to identify testicular abnormalities earlier and consult their primary care provider as needed (The Ohio State University Comprehensive Cancer Center 2022).

*Signs and Symptoms*

Although the signs and symptoms of testicular cancer range depending on severity, many studies agree that the common signs of testicular cancer include a painless, hard lump on one testicle, scrotal pain, a feeling of heaviness in the scrotal area, swelling or significant enlargement of the testicle, and back pain (Akers, 2018). Signs and symptoms overlap with the current general guidelines from the Testicular Cancer Society, American Cancer Society, National Testicular Cancer Society, National Cancer Institute, and the Testicular Cancer Foundation on how to perform testicular self-examinations displaying similar symptoms of testicular cancer that men should be aware of.

*Awareness and Health Promotion*

Health promotion was another common theme in the literature review encouraging clinicians to help increase awareness of testicular cancer and promote the practice of testicular self-examinations. Nurses play a vital role in testicular cancer awareness and in promoting the practice of testicular self-examinations (Saab, Landers, & Hegarty, 2016). Social media and mass media may be large influences on the young adult population, but young adults do value what nurses promote as a health standard. Testicular self-examinations have the potential to improve quality of life and decrease testicular cancer mortality for men and males who do perform routine testicular self-examinations identify testicular cancers earlier than men who do not (Rovito et al., 2018). It has been posited that testicular self-examination programs should be created and facilitated by healthcare professionals to improve health care outcomes (Tosun, Gul, & Arikan, 2020).

Healthcare professionals should be the leaders in testicular cancer awareness and promote testicular self-examinations to students and patients in their practice setting. Clinicians and other healthcare personnel are encouraged to discuss testicular cancer, testicular torsion, and other benign testicular conditions to increase men's knowledge of testicular health. Rovito et al., (2018) determined that promotional messaging about testicular self-examinations can be a positive influence on men. Promotional messaging can increase knowledge retention, actual performance, and adherence to testicular self-examinations for the early detection of testicular cancer (Rovito et al., 2018). Patients should be educated and encouraged to follow the general testicular self-examination guidelines set by the previously mentioned cancer societies for the early detection of testicular cancer or other abnormalities.

*Testicular Cancer and Self-Examination Knowledge Gap*

The literature clearly states that there is a significant lack of knowledge relating to testicular cancer and testicular self-examinations. The Ohio State University Comprehensive Cancer Center (2022) recommends that men start to perform monthly testicular self-examinations at age 14. Ustundag (2019) found that 80% of males did not know how to perform testicular self-examinations magnifying the need for an educational intervention. Studies suggest that males who do not perform testicular self-examinations also lack knowledge of testicular cancer. In fact, 89% of males had a poor understanding of testicular cancer including the diagnosis, prognosis, signs, and symptoms (Salati, 2019).

Roy and Casson (2017) found that only 17% of males even heard of testicular cancer displaying the need for an educational intervention to help men recognize the signs and symptoms of testicular cancer. Dhakal, Paudel, and Paudel (2021) claim that a lack of knowledge and training in testicular cancer and testicular self-examinations has the potential to miss the signs and symptoms of the disease substantially. It is critical to implement massive educational campaigns for testicular cancer and testicular self-examinations among young males so that they recognize testicular abnormalities and seek medical attention (Dhakal et al., 2021).

Although current literature does not clearly define why there is a lack of knowledge of testicular cancer, Jahangard et al, (2019) claimed that factors including beliefs, attitudes, and social context are factors that influence a person's health behavior. Individuals with low health literacy are less likely to participate in health-related screenings including testicular self-examinations. Jahangard et al., (2019) study concluded that there are many factors that may influence positive and negative health behaviors. The factors mentioned above may include knowledge, legal constraints, social context economic status, and attitudes relating to the new healthy behavior (Jahangard et al., 2019).

Educational interventions are needed to increase health literacy and become more proactive about health decisions. Included in the knowledge gap of testicular cancer, Umeh and Chadwick (2016) claimed that men with low self-efficacy are also more likely to not perform testicular self-examinations suggesting a need for an educational intervention. Increased self-efficacy is associated with males having a better understanding of their testicular health and sustaining the practice of testicular self-examinations.

*Educational Intervention Design and Variables*

Although the current literature review magnified the need for an educational intervention to educate men about testicular cancer and testicular self-examinations, many studies display different ideas of what educational interventions should be implemented. Studies indicate that current literature shows that all males regardless of race, ethnicity, or socioeconomic background should have knowledge of testicular cancer and practice testicular self-examinations. Hachfeld, MacWilliams, and Schmidt (2016) claimed that males that participate in sports or other athletics are more willing to learn about testicular cancer and testicular self-examinations than males that do not participate in sports. The study suggested that the increase in physical awareness prompts better health motivation.

Uyar, Yildirm, and Kemal (2019) claimed that medical students had a better understanding of testicular cancer than non-medical students however, medical students understand the rationale behind the need to perform testicular self-examinations. Wilson et al., (2018) focused on testicular cancer and testicular self-examinations in a group of intellectually disabled men. The men at the beginning of the study displayed a significant lack of knowledge of testicular cancer and testicular self-examinations. After an educational intervention using direct education, limited print media, and reinforcement, the men were able to understand major

concepts of testicular cancer and properly perform testicular self-examinations.

Wilson et al., (2018) study suggested that an appropriate educational intervention will significantly impact men's knowledge of testicular cancer and screening techniques. The study displayed that all men regardless of health literacy can learn the signs and symptoms of testicular cancer and correctly practice testicular self-examinations.

Many studies provided different methods to help enhance the educational intervention of testicular cancer and testicular self-examinations. The most common theme in the current literature is using the Health Belief Model to assess men's beliefs, attitudes, and ideas about testicular cancer and screening techniques. The health belief model is very similar to Pender's HPM except the health belief model lacks the promotion aspect needed to advocate health change (Pender, 2011).

Understanding how men feel about testicular cancer and testicular self-examinations allows clinicians to clarify myths or reinforce aspects of testicular cancer as needed (Avci & Altinel, 2018). Jeihooni et al., (2021) incorporated the health belief model by using questionnaires to assess the subject's knowledge of testicular cancer and practice of testicular self-examinations. Results of the study displayed those men lacked knowledge of testicular cancer and many did not practice testicular self-examinations. After an educational intervention was performed, men in the study adopted the practice of testicular self-examinations three months later. The health belief model proved to be an effective model to increase knowledge of testicular cancer and encourage males to perform routine testicular self-examinations three and six months after the initial educational intervention was concluded (Jeihooni et al., 2021). Other methods used to educate men about testicular cancer and testicular self-examinations include humor-based interventions, social media, mass media, print media, and YouTube.

All college men in the literature review expressed an interest in learning about testicular disorders through a media format including television, internet, and print. Many college men agreed with the idea that social media and mobile phone applications could be used to increase knowledge and awareness of testicular cancer (Saab, Landers, & Hegarty, 2017). Suggested sites of information included Facebook and YouTube for information relating to testicular cancer. College men further expressed that they would prefer an educational intervention to be visually appealing, original, humorous, brief, and positive.

Humor-based interventions were magnified in a study by Miller et al., (2021). The study discovered that educational interventions that used humor-based interventions including jokes can help reduce anxiety for participants when discussing serious public health topics including testicular cancer. Miller et al., (2021) displayed that humor-based health promotion can increase awareness of screening procedures including testicular self-examinations and remove the associated stigma associated with men exanimating themselves.

Nabi, (2016) also discovered how impactful humor-based educational interventions can be for men learning about testicular cancer. The study displayed how humor can be used to reduce the fear of testicular cancer when discussing testicular cancer and testicular self-examinations. Social media platforms including Facebook or Twitter can be used to raise awareness of testicular cancer and promote the practice of testicular self-examination in a serious yet productive way (Nabi, 2016).

Suggestions for an appropriate educational intervention included television, mobile applications, school, and university campaigns, and limited print media. Also, many college men expressed that the educational intervention should be mindful of male subjects that do not identify as heterosexual (Saab, Landers, & Hegarty, 2017). Overall, the synthesis of the literature

supports the need of providing an educational intervention to increase the practice of testicular self-examinations for the early detection of testicular cancer.

*Reminder Mobile Application Selection*

The use of mobile reminders can be instrumental in the early detection of testicular cancer. A study done by Saab et al., (2017) displayed how influential social media platforms and mobile applications are in bringing awareness to testicular cancer and educating men about testicular self-examinations. It has also been noted in the literature that YouTube videos can provide a positive impact on men learning the signs, symptoms, diagnosis, and treatment of testicular cancer while understanding how to perform proper testicular self-examinations (Selvi, Baydilli, & Akinsal, 2020). A comparison evaluating mobile applications that discuss and review testicular cancer and testicular self-examinations comparison was created and is displayed in Appendix A, Table 5.

Vital aspects for the selection of an appropriate mobile reminder application for this evidence-based practice project included providing instruction on testicular self-examinations, discussing testicular cancer, containing a reminder application, compatibility with Android and iPhone users, multilingual, and financial cost. Five mobile applications were recognized as potential reminder resources for males to help sustain and reinforce testicular self-examinations. examinations.

The first mobile application that was evaluated was Ball Checker©. Ball Checker© was the only mobile application that successfully satisfied all recognized areas to help support college males to sustain the practice of testicular self-examinations. The Ball Checker© reminder mobile application was created by the Testicular Cancer Society which is one of the several national testicular cancer societies that provides guidelines on how to perform testicular self-

examinations (Testicular Cancer Society, 2022). The Testicular Cancer Society created the application for the purpose to bring awareness of testicular cancer and provide resources for men that do identify a testicular abnormality. The Ball Checker© application discusses testicular self-examinations and testicular cancer in a simple and meaningful way consisting of picture instructions for men to follow (Testicular Cancer Society, 2022).

When the application is downloaded to the user's phone, the application links to the user's phone calendar to help set reminders on when to perform monthly testicular self-examinations. Individuals that use Google Calendar will be able to see their monthly reminders on their desktop or laptop devices as well providing useful reminders to practice testicular self-examinations. The Ball Checker© application is compatible with Android and iPhone devices and was the only recognized application that was multilingual providing access to English and Spanish. Ball Checker© is also a free application that allows males to not worry about a financial burden.

## Methods

### *Model*

The Model of Evidence-Based Practice Change is a theory inspired by the scientific problem-solving process to assist practitioners and researchers in evaluating interventions to promote the best patient outcomes (Melnyk and Fineout-Overholt 2019). The model is composed of six steps that guide practitioners and researchers to create or promote interventions that promote positive change for their current patient population. Steps included in the process are assessing the need for change in practice, locating the best evidence, critically analyzing the best evidence, designing practice change, evaluating change in practice, and maintaining change in practice. (Melnyk and Fineout-Overholt 2019).

*Step 1: Assess the Need for Change in Practice*

The early detection of testicular cancer is vital because testicular cancer can lead to death if untreated (American Cancer Society, 2022). The first step in this process is identifying the problem and assessing the current practice guidelines regarding the issue. Current literature identified that there is a significant knowledge gap exists among men relating to testicular cancer and testicular self-examinations (Ustundag, 2019; Jahangard et al., 2019; Roy & Casson, 2017). Several guidelines highlight the current knowledge gap regarding self-testicular examination education and regulation. The organizations also promote the role of health care providers in advocating for routine screening (Testicular Cancer Society, 2022; American Cancer Society, 2022; National Testicular Cancer Society, 2022; National Cancer Institute, 2022; Testicular Cancer Foundation, 2022).

*Step 2: Locate the Best Evidence*

Once the problem has been identified, the clinician locates the best evidence to implement an intervention for the proposed problem. A thorough literature review was completed based on aspects of the clinical question: *"In male college students, how does testicular self-examination education with a reminder mobile application, as compared to no education, improve self-reports of testicular self-examination practices over a period of 45 days?"*. Twenty-five articles were considered after meeting inclusion criteria and one reminder mobile application was considered after meeting all necessary qualifications.

*Step 3: Critically Analyze the Evidence*

A synthesis table (Appendix A, Table 1) was created to evaluate the feasibility, benefits, and risks of the proposed intervention. The synthesis table also detailed each study's conceptual framework (if one was used), design and method, purpose, sample, findings, data analysis, and

strengths and limitations. Each article was categorized using the Hierarchy of Evidence (Appendix A, Table 3, Figure 9). Studies were also evaluated for quality of evidence by the GRADE system and their strength of evidence by the two SORT tools (Appendix A, Table 4, Figures 10, 11, and 12). Out of all the included articles, 16 of the 25 ranked a B recommendation based on SORT criteria meaning they provide sufficient support for the clinical question and can be used for the proposed intervention.

*Step 4: Design Practice Change*

The next step is to design an appropriate practice change intervention to resolve the identified problem. One aspect of this process is to determine outcomes and how they will be measured to evaluate feasibility. Another aspect is to implement the intervention once the Institutional Review Board (IRB) of The University of Toledo approves the project. The proposed practice change is to educate men about testicular cancer and how to perform testicular self-examinations with the Ball Checker© reminder mobile application. Educating men about testicular cancer and testicular self-examinations will help men understand and recognize the signs and symptoms of testicular cancer.

*Guideline Appraisal*

The reminder mobile application was graded on separate criteria which included if the application provided instructions on how to perform testicular self-examinations, discussed testicular cancer, had a reminder application, compatibility with other cellphone types, and was multilingual (Appendix A, Table 5). An appraisal of general guidelines for testicular self-examination was completed using the Appraisal of Guidelines for Research and Evaluation II. The results of this appraisal tool displayed that the guidelines were clear, easy to follow, and can be used as a standard of practice. More details regarding the literature and reminder mobile

application search can be found in the “Literature Review” section with tables used found in Appendix A.

*Theoretical Frameworks*

Pender’s Health Promotion Model was the guiding conceptual framework for this project. The nursing model was designed to promote health-changing behaviors after identifying patients’ negative health habits. The model suggests that people can change health habits and seek to regulate their own behavior. The HPM is related to the clinical problem because it allowed males to recognize and change their maladaptive behavior and learn a new, health-promoting behavior. It is related to the intervention because it encouraged males to advocate for their own health. Pender’s HPM suggests that individuals are willing to learn new behaviors that benefit their health. Educating males about testicular cancer and testicular self-examinations promotes the concept of health-changing behavior. The health promotion model is composed of three main aspects including individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (Pender, 2011).

The first aspect of Pender’s Health Promotion Model focuses on individual characteristics and experiences. Identifying behaviors college men had before testicular self-examination education to set a foundation for college men’s previous experiences. Previous experiences of college men may be influenced by race, culture, ethnicity, and socioeconomic status (Pender, 2011). Foundational knowledge must be obtained first before implementing the health-changing behavior that will be obtained from the Testicular Cancer Survey created by the Center for Advocacy for Cancer of the Testes International. Examples of the pre-, post-, and follow-up surveys can be found in Appendix A, Figures 14 and 15.

The second aspect of Pender’s Health Promotion Model evaluates college men’s

behavior-specific cognitions and affect. First, college men will need to value the perceived benefit of practicing testicular self-examinations for the early detection of testicular cancer. College men also need to recognize perceived barriers, self-efficacy, subjective feelings before the intervention, interpersonal influences, and situational influences. Perceived barriers to adopting testicular self-examination practices may be personal or religious. Perceived self-efficacy relates to college men's personal capability to perform testicular self-examinations successfully. Self-efficacy will be measured with reports of self-confidence in reporting the new health behavior. There are several other aspects of Pender's Health Promotion Model that will be considered although not the focus of this project. These aspects include subjective feelings before the intervention, interpersonal influences, and situational influences.

Once the initial evaluation of behavior-specific cognition and affect is completed, then the commitment to a plan of action can occur. The plan of action in this study includes testicular self-examination education. The educational intervention will increase men's knowledge of testicular cancer and the rationale for performing testicular self-examinations. A mobile reminder application will also be discussed to help promote and sustain the practice of testicular self-examinations.

After the educational intervention is completed, there may be immediate competing demands and preferences. This would include alternative behaviors that may occur after the intervention. Examples could be an unwillingness to change behaviors, a lack of understanding of the new proposed behavior, or a misinterpretation of the proposed intervention.

The final aspect of Pender's HPM is behavioral change. The desired behavioral outcome after the educational intervention is for college men to have increased knowledge of testicular cancer and have increased self-reports of testicular self-examinations. Also, college men

continue to use a mobile reminder application to help promote and sustain testicular self-examination practices. College-aged men can also spread awareness of testicular cancer, testicular self-examinations, and the mobile reminder application to their peers and primary care providers. An overview of Pender's HPM can be found in Appendix A, Figure 5.

*Step 5: Implement the Evidence-Based Project and Evaluate Practice Change*

After the project design was confirmed, the doctoral student implemented the evidence-based project supported by the current practice guidelines and the current literature review. The sample, intervention, role responsibilities, barriers, facilitators, approvals from the University of Toledo's Institutional Review Board (IRB), and project implementation timelines were magnified. Cost, process evaluation, outcomes, conclusions, and recommendations of the evidence-based project were also incorporated.

*Step 6: Maintaining Change in Practice*

Integrating and maintaining change in practice is the final step in the Model of Evidence-Based Practice Change. One aspect of this process included disseminating the results of the evidence-based project to all relevant organizations for their further research and record of testicular cancer and testicular self-examinations. After all data and outcomes have been measured, results were displayed to, the University of Toledo Office of Student Involvement and Leadership, the Testicular Cancer Society, and the Center for Advocacy for Cancer of the Testes International. Presenting results to the University of Toledo Office of Student Involvement may lead to further discussion of sustaining educational interventions focused on testicular cancer and other aspects of men's health. Annual events focused on testicular cancer and men's health could be implemented during testicular cancer awareness month in April (American Association for Cancer Research, 2022) or during men's health awareness month in June (U.S. Department of

Health and Human Services Office of Minority Health, 2022). Increased provider input and annual student testicular cancer educational events will help maintain testicular self-examination practice change.

The Testicular Cancer Society and the Center for Advocacy for Cancer of the Testes International are both interested in the results of the evidence-based practice project. Both testicular cancer societies have a magnified interest in promoting awareness of testicular cancer and increasing testicular self-examination practices in males. Results from the evidence-based practice health promotion project will provide both organizations with more information on the knowledge gap of testicular cancer, the current practice of testicular self-examinations among men, and recommendations for future educational interventions. The overall goal of the evidence-based practice health promotion project is to increase knowledge and awareness of testicular cancer and to increase the practice of testicular self-examinations for the early detection of testicular cancer. A poster of the evidence-based practice health promotion project can be found in Appendix B, Figure 5.

*Stakeholders*

The stakeholders identified in the evidence-based project are the University of Toledo College of Nursing and the University of Toledo Office of Student Involvement. The doctorial project committee is composed of the doctorial project chair Dr. Heidi Shank and two committee members including Dr. Gregory Shannon and Dr. Angela Scardina. Mr. Alex Zernechel the associate director of the University of Toledo Office of Student Involvement and Leadership, encouraged male members participating in fraternities, intramural club sports, leadership organizations, and other University of Toledo-approved clubs or organizations to participate in the EBP.

*Sample*

The project participants were a convenience sample of 10 male voluntary participants from the University of Toledo (n=10). Each participant was at least 18 years old participants and their ages ranged between 18 and 44 years. Males participating in the evidence-based practice project were healthcare-related students (pre-medical, medical, pharmacy, respiratory, nursing, etc.) and non-healthcare-related students (engineering, art, law, religion, business, etc.). Students were full-time or part-time and of the undergraduate or graduate level.

Eligible participation criteria included: 1.) voluntary consent, 2.) be at least 18 years of age, 3.) was born biologically male, 4.) a personal smartphone to access the Ball Checker© reminder mobile application, 5.) computer, laptop, or smartphone to access the pre and post surveys, 6.) English as their primary language, 7.) be currently asymptomatic of testicular cancer, and 8.) be a student at the University of Toledo. A flowchart of participant recruitment can be found in Appendix A, Figure 16.

Marketing and recruitment of the participants for the project were aided by creating electronic flyers sent by email to all qualifying participants throughout the University of Toledo. Communication with the University of Toledo Office of Student Involvement and Leadership allowed students to become more aware of the evidence-based project. The project marketing flyers used components approved by the Testicular Cancer Society and Center for Advocacy for Cancer of the Testes International (see Appendix B, Figures 1 and 2) to help with initial recruitment. Permission to use their information as promotional materials can be found in Appendix B, Figure 4. Some physical flyers were displayed across the University of Toledo campus on the main and health science campuses with approval. The University of Toledo Office of Student Involvement and Leadership also displayed university events including group

sessions, sports, and event socials on their website. Including the evidence-based project on their website helped with awareness and recruitment.

Flyers and advertisements for the evidence-based project included information relating to the purpose of the project, length of intervention, and process of the project (see Appendix B, Figures 1 and 2). More details about the project would be discussed during the educational intervention. Once the male participant was interested, then eligibility was assessed. All eligible male participants completed a written consent, asked any questions relating to the project and goals, and completed the education intervention and the pre- and post-interventional testicular cancer surveys (see Appendix A, Figures 14 and 15).

*Intervention*

The Testicular Cancer Survey inspired by the Center for Advocacy for Cancer of the Testes International survey assessed knowledge of testicular cancer and testicular self-examinations were administered first (Appendix A, Figure 14). The pre-interventional survey collected baseline knowledge before the educational intervention was implemented. Participants were given five minutes to complete the electronic pre-interventional survey on the day of the educational intervention.

Testicular self-examination education included a YouTube video titled, "How To Check Youself For Testicular Cancer – Manscaped ™ | Testicular Cancer Society" created by Manscaped ™ (2020) in partnership with the Testicular Cancer Society. The first video was selected because it provided a brief synopsis of testicular cancer and why men should perform testicular self-examinations. Also, the video provided statistics relating to testicular cancer and was less than a minute in duration.

After the introductory video, the doctoral student presented a self-created PowerPoint magnifying key aspects of testicular cancer and testicular self-examinations. The PowerPoint (see Appendix B, Figure 3) discussed basic anatomy, signs and symptoms of testicular cancer, diagnosis and treatment options for testicular cancer, and how to properly perform testicular self-examinations. The doctoral student's presentation was short, five minutes, based on the foundational understanding that current literature supports the idea of using media to provide education rather than lectures (Saab et al., 2016).

A second video titled "7 Guys Perform a Testicular Self-Exam on Camera (SFW)" created by Birchbox Grooming (2015) was displayed to provide testicular self-examination experiences from multiple men. The video was selected to provide a humor-based intervention while staying focused on testicular cancer and testicular self-examinations (Miller et al., 2021; Nabi, 2016). Throughout the video, different men demonstrated how to perform proper testicular self-examinations and explain their emotions and experiences with the technique. Some men in the video even express that they have never performed a testicular self-exam before supporting the current literature review which revealed that there is a lack of knowledge of testicular self-examinations (Tosun et al., 2020). The video was engaging to the participants and detailed all necessary steps needed to perform a proper testicular self-exam for the early detection of testicular cancer. The video was approximately four minutes.

After the second video, the doctoral student discussed how to implement the Ball Checker© reminder mobile application into their testicular health routine. Instructions on how to download and properly use the Ball Checker© mobile reminder application was also included. A final video titled "Bad for your Business - Testicular Cancer PSA with Tyler Labine" created by Thejonweinberg (2019) was presented. The video was less than a minute long providing details

on what the Ball Checker© reminder mobile application is and how important it is to perform testicular self-examinations for the early detection of testicular cancer. The video also supported the concept of using humor to provide education on serious health concerns (Miller et al., 2021; Nabi, 2016).

Limited written material including example images on how to perform testicular self-examinations (see Appendix A, Figures 3 and 4) was given to participants to not overwhelm them with print information. The entire presentation for the educational intervention took 30 minutes. A timeline for the educational intervention can be found in Appendix A, Table 7.

After completing the educational intervention, a 45-day follow-up with participants occurred via emailed Qualtrics surveys. The first interaction was the immediate post-survey using The Testicular Cancer Survey inspired by the Center for Advocacy for Cancer of the Testes International to assess gained knowledge (see Appendix A, Figure 15). The second interaction occurred 45 days after the educational intervention was completed. The second interaction assessed retained knowledge of testicular self-examination practice and if the Ball Checker© mobile reminder application was useful to sustain the practice of testicular self-examinations. The same post-survey used after the immediate intervention was used for the second follow-up interaction to monitor for sustainable consistent use among participants.

*Role Responsibilities*

Implementing the evidence-based practice project required limited assistance from staff members at the University of Toledo Office of Student Involvement and Leadership. Once all interested and eligible participants were recruited, the doctoral student obtained participant consent and implemented the educational intervention independently. The University of Toledo Office of Student Involvement and Leadership was a resource to help bring more awareness to

the evidence-based health promotion project. The University of Toledo Office of Student Involvement and Leadership's primary role was to promote the evidence-based project and assist the doctoral student in selecting an appropriate venue. The educational intervention took place in the Oak Room at the student recreation center on the University of Toledo's main campus.

*Barriers*

Barriers are aspects that can limit an evidence-based project practice project's success. Identifying these barriers and finding possible solutions can help reduce inconveniences when implementing the educational intervention. The project had the following identified barriers: various activities and class conflicts, lack of compliance with the Ball Checker© reminder mobile application, and lack of post-intervention follow-up.

To encourage participation in the educational intervention, there were incentives to participate in the project. One way to increase participation included light refreshments during the educational intervention. All attendees were entered into a raffle for a MANSCAPED ™ box, a Best Buy gift card, and an Amazon gift card.

The Ball Checker© reminder mobile application was an additional intervention along with the educational intervention to help men sustain the practice of testicular self-examinations. Lack of compliance with the Ball Checker© application may impact men's timing of performing monthly testicular self-examinations. During the educational intervention, the doctoral student advocated that men download the Ball Checker© application and connect the reminder aspect to their mobile calendars. The post-interventional survey also reminded males to download and use the Ball Checker© application to help sustain testicular self-examination practice.

Lack of post-interventional follow-up participation was also a potential barrier because, without proper follow-up, the doctoral student would not be able to properly assess the

educational interventional impact. One way used to improve post-interventional follow-up was to educate males during the educational intervention on the importance of the follow-up surveys and how the information would be used.

*Facilitators*

Facilitators were individuals that help ensure that the proposed project intervention was successfully executed. Facilitators helped the doctoral student navigate, anticipate, and unanticipated barriers of the evidence-based health promotion project. Staff from the University of Toledo Office of Student Involvement helped the doctoral student by providing venue space, awareness of the EBP, promoting the Ball Checker© reminder mobile application, and providing other resources related to the project. Other facilitators included the doctoral student, the doctoral project chair, and all committee members.

*Research Budget*

The evidence-based practice project needed financial support to ensure that the educational intervention was successful. The doctoral student was the primary financial contributor to the project. Project expenses are detailed in Appendix A, Table 6. Major project expenses were focused on promoting and incentivizing the evidence-based project with a raffle. The main prize for the raffle consisted of a MANSCAPED ™ Refined Package Shaving Set – 4ct priced at $100 (Target, 2022) and two gift cards priced at $25 each. The advertisement cost for the evidence-based practice project included free electronic flyers that were emailed to promote awareness and $100 worth of paper flyers that were posted throughout the University of Toledo's main and health science campuses.

Costs for the educational intervention were minimal. The YouTube videos, Ball Checker© reminder mobile application, and educational PowerPoint were all free. Other costs

for the educational intervention included light refreshments including fruit, cheese, vegetable, and a cracker tray ($100-$150). Qualtrics which is free for University of Toledo students were used to disseminate surveys, collect data, and perform basic data analysis. The Oak Room venue space in the University of Toledo recreation center was free.

Other proposed costs included decorations to make the evidence-based practice project more appealing, silverware, and other resources. The final project budget totaled approximately $473.

*Approval from IRB*

The University of Toledo's Institutional Review Board approved the proposed evidence-based health promotion project on October 22, 2022 before implementation occurred. Collaborative Institutional Training Initiative (CITI) completion was completed by the student as required (see Appendix A, Figure 17).

*Project Implementation Timelines*

After completing a successful project proposal defense and obtaining IRB approval, the process of establishing a venue and recruitment occurred with support from the University of Toledo Office of Student Involvement and Leadership. The time frame for establishing a venue and project awareness was one month. After one month, the one-day educational intervention was executed which lasted 30 minutes. A detailed timeline of the educational intervention and the steps of The Model of Evidence-Based Practice Change can be found in Appendix A, Tables 7 and 8.

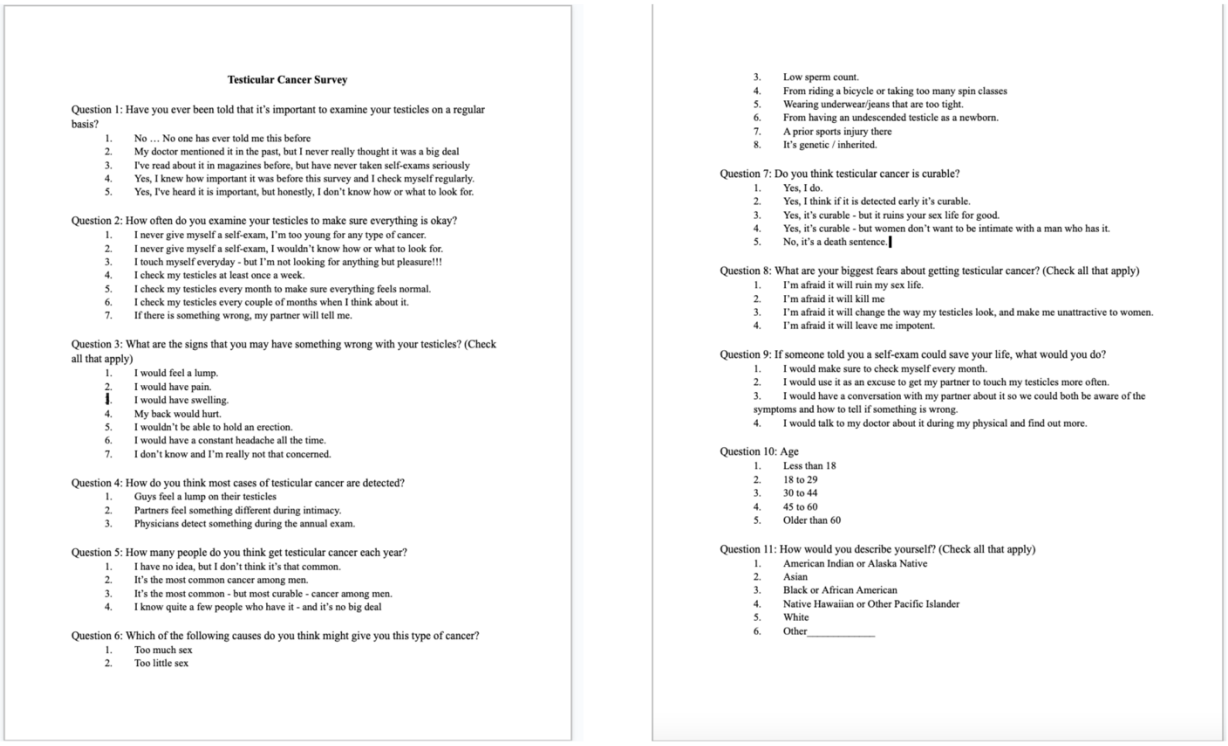
**Evaluation Process**

The outcomes of the evidence-based practice project were evaluated by pre-, post-, and follow-up interventional electronic surveys measuring testicular cancer knowledge, testicular

self-examination practice, and demographic data (Appendix A, Figures 14 and 15). There were differences among the pre-, post-, and follow-up interventional surveys with the pre-interventional survey containing more demographic information and the post- and follow-up interventional surveys containing focused information on knowledge obtained after the educational intervention. The pre-, post-, and follow-up interventional surveys were inspired and modified with permission from the Center for Advocacy for Cancer of the Testes International (Appendix B, Figure 4). Each survey collected qualitative and quantitative data. Outcome data were measured before the educational intervention (pre-interventional survey) and after the educational intervention was completed (post- and follow-up interventional survey). There were two follow-up surveys after the educational intervention was completed, one immediately after and the other 45 days later.

*Testicular Cancer Pre-Interventional Survey*

The pre-interventional survey contained 14 questions that were administered to male participants first before the educational intervention. All questions in the survey needed to be answered to submit the survey. There were 10 multiple-choice questions and 4 select-all-that-apply questions.



**Testicular Cancer Survey**

Question 1: Have you ever been told that it's important to examine your testicles on a regular basis?
1. No … No one has ever told me this before
2. My doctor mentioned it in the past, but I never really thought it was a big deal
3. I've read about it in magazines before, but have never taken self-exams seriously
4. Yes, I knew how important it was before this survey and I check myself regularly.
5. Yes, I've heard it is important, but honestly, I don't know how or what to look for.

Question 2: How often do you examine your testicles to make sure everything is okay?
1. I never give myself a self-exam, I'm too young for any type of cancer.
2. I never give myself a self-exam, I wouldn't know how or what to look for.
3. I touch myself everyday - but I'm not looking for anything but pleasure!!!
4. I check my testicles at least once a week.
5. I check my testicles every month to make sure everything feels normal.
6. I check my testicles every couple of months when I think about it.
7. If there is something wrong, my partner will tell me.

Question 3: What are the signs that you may have something wrong with your testicles? (Check all that apply)
1. I would feel a lump.
2. I would have pain.
3. I would have swelling.
4. My back would hurt.
5. I wouldn't be able to hold an erection.
6. I would have a constant headache all the time.
7. I don't know and I'm really not that concerned.

Question 4: How do you think most cases of testicular cancer are detected?
1. Guys feel a lump on their testicles
2. Partners feel something different during intimacy.
3. Physicians detect something during the annual exam.

Question 5: How many people do you think get testicular cancer each year?
1. I have no idea, but I don't think it's that common.
2. It's the most common cancer among men.
3. It's the most common - but most curable - cancer among men.
4. I know quite a few people who have it - and it's no big deal

Question 6: Which of the following causes do you think might give you this type of cancer?
1. Too much sex
2. Too little sex
3. Low sperm count.
4. From riding a bicycle or taking too many spin classes
5. Wearing underwear/jeans that are too tight.
6. From having an undescended testicle as a newborn.
7. A prior sports injury there
8. It's genetic / inherited.

Question 7: Do you think testicular cancer is curable?
1. Yes, I do.
2. Yes, I think if it is detected early it's curable.
3. Yes, it's curable - but it ruins your sex life for good.
4. Yes, it's curable - but women don't want to be intimate with a man who has it.
5. No, it's a death sentence.

Question 8: What are your biggest fears about getting testicular cancer? (Check all that apply)
1. I'm afraid it will ruin my sex life.
2. I'm afraid it will kill me
3. I'm afraid it will change the way my testicles look, and make me unattractive to women.
4. I'm afraid it will leave me impotent.

Question 9: If someone told you a self-exam could save your life, what would you do?
1. I would make sure to check myself every month.
2. I would use it as an excuse to get my partner to touch my testicles more often.
3. I would have a conversation with my partner about it so we could both be aware of the symptoms and how to tell if something is wrong.
4. I would talk to my doctor about it during my physical and find out more.

Question 10: Age
1. Less than 18
2. 18 to 29
3. 30 to 44
4. 45 to 60
5. Older than 60

Question 11: How would you describe yourself? (Check all that apply)
1. American Indian or Alaska Native
2. Asian
3. Black or African American
4. Native Hawaiian or Other Pacific Islander
5. White
6. Other_____

Question 12: Sexual Orientation
1. Heterosexual
2. Homosexual
3. Bisexual
4. Other

Question 13: College/Program of Study (Please select one)
1. Arts and Letters
2. Business and Innovation
3. Education
4. Engineering
5. Health and Human Services
6. Law
7. Medicine and Life Sciences
8. Natural Sciences and Mathematics
9. Nursing
10. Pharmacy and Pharmaceutical Sciences
11. University College

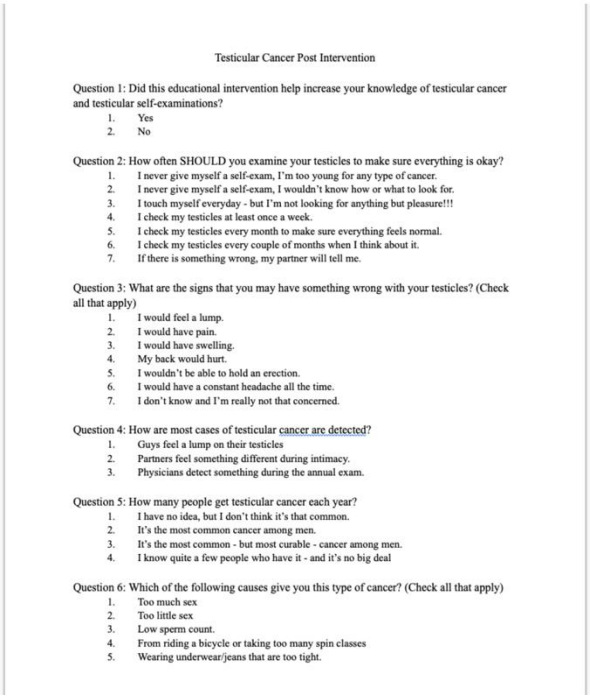
Question 14: What type of cell phone do you currently use?
1. Android
2. iPhone

The remaining five questions collected demographic data including age, race, sexual orientation, the student's program of study, and cell phone type. All demographic information was collected and used to identify correlations between demographics and knowledge of testicular self-examinations. Demographic information related to the participant's cell phone was

collected to evaluate the outcome of using the Ball Checker© reminder mobile application to help sustain the practice of testicular self-examinations.

*Testicular Cancer Post- and Follow-Up Interventional Surveys*

The post- and follow-up interventional survey contained nine questions with six multiple-choice questions, two select-all-that-apply questions, and one Likert scale question. All questions in the survey needed to be answered to submit the survey. The post- and follow-up interventional study was administered to participants immediately after the educational intervention was completed and again 45 days after the educational intervention. Some questions including wording in the post-intervention survey changed because the survey was assessing knowledge gained after the educational intervention.



Testicular Cancer Post Intervention

Question 1: Did this educational intervention help increase your knowledge of testicular cancer and testicular self-examinations?
1. Yes
2. No

Question 2: How often SHOULD you examine your testicles to make sure everything is okay?
1. I never give myself a self-exam, I'm too young for any type of cancer.
2. I never give myself a self-exam, I wouldn't know how or what to look for.
3. I touch myself everyday - but I'm not looking for anything but pleasure!!!
4. I check my testicles at least once a week.
5. I check my testicles every month to make sure everything feels normal.
6. I check my testicles every couple of months when I think about it.
7. If there is something wrong, my partner will tell me.

Question 3: What are the signs that you may have something wrong with your testicles? (Check all that apply)
1. I would feel a lump.
2. I would have pain.
3. I would have swelling.
4. My back would hurt.
5. I wouldn't be able to hold an erection.
6. I would have a constant headache all the time.
7. I don't know and I'm really not that concerned.

Question 4: How are most cases of testicular cancer are detected?
1. Guys feel a lump on their testicles
2. Partners feel something different during intimacy.
3. Physicians detect something during the annual exam.

Question 5: How many people get testicular cancer each year?
1. I have no idea, but I don't think it's that common.
2. It's the most common cancer among men.
3. It's the most common - but most curable - cancer among men.
4. I know quite a few people who have it - and it's no big deal

Question 6: Which of the following causes give you this type of cancer? (Check all that apply)
1. Too much sex
2. Too little sex
3. Low sperm count.
4. From riding a bicycle or taking too many spin classes
5. Wearing underwear/jeans that are too tight.
6. From having an undescended testicle as a newborn.
7. A prior sports injury there
8. It's genetic / inherited.

Question 7: Is testicular cancer curable?
1. Yes, I do.
2. Yes, I think if it is detected early it's curable.
3. Yes, it's curable - but it ruins your sex life for good.
4. Yes, it's curable - but women don't want to be intimate with a man who has it.
5. No, it's a death sentence.

Question 8: Have you downloaded the Ball Checker© application?
1. Yes!
2. No.

Question 9: How would you rate this educational intervention with 1 being the lowest quality and 10 being the highest quality?

Low 1 2 3 4 5 6 7 8 9 10 High

**Statistical Analysis**

The statistical analysis used to measure the outcomes of the evidence-based health promotion practice project was through Qualtrics/Excel in three specific aspects. The first aspect

was measuring data collected in the pre-interventional survey. Data contained demographic, questions relating to testicular cancer, and testicular self-examinations for the analysis. Collecting results from the pre-interventional survey set the foundation for further correlations related to testicular cancer and testicular self-examinations.

Qualtrics is a statistical analysis system supported by the University of Toledo Office of Institutional Research. The University of Toledo currently has a site license for it allowing student researchers to collect and display the outcomes of research projects. Information contained in Qualtrics is valid, reliable, and secure protecting the subject's private information. After participants submitted their surveys, information is kept in Qualtrics which can then be translated into a spreadsheet.

Quantitative data was used to evaluate knowledge of testicular cancer and testicular self-examinations. Qualitative data were used to evaluate themes on how men view testicular cancer and testicular self-examinations. Demographic information was considered to evaluate if there were correlations between testicular cancer or testicular self-examinations between age, race, sexual orientation, or the student's plan of study.

After the initial analysis of pre-interventional data was completed, post- and follow-up interventional data were collected and assessed. A two-tailed test was first completed for the pre- and post- interventional data. Another two-tailed test was completed for the pre- and follow-up interventional data and post- and follow-up interventional data.

In addition to displaying results of the pre-, post-, and follow-up interventional outcomes, correlations were calculated which did not occur in the original testicular cancer survey by the Center for Advocacy for Cancer of the Testes International. Correlations between pre and post-intervention surveys involving continuous variables were analyzed and displayed. Correlations

between post- and follow-up intervention surveys involving continuous variables were also analyzed and displayed. The addition of these correlations improved the outcome data analysis and create created a better description of men's knowledge of testicular cancer and testicular self-examinations. The level of statistical significance was set at $p < 0.5$.

Data was analyzed using the 2 tailed t-tests analysis tool in Excel. The sample size consisted of 10 male college student volunteer participants (n=10). De-identified results from the pre-interventional survey displayed a lack of knowledge of testicular cancer and how/when to perform testicular self-examinations. Immediately after the educational intervention and implementation of the Ball Checker© application, pre- and post-interventional survey comparative quantitative data analysis revealed a statistically significant increase in knowledge of testicular cancer signs and symptoms *(p*=0.43) and common causes of testicular cancer (*p*=0.43). Qualitative findings revealed most participants did not have any previous testicular self-exam training. At 45 days post-educational intervention, 100% of participants reported that they continued to use the Ball Checker© reminder mobile application to help sustain the practice of testicular self-examination practice.

**Outcomes**

*Demographics*

Demographic data were obtained from the pre-interventional survey results (Appendix C, Table 1). The entire sample consisted of ten males (n=10). The ages of participants ranged from 18 to 44 years. 80% (d=8) of participants claimed they were between the ages 18 to 29 and 20% (d=2) of participants claimed they were between the ages 30 to 44 years. 60% (n=6) of participants claimed they were Caucasian while 10% (n=1) responded to be Black or African American and 30% (n=3) responded to be Asian. 100% (d=10) of participants claimed to be

heterosexual. There was a great diversity of colleges/programs of study among participants. 10% (n=1) was from the college of arts and letters, 10% (n=1) was from the college of education, 30% (n=3) was from the college of engineering, 10% (n=1) was from the college of medicine and life sciences, 20% (n=2) was from the college of natural sciences and mathematics, and 20% (n=2) was from the college of nursing. The type of cell phone was included in the demographic analysis with 30% (n=3) of participants owning an Android phone and 70% (n=70) of participants owning an iPhone.

Subject Respondents Demographic Characteristics Pre-Interventional Survey

| Demographic | Responses n=10 | Percentage |
|---|---|---|
| **Age** | | |
| Less than 18 | 0 | 0% |
| 18 to 29 | 8 | 80% |
| 30 to 44 | 2 | 20% |
| 45 to 60 | 0 | 0% |
| Older than 60 | 0 | 0% |
| **Race/Ethnicity** | | |
| American Indian or Alaskian Native | 0 | 0% |
| Asian | 3 | 30% |
| Black or African American | 1 | 10% |
| Native Hawaian or Pacific Islander | 0 | 0% |
| White | 6 | 60% |
| Other | 0 | 0% |
| **Sexual Orientation** | | |
| Heterosexual | 10 | 10% |
| Homosexual | 0 | 0% |
| Bisexual | 0 | 0% |
| Other | 0 | 0% |
| **College/Program of Study** | | |
| Arts and Letters | 1 | 10% |
| Business and Innovation | 0 | 0% |
| Education | 1 | 10% |
| Engineering | 3 | 30% |
| Health and Human Services | 0 | 0% |
| Law | 0 | 0% |
| Medicine and Life Sciences | 1 | 10% |
| Natural Sciences and Mathematics | 2 | 20% |
| Nursing | 2 | 20% |
| Pharmacy and Pharmaceutical Sciences | 0 | 0% |
| University College | 0 | 0% |
| **Type of cell phone** | | |
| Android | 3 | 30% |
| iPhone | 7 | 70% |

*Qualitative Analysis*

Qualitative results were obtained from questions 1, 8, and 9 from the pre-interventional survey (Appendix A, Figure 14). Results from question 1 displayed most participants never heard about testicular self-examinations, one claimed that a physician mentioned testicular self-examinations before but did not take it seriously, and one claimed that he has seen testicular self-examinations in a magazine before but did not take it seriously. Results from question 8 displayed that most participants were afraid that testicular cancer would kill them, some of the participants were afraid that testicular cancer would ruin their sex life, some of the participants were afraid that testicular cancer would leave them impotent, and other participants were afraid that testicular cancer would ruin their sex life. Results from question 9 displayed that all participants would perform testicular self-examinations monthly if someone told them that performing a self-exam could save their life.

Qualitative Data Analysis from Pre-Interventional Survey

| Question | Responses (n=10) | Percentage |
|---|---|---|
| **Have you ever been told that it's important to examine your testicles on a regular basis?** | | |
| No… No one has ever told me this before. | 8 | 80% |
| My doctor mentioned it in the past before, but I have never really thought it was a big deal. | 1 | 10% |
| I've read about it in magazines before, but have never taken self-exams seriously. | 1 | 10% |
| Yes, I knew how important it was before this survey and I check myself regularly. | 0 | 0% |
| Yes, I've heard it is important , but honestly, I don't know how or what to look for. | 0 | 0% |
| **What are your biggest fears about getting testicular cancer? (Check all that apply)** | | |
| I'm afraid it will ruin my sex life. | 4 | 40% |
| I'm afraid it will kill me | 8 | 80% |
| I'm afraid it will change the way my testicles look, and make me unattractive to women. | 0 | 0% |
| I'm afraid it will leave me impotent. | 4 | 40% |
| **If someone told you a self-exam could save your life, what would you do?** | | |
| I would make sure to check myself every month | 10 | 100% |
| I would use it as an excuse to get my partner to touch my testicles more often. | 0 | 0% |
| I would have a conversation with my partner about it so we could both be aware of the symptoms and how to tell if something is wrong. | 0 | 0% |
| I would talk to my doctor about it during my physical and find out more. | 0 | 0% |

*Quantitative Analysis*

Detailed results from the pre-, post-, and follow-up interventional surveys can be found in Appendix C tables 1, 2, and 3. Each survey displayed increased testicular cancer and testicular self-examination knowledge with each consecutive survey.

*Pre- and Post-Interventional Comparative Results*

| **Paired Differences Pre- and Post-Interventional Surveys** | | | | | | |
|---|---|---|---|---|---|---|
| **N=10 for all pairings** | | | | | | |
| | | | | **Paired T-Test** | | |
| Pair 1 | | **Mean** | **Standard Deviation** | ***t*** | ***df*** | ***p*-value (two-tailed)** |
| Question 2 | Pre-Test | 1.43 | 2.3 | 0 | 6 | 1 |
| | Post-Test | 1.43 | 3.78 | | | |
| | | | | | | |
| Pair 2 | | | | | | |
| Question 3 | Pre-Test | 5.57 | 4.39 | 0.85 | 6 | 0.43 |
| | Post-Test | 4.86 | 5.01 | | | |
| | | | | | | |
| Pair 3 | | | | | | |
| Question 4 | Pre-Test | 3.33 | 0.58 | 0 | 2 | 1 |
| | Post-Test | 3.33 | 5.77 | | | |
| | | | | | | |
| Pair 4 | | | | | | |
| Question 5 | Pre-Test | 2.5 | 3.32 | 0 | 3 | 1 |
| | Post-Test | 2.5 | 3.32 | | | |
| | | | | | | |
| Pair 5 | | | | | | |
| Question 6 | Pre-Test | 3.13 | 2.36 | 0.43 | 7 | 0.68 |
| | Post-Test | 2.75 | 3.61 | | | |
| | | | | | | |
| Pair 6 | | | | | | |
| Question 7 | Pre-Test | 2 | 2.55 | 0 | 4 | 1 |

*Pre- and Follow-Up Interventional Comparative Results*

| **Paired Differences Pre- and Follow-Up Interventional Surveys** | | | | | | |
|---|---|---|---|---|---|---|
| **N=10 for all pairings** | | | | | | |
| | | | | **Paired T-Test** | | |
| Pair 1 | | **Mean** | **Standard Deviation** | ***t*** | ***df*** | ***p*-value (two-tailed)** |
| Question 2 | Pre-Test | 1.43 | 2.3 | 0 | 6 | 1 |
| | Follow-Up Test | 1.43 | 3.78 | | | |
| Pair 2 | | | | | | |
| Question 3 | Pre-Test | 5.57 | 4.39 | 1.8 | 6 | 0.12 |
| | Follow-Up Test | 4.29 | 5.35 | | | |
| Pair 3 | | | | | | |
| Question 4 | Pre-Test | 3.33 | 0.58 | 0 | 3 | 1 |
| | Follow-Up Test | 2.5 | 5 | | | |
| Pair 4 | | | | | | |
| Question 5 | Pre-Test | 2.5 | 3.32 | 0 | 3 | 1 |
| | Follow-Up Test | 2.5 | 5 | | | |
| Pair 5 | | | | | | |
| Question 6 | Pre-Test | 3.13 | 2.36 | -0.73 | 7 | 0.49 |
| | Follow-Up Test | 3.89 | 4.85 | | | |
| Pair 6 | | | | | | |
| Question 7 | Pre-Test | 2 | 2.55 | 0 | 4 | 1 |
| | Follow-Up Test | 2 | 4.47 | | | |

*Post- and Follow-Up Interventional Comparative Results*

**Paired Differences Post- and Follow-Up Interventional Surveys**
**N=10 for all pairings**

| | | | | Paired T-Test | | |
|---|---|---|---|---|---|---|
| Pair 1 | | **Mean** | **Standard Deviation** | ***t*** | ***df*** | ***p*-value (two-tailed)** |
| Question 1 | Post-Test | 5 | 7.07 | NaN | 1 | NaN |
| | Follow-Up Test | 5 | 7.07 | | | |
| Pair 2 | | | | | | |
| Question 2 | Post-Test | 1.43 | 3.78 | NaN | 6 | NaN |
| | Follow-Up Test | 1.43 | 3.78 | | | |
| Pair 3 | | | | | | |
| Question 3 | Post-Test | 4.86 | 5.01 | 1 | 6 | 0.36 |
| | Follow-Up Test | 4.29 | 5.35 | | | |
| Pair 4 | | | | | | |
| Question 4 | Post-Test | 3.33 | 5.77 | NaN | 3 | NaN |
| | Follow-Up Test | 2.5 | 5 | | | |
| Pair 5 | | | | | | |
| Question 5 | Post-Test | 2.5 | 3.32 | 0 | 3 | 1 |
| | Follow-Up Test | 2.5 | 5 | | | |
| Pair 6 | | | | | | |
| Question 6 | Post-Test | 2.75 | 3.61 | -0.85 | 7 | 0.43 |
| | Follow-Up Test | 3.89 | 4.85 | | | |
| Pair 7 | | | | | | |
| Question 7 | Post-Test | 2 | 3.46 | NaN | 3 | NaN |
| | Follow-Up Test | 2 | 4.47 | | | |
| Pair 8 | | | | | | |
| Question 8 | Post-Test | 5 | 7.07 | NaN | 1 | NaN |
| | Follow-Up Test | 5 | 7.07 | | | |

## Limitations

There were several limitations to the evidence-based practice health promotion project which may have affected outcome results. The sample size was small with 10 subjects participating. The reduced sample size limits the generalizability of the results of statistical analysis of the pre-, post-, and follow-up interventional surveys. Also, having a reduced sample size limited the demographic diversity of subjects including their age, race/ethnicity, sexual orientation, college/program of study, and their type of cell phone.

Another limitation that may have affected participation was the timing of the in-person educational intervention. Although the educational intervention was promoted through the University of Toledo to all male college students, there were other major events occurring on the same day of the project. The largest event that occurred that day was the University of Toledo homecoming football game. Potential subjects could have been more interested in university homecoming events limiting the sample size.

The educational intervention was only an in-person event which could have been a limitation for male students unable to attend the event. A virtual option could have increased participation with male students watching videos and evaluating the PowerPoint presentation online. The pre-, post-, and follow-up surveys could have still been completed in an appropriate timeframe with a virtual option.

The timeframe of data collection could have been a limitation with the project lasting 45 days. Subjects during that period were able to perform one testicular self-examination with assistance from the Ball Checker© application. A longer data collection period would allow the researcher to analyze better subject sustainability of testicular self-examinations.

**Discussion**

Results from the pre-interventional survey agreed with the current literature review claiming that college males lack knowledge of testicular cancer and testicular self-examinations (Tosun, Gul, & Arikan, 2020; Gutema et al, 2020, Salati, 2019; Ustundag, 2019). Many subjects in the project claimed to never even hear about testicular self-examinations correlating to Roy and Casson's (2017) study. Male students in healthcare-related programs including medicine and life sciences, natural sciences and mathematics, and nursing had limited knowledge of testicular

cancer and testicular self-examinations correlating to the study performed by Gutema et al. (2020).

Nearly all participants who completed the pre-interventional survey had a general idea of testicular cancer's major signs and symptoms.

Qualitative results from the pre-interventional survey demonstrated that most participants never heard about testicular self-examinations. Participants that did have knowledge of testicular self-examinations did not take it seriously. Only 1 student heard of testicular self-examinations from a healthcare professional corresponding to Saab, Landers, & Hegarty's (2016) study. Sexual dysfunction was a common theme for participants when asked about their biggest fears of testicular cancer. All participants were either afraid of death or sexual dysfunction (ruined sex life or impotence) if diagnosed with testicular cancer. When participants were asked what they would do if someone told them a testicular self-examination could save their life, all participants agreed to perform self-exams monthly. The concept of learning about testicular cancer and increases in performing testicular self-examinations corresponds to Umeh and Chadwick's (2016) study of self-efficacy.

Results from the post-interventional survey demonstrated new knowledge of testicular cancer and testicular self-examinations. All participants agreed that the educational intervention was beneficial to increase knowledge of testicular cancer and testicular self-examinations. Also, all participants agreed that the educational intervention was of high quality. Significant knowledge improvement was obtained in how often testicular self-examinations should be performed, signs and symptoms of testicular cancer, testicular cancer detection, incidence, and prognosis. All participants successfully downloaded the Ball Checker© application to their mobile devices.

The post- and follow-up interventional surveys did display a continued variety of answers for question 6, but the overall knowledge of causes of testicular cancer remained constant. Some participants continued to believe that a sports injury can cause testicular cancer even after the educational intervention. Future testicular self-examination educational interventions can provide more details that sports injuries are not a common cause of testicular cancer.

The initiated educational intervention along with the Ball Checker© reminder mobile application did increase the knowledge of testicular cancer and the practice of males performing testicular self-examinations. The Ball Checker© reminder mobile application did help in retaining knowledge of testicular cancer and in sustaining the practice of testicular self-examinations 45 days after the educational intervention.

**Recommendations**

The evidence-based health promotion project aimed to increase testicular self-examination practices in male college students and increase their knowledge of testicular cancer. The main purpose was to investigate if an educational intervention along with the Ball Checker© mobile reminder application was beneficial to increase self-reports of testicular self-examinations and increase knowledge of testicular cancer.

Incorporating the Ball Checker© reminder mobile application and the educational intervention helped sustain the practice of testicular self-examinations for this at-risk population. The evidence-based health promotion project was able to fulfill its purpose of increasing men's practice of performing testicular self-examinations for the early detection of testicular cancer. Also, the evidence-based health promotion project was able to reduce the testicular cancer knowledge gap allowing men to recognize early signs and symptoms of testicular abnormalities.

The doctoral student plans to disseminate project findings with the University of Toledo College of Nursing, the University of Toledo Office of Student Involvement and Leadership, the Center for Advocacy for Cancer of the Testes International, and the Testicular Cancer Society. The University of Toledo College of Nursing and the University of Toledo Office of Student Involvement and Leadership may use research findings to promote testicular self-examinations for their male students and as a model for future health promotional events. Also, the Center for Advocacy for Cancer of the Testes International and the Testicular Cancer Society may use these findings to continue their research and promotion of testicular self-examinations. Research design and findings are planned to be presented at the Ohio Public Health Conference involving the Ohio Department of Health, Ohio Public Health Association, the Ohio Society for Public Health Education, and the Association of Ohio Health Commissioners. Testicular cancer screenings are a public health issue that should be promoted to all males that have reached puberty.

Future testicular cancer educational intervention events can be held on university campuses throughout Ohio and beyond. Educational events could be promoted in high schools throughout Toledo and surrounding Ohio areas. Stronger partnerships with the Center for Advocacy for Cancer of the Testes International and the Testicular Cancer Society may allow testicular self-examinations education to be brought to larger male audiences throughout the United States.

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Appendix A

Table 1.

*Synthesis of Evidence*

| Citation and Title | Conceptual Framework | Design/Method | Sample/Setting | Major Variables Studied | Measurement | Data Analysis | Findings | Strengths & Limitations |
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| (Akers, 2018) Aetiology, clinical presentation, and treatment of testicular cancer. | The Code: Professional Standards of Practice and Behavior for Nurses and Midwifes | Systematic Review Purpose: Improve healthcare providers' understanding of the clinical presentation, treatments, and epidemiology of testicular cancer. | N/A | Epidemiology Pathology Clinical presentation Treatments | Meta-analysis of various databases. | N/A | Testicular cancer is most common in males between 15 and 35 years of age. Nurses should be responsible to teach and educate males about the signs and symptoms of testicular cancer. They should also teach testicular self-exams. Survivors of testicular cancer may still need emotional and mental support after their treatment is completed. | S: Provides an overview of testicular cancer including the presentation, diagnosis, and treatment. Supports the use of testicular self-examinations as a health practice method. L: Not an experimental study and does not provide a specific educational recommendation to promote the practice of testicular self-examinations. |
| (Avci, & Altinel, 2018) The validity and reliability of health belief scale for testicular cancer self-examination. | The health belief model | Methodological and cross-sectional study. Purpose: Create a measurement tool to evaluate the health | 425 university students. Students age ranged from 17 to 40. | Susceptibility, seriousness, benefit, barriers, self-efficacy in self- | Data was obtained using an interview form containing questions about descriptive characteristics and | The Kaiser-Meyer-Olkin and Barlett tests. The IBM SPSS 21.0 program was | Students do not have sufficient knowledge about testicular cancer. They also rarely perform testicular | S: The health belief model can be used to assess the reasons why men do not perform testicular self-examination or lack |

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| | | beliefs about testicular cancer and testicular self-examinations | | examination practices, and health motivation. | knowledge and practice of self-examination. | used to analyze data. Psychometric measurements were factored by the Cronbach's alpha reliability analysis | self-examinations. Study resulted that 88.6% of participants never heard of testicular cancer while 63% never learned about self-examination. | knowledge of testicular cancer. Suggests healthcare professionals educate men about TC and TSE.<br>L: Study was performed once. Study did not distinguish if some men were medical or non-medical students. |
| (Boarin et al., 2019) Knowlsdge and awareness of self-examination among young men for testicular cancer primary prevention, | None | Systematic Review Purpose: To evaluate interventions for primary prevention of testicular cancer | 18 studies were included. | Critical reading of articles, data extraction, and evidence synthesis | Preferred Reporting Items for Systemic Reviews and Meta-Analysis (PRISMA) | Literature review from databases including CINAHL, Cochrane Library, Embase, Pubmed, and Scopus. | There is a knowledge gap and lack of awareness of TC and TSE. Very few males have ever performed TSE. Some men feel that TSE is an invasion of their privacy and masculinity. Most effective tools recognized are television, radio, and YouTube. | S: Systematic review providing interventions to support the educational intervention of TC and TSE.<br>L: Does not provide information on which educational intervention was most effective. |
| (Braga et al., 2017) Testicular cancer awareness and knowledge: Is it the same? Exploratory study in a mixed-gender population | None | Exploratory study Purpose: to compare and evaluate awareness for TC and TSE in males and females. | 815 participants. 507 male and 308 female. All participants were public university students. Age range 16-35 years of age | Awareness and knowledge of TC and TSE. | Questionnaires and surveys containing 17 questions regarding TC and TSE. | SPSS version 19.0. Chi-square and Mann-Whitney tests were used for categorical variables with significance of 0.05. | Although there may be good awareness of TC and TSE, there is a significant lack of correct knowledge about the disease. Even in a population considered more educated, women had a better understanding of the condition than | S: Displays there is a lack of knowledge and awareness of testicular cancer and testicular self-examination practice. Includes both genders which adds to the idea that there is a need of more testicular self-examination education.<br>L: Does not provide details as to why there is a lack of |

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| | | | | | | | men. Educational interventions are suggested for accurate information about TC and TSE | understanding of TC even in a more educated population. |
| (Dhakal, Paudel, & Paudel, 2021) Knowledge, Attitude, and Practice regarding testicular cancer and testicular self-examination among male students pursuing bachelor's degree in Bharatpur Metropolitan City, Chitwan, Nepal | None | Cross-sectional analytical study Purpose: To assess the knowledge, attitude, and practice concerning TC and TSE among college students obtaining a bachelor's degree. | 402 college students in the Bharatpur Metropolitan City. Age ranged from 16 to 37. | Knowledge and attitude of TC. Practice of TSE. | Surveys were used in various formats including Viber, Messenger, and Emails. | Data was collected in SPSS version 22 and analyzed using the Chi-square test, Pearson's correlation, and binary logistic regression | Knowledge of TC and TSE was low. Due to the knowledge gap of TC and TSE, early detection of TC is low. TSE is recommended for the early detection of testicular cancer | S: Large sample size. Focuses on male students attending a college or university. Clarifies that male students obtaining a bachelor's degree still lack knowledge of testicular cancer and testicular self-examinations L: Did not clarify if there was knowledge difference between medical or non-medical students. Study did not take place in the USA. |
| (Gutema et al., 2018) Testicular self examination among Bahir Dar University students: Application of integrated behavioral model | Integrated Behavioral Model | Cross-sectional study Purpose: Assess the practice and knowledge of TC and TSC among students at Bahir Dar University | 884 participants attending Bahir Dar University. | Demographics, knowledge, TSE, intention, attitude, norm, perceived control, and self-efficacy. | Self-administered questionnaire among students online. | SPSS 21 was used for analysis. Path analysis was completed using STATA 14.2. Internal reliability was analyzed using Cronbach's alpha | About 11.8% of participants performed TSE in the previous year. Self-efficacy has a significant impact on the intent of an induvial to preform TSE. Intention and knowledge were the most significant factors to influence males to perform TSE. | S: Claims that although testicular cancer is rising, there is still little effort on screening for testicular cancer or educating patients on testicular self-examinations. Supports the use of testicular self-examinations. Focuses on college and university male students. L: Study did not take place in the USA. |

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| (Hatchfeld, MacWilliams, & Schmidt, 2016) Physical awareness a key to improving adolescent male health: A grounded theory study of the perception of testicular self examination in male student athletes | The Glaserian or classic grounded theory (CGT) | Cohort study<br>Purpose: Explore the view of TC awareness from the student athlete perspective. | 23 male student athletes from the University of Wisconsin. | Awareness and knowledge of TC and TSE. | Qualitative data was obtained from focus groups and interviews. | Theoretical sampling to compare the coded interviews with literature. Followed by selective coding, delimiting memoing, and theory emerge3nce | Students view injury or illness as an obstacle from preforming well in sports. Physical awareness increases the intent and motivation to learn and sustain the practice of TSE. | S: Focuses on male student athletes and how they are more willing to learn proper testicular self-exam techniques compared to non-athlete male students. More physical awareness increases testicular self-examinations. Supports male practice of testicular self-examination.<br>L: Small sample size. Does not distinguish what students were majoring in college. |
| (Jahangard et al., 2019) Risky behaviors and health-promoting behaviors in young adults: An. Epidemiological study | None | Cross-sectional epidemiological study<br>Purpose: To assess health risk behaviors and their factors in college level students. | 800 undergraduate students. 400 male and 400 female. All undergraduate college level students. | Substance use, physical activity, eating habits, risk taking behaviors, and self-care. | International Health and Behavior Study (IHBS) Questionnaire. Breslau's 7-Item Screening Test for Posttraumatic Stress Disorder (PTSD. The Alcohol Use Disorder Identification Test-Consumption (AUDIT-C) | Informaiton was obtained using a chi-square test. Multivariate logistic regression was used between variables. Data was analyzed using SPSS 22.0 with the significance level set at $p<0.05$. | Only 8.5% of the 400 men claimed they performed TSE. Numerious factors affect positive and negative health behaviors including attitudes, legal constraints, and social context. A lower health literacy tends to lead to more negative health behaviors. | considers testicular self-examinations as health promoting behaviors. Supports the male practice of testicular self-examinations. There is a lack of self-care behaviors (testicular self-examinations) that needs to be addressed for early detection of certain diseases including testicular cancer. Focuses on the younger adult population.<br>L: Does not provide a specific educational intervention to increase |

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| (Jeihooni et al., 2021) The effect of educational intervention based on health belief model and social support on testicular self-examination in sample of Iranian men | Health Belief Model | Quasi-experimental study<br>Purpose: Examine the effect of an educational intervention based on the health belief model and social support on testicular self-examinations in men. | 200 men (100 in experimental and 100 in control group) Men aged between 15 to 35 years-of-age in Fasa city, Iran. | Demographic information, knowledge, HBM construct, and social support. | Questionnaires were administered to the patient population | Data was analyzed using the SPSS-22 via chi-squared, independent samples t-test, and Mann-Whitney test. Results were then repeated with ANOVA at a significance level of 0.5. | The HBM displayed to be effective in increasing compliance of TSE. The HBM can be used when designing and implementing educational interventions for testicular cancer and testicular self-examinations. | focuses on young adult males. Increased knowledge and practice of testicular self-examination occurred after educational intervention (3 months later). Supports use of testicular self-examination.<br>L: Smaller sample size. Study did not take place in the USA. |
| Miller et al. (2021) A systematic review of humour-based strategies for addressing public health priorities. | None | Systematic Review<br>Purpose: Review humor-based strategies addressing health concerns. | N=13 studies<br>Setting: all settings were included (examples universities, school, online) | At least one behavioral or health variable assessed after intervention. An intervention such as testicular self-examinations. | N/A | Preferred Reporting Items for Systematic Reviews and Meta-Analysis. | Literature supports the idea of humor-based interventions for healthcare concerns that have stigmas depending on the audience's characteristic | S: Humor based approaches have a positive impact on individuals when addressing public health concerns.<br>L: Small sample of literature was used. |
| (Nabi, 2016), Laughing in the face of fear (of disease detection): Using humor to promote cancer self-examination behavior | Extended Parallel Process Model | Cross-sectional study<br>Purpose: to examine the possible benefits of using humor to decrease anxiety when learning or performing TSE. | 1,187 undergraduate students. | Issue relevance, perceived knowledge, attitude toward performing a self-exam, | 7-point questionnaires and surveys. Humorous public service announcement (PSA) | Root Mean Square Error of Approximation (RMSEA) | Humor can be used to help reduce anxiety of testicular cancer and promoting the practice of testicular self-examinations. | S: focuses on the young adult male population. Supports the male practice of testicular self-examinations. Humor can be added with an educational intervention to increase |

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| | | | | message humorousness, intent to perform a self-exam, and anxiety | | | Humor can be used to attract attention to serious topics including TC and TSE. | compliance of testicular self-examination and increase knowledge of testicular<br>L: Lack of follow up to determine if humor can promote sustained practice of TSE |
| (Rovito et al., 2021) The association between testicular self-examination and stages of testicular cancer diagnosis: A cross-sectional analysis | None | Cross-sectional study<br>Purpose: To examine the relationship between performing routine TSE and the stage of diagnosis for TC survivors. | 619 TC survivors all at least 18 years and older. | Awareness, knowledge, and TSE confidence | 40 item surveys were completed | Bivariate analysis including Spearman Rho correlations of all considered variables. Multivariate analysis performed for logistic regression to determine stage diagnosis predictors. | There is an indirect relationship between TC and TSE. Individuals that performed routine TSE were more likely to have early detection of testicular cancer than males that did not perform TSE. | S: Supports the idea that testicular self-examinations can help with early detection of testicular cancer. Focuses on the young adult male population. Supports the male practice of testicular self-examinations. |
| (Rovito et al., 2018) Developing the "Control Idenity" typology to create a more effective testicular health promotional messaging. | None | Cross-sectional research design<br>Purpose: To integrate the Control Identify personality typology to create more effective TSE promotional interventions. | 300 university males between ages 18 and 35 years of age. | Perceived health outcome, perceived vulnerability, perceived value of general promotion, and intention to perform TSE. | 41-item survey Control Identify Assessment Scale and Multidimensional Health Locus of Control Survey. | Five-factor structure matrix served as the study's foundation. Reliability and validity measures used Barlett's test and Kaiser-Meyer-Olkin. Cronbach's alpha was used to each construct of this study | Most men were not aware of TC and TSE. Men have different perspectives of TC and TSE. Recommend that health educators, counselors, and practitioners educate and promote the practice of TSE. | S: Focuses on the young male adult population. Supports the male practice of testicular self-examinations. Supports the idea that testicular self-examinations help with the detection of testicular cancer. Encourages that healthcare professionals educate patients about practicing |

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| | | | | | | | | testicular self-examinations.<br>L: Limited sample size Lack of follow up on typology to sistain practice of TSE. |
| (Rovito et al., 2018) Recommendations for treating males: An ethical rationale for the inclusion of testicular self-examination (TSE) in a standard of care | None | Systematic Review<br>Purpose:<br>To promote healthcare practitioner to advocate TSE as a standard of care for males as a screening method for the early detection of testicular cancer | None | Need of an TC risk assessment, arguments against TSE, arguments for TSE. | USPSTF guidelines | Compared various studies including "Men's Health Checklist" by the American Urological Association to the current recommendation of USPSTF. | Although the USPSTF does not clearly promote the practice of TSE and ranks it as a D, healthcare providers should use their own ethics to provide positive health promoting techniques including TSE for early detection of testicular cancer. | S: Supports the idea that there is a lack of knowledge about the practice of testicular self-examinations. Claims that testicular self-examinations should become a standard of care for the early detection of testicular cancer in young male adults<br>L: Is not an experimental study. Does not provide a specific educational intervention to promote TSE or TC |
| (Roy & Casson, 2017) Attitudes toward testicular cancer and self-examination among Northern Irish males | Health Belief Model | Cross-sectional study design<br>Purpose:<br>To establish baseline knowledge of TC and TSE among Northern Irish males. | 150 men aged 18 to 45 years | Knowledge, awareness, and attitudes | Online survey questionnaires consisting of 20 item questions. | Not one specific research instrument was used for knowledge, attitude, or awareness. Reailibility was evaluated using Cronbach's alpha. | Only 11% of men considered themselves at risk for TC. Forty-four percent of males considered self-exams important. Twenty-one percent of participants felt more than somewhat confident in performing TSE. Targeted | Focuses on the young male adult population. Supports the idea of health promoting behaviors. Assessed the participants' ideas and attitudes of testicular self examinations.<br>L: Study did not take place in the USA. Limited sample size. |

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| | | | | | | | educational interventions are needed to educate men about TC and TSE. | |
| (Saab, Landers, & Hegarty, 2016) Testicular cancer awareness and screening practices: A systematic review | None | Systematic Review Purpose: Appraise evidence that explored men's knowledge, awareness, and attitudes toward TC and TSE. Also, evaluated practice of TSE, barriers, and facilitators to the practice. | 25 articles met inclusion criteria from MEDLINE ®, CINAHL®, and EMBASE ®. | Knowledge, awareness, and attitude. Barriers and facilitators to TSE practice. | N/A | Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) | Although males may have heard of TC, many do not know the risk factors, signs and symptoms, and treatment for TC. There was very low practice of TSE with many men believing that is a screening technique for their clinician. Educational interventions are needed to bring more awareness and know of TC and TSE. | S: Supports the use of an educational intervention to increase testicular self-examination practice. Compiles other studies to evaluate how to increase testicular self-examinations. L: Small sample size of studies were considered. No specific educational intervention was noted to increase awareness and knowledge of TC and TSE. |
| (Saab, Landers, & Hegarty, 2016) Promoting testicular cancer awareness and screening a systematic review of interventions | None | Systematic Review Purpose: To review studies that were conducted to increase men's understanding of TC and TSE. | 11 studies met inclusion criteria from MEDLINE ®, CINAHL®, and EMBASE ®. | Knowledge, awareness, and increased practice of TSE | N/A | Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) | There is a significant deficit in TC knowledge. Lack of education is the primary reason why men do not perform TSE. Television, physician-led presentations, and other forms of mass medica can be used to increase awareness and | S: Supports the idea that healthcare providers should encourage the practice of testicular self-examinations. Supports the idea that an educational intervention is the best method to support testicular self-examinations. |

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| | | | | | | | knowledge of TC/TSE. | |
| (Saab, Landers, & Hegarty, 2018) Males' awareness of benign testicular disorders: an integrative review | None | Integrative review<br>Purpose:<br>To explore awareness of benign testicular disorders | 4 articles met inclusion criteria from databases consisting of MEDLINE ®, CINAHL®, PsychINFO ®, and EMBASE ®. | Knowledge, awareness, attitude, and help-seeking behaviors if a man comes across scrotal abnormalities. | N/A | Data was reviewed using Cohen's alpha. A score of 0.89 was considered satisfactory. | Two of the included studies displayed that although men were aware of TC, only 54% and 50% of men understood the reason behind genital examination. Very few men in all included studies claim that they would seek help if they noticed scrotal swelling. One of the included studies displayed that only 43% of men understood the seriousness of scrotal pain. | S: Supprtts the concept that there needs to be an education intervention to increase knowledge of testicular health among men. Men lack knowledge of benign and malignant signs and symptoms of testicular disorders.<br>L: Study primary focuses on benign testicular disorders. |
| (Salati, 2019) Awareness about testicular cancer and testicular self-examination (TSE) in Indian expatriates in the Middle East. | None | Cross-sectional survey<br>Purpose:<br>To assess awareness of TC and practice of TSE in the Middle East. | 1000 men of Indian origin | Demographic data, epidemiology, possible symptoms of localized and metastatic TC, and technique performing TSE | 12 question questionnaires were administered to the participants. | Data was analyzed using SPSS for Windows version 11.5 | Awareness was generally poor. Recommend that healthcare providers educate males about TC and TSE. Only 7% of males heard about TSE with only 1% having good awareness of TC. Even individuals at the college level | S: Supports the idea that there is a lack of knowledge of testicular cancer and testicular self-examinations. Practice of testicular self-examinations was essentially "non-existent". Focuses on the young male adult population. Supports the idea that an educational intervention is needed to increase |

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| | | | | | | | displayed a knowledge gap with TC and TSE. Ninety-seven percent of men do not perform TSE because they forget how after being taught. | knowledge of testicular cancer and testicular self-examinations.<br>L: Study did not take place in the USA. Study primarily only focuses on one specific group of individuals (individuals of Indian descent). |
| (Selvi, Baydilli, & Akinsal, 2020) Can YouTube English videos be recommended as an accurate source for learning about testicular self-examination? | None | Cross-sectional study<br>Purpose:<br>To evaluate if YouTube videos are reliable and provide enough content to teach men about TSE | 123 YouTube videos met inclusion criteria | Two distinct groups were created including useful information and misleading information. | N/A | 5-point modified Global Quality Score was used to evaluate quality, the 7-point scale was used for comprehensiveness of videos, and the DISCERN tool was used for reliability. | YouTube was found to have a more positive effect on displaying information about TC and TSE than Facebook, Twitter, or other media platforms. Encourage healthcare professionals to use YouTube as part of an educational intervention to promote awareness of TC and TSE. | S: Supports the idea that an educational intervention is needed to increase the practice of testicular self-examinations. YouTube videos can be used an educational source of information to increase awareness and knowledge of testicular self-examinations. Videos from YouTube can also be used to increase knowledge of testicular cancer.<br>L: Only English videos were considered. There was no specific video that was recommended more than another for an educational intervention. |
| (Tosun, Gul, & Arikan, 2020) Awareness of testicular cancer and healthy lifestyle | None | Cross-sectional study<br>Purpose: | 410 male students in health-related science fields. | Knowledge, attitudes, and behaviors related to TC and TSE | Socio-demographic questionnaire. An 18-question questionnaire was also used. The Healthy Lifestyle | SPSS for Windows 23 was used for statical analysis. Kruskall Wallis and Mann | Only 25.^% of males understood that TSE should be performed once a month. The highest influences | S: Includes college and university male students. Supports the idea that an educational intervention is |

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| behaviors in male college students | | | | | Behavior Scale – II consisting of 52 items were used for overall health practices of participants. | Whitney U tests were also used. Significance level of 0.05 was accepted. | of healthy behaviors were spiritual development and interpersonal relationships. Stress management and physical activity were low influences of healthy behaviors | needed to increase knowledge of testicular cancer and testicular self-examination.<br>L: Study did not take place in the USA. |
| (Umeh & Chadwick, 2016) | Health Belief Model | Controlled trial without randomization<br>Purpose:<br>To evaluate the interaction between self-efficacy, vulnerability, and severity of TSE in young asymptomatic men. | 128 undergraduate men between ages 18 and 35 in the United Kingdom | Vulnerability, severity, and self-efficacy. | 22-item questionnaire was administered to participants | ANOVA and MANOVAwas used to measure variables. | Results displayed that 41.4% of men never performed TSE in the past 12 months. Most men perceived themselves to have low vulnerability and severity to TC. Most men displayed high levels of self-efficacy which could conflict with results understanding most peen do not consider TC in their lives. | S: focuses on the young male adult population. Focuses on self-efficacy of testicular self-examinations. Supports the male practice of testicular self-examinations for the early detection of testicular cancer. Supports the idea that healthcare providers should encourage the practice of testicular self-examinations to their patients.<br>L: Study did not take place in the USA. The study had a small sample size. Study did not separate students from medical or non-medical. |
| (Ustundag, 2019) Assessment of the testicular self-examination knowledge and | Health Belief Model | Descriptive study<br>Purpose:<br>Identify knowledge and practice of TC and TSE among | 262 male health science students in Turkey. | Sensitiveness, seriousness, benefits, barriers, and self-efficacy | Socio-demographic form and Turkish version of Champion Health Belief Model Scale | Kruskal Wallis test and Mann Whitney-U tests were completed. | Results displayed 42% claimed that their knowledge of TC came from the internet or | S: Includes males from colleges or universities. Focuses on health science students. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Health Belief Model of health science students | | health science students | | | | | social media. More than 80% of participants did not know how to perform TSE and 74.4% of men did not take self-examination seriously. | supports the idea that there is a lack of knowledge relating to testicular cancer and testicular self-examinations. Sup ports the male practice of testicular self-examinations for the early detection of testicular cancer.<br>L: Study did not take place in the USA. Study primarily focused on health science students excluding non-health related students. |
| (Uyar, Yildirm, & Kemal, 2019) Evaluation of testicular self-examination technique and testis cancer knowledge levels of final-year medical students | None | Cross-sectional study | 202 final-year medical students participated | Socio-demographic, TSE technique, and knowledge about TC and TSE, | Data collection questionnaire form consisting of 29 questions | SPSS 24 was used for data analysis. McNemar test was used for categorical data. Spearman correlation was used to determine relationship between numeral data. Significance values of 0.05 were considered. | Only 1 student got a perfect sore in TSE technique even though 53 participants claimed to know how to perform TSE. Many students that believe they know how to perform TSE did not have accurate information about the screening technique. | S: Supports the concept that there is a significant knowledge gap between TSE and TC even in a more educated population. Supports the concept that there needs to be an educational intervention regarding TC and TSE for medical and non-medical students.<br>L: Limited sample size. Included females in the sample size. Study did not take place in the USA. |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wilson et al. (2018) | None | Randomized Control Trial<br>Purpose: Testicular self-examinations and awareness education young males with intellectual disabilities. | 73 men with an intellectual disability | Testicular self-examination education. | Primary measurement: 10 item questionnaires in verbal/ pictured/ or written format (S&K-Q).<br>Secondary measurement: 12 item adapted questionnaire (12-item Adpt-Q) | SPSS 24.0 was used for data analysis. Mann Whitney U was used to analyze frequency of TSE. Categorical variables were analyzed using chi square analysis. | Individuals with intellectual disabilities can learn and practice testicular self-examinations | Testicular self-examinations and testicular cancer screenings can be addressed in an effective and appropriate way for individuals with intellectual disabilities.<br>L: Limited sample size. The study did not distinguish if males were in college. |

Table 2

*Search Strategy and Results Table*

| **Search Date** | **Keywords combined with Boolean Phrases (AND, OR, NOT)** | **Limits/ Filters/ Qualifiers** | **Database** | **Results** | | |
|---|---|---|---|---|---|---|
| | | | | **Total** | **Reviewed** | **Used** |
| 09/05/20 | Testicular self-examination *Intervention* | Publication dates 2016-2020, English language, EBSCO Full Text Only | CINAHL Plus | 12 | 10 | 7 |
| 09/05/20 | Testicular self-examination AND testicular self-exam *Intervention* | Publication dates 2016-2020 | Embase | 16 | 7 | 3 |
| 09/11/20 | Testicular self-examination *Intervention* | Publication dates 2017-2020 | Cochrane Library | 3 | 3 | 2 |
| 09/11/20 | Testicular self-examination awareness AND self-efficacy *Problem* | Publication dates 2017-2020, English language | Pubmed | 11 | 8 | 4 |
| 09/12/20 | Young male adult AND testicular self-examination OR exams *Population* | Publication dates 2016-2020, English language | CINAHL Plus | 12 | 7 | 5 |
| 09/13/20 | Testicular self-examination AND self-efficacy *Concept* | Publication dates 2016-2020, Full Text Only, | PsycInfo | 3 | 2 | 2 |
| 09/14/20 | Testicular self-examination AND self-efficacy *Concept* | Publication dates 2016-2020 | CINAHL | 6 | 6 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 09/16/20 | Testicular self-examination AND men *Population* | Adults (18-64 years old) | Embase | 14 | 10 | 2 |
| 02/05/22 | Testicular self-examination *Concept* | Publication dates 2020-2021 | CINAHL | 23 | 11 | 8 |

**Problem: The lack of testicular self-examination self-efficacy.**

**Population: Male patients attending a college or university.**

**Evidence-based Interventions: Testicular self-examination education.**

**Concept: Testicular self-examination self-efficacy.**

Table 3.

*Comparison of Literature on Levels*

| Level of Literature | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level I: Systematic Review or Meta-Analysis | | | X | | | | | | | X | | |
| Level II: Randomized Control Trial | | | | | | | | | | | | |
| Level III: Controlled Trial without Randomization | | | | | | | | | X | | | |
| Level IV: Case-Control or Cohort-Study | | X | | | X | X | | X | | | X | X |
| Level V: Systematic Review or Qualitative or Descriptive Studies | X | | | | | | | | | | | |
| Level VI: Qualitative or Descriptive Study | | | | X | | | X | | | | | |
| Level VII: Expert opinion or concensus | | | | | | | | | | | | |

| Level of Literature | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level I: Systematic Review or Meta-Analysis | | | | X | X | X | | | | | | | |
| Level II: Randomized Control Trial | | | | | | | | | | | | | X |
| Level III: Controlled Trial without Randomization | | | | | | | | | | X | | | |
| Level IV: Case-Control or Cohort-Study | X | | | | | | X | X | X | | | X | |
| Level V: Systematic Review or Qualitative or Descriptive Studies | | | | | | | | | | | | | |
| Level VI: Qualitative or Descriptive Study | | X | X | | | | | | | | X | | |
| Level VII: Expert opinion or concensus | | | | | | | | | | | | | |

Note: 1= (Akers, 2018), 2= (Avci, & Altinel, 2018), 3= (Boarin et al., 2019), 4= (Braga et al., 2017), 5= (Dhakal, Paudel, & Paudel, 2021), 6= (Gutema et al., 2018), 7= (Hatchfeld, MacWilliams, & Schmidt, 2016), 8= (Jahangard et al., 2019), 9= (Jeihooni et al., 2021), 10= (Miller et al., 2021), 11= (Nabi, 2016), 12= (Rovito et al., 2021), 13= (Rovito et al., 2018), 14= (Rovito et al., 2018), 15= (Roy & Casson, 2017), 16= (Saab, Landers, & Hegarty, 2016), 17= (Saab, Landers, & Hegarty, 2016), 18= (Saab, Landers, & Hegarty, 2018), 19= (Salati, 2019), 20= (Selvi, Baydilli, & Akinsal, 2020), 21= (Tosun, Gul, & Arikan, 2020), 22= (Umeh & Chadwick, 2016), 23= (Ustundag, 2019), 24= (Uyar, Yildirm, & Kemal, 2019), 25= (Wilson et al., 2018)

Table 4.
*Recommendations Derived from Evidence Synthesis*

| Recommendation | Strength of Evidence for Recommendations | Reference in Support of Recommendation | Rationale | Level of Evidence | Quality Rating |
|---|---|---|---|---|---|
| Recommends the practice of performing testicular self-examinations. | B | Akers, C. (2018) | Testicular cancer is the most common malignancy in men aged 15-35 years. Examined the epidemiology and etiology of testicular cancer. Provided a clinical presentation and treatment options for patients with testicular cancer. Emphasized the importance of performing routine testicular self-examinations for early detections of testicular cancer. | 1 | ++++ |
| | B | Boarin et al., (2019) | | 1 | ++++ |
| | C | | The incidence rate of testicular cancer is increasing in young adult males. There is a lack of knowledge of testicular self-examinations that would benefit men to identify risk factors for testicular cancer. Regular testicular self-examinations are recommended for individuals with a medical history of cryptorchidism. | 3 | +++ |
| | B | Braga et al., (2021) | | 2 | ++++ |
| | B | Dhakal, Paudel, & | Although awareness of testicular cancer may be moderate, actual knowledge of testicular cancer is low. Testicular self-examinations for early | 2 | |

| | | | | | |
|---|---|---|---|---|---|
| | | Paudel, (2021) | cancer detection are important for males to promote positive health behaviors. | | ++++ |
| | B | Gutema et al., (2018) | Periodic testicular self-examinations are important for the early detection of testicular cancer and are recommended. Males have a lack of knowledge of testicular cancer and how to perform testicular self-examinations. Training should be implemented to increase knowledge of testicular cancer. | 2 | ++++ |
| | B | Hachfeld, MacWilliams, & Schmidt, (2016) | Practice and knowledge of testicular self-examination are low among university students. Behavior change through education is recommended to increase testicular self-exam practice for the early detection of testicular cancer. | 2 | +++ |
| | B | Jahangard et al., (2019) | Males that participate in sports or other athletics are more willing to learn how to perform testicular self-examinations. An increase in physical awareness will lead to better health motivation. Testicular self-examinations are encouraged for male athletes. | 2 | ++++ |
| | C | Jeihooni et al., (2021) | Low health literacy may lead to more negative health behaviors. Recommends that males perform testicular self-examinations to promote health-promoting behaviors. Beliefs, attitudes, and social context are factors that may influence individuals' health behaviors. | 3 | +++ |
| | A | Rovito, (2021) | Testicular self-examinations are necessary for the early detection of testicular cancer and are recommended. Integrating the health belief | 1 | ++++ |
| | B | | | 2 | ++++ |

| | | | | | |
|---|---|---|---|---|---|
| Non-direct educational interventions to encourage the practice of performing testicular self-examinations. | B | Roy, & Casson, (2017). | model in an educational intervention will allow significant improvement in practice of testicular self-examination. | 2 | +++ |
| | B | Saab, Landers & Hegarty (2016). | Testicular self-examinations have the potential to improve quality of life and mortality among young adults. Testicular cancer is the most prevalent tumor in males between 15 and 40 years of age. Testicular self-examinations are recommended for the early detection of testicular cancer. | 2 | +++ |
| | B | Salati, (2019). | Health promotion of testicular self-examinations are necessary for the early detection of testicular cancer and is recommended. There is a significant lack of male knowledge of signs and symptoms of testicular cancer and how to perform testicular self-examinations. Only 17% of subjects in this study every heard of testicular self-examinations. | 2 | ++++ |
| | A | Tosun, Gul, & Arikan (2020). | | 2 | +++ |
| | C | Umeh & Chadwick, (2016). | There is lack of knowledge of testicular cancer and testicular self-examinations among men. Also, there are limited tools to assess testicular cancer knowledge and screening. Testicular self-examinations are recommended for the early detection of scrotal abnormalities. | 1 | ++++ |
| | C | Ustundag, H. (2019) | Knowledge of testicular cancer and testicular self-examinations among men were low. Testicular self-examinations are recommended to increase awareness of testicular cancer and compliance of testicular self-examinations. | 2 | +++ |
| | B | Uyar, | | 2 | +++ |
| | | | | 3 | |

| | | | | | |
|---|---|---|---|---|---|
| | C | Yildirm, & Kemal (2019) | Eighty-nine percent of men in the study had a poor understanding of testicular cancer. | | +++ |
| | | | Training programs supported and facilitated by healthcare professionals are recommended to increase awareness and knowledge of testicular cancer and testicular self-examinations. Only 25.6% of males understood that testicular self-examinations should be performed once a month. | 3 | |
| | | Wilson et al., (2018) | | | ++ |
| | C | | Men with low self-efficacy are more likely to not practice testicular self-examination and have more limited knowledge of testicular cancer. | 3 | |
| | | Avci, I. A., & Altinel, B. (2018) | | | |
| | B | | Increased self-efficacy is liked to males understanding abnormalities of their testicular health and perform routine testicular self-examinations as recommended. | 1 | ++++ |
| | C | Miller et al., (2021) | Eighty percent of males had no knowledge on how to perform testicular self-examinations. The health belief model can be used to help increase knowledge and compliance of testicular cancer. | 3 | ++ |
| | B | Nabi, R. L. (2016) | Testicular self-examinations are recommended for the early detection of testicular cancer. | 3 | ++++ |
| | | Rovito et al., (2018) | Medical students have a better understanding of testicular cancer than non-medical students. The overall understanding of testicular cancer was low prompting the need to educate all college level students testicular cancer and testicular self-examinations. | | |
| | | | Testicular self-examinations for the early detection of testicular cancer are recommended for all males including males with intellectual | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Rovito et al., (2018) | disabilities. Males with intellectual disabilities were able to learn testicular self-examinations after reinforcement. | | |
| | | Saab, Landers & Hegarty, (2016) | Evaluated the health beliefs of university students by using the health belief model. Early diagnosis and treatment are needed to cure testicular cancer. The health belief model can be used to assess seriousness, motivation, barriers, benefits, and self-efficacy of testicular cancer. | | |
| | | Saab, Landers & Hegarty (2018). | Humor-based health promotion strategies may be useful for increasing awareness and highlighting health priorities. Humor-based promotion strategies may be especially useful for health promotion guidelines that come with a stigma or that individuals may feel are uncomfortable. | | |
| | | Selvi., Baydilli & Akinsal (2020) | Humor-based interventions are beneficial to help promote health-changing behaviors. Humor can decrease anxiety on serious health issues and allow participants to gain a better self-attitude about the new proposed intervention. | | |
| | | | Testicular self-examinations are essential to improving the overall male well-being. Evaluating the appropriate level of typology when discussing testicular cancer will help increase awareness and practice of testicular self-examinations. | | |
| | | | Clinicians should use their own judgement when assessing screening guidelines and promote the | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | appropriate guideline for their patient population. Although the USPTF discourages the practice of testicular self-examinations, ethics should lead the practitioner to suggest which standards of care are appropriate for their patient population.<br><br>Social media and mass media are two key components that are useful for educating males about testicular cancer and testicular self-examinations. Healthcare personnel including nurses also play a vital role in testicular health promoting techniques.<br><br>An overview of testicular disorders should be taught to males including testicular cancer, testicular torsion, and other abnormalities. Clinicians are encouraged to discuss with their patients about benign testicular disorders.<br><br>YouTube videos relating to testicular cancer and testicular self-examinations are reliable for educating young males about testicular cancer. YouTube videos can be used to display the steps and proper technique to perform testicular self-examinations. | | |

*Note*. 1 (Level 1) = Good quality patient-oriented evidence, 2 (Level 2) = Limited-quality patient-oriented evidence, 3 (Level 3) = Other evidence, ++++ = High quality, +++ = Moderate quality, ++ = Low quality, + = Very Low quality.

[a]Using Strength of Recommendation Taxonomy (SORT) Criteria. [b]Using Grading of Recommendations Assessment, Development and Evaluation (GRADE) Criteria

Table 5.

*Testicular Cancer and Testicular Self-Examinations Comparison Chart*

| Name of Mobile Application | Provides Instructions on Testicular Self-Examinations | Discusses Testicular Cancer | Has a Reminder application | Copyright | Compatibility | Multilingual |
|---|---|---|---|---|---|---|
| Ball Checker© | Yes, including a sound guide and video instructions | Yes | Yes. Reminders are set in phone's calendar | Testicular Cancer Society | Android and iPhone | Yes, English and Spanish |
| Testicular Cancer Staging© | No | Yes, but only testicular cancer staging | No | IMedicalApps | Android and iPhone | No |
| TESTicular - Cancer Screening App© | Yes | Yes | No | TALHA UK | Android only | No |
| Testicular Cancer Guide© | Yes | Yes | No | Expert Health Studio | Android only | No |
| Men's Health© | Yes, but not the focus of the app. Discusses various aspects of men's health. | Yes, but not the focus of the app. | No | Men's Health | Android and iPhone | No |

*Financial Cost of Mobile Application Chart*

| Name of Mobile Application | Cost |
|---|---|
| Ball Checker© | Free |
| Testicular Cancer Staging© | Free |
| TESTicular- Cancer Screening App© | Free |
| Testicular Cancer Guide© | Free |
| Men's Health© | Subscription 1 Month - $2.99. Subscription for 1 year $23.99. |

Table 6.

Proposed Research Budget

| Expense | Quanity | Cost | Total | Source |
|---|---|---|---|---|
| Food and Supplies | N/A | N/A | $100-$150 | |
| MANSCAPED'S Refined Package Shaving Set - 4ct | 1 | $99.99 | $99.99 | https://www.target.com/p/manscaped-refined-package-shaving-set-4ct/-/A-86166359#lnk=sametab |
| 2 gift cards for prizes | 2 | $25 | $50 | |
| Miscellaneous (Other unpredicted costs) | | | 173.10 | |

Total Proposed Research Budget
$473.09
Ideal Total Proposed Research Budget
$500.00

*Table 6*. Proposed Research Budget.

Table 7.

Educational Intervention Timeline

XX:00 Introduction and Pre Interventional Survey

XX:05 PowerPoint and Video Presentations Including how to Implement the Ball Checker Reminder Mobile Application

XX:15 Conclusion and Post Interventional Survey

XX:20 Post Educational Intervention Raffle and Answering Participant's Questions

*Table 7*. Educational intervention timeline

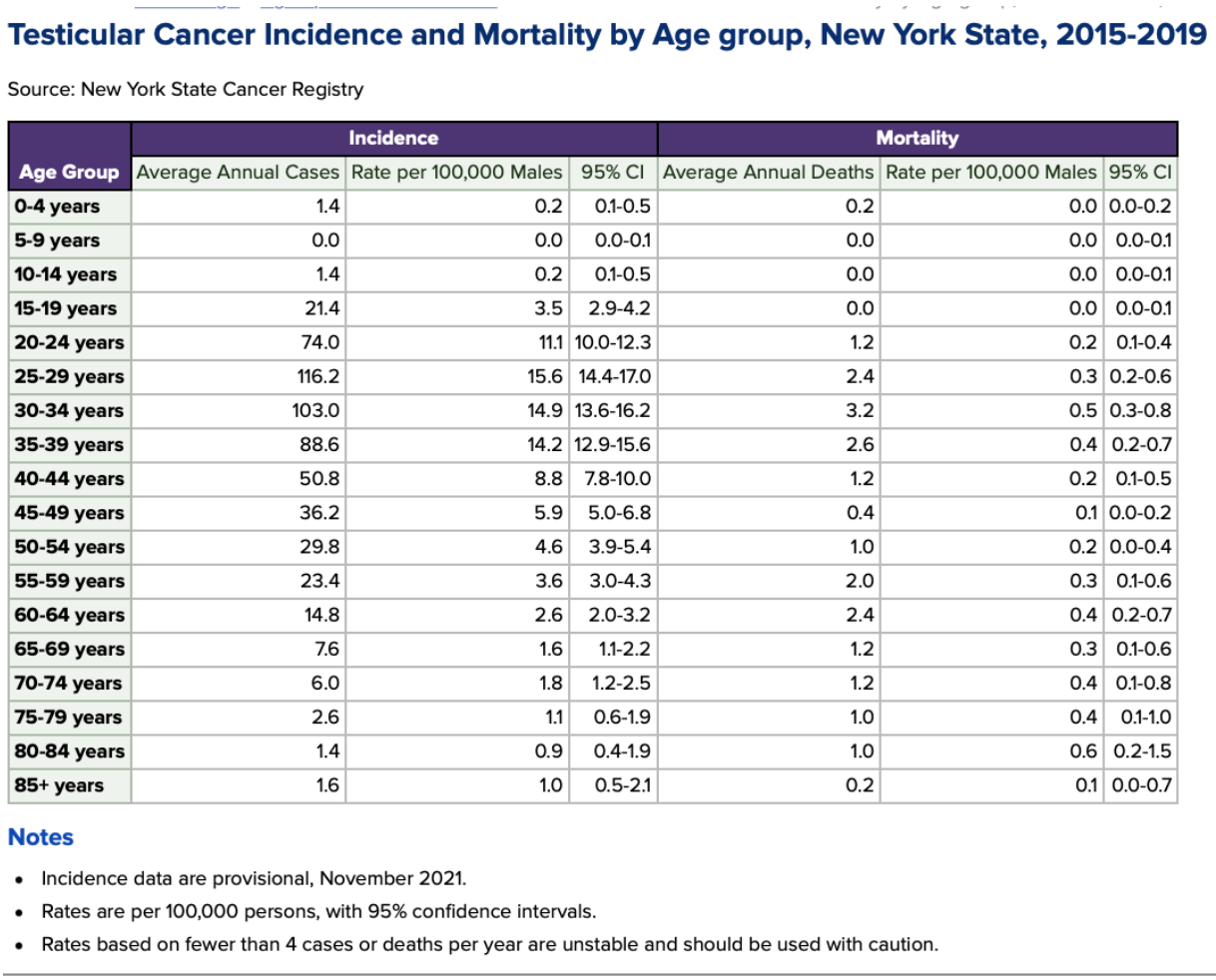
Table 8

*Planning for Implementation Timeline*

| Planning for Implementation | Timeline |
|---|---|
| **1. Assess the Need for Change in Practice** | |
| PICOT | October 2020 |
| - *In male college students, how does testicular self-examination education with a reminder mobile application, as compared to no education, improve self-reports of testicular self-examination practices over a period of forty-five days?* | |
| **2. Locate the Best Evidence** | |
| - Literature Search | September 2020, February 2022 |
| - Literature Review | February 2022 |
| **3. Critically Analyze the Evidence** | |
| - Critical Appraisal of Literature | June 2022 |
| · Rapid Critical Appraisal | |
| · Hierarchy of Evidence | |
| · Strength of Evidence | |
| · Strength of Recommendation | |
| - Literature Synthesis | July 2022 |
| **4. Design Practice Change** | |
| - Select outcomes to be measured | October 2020 |
| - Design Evidence-Based Practice Project | Feburary 2022 |
| - · Select chair | March 2022 |
| - · Select committee members | March 2022 |
| - Defend proposed Evidenced-Based Practice Project | August 2022 |
| **5. Implement and Evaluate Change in Practice** | |
| - Obtain IRB approval | September 2022 |
| - Implement Evidence-Based Practice Project | October 2022, November 2022 |
| **6. Intregrate and Maintain Change in Practice** | |
| - Defend Evidenced-Based Practice Project results | December 2022 |
| - Present results to the University of Toledo Student Health and Wellness Center and the University of Toledo Office of Student Involvement and Leadership | December 2022 |

*Table 8.* Planning for implementation timeline.

Figure 1.



**Testicular Cancer Incidence and Mortality by Age group, New York State, 2015-2019**

Source: New York State Cancer Registry

| Age Group | Incidence | | | Mortality | | |
|---|---|---|---|---|---|---|
| | Average Annual Cases | Rate per 100,000 Males | 95% CI | Average Annual Deaths | Rate per 100,000 Males | 95% CI |
| **0-4 years** | 1.4 | 0.2 | 0.1-0.5 | 0.2 | 0.0 | 0.0-0.2 |
| **5-9 years** | 0.0 | 0.0 | 0.0-0.1 | 0.0 | 0.0 | 0.0-0.1 |
| **10-14 years** | 1.4 | 0.2 | 0.1-0.5 | 0.0 | 0.0 | 0.0-0.1 |
| **15-19 years** | 21.4 | 3.5 | 2.9-4.2 | 0.0 | 0.0 | 0.0-0.1 |
| **20-24 years** | 74.0 | 11.1 | 10.0-12.3 | 1.2 | 0.2 | 0.1-0.4 |
| **25-29 years** | 116.2 | 15.6 | 14.4-17.0 | 2.4 | 0.3 | 0.2-0.6 |
| **30-34 years** | 103.0 | 14.9 | 13.6-16.2 | 3.2 | 0.5 | 0.3-0.8 |
| **35-39 years** | 88.6 | 14.2 | 12.9-15.6 | 2.6 | 0.4 | 0.2-0.7 |
| **40-44 years** | 50.8 | 8.8 | 7.8-10.0 | 1.2 | 0.2 | 0.1-0.5 |
| **45-49 years** | 36.2 | 5.9 | 5.0-6.8 | 0.4 | 0.1 | 0.0-0.2 |
| **50-54 years** | 29.8 | 4.6 | 3.9-5.4 | 1.0 | 0.2 | 0.0-0.4 |
| **55-59 years** | 23.4 | 3.6 | 3.0-4.3 | 2.0 | 0.3 | 0.1-0.6 |
| **60-64 years** | 14.8 | 2.6 | 2.0-3.2 | 2.4 | 0.4 | 0.2-0.7 |
| **65-69 years** | 7.6 | 1.6 | 1.1-2.2 | 1.2 | 0.3 | 0.1-0.6 |
| **70-74 years** | 6.0 | 1.8 | 1.2-2.5 | 1.2 | 0.4 | 0.1-0.8 |
| **75-79 years** | 2.6 | 1.1 | 0.6-1.9 | 1.0 | 0.4 | 0.1-1.0 |
| **80-84 years** | 1.4 | 0.9 | 0.4-1.9 | 1.0 | 0.6 | 0.2-1.5 |
| **85+ years** | 1.6 | 1.0 | 0.5-2.1 | 0.2 | 0.1 | 0.0-0.7 |

**Notes**

- Incidence data are provisional, November 2021.
- Rates are per 100,000 persons, with 95% confidence intervals.
- Rates based on fewer than 4 cases or deaths per year are unstable and should be used with caution.

*Figure 1*. Testicular Cancer Incidence and Mortality by Age group, New York State, 2015-2019. Obtained from New York State Cancer Registry. (2022). Testicular cancer incidence and mortality by age group, New York State, 2015-2019. New York State. Retrieved from https://www.health.ny.gov/statistics/cancer/registry/table6/tb6testisnys.htm

Figure 2.

| Year of Diagnosis/Death | Cases | Rate per 100,000 Males | 95% CI | Deaths | Rate per 100,000 Males | 95% CI |
|---|---|---|---|---|---|---|
| 1976 | 179 | 3.6 | 3.0-4.1 | 33 | 0.6 | 0.4-0.9 |
| 1977 | 177 | 3.5 | 3.0-4.1 | 29 | 0.5 | 0.4-0.8 |
| 1978 | 201 | 4.1 | 3.5-4.7 | 35 | 0.7 | 0.5-1.0 |
| 1979 | 227 | 4.6 | 4.0-5.2 | 31 | 0.7 | 0.4-1.0 |
| 1980 | 236 | 4.6 | 4.0-5.2 | 30 | 0.6 | 0.4-0.8 |
| 1981 | 228 | 4.3 | 3.8-5.0 | 28 | 0.5 | 0.3-0.7 |
| 1982 | 228 | 4.4 | 3.8-5.0 | 25 | 0.5 | 0.3-0.8 |
| 1983 | 250 | 4.7 | 4.1-5.3 | 24 | 0.5 | 0.3-0.8 |
| 1984 | 295 | 5.6 | 4.9-6.3 | 17 | 0.3 | 0.2-0.5 |
| 1985 | 265 | 5.0 | 4.4-5.6 | 21 | 0.4 | 0.2-0.6 |
| 1986 | 254 | 4.6 | 4.1-5.3 | 25 | 0.5 | 0.3-0.7 |
| 1987 | 281 | 5.1 | 4.5-5.7 | 22 | 0.4 | 0.2-0.6 |
| 1988 | 270 | 4.8 | 4.2-5.4 | 16 | 0.3 | 0.2-0.5 |
| 1989 | 268 | 4.8 | 4.2-5.4 | 22 | 0.4 | 0.2-0.6 |
| 1990 | 296 | 5.3 | 4.7-5.9 | 16 | 0.3 | 0.2-0.5 |
| 1991 | 275 | 4.9 | 4.3-5.5 | 14 | 0.2 | 0.1-0.4 |
| 1992 | 298 | 5.3 | 4.7-6.0 | 20 | 0.4 | 0.2-0.6 |
| 1993 | 312 | 5.6 | 5.0-6.3 | 24 | 0.5 | 0.3-0.7 |
| 1994 | 305 | 5.5 | 4.9-6.2 | 12 | 0.2 | 0.1-0.4 |
| 1995 | 313 | 5.7 | 5.1-6.4 | 16 | 0.3 | 0.2-0.5 |
| 1996 | 310 | 5.7 | 5.1-6.3 | 21 | 0.4 | 0.2-0.6 |
| 1997 | 333 | 6.2 | 5.5-6.9 | 6 | 0.1 | 0.0-0.3 |
| 1998 | 342 | 6.4 | 5.7-7.1 | 18 | 0.3 | 0.2-0.5 |
| 1999 | 334 | 6.2 | 5.6-7.0 | 14 | 0.3 | 0.1-0.4 |
| 2000 | 306 | 5.7 | 5.1-6.4 | 13 | 0.2 | 0.1-0.4 |
| 2001 | 329 | 6.2 | 5.5-6.9 | 13 | 0.3 | 0.1-0.4 |
| 2002 | 312 | 5.9 | 5.3-6.6 | 24 | 0.5 | 0.3-0.7 |
| 2003 | 353 | 6.7 | 6.0-7.4 | 12 | 0.2 | 0.1-0.4 |
| 2004 | 331 | 6.3 | 5.7-7.0 | 11 | 0.2 | 0.1-0.4 |
| 2005 | 349 | 6.7 | 6.0-7.4 | 8 | 0.1 | 0.1-0.3 |
| 2006 | 326 | 6.2 | 5.5-6.9 | 13 | 0.2 | 0.1-0.4 |
| 2007 | 352 | 6.8 | 6.1-7.5 | 8 | 0.1 | 0.1-0.3 |
| 2008 | 383 | 7.4 | 6.7-8.2 | 11 | 0.2 | 0.1-0.4 |
| 2009 | 340 | 6.5 | 5.8-7.3 | 7 | 0.1 | 0.1-0.3 |
| 2010 | 359 | 6.9 | 6.2-7.7 | 15 | 0.3 | 0.2-0.5 |
| 2011 | 362 | 6.9 | 6.2-7.7 | 9 | 0.2 | 0.1-0.3 |
| 2012 | 377 | 7.3 | 6.5-8.0 | 12 | 0.2 | 0.1-0.4 |
| 2013 | 342 | 6.6 | 5.9-7.4 | 8 | 0.1 | 0.1-0.3 |
| 2014 | 363 | 7.0 | 6.3-7.8 | 15 | 0.3 | 0.2-0.5 |
| 2015 | 352 | 6.7 | 6.0-7.5 | 13 | 0.2 | 0.1-0.4 |
| 2016 | 373 | 7.2 | 6.5-8.0 | 10 | 0.2 | 0.1-0.3 |
| 2017 | 354 | 6.9 | 6.2-7.7 | 9 | 0.1 | 0.1-0.3 |
| 2018 | 385 | 7.5 | 6.7-8.3 | 10 | 0.2 | 0.1-0.3 |
| 2019 | 335 | 6.6 | 5.9-7.3 | 28 | 0.5 | 0.3-0.7 |

*Figure 2.* Testicular Cancer Incidence and Mortality by Year, New York State Excl New York City, 1976-2019. Retrieved from New York State Cancer Registry. (2022). Testicular cancer incidence and mortality by year, New York state excl New York City, 1976-2019. Retrieved from https://www.health.ny.gov/statistics/cancer/registry/table2/tb2testisupstate.htm

Figure 3.

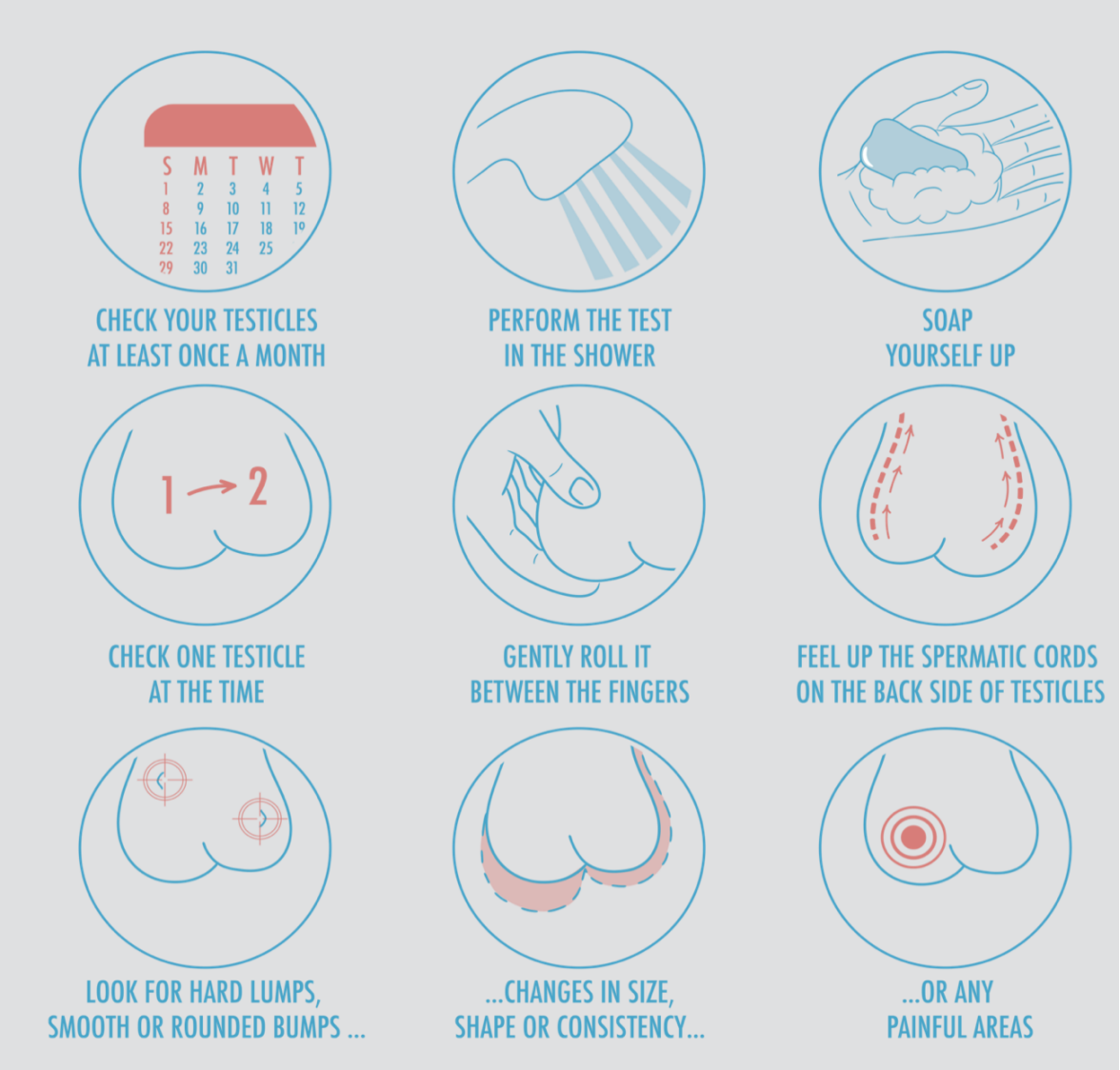



*Figure 3.* Monthly shower self-exam. Obtained from Testicular Cancer Foundation. (2022). Testicular cancer education. Retrieved from https://www.testicularcancer.org/testicular-self-exam

Figure 4.

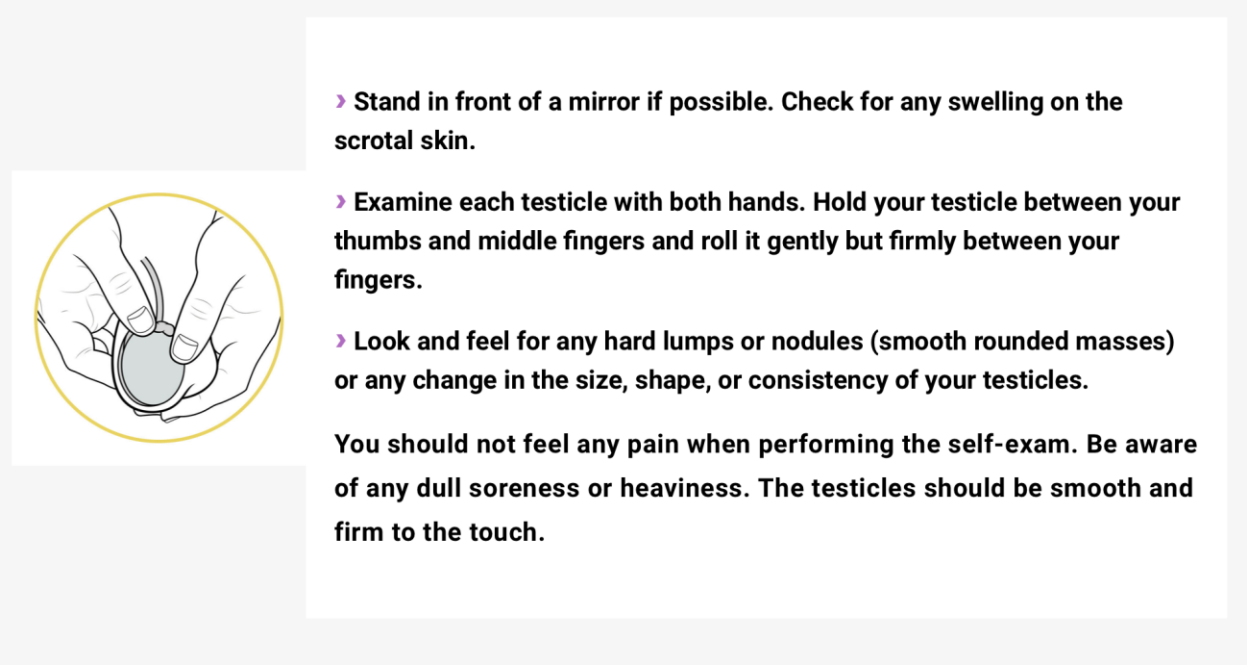



*Figure 4.* How to perform testicular self-examinations. Obtained from Testicular Cancer Society. (2022). Testicular self-exam https://testicularcancersociety.org/pages/self-exam-how-to

Figure 5.

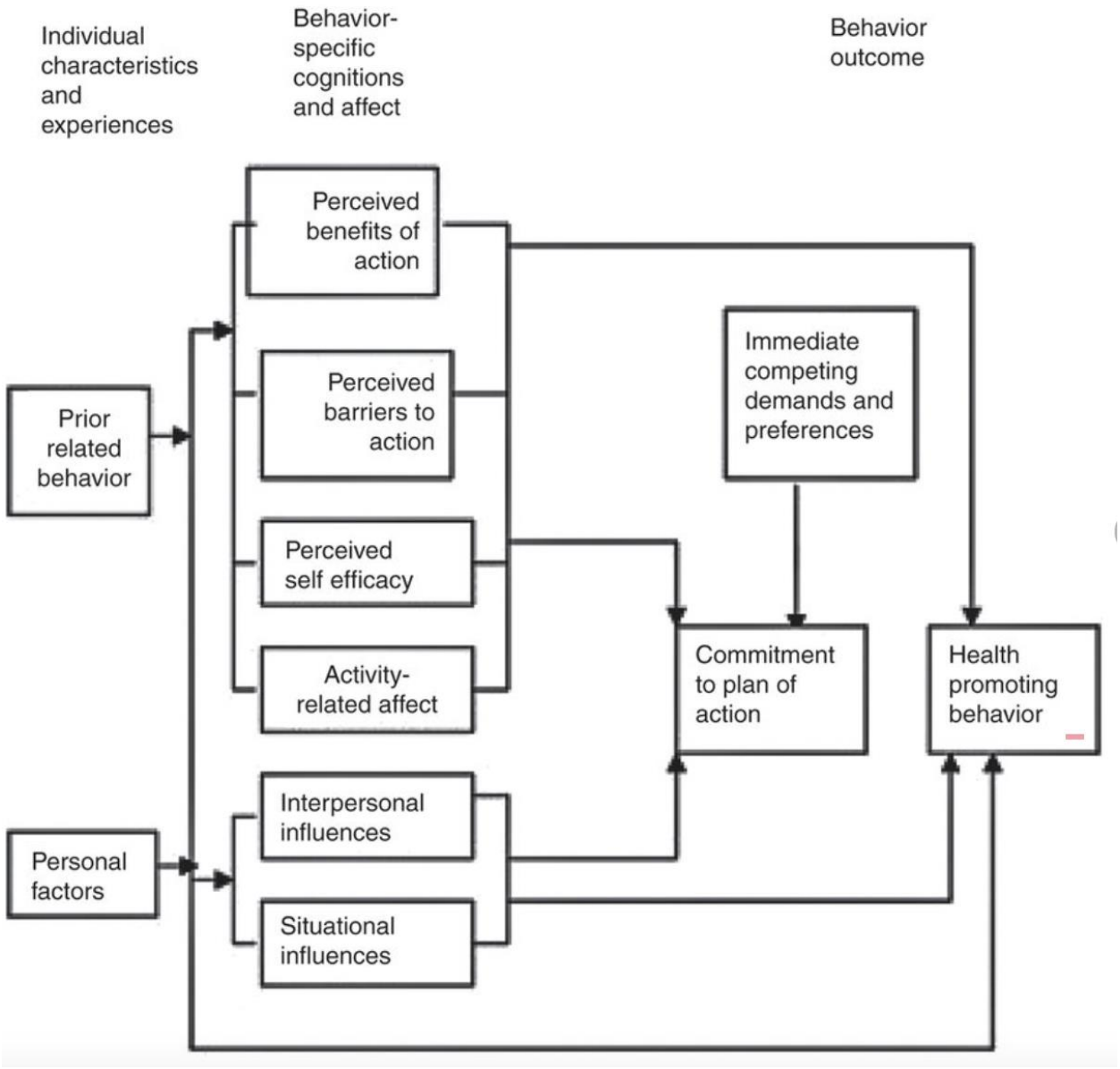



*Figure 5.* Pender's Health Promotion Model diagram. Retrieved from Research Gate. (2022). Diagram of Pender's health promotion model. According to the content of Pender's HPM, the goal of present study is analysis, evaluation and application of this theory according to Barnum's approach. Retrieved from https://www.researchgate.net/figure/Diagram-of-Penders-health-promotion-model-According-to-the-content-of-Penders-HPM-the_fig2_322479619

Figure 6.

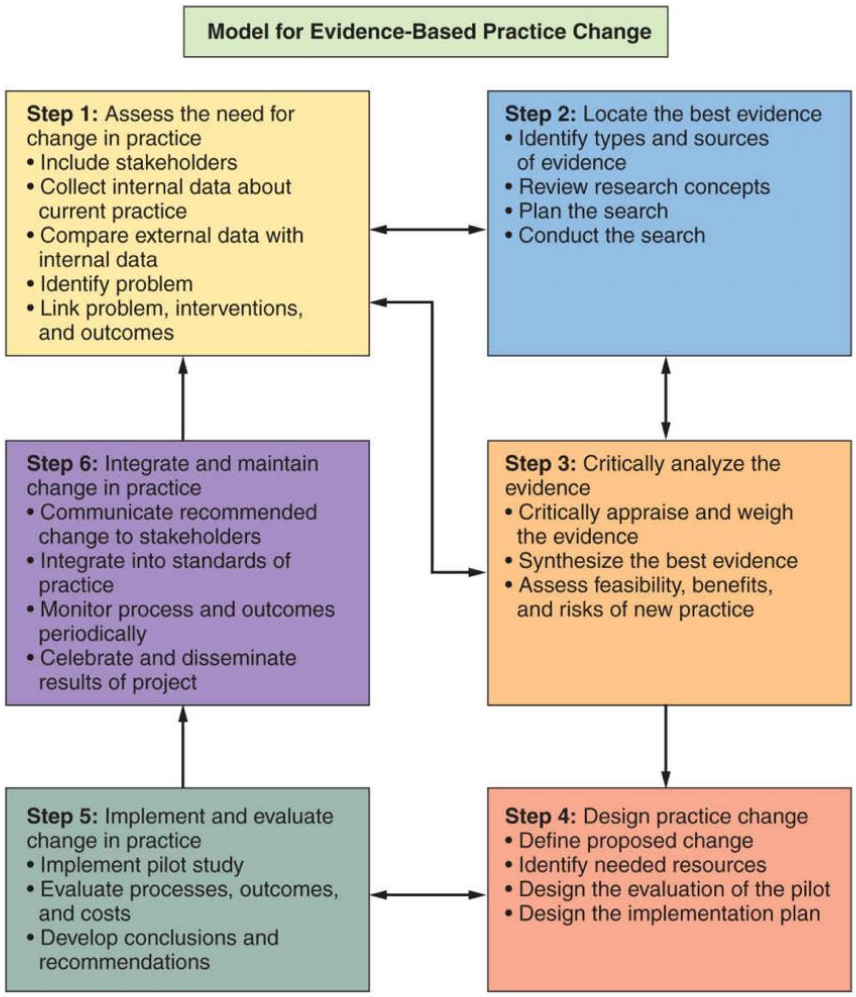



**Figure 14.5:** A model of evidence-based practice change. (Larrabee, J. H. [2009]. *Nurse to nurse: Practice*. New York, NY: McGraw-Hill.

*Figure 6.* Model for Evidence-Based Practice Change. Retrieved from Melnyk, B.M., &Fineout-Overholt, E. (2019). *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*. (3rd ed.) Philadelphia, PA: Lippincott Williams & Wilkins.

Figure 7.

**RAPID CRITICAL APPRAISAL QUESTIONS FOR SYSTEMATIC REVIEWS AND META-ANALYSES OF CLINICAL INTERVENTIONS QUESTION**

| | | | |
|---|---|---|---|
| **VALIDITY** | | | |
| **1. Are the results of the review valid?** | | | |
| a. Are the studies contained in the review randomized controlled trials (RCTs)? | Yes | No | Unknown |
| b. If not, were all relevant studies included in the review? | Yes | No | Unknown |
| c. Does the review include a detailed description of the search strategy to find all relevant studies? | Yes | No | Unknown |
| d. Does the review describe how validity of the individual studies was assessed (e.g., methodological quality, including the use of random assignment to study groups and complete follow-up of the participants)? | Yes | No | Unknown |
| e. Were the results consistent across studies? | Yes | No | Unknown |
| f. Were individual patient data or aggregate data used in the analysis? | Individual | Aggregate | |
| g. Does the review include a description of how studies were compared using statistical analysis? | Yes | No | Unknown |
| **RELIABILITY** | | | |
| **2. What were the results?** | | | |
| a. How large is the intervention or treatment effect (OR, RR, effect size)? | | | |
| b. How precise is the intervention or treatment (CI)? | | | |
| **APPLICABILITY** | | | |
| **3. Will the results assist me in caring for my patients?** | | | |
| a. Are my patients similar to the ones included in the review? | Yes | No | Unknown |
| b. Is it feasible to implement the findings in my practice setting? | Yes | No | Unknown |
| c. Do the pooled or combined results of the studies support the hospital's values and goals of service delivery? (i.e., Is it feasible to implement the findings in my practice setting?) | Yes | No | Unknown |
| d. Were all clinically important outcomes considered, including risks and benefits of the treatment? | Yes | No | Unknown |
| e. What is my clinical assessment of the patient and are there any contraindications or circumstances that would inhibit me from implementing the treatment? | Yes | No | Unknown |
| f. What are my patient's and his or her family's preferences and values about the treatment that is under consideration? | Yes | No | Unknown |
| **Would you use the study results in your practice to make a difference in patient outcomes?**<br>• If yes, how?<br>• If yes, why?<br>• If no, why not? | | | |
| **Additional Comments/Reflections:** | | | |
| **Recommendation for article use within a body of evidence:** | | | |

*Figure 7.* Rapid Critical Appraisal Checklist for Systematic Reviews and Meta-Analyses of Clinical Intervention Question. Melnyk, B.M., &Fineout-Overholt, E. (2019). *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*. (3rd ed.) Philadelphia, PA: Lippincott Williams & Wilkins.

Figure 8.

**RAPID CRITICAL APPRAISAL QUESTIONS FOR RANDOMIZED CLINICAL TRIALS (RCTS)**

| | |
|---|---|
| **VALIDITY** | |
| **1. Are the results of the study valid?** | |
| a. Were the participants randomly assigned to the experimental and control groups? | Yes |
| b. Was random assignment concealed from the individuals who were first enrolling participants into the study? | Yes |
| c. Were the participants and providers blind to the study group? | Yes |
| d. Were reasons given to explain why participants did not complete the study? | Yes |
| e. Were the follow-up assessments conducted long enough to fully study the effects of the intervention? | Yes |
| f. Were the participants analyzed in the group to which they were randomly assigned? | Yes |
| g. Was the control group appropriate? | Yes |
| h. Were the instruments used to measure the outcomes valid and reliable? | Yes |
| i. Were the participants in each of the groups similar on demographic and baseline clinical variables? | Yes |
| **RELIABILITY** | |
| **2. What are the results?** | |
| a. How large is the intervention or treatment effect (NNT, NNH, effect size? | _____ |
| b. How precise is the intervention or treatment (CI)? | _____ |
| **APPLICABILITY** | |
| **3. Will the results help me in caring for my patients?** | |
| a. Were all clinically important outcomes measured? | Yes |
| b. What are the risks and benefits of the treatment? | _____ |
| c. Is the treatment feasible in my clinical setting? | Yes |
| d. What are my patient's/family's values and expectations for the outcome that is trying to be prevented and the treatment itself? | _____ |
| **Would you use the study results in your practice to make a difference in patient outcomes?**<br>• If yes, how?<br>• If yes, why?<br>• If no, why not? | |
| **Additional Comments/Reflections:** | |
| **Recommendation for article use within a body of evidence:** | |

*Figure 8.* Rapid Critical Appraisal Questions for Randomized Clinical Trials Melnyk, B.M., & Fineout-Overholt, E. (2019). *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*. (3rd ed.) Philadelphia, PA: Lippincott Williams & Wilkins.

Figure 9.

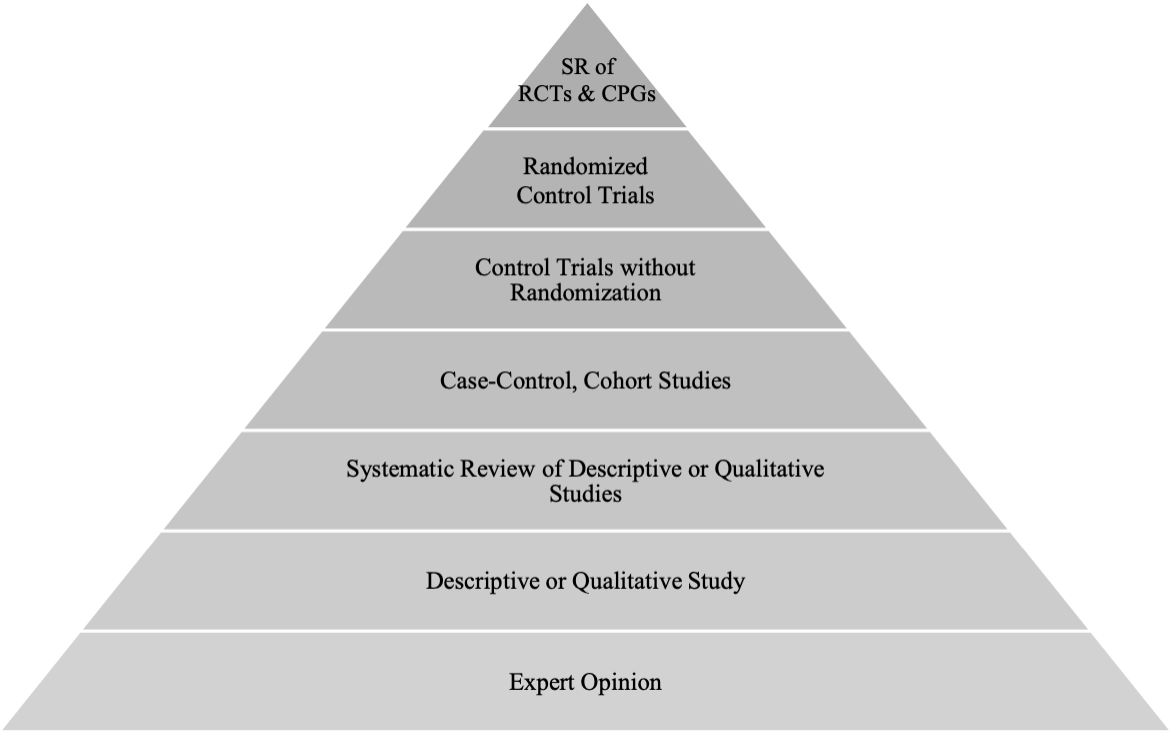



*Figure* 9. Hierarchy of Evidence Retrieved from Melnyk, B.M., &Fineout-Overholt, E. (2019). *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*. (3rd ed.) Philadelphia, PA: Lippincott Williams & Wilkins.

Figure 10.

| Symbol | Quality | Interpretation |
|---|---|---|
| ⊕⊕⊕⊕ | **High** | We are very confident that the true effect lies close to that of the estimate of the effect. |
| ⊕⊕⊕O | **Moderate** | We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different. |
| ⊕⊕OO | **Low** | Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect. |
| ⊕OOO | **Very low** | We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. |

*Figure 10.* The table used for determining the quality of evidence based on GRADE ratings and their interpretation. Adapted from Ryan, R. & Hill, S. (2016). How to GRADE the quality of evidence. *Cochrane consumers and communication group.*

Figure 11.

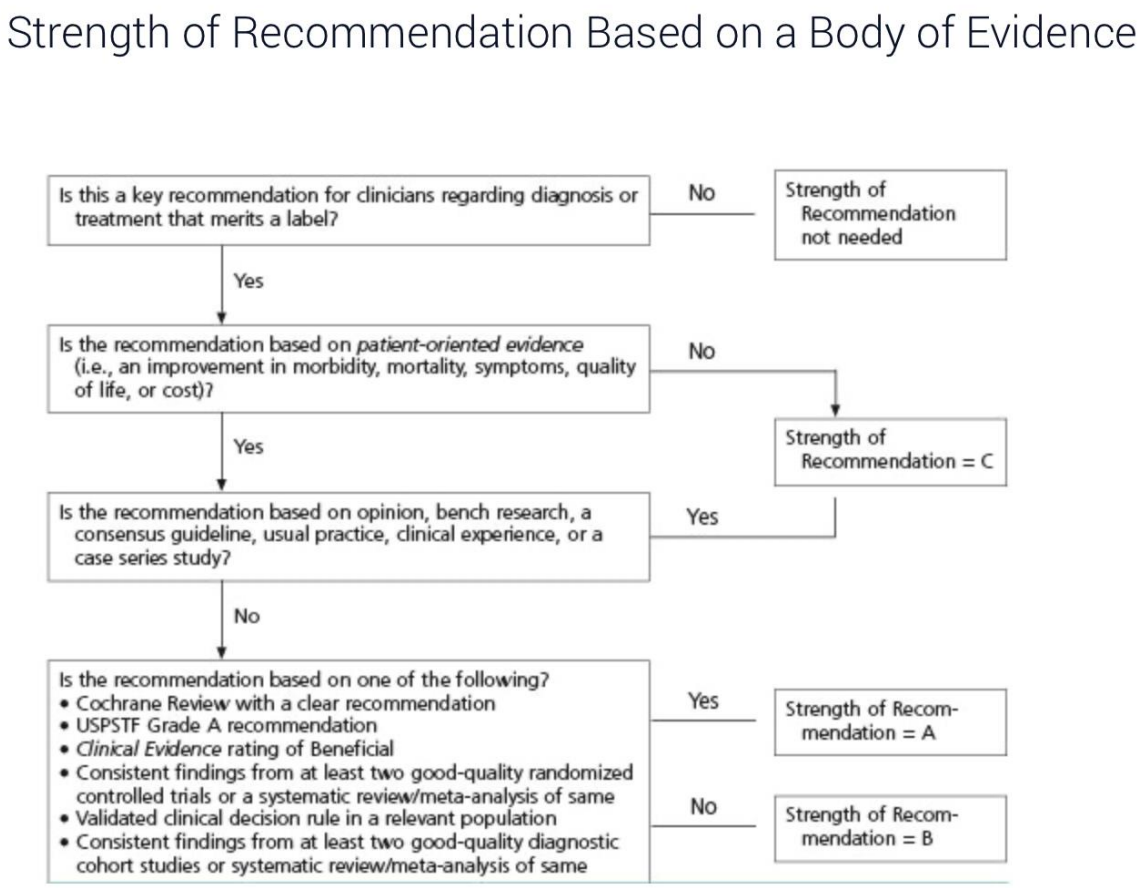



*Figure 11*. The algorithm used for determining the strength of a recommendation based on a body of evidence as described by Strength of Recommendation Taxonomy (SORT). Adapted from Ebell, M. H., Siwek, J., Weiss, B. D., Woolf, S. H., Susman, J., Ewigman, B., & Bowman, M. (2004). Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *The Journal of the American Board of Family Practice, 17*(1), 59-67.

Figure 12.

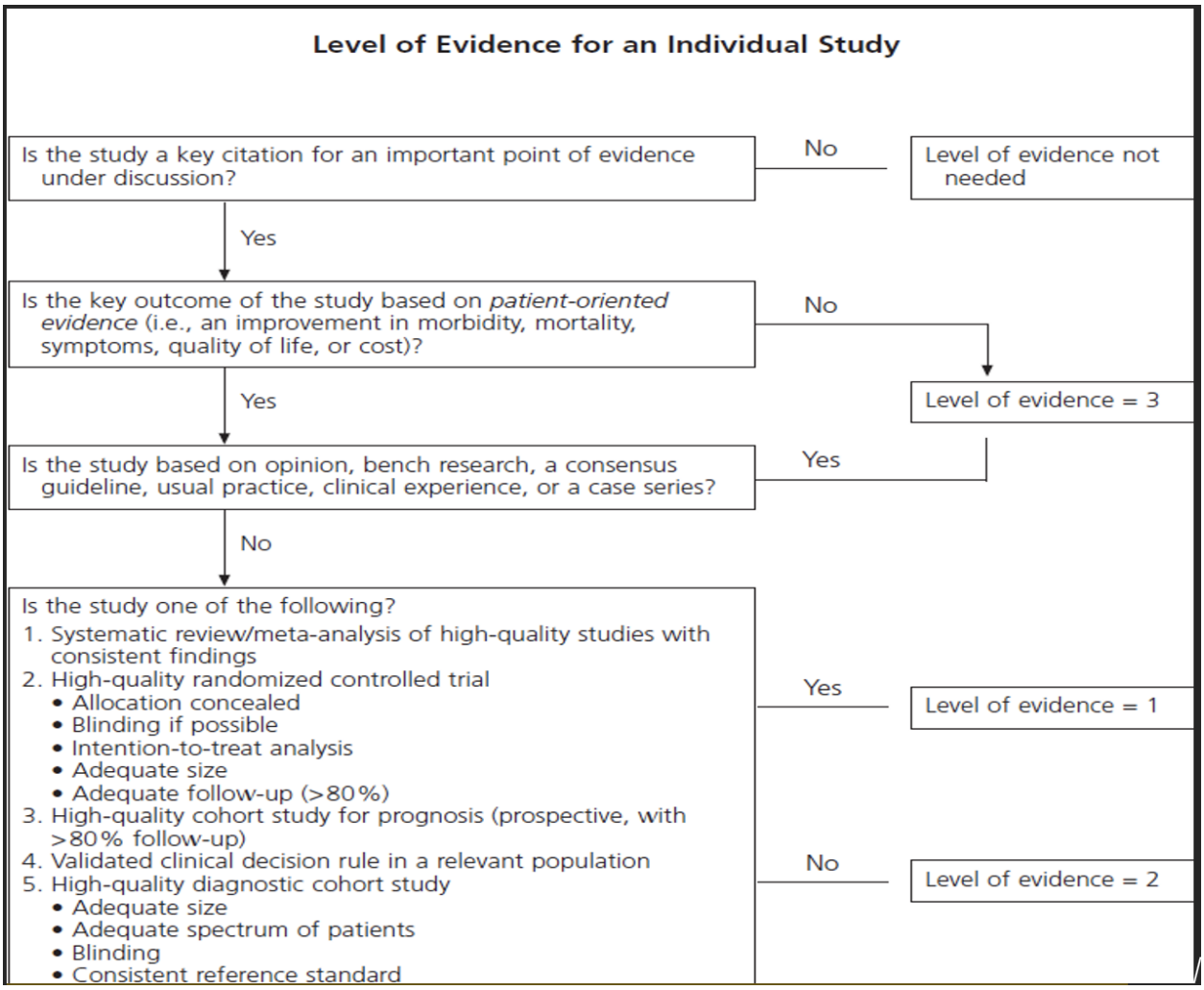



*Figure 12.* Algorithm for determining the level of evidence for an individual study as described by Strength of Recommendation Taxonomy (SORT). Adapted from Ebell, M. H., Siwek, J., Weiss, B. D., Woolf, S. H., Susman, J., Ewigman, B., & Bowman, M. (2004). Strength of recommendation taxonomy (SORT): a patient-centered approach to grading evidence in the medical literature. *The Journal of the American Board of Family Practice*, *17*(1), 59-67.

Figure 13.

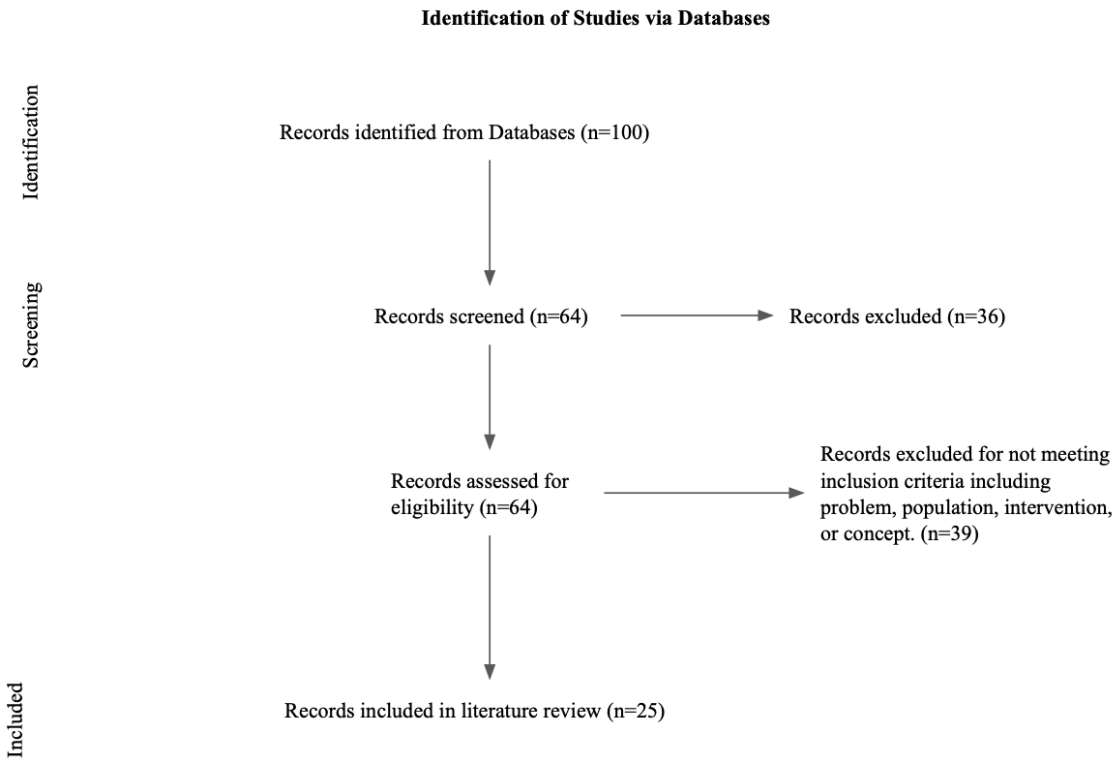
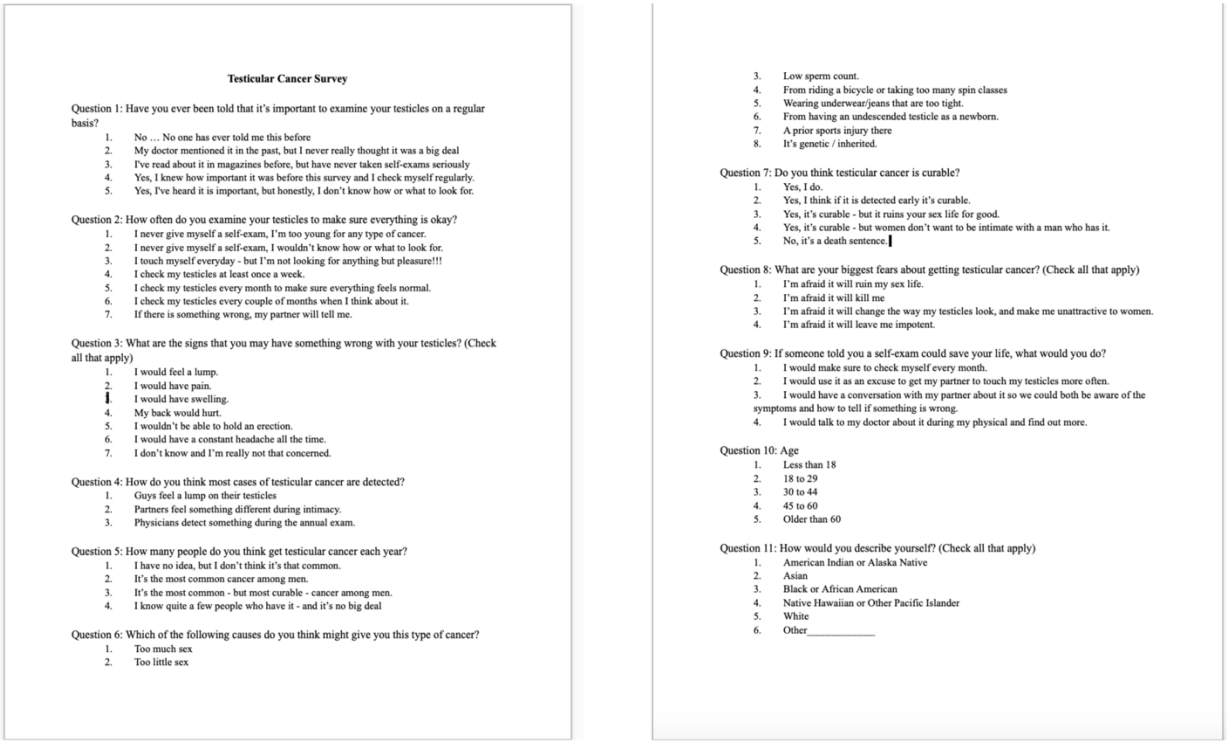



*Figure 13.* Prisma flowchart displaying search strategy of included and excluded studies.

Figure 14.



**Testicular Cancer Survey**

Question 1: Have you ever been told that it's important to examine your testicles on a regular basis?

1. No … No one has ever told me this before
2. My doctor mentioned it in the past, but I never really thought it was a big deal
3. I've read about it in magazines before, but have never taken self-exams seriously
4. Yes, I knew how important it was before this survey and I check myself regularly.
5. Yes, I've heard it is important, but honestly, I don't know how or what to look for.

Question 2: How often do you examine your testicles to make sure everything is okay?

1. I never give myself a self-exam, I'm too young for any type of cancer.
2. I never give myself a self-exam, I wouldn't know how or what to look for.
3. I touch myself everyday - but I'm not looking for anything but pleasure!!!
4. I check my testicles at least once a week.
5. I check my testicles every month to make sure everything feels normal.
6. I check my testicles every couple of months when I think about it.
7. If there is something wrong, my partner will tell me.

Question 3: What are the signs that you may have something wrong with your testicles? (Check all that apply)

1. I would feel a lump.
2. I would have pain.
3. I would have swelling.
4. My back would hurt.
5. I wouldn't be able to hold an erection.
6. I would have a constant headache all the time.
7. I don't know and I'm really not that concerned.

Question 4: How do you think most cases of testicular cancer are detected?

1. Guys feel a lump on their testicles
2. Partners feel something different during intimacy.
3. Physicians detect something during the annual exam.

Question 5: How many people do you think get testicular cancer each year?

1. I have no idea, but I don't think it's that common.
2. It's the most common cancer among men.
3. It's the most common - but most curable - cancer among men.
4. I know quite a few people who have it - and it's no big deal

Question 6: Which of the following causes do you think might give you this type of cancer?

1. Too much sex
2. Too little sex
3. Low sperm count.
4. From riding a bicycle or taking too many spin classes
5. Wearing underwear/jeans that are too tight.
6. From having an undescended testicle as a newborn.
7. A prior sports injury there
8. It's genetic / inherited.

Question 7: Do you think testicular cancer is curable?

1. Yes, I do.
2. Yes, I think if it is detected early it's curable.
3. Yes, it's curable - but it ruins your sex life for good.
4. Yes, it's curable - but women don't want to be intimate with a man who has it.
5. No, it's a death sentence.

Question 8: What are your biggest fears about getting testicular cancer? (Check all that apply)

1. I'm afraid it will ruin my sex life.
2. I'm afraid it will kill me
3. I'm afraid it will change the way my testicles look, and make me unattractive to women.
4. I'm afraid it will leave me impotent.

Question 9: If someone told you a self-exam could save your life, what would you do?

1. I would make sure to check myself every month.
2. I would use it as an excuse to get my partner to touch my testicles more often.
3. I would have a conversation with my partner about it so we could both be aware of the symptoms and how to tell if something is wrong.
4. I would talk to my doctor about it during my physical and find out more.

Question 10: Age

1. Less than 18
2. 18 to 29
3. 30 to 44
4. 45 to 60
5. Older than 60

Question 11: How would you describe yourself? (Check all that apply)

1. American Indian or Alaska Native
2. Asian
3. Black or African American
4. Native Hawaiian or Other Pacific Islander
5. White
6. Other_____

Question 12: Sexual Orientation

1. Heterosexual
2. Homosexual
3. Bisexual
4. Other

Question 13: College/Program of Study (Please select one)

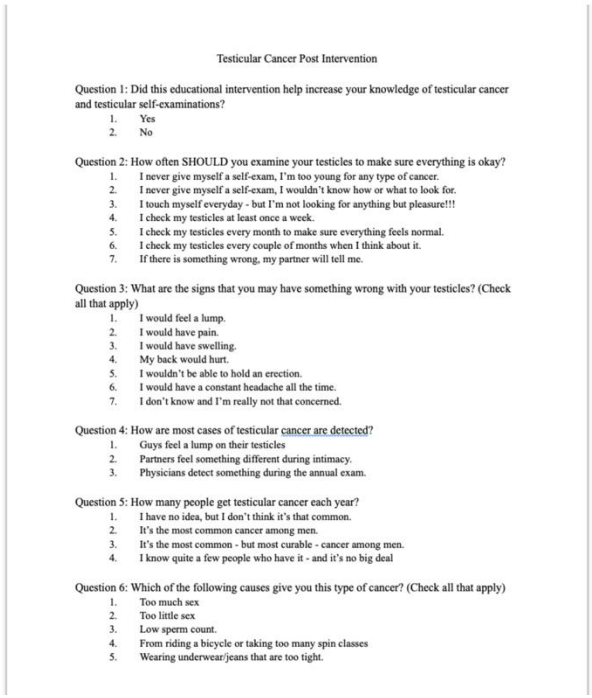
1. Arts and Letters
2. Business and Innovation
3. Education
4. Engineering
5. Health and Human Services
6. Law
7. Medicine and Life Sciences
8. Natural Sciences and Mathematics
9. Nursing
10. Pharmacy and Pharmaceutical Sciences
11. University College

Question 14: What type of cell phone do you currently use?

1. Android
2. iPhone

*Figure 14.* Testicular Cancer Survey. Modified from Center for Advocacy for Cancer of the Testes International. (2022). Center for Advocacy for Cancer of the Testes International. Retrieved from https://www.cacti.org/our-research/testicular-cancer-survey/#body

Figure 15.



Testicular Cancer Post Intervention

Question 1: Did this educational intervention help increase your knowledge of testicular cancer and testicular self-examinations?

1. Yes
2. No

Question 2: How often SHOULD you examine your testicles to make sure everything is okay?

1. I never give myself a self-exam, I'm too young for any type of cancer.
2. I never give myself a self-exam, I wouldn't know how or what to look for.
3. I touch myself everyday - but I'm not looking for anything but pleasure!!!
4. I check my testicles at least once a week.
5. I check my testicles every month to make sure everything feels normal.
6. I check my testicles every couple of months when I think about it.
7. If there is something wrong, my partner will tell me.

Question 3: What are the signs that you may have something wrong with your testicles? (Check all that apply)

1. I would feel a lump.
2. I would have pain.
3. I would have swelling.
4. My back would hurt.
5. I wouldn't be able to hold an erection.
6. I would have a constant headache all the time.
7. I don't know and I'm really not that concerned.

Question 4: How are most cases of testicular cancer are detected?

1. Guys feel a lump on their testicles
2. Partners feel something different during intimacy.
3. Physicians detect something during the annual exam.

Question 5: How many people get testicular cancer each year?

1. I have no idea, but I don't think it's that common.
2. It's the most common cancer among men.
3. It's the most common - but most curable - cancer among men.
4. I know quite a few people who have it - and it's no big deal

Question 6: Which of the following causes give you this type of cancer? (Check all that apply)

1. Too much sex
2. Too little sex
3. Low sperm count.
4. From riding a bicycle or taking too many spin classes
5. Wearing underwear/jeans that are too tight.
6. From having an undescended testicle as a newborn.
7. A prior sports injury there
8. It's genetic / inherited.

Question 7: Is testicular cancer curable?

1. Yes, I do.
2. Yes, I think if it is detected early it's curable.
3. Yes, it's curable - but it ruins your sex life for good.
4. Yes, it's curable - but women don't want to be intimate with a man who has it.
5. No, it's a death sentence.

Question 8: Have you downloaded the Ball Checker© application?

1. Yes!
2. No.

Question 9: How would you rate this educational intervention with 1 being the lowest quality and 10 being the highest quality?

Low 1 2 3 4 5 6 7 8 9 10 High

*Figure 15.* Testicular Cancer Survey (post-intervention). Modified from Center for Advocacy for Cancer of the Testes International. (2022). Center for Advocacy for Cancer of the Testes International. Retrieved from https://www.cacti.org/our-research/testicular-cancer-survey/#body

Figure 16.

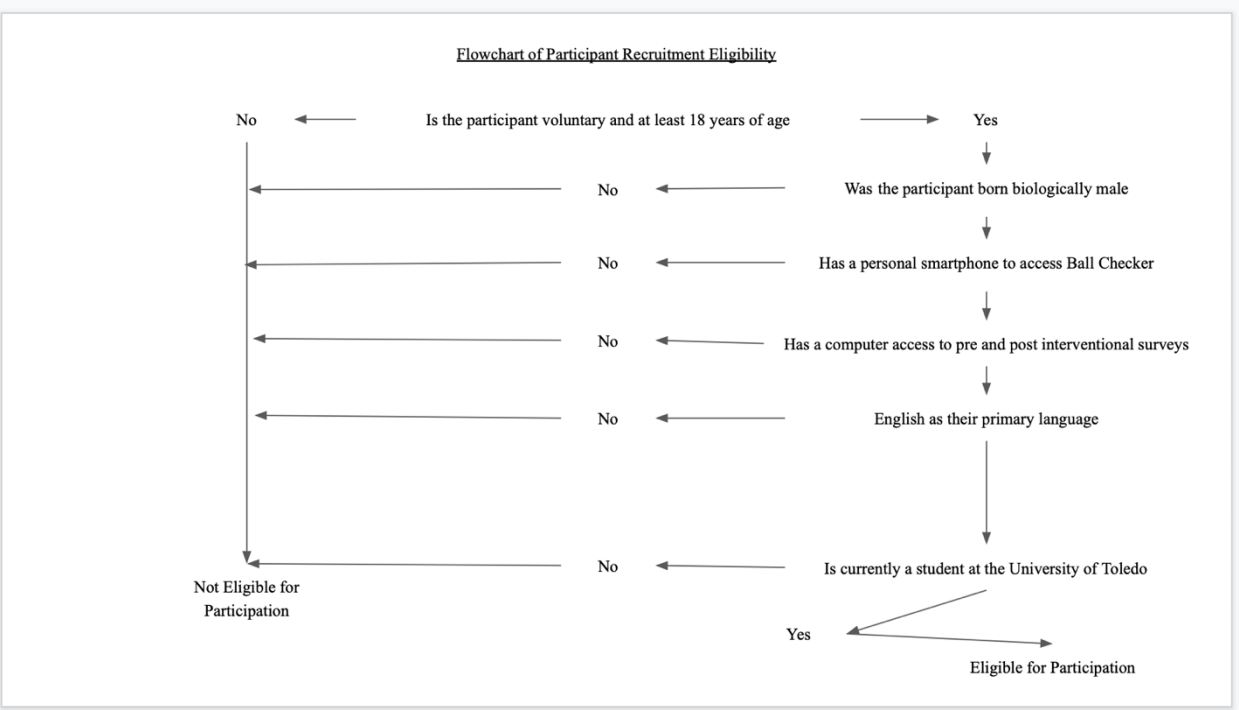



*Figure 16.* Flowchart of how eligible participants will be identified based on selection criteria.

Figure 17.


*Figure 17.* CITI Program Human Research Certificate.

Appendix B

Figure 1.


*Figure 1.* Promotion for the evidence-based practice project.

Figure 2.


*Figure 2.* Promotion for the evidence-based practice project.

Figure 3.

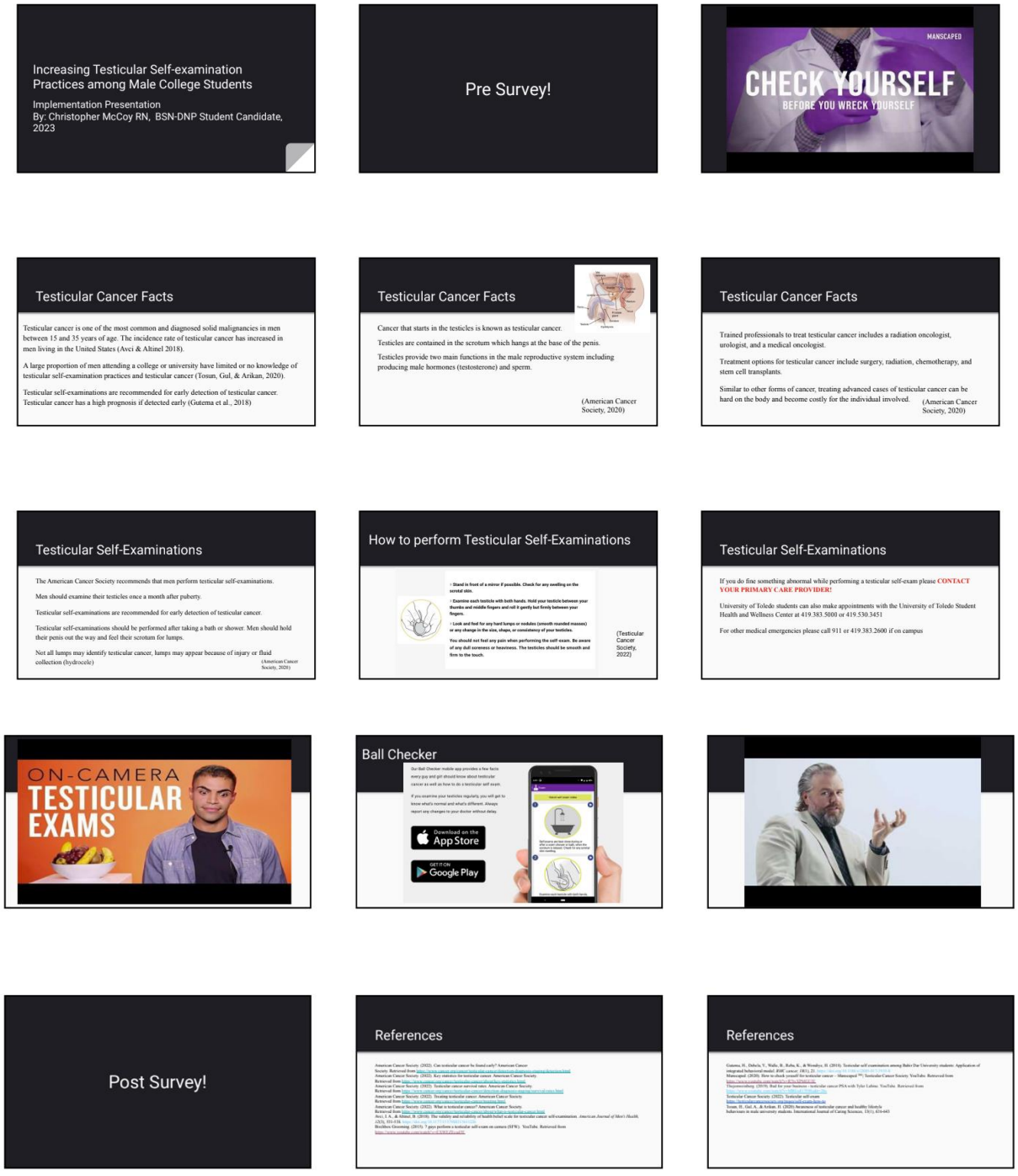



*Figure 3.* Testicular cancer and testicular self-examination implementation presentation.

Figure 4.

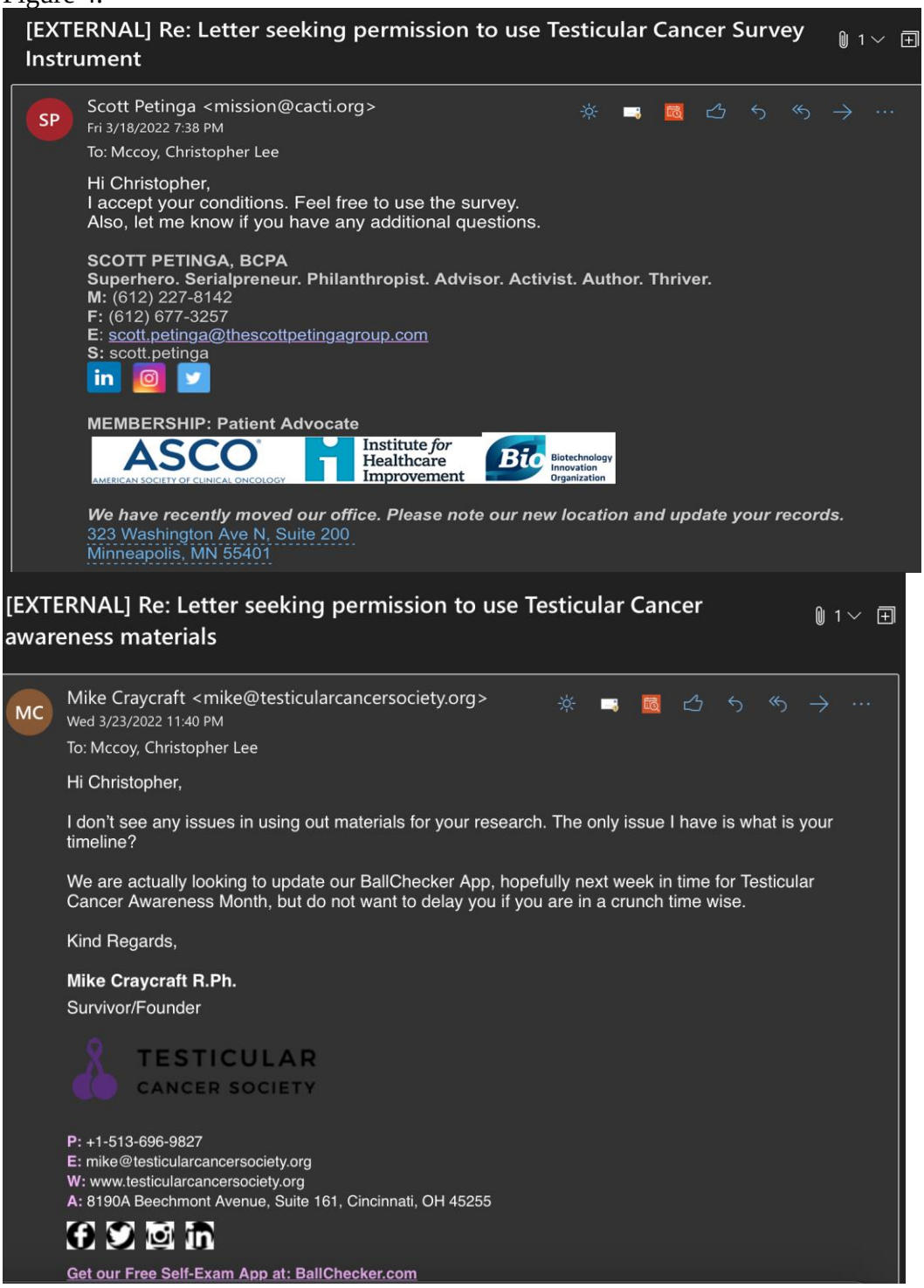



*Figure 4.* Permission to use testicular cancer surveys and promotional materials.

Figure 5.

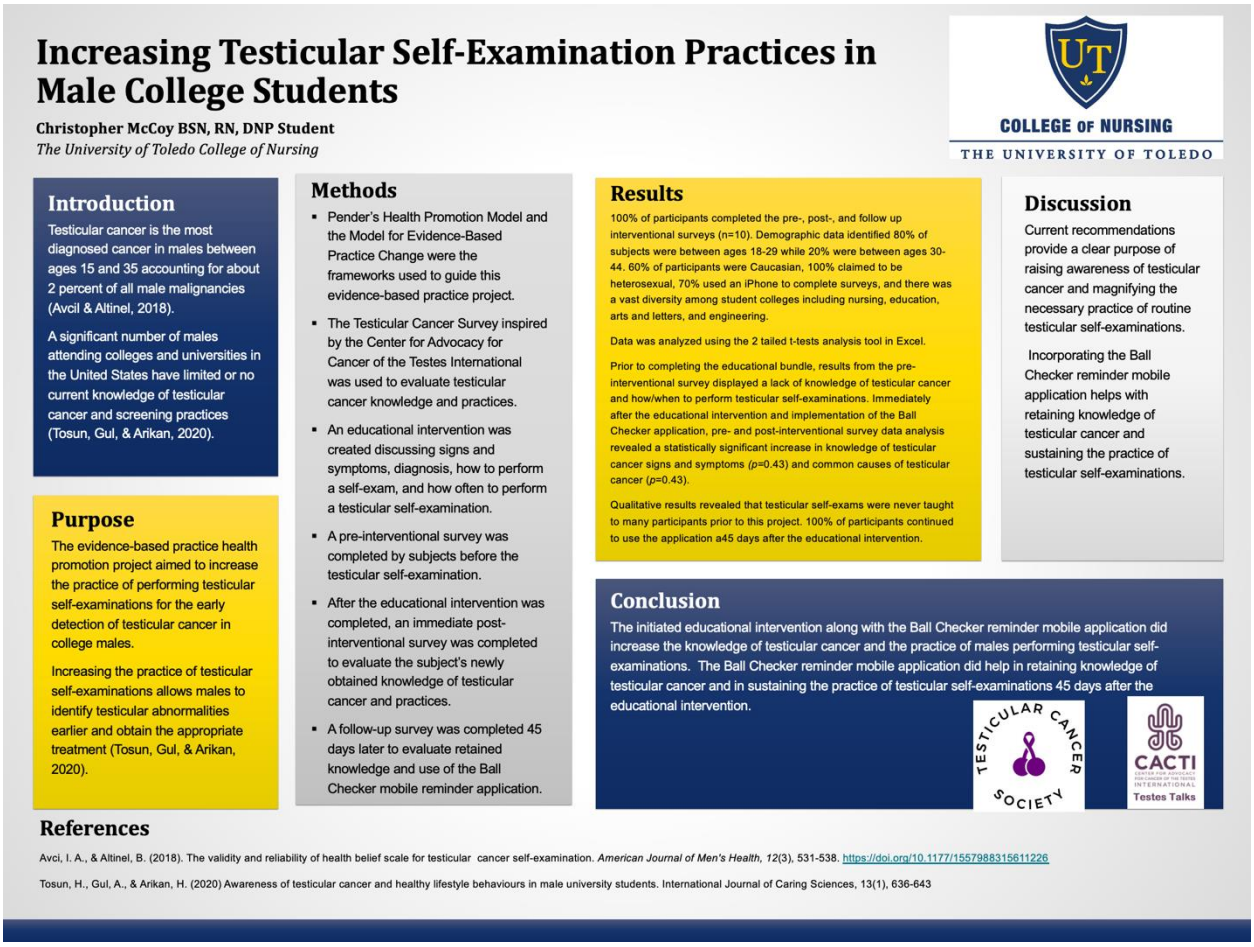
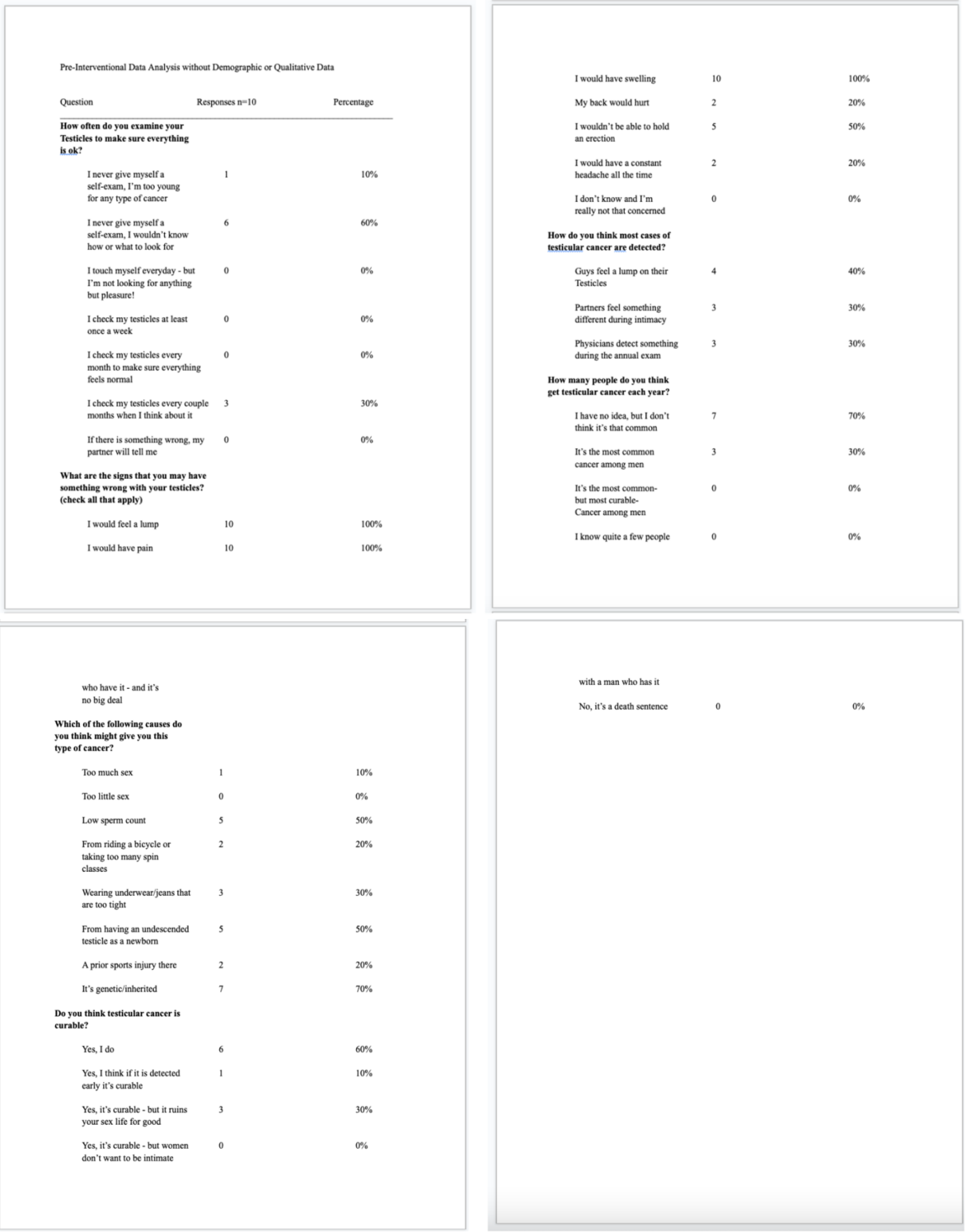



*Figure 5.* Poster for the evidence-based health promotion practice project.

Appendix C

Table 1.
Pre-Interventional Data Analysis without Demographic or Qualitative Data

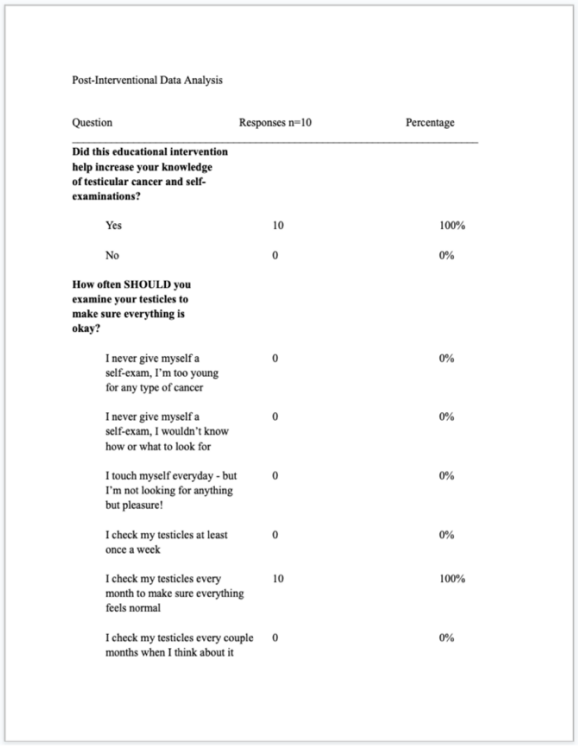


Pre-Interventional Data Analysis without Demographic or Qualitative Data

| Question | Responses n=10 | Percentage |
|---|---|---|
| **How often do you examine your Testicles to make sure everything is ok?** | | |
| I never give myself a self-exam, I'm too young for any type of cancer | 1 | 10% |
| I never give myself a self-exam, I wouldn't know how or what to look for | 6 | 60% |
| I touch myself everyday - but I'm not looking for anything but pleasure! | 0 | 0% |
| I check my testicles at least once a week | 0 | 0% |
| I check my testicles every month to make sure everything feels normal | 0 | 0% |
| I check my testicles every couple months when I think about it | 3 | 30% |
| If there is something wrong, my partner will tell me | 0 | 0% |
| **What are the signs that you may have something wrong with your testicles? (check all that apply)** | | |
| I would feel a lump | 10 | 100% |
| I would have pain | 10 | 100% |
| I would have swelling | 10 | 100% |
| My back would hurt | 2 | 20% |
| I wouldn't be able to hold an erection | 5 | 50% |
| I would have a constant headache all the time | 2 | 20% |
| I don't know and I'm really not that concerned | 0 | 0% |
| **How do you think most cases of testicular cancer are detected?** | | |
| Guys feel a lump on their Testicles | 4 | 40% |
| Partners feel something different during intimacy | 3 | 30% |
| Physicians detect something during the annual exam | 3 | 30% |
| **How many people do you think get testicular cancer each year?** | | |
| I have no idea, but I don't think it's that common | 7 | 70% |
| It's the most common cancer among men | 3 | 30% |
| It's the most common- but most curable- Cancer among men | 0 | 0% |
| I know quite a few people | 0 | 0% |
| who have it - and it's no big deal | | |
| **Which of the following causes do you think might give you this type of cancer?** | | |
| Too much sex | 1 | 10% |
| Too little sex | 0 | 0% |
| Low sperm count | 5 | 50% |
| From riding a bicycle or taking too many spin classes | 2 | 20% |
| Wearing underwear/jeans that are too tight | 3 | 30% |
| From having an undescended testicle as a newborn | 5 | 50% |
| A prior sports injury there | 2 | 20% |
| It's genetic/inherited | 7 | 70% |
| **Do you think testicular cancer is curable?** | | |
| Yes, I do | 6 | 60% |
| Yes, I think if it is detected early it's curable | 1 | 10% |
| Yes, it's curable - but it ruins your sex life for good | 3 | 30% |
| Yes, it's curable - but women don't want to be intimate with a man who has it | 0 | 0% |
| No, it's a death sentence | 0 | 0% |

Table 2.

Post-Interventional Data Analysis



Post-Interventional Data Analysis

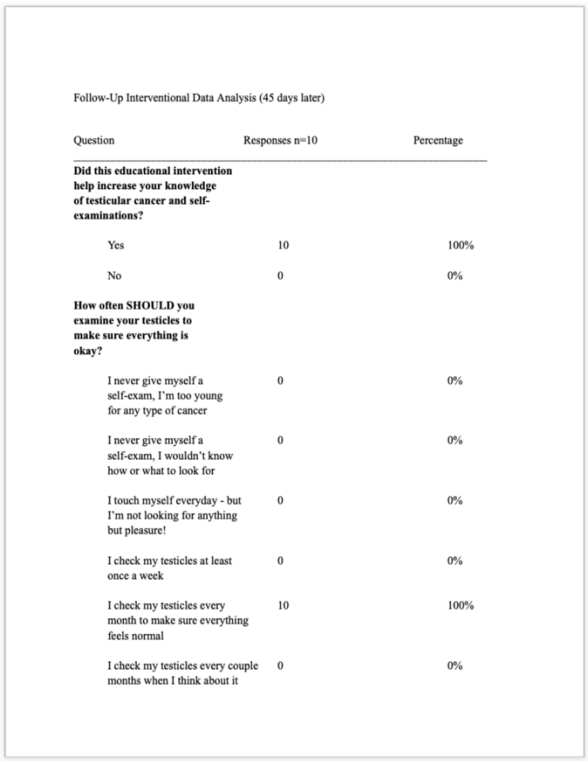
| Question | Responses n=10 | Percentage |
|---|---|---|
| **Did this educational intervention help increase your knowledge of testicular cancer and self-examinations?** | | |
| Yes | 10 | 100% |
| No | 0 | 0% |
| **How often SHOULD you examine your testicles to make sure everything is okay?** | | |
| I never give myself a self-exam, I'm too young for any type of cancer | 0 | 0% |
| I never give myself a self-exam, I wouldn't know how or what to look for | 0 | 0% |
| I touch myself everyday - but I'm not looking for anything but pleasure! | 0 | 0% |
| I check my testicles at least once a week | 0 | 0% |
| I check my testicles every month to make sure everything feels normal | 10 | 100% |
| I check my testicles every couple months when I think about it | 0 | 0% |
| If there is something wrong, my partner will tell me | 0 | 0% |
| **What are the signs that you may have something wrong with your testicles? (check all that apply)** | | |
| I would feel a lump | 10 | 100% |
| I would have pain | 10 | 100% |
| I would have swelling | 10 | 100% |
| My back would hurt | 4 | 40% |
| I wouldn't be able to hold an erection | 0 | 0% |
| I would have a constant headache all the time | 0 | 0% |
| I don't know and I'm really not that concerned | 0 | 0% |
| **How are most cases of testicular cancer detected?** | | |
| Guys feel a lump on their testicles | 10 | 100% |
| Partners feel something different during intimacy | 0 | 0% |
| Physicians detect something during the annual exam | 0 | 0% |
| **How many people get testicular cancer each year??** | | |
| I have no idea, but I don't think it's that common | 0 | 0% |
| It's the most common cancer among men | 3 | 30% |
| It's the most common- but most curable- cancer among men | 7 | 70% |
| I know quite a few people who have it - and it's no big deal | 0 | 0% |
| **Which of the following causes do you think might give you this type of cancer?** | | |
| Too much sex | 0 | 0% |
| Too little sex | 1 | 10% |
| Low sperm count | 0 | 0% |
| From riding a bicycle or taking too many spin classes | 1 | 10% |
| Wearing underwear/jeans that are too tight | 2 | 20% |
| From having an undescended testicle as a newborn | 8 | 80% |
| A prior sports injury there | 1 | 10% |
| It's genetic/inherited | 9 | 90% |
| **Do you think testicular cancer is curable?** | | |
| Yes, I do | 2 | 20% |
| Yes, I think if it is detected early it's curable | 8 | 80% |
| Yes, it's curable - but it ruins your sex life for good | 0 | 0% |
| Yes, it's curable - but women don't want to be intimate with a man who has it | 0 | 0% |
| No, it's a death sentence | 0 | 0% |
| **Have you downloaded the Ball Checker application?** | | |
| Yes! | 10 | 100% |
| No | 0 | 0% |

**How would you rate this educational intervention with 1 being the lowest quality and 10 being the highest quality?**

Low 1 2 3 4 5 6 7 8 9 10 High

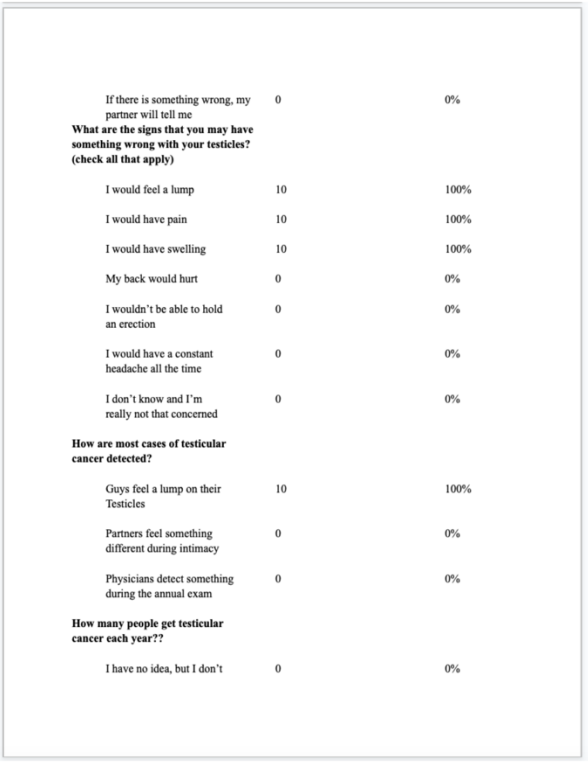
10 (100%)

Table 3.
Follow-Up Interventional Data Analysis (45 days later)

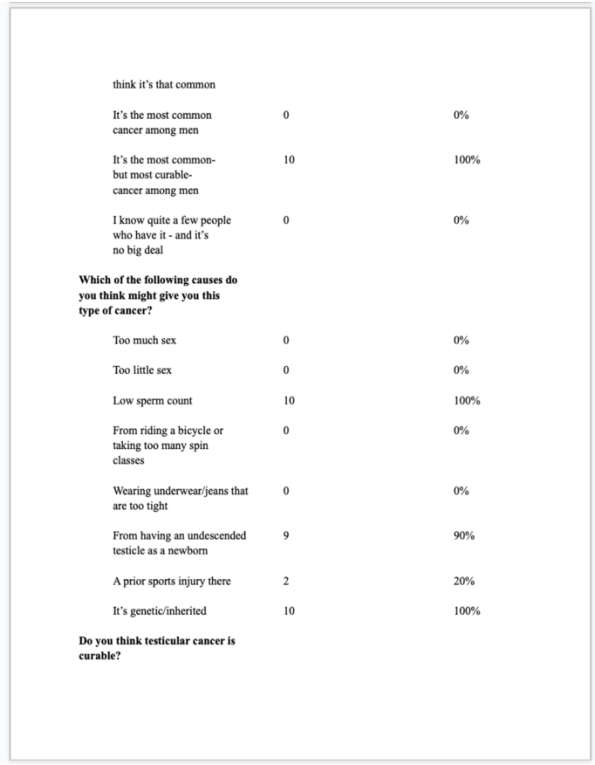


Follow-Up Interventional Data Analysis (45 days later)

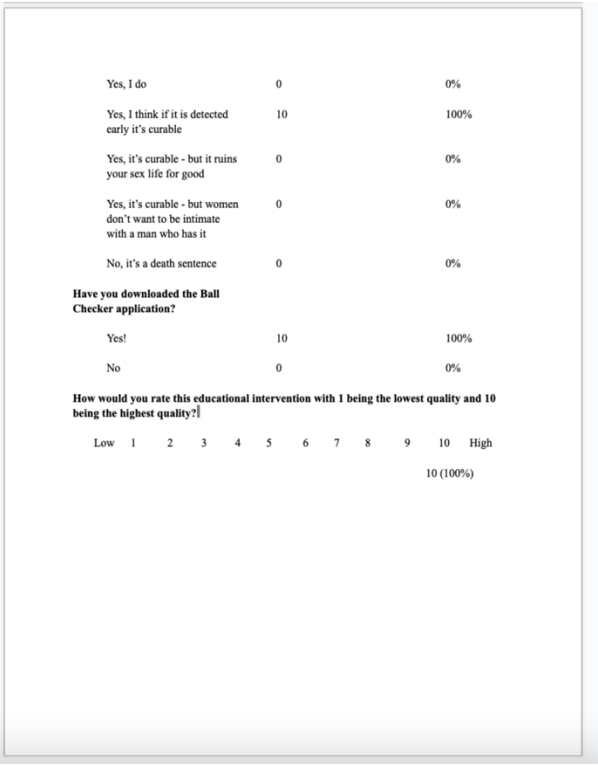
| Question | Responses n=10 | Percentage |
|---|---|---|
| **Did this educational intervention help increase your knowledge of testicular cancer and self-examinations?** | | |
| Yes | 10 | 100% |
| No | 0 | 0% |
| **How often SHOULD you examine your testicles to make sure everything is okay?** | | |
| I never give myself a self-exam, I'm too young for any type of cancer | 0 | 0% |
| I never give myself a self-exam, I wouldn't know how or what to look for | 0 | 0% |
| I touch myself everyday - but I'm not looking for anything but pleasure! | 0 | 0% |
| I check my testicles at least once a week | 0 | 0% |
| I check my testicles every month to make sure everything feels normal | 10 | 100% |
| I check my testicles every couple months when I think about it | 0 | 0% |



| | | |
|---|---|---|
| If there is something wrong, my partner will tell me | 0 | 0% |
| **What are the signs that you may have something wrong with your testicles? (check all that apply)** | | |
| I would feel a lump | 10 | 100% |
| I would have pain | 10 | 100% |
| I would have swelling | 10 | 100% |
| My back would hurt | 0 | 0% |
| I wouldn't be able to hold an erection | 0 | 0% |
| I would have a constant headache all the time | 0 | 0% |
| I don't know and I'm really not that concerned | 0 | 0% |
| **How are most cases of testicular cancer detected?** | | |
| Guys feel a lump on their Testicles | 10 | 100% |
| Partners feel something different during intimacy | 0 | 0% |
| Physicians detect something during the annual exam | 0 | 0% |
| **How many people get testicular cancer each year??** | | |
| I have no idea, but I don't | 0 | 0% |



| | | |
|---|---|---|
| think it's that common | | |
| It's the most common cancer among men | 0 | 0% |
| It's the most common- but most curable- cancer among men | 10 | 100% |
| I know quite a few people who have it - and it's no big deal | 0 | 0% |
| **Which of the following causes do you think might give you this type of cancer?** | | |
| Too much sex | 0 | 0% |
| Too little sex | 0 | 0% |
| Low sperm count | 10 | 100% |
| From riding a bicycle or taking too many spin classes | 0 | 0% |
| Wearing underwear/jeans that are too tight | 0 | 0% |
| From having an undescended testicle as a newborn | 9 | 90% |
| A prior sports injury there | 2 | 20% |
| It's genetic/inherited | 10 | 100% |
| **Do you think testicular cancer is curable?** | | |



| | | |
|---|---|---|
| Yes, I do | 0 | 0% |
| Yes, I think if it is detected early it's curable | 10 | 100% |
| Yes, it's curable - but it ruins your sex life for good | 0 | 0% |
| Yes, it's curable - but women don't want to be intimate with a man who has it | 0 | 0% |
| No, it's a death sentence | 0 | 0% |
| **Have you downloaded the Ball Checker application?** | | |
| Yes! | 10 | 100% |
| No | 0 | 0% |

**How would you rate this educational intervention with 1 being the lowest quality and 10 being the highest quality?**

Low 1 2 3 4 5 6 7 8 9 10 High

10 (100%)