Teaching Testicular Self-Examination: Education and Practices in Pediatric Residents

Joel S. Brenner, MD, MPH*; Albert C. Hergenroeder, MD‡; Claudia A. Kozinetz, PhD, MPH§; and Steven H. Kelder, PhD, MPH||

ABSTRACT. Objectives. Although testicular cancer is the most common cancer among 15- to 35-year-old male individuals, physicians seldom conduct testicular self-examination (TSE) education, thus potentially missing opportunities for early detection. Pediatric residents should be learning TSE skills training and be encouraged to incorporate them into routine practice. There are no published studies addressing the medical education and practices of pediatric residents regarding testicular cancer and TSE. The purpose of this study was to determine the prevalence of pediatric residents who teach TSE to their adolescent patients, and significant factors related to teaching TSE.

Methods. A cross-sectional study was conducted of all pediatric residents at 2 pediatric residency programs during the 2000 to 2001 academic year. A self-administered, 37-item Internet-based questionnaire was developed, pilot-tested, and then used. Statistical analyses included frequency distributions, univariate analysis, correlation coefficient, and logistic regression.

Results. A total of 129 (61%) of the eligible pediatric residents participated. Fourteen (29%) of the male residents reported performing TSE on themselves at least once a month, and 30 (61%) reported performing TSE at least every 3 months. The most frequent reason cited for not performing TSE monthly was "know how, but forget to do it" (97%). Forty (40%) of all residents reported teaching TSE to their 12- to 21-year-old male patients during a routine annual physical examination. The 2 most common reasons for not teaching TSE were “never thought about including it” (36%) and “lack of time” (29%). The senior-level residents reported teaching TSE to their male patients during a routine annual physical examination more often (51%) than the first-year pediatric residents (21%); odds ratio [OR]: 3.99; 95% confidence interval [CI]: 1.5–10.5). There was no difference in teaching TSE between the male residents who report performing TSE more than every 3 months (43%) and those who do not perform TSE (37%; OR: 1.27; 95% CI: 0.36–4.5) and between male and female residents (OR: 0.9; 95% CI: 0.44–1.9). There was no association between knowledge of TSE and testicular cancer with teaching TSE or practicing TSE. In a logistic regression model, confidence in testicular examination (OR: 3.1; 95% CI: 1.2–7.9), confidence teaching TSE (OR: 3.6; 95% CI: 1.2–10.9), and knowing someone with testicular cancer (OR: 2.4; 95% CI: 1.0–5.8) were associated with residents’ teaching TSE to their patients.

Conclusion. Fewer than half of the pediatric residents teach TSE to their adolescent patients. Confidence in performing a testicular examination, confidence in teaching TSE, and knowing someone with testicular cancer were the most important factors related to teaching TSE. This information could be used to design an educational intervention to increase physician promotion of TSE and ultimately increase young males’ TSE practices. Additional studies are recommended to determine the generalizability of these results.

ABBREVIATIONS. TSE, testicular self-examination; HBM, health belief model; BSE, breast self-examination; SD, standard deviation; OR, odds ratio; CI, confidence interval.

Testicular self-examination (TSE) instruction is not emphasized in residency training.1 No studies have addressed the medical education and practices of residents regarding testicular cancer and TSE. Increased physician training regarding TSE has been recommended.2 Barriers to providing TSE training to patients may include a lack of physician/nurse time and a lack of knowledge, skill, or comfort level in teaching TSE to patients. If barriers can be identified, then an educational intervention can be developed to attempt to overcome the barriers.

Testicular cancer accounts for 20% of cancer diagnoses in male individuals 15 to 35 years of age, making it the most common cancer in male individuals within this age group.3,4 The incidence of testicular cancer has risen 42% in the past 25 years and is 5 times higher in whites compared with blacks.4 The incidence rate for male individuals 15 to 34 years of age is 8.8 cases per 100 000. The risk of developing testicular cancer varies geographically. The highest risk is in the United States, United Kingdom, and Northern Europe and the lowest in Africa, Asia, and Puerto Rico.5

Secondary to improved treatment, the mortality rate for male individuals who are younger than 65 years has decreased 70% in the past 25 years with an estimated annual decrease of >5%.4 Mortality for
white male individuals decreased 69% versus 57% for black male individuals.4 It has been reported that patients delay consulting a physician regarding symptoms from weeks to many months.6 The most common reasons for this delay are ignorance of the symptoms’ importance, fear of cancer, and procrastination.9 This delay has resulted in as many as 88% of male individuals with testicular cancer presenting with metastases at the time of diagnosis.5–8 This is critical because there is an increase in morbidity and mortality with more advanced disease.6,8 The current 5-year survival for all testicular cancers diagnosed in US male individuals at <45 years of age is 96%.4

Two additional factors are years of potential life lost and the social impact from testicular cancer.9 Although testicular cancer accounted for the lowest number of deaths among 10 leading causes of death caused by cancer, it had the highest years of potential life lost per death.9 There are many social implications when a young man (15–35 years of age) dies or becomes disabled from testicular cancer. He is often still in the process of obtaining his education and/or starting a family. This loss may ultimately affect his contribution to society and the lives of his family.9

Testicular cancer awareness among male individuals who are at risk is low, and their knowledge regarding TSE is poor. Physician emphasis on the importance and teaching of TSE to their patients is suboptimal. Physicians need to improve their knowledge about testicular cancer in adolescents and young adults and their skills in teaching TSE to promote TSE to their patients. This training should begin in medical school and continue during residency.

To increase male individuals’ knowledge and awareness of testicular cancer, information must be presented in settings other than physicians’ offices. Increased publicity in the general community is needed. Testicular cancer has been highlighted by Lance Armstrong, the 4-time Tour de France champion cyclist, who is a testicular cancer survivor (www.laf.org). In addition, schools could be involved in educating students of both genders regarding their respective cancer risks and screening techniques. A third component is better education of young male patients by physicians regarding risks and TSE. Physicians taught only half of the male patients who performed TSE how to do their TSE.2,10

Adolescent and young male adults are ill informed regarding testicular cancer and performing TSE. Ninety percent of male college athletes were unaware of their risk of testicular cancer, 10% were ever taught TSE, and only 6% performed it regularly.10 In comparison, 64% of female college athletes were taught breast self-examination (BSE), and 33% performed it.10 Thirty percent of male soldiers were aware of their risk of testicular cancer, 16% were taught TSE, and only 2% performed it regularly.2 Soldiers were 7 times more likely to perform TSE when they were taught the technique.2 Similar studies have found equally discouraging results.7,11–26

Singer et al2 reported that only 70% of the military physicians were ever taught how to examine testes, and 10% examined testes as part of a routine physical examination. Sixty-two percent believed that TSE was the best method of early detection, 22% practiced TSE themselves, but only 16% of the physicians taught the importance of TSE to their patients.2 Singer et al reported that 96% of physicians examine the testes during a routine physical examination, yet 18% teach TSE and 7% give out TSE patient handouts. The most common reasons for not teaching TSE were being unfamiliar with TSE technique or never having thought about teaching it (82%).1

This study addressed 4 questions: 1) What percentage of pediatric residents teach TSE to their adolescent patients? 2) Do male pediatric residents who perform TSE on themselves teach TSE to their adolescent patients more than those who do not perform TSE? 3) Do senior-level (third- and fourth-year) pediatric residents teach TSE more often than first-year pediatric residents? 4) Do male pediatric residents teach TSE more often than female pediatric residents?

METHODS

Study Design and Population

A cross-sectional and group-comparison study design was conducted. Pediatric residents at 2 pediatric residency programs in the United States during the 2000 to 2001 academic year composed the study population. Residents of a combined internal medicine/pediatric residency program were included. One of the programs was located in the southwestern United States with 163 residents. The other program had 47 residents and was located in the southeastern United States. A nonprobability sampling design was chosen because of limited availability of resources and time constraints. All of the residents in the 2 programs were invited to participate.

The health belief model (HBM), a common theory used to explain health behaviors and then subsequently design interventions, along with Bandura’s self-efficacy construct was used for this study’s theoretical background.27,28 The principal investigator devised the questionnaire (available on request) for this study because one was not available for physicians in training. Portions of the questionnaire were adapted from questions in similar studies.1,2,7,8,10–17,19,21–23,25,29–31 Eighteen items of the questionnaire relate to the subjects’ attitude and practices regarding testicular cancer and TSE. Two items evaluated knowledge of TSE, and 6 items evaluated testicular cancer knowledge. The questionnaire included multiple-choice and Likert-scale items.

Data were gathered with a self-administered 37-item questionnaire on the Internet. We contacted the subjects by e-mail to explain that the purpose of the study was to understand the current knowledge and practices of pediatric residents regarding testicular cancer and teaching patients TSE. In addition, they were assured that their responses were confidential and then instructed on how to complete the survey. The survey was placed on the Internet and accessed through a hyperlink in the e-mail. Informed consent was implied by the user’s completion of the survey. All results were automatically placed in an electronic database and remained anonymous and confidential. Each subject was given a number for tracking purposes only and asked to use the number when completing the survey. The number assigned to each participant was kept in a separate database to minimize any chance of linking a participant’s answers with his identity. Four weeks after the initial e-mail correspondence, a follow-up e-mail requesting completion of the survey was sent to the nonresponders. This process was repeated a final time 2 weeks later. A paper copy of the Internet survey with a self-addressed stamped envelope was mailed to all of the nonresponders 4 weeks after the last e-mail notice was sent. The survey was closed 4 weeks after the paper copy was mailed. This study was approved by the Institutional Review Boards of both Baylor College of Medicine and the University of Texas Health Science Center at Houston.

Pilot testing of the questionnaire was performed to ensure clarity, coherence, and consistency using 11 practicing physicians.
who were given the questionnaire in the paper format. Each physician was interviewed regarding his or her perception and understanding of the survey. The questionnaire was modified on the basis of their feedback. Test-retest reliability was performed by sending out the questionnaire a second time to everyone who responded after the first 2 e-mails (41 residents) and comparing their answers.

Statistical Methods

The data were automatically entered into an electronic database from the Internet, which was then transferred directly into SPSS version 10 (SPSS, Inc, Chicago, IL). The principal investigator entered the data from the paper copies of the surveys. Range checking was done to exclude data entry errors. The demographic data were analyzed using frequency distributions. Univariate analysis was performed with the dependent variable (teaching TSE) and each independent variable. Spearman correlation coefficients were calculated among the independent variables that had significant relationships with the dependent variable to assess intercorrelation. Test-retest reliability for the continuous variables was assessed using Pearson correlation coefficient. Percentage intercorrelation. Test-retest reliability measurement over a 6-week period for total knowledge had a correlation of 0.40 and percentage agreement of 71% to 100%.

Knowledge of TSE and Testicular Cancer

The mean percentage correct score for knowledge about testicular cancer was 74.2% (standard deviation [SD]: 15.7%). The mean percentage correct score for knowledge about TSE was 85.7% (SD: 25%). The cumulative total knowledge percentage correct score for TSE and testicular cancer was 77% (SD: 13.4%). Univariate analysis revealed no association between total knowledge and teaching TSE (P = .34) or practicing TSE (P = .84).

Breast Self-Examination Compared With Testicular Self-Examination

Ninety-four percent of the female pediatric residents were taught how to perform breast self-examination (BSE) compared with 45% of the male residents who were taught TSE. Thirteen percent of the female residents perform BSE at least monthly, and 54% perform BSE at least every 3 months. Eighty-eight percent of the residents were taught how to teach BSE compared with 41% being taught how to teach TSE.

Prevalence of Performing and Teaching TSE

Table 2 shows the results of the individual survey questions. Highlights include the following: 29% of the male residents perform TSE on themselves at least once a month; 61% perform TSE at least every 3 months. The main reason cited by 97% of the residents for not performing TSE once a month was “know how, but forget to do it.” Forty percent of the

![Table 1. Demographic Characteristics of Pediatric Residents Surveyed](http://www.pediatrics.org/cgi/content/full/111/3/e239/e241)
residents teach TSE to their adolescent patients during a routine annual physical examination. The 2 most common reasons for not teaching TSE included never thinking about it (36%) and lack of time (29%). Fifty-one percent of the senior-level residents (year 3 or 4) teach TSE to their male patients during a routine annual physical examination compared with 37% of the male residents who do not perform TSE with 37% of male residents who do not perform TSE.

A logistic regression model was created and included the independent variables of confidence in testicular examination, confidence in teaching TSE, knowing someone with testicular cancer, and residency program location (Table 4). Only confidence in testicular examination (OR: 3.1; 95% CI: 1.2–7.9; P = .02), confidence teaching TSE (OR: 3.6; 95% CI: 1.2–10.9; P = .03), and knowing someone with testicular cancer compared with 41% of the female residents (OR: 0.9; 95% CI: 0.44–1.9; P = .78).

The results of a univariate analysis between teaching TSE and the other independent variables are presented in Table 3. In addition, there was no difference in teaching TSE between the pediatric residents (39%) and the medicine/pediatric residents (47%; OR: 0.71; 95% CI: 0.27–1.9; P = .71). However, there was a difference in teaching TSE between program 1 (47%) and program 2 (22%; OR: 3.1; 95% CI: 1.3–7.6; P = .009).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Yes</th>
<th>No</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM rotation</td>
<td>41 (51%)</td>
<td>11 (23%)</td>
<td>3.4 (1.5–7.7)</td>
</tr>
<tr>
<td>Confident in testicular examination</td>
<td>32 (68%)</td>
<td>20 (24%)</td>
<td>6.6 (3.0–14.6)</td>
</tr>
<tr>
<td>Taught how to teach TSE to patients</td>
<td>30 (88%)</td>
<td>22 (29%)</td>
<td>3.3 (1.6–7.0)</td>
</tr>
<tr>
<td>Confident in teaching TSE to patients</td>
<td>23 (74%)</td>
<td>28 (29%)</td>
<td>7.1 (2.8–17.7)</td>
</tr>
<tr>
<td>Know someone with testicular cancer</td>
<td>27 (61%)</td>
<td>25 (29%)</td>
<td>3.8 (1.8–8.2)</td>
</tr>
<tr>
<td>Believe TSE is an important behavior</td>
<td>52 (42%)</td>
<td>0 (0%)</td>
<td>*</td>
</tr>
<tr>
<td>Taught how to perform TSE on self</td>
<td>8 (36%)</td>
<td>11 (41%)</td>
<td>NS</td>
</tr>
<tr>
<td>Had testicular examination with last physical</td>
<td>8 (50%)</td>
<td>11 (33%)</td>
<td>NS</td>
</tr>
<tr>
<td>Perform BSE on self at least every 3 mo</td>
<td>21 (49%)</td>
<td>12 (32%)</td>
<td>NS</td>
</tr>
<tr>
<td>Usually use a chaperone</td>
<td>10 (44%)</td>
<td>23 (40%)</td>
<td>NS</td>
</tr>
<tr>
<td>Believe testicular cancer is a problem for males</td>
<td>46 (43%)</td>
<td>6 (26%)</td>
<td>NS</td>
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</table>

NS indicates not significant.
* Unable to compute statistical test secondary to 1 cell having 0 respondents (% = number answering yes or no/applicable subjects).
TABLE 4. Logistic Regression Model Comparing Independent Variables Associated With Residents’ Teaching TSE to Their Patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
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<tbody>
<tr>
<td>Confident in testicular examination</td>
<td>3.1 (1.2–7.9)</td>
<td>.021</td>
</tr>
<tr>
<td>Confident in teaching TSE to patients</td>
<td>3.6 (1.2–10.9)</td>
<td>.025</td>
</tr>
<tr>
<td>Know someone who had testicular cancer</td>
<td>2.4 (1.0–5.8)</td>
<td>.048</td>
</tr>
<tr>
<td>Residency training location</td>
<td>2.5 (0.9–6.9)</td>
<td>.066</td>
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</tbody>
</table>

cancer (OR: 2.4; 95% CI: 1.0–5.8; P = .05) remained independently associated with the residents’ teaching TSE to their patients. Having taken an adolescent medicine rotation, level of residency training, or being taught how to teach TSE were not retained in the model.

DISCUSSION

This study was the first to examine testicular cancer and TSE education and practices of pediatric residents. The residents in this study showed a higher prevalence of regularly teaching TSE (40%) to their patients compared with an earlier study of practicing physicians.1 They reported that only 18% of the physicians in a variety of specialties taught TSE to their patients regularly. The most common reason cited (82%) for not teaching TSE was being unfamiliar with the technique or never having thought about it, similar to our results. A study by Singer et al2 surveyed 200 mostly male Israeli military physicians regarding their testicular cancer knowledge, awareness, and TSE practices. Of the 70 (35% of the potential sample) respondents, only 16% taught their patients about the importance of TSE. The percentage who actually taught the TSE technique was not reported. One possible explanation for the increased prevalence of teaching TSE in the current study is an increased public awareness of the risks of testicular cancer and increased teaching in training programs through rotations such as adolescent medicine during the past decade. In addition, this study surveyed physicians in training programs as opposed to physicians in practice. One of the reasons cited by the residents for not teaching TSE was the lack of time available. It is possible that the practicing physicians experience even more time constraints than the physicians in training. The study by Singer et al2 also reported that 22% of the physicians practiced TSE “regularly.” “Regularly” was not defined. Our study reported that 29% of the residents followed the current recommendation of performing TSE monthly. Almost two thirds (61%) of the residents performed TSE at least every 3 months. This rate of practicing TSE is much higher than reported by the 19 previously cited studies. One possible explanation is that current residents may be more attuned to preventive health care techniques.

It was encouraging that the senior-level residents were 4 times more likely to teach TSE to their patients compared with the first-year residents. Their educational exposure commonly was during an adolescent medicine rotation or a conference taught by an adolescent medicine physician. The residents reported through adolescent medicine during their second year in one program and during their third year in the other program. However, factors besides an adolescent medicine rotation are involved because this variable was not significant in the logistic regression model, only in the univariate analysis.

No difference was found in teaching TSE between the male and female residents. Singer et al2 also reported a similar finding. The rate of teaching TSE was no different between those who practice and those who do not practice TSE. No other studies in the literature have examined this combination of variables.

Resident physicians have a higher knowledge base (77%) than the general public. However, this increased knowledge level is not a significant factor in practicing TSE or teaching TSE to their patients. This finding has been supported by others.7,13,22 This study is unique in its use of e-mail and the Internet as part of its methodology. The advantages of this method include ability of the subjects to complete the questionnaire any time during the study period, low cost, immediate data transfer into an electronic database, and ability to survey subjects in geographically distant locations. The participants may feel more comfortable answering the questions truthfully in private because a few of the questions are personal. This method may have decreased the chance of the answers being biased compared with the more traditional paper copy. The disadvantages include lack of control over nonresponse rate and dependence on the subjects using e-mail. Most of the respondents who responded to the survey via the Internet believed that it was easier to complete and would prefer to receive other surveys electronically. Two problems encountered during the process were the inability of some respondents to connect to the Web site and having an incorrect e-mail address. The majority (81%) of the residents did not use their institution-assigned e-mail account, making it imperative to attain a correct private e-mail address.

The reliability of the total knowledge scale was low. However, a likely explanation is that the retest occurred after a prolonged length of time (6 weeks), during which learning regarding this subject, stimulated by the initial survey, may have occurred. This explanation is strengthened by the fact that the second administration of the test was higher than the first administration. The learning effect may also have played a role in the variables with a lower percentage agreement.

One limitation of this study is that it surveyed only a small subgroup of all pediatric residents being trained in the United States and consisted of mostly white and Asian physicians. However, the demographic characteristics of the respondents are similar to those of pediatric residents training in the United States. Unfortunately, the actual sample size of the study group was less than the sample size calculated before the start of the study. Additional studies of pediatric residents would be helpful to determine whether the results are generalizable.

The difference in teaching TSE between the 2 programs was most likely secondary to both when the
adolescent medicine rotation is instituted (second year in one program and third year in the other) and the teaching curriculum. In addition, the principal investigator has given multiple lectures on TSE and testicular cancer to 1 group of residents, and no formal lectures had been given to the other group in the 2 years before the study.

The few studies that investigated TSE behavior using the HBM as a theoretical framework suggest that perceived susceptibility, benefits, barriers, and self-efficacy are essential to practicing TSE.27 It is repeatedly stated in many studies that most men do not feel confident in performing TSE.7,13,22 Our study’s finding that residents’ confidence to teach and examine testicles is most important regarding teaching TSE underlies the importance of having self-efficacy, as described by Bandura, to perform a behavior.28 In addition, 97% of the residents who do not do TSE and 36% who do not teach TSE report that it is because they “know how, but forget to do it.” This adds credence to the importance of having cues to teach and perform TSE.

Health care professionals who take care of young male patients can have a significant impact on their patients’ preventive health behaviors. Health care professionals are educated about testicular cancer and TSE, but promotion of TSE during health maintenance visits is poor. This can be improved as evident by the greater percentage of female residents who have been taught how to perform BSE and how to teach BSE. To increase young male individuals’ TSE practices, we should increase health care workers’ TSE teaching and educational practices. The HBM’s constructs, especially self-efficacy and cues to action, could be used to design an intervention that would produce the desired outcome.

CONCLUSION

Testicular cancer is an important public health problem that needs to be addressed. The only known risks are all predetermined; therefore, a focus on earlier diagnosis and treatment through regular TSE is indicated. The most important factors involved in this sample of pediatric residents teaching TSE to their patients include confidence in performing a testicular examination, confidence in teaching TSE, and knowing someone with testicular cancer. Residency program directors could use this information to help ensure that their program is fulfilling their residents’ educational needs pertaining to male health. Information in this study could be used to design a theory-based educational intervention to help increase residents’ teaching practices. The HBM could be used to increase physician promotion of TSE and then ultimately increase young male individuals’ TSE practices.

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