Eclipsed by the Prostate: Expanding Testicular Cancer Scholarship Through Years of Potential Life Lost and Economic Productivity

Michael J. Rovito, PhD, CHES, FMHI

Abstract
Men’s health has been generalized as prostate cancer (PCa) with a supporting cast of other health issues, such as testicular cancer (TCa). As a result, research and scholarship in these supporting topical areas may not receive appropriate attention. This may possibly lead to disease burden indicators failing to comprehensively assess overall affect from a specific outcome within the population. The following commentary provides an example of years of potential life lost (YPLL) and economic productivity as it relates to TCa to encourage diversity in male health research and scholarship topical areas. Overall incidence and mortality rates overwhelmingly support a disparate burden from PCa as compared to other male-specific outcomes, specifically, TCa. When factoring in YPLL and lost economic activity as a result of early death, that disparity essentially dissipates. This discussion will provide an alternative disposition on how males are affected by PCa and TCa. Although PCa has much larger mortality and incidence rates compared to TCa, the amount of life a man potentially loses (nearly quadrupled) if he would die of TCa as compared to PCa assists in balancing out the disparate aforementioned burden. Suggestions are offered to encourage scholarship attention equity as well as implications for future research in the field.

Keywords
research, testicular cancer, prostate cancer, health inequality/disparity

Received August 7, 2016; revised September 20, 2016; accepted September 26, 2016.

Overview of the Issue
According to Wenger and Oliffe (2013), men’s health has been generalized as prostate cancer (PCa) with a supporting cast of other health issues, such as testicular cancer (TCa). As a result, research and scholarship in these supporting topical areas may not receive appropriate attention. This may possibly lead to disease burden indicators failing to comprehensively assess overall affect from a specific outcome within the population. The following commentary provides an example of years of potential life lost (YPLL) and economic productivity as it relates to TCa to encourage diversity in male health research and scholarship topical areas. Overall incidence and mortality rates overwhelmingly support a disparate burden from PCa as compared to other male-specific outcomes, specifically, TCa. When factoring in YPLL and lost economic activity as a result of early death, that disparity essentially dissipates. This discussion will provide an alternative disposition on how males are affected by PCa and TCa. Although PCa has much larger mortality and incidence rates compared to TCa, the amount of life a man potentially loses (nearly quadrupled) if he would die of TCa as compared to PCa assists in balancing out the disparate aforementioned burden. Suggestions are offered to encourage scholarship attention equity as well as implications for future research in the field.

Although this imbalance of scholarship can potentially shelve from the spotlight other equally pressing health concerns, one may perhaps argue that PCa is the primary male-specific adverse health outcome and, therefore, deserves the most attention. A different set of health and wellness priorities emerge, however, when populations are stratified by age. Testicular cancer (TCa), for example, is the most common form of cancer among U.S. males aged 15 to 35 years (Giannandrea et al., 2013; Palmer, 2013). Although mortality from the disease is decreasing, overall incidence has increased rapidly over the past few decades (Kennett, Shaw, & Woolley, 2014). Attention offered to this disease, still, pales in comparison with not just PCa-related scholarship but also other outcomes dominant in this specific age category, including human papillomavirus (HPV)-related cancers (including anal, penile,
oropharyngeal, and rectal together), despite those cancers, in the aggregate, affecting ~15,800/year (Viens et al., 2016) versus ~8,800 for just TCa (see Rovito et al., 2015, for an expanded discussion).

Let it be very clear that this author considers the aforementioned topics critically important and deserving of rightful scrutiny within research. Due to the overwhelming amount of attention to these concerns, in this author’s opinion, other outcomes tend to become eclipsed in the literature. Any particular glance within the pages of the present academic milieu will reveal a significant amount of information about dietary risks causing PCa, barriers to HPV awareness among adolescent males, and/or perhaps reasons why males conceal injuries, yet very little on TCa in comparison.

The following commentary provides an example of years of potential life lost (YPLL) and economic productivity as it relates to TCa and is meant to encourage diversity in male health research and scholarship topical areas beyond the prostate. It is meant to serve as a response to the knee-jerk riposte as to why PCa gets more attention than TCa in that it, simply, affects more males. The way in which affect is contextualized, as this commentary hopefully illustrates, offers a very different perspective on this particular matter.

Taking Carter and Nguyen’s (2012) lead, this author suggests that revisiting this discussion from the perspective of YPLL and economics instead of overall incidence and mortality will provide said fresh perspective on how males are affected by PCa and TCa. This perspective aims to encourage an increase in research and advocacy regarding TCa-related matters. This commentary is not meant to dissuade research in any particular subject area of men’s health. This piece, in fact, is an advocate of all subjects related to the promotion of wellness among males.

**YPLL and Economics as Evidence for Expanding TCa Scholarship**

Li, Ekwueme, Rim, and Tangka (2010) indicate that in 2004, U.S. male deaths from PCa and TCa were 29,002 and 357, respectively, which is an approximate 81.2:1 ratio. Siegel, Miller, and Jemal (2015) suggest estimated deaths from PCa and TCa in 2016 will respectively tally at approximately 26,120 and 380 deaths. This calculates to a morality ratio of 68.7:1. In terms of projected 2016 incidence, 180,890 cases of PCa and 8,720 cases of TCa are expected (Siegel et al., 2015), which calculates to an incidence ratio of 20.7:1. Although overdiagnoses may influence PCa incidence rates, Roobol and Schröder’s (2014) suggests a very broad range of PCa cases would apply to this concern (i.e., between 1.7% and 67%). Assuming that value is around 30%, 126,623 PCa cases would still be left after compensating for possible overdiagnoses, which calculates to a 14.5:1 incidence ratio.

These ratios, at first glance, portray an overwhelming disparity in mortality and incidence that may well weave a narrative that PCa warrants an increased amount of attention as compared with TCa. In other words, if there is only 1 TCa death for approximately every 81 or 68 PCa deaths (depending on the year observed), or if for every 1 diagnosed case of TCa nearly 21 cases of PCa will be diagnosed, it would be a rational disposition that TCa would be a secondary matter to PCa. As mentioned previously, however, let us observe affect from a different angle.

Li et al. (2010) state that among U.S. males in 2004, the average YPLL per death for PCa was 10.1 and the average YPLL per death for TCa was 37.9. This indicates a nearly quadruple amount of life lost per death from TCa deaths as compared with PCa deaths. Observing YPLL from a temporally-aggregate perspective, Kamel, Moore, Bissada, and Heshmat (2012) indicate that from 1972 to 2006, the total YPLL was 2,605,410 for PCa and 556,607.5 for TCa. This calculates to a 4.7:1 ratio where for every 1 year of life lost from TCa, 4.7 were lost from PCa. This is where the burden is beginning to balance out. Not only is the average YPLL per death for TCa almost quadrupled when compared with PCa deaths, the 4.7:1 YPLL ratio compared with the 68:1 more conservative estimate of mortality ratio suggests a leveling of the playing field with regard to the overall burden from both diseases. As one may suggest that this is a mathematical slight of hand, let us discuss the topic from an ecological, even applied, perspective.

Bonhomme (2007) rightfully suggests that male health needs to be viewed from a more sociological perspective instead of at an individual level. Relating that point to the present discussion, an example demonstrating the potential societal impact of YPLL via aggregate economic productivity may assist in the matter of determining burden or affect from TCa.

Li et al. (2010) state that the average age of death for TCa among U.S. males was 42.5 years and for PCa it was 78.2 years. A 42-year-old male is in the prime of his economic viability (prime-age labor defined as 25-54 according to Lindsey, 2016). The 42-year-old helps form the backbone of the nation’s economic engine and provides a large share of revenue to support social welfare programs (Lindsey, 2016). Speaking to mortality, if, on average, 370 U.S. males per year die of TCa, their average age is 42 at time of death, and they would have retired at age 65, that calculates to approximately 85,100 years of economic activity lost just in the past 10 years. Speaking in terms of survivorship, if a male is affected by TCa at such an early age, the economy possibly suffers from reduced spending as a result of lost wages during treatment and recovery, dependency on the welfare system via disability, and/or reduced tax revenue from possible employment truancy.
(Brott et al., 2011). These factors, of course, are permanent should the individual succumb to the disease.

The effect on the U.S. economy would be significant, perhaps even incalculable, when observed in the aggregate over the course of time. Brott et al. (2011) suggest that the economic fallout of reduced activity due to health issues among U.S. male tallies into the hundreds of billions of dollars per year via health care costs and lessened productivity. As the previous example illustrates, the quantified value of potential lost economic input from those males who died of TCa over the past decade would be substantial, let alone factoring in the economic and social impacts of survivorship. This same argument, admittedly, can be made with other health outcomes besides TCa. This piece, however, chose to spotlight TCa-specific outcomes.

**A Call for Equity**

TCa is, thankfully, one of the most curable cancers (Aberger, Wilson, Holzbeierlein, Griebling, & Nangia, 2014). If caught early enough, 5-year survival rates approach 99% (Rovito, Cavayero, Leone, & Harlin, 2014), which further supports the call for increased attention be paid to TCa as we can be saving more male lives. Although PCa has much larger mortality and incidence rates compared with TCa, the amount of life a man potentially loses (i.e., nearly quadrupled) if he would die of TCa as compared with PCa balances out the grossly disparate burden. This is in stark contrast to existing funding levels allocated to research each outcome. For example, Carter and Nguyen (2012) indicate that in 2010 the National Cancer Institute allotted US$6.3 million for TCa research and US$300.5 million for PCa, which is a 47.7:1 funding ratio. In other words, for every 1 dollar spent on TCa research, nearly 50 dollars were spent on PCa. Another slight of hand? Perhaps. But, perhaps not. In this author's opinion, the math does not quite add up as it should in terms of a burden-to-funding ratio.

In closing, disease burden needs to be observed from other perspectives, such as the YPLL and economic impact, in order to more comprehensively assess the overall negative affect from specific health outcomes (in this case, PCa and TCa). This will assist in fostering discussions on how best to distribute resources and promote scholarship initiatives. Some suggestions for future research include scrutiny on the impact TCa deaths and illnesses may have on families, friendships, and social fabrics. If a man, on average, dies at age 42 from TCa, it would be paramount to understand more concretely the potential negative cascading events that may affect his dependents, friends, family, and support network.

Future research should also focus on life after TCa as previous research indicates that TCa survivors are at higher risk of death compared with the general population for some noncancer causes, such as disorders involving the digestive, respiratory, and circulatory systems (Fossà et al., 2007), as well as suicide (Alanee & Russo, 2012). TCa survivors experience significantly higher levels of anxiety related to peripheral neuropathy, anxiety of relapse, sexual issues, all of which are the result of, or related to, their TCa treatment and diagnosis (Dahl et al., 2005). These findings were corroborated by Smith et al. (2016), who found higher levels of stress, anxiety, and depression correlated to TCa treatment. TCa treatment is also associated with physiological outcomes as well, patients who underwent radiotherapy experience high usage of antihypertensive drugs, as well as diabetes (Haugnes et al., 2010).

It is a disservice to these men and their loved ones that we do not offer the same amount of resources and scrutiny to this disease despite the enormous burden placed on them all. The existing ~50:1 funding ratio of PCa to TCa is a disservice to the overall pursuit of achieving health equity and the promotion of a true public health for all. Perhaps through this increased research and scholarship, eventually we can reduce the number of times we hear, “It’s a shame he died so young from something so curable.”

**Acknowledgments**

We would like to thank everyone at Men’s Health Initiative, Inc. for their tireless efforts in executing this study as well as their devotion to promoting men’s health.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

**References**

Aberger, M., Wilson, B., Holzbeierlein, J. M., Griebling, T. L., & Nangia, A. K. (2014). Testicular self-examination and testicular cancer: A cost-utility analysis. *Cancer Medicine, 3*, 1629-1634.

Alanee, S., & Russo, P. (2012). Suicide in men with testis cancer. *European Journal of Cancer Care, 21*, 817-821.

Bonhomme, J. J. (2007). Men’s health: Key to healthier women, children, and communities. *American Journal of Men’s Health, 1*, 335-338.

Brott, A., Dougherty, A., Williams, S. T., Matope, J. H., Fadich, A., & Taddelle, M. (2011). The economic burden shoudered by public and private entities as a consequence of health disparities between men and women. *American Journal of Men’s Health, 5*, 528-539.
Carter, A. J., & Nguyen, C. N. (2012). A comparison of cancer burden and research spending reveals discrepancies in the distribution of research funding. *BMC Public Health, 12*(1), 526.

Dahl, A., Haaland, C., Mykletun, A., Bremnes, R., Dahl, C., Klepp, O., . . . Fosså, S. (2005). Study of anxiety disorder and depression in long-term survivors of testicular cancer. *Journal of Clinical Oncology, 23*, 2389-2395.

Fosså, S. D., Gilbert, E., Dores, G. M., Chen, J., Meglynn, K. A., Schonfeld, S., . . . Travis, L. B. (2007). Noncancer causes of death in survivors of testicular cancer. *Journal of the National Cancer Institute, 99*, 533-544.

Giannandrea, F., Paoli, D., Figà-Talamanca, I., Lombardo, F., Lenzi, A., & Gandini, L. (2013). Effect of endogenous and exogenous hormones on testicular cancer: The epidemiological evidence. *International Journal of Developmental Biology, 57*, 255-263.

Haugnes, H., Wethal, T., Aass, N., Dahl, O., Klepp, O., Langberg, C., . . . Fossa, S. (2010). Cardiovascular risk factors and morbidity in long-term survivors of testicular cancer: A 20-year follow-up study. *Journal of Clinical Oncology, 28*, 4649-4657.

Kamel, M. H., Moore, P. C., Bissada, N. K., & Heshmat, S. M. (2012). Potential years of life lost due to urogenital cancer in the United States: Trends from 1972 to 2006 based on data from the SEER database. *Journal of Urology, 187*, 868-871.

Kennett, A., Shaw, J. W., & Woolley, P. D. (2014). Testicular self-examination amongst genitourinary medicine clinic attendees. *International Journal of STD & AIDS, 25*, 844-850.

Li, C., Ekwueme, D. U., Rim, S. H., & Tangka, F. K. (2010). Years of potential life lost and productivity losses from male urogenital cancer deaths—United States, 2004. *Urology, 76*, 528-535.

Lindsey, B. (2016). The coming of peak gross domestic product? *Independent Review, 20*, 357.

Palmer, L. S. (2013). Hernias and hydroceles. *Pediatrics in Review/American Academy of Pediatrics, 34*, 457-464.

Ridge, D. T., Emslie, C., & White, A. (2011, April). *Theorising men and distress: What’s on the horizon for research and scholarship?* Paper presented at the International Society of Critical Health Psychology, 7th Biennial Conference, Adelaide, Australia.

Roobol, M. J., & Schröder, F. H. (2014). The rate of overdiagnosis inextricably linked to prostate-specific antigens–based screening for prostate cancer can be quantified in several ways, but what is the practicable message? *European Urology, 65*, 1056-1057.

Rovito, M. J., Cavayero, C., Leone, J. E., & Harlin, S. (2014). Interventions promoting testicular self-examination (TSE) performance: A systematic review. *American Journal of Men’s Health, 9*, 506-518. doi:1557988314555360.

Rovito, M. J., Manjelievskaia, J., Leone, J. E., Lutz, M., Cavayero, C. T., & Perlman, D. (2015). Recommendations for treating males: An ethical rationale for the inclusion of testicular self-examination (TSE) in a standard of care. *American Journal of Men’s Health. Advance online publication. doi:10.1177/1557988315620468.*

Siegel, R. L., Miller, K. D., & Jemal, A. (2015). Cancer statistics, 2015. *CA: A Cancer Journal for Clinicians, 65*(1), 5-29.

Smith, A. B., Butow, P., Oilver, I., Luckett, T., Grimison, P., Toner, G. C., . . . King, M. T. (2016). The prevalence, severity, and correlates of psychological distress and impaired health-related quality of life following treatment for testicular cancer: A survivorship study. *Journal of Cancer Survivorship, 10*, 223-233.

Viens, L. J., Henley, S. J., Watson, M., Markowitz, L. E., Thomas, C. C., Thompson, T. D., . . . Saraiya, M. (2016). Human papillomavirus–associated cancers—United States, 2008-2012. *Morbidity and Mortality Weekly Report, 65*(26), 661-666.

Wenger, L. M., & Oliffe, J. L. (2013). Moving beyond the prostate: Benefits in broadening the scope of research on men and cancer. *American Journal of Men’s Health, 7*, 138-141.