Projections for prostate cancer incidence

Background

Prostate cancer is the most commonly diagnosed cancer among men in British Columbia (BC) with about 1 in 8 men expected to develop prostate cancer during their lifetime. The incidence rate of prostate cancer was increasing steadily before Prostate Specific Antigen (PSA) testing was licensed in 1986, ascribed to increased use of transurethral resection of the prostate for benign hypertrophy (Zhou et al. 2016). In Canada, PSA testing started in the early 1990's; subsequently BC saw a dramatic increase in the incidence rate of the disease, peaking in 1993. Thereafter, the incidence rate has been decreasing with a couple of peaks in 2000/2001 and 2007 and a steeper decline happening from 2011 (Figure 1); which has been attributed to a "harvesting" effect of early diagnosis with initial PSA testing. In 2015, the incidence rate was the lowest it has been since the 1980's and is now lower than prior to the introduction of PSA testing.

These changes in patterns and temporal trends in prostate cancer incidence rates are largely due to factors influencing the incidental detection of existing tumours, diagnostic ascertainment and population risk factors. In addition to PSA testing, other specific factors that have thought to influence the increase in prostate incidence rates in Canada in the past have been the greater use of transrectal or perineal prostate biopsies under ultrasound guidance with 6 to 12 or more core biopsy specimens and modification of the Gleason grading system. The peak in 2000/2001 has been attributed to intensified PSA testing (Ellison 2016). Some factors decreasing incidence rates are thought to be due to the depleting reservoir of symptomatic men already having used PSA testing, the management of benign hypertrophy largely changing from surgical to medical therapy and, more recently, a reduction in PSA testing related to the concern of over diagnosis which has led the U.S. Preventive Services Task Force (USPSTF) (in 2012) and the Canadian Task Force on Preventive Health Care (CTFPHC) (in 2014) to recommend against PSA testing for men of any age. However, in May 2017, USPSTF changed their recommendation saying the decision to use PSA testing for screening for prostate cancer should be an individual one (Curry, Krist, and Owens 2019) while CTFPHC continues to recommend against PSA screening for low-risk men of all ages (G. LeBlanc, Demers, and Shaw 2019).

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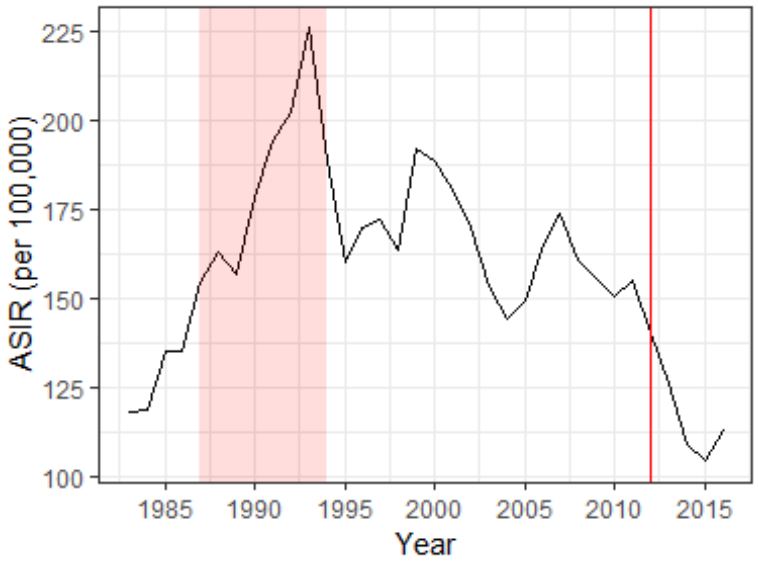

Figure 1. Prostate cancer Age Standardized Incidence Rate (ASIR) for BC. Shaded region is the time period of introduction and increased PSA testing. Red line marks the release of USPSTF guildines on PSA testing.

Projecting Prostate Cancer Incidence Rates

A key assumption when producing cancer incidence projections is that recent trends in the cancer rates can be extrapolated into the future. For this to be true, it must be assumed that trends in the incidental detection of existing tumours, diagnostic ascertainment and risk factors that influence the cancer will remain fairly stable over the period for which projections are being made. As described above, factors influencing the incidental detection of prostate cancer and ad hoc use of PSA testing as a screening tool for prostate cancer have not remained stable over time and given the recent changes in recommendations in PSA screening it is very challenging to predict whether the rate of decline in prostate cancer incidence rates since 2011 will continue or slow down or whether the increase seen in 2016 is the start of a new trend. The presence of prostate cancer does vary with age, and with BC's aging population; if rates of screening and diagnostic testing were stable, the incidence (number of new cases per year) would be expected to increase over time, although the ASIR would remain stable.

Another factor that has recently developed but has yet to be implemented into clinical care paths is the use of MRI in prostate cancer diagnosis. MRI has been shown to decrease the diagnosis of prostate cancer in men with elevated PSA test by decreasing the rate of low grade cancer diagnosis. Therefore, if MRI is incorporated into the diagnostic pathway, this could further decrease the ASIR in the future.

Given the uncertainty around prostate cancer detection in the future, we have made the assumption that future prostate cancer incidence rates will be similar to that seen in the last couple of years of observed data, by taking the average of 2015 and 2016 observed incidence rates, and we assume it will

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remain stable at this level for all projected incidence years. Therefore, any change in projected incidence counts is only due to population growth and aging.

References

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