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The continuing impacts of the COVID-19 pandemic on diagnosis and surgical prostate cancer management: a population-based analysis

Since early 2020, the global pandemic caused by COVID-19 has resulted in considerable healthcare related and economic impacts, though Australia performed favourably compared to other developed countries with respect to the number of cases and deaths. To mitigate health impacts to the wider population, restrictions on non-essential services were imposed. In line with these, recommendations to limit non-urgent urologic care were formulated to optimize patient safety[1] and many of these were adopted in Australia. In Victoria, there was an estimated 25.7% drop in prostate cancer notifications to the state registry[2] from April to October 2020, while transient falls in the absolute number of PSA tests and radical prostatectomies were observed in the first six-months of 2020.[3] We aimed to extend this analysis to observe the trend in PSA tests, biopsies, and radical prostatectomies in the first 24 months of the pandemic, from January 2020 through to December 2021, and compare these to the previous 10 years.

Medicare Benefits Schedule data was extracted per state and per month from January 2010 to June 2021 for PSA tests (items: 66655, 66659), prostate biopsies (items: 37216, 37219, 37226), and radical prostatectomies (items: 37210, 37211). Each item was plotted as a two-year trend (Jan 2010–Dec 2011, Jan 2012–Dec 2013, …, Jan 2020–Dec 2021), with the count of tests/procedures expressed as a ratio to the first January count of that two-year period. In this manner, the effect of known decade-long increases or decreases[4] in these counts is reduced and the pandemic 2020–2021 trend can be visually compared with the five previous 'two-year' periods. Graphs for each test or procedure were generated for Australia and the four states with the highest populations. Data on the number of covid cases per day to 31st December 2021, as a 7-day average, was taken from https://www.covid19data.com.au. These were divided by the estimated resident population on 30th June 2020 to provide a cases per million population statistic.

Considering the impact on prostate cancer management since the COVID-19 pandemic began, several notable trends and associations were observed. A sharp fall in PSA tests among all states was seen in April 2020 as the first wave of COVID-19 cases were detected and lockdown measures initiated. This was far lower in relative terms than at any time in the previous decade (Fig. 1). Another brief drop was noted in Victoria during the second wave in August 2020, and in both NSW and Victoria in the 2021 'delta' wave. In between, test numbers rebounded quickly but remained slightly below the long-term trend (Fig. 1, green line). For biopsy procedures, a decline from the expected trend began in March/April 2020 but generally remained below trend for the remainder of the year, rebounding in 2021, particularly in Western Australia. The observed deviation for radical prostatectomies commenced later than biopsies, with an apparent two- or three-month lag. Again, Western Australia appeared unaffected through 2020–2021 but had a transient fall noted in January–February 2021, which corresponds to a sharp lockdown period.

In comparison to the longer-term average trend, from Jan 2020 to Dec 2021 it is estimated that there were 14% fewer PSA tests, 12% fewer biopsies and 16% fewer prostatectomies in Australia. The eastern states, NSW, Victoria, and Queensland all had similar decreases; however, Western Australia had an estimated rise in biopsies (+21%) and prostatectomies (+16%) with a smaller fall in PSA tests (11% fewer) than the other states. Since the initial rise in COVID-19 cases, we observed a sustained reduction in prostate biopsies and subsequent radical prostatectomies compared to the long-term average. The reductions were more pronounced in states that have experienced more COVID-19 cases (Victoria, New South Wales) and their ensuing restrictions. Conversely, lower case numbers and shorter lockdowns, such as those performed in Western Australia appeared to have a limited quantifiable impact on prostate cancer treatment. While these trends may be pure chance, the temporal association with COVID-19 case spikes suggest a strong association.

The current findings represents a snapshot of the impact of COVID-19 on the broad prostate cancer pathway, from the primary care setting to the definitive management of localized prostate cancer. Given the diversity of settings that PSA-testing, prostate biopsy and prostatectomy is performed, the mechanism and magnitude of the impact of COVID-19 may vary. For example, the reasoning for the continued reduction in PSA testing is likely due to avoidance of primary care visits and limited engagement in non-critical preventative health measures. A reduction in routine PSA testing may result in an increased presentation of delayed prostate cancer diagnoses. This notion has been demonstrated previously in response to the controversial fluctuance in recommendations by the United States Preventative Services Task Force (USPSTF).[5] Conversely, the cause for reduction in prostate biopsies and prostatectomy is likely a combination of elective surgery reduction and downstream effect of reduced PSA testing. The impact of delayed treatment of prostate cancer is controversial, though recent European data has suggested a several month postponement in the treatment of intermediate and high risk prostate cancer has had limited oncologic consequences.[6]

The numbers of PSA tests, prostate biopsies and radical prostatectomies largely returned to the long-term average trend by June 2021. However, rises in COVID-19 cases and subsequent

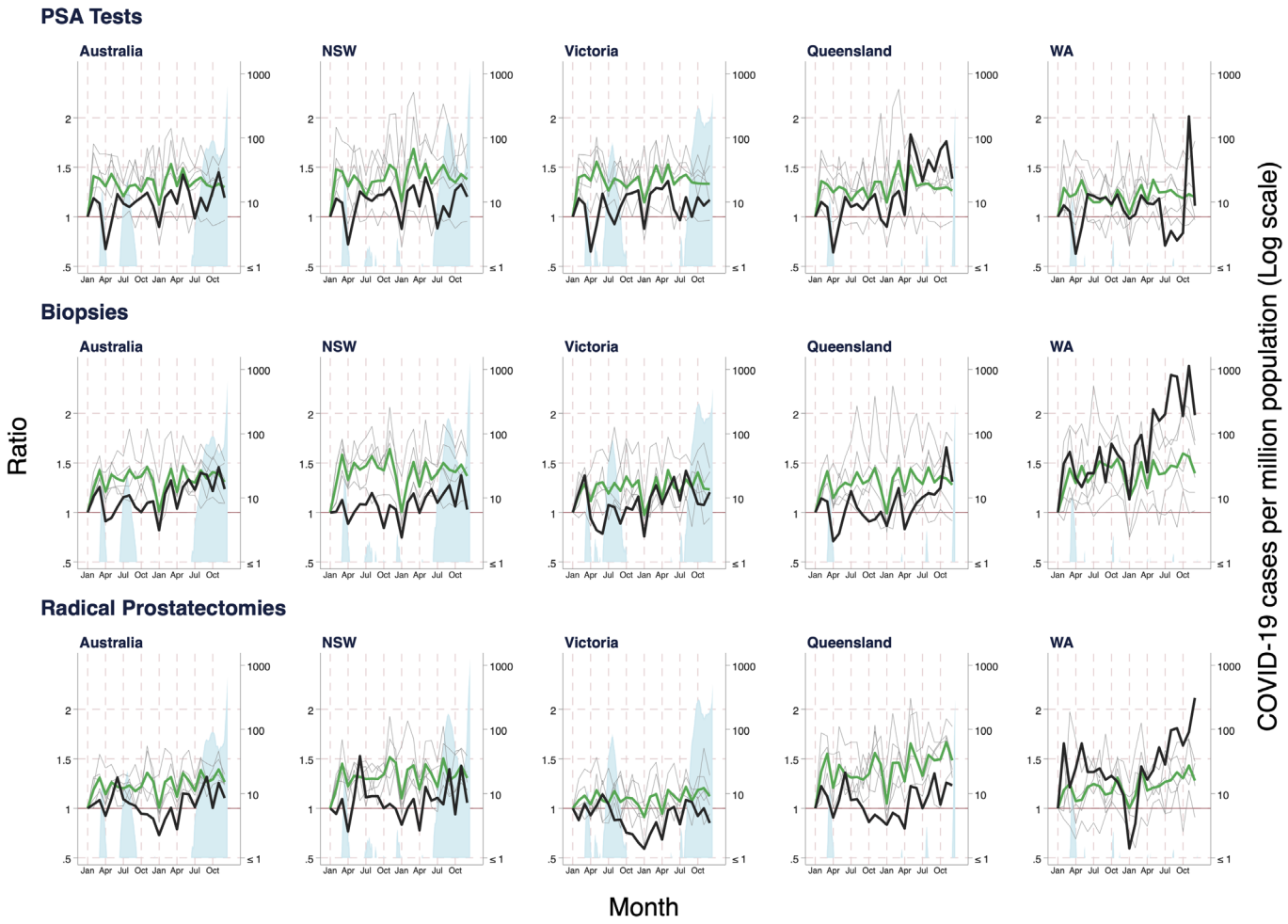

Fig. 1. Two-year trends in the number of PSA tests, prostate biopsies and radical prostatectomies in Australia and selected states. Lines indicate the number of those tests/procedures relative to the number in the first January of that two-year period (ratio). Grey lines are the 25-year periods: 2010–2011, …, 2018–2019. The green line is the mean of these five trend lines. The black line is the number of tests or procedures in the 24 months from January 2020 to December 2021, relative to the January 2020 number. The blue shading indicates the seven-day average number of COVID-19 cases per million population within that jurisdiction and this is plotted on the log-10 scale.

lockdowns in the second half of 2021 caused similar reductions in PSA tests. The consequence of these changes in patterns of care on stage at presentation and oncological outcomes is unknown but should be measured, particularly in disadvantaged communities (e.g., remote and First Nations) who are encountering high COVID-19 infections levels for the first time in 2022. With high vaccination levels in Australia, it is expected that strict COVID-19 mitigation measures will not be required in future, therefore limiting the consequent impact on prostate cancer management.

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Author contributions

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References

1. Ribal MJ, Cornford P, Briganti A *et al*. European Association of Urology guidelines office rapid reaction group: an organisation-wide collaborative effort to adapt the European Association of Urology guidelines recommendations to the coronavirus disease 2019 era. *Eur. Urol.* 2020; **78**: 21–8.

2. Te Marvelde L, Wolfe R, McArthur G, Blake LA, Evans SM. Decline in cancer pathology notifications during the 2020 COVID-19-related restrictions in Victoria. *Med. J. Aust.* 2021; **214**: 281–3.
3. Cancer Australia. Review of the Impact of COVID-19 on Medical Services and Procedures in Australia Utilising MBS Data: Lung and Prostate Cancers. Cancer Australia, 2020.
4. Roberts MJ, Papa N, Perera M *et al*. A contemporary, nationwide analysis of surgery and radiotherapy treatment for prostate cancer. *BJU Int.* 2019; **124**: 31–6.
5. Sheng IY, Wei W, Chen YW *et al*. Implications of the United States preventive services task force recommendations on prostate cancer stage migration. *Clin. Genitourin. Cancer* 2021; **19**: e12–6.
6. Diamand R, Ploussard G, Roumiguié M *et al*. Timing and delay of radical prostatectomy do not lead to adverse oncologic outcomes: results from a large European cohort at the times of COVID-19 pandemic. *World J. Urol.* 2021; **39**: 1789–96.

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