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# COVID-19 had no impact on emergency urological admissions at an Australian tertiary hospital

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## Abstract

**Backgrounds:** The COVID-19 pandemic is an unprecedented threat to health and healthcare systems. There is no published data on the impact on urological presentations in Australia.
**Methods:** A retrospective analysis of all admissions under the urology service at Liverpool Hospital, Australia from February 1st to April 30th for 2020 and the previous 5 years.
**Results:** There was a total of 397 admissions in 2020 and 438 in 2019. The mean age, proportion of male, and mean length of stay were similar. In 2020, there were 229 emergency admissions. Over the same period during the previous 5 years, there were between 195 and 218 emergency admissions. In 2019, there were 220 planned admissions and 168 in 2020. Between 2019 and 2020, there was no significant difference in the proportion of patients with admission longer than 10 days ($P = 0.602$), requiring intensive care unit admission ($P = 0.708$) or inpatient operative management ($P = 0.171$). Among the emergency admissions, the mean Charlson Comorbidity Index was significantly lower in 2020 compared to 2019 ($P = 0.009$).
**Conclusions:** Despite the pervasive fear of the COVID-19 pandemic and multiple, substantial alterations to hospital systems, structures and elective operating restrictions, no significant difference in numbers or acuity of emergency admissions were observed. Due to limitations in elective operating, there was an expected reduction in planned admissions. Our findings are in contrast to multiple recent studies and may be the result of our patient demographic where health-seeking behaviours appear to have not been significantly influenced by the pandemic.

## Introduction

The COVID-19 pandemic, caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2) is an unprecedented threat to health and healthcare systems.[1,2] The World Health Organization (WHO) declared COVID-19 as a pandemic on March 11, 2020. Healthcare systems have been altered worldwide to prioritise the prevention, identification and treatment of COVID-19.[3] While the mortality and infection rates in Australia have thus far been significantly less than many other nations, the pandemic has caused significant disruption to the health system as substantial surge preparation and adaptation occurred.[4] This has impacted the treatment of urological conditions and urological surgical training programs.[5,6]

In Australia, the first case of COVID-19 was diagnosed on the 25th January 2020. The threat of an uncontrolled Australian outbreak increased over the next 2 months. Progressive closure of borders, quarantining of returned travellers, restrictions on social gatherings, forced lockdowns and viral testing ensued. On the 18th March 2020, the government announced restrictions limiting gatherings of more than 100 people indoors and 500 people outdoors, social distancing, limitations on visitors to ages care facilities and advising against unnecessary travel. On the 24th of March 2020, the Australian Health Protection Principal Committee (AHPPC) announced restricted elective operating in both the public and private sectors to assist with healthcare resource preservation in line with recommendations from government organisations and professional bodies including the Royal Australasian College of Surgeons

(RACS).[7] Many hospitals redeployed staff to assist with COVID-19 testing or in anticipation of increased requirements in COVID-19 wards and intensive care unit (ICU). At our institution, non-urgent cases were initially delayed, and from the 6th of April 2020, operating lists were drastically reduced. The urology department was allocated one full day list per week. Compared to many other nations, Australia's case numbers remained relatively low; at the end of April 2021, there had been 6753 cases and 91 deaths. Of these, 3016 cases and 40 deaths were in New South Wales (NSW). Australian daily case numbers peaked at above 400 in late March.[8]

A number of recent studies demonstrate a reduction in presentations across a variety of medical and surgical specialities.[9–13] A recent Canadian study found a 22% reduction in total urological presentations and a 54% reduction in urologic emergencies.[14] There is no published data regarding the impact on emergency urological presentations in Australia. The aim of the present study is to investigate the impact of the COVID-19 pandemic on urological admissions. We hypothesise that there will be a reduction in the number of emergency urology admissions during the pandemic period due to patient fear and reluctance to present to the hospital. We hypothesise that the acuity of these presentations and requirements for inpatient operative intervention will be higher due to delayed presentation and limited elective operating lists.

## Methods

A retrospective analysis of medical records was performed. Admission data were collected for the period from February 1st to April 30th 2020 and compared to the identical period over the previous 5 years. This period was chosen to capture time before, during and after the first wave of infections for NSW. During this time, the pandemic was just beginning, and community fear was rapidly increasing. All admissions under the urology service at Liverpool Hospital, NSW, Australia were included. Liverpool Hospital is a tertiary centre with 877 beds and is the major hospital servicing South Western Sydney. South Western Sydney is a culturally diverse area with approximately 43% of people born overseas and in some areas, up to 75% of people speak a language other than English at home. Financial and social disadvantage is unfortunately common and the rates of private health insurance are lower than the state average.[15]

Demographics, comorbidities and detailed admission data were collected for 2019 and 2020. Comorbidities were recorded using the Charlson Comorbidity Index (CCI).[16] The CCI is a commonly used measure that allocates scores to 19 diseases. The sum of these scores has been correlated with mortality and has been studied in a large variety of populations.[17] Myocardial infarction, cerebrovascular disease, congestive heart failure, COPD/asthma, dementia, depression, diabetes without end-organ damage, hypertension, mild liver disease, peripheral vascular disease, ulcer disease and rheumatic disease are allocated a score of one. Hemiplegia, moderate/severe renal disease, diabetes with end-organ damage, any tumour/leukaemia/lymphoma and skin ulcers/cellulitis are allocated a score of two. Moderate/severe liver disease is three and metastatic solid tumour and HIV/AIDS are allocated six points.[18] Information regarding acuity of the presentation included rates of emergency operations, ICU admission rates and length of stay (LOS). Procedures were categorised as shown in Table 1. Ethics approval was obtained from the South Western Sydney Local Health District Human Research Ethics Committee (2020/ETH01069). The Student's *t*-test was used to compare means of normally distributed variables and the chi-squared test was used to analyse the strength of association of categorical variables. An alpha level of 0.05 was used. Statistical analyses were performed using SPSS version 24 (IBM Corp., Armonk, NY, USA).

## Results

Between February 1st and April 31st 2020, there were a total of 397 admissions under the urology service. In the corresponding periods in 2015–2019, there were between 385 and 470 admissions.

The emergency admission numbers have increased slightly over the past 6 years from 195 in 2015 to 229 in 2020. The mean age and proportion male were similar across the years (Table 2).

In 2019, there were 218 emergency admissions with a mean age of 57, 74.3% were male and the mean LOS was 3.2 days. In 2020, there were 229 emergency admissions with a mean age of 55, 74.2% were male and the mean LOS was 3.2 days. In 2020, a higher proportion of emergency admission patients had a LOS greater than 10 days (5.7% in 2020 and 4.6% in 2019) and required ICU admission (4.4% in 2020 and 3.7% in 2019). However, these differences did not meet statistical significance ($P = 0.602$ and 0.708, respectively). The mean CCI score for emergency admission patients was significantly higher in 2019 compared to 2020 (2.87 and 2.21, $P = 0.009$). Similar rates were observed for smoking status, antiplatelet use and anticoagulation. In 2020, there was a trend toward a higher rate (45.9%) of emergency patients requiring in-patient operative management compared to 2019 (39.4%) but this did not reach statistical significance.

A similar case mix was observed in emergency procedures. Cystoscopy ± intervention was the most common procedure accounting for 69.8% and 68.6% of procedures in 2019 and 2020. Penoscrotal procedures were the next most common operation category, accounting for 24.4% in 2019 and 18.1% in 2020. More ureteroscopy/pyeloscopy procedures were performed as emergency operations in 2020 (6.7% compared to 1.2%) (Fig. 1).

In 2019, there were 220 planned admissions with a mean age of 66, 75.9% male and the average LOS was 1.5 days. In 2020, there were 168 elective admissions with a mean age of 64, 72.6% male and a mean LOS of 1.3 days (Table 1). There were a statistically significant differences in number of elective admissions as a proportion of total admissions in 2019 compared to 2020 ($P = 0.022$). More elective patients required ICU admission (four compared with zero) and had LOS greater than 10 days (four and three, respectively) in 2020 compared to 2019; however, these differences did not reach statistical significance ($P = 0.707$ and 0.752). In 2019, there were 202 elective procedures performed, compared to 153 in 2020. The most common elective procedure was cystoscopy ± intervention, accounting for 42.6% of procedures in 2019 and 44.4% in 2020. In 2019, transrectal ultrasound (TRUS) guided prostate biopsy was the next most common procedure accounting for 13.9% followed by ureteroscopy/pyeloscopy (9.9%). In 2020, ureteroscopy/pyeloscopy (15.0%) and penoscrotal (10.5%) were the next most common procedures.

**Table 1** Demographics and results

| | 2019 | | 2020 | | |
|---|---|---|---|---|---|
| | N | Proportion of total (%) | N | Proportion of total (%) | *P*-value |
| Emergency | 218 | 49.7 | 229 | 57.7 | |
| Mean age | 57 | | 55 | | |
| Male | 162 | 74.3 | 170 | 74.2 | |
| ICU admissions | 8 | 3.7 | 10 | 4.4 | 0.708 |
| Number of admissions >10 days | 10 | 4.6 | 13 | 5.7 | 0.602 |
| Average LOS (days) | 3.2 | | 3.2 | | |
| Charlson Comorbidity Index (mean) | 2.86 | | 2.21 | | 0.009 |
| Standard deviation | 2.87 | | 2.33 | | |
| Therapeutic anticoagulation | 17 | 7.8 | 13 | 5.7 | |
| Antiplatelets | 36 | 16.5 | 36 | 15.7 | |
| Smoking status | | | | | |
| Never | 97 | 44.5 | 98 | 42.8 | |
| Current | 40 | 18.3 | 34 | 14.8 | |
| Ex-smoker | 11 | 5.0 | 20 | 8.7 | |
| Unknown | 70 | 32.1 | 76 | 33.2 | |
| Inpatient operation | 86 | 39.4 | 105 | 45.9 | 0.171 |
| Operation type | | | | | |
| Cystoscopy ± intervention | 60 | 69.8 | 72 | 68.6 | |
| Ureteroscopy/pyeloscopy | 1 | 1.2 | 7 | 6.7 | |
| Penoscrotal | 21 | 24.4 | 19 | 18.1 | |
| Transurethral resection of the prostate (TURP) | 1 | 1.2 | 3 | 2.9 | |
| Nephrectomy | 0 | 0.0 | 1 | 1.0 | |
| Transrectal ultrasound (TRUS) guided prostate biopsy | 0 | 0.0 | 1 | 1.0 | |
| Transurethral resection of bladder tumour (TURBT) | 3 | 3.5 | 2 | 1.9 | |
| Planned | 220 | 50.2 | 168 | 42.3 | 0.022 |
| Mean age | 66 | | 64 | | |
| Male | 167 | 75.9 | 122 | 72.6 | |
| ICU admissions | 0 | 0.0 | 4 | 2.38 | 0.708 |
| Number of admissions >10 days | 3 | 1.4 | 4 | 2.38 | 0.752 |
| Average LOS (days) | 1.5 | | 1.3 | | |
| Operation | 202 | 91.8 | 153 | 91.1 | |
| Operation type | | | | | |
| Cystoscopy ± intervention | 86 | 42.6 | 68 | 44.4 | |
| Ureteroscopy/pyeloscopy | 20 | 9.9 | 23 | 15.0 | |
| Penoscrotal | 16 | 7.9 | 16 | 10.5 | |
| TURP | 10 | 5.0 | 8 | 5.2 | |
| Radical Prostatectomy | 10 | 5.0 | 6 | 3.9 | |
| Radical cystectomy | 0 | 0.0 | 3 | 2.0 | |
| Nephrectomy | 8 | 4.0 | 4 | 2.6 | |
| Partial nephrectomy | 0 | 0.0 | 1 | 0.7 | |
| Urethroplasty | 5 | 2.5 | 3 | 2.0 | |
| Pyeloplasty | 2 | 1.0 | 0 | 0.0 | |
| TRUS guided prostate biopsy | 28 | 13.9 | 10 | 6.5 | |
| Ureteric reimplantation | 1 | 0.5 | 1 | 0.7 | |
| TURBT | 12 | 5.9 | 8 | 5.2 | |
| Percutaneous nephrolithotomy (PCNL) | 3 | 1.5 | 2 | 1.3 | |
| Renal cystectomy | 1 | 0.5 | 0 | 0.0 | |

Abbreviations: ICU, intensive care unit; LOS, length of stay.

**Table 2** Annual admission numbers stratified by admission type, mean age, percentage male and mean length of stay

| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Total admissions (*n*) | 385 | 428 | 419 | 470 | 438 | 397 |
| Emergency admission (*n*) | 195 | 213 | 204 | 211 | 218 | 229 |
| Planned admission (*n*) | 190 | 215 | 215 | 259 | 221 | 168 |
| Mean age (years) | 60.044 | 61.94 | 59.33 | 60.45 | 61.6401 | 59.1461 |
| Sex (% male) | 79 | 75 | 78 | 76 | 75 | 74 |

## Discussion

COVID-19 significantly impacted many hospitals in Australia, including our institution. Elective operating time was dramatically reduced to preserve hospital bed capacity and resources. Teams were restructured and precautions implemented to reduce the impact on patient care if an outbreak among staff occurred. To protect patients, staff and maintain reliable service provision, the

urology team was separated. Clinical handovers were completed via teleconference, only one registrar and one junior doctor reviewed inpatients each day, one registrar visited the emergency department to review new patients, social distancing and face masks were used and other avoidable face to face interactions such as in the operating theatre were limited as able. Despite these large-scale changes and the threat of the pandemic, our study did not find a significant difference in emergency urological admissions over the period studied. To our knowledge, this is the first study to investigate the impact of COVID-19 on urological presentations in Australia.

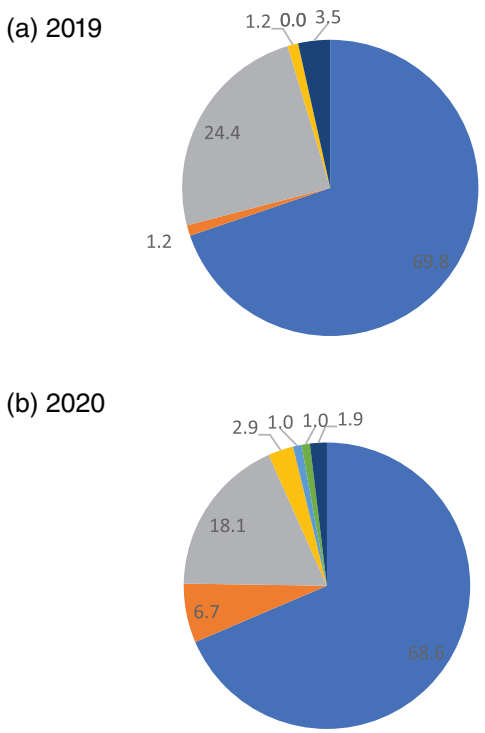
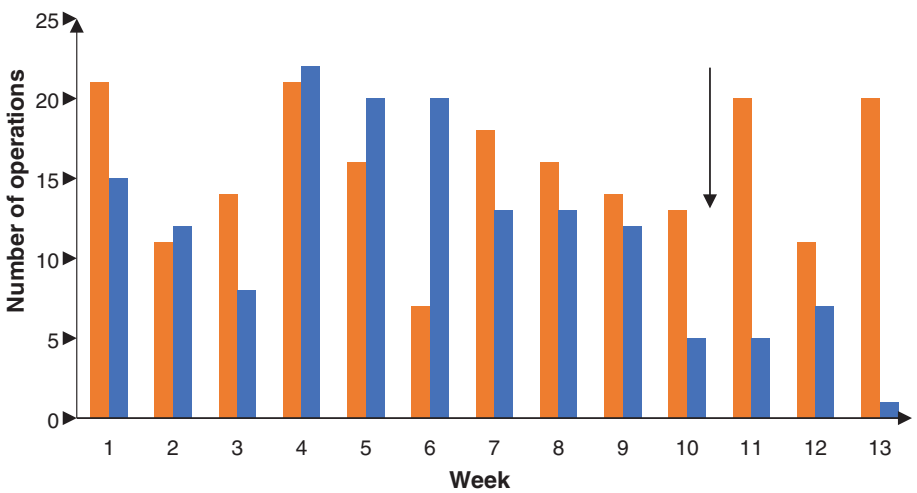



**Fig 1.** Operative case breakdown for emergency admissions in the 2019 (a) and 2020 (b) time periods. (■) cystoscopy ± intervention, (■) penoscrotal, (■) nephrectomy, (■) TURBT, (■) ureteroscopy/pyeloscopy, (■) TURP, (■) transrectal ultrasound (TRUS) prostate biopsy

Unsurprisingly, our study demonstrated a significant reduction in number of planned admissions as a proportion of total admissions in 2020 compared to 2019. Our institution limited elective operating lists, permitting only urgent cases to be performed at the height of pandemic preparations. In line with the recommendations from the Urological Society of Australia and New Zealand, Royal Australasian College of Surgeons and in consultation with the other hospital surgical departments laser lithotripsy procedures, robotic prostatectomies for low and intermediate-risk prostate cancer, partial nephrectomies for small renal tumours and other general urology procedures were delayed, while urgent procedures for malignancy were prioritised.[7,19] Instead of the usual dedicated lists for individual surgeons, the department was allocated weekly theatre time with one supervising surgeon. Additional theatre time was available when required for urgent cases upon negotiation. The flexible cystoscopy and TRUS prostate biopsy lists were also temporarily cancelled. The difference in numbers of planned cases between 2019 and 2020 is likely minimised due to the types of cases performed. Larger, more complex cases that were less urgent were delayed to preserve hospital and ICU beds and therefore potentially a higher proportion of day-only operative cases may have been performed. The mean age, proportion of males and LOS for planned admissions were similar in both years. The number of cases performed per week demonstrates similar case numbers over the first 8 weeks of the study but a significant reduction over the final 4 weeks when compared to 2019 (Fig. 2). This corresponds to the date of elective operating restrictions at our institution. While urgent cases for malignancy were prioritised, the long-term impact of delays to TRUS prostate biopsy, cystoscopic surveillance for bladder cancer and similar procedures is not yet known.

Overall, there was no difference in number of emergency admissions, nor in the surrogate markers of illness acuity. No statistically significant difference was found in the average length of stay, the proportion of admissions requiring ICU or admissions longer than 10 days. The CCI score of the emergency admission patients in 2020 was significantly lower than in 2019. These findings are

**Fig 2.** Elective operations per week comparing 2019 and 2020. The arrow indicates the date of limited elective operating at our institution. *Note*: The number of operations performed in each seven-day period starting from 1 February to 30 April in 2019 and 2020. Week 13 in 2019 is 5 days and in 2020 was 6 days. (■) 2019, (■) 2020



unexpected and in contrast to multiple recent studies demonstrating a significant reduction in patient presentations across a wide range of both medical and surgical specialities during the height of the pandemic.[10,11,13,20,21] A retrospective study at a large stroke centre in Australia with comparable study dates to ours found a significant decline in acute stroke presentations and imaging, concluding that patient fear and avoidance of hospitals was likely a major factor.[9] Similarly, a retrospective audit of Acute Medical Unit admissions in a large, tertiary Australian hospital comparing admissions in March 2020 to March 2019 found that along with an overall reduction in admissions, the patients admitted during the pandemic period were more co-morbid.[12] The authors postulated that these findings may be due to patients with more mild illnesses avoiding hospitals, fear of hospital or social isolation resulting in a reduction of communicable diseases and subsequently lower acute exacerbations of chronic diseases.[12] Our contrasting results are likely related to our patient demographic. Liverpool Hospital services a large area of South Western Sydney with a large multicultural population, many of whom are from non-English speaking backgrounds. South Western Sydney is a diverse area with a high proportion of people who were born overseas and speak a language other than English at home. This often translates into poor health literacy and consequential lack of understanding of how to navigate the health system. Our results suggest that patients in our area may not present to the hospital until they have more severe symptoms and therefore these patterns did not change during the pandemic. Alternatively, health-seeking behaviours may not have changed for patients in our area secondary to a lack of perceived personal danger, potentially due to a lack of local cases during the study period or confidence in our health system.

Among the emergency admissions, a higher proportion in 2020 required inpatient operative management, however, this did not meet statistical significance. Possible explanations for this trend include patients presenting at a more acute stage requiring urgent intervention or a lower threshold to complete operation as an inpatient due to difficulties organising elective operating for urgent cases. Of the emergency operations performed, similar numbers of TURP, TURBT and cystoscopy ± intervention were performed. In 2020, penoscrotal procedures accounted for a lower proportion and ureteroscopy/pyeloscopy procedures accounted for a higher proportion.

To our knowledge, this is the first study investigating the impact of the COVID-19 pandemic on urological presentations in Australia. The strengths of the study include the multiple variables examined and the broad inclusion criteria. We were able to study the change over time, both before and during the suspension of normal elective operating and the evolving pandemic. The limitations include the retrospective methodology and its inherent reliance on medical records. The data utilised were collected for clinical as opposed to research purposes and therefore high rates of missing data were observed, particularly with regards to smoking status and social/living situation. Another limitation is the limited study period. Mandatory restrictions began on 18th March 2020 with many changes occurring during the study period. Importantly, this study represents only a short period of the pandemic in Australia. Furthermore, as this study only included admissions and not all emergency presentations, there may have been a greater avoidance of hospitalisation during this period than documented in our study. It is possible that patients with less severe symptoms chose to avoid hospital due to perceived health-protecting behaviours, while patients with severe symptoms presented and were admitted regardless. Procedures not performed by the urology team such as insertion of percutaneous nephrostomies or percutaneous drainage of perinephric abscesses were also not included in the analysis and may have skewed results.

In conclusion, our study demonstrated no significant difference in the number or acuity of emergency admissions during the COVID-19 pandemic when compared to 2019. Unsurprisingly, due to limitations on elective operating, a significant reduction was observed. This study raises questions about the health-seeking behaviours of patients during the COVID-19 pandemic which requires further study and acknowledges that the impact of delayed surveillance and surgery for urological conditions may not be realised for some time.

## Conflict of interest

The authors have no conflict of interest to declare.

## Author contributions

**Oliver Best:** Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing-original draft; writing-review & editing. **David Armany:** Data curation; writing-review & editing. **Vinay Murthy:** Data curation; formal analysis; writing-review & editing. **Marcus Handmer:** Conceptualization; data curation; investigation; methodology; project administration; supervision; writing-review & editing. **Pascal Mancuso:** Methodology; supervision; writing-review & editing.

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