Brief Correspondence

Estimating the Impact of COVID-19 on Urology: Data from a Large Nationwide Cohort

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Abstract

The impact of the coronavirus disease 2019 (COVID-19) pandemic on urology worldwide has been the subject of frequent speculation, but population-level estimates on changes in urology care are sparsely reported. Here, we use newly released data from a large USA-based cohort to provide further insight into the impact of the pandemic on our field. For a final cohort of 900,900 patient encounters in 418 hospitals, we describe an approximately 20% decrease in urology-specific emergency room (ER) visits (19.4%, 95% confidence interval [CI] 17.4–21.5%), admissions to a urology service (19.3%, 95% CI 13.7–24.9%), and ambulatory urology surgeries (22.9%, 95% CI 13.2–32.6%) during March 2020 relative to baseline. On linear regression, region was the sole predictor of decrease in volume, reflecting the heterogeneous spread of the SARS-CoV-2 virus within the USA. Selected higher-acuity ER presentations, such as obstructing kidney stones and “acute scrotum”, appeared to be preserved relative to lower-acuity presentations, such as nonobstructing stones, hematuria, and urinary retention. These data create context for changes observed by individual urology practices and shed light on triage patterns during natural disasters.

Patient summary: The coronavirus disease 2019 (COVID-19) pandemic decreased the amount of urology care provided in the USA by approximately 20% during March 2020. Patients with complaints potentially requiring imaging tests or surgery seemed to come to the emergency room at nearly normal levels.

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Fig. 1 – Percent change from average monthly volume in (A) urology-specific emergency room visits (n = 594,410 patients, 406 hospitals), (B) inpatient admissions to a urologist (n = 43,412 patients, 131 hospitals), and (C) ambulatory urology surgery (n = 263,078 patients, 114 hospitals), by month. Error bars represent the 95% confidence interval, included on March dates for comparison.
The urology literature has largely focused on expert opinion regarding the safety and feasibility of delaying care. Published single- or few-center experiences, while also valuable, are biased towards academic institutions [3,4]. Individual urology practices may therefore struggle to contextualize changes they observed during the pandemic. Here, we use newly released data from a large, USA-based, nationally representative cohort to better estimate the impact of COVID-19 on urology.

The Premier Healthcare Database (PHD) is an all-payer database that captures outcomes from an estimated 20% of hospital admissions throughout the USA [5]. Newly updated data include encounters through the end of March 2020, which is, to the best of our knowledge, one of the first releases of nationwide, patient-level data capturing non–COVID-19–related care at the beginning of the pandemic.

We sought to estimate the change in urology patient volume in March 2020 (corresponding to the early spread of COVID-19 in the USA) relative to the baseline average across a range of hospital settings. Our cohort consisted of patients presenting to the ER with urologic complaints (Supplementary material), those admitted to the inpatient urology service, and those undergoing ambulatory urology surgery.

Our analysis included data from the previous 2 years to account for seasonal variation and trends in patient encounters. Given the changing membership of PHD over time, we included only centers submitting patient encounters during every month of the study period and maintaining >5% of their annual volume between years. We analyzed patients on the basis of discharge month, as data from April and beyond were unavailable to populate late-March admissions.

The average monthly volume was calculated by hospital using data through February 2020. The percent change was calculated as a weighted (by average volume) mean across hospitals.

The final cohort included 418 hospitals and 900,900 patient encounters over 27 mo. Figure 1 shows the percent change from average monthly volume in different patient care settings. ER visits decreased on average by 19.4% (95% confidence interval [CI] 17.4–21.5%) inpatient encounters by 19.3% (95% CI 13.7–24.9%), and ambulatory surgeries by 22.9% (95% CI 13.2–32.6%) in March 2020.

Next, linear regression models were constructed using the absolute change in patient encounters in March 2020 to investigate whether hospital-level variables modified the effect of the pandemic on patient volume. Our final models accounted for average hospital volume, hospital region, urban/rural status, academic status, and hospital race and insurance makeup (Supplementary Table 1). On multivariable linear regression, Northeast and Midwest regions were correlated with a decrease in ER volume (vs South as the reference: $\beta = -4.06, 95\% CI -7.96$ to $-0.16; p = 0.043$; and $\beta = -3.27, 95\% CI -6.19$ to $-0.35; p = 0.030$). Only the Midwest region predicted a decrease in ambulatory surgery volume ($\beta = -15.70, 95\% CI -19.52$ to $-11.88$).
CI −26.6 to −4.78; \( p = 0.006 \)). No significant predictors of change in inpatient volume were identified. Academic status, urban/rural status, and hospital race and insurance makeup were not correlated with change in hospital volume.

Finally, we sought to understand the influence of the pandemic on urology-specific ER presentations. The average monthly volume and the percent change were calculated as above for select diagnoses (Supplementary material). We also present data from March 2019 to account for the seasonality of certain ER presentations.

Relative to the average monthly volume, the percent change in March 2019 and 2020 was −2.9% and −23.3% for nonobstructing kidney stones, +5.4% and −23.1% for hematuria, +4.4% and −21.1% for urinary retention, −3.8% and −3.1% for obstructing kidney stones, and +0.7% and +0.1% for acute scrotum, respectively (Fig. 2).

Overall, these data highlight an approximately 20% decrease in urology patient discharges during March 2020 across all hospital settings studied. Hospital region was predictive of changes in some but not all settings; this is intuitive yet noteworthy in light of the concentration of COVID-19 cases in March in metropolitan areas, predominantly in the Northeast in the USA [6,7]. Importantly, other hospital demographics, including hospital race and insurance makeup, did not predict a change in patient volume. This is in spite of the heterogeneous impact of COVID-19 across patient demographics [6].

The Centers for Disease Control and Prevention reported a 42% decline in ER visits from March 29 to April 25, 2020 [2]. Our estimates are in line with these figures when accounting for the slight discrepancy in the time period studied. Similarly, they noted a decrease across all geographic regions and age groups studied.

We found a minimal decrease in patients presenting with an obstructing kidney stone or “acute scrotum” in March 2020, but found greater differences in presentations for hematuria or urinary retention. We can speculate that this may be secondary to the need for imaging, possible surgical intervention, and intravenous pain control for the former, while the latter conditions may be manageable in the office and are common consequences of urology surgery, which decreased during this time.

Limitations include the granularity of the discharge date, which does not allow us to distinguish early from late March. In addition, data from April and beyond are lacking, although changes from the onset of the pandemic can inform triage patterns and patient tendencies with respect to willingness to interface with health care. Granular clinical details are unavailable to contextualize ER presentations. Finally, our study cohort is USA-based, which may hamper the generalizability of the findings.

In spite of these limitations, our findings confirm that urology patient volume decreased markedly across all settings at the beginning of the COVID-19 pandemic. This decline was heterogeneous across regions within the USA. Interestingly, presentations for higher-acuity complaints decreased substantially relative to the average. Population-level data such as these create context in which individual urology practices can better understand changes observed during the pandemic. The data represented here are consistent with our anecdotal observations in a urology department in New York city during this time period.

**Author contributions:** Jonathan E. Shoag had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study concept and design:** Shoag, Lewicki, Basourakos.

**Acquisition of data:** Shoag, Al Hussein Al Awamleh, Schlegel.

**Analysis and interpretation of data:** Shoag, Lewicki, Wu, Basourakos.

**Drafting of the manuscript:** Lewicki, Basourakos.

**Critical revision of the manuscript for important intellectual content:** Shoag, Al Hussein Al Awamleh, Hu, Schlegel.

**Statistical analysis:** Lewicki, Wu.

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**Appendix A. Supplementary data**

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.euros.2021.01.006.

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