

## Original Research

## Decrease in prostate cancer detection during COVID-19 pandemic

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### Abstract

**Background and objectives:** The aim of this study was to evaluate the impact of the COVID-19 pandemic on the detection of prostate cancer in men considered at high risk. This was done by comparing data from the Mures County Clinical Hospital, Clinic of Urology one year before (non-pandemic, NP) and during (pandemic, P) the global COVID-19 pandemic.

**Methods:** A retrospective study was performed based on the Mures County Clinical Hospital database. The inclusion criteria were clinical suspicion (digital rectal examination) and elevated prostate-specific antigen (PSA) level (threshold 3.2 ng/mL). Statistical analysis was performed with STATA 11 Program. Mann-Whitney, Student and chi-square tests were used to compare median PSA, prostate volume, number of TRUSbx performed, number of core biopsies, Gleason Score values, and perineural invasion between the NP and P groups.

**Results:** A total of 440 patients were studied, comprising 271 in the NP group and 169 in the P group. The average number of TRUSbx procedures was 22.58 per month in 2019 (NP group) and 14.08 per month in 2020 (P group), representing a decrease of 37.65%. Analysis of data for the P and NP groups showed a median PSA of 10.48 vs 10.58, mean prostatic volume of 43.69 vs 43.26, number of core biopsies 11.39 vs 11.70, and Gleason score of 7.31 vs 7.15, respectively. Mann-Whitney U test revealed no statistically significant differences between the two groups, with only the Gleason Score showing a trend for significance ( $p = 0.065$ ).

**Conclusions:** The COVID-19 pandemic led to a major decrease in the number of surgeries performed, with TRUSbx declining by almost 40%. No differences between P and NP periods were observed for median PSA, prostate volume, number of core biopsies, and perineural invasion. The Gleason Score showed a slightly higher incidence of advanced prostate cancer in the P group, but this did not reach statistical significance.

### Keywords

Global pandemic; COVID-19; TRUSbx; Prostate biopsy; Prostate cancer

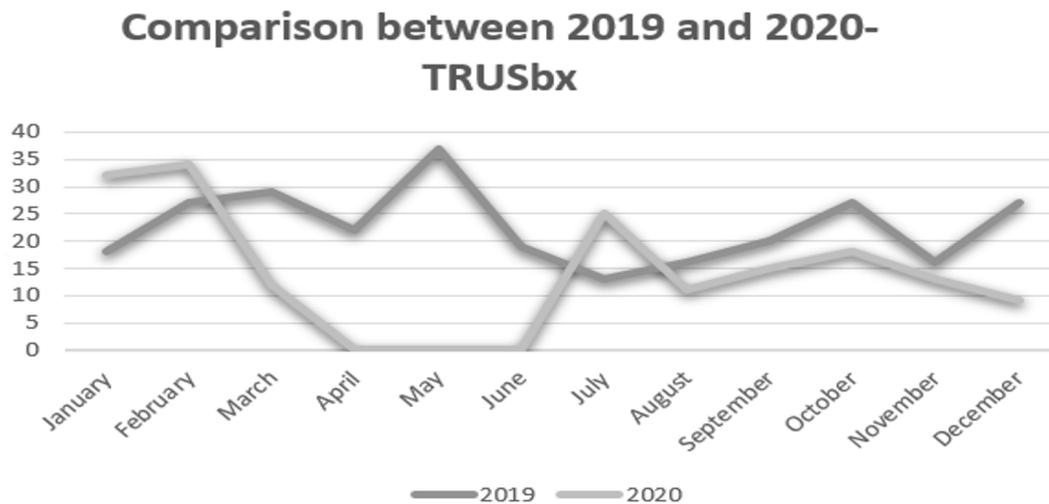


FIG. 1. Monthly comparison of TRUSbx performed in 2019 and 2020.

## 1. Introduction

Prostate cancer (PCa) is a major worldwide health concern, being the sixth most common cause of cancer-related deaths and the second most common tumor type in the male population. At the moment, transrectal ultrasound-guided prostate biopsy (TRUSbx) is the most widely used method for prostate cancer diagnosis [1–3].

A recent study by the World Health Organization (WHO), indicates that of the 19.3 million new cases of cancers reported in 2020, 1.4 million were prostate cancer, representing 7% of the total number of cases. In the central and eastern European population, the age of prostate cancer diagnosis is usually within the range of 40 to 72 years. The mortality rate from PCa in this region is quite high at around 13.7 deaths per 100,000 inhabitants [4, 5].

Since the first report of SARS-CoV-2 (COVID-19) infection in China on 31st of December 2019, the number of new cases worldwide increased rapidly. This has put all health care practitioners at risk and jeopardized any kind of medical act or procedure due to the risk of infection. Given the fact that older men represent the high-risk group for PCa, COVID-19 infection may overlap with this population group, thus increasing the mortality. Even ignoring this overlap, a cancer diagnosis with other comorbidities may increase the risk of death from COVID-19 infection [6–10].

In accordance with EU Guidelines, the surgical activities in our Urological Department suffered from the COVID-19 pandemic, including delays in the diagnosis and staging of PCa [6, 11]. The objective of this study was therefore to compare PCa diagnosis before and during the crisis caused by the new coronavirus in the Mures County Clinical Hospital.

## 2. Materials and methods

This retrospective study includes 440 patients who underwent TRUSbx at the Mures County Clinical Hospital, Romania, from January 2019 to December 2020. The inclusion criteria for the study were clinical suspicion upon digital

rectal examination (DRE) and/or elevated prostate-specific antigen (PSA) at a threshold level of 3.2 ng/mL. No age criteria were applied.

The total number of beds in the Urology Clinic before the pandemic period was 82, serving approximately 200,000 persons. This decreased to 10 beds during the quarantine period (April–May) and then stabilized at 37 after this period. The number of confirmed cases of COVID-19 in Mures County, Romania in 2020 was 14,948. During the quarantine period, only urological emergencies were admitted to the clinic.

The Vienna Nomogram was used for the pathological examination and most samples contained 12 randomized biopsies.

Patients were divided into two groups: nonpandemic (NP) and pandemic (P). The NP group comprised 271 patients who underwent TRUSbx in 2019, while the P group consisted of 169 patients with TRUSbx performed in 2020.

In all patients the age, PSA level, prostate volume (transrectal ultrasound assessment), number of biopsy core performed, and pathological evaluation (Gleason score and perineural invasion) were recorded.

Statistical analysis was performed with STATA 11 Statistical Program (StataCorp LLC, College Station, TX, USA). Results from biopsies performed using the same procedure before (NP) and during the global pandemic (P) were compared. Mann-Whitney, Student and chi-square tests were used to compare the Gleason score values, number of TRUSbx performed, PSA values, and the prostate volume between the NP and P groups.

## 3. Results

A total of 440 patients met the inclusion criteria for the study, of which 271 (62%) were in the 2019 NP group and 169 (38%) in the 2020 P group. The average number of procedures for 2019 was 22.58 per month and for 2020 it was 14.08, thus representing a decrease of 37.65% (Fig. 1).

The number of positive prostate biopsies (PCa) was 187

**TABLE 1. Characteristics for the Pandemic and Nonpandemic groups.**

		Age	PSA (ng/mL)	Prostate (cm <sup>3</sup> )	Number of core biopsies	Gleason score
Pandemic	Mean	70.0296	79.4064	43.69	11.39	7.31
	Std. Deviation	7.40771	312.84429	13.63	3.058	0.885
	Median	70.0000	10.4800	40.00	12.00	7.00
	Minimum	50.00	0.63	20.00	3	6
	Maximum	87.00	3500.00	100.00	18	9
	Patients	169	169	169	169	123
Nonpandemic	Mean	76.3976	41.6954	43.26	11.70	7.15
	Std. Deviation	11.7759	106.38441	15.93	2.486	0.909
	Median	72.1030	10.5800	40.00	12.00	7.00
	Minimum	51.00	0.58	3.00	2	6
	Maximum	86.00	1026.00	100.00	19	9
	Number	271	271	271	271	187
Total	Patients	440	440	440	440	310

(69.0%) for the NP group and 123 (72.78%) in the P group, highlighting the importance of good patient selection.

The average age for the P group was 70.0 years (IQR 50–87) and for the NP group it was 76.4 (IQR 51–86) (Table 1).

Using the same statistic test, we compared the PSA values for the same two groups. In the PANDEMIC group, the PSA maximum value was 3.500 ng/dL (mean-79.40) with 1.026 ng/dL (mean-41.69) in the NONPANDEMIC group. No major differences were recorded between the two groups regarding prostate volume (Table 1).

The number of confirmed cases with PCa was 123 patients in the P group and 187 patients in the NP group.

The Mann Whitney test was also applied to compare the Gleason score values, number of TRUSbx performed, PSA values, and the prostate volume between the P and NP groups. A *p*-value of 0.065 was obtained for the Gleason score (Table 2).

**TABLE 2. Mann Whitney test comparison of the Pandemic and Nonpandemic groups.**

	PSA (ng/mL)	Prostate (cm <sup>3</sup> )	Biopsy	Gleason score
Mann-Whitney U	21505.000	21685.000	21831.500	10035.500
Wilcoxon W	35200.000	58270.000	36027.500	27613.500
Z	-0.155	-0.882	-0.787	-1.848
<i>p</i> value	0.877	0.378	0.431	0.065

Chi-squared tests were performed to compare pathology results between the two groups. Pathological evaluation of post-biopsy specimens revealed a higher percentage of PCa with bilateral localization (40.2%) (Table 3).

**TABLE 3. Chi-squared test results for comparison of pathology results.**

Diagnosis		Pandemic	Nonpandemic	Total
Bilateral prostate cancer	Count	68	109	177
	Percentage	40.2%	40.2%	40.2%
Right lobe prostate cancer	Count	28	36	64
	Percentage	16.6%	13.3%	14.5%
Left lobe prostate cancer	Count	27	42	69
	Percentage	16.0%	15.5%	15.7%

The chi-squared test was also used to compare the Gleason score between the P and NP groups (Table 4). A higher percentage of advanced-stage PCa (Gleason = 8/Gleason = 9) was observed in the P group, but this did not reach statistical significance (*p* = 0.12). The same test revealed a higher percentage of Gleason = 6 PCa diagnosed in the NP group.

**TABLE 4. Chi-squared for Gleason score.**

		Pandemic	Nonpandemic	Total
Gleason 6	Count	17	40	57
	Percentage	13.82%	21.40%	18.38%
7	Count	67	104	171
	Percentage	54.47%	55.61%	55.16%
8	Count	22	18	40
	Percentage	17.88%	9.62%	12.90%
9	Count	17	25	42
	Percentage	13.83%	13.37%	13.56%
Total	Count	123	187	310

Perineural invasion was also assessed using the chi-square test. No significant difference in the frequency of this characteristic was observed between the two groups (*p* = 0.20) (Table 5).

**TABLE 5. Chi-squared test for comparison of perineural invasion.**

		Pandemic	Nonpandemic	Total
Perineural invasion Yes	Count	64	92	156
	Percentage	52.04%	49.19%	50.32%
No	Count	59	95	154
	Percentage	47.96%	50.81%	49.68%

## 4. Discussion

Given that PCa is the second most common neoplasia in the male population, early diagnosis and treatment remain a priority.

In this study the number of patients who underwent TRUS was observed to decrease by 38% during the COVID-19 pandemic. Although the number of investigated patients was

smaller in the P group, statistical analysis of all the data collected from the P and NP groups did not find any significant differences in terms of PSA, prostate volume, or number of biopsies. The only notable change was a higher Gleason score in the P group, but this did not reach statistical significance.

Ginsburg *et al.* [12] reported that no adverse clinical outcome was associated with a 12-month delay in surgery, even in high-risk prostatic cancers. Effective triage can minimize the negative impact of this disease during the pandemic [13].

A likely reason for the lower number of TRUSbx performed during the pandemic can be attributed to the fear of getting infected. Another obvious reason is the reduced number of beds available in hospital departments due to the high infectivity and transmission of SARS-CoV-2. The majority of medical practitioners kept the same workplace during the pandemic, while others were asked to move to a COVID-19 ward [14]. At the Mures County Clinical Hospital, the urology department worked for three continuous months only with coronavirus-positive patients. This relocation had a negative impact on the diagnosis, staging, and treatment of prostate cancer patients and resulted in no TRUSbx being performed during two months (April, May) of 2020.

Compelling evidence gathered since the start of the pandemic indicates that PCa patients have a higher risk of infection than the rest of the male population [17]. Even without an oncological diagnosis, several studies have shown that more men are dying due to immunological status or smoking habit [15–17].

Prostate cancer management is currently facing a new approach. Doctors worldwide are attempting to implement an efficient triage concept that was previously discussed for application during times of disaster [18–20]. This method can screen and categorize patients, with urgent cases having priority while those described as “well” being monitored [21, 22].

Another important matter to consider is the protection for doctors and medical personnel. A recent study found that in more than 20% of SARS-CoV-2 patients with negative reverse transcriptase-polymerase chain reaction (rRT-PCR) results, viral RNA was still present in feces. This is important because without proper surgical technique, doctors performing TRUSbx could be exposed to a high risk of contracting and spreading the viral infection [23–25].

## 5. Conclusions

The COVID-19 pandemic has led to a large decrease in the number of surgeries performed, including TRUSbx.

Even though the number of TRUSbx decreased by almost 40% during the pandemic period, no differences in median PSA, prostate volume, number of core biopsies, and perineural invasion were found between pandemic and non-pandemic periods.

The Gleason Score showed a higher incidence of advanced prostate cancer in the P group, but this did not reach statistical significance.

## Author contributions

DPH, conceived and designed the analysis, contributed data or analysis tools. DB, conceived and designed the analysis, performed the analysis, wrote the paper. RG, collected the data, performed the analysis. SV, contributed data or analysis tools, performed the analysis. CTM, contributed data or analysis tools, designed the analysis. OVA, contributed data or analysis tools, designed the analysis. OM, conceived and designed the analysis, contributed data or analysis tools.

## Ethics approval and consent to participate

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of 7371/2021.

## Acknowledgment

Thanks to all the peer reviewers for their opinions and suggestions.

## Funding

This research received no external funding.

## Conflict of interest

The authors declare no conflict of interest.

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