



## An Updated Review of NHS England Prostate Biopsy Data during the COVID-19 Pandemic (2019-2021)

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Keywords:	COVID-19, Prostate Biopsy, Transperineal, Transrectal, TRexit
Abstract:	<p><b>Introduction</b></p> <p>The abandonment of traditional transrectal (TR) towards transperineal (TP) prostate biopsies, or TEXIT, is in vogue. Following our evaluation (Tamhankar et al. BJUI 2020; 126: 133-141) of nearly half a million prostate biopsies in the NHS over a decade (2008-2019), the reduced sepsis and emergency readmission rates with the TP approach were alluded to. During the last two years of this cohort (2017-19) the majority of biopsies remained TR (67.2%). Has the current COVID-19 pandemic proved a catalyst for increasing TP biopsy uptake?</p> <p><b>Methods</b></p> <p>The Hospital Episode Statistics (HES) data over the most recent two years (2019-21) were analysed. This included biopsy approach, setting, complications (28 days post-procedure), non-elective (NEL) readmissions and associated NHS expenditure.</p> <p><b>Results</b></p> <p>In this dataset, between 2019-2021, 93,041 prostate biopsies were undertaken (44,706 TR and 48,335 TP). In 2019/20 43.2% of these were via the TP approach compared with 65.7% in 2020/21, amid the COVID-19 pandemic. The number of TP biopsies undertaken in the outpatient setting increased by 150% from 2019/20 to 2020/21. Across the 2 years the post-procedural sepsis, urinary tract infection and NEL readmission rates were significantly higher following TR biopsy (<math>p &lt; 0.0001</math>). Total costs for readmission were £4,193,828.48 and</p>

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	<p>£2,790,528.46 for the TR and TP approaches respectively.</p> <p>Conclusions</p> <p>The increasing adoption of TP prostate biopsies, particularly in the outpatient setting, has been accelerated during these extraordinary times. Cancer diagnostic services have had to adapt and this appears to have benefited the move away from TR biopsy.</p>



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Peer Review

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4 **An Updated Review of NHS England Prostate Biopsy**  
5 **Data during the COVID-19 Pandemic (2019-2021)**  
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# Abstract

## Introduction

The abandonment of traditional transrectal (TR) towards transperineal (TP) prostate biopsies, or TRexit, is in vogue. Following our evaluation (Tamhankar et al. BJUI 2020; 126: 133-141) of nearly half a million prostate biopsies in the NHS over a decade (2008-2019), the reduced sepsis and emergency readmission rates with the TP approach were alluded to. During the last two years of this cohort (2017-19) the majority of biopsies remained TR (67.2%). Has the current COVID-19 pandemic proved a catalyst for increasing TP biopsy uptake?

## Methods

The Hospital Episode Statistics (HES) data over the most recent two years (2019-21) were analysed. This included biopsy approach, setting, complications (28 days post-procedure), non-elective (NEL) readmissions and associated NHS expenditure.

## Results

In this dataset, between 2019-2021, 93,041 prostate biopsies were undertaken (44,706 TR and 48,335 TP). In 2019/20 44.2% of these were via the TP approach compared with 69.9% in 2020/21, amid the COVID-19 pandemic. The number of TP biopsies undertaken in the outpatient setting increased by 150% from 2019/20 to 2020/21. Across the 2 years the post-procedural sepsis, urinary tract infection and NEL readmission rates were significantly higher following TR biopsy ( $p < 0.001$ ). Total costs for readmission were £4,193,828.48 and £2,790,528.46 for the TR and TP approaches respectively.

## Conclusions

The increasing adoption of TP prostate biopsies, particularly in the outpatient setting, has been accelerated during these extraordinary times. Cancer diagnostic services have had to adapt, and this appears to have benefited the move away from TR biopsy.

## Introduction

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3 The COVID-19 pandemic has had a profound impact on the delivery of elective diagnostic  
4 cancer services.  
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7 Prostate Cancer is the preeminent cancer in men, comprising 27% of all new cancer cases.  
8 During 2016-2018, 52 254 new cases were diagnosed in the UK.<sup>1</sup> The prostate biopsy and the  
9 obtainment of the histological Gleason Score remain the gold standard modality in the  
10 diagnosis of the disease. The father of modern urology, Hugh Hampston Young (1870-1945)  
11 was the first to describe a biopsy of the gland, albeit an open trans-perineal approach, in  
12 1926.<sup>2</sup> John McNeal's subsequent appreciation of the prostatic anatomy, the clinical adoption  
13 of prostate specific antigen (PSA), and the development of multi-parametric magnetic  
14 resonance imaging (MRI) have been key milestones in the prostate biopsy journey.<sup>3,4</sup>  
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22 In solidarity with HH Young, it has been suggested that as a urological community we are  
23 going full circle in regards to prostate biopsy approach. The move towards trans-perineal  
24 (TP) biopsy and retreat from the traditional trans-rectal (TR) approach, termed TRexit in  
25 certain quarters, is in vogue.<sup>5</sup>  
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29 When considering TR biopsies, the traversing of the biopsy needle through the rectal mucosa  
30 has been consistently shown to result in increased rates of post-procedural sepsis, with  
31 associated increased rates of emergency non-elective (NEL) readmissions. These findings  
32 were alluded to in our paper reviewing the clinical and financial implications of a decade of  
33 NHS prostate biopsies from 2008 to 2019.<sup>6</sup> The recent 2022 European Association of  
34 Urology (EAU) Guidelines on Prostate Cancer now strongly recommend the use of the TP  
35 approach due to the lower risk of infectious complications.<sup>7</sup>  
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42 The aim of this review was to evaluate the most recent NHS prostate biopsy data, from 2019  
43 to 2021, in the context of the global COVID-19 pandemic.  
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## 51 **Methods**

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53 The Hospital Episode Statistics (HES) data were used and accessed via a licensed  
54 intermediary, Harvey Walsh. The information provided includes inpatient admissions,  
55 outpatient visits and emergency department attendances for all UK NHS Clinical  
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3 Commissioning Groups. The period under review was April 2019 to March 2021, which  
4 incorporated the initial UK COVID-19 lockdown period, at the end of March 2020.  
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8 The data are collected during every patient interaction within the healthcare system and can  
9 be used for both clinical and non-clinical purposes. Information on patient demographics,  
10 diagnosis and treatment can be obtained. Given the pseudonymization of the data, ethical  
11 approval is not required. The information is captured on a prospective basis. During each  
12 episode patients are assigned a diagnosis, coded for in the International Statistical  
13 Classification of Diseases and Related Health Problems 10th revision (ICD-10), for their  
14 admission.<sup>8</sup>  
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21 Each episode is additionally assigned a procedural code, which is coded in the Office of  
22 Population Censuses and Surveys (OPCS). The HES-recorded procedure-specific codes  
23 (Classification of Intervention and Procedure Codes or OPCS-4) were used to identify  
24 patients.<sup>9</sup> Patients were included if they were coded as either M702 (TP needle biopsy of  
25 prostate) or M703 (TR needle biopsy of prostate).  
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31 All patients who were either re-admitted or attended the emergency department within the  
32 first 28 days following biopsy were identified and assigned an ICD-10 diagnosis for their  
33 presentation. Outcomes assessed included post-procedural complications (28 days post-  
34 biopsy) including sepsis, urinary tract infection and acute urinary retention. The rates of non-  
35 elective (NEL) re-admissions and the secondary healthcare costs were also analysed.  
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41 The comparison between TP and TR biopsies for rates of infection, sepsis and NEL re-  
42 admission (within 28 days) was tested using the N-1 Chi-squared test. Statistical significance  
43 was considered at  $P < 0.05$ .  
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## 53 Results

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55 Between 2019 and 2021 in our dataset, a total of 93 041 prostate biopsies were undertaken.  
56 44 706 of these were via the TR route and 48 335 TP. Between April 2019 and March 2020,  
57 56 987 biopsies were performed (32 389 TR and 24 618 TP). Between April 2020 and March  
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3 2021, in the midst of the COVID-19 pandemic, 36 054 biopsies were performed (12 366 TR  
4 and 23 687 TP). The total number of prostate biopsies undertaken reduced by 36.3% (**Figure**  
5 **1**). The proportion of TP biopsies increased: 44.2% (2019/20) v. 66.9% (2020/21) (**Figure 2**).  
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9 Across the two years, 58 557 were coded as day case, 30 428 as outpatient and 5 062 as  
10 inpatient admission (**Table 1**). Contrary to the general trend, the number of TP biopsies being  
11 undertaken in the outpatient setting increased by 149% between 2019-20 and 2020-21  
12 (**Figure 3**). The number of TR biopsies undertaken in outpatients over the same period  
13 reduced by 60.2%.  
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18 On review of post-procedural complications (**Table 2**), between 2019 and 2020, rates of  
19 sepsis were 0.31% and 1.05% for the TP and TR approaches respectively ( $p < 0.001$ ). NEL re-  
20 admission rates were 3.12% for TP v. 3.99% for TR ( $p < 0.001$ ). The proportion of patients  
21 re-presenting with acute urinary retention (AUR) were 3.17% post-TP v. 1.55% post-TR  
22 ( $p < 0.001$ ).  
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28 Between 2020 and 2021, rates of sepsis were 0.25% and 0.85% for TP and TR respectively  
29 ( $p < 0.001$ ). Re-admission rates were 2.37% for TP v. 3.33% for TR ( $p < 0.001$ ). AUR rates  
30 were 2.05% post-TP v. 1.45% post-TR ( $p < 0.001$ ).  
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35 Across the two years (2019-2021), the estimated expenses for emergency re-admissions were  
36 £4,193,828.48 and £2,790,528.46, for the TR and TP cohorts respectively. The average cost  
37 of readmission was £2,462.61 (TR biopsy) and £2,099.72 (TP).  
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## 47 **Discussion**

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49 The COVID-19 pandemic has forced healthcare systems to adapt in an unprecedented  
50 fashion. This has included cancer diagnostic services which have had to display greater  
51 flexibility considering the challenges faced. Given the change in clinical priorities, diagnostic  
52 pathways have had to be restructured and healthcare resources reallocated.  
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57 The impact on prostate cancer diagnosis has been substantial. During the first year of the  
58 'pandemic era' there was a significant reduction in the number of prostate biopsies  
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3 performed. This inevitably led to reduced number of men diagnosed, undergoing radical  
4 treatments, including prostatectomy and radiotherapy, or systemic treatments, including  
5 androgen deprivation therapy (ADT). The cancer when diagnosed was more advanced.<sup>10</sup>  
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9 There existed an understandable reluctance for patients to seek primary care consultation,  
10 impacting on the number of onward referrals to urology specialists. Furthermore, a pragmatic  
11 approach was proposed by the British Association of Urological Surgeons (BAUS) and the  
12 European Association of Urology (EAU) whereby prostate biopsy was dissuaded in certain  
13 subgroups.<sup>11, 12</sup> For those patients that warranted a biopsy and tissue diagnosis, the use of TR  
14 biopsy was discouraged, and the preference was for local anaesthetic TP biopsy. Evidence  
15 suggested the presence of SARS-CoV-2 in the stools of COVID-19 patients and so potential  
16 viral transmission during TR prostate biopsy was possible.<sup>13</sup> A balance was required between  
17 the potential risks of COVID-19 transmission, during the investigative pathway, versus the  
18 risk of delaying the diagnosis and potential treatment of clinically significant prostate cancer.  
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28 Upon review of the BAUS guidance, any new patient referred to the urology service was  
29 triaged primarily by PSA level. Patients with a PSA >20 were recommended to undergo  
30 clinical assessment with functional imaging to assess for metastatic disease, with a view to  
31 starting on ADT. Patients presenting with a PSA <20 and a PSA density (PSAD) of >0.15  
32 were recommended to go down the traditional biopsy route. For those men with a PSAD  
33 <0.15, an active surveillance approach was proposed with a repeat PSA in 6 months. Biopsies  
34 were ultimately being rationed to men with a higher likelihood of organ confined clinically  
35 significant disease.  
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44 At a time where bed occupancy was of utmost concern, factors to mitigate any unnecessary  
45 inpatient admissions were advocated. Critical care beds were being prioritised for patients  
46 with the severe clinical sequelae of COVID-19 infection, often requiring multi-organ support.  
47 Anaesthetists were a precious commodity and redeployed to the critical care setting, away  
48 from the elective operating theatres.<sup>14</sup> The preference towards TP biopsy may have been due  
49 to the lower reported rates of non-elective readmission and post-procedural sepsis,  
50 particularly at a time when critical care beds were of even greater value.  
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57 During our ten-year review of prostate biopsies, the majority were via the TR approach.<sup>6</sup>  
58 Between 2008 and 2019, 20.3% were via the TP route. The proportion of TP biopsies at the  
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3 end of that dataset (2017-19) had increased to 32.8%. During the pandemic the TP approach  
4 gained precedence, 2 TP biopsies were performed for every 1 TR.  
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8 Stroman et al. (2020), whilst surveying 268 urologists in England between April and May  
9 2020, observed that 64% had ceased all GA TP biopsies and 60% TR, compared to 20% for  
10 local anaesthesia (LA) TP biopsies.<sup>15</sup> Given the risk of aerosol generation with GA  
11 procedures the guidance was that these should be avoided. There was less of a consensus  
12 regarding LA procedures, as they were perceived as non-aerosol-generating. The advice from  
13 Pubic Health England was that non-aerosol generating procedures could be performed in a  
14 safe fashion with a fluid repellent mask, eye protection, gloves and a surgical gown.  
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21 Both the inpatient and day-case elective workload reduced following the initial lockdown  
22 period. The number of TP biopsies being performed under LA in the outpatient setting  
23 however increased, compared to pre-pandemic levels. There appears to have been a conscious  
24 drive, during the initial pandemic period, to encourage centres to adopt LA TP biopsy.  
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26 Regardless, most biopsies over this period were still being performed as day cases.  
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31 The rates of post-procedural complications in this 2019-21 dataset consolidate previous  
32 studies. TR biopsy is associated with increased rates of sepsis and unplanned emergency  
33 admissions post-procedure. The higher observed rates of acute urinary retention (AUR) post-  
34 TP biopsy were also observed during our previous review. Given the nature of the data, the  
35 specific risk factors were unable to be determined. The heterogeneity in biopsy technique in  
36 this dataset does not allow one to ascertain the specific factors at play. The majority of TP  
37 biopsies are template and involve the attainment of a considerable number of core biopsies.  
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39 The number of cores obtained, the distribution of the sampling, gland size and pre-procedural  
40 lower urinary tracts symptoms (LUTS) have been posed as potential factors influencing the  
41 risk of AUR post-biopsy.<sup>16</sup> The pathophysiological mechanisms alluded to include  
42 inflammatory oedema post-biopsy and urethral sphincteric spasm. The future adoption of the  
43 pre-biopsy MR and real-time US fused imaging may offer improved targeting of lesions and  
44 systematic biopsies from the remainder of the peripheral zone, avoiding excessive targeting  
45 of the transition zone.  
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55 There exist limitations to a review using HES data. Given the nature of data collection, there  
56 is a lack of standardised reporting of biopsy technique such as the use of template or free  
57 hand LA TP biopsies. The data do not capture all post-operative complications, and this may  
58 have been underreported, particularly during the COVID-19 era. One might suspect that  
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3 patients during this period were eager to avoid face-to-face interactions within the healthcare  
4 setting. The post-operative complaints may have been increasingly dealt with in the primary  
5 care setting. The demographic and procedural factors that may have contributed to post-  
6 procedural complications are not analysed. Patients could have undergone several biopsies  
7 during this period and again this is not clearly alluded to. Nevertheless, this large dataset does  
8 provide us with a large population-based patient cohort from which we can draw broad  
9 conclusions.  
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16 This updated review compliments our previous decade study of NHS prostate biopsies and  
17 illustrates the impact the COVID-19 pandemic has had on prostate cancer diagnostics. The  
18 pandemic has proved the catalyst that has prompted an increasing adoption of the LA TP  
19 technique.  
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## 28 **Conclusion**

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31 This review of recent NHS England prostate biopsy data, encompassing over 93 000 biopsies  
32 from 2019 to 2021, has demonstrated advantages of TP biopsy over the TR approach,  
33 including reduced sepsis, urinary tract infection and non-elective readmission rates. The rates  
34 of AUR appear higher following TR biopsy and further research is necessitated to determine  
35 the specific contributory factors. The TRexit movement has gained significant traction over  
36 recent years, and this appears to have been further fuelled by the COVID-19 pandemic. TP  
37 biopsy will likely remain the modality of choice at present, increasingly being performed in  
38 the outpatient setting under local anaesthesia. The future of the prostate biopsy journey is an  
39 exciting one, particularly in the age of artificial intelligence and enhanced imaging. Our  
40 approach to the diagnosis of the disease will continue to evolve, just as it has done over the  
41 last 100 years.  
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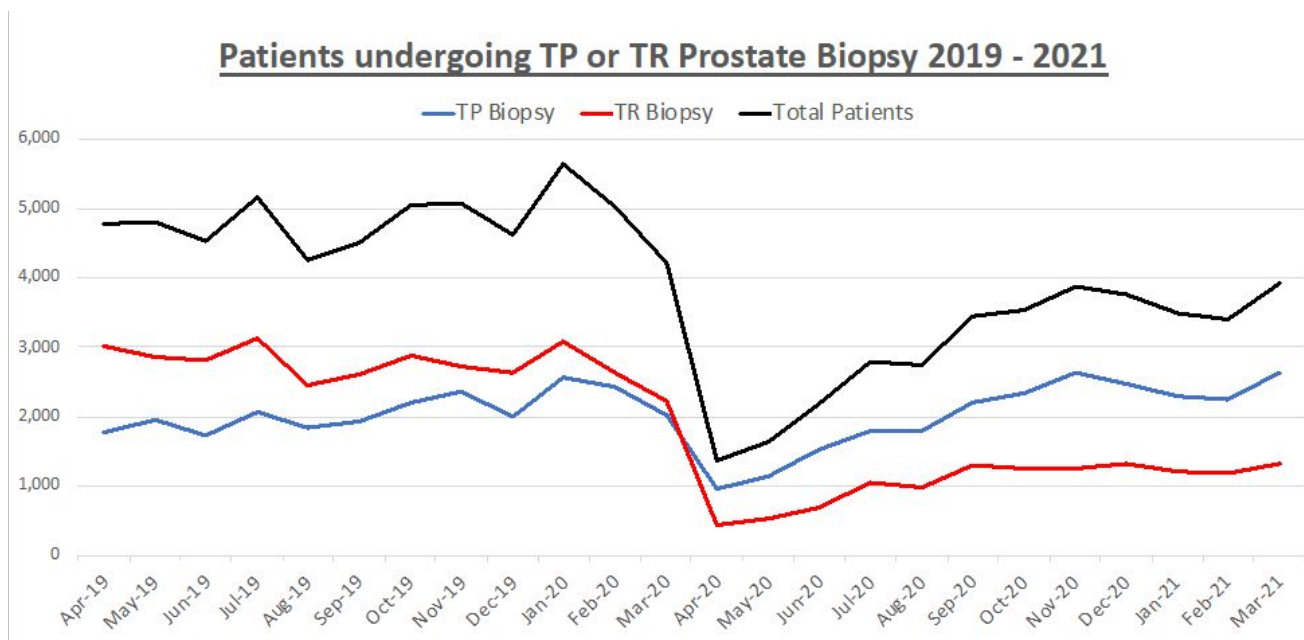
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TP Biopsy	Inpatient	Outpatient	Daycase
2019-20	2424	1820	20574
2020-21	1499	4543	17908
TR Biopsy	Inpatient	Outpatient	Daycase
2019-20	779	17211	14733
2020-21	360	6854	5342

**Table 1:** Prostate Biopsy Setting (2019-21)

	SEPSIS	RE-ADMISSION	UTI	AUR
<b>2019-2020</b>				
TP	76 (0.31%)	768 (3.12%)	160 (0.65%)	781 (3.17%)
TR	340 (1.05%)	1292 (3.99%)	363 (1.12%)	503 (1.55%)
	P < 0.001	P < 0.001	P < 0.001	P < 0.001
<b>2020-2021</b>				
TP	59 (0.25%)	561 (2.37%)	108 (0.46%)	485 (2.05%)
TR	105 (0.85%)	411 (3.33%)	116 (0.94%)	179 (1.45%)
	P < 0.001	P < 0.001	P < 0.001	P < 0.001

**Table 2:** Post-Biopsy Complication Rates

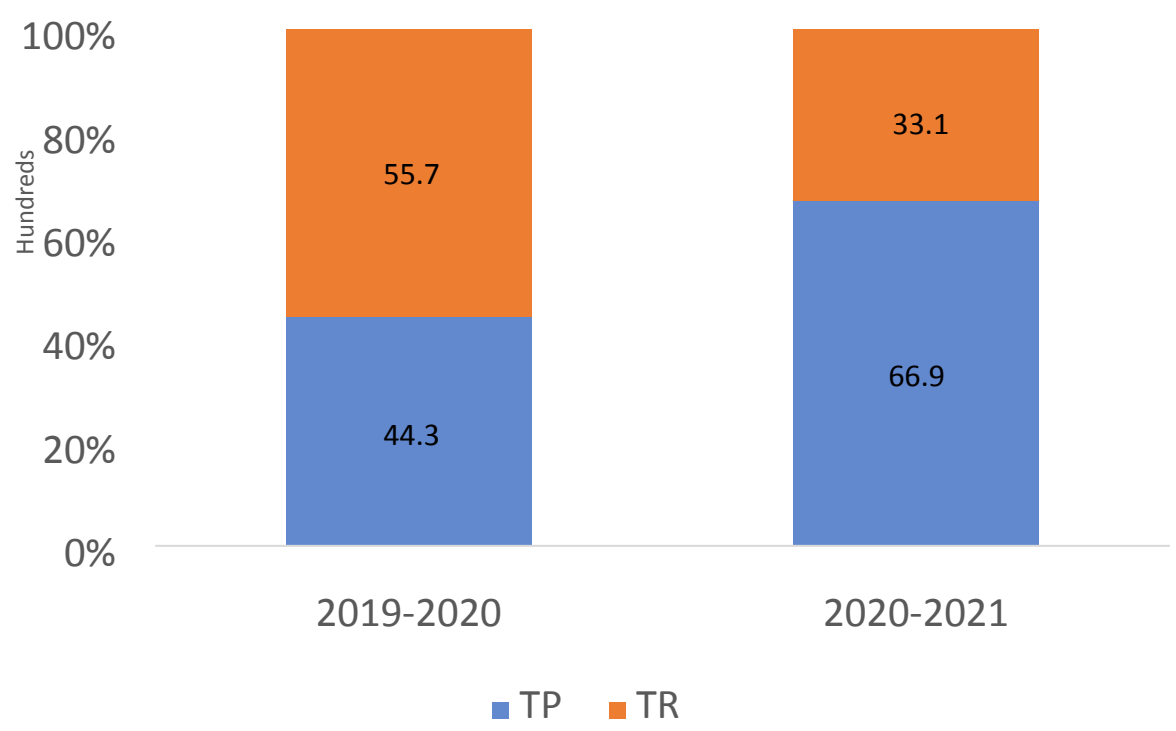


**Figure 1: Total Biopsies performed (2019-21)**

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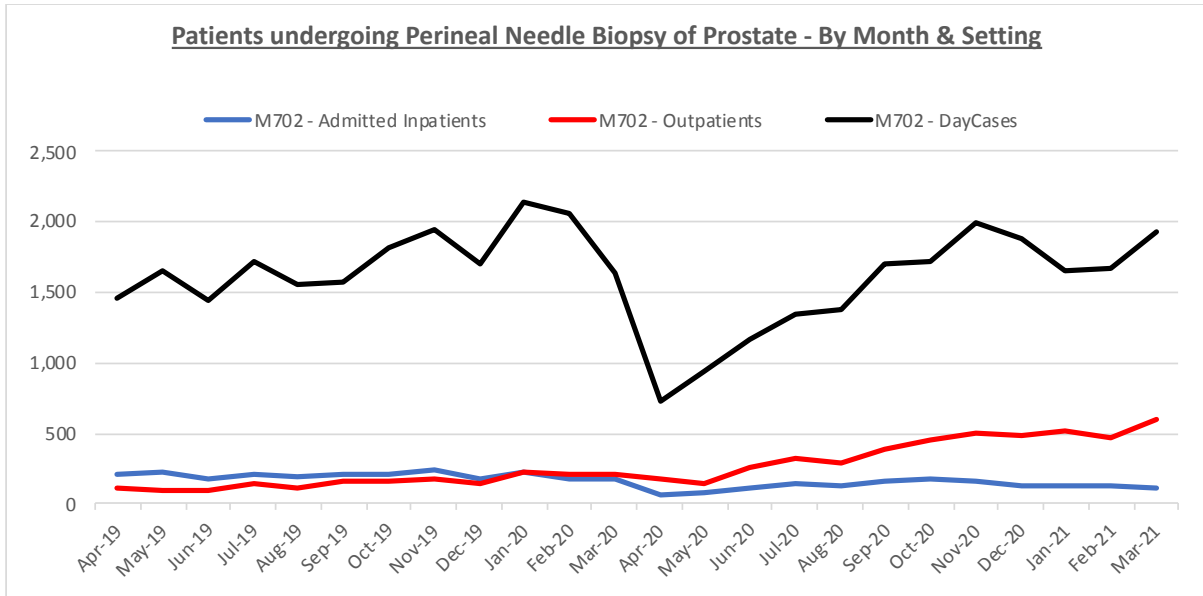
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**Figure 2:** Biopsy approach during 2019-20 and 2020-21

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**Figure 3: Transperineal Biopsy (M702) Setting (2019-21)**

Peer Review

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