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Brief Correspondence

What Experts Think About Prostate Cancer Management During the COVID-19 Pandemic: Report from the Advanced Prostate Cancer Consensus Conference 2021

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Patients with advanced prostate cancer (APC) may be at greater risk for severe illness, hospitalisation, or death from coronavirus disease 2019 (COVID-19) due to male gender, older age, potential immunosuppressive treatments, or comorbidities. Thus, the optimal management of APC patients during the COVID-19 pandemic is complex. In October 2021, during the Advanced Prostate Cancer Consensus Conference (APCCC) 2021, the 73 voting members of the panel members discussed and voted on 13 questions on this topic that could help clinicians make treatment choices during the pandemic. There was a consensus for full COVID-19 vaccination and booster injection in APC patients. Furthermore, the voting results indicate that the expert’s treatment recommendations are influenced by the vaccination status: the COVID-19 pandemic altered management of APC patients for 70% of the panelists before the vaccination was available but only for 25% of panelists for fully vaccinated patients. Most experts (71%) were less likely to use docetaxel and abiraterone in unvaccinated patients with metastatic hormone-sensitive prostate cancer. For fully vaccinated patients with high-risk localised prostate cancer, there was a consensus (77%) to follow the usual treatment schedule, whereas in unvaccinated patients, 55% of the panel members voted for deferring radiation therapy. Finally, there was a strong consensus for the use of telemedicine for monitoring APC patients.
Cancer patients are at a higher risk of illness or death from coronavirus disease 2019 (COVID-19) [1]. Various other factors have been associated with infection severity and mortality, including male gender, older age, and pre-existing comorbidities such as diabetes or cardiopulmonary disease [2]. Since prostate cancer patients are often elderly with comorbidities, they are at a high risk of developing more severe disease and sequelae after COVID-19 infection. Furthermore, long-term androgen-deprivation therapy (ADT) as the mainstay of advanced prostate cancer (APC) treatment is known to be associated with weight gain, diabetes, and cardiovascular disease [3]. Early in the pandemic, some studies have suggested a protective effect of ADT on severe forms of COVID-19 [4]. Unfortunately, these observations have not been confirmed [5].

The Advanced Prostate Cancer Consensus Conference (APCCC) is a meeting where international experts discuss clinically relevant areas of APC treatment. For 2021, one of the topics voted on was management of APC patients throughout the different phases of the COVID-19 pandemic. In particular, in October 2021, the voting members of the panel voted on 13 questions regarding the most debated aspects on this topic (Table 1). Answer options with ≥75% agreement are considered a consensus. At the time of this meeting, “fully vaccinated” meant “after the administration of one or two doses” (depending on the COVID-19 vaccine).

| Question                                                                 | Answers                                                                 | Voting results, % (N) |   |
|--------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------|---|
| Has the COVID-19 pandemic altered your treatment selection or sequencing of treatments for patients with advanced prostate cancer before the availability of the COVID-19 vaccinations? | 1. Yes 70% (50)                                                          | 2. No 30% (21)        |   |
| Do you recommend COVID-19 vaccination for patients with advanced prostate cancer? | 1. Yes 97% (69), strong consensus                                         | 2. No 3% (2)          |   |
| In fully vaccinated patients with advanced prostate cancer, has the COVID-19 pandemic impacted your management? | 1. Yes 25% (18), consensus                                               | 2. No 75% (53)        |   |
| In the majority of patients with mHSPC who are not vaccinated, what would be your preferred systemic treatment during the active phase of the COVID-19 pandemic? | 1. I am less likely to use docetaxel 43% (30)                             | 2. I am less likely to use abiraterone because of concomitant steroid requirement 1% (1) |
|                                                                         |                                                                         | 3. Both of the above 27% (19)                                            |   |
|                                                                         |                                                                         | 4. Would not affect my choice 29% (20)                                    |   |
|                                                                         |                                                                         | 5. Abstain 1                                                          |   |
| In the majority of patients with mHSPC who are fully vaccinated, what would be your preferred systemic treatment during the active phase of the COVID-19 pandemic? | 1. Would not affect my choice 69% (49)                                  | 2. I do not recommend docetaxel in this setting 28% (20)                     |   |
|                                                                         |                                                                         | 3. I recommend ADT alone 3% (2)                                           |   |
| For chemotherapy-fit patients with PSMA imaging–positive mCRPC with no PSMA PET/CT–negative lesion who have received at least one line of AR pathway inhibitor and one line of taxane-based chemotherapy, what would be your preferred treatment option (assuming that both treatments are readily available and there is no molecular alteration with approved therapy) during the active phase of the COVID-19 pandemic for the majority of unvaccinated patients? | 1. I am less likely to use cabazitaxel/prednisone 47% (33)               | 2. I am less likely to use radium-223 or lutetium-PSMA 1% (1)             |   |
|                                                                         |                                                                         | 3. Both of the above 11% (8)                                              |   |
|                                                                         |                                                                         | 4. Would not affect my choice 41% (29)                                    |   |
| For chemotherapy-fit patients with PSMA imaging–positive mCRPC with no PSMA PET/CT–negative lesion who have received at least one line of AR pathway inhibitor and one line of taxane-based chemotherapy, what would be your preferred treatment option (assuming that both treatments are readily available and there is no molecular alteration with approved therapy) during the active phase of the COVID-19 pandemic for the majority of fully vaccinated patients? | 1. I am less likely to use cabazitaxel/prednisone 17% (12)                | 2. I am less likely to use radium-223 or lutetium-PSMA 1% (1)             |   |
|                                                                         |                                                                         | 3. Both of the above 3% (2)                                               |   |
The question regarding the recommendation of the COVID-19 vaccine in patients with APC reached a strong consensus, with 97% of panellists voting in favour of vaccination. It has been shown that cancer patients can mount a protective immune response to the COVID-19 vaccine without experiencing more side effects than the general population [6], and therefore vaccination against COVID-19 is deemed safe for cancer patients. Panellists also reached a consensus for therapy regimens (abiraterone, docetaxel, cabazitaxel).

The COVID-19 pandemic changed the management of APC patients for 70% of panellists in the time before the vaccinations became available. Once the vaccines became available, only 25% of the panellists would still change management for fully vaccinated patients. The panel did not consider the effects of COVID-19 variants where the available vaccines may be less effective.

There was a consensus in the panel (77%) not to change the therapeutic choice during the active phase of COVID-19 for fully vaccinated patients with high-risk localised or locally advanced prostate cancer, for whom definitive radiation therapy in combination with long-term ADT is planned. In addition, for chemotherapy-fit patients with...
metastatic castration-resistant prostate cancer (mCRPC) who had received at least one line of androgen receptor pathway inhibitors (ARPIs) and one line of taxane-based chemotherapy, there was a consensus (79%) not to change the treatment decision in fully vaccinated patients. Consensus was not reached regarding changes in therapeutic choices for unvaccinated patients in the same settings.

Several life-prolonging therapies are now available for patients with metastatic hormone-sensitive prostate cancer (mHSPC), including docetaxel, abiraterone, enzalutamide, and apalutamide [8]. No formal consensus was reached on which systemic treatment would be preferred during an active phase of the COVID-19 pandemic, but 69% of the panelists would not change their usual treatment for fully vaccinated patients with mHSPC. In contrast, 71% of panelists were less likely to offer docetaxel, abiraterone/prednisone, or both, for unvaccinated patients.

The vaccination status of a patient with mCRPC had less effect on treatment decisions. For example, 58% of the panelists would use cabazitaxel less frequently in unvaccinated mCRPC patients who were suitable for chemotherapy and who had received at least one ARPI and one taxane-based chemotherapy; only 20% would use cabazitaxel less frequently in this setting for fully vaccinated patients.

These differences could be because chemotherapy in general has been reported to have a negative impact on the outcome of COVID-19 infections, and usually concomitant and premedication steroids are used. Therefore, some COVID-19–specific guidelines recommend avoiding taxane treatment during a peak of the COVID-19 pandemic in mHSPC and mCRPC patients if a similarly effective alternative therapy is available, in order to reduce the risk of neutropenia and number of hospital visits during the pandemic [9]. It is important to note that most of these guidelines were established when no vaccines were available.

Telemedicine in general has been shown to reduce health care costs and in-person patient visits without worsening the quality of communication between physician and patient. Telemedicine may also help reduce the transmission of COVID-19 in health care settings [10]. No formal consensus was reached regarding the use of telemedicine in patients on an ARPI, but 94% of panelists recommend it during an active phase of the pandemic. Interestingly, 86% of the experts would recommend its use in some form also outside of an active phase of the pandemic.

In summary, there was a consensus among the APCCC 2021 panelists to encourage “full vaccination” in all APC patients as well as for the booster injection. Management recommendations were influenced by patient vaccination status across different APC settings. Many panelists voted in favour of reducing the use of certain treatments due to a perceived increased risk of serious complications of COVID-19.

The APCCC 2021 meeting has cast light on different recommendations and perceptions of risks of various treatments for APC in the setting of the COVID-19 pandemic. These findings will remain relevant in the event of a resurgence of vaccine-resistant variants or indeed future pandemics of novel pathogens. Simple approaches to minimise the risk of transmission or death are needed and supported. Effective anticancer therapies still need to be provided. A discussion with each patient is warranted to ensure that consideration of their personal risks of COVID-19 is taken into account as they make decisions about their treatments. Finally, there was a consensus among the experts to use telemedicine in place of some in-person visits for patients treated with ARPIs. In addition, it is interesting to see how fast the meaning of “fully vaccinated” has changed in times of this pandemic, and the fast development of vaccines and growing knowledge about the duration of response to them.

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**Study concept and design:** Turco, Gillessen, Omlin.

**Acquisition of data:** All authors.

**Analysis and interpretation of data:** All authors.

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**Supplementary data**

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**References**

[1] Gillessen S, Powles T. Advice regarding systemic therapy in patients with urological cancers during the COVID-19 pandemic. Eur Urol 2020;77:867–8.

[2] Caffo O, Messina M, Veccia A, Kinspergher S, Maines F, Messina C. Severe acute respiratory syndrome coronavirus 2 infection in patients with prostate cancer: A critical review. Crit Rev Oncol Hematol 2021;167:103491.

[3] Nguyen PL, Alihaji SM, Basaria S, et al. Adverse effects of androgen deprivation therapy and strategies to mitigate them. Eur Urol 2015;67:825–36.

[4] Montopoli M, Zumerle S, Vettor R, et al. Androgen-deprivation therapies for prostate cancer and risk of infection by SARS-CoV-2: a population-based study (N = 4532). Ann Oncol 2020;31:1040–5.

[5] Sari Motlagh R, Abufaraj M, Karakiewicz PI, et al. Association between SARS-CoV-2 infection and disease severity among prostate cancer patients on androgen deprivation therapy: a systematic
review and meta-analysis. World J Urol 2022. 10.1007/s00345-021-03810-6, In press.

[6] Cavanna L, Citterio C, Toscani I. COVID-19 vaccines in cancer patients. Seropositivity and safety. Systematic review and meta-analysis. Vaccines (Basel) 2021;9:1048.

[7] Bar-On YM, Goldberg Y, Mandel M, et al. Protection of BNT162b2 vaccine booster against COVID-19 in Israel. N Engl J Med 2021;385:1393–400.

[8] Cornford P, van den Bergh RCN, Briers E, et al. EAU-EANM-ESTRO-ESUR-SIOG guidelines on prostate cancer. Part II-2020 update: treatment of relapsing and metastatic prostate cancer. Eur Urol 2021;79:263–82.

[9] Wallis CJD, Catto JWF, Finelli A, et al. The impact of the COVID-19 pandemic on genitourinary cancer care: re-envisioning the future. Eur Urol 2020;78:731–42.

[10] Montenegro P, Pinillos L, Young F, et al. Telemedicine and the current opportunities for the management of oncological patients in Peru in the context of COVID-19 pandemic. Crit Rev Oncol Hematol 2021;157:103129.