Operational scope and clinical practice profile of a nurse practitioner-led advanced prostate cancer clinic: A retrospective review from a Canadian cancer center

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ABSTRACT

Introduction: The use of androgen receptor pathway inhibitors (ARPIs) in advanced prostate cancer has improved survival outcomes, leading to increased survivorship followup demands and resource utilization. To address this, nurse practitioner-led prostate cancer clinics (NPPCCs) were implemented at a Canadian regional academic cancer center. We aimed to evaluate the scope and care delivery practices of NPPCCs managing patients on androgen deprivation therapy (ADT) and ARPI therapy.

Methods: A retrospective review of electronic medical records (EMR) was conducted at the Verspeeten Family Cancer Centre for patients ≥18 years old with confirmed prostate cancer managed in NP-led clinics from December 2018 to November 2024. Data included patient volumes/visits, as well as prescription, test, and referral orders within the EMR.

KEY MESSAGES

- Nurse practitioner-led prostate cancer clinics (NPPCCs) deliver guideline-based management for patients with advanced or metastatic prostate cancer receiving ADT and androgen receptor pathway inhibitor therapy.
- NPs demonstrated full clinical autonomy across diagnosis, prescribing, monitoring, and coordination of multidisciplinary care.
- Two NPs, providing one full workday per week each in a NPPCC, were able to provide followup care for 329 patients on treatment for prostate cancer annually.
- Integration of genetic testing, bone health optimization, and supportive symptom management highlights the quality and comprehensiveness of NP-led care.
- Expanding NP-led oncology models offers a sustainable strategy to meet growing prostate cancer survivorship demands.

Results: A total of 531 patients were managed in the NPPCCs from December 2018 to November 2024. Annually, between two full-time NPs devoting one weekday to a NPPCC, there were 990 individual patient visits. In a one-year timeframe, each NP provided followup care to 167 and 162 patients, respectively. ARPI prescriptions were completed by NPs in 91.1% of patients. Across the 12-month evaluation period, 990 followup visits were delivered through NP-led clinics, representing a redistribution of longitudinal monitoring visits that would otherwise have occurred within physician clinics. Genetic testing was ordered in 35.3% of patients, and 39% received supportive medications for symptoms and toxicity management.
Conclusions: NPPCCs represent a feasible NP-led followup model for patients with prostate cancer receiving ADT and ARPIs. This descriptive evaluation characterizes the operational scope and clinical activities of the clinic, and provides a foundation for future studies evaluating safety, effectiveness, and economic impact.

INTRODUCTION

Prostate cancer is the most commonly diagnosed malignancy among Canadian men and the third leading cause of cancer-related mortality in this population, accounting for over 24,000 new cases and approximately 4,600 deaths annually [1]. Over the past decade, the management of advanced prostate cancer has evolved with the introduction and widespread adoption of androgen receptor pathway inhibitors (ARPIs), such as abiraterone, enzalutamide, apalutamide, and darolutamide. These agents have demonstrated robust survival benefits across various disease states, including metastatic castration-sensitive prostate cancer (mCSPC), metastatic castration-resistant prostate cancer (mCRPC), non-metastatic castrate resistant prostate cancer (nmCRPC) and high-risk non-metastatic settings [2-4].

With these therapeutic advancements, men are living longer with prostate cancer, necessitating prolonged surveillance, toxicity monitoring, and management of treatment-related complications. Although ARPIs are generally well tolerated, they require regular follow-up due to potential adverse effects such as hypertension, fatigue, cognitive impairment, metabolic disturbances, and skeletal complications [5]. Furthermore, comprehensive care often involves genetic testing, imaging, and multidisciplinary referrals, creating substantial demands on already strained oncology clinics.

The College of Nurses of Ontario defines Nurse Practitioners (NPs) as registered nurses with advanced clinical training who “are authorized to diagnose, order and interpret diagnostic tests and prescribe medication and other treatments for clients”, under independent prescribing authority within their legislated scope of practice [6]. The NP role in cancer care has expanded significantly, especially in breast, palliative, and hematologic oncology [7-9]. Prior studies have shown that NP-led care can achieve comparable outcomes to physician-led care in areas such as diagnostic accuracy, treatment safety, patient satisfaction, and healthcare utilization [10-12].

However, evidence evaluating NP-led models specifically within genitourinary oncology remains limited, particularly in Canada.

To our knowledge, there are no published Canadian data characterizing the operational scope and clinical activities of NP-led clinics specifically managing patients receiving ARPIs for advanced prostate cancer. Given the increasing complexity and duration of therapy in this population, understanding the structure and function of such care models is important for workforce planning and system sustainability within publicly funded oncology systems.

The Verspeeten Family Cancer Centre (VFCC) at London Health Sciences Centre responded to the growing demands in advanced prostate cancer management by developing and implementing NP-led Prostate Cancer Clinics (NPPCCs) at the end of 2018, to follow and monitor patients receiving androgen deprivation therapy (ADT) and ARPIs. Criteria for patients being transferred to the NPCC include the following: the patient has completed a consultation with a medical oncologist where a formal diagnosis of either high risk non-metastatic prostate cancer, nmCRPC, mCSPC or mCRPC was made and a treatment plan was initiated; at least one follow-up with the oncologist has occurred where the patient has demonstrated both clinical tolerance and biochemical response to the prescribed therapy; patient has been informed about the option of being transferred to the NPPCC and agreed to it. Throughout the course of follow-up with the NP, if concerns about disease progression (rising PSA, clinical symptoms, progression on CT/bone scan) arise, then patients are transferred from the NPPCC back to their original oncologist to discuss next steps.

In late 2018, there was one NP operating a NPPCC one day per week (other weekdays, the NP supports follow-ups in other oncology clinics). Due to the high use of the NPPCC and the increasing numbers of patients with advanced prostate cancer on treatment requiring ongoing monitoring and management, there was strong support from the oncologists and the VFCC leadership to hire second full-time NP in 2023, which added another full day of NPPCC in the workweek.

Within NPPCCs, the NPs independently conduct patient assessments, manage systemic therapies, coordinate laboratory and imaging investigations, and initiate specialist referrals. Patients are followed every three months by the NP, with regular bloodwork (including PSA, testosterone, complete blood count, electrolytes, liver studies, and thyroid studies). Currently, each NP has one eight-hour clinic day per week assigned to NPPCCs. The clinic template is built for twelve 30-minute follow-up appointments. Time spent during visits include: 5-10 minutes for registered nurse assessment and administration of injections; 10-15 minutes for NP assessment; and 5-10 minutes for order entry, appointment booking and documentation. These activities are performed under established institutional policies and with collaborative oversight from medical oncologists.

Formal evaluation of the NPPCC care model on patient follow-up visits, prescription practices, referrals, diagnostic test ordering, and clinic use have not yet been published. This study aims to address this gap through a retrospective review of patients managed within the

NPPCC, with the objective of characterizing clinic volumes, prescribing patterns, diagnostic testing, referral practices, and estimated time contribution of NP-led care. These findings aim to inform broader integration of NP-led models in oncology and support system-level planning to address rising demands in prostate cancer survivorship and follow-up care.

METHODS

Study design

A retrospective chart review was performed using electronic medical records (EMR) of patients treated at the Verspeeten Family Cancer Centre, London Health Sciences Centre, Ontario, Canada. Patients aged ≥18 years with histologically confirmed prostate cancer who had at least one NPPCC visit between December 12, 2018, and November 4, 2024, were included. This time frame was selected as the NPPCC was first established with one NP in late 2018. In order to understand clinic usage annually for two independent NPs working in a NPPCC one full day per week each, data was analyzed from Nov 1, 2023–Nov 4, 2024, when two NPs had established fairly full clinic rosters. Eligible patients were those receiving ADT with ARPI therapy and followed longitudinally
within the NPCC.

Clinic workflow and patient pathway

All patients included in the NPPCC were initially evaluated by a medical oncologist who established diagnosis, staging, and a treatment plan. Patients were eligible for transfer to the NPPCC after: (1) confirmation of high-risk non-metastatic prostate cancer, nmCRPC, mCSPC, or mCRPC; (2) initiation of ADT with or without ARPI therapy; (3) at least one follow-up visit demonstrating biochemical response and clinical tolerance; and (4) patient agreement to NP-led follow-up care.

Patients were routinely followed every three months by the NP for laboratory monitoring, toxicity assessment, and supportive care management. Indications for return to the medical oncologist included rising PSA suggestive of progression, radiographic progression, intolerable toxicity, or other clinical concerns requiring oncologist-level decision-making**.**

Data source

Retrospective, de-identified demographic and clinical variables were collected and stored in REDCap, including visit volume, prescriptions (ARPI, ADT, and supportive medications), diagnostic orders, genetic testing, and specialist referrals. This study was approved by the Western University Health Sciences Research Ethics Board (REB: 125589). A waiver of consent was granted due to the retrospective nature and minimal risk to participants.

Statistical analysis

Descriptive statistics were used to summarize patient demographics, treatment patterns, clinic utilization, and supportive care practices. Continuous variables were reported as means with

standard deviations and ranges, while categorical variables were summarized as frequencies and percentages.

No hypothesis testing or regression modeling was performed, as the primary objective was to characterize the scope and operational metrics of the NPPCC. Data analysis and aggregation were conducted using Microsoft Excel and IBM SPSS Statistics (version 29.0.2.0).

RESULTS

Patient demographics and clinic utilization

Between December 12, 2018, and November 4, 2024, a total of 531 unique patients with high-risk non-metastatic prostate cancer, nmCRPC, mCSPC and mCRPC were referred and followed in the NPPCCs at the VFCC (Table 1). The median follow-up duration was 13.9 months (range: 0–68 months). The relatively short median follow-up duration reflects the transitional nature of the clinic model, as patients were transferred back to their medical oncologist at the time of disease progression or clinical deterioration. The clinic population included both newly referred and ongoing patients managed on ADT and ARPI-based systemic therapy, as well as a few patients managed on ADT alone.

During a focused 12-month evaluation period (Nov 1, 2023–Nov 4, 2024), selected to reflect operations following implementation of a second NP clinic day, a total of 990 patient encounters occurred, representing a substantial volume of ambulatory cancer care delivered independently by NPs (Figure 1). Based on standard 30-minute appointment time slots within an 8-hour clinic day, this corresponds to 62 full clinic days over the year. In this year, one NP conducted 539 visits (mean 42 per month), and the other 451 visits (mean 35 per month), indicating consistent clinical workload. During this 12-month period, 329 unique patients were followed across both NP clinics (167 and 162 per NP, respectively).

Treatment management

Systemic therapy management represented a central function of NPPCC: ARPIs were prescribed by NPs in 91.1% (n=484) of patients, and 36.5% (n=194) were prescribed ADT, reflecting common combination approaches in mCSPC and mCRPC settings. A summary of clinical interventions performed by NPs during follow-up visits, including systemic therapy prescribing, supportive medications, genetic testing, and specialist referrals, is shown in Table 2. In most cases, ARPI therapy had been initiated by the medical oncologist prior to transfer, with NP prescribing primarily involving continuation, renewal, and dose modification. The majority of patients in NPPCCs are maintained on ADT that continued to be prescribed by mutual urologists or radiation oncologists also involved in the follow-up and care of these patients.

In addition to disease-directed therapies, 39% (n=205) of patients received prescriptions for supportive medications, which included denosumab for bone protection, and pharmacologic interventions addressing urinary symptoms and cancer-related pain.

NPs also independently managed oral systemic therapies, including prescription renewals, laboratory monitoring for hepatotoxicity and electrolyte disturbances, and surveillance for treatment-emergent toxicities such as hypertension, cognitive changes, and bone health concerns.

Diagnostics and referrals

NPs independently ordered diagnostic investigations and facilitated multidisciplinary follow-up pathways. During the 12-month evaluation period, NPs independently ordered CT imaging and bone mineral density testing as part of routine surveillance. Nuclear imaging studies (bone scan and PSMA PET) require oncologist co-signature per institutional policy. A total of 179 electronic referrals (33.8% of patients) were initiated, most commonly to medical oncology, urology, radiation oncology, geriatrics, and metabolic bone specialists. Genetic testing was ordered for 35.3% of patients, often in the form of multigene panel testing for DNA damage repair mutations/alterations or germline predisposition, consistent with evolving biomarker-driven management in prostate cancer.

NPs also routinely ordered and interpreted imaging, including computed tomography (CT), bone scan (through consultation with oncologists given NPs are not yet permitted to order nuclear medicine scans directly), and bone mineral density (BMD), as well as laboratory investigations, forming an integral part of disease monitoring and survivorship care.

DISCUSSION

This retrospective analysis demonstrates that NPPCCs can manage follow-up care for a large cohort of men with advanced or metastatic prostate cancer receiving ADT and ARPIs. The findings reinforce the clinical and operational value of expanding NP roles in oncology, particularly in resource-intensive, long-term management settings such as genitourinary malignancies.

NPs independently prescribed ARPIs in over 90% of patients, demonstrating the breadth of prescribing activities occurring within this NP-led follow-up model. NP activities within NPPCCs showed that they were working to their full scope of practice: diagnosis, treatment initiation, monitoring, referrals, as well as patient counseling and education. Given that the VFCC still does a significant amount of paper-based diagnostic test ordering and referrals, this study under-represents actual diagnostic testing and referrals ordered by the NP. The integration of guideline-concordant practices such as early genetic testing and bone health management underscores the clinical quality upheld in this model. The high rate of supportive prescriptions (39%) and specialist referrals (33.8%) reinforces that NP-led care is not isolated but integrative, ensuring patients have access to multi-disciplinary services as needed.

This study did not evaluate clinical outcomes such as progression-free survival, adverse event rates, patient-reported outcomes, or direct comparisons with physician-led clinics. Therefore, conclusions regarding safety, effectiveness, or cost-efficiency cannot be drawn from

these data. However, the use of a large, real-world dataset and standardized EMR documentation strengthens the validity and generalizability of this model of care.

The NPPCC model can potentially contribute to system efficiency. By shifting follow-up care from oncologists to NPs just twice a week, the VFCC recovers hundreds of patient visits and hours of oncologist clinic time annually, as patients would otherwise have their follow-up care within the oncologists' clinics if NPPCCs did not exist. The addition of a second NPPCC in the week in 2023 speaks to the need and value of this model of care by VFCC oncologists and institution leadership. This redistribution of workload enables oncologists to dedicate more time to high-acuity care, consultations, and managing patients with disease progression. Although not explicitly measured, given NP salary is significantly less than that of an oncologist, there is likely a cost-saving benefit to NPPCCs. This study describes the clinical scope and operational footprint of an NP-led advanced prostate cancer follow-up clinic. While safety, effectiveness, and cost-efficiency were not directly measured, the findings provide a descriptive foundation for future comparative and economic evaluations of this model of care.

Future directions

To build on these results, future work will involve expanding retrospective review to other NP-led oncology clinics across disease sites to assess generalizability and scalability. Future research will include formal evaluation of clinical outcomes, patient and provider satisfaction surveys, and economic analyses to assess comparative efficiency and cost-effectiveness relative to physician-led models.

CONCLUSIONS

This study contributes new evidence specific to the ADT and ARPI-treated prostate cancer population, a group with increasing follow-up demands and substantial survivorship burdens. The integration of NPPCC is a feasible care model that allows men with advanced prostate cancer to have ongoing quality follow-up care provided by NPs. These findings support the expansion of NP roles across oncology domains and contribute important data to inform policy and practice changes in cancer care delivery.

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FIGURES AND TABLES

Figure 1. Number of patient visits per month per NP in NPPCC in a 12-month period. NP: nurse practitioner; NPPCC: NP-led prostate cancer clinics.

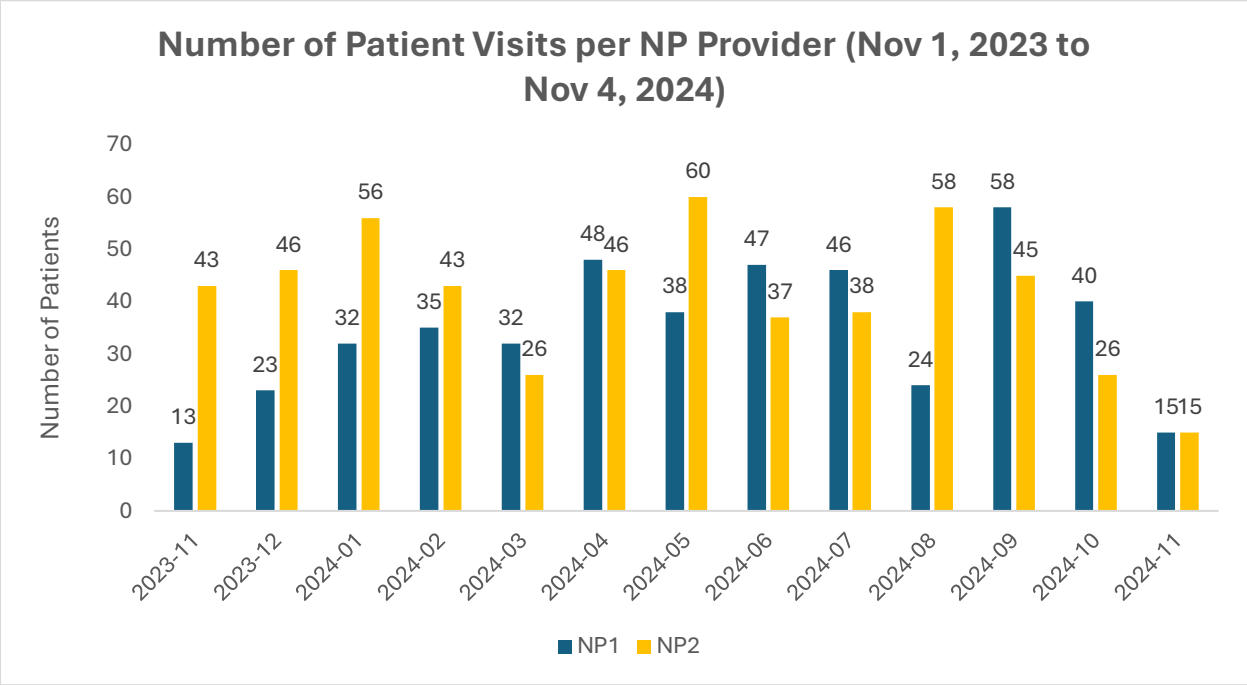

Table 1. New patient referrals per year to nurse practitioner-led prostate cancer clinics	
Year of visit	**Number of new patient referrals (n)**
2018	8
2019	110
2020	56
2021	59
2022	43
2023	107
2024	148
Total	531

Table 2. Distribution of clinical activities and interventions based on EMR			
Category	**Examples**	**Number of actions (n)**	**% of total patients (N=531)**
Systemic therapy prescriptions	ARPI, ADT	484	91.1 %
Supportive medications	Denosumab, analgesics	205	39 %
Genetic testing ordered	Multigene or DDR panels	187	35.3 %
Specialist referrals	Med Onc, Urology, Rad Onc, Geriatrics, Bone	179	33.8 %

ARPI: androgen receptor pathway inhibitor; ADT: androgen deprivation therapy; DDR: DNA damage repair; EMR: electronic medical record.