Categorizing Localized Prostate Cancer Patients Based on Initial Active Treatment: A Real-World Evidence Case Study in Finland

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BACKGROUND

Prostate cancer has significant health and societal impacts, with no clear consensus on the most effective and efficient treatment strategy for localized prostate cancer (LPC)[a]. To evaluate the economic impacts of different treatment strategies, it is essential to accurately identify these strategies. The challenge in categorizing LPC patients in retrospective registry studies is finding a balance between using clinically accurate definitions and dealing with the common data limitations that make precise definitions difficult.

OBJECTIVES

The aim of this study was to develop a robust method for identifying key data points in the prostate cancer treatment pathway, such as the timing of diagnosis and metastasis, distinguishing localized prostate cancers from metastatic cases, defining the first active treatment, and separating treatment lines from adjuvant or combination therapies to better categorize prostate cancer patients.

METHODS

STUDY POPULATION

Retrospective pseudonymized data were collected from Finland's five university hospitals on adult males diagnosed with prostate cancer (ICD-10 code C61) between July 2010 and June 2021. Additional data from the Social Insurance Institution were included to capture information on outpatient medication use, including androgen deprivation therapy (ADT).

CATEGORIZATION ALGORITHM FORMULATION

In collaboration with nine urologists and oncologists from the five university hospitals a preliminary algorithm was developed to accurately categorize LPC patients according to their initial treatment strategy.

ALGORITHM VALIDATION AND REVISION

Validation of initial categorization algorithm by analyzing the survival rates and healthcare resource utilization of the LPC categories.

5 University hospitals

9 Clinical Experts

16,212 PC patients

9 Challenges identified with proposed solutions

RESULTS

FINAL ALGORITHM

The methodology outlined in Table 1 was applied to identify the diagnosis and potential timing of metastasis in LPC patients, stratify them into risk categories, and assign their active treatments. Active treatments were determined using NOMESCO procedure codes and ATC codes. Patients were then classified into four groups based on their first active cancer treatment, as detailed on the right.

The four groups based on first active treatment

No immediate treatment (NIT)
No active cancer treatments within 9 months after diagnosis

Radiotherapy only (RT)
RT as the first radical treatment within 9 months after diagnosis and no ADT given before the start of RT

Radical prostatectomy (RP)
RP as the first radical treatment within 9 months after diagnosis, with or without ADT

Radiotherapy and ADT (RT+ADT)
RT as the first radical treatment within 9 months after diagnosis and ADT given before the start of RT.

Identified Challenge	Devised Solution
PC diagnosis timing: Active cancer treatment was sometimes recorded before official diagnosis was recorded	Defined diagnosis date as the earliest of ICD-10 code C61 or the start of treatment.
Metastasis diagnosis timing: Metastasis was inconsistently registered with ICD-10 codes.	Developed criteria: (i) ICD-10 codes C76-C80, (ii) Z51.5, (iii) NOMESCO surgical codes and radiotherapy codes indicating treatment of metastasis, (iv) metastasis-related terms in free-text, or (v) PSA >100 ng/mL.
Variation in treatment timing: Although guidelines suggest that active treatments should begin within six months from diagnosis, active treatments often began (or were registered) just before the 6-month mark, particularly radiotherapy.	Extended treatment window to 9 months post-diagnosis to account for registration delays and misalignment.
Free-text field absence: The absence of free-text fields resulted in missing clinical T-stage data, potentially obscuring aggressive cases. Additionally, incomplete clinical data made patient stratification challenging, complicating risk categorization.	PSA and Gleason score were used to refine stratification in the absence of T-stage data. Available risk data (T-stage, Gleason score) were then combined with hospital-specific patterns to enhance the stratification process.
PSA variability: PSA levels measured after ADT initiation could lower the PSA value.	Defined PSA as the closest measurement within 3 months before diagnosis, excluding post-ADT values.
Active surveillance misidentification: Procedure code for active surveillance was rarely used, making it hard to distinguish from watchful waiting.	Classified patients with no treatment within 9 months as "no initial treatment," encompassing both active surveillance and watchful waiting. Age, PSA, and Gleason were considered but not robust enough for differentiation.
Distinguishing adjuvant treatment from relapse: Adjuvant treatments often began slightly after 3 months.	Defined adjuvant treatment as any therapy within 6 months of radical treatment, beyond which it was considered relapse management.
Castration-resistant disease: Lack of testosterone data made it difficult to define castration resistance.	Inferred castration resistance using PSA progression during ADT and explored prescription patterns for intermittent hormone therapy.
Treatment outside university hospitals: For patients residing outside the immediate region of university hospitals, referrals and follow-up are managed by sources other than university hospitals. As a result, not all pre-diagnosis or post-treatment data is available.	The analysis was limited to patients within the immediate region of the university hospital to ensure the availability of all necessary patient data.

Table 1. Challenges in diagnosing, risk stratifying, and identifying treatment in LPC patients from retrospective registry data, and proposed solutions to address these challenges.

CONCLUSIONS

Retrospective categorization of LPC patients into different treatment strategies is challenging. The NIT cohort includes patients both under active surveillance, where regular monitoring leads to treatment if cancer progresses, and those under watchful waiting, a less intensive approach for older or sicker patients, where treatment is provided only if symptoms arise. While distinguishing these groups in the dataset wasn't consistently possible, the algorithm offers a robust framework for categorizing LPC patients based on key data points.

References

a) Cantarero-Prieto D et al. 2022. The Economic Burden of Localized Prostate Cancer and Insights Derived from Cost-Effectiveness Studies of the Different Treatments. doi:10.3390/cancers14174088

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