NPCA
National Prostate Cancer Audit

NATCAN
National Cancer Audit Collaborating Centre

National Prostate Cancer Audit State of the Nation Report: Methodology Supplement

An audit of care received by people diagnosed or treated with prostate cancer from 1 September 2021 to 31 March 2024 in England and Wales. In addition, a description of national time trends in diagnoses and treatments from 1 January 2019 to 31 December 2024 in England and 1 January 2022 to 31 December 2023 in Wales.

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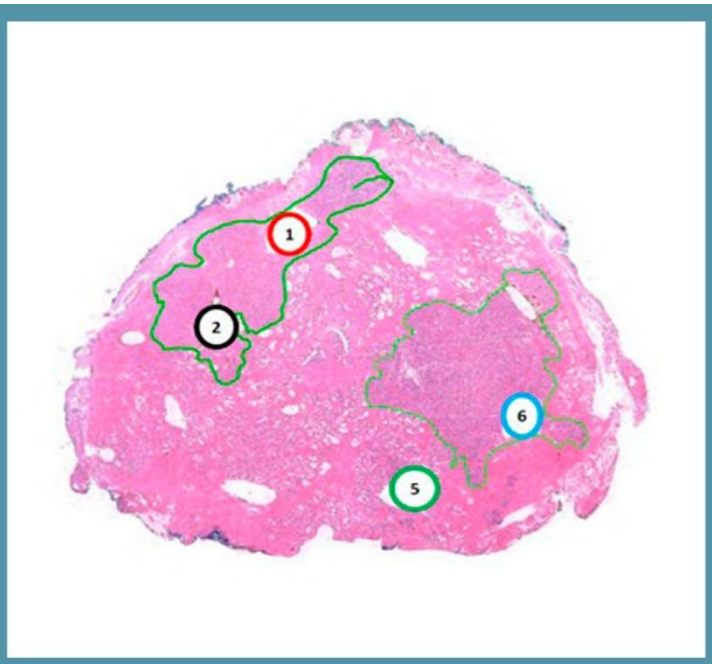

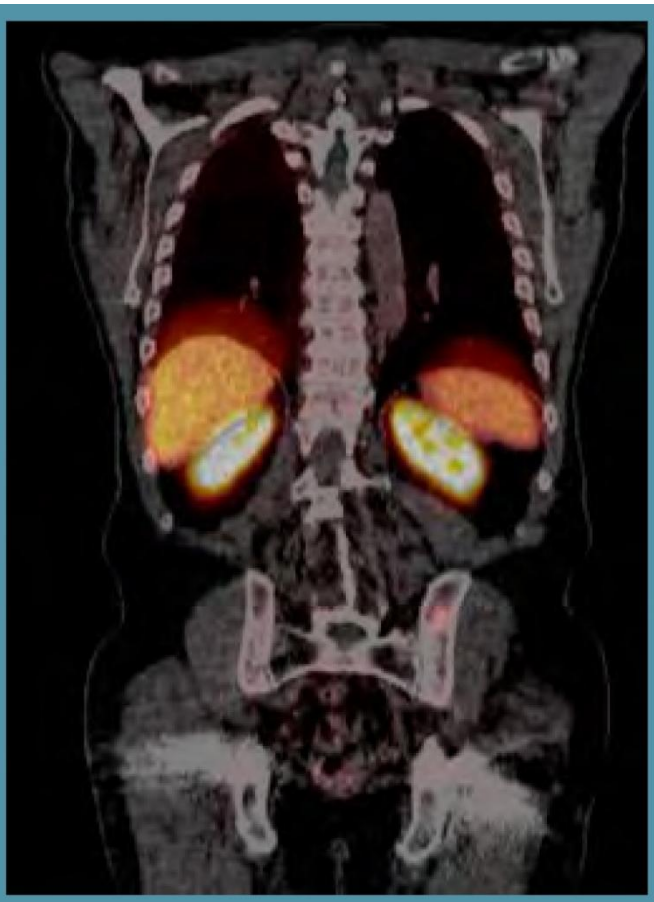

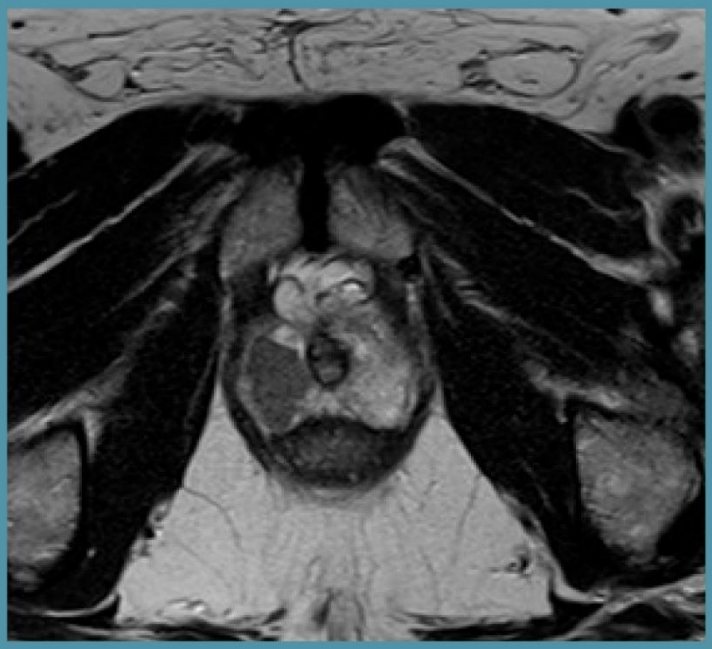

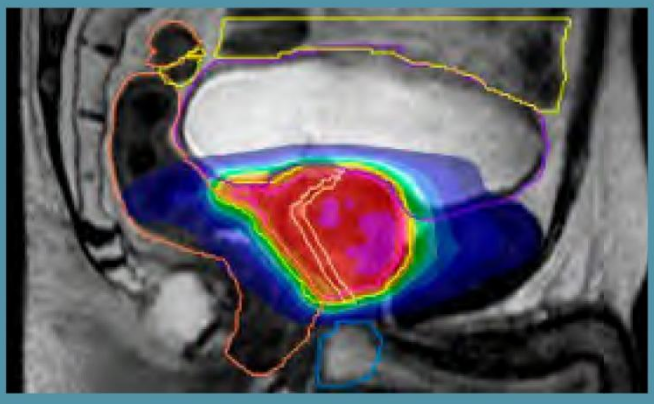

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The National Cancer Audit Collaborating Centre (NATCAN) is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and funded by NHS England and the Welsh Government as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP). NATCAN delivers national audits in bowel, breast (primary and metastatic), kidney, lung, non-Hodgkin lymphoma, oesophago-gastric, ovarian, pancreatic and prostate cancers.

The British Association of Urological Surgeons (BAUS) was founded in 1945 and exists to promote the highest standards of practice in urology, for the benefit of patients, by fostering education, research and clinical excellence. BAUS is a registered charity and qualified medical practitioners practising in the field of urological surgery are eligible to apply for membership. Registered Charity no: 1127044

The British Uro-oncology Group (BUG) was formed in 2004 to meet the needs of clinical and medical oncologists specialising in the field of urology. As the only dedicated professional association for uro-oncologists, its overriding aim is to provide a networking and support forum for discussion and exchange of research and policy ideas. Registered Charity no: 1116828

This work uses data that has been provided by patients and collected by the NHS as part of their care and support. For patients diagnosed in England, the data is collated, maintained and quality assured by the National Disease Registration Service (NDRS), which is part of NHS England. Access to the data was facilitated by the NHS England Data Access Request Service.

NHS Wales is implementing a new cancer informatics system. As a result, the quality and completeness of data from Wales is likely to have been impacted due to implementation of this new system across multiple NHS organisations (health boards), which has resulted in data being supplied by both old and new systems. Additionally, and reflecting the uncertainty of data quality, the data submitted to the audit may not have undergone routine clinical validation prior to submission to the Wales Cancer Network (WCN), Public Health Wales.

Contents

1. Introduction

This document provides supporting material to the 2025 State of the Nation (SotN) Report for the National Prostate Cancer Audit (NPCA) and its data tables and data viewer. The document describes the data used in the report with details on sources of data, criteria for inclusion and how data completeness, patient characteristics and performance indicators are derived and reported.

2. Sources of Data

The audit uses information from routine national health care datasets in England and Wales. These datasets capture details on the diagnosis, management, treatment and outcome of every patient newly diagnosed with cancer in the NHS in England and Wales.

For England, the audit received information from the National Disease Registration Service (NDRS) at a tumour level for this State of the Nation report. The information held in the National Cancer Registration Dataset (NCRD) and the Rapid Cancer Registration Dataset (RCRD) is compiled from a variety of sources including the Cancer Outcomes and Services Dataset (COSD), Hospital Episode Statistics Admitted Patient Care (HES APC) records, the Systemic Anti-Cancer Therapy dataset (SACT), Radiotherapy Dataset (RTDS) and data submitted by pathology laboratories. The audit also received linked information from COSD (linked at tumour level), HES APC, HES Outpatients data (HES OP), SACT and RTDS (all linked at patient level). Appendix 1 provides more detail on the data sources listed below and the information they contain.

The English data received by the National Cancer Audit Collaborating Centre (NATCAN) included data on men registered with cancer up to 31st December 2024. For information on the timeliness of NCRD and RCRD, please see the NATCAN website.

As with cancer registries in other countries, cancer registrations in England can take up to 5 years after the end of a given calendar year to reach *approximately* 100% completeness and stability. NDRS uses an active system of gathering information on cancer diagnoses from multiple sources across the patient pathway. Completeness varies by tumour type because different patient pathways provide different opportunities for data flows into NDRS. The 'Gold standard' cancer registration dataset that is used in cancer statistics bulletins and available for analysis outside of NDRS contains over 98% of all the people that will eventually be found by the registration process, and the completeness for a calendar year of data increases over time. More information about the cancer registration process can be found here.

This year, we use the NCRD to report on seven of our eight performance indicators and use the RCRD for one performance indicator (PI5) and the national picture section of the report. The NCRD undergoes more processing to improve its data completeness compared to the RCRD and also contains a broader range of variables. On the other hand, the RCRD has the advantage that it is available to us much more quickly after a patient is diagnosed so we can conduct more timely analyses. The RCRD captures approximately 90% of cancer diagnoses that are seen in the NCRD dataset, with consistent completeness of data collection across trusts. A comparison of the NCRD with the RCRD for four NPCA performance indicators can be found here.

For Wales, the audit was provided with a registration dataset at patient level for men diagnosed with kidney cancer in 2023. Welsh cancer registration data is captured through a national system, Cancer Information System for Wales (CaNISC) and the new Welsh Clinical Portal. The audit also received linked datasets of records from the Patient Episode Database for Wales (PEDW) containing information on inpatient and day case activity, and mortality data from the Office for National Statistics (ONS).

England and Wales data were managed separately. For indicators with the same time period, England and Wales data were analysed together, otherwise they were analysed separately.

3. Inclusion and Exclusion Criteria

The data submitted by NDRS and WCN is checked and filtered for eligible participants, tables 3.1 and 3.2 explain the process in defining the final cohort to be used in the audit.

People were included for analysis within the SotN Report if they met the following inclusion and not the exclusion criteria:

Table 3.1: Audit Inclusion Criteria	
Inclusion Criteria	**Details**
Type of cancer	C61 (Malignant neoplasm of prostate)
Adults	Age >=18
Valid Diagnosis Date	England: 1 January 2018 to 30 September 2024 Wales: 1 January 2021 to 31 December 2023
First Diagnosis	Earliest diagnosis (diagnosisdatebest) was included in the cohort if dates of diagnosis differed.

Table 3.2: Audit Exclusion Criteria	
Exclusion Criteria	**Details**
Reported by death certificate only or date of diagnosis corresponds to date of death	**For English data:** Using NCRD or RCRD: final_route = DCO (Death Certificate Only) and/or basisofdiagnosis = 0 (Death certificate) and/or dco = Y (tumour registered from a death certificate only) and/or diagnosisdatebest = deathdatebest **For Welsh data:** DIAGNOSIS_DATE (Cohort data) = date of death
Diagnosed and treated outside of an NHS organisation in England or Wales	**For English data:** Organisation of diagnosis was a Welsh health board (code starting with 7) Organisation of diagnosis was a private healthcare organisation **For Welsh data:** Organisation of diagnosis was an English trust (code starting with R) Organisation of diagnosis was a private healthcare organisation

4. Key Data Items

Details of the variables and datasets used to compile the data completeness are shown below in Table 4.1.

Table 4.1: Data Completeness Variables				
Data Item	**Source**			
	England		**Wales**	
	Data field	**Dataset**	**Data field**	**Dataset**
Ethnicity	ethnicity	NCRD	EthnicGroup	PEDW
Index of multiple deprivation	imd19_quintile_lsoas	NCRD	deprivationquintile	PEDW
Performance status	performancestatus	COSD	PerformanceStatus	Can reg dataset
PSA	psa_diagnosis	NCRD	PSAdiagnosis	Can reg dataset
Gleason score	gleason_primary, gleason_secondary, gleason_combined	NCRD	GleasonPrimary, GleasonSecondary	Can reg dataset
T stage	t_best	NCRD	TNMStageT	Can reg dataset
N category	n_best	NCRD	TNMStageN	Can reg dataset

M category	m_best	NCRD	TNMStageM	Can reg dataset

Details of the variables and datasets used to compile the patient and tumour characteristics are shown below in Table 4.2.

Table 4.2: Patient and Tumour Characteristics Variables

Data Item	Source			
	England		Wales	
	Data field	Dataset	Data field	Dataset
Age at diagnosis	*age* categorised into 4 groups: <60, 60-69, 70-79, ≥80	NCRD	*AgeAtDiag* categorised into 4 groups: <60, 60-69, 70-79, ≥80	Can reg dataset
Ethnicity	*Ethnicity* categorised into 5 groups	NCRD	*ethnicgroupcategory*	PEDW
Index of multiple deprivation	*imd19_quintile_lsoas*	NCRD	*deprivationquintile*	PEDW
Performance status	*Performancestatus* categorised into 3 groups: 0, 1-2, ≥3	COSD	*PerformanceStatus* categorised into 3 groups: 0, 1-2, ≥3	Can reg dataset
Number of co-morbidities (Charlson score)	See appendix 2 for details Categorised into 3 groups: 0, 1, ≥2	HES APC	See appendix 2 for details Categorised into 3 groups: 0, 1, ≥2	PEDW
Prostate Specific Antigen (PSA)	*Psa_diagnosis*	COSD	*PSAdiagnosis*	Can reg dataset
Gleason score	*Gleason_combined*	NCRD	*GleasonPrimary, GleasonSecondary*	Can reg dataset
Stage	*Stage_best*	NCRD	*StageOther*	Can reg dataset
T stage	*T_best*	NCRD	*TNMStageT*	Can reg dataset
N category	*N_best*	NCRD	*TNMStageN*	Can reg dataset
M category	*M_best*	NCRD	*TNMStageM*	Can reg dataset
Risk group	See detail below	N/A	See detail below	N/A
Cambridge Prognostic Group (CPG)	See detail below	N/A	See detail below	N/A

Risk group

Men were assigned to a prostate cancer risk group according to a modified D'Amico classification, which is a three-tiered disease status category, assigned according to their TNM category, Gleason score and PSA, using an adapted version of an algorithm previously developed by the NPCA. The algorithm was adapted to broaden the inclusion criteria of the low-risk group so that anyone T stage 1 or 2, and M category 0 or missing, and N category 0 or missing, with a combined Gleason score of 6 or less was classified as low-risk. The underlining above highlights the expansion of the criteria.

Cambridge Prognostic Group (CPG)

Men were assigned to a prostate cancer risk according to the Cambridge Prognostic Group (CPG) classification, which is a five-tiered disease status category, assigned according to their TNM category, Gleason score and PSA.

5. Indicator Definitions

The audit uses key indicators to monitor progress against its healthcare improvement goals. These indicators align with national guidelines and standards. Definitions of how the indicators included in the SotN report were derived from data for England and Wales are described below.

Some indicators are further focused on subgroups of men as defined by sex and stage of the disease, as these factors are important determinants of whether particular treatments are suitable for men.

5.1 Performance Indicator 1: Diagnosed with metastatic disease

This process indicator provides information on the variation of the proportion of men diagnosed with metastatic prostate cancer, at a point at which they are normally beyond curative treatment. This could potentially indicate a late diagnosis.

Table 5.1: Proportion of men diagnosed with metastatic disease

	England	**Wales**
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/4/2023 to 31/12/2023
Numerator: Number of men diagnosed with metastatic disease	Number of men with metastatic status disease at diagnosis (*m_best* = 1).	Number of men with metastatic status disease at diagnosis (*TNMStageM* = 1).
Denominator: Number of men whose disease status has been determined	Number of men with metastatic status complete (*m_best* = 0 or 1).	Number of men with metastatic status complete (*TNMStageM* = 0 or 1).
Construction notes	Where metastatic status (M category) was missing, non-metastatic status could sometimes be inferred based on T stage, N category, Gleason score and PSA score based on the principles of the D'Amico classification and the Cambridge Prognostic Group system. Four clinical assumptions were followed: 1. Men with a recorded N category but missing M category have no distant metastases (M0) 2. Low/intermediate risk men with missing M category have no distant metastases (M0) 3. Low/intermediate risk men with missing N category have no nodal disease 4. High risk men with missing M category have no distant metastases (M0) M. Parry et al. Imputation of missing prostate cancer stage in English cancer registry data based on clinical assumptions. Cancer Epidemiology. 2019.	Where metastatic status (M category) was missing, non-metastatic status could sometimes be inferred based on T stage, N category, Gleason score and PSA score based on the principles of the D'Amico classification and the Cambridge Prognostic Group system. Four clinical assumptions were followed: 1. Men with a recorded N category but missing M category have no distant metastases (M0) 2. Low/intermediate risk men with missing M category have no distant metastases (M0) 3. Low/intermediate risk men with missing N category have no nodal disease 4. High risk men with missing M category have no distant metastases (M0) M. Parry et al. Imputation of missing prostate cancer stage in English cancer registry data based on clinical assumptions. Cancer Epidemiology. 2019.
Country reporting:	England & Wales separate	

Organisational Reporting level: SMDT	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).
Subgroup Reporting:	None	None
Risk adjusted:	No	
Outlier reporting:	No	

5.2 Performance Indicator 2: Over-treatment

This process indicator provides information about the potential "over-treatment" of men with low-risk prostate cancer.

Table 5.2: Proportion of men with low-risk (CPG 1) localised cancer undergoing radical prostate cancer treatment

	England	**Wales**
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/4/2023 to 31/12/2023
Numerator: Number of these having radical prostatectomy, radiotherapy or brachytherapy within 12 months of diagnosis	Number of men with low-risk localised disease who have radical prostatectomy, radiotherapy or brachytherapy within 12 months of diagnosis (*diagnosisdatebest)*. Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code. Radiotherapy is identified via RTDS using the following criteria: prostate cancer diagnosis code or missing (*radiotherapydiagnosisicd* = C61 or missing) **and** prostate anatomical treatment site or missing (*rttreatmentanatomicalsite* = Z422 or missing) **and** treatment region is not metastasis (*rttreatmentregion* ≠ M **and** radiotherapy intent is "anti cancer" or missing (*radiotherapyintent* = 2 or missing). Brachytherapy is identified via HES APC using the following OPCS-4 procedure codes: X653, M706 and M712.	Number of men with low-risk localised disease who have radical prostatectomy, radiotherapy or brachytherapy within 12 months of diagnosis (*DiagDate)*. Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (*RPdate*). Radiotherapy is identified via the radiotherapy dataset using the following criteria: prostate cancer diagnosis code (*PRIMARY_DIAGNOSIS* = "Malig neop prostate") and treatment intent isn't palliative (*RT_INTENT* ≠ "Palliative"). Radiotherapy was also identified via the cancer registration dataset if the intent of the radiotherapy was primary radical intent, adjuvant, other and not known (*Plannedradiotherapyintentpro* = 1, 2, 8 or 9). Brachytherapy is identified via the cancer registration dataset, we included LDR monotherapy and brachytherapy of unknown type (*Plannedbrachytherapytype* = 1 or 9).
Denominator: Number of men with low-risk localised prostate cancer	Number of men with low-risk localised prostate cancer.	Number of men with low-risk localised prostate cancer.
Construction notes	• Low-risk localised prostate cancer is defined as men with T stage 1 or 2 (*t_best* = 1 or 2), and M category 0 or missing (*m_best* = 0 or missing), and N category 0 or missing (*n_best* = 0 or missing) and a combined Gleason score of 6 or less (*gleason_combined* ≤ 6).	• Low-risk localised prostate cancer is defined as men with T stage 1 or 2 (*TNMStageT* = 1 or 2), and M category 0 or missing (*TNMStageM* = 0 or missing), and N category 0 or missing (*TNMStageN* = 0 or missing) and a combined Gleason score of 6 or less (*GleasonPrimary* + *GleasonSecondary* = ≤6).
Country reporting:	England & Wales separate	
Organisational Reporting level: SMDT	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).

Subgroup Reporting :	None	
Risk adjusted:	Yes: age and co-morbidity	
Outlier reporting:	No	

5.3 Performance Indicator 3: Under-treatment

This process indicator provides information about potential "under-treatment" of men with high-risk/locally advanced disease.

Table 5.3: Proportion of men with high-risk/locally advanced disease undergoing radical prostate cancer treatment

	England	**Wales**
Dates of diagnosis:	1/1/2022 to 31/12/2022	1/4/2023 to 31/12/2023
Numerator: Number of these having radical prostatectomy, radiotherapy, or brachytherapy within 12 months of diagnosis	Number of men with high-risk/locally advanced disease who have radical prostatectomy, radiotherapy or brachytherapy within 12 months of diagnosis (*diagnosisdatebest*). Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code. Radiotherapy is identified via RTDS using the following criteria: prostate cancer diagnosis code or missing (*radiotherapydiagnosisicd* = C61 or missing) and prostate anatomical treatment site or missing (*rttreatmentanatomicalsite* = Z422 or missing) and treatment region is not metastasis (*rttreatmentregion* ≠ M and radiotherapy intent is "anti cancer" or missing (*radiotherapyintent* = 2 or missing). Brachytherapy is identified via HES APC using the following OPCS-4 procedure codes: X653, M706 and M712.	Number of men with high-risk/locally advanced disease who have radical prostatectomy, radiotherapy or brachytherapy within 12 months of diagnosis (*DiagDate*). Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (*RPdate*). Radiotherapy is identified via the radiotherapy dataset using the following criteria: prostate cancer diagnosis code (*PRIMARY_DIAGNOSIS* = "Malig neop prostate") and treatment intent isn't palliative (*RT_INTENT* ≠ "Palliative"). Radiotherapy was also identified via the cancer registration dataset if the intent of the radiotherapy was primary radical intent, adjuvant, other and not known (*Plannedradiotherapyintentpro* = 1, 2, 8 or 9). Brachytherapy is identified via the cancer registration dataset, we included LDR monotherapy and brachytherapy of unknown type (*Plannedbrachytherapytype* = 1 or 9).
Denominator: Number of men with high-risk/locally advanced disease	Number of men with high-risk/locally advanced disease	Number of men with high-risk/locally advanced disease
Construction notes	• High-risk/locally advanced disease is defined as men with non-metastatic disease (*m_best* = 0 or missing) who also meet one of the following criteria: ○ Nodal disease (*n_best* = 1) ○ Combined Gleason score of greater than 7 (*gleason_combined* ≥ 8) ○ T3 or T4 disease (*t_best* = 3 or 4)	• High-risk/locally advanced disease is defined as men with non-metastatic disease (*TNMStageM* = 0 or missing) who also meet one of the following criteria: ○ Nodal disease (*TNMStageN* = 1) ○ Combined Gleason score of greater than 7 (*GleasonPrimary* + *GleasonSecondary* = ≤8) ○ T3 or T4 disease (*TNMStageT* = 3 or 4)

	○ PSA score greater than 20 (*psa* > 20)	○ PSA score greater than 20 (*PSAdiagnosis* > 20)
Country reporting:	England & Wales separate	
Organisational Reporting level: SMDT	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).
Subgroup Reporting :	None	
Risk adjusted:	Yes: age and co-morbidity	
Outlier reporting:	No	

5.4 Performance Indicator 4: Treatment intensification for metastatic disease

Proportion of men with newly diagnosed hormone-sensitive metastatic disease receiving systemic treatment intensification within 12 months of diagnosis (under 75 years old and 75 years and older).

Table 5.4: Proportion of men with newly diagnosed hormone-sensitive metastatic disease receiving systemic treatment intensification within 12 months of diagnosis (under 75 years old and 75 years and older)		
	England	**Wales**
Dates of diagnosis:	1/1/2022 to 31/12/2022	N/A
Numerator: Number of men with newly diagnosed hormone-sensitive metastatic disease receiving systemic treatment intensification within 12 months of diagnosis	Number of men with newly diagnosed hormone-sensitive metastatic disease (*m_best* = 1) receiving systemic treatment intensification within 12 months of diagnosis (*diagnosisdatebest*). Systemic treatment was identified via SACT. The systemic treatment included enzalutamide, docetaxel, abiraterone and apalutamide (*analysis_group* = "ENZALUT", "DOCETAX", "ABIRAT" or "APALUT").	N/A
Denominator: Number of men with newly diagnosed hormone-sensitive metastatic disease	Number of men with newly diagnosed hormone-sensitive metastatic disease (*m_best* = 1).	N/A
Construction notes		N/A
Country reporting:	England only (Wales was excluded from this indicator as sufficient systemic therapy data was not available)	
Organisational Reporting level: SMDT	Reported at the level of diagnosing specialist multidisciplinary team (SMDT).	N/A
Subgroup Reporting :	None	N/A
Risk adjusted:	Yes: age, co-morbidity, frailty and performance status	
Outlier reporting:	Yes	

5.5 Performance Indicator 5: Emergency readmission following surgery

This outcome indicator may reflect that men experienced a complication related to radical prostate cancer surgery after discharge from hospital.

Table 5.5: Proportion of men who had an emergency readmission within 90 days of radical prostate cancer surgery		
	England	**Wales**

Dates of diagnosis:	1/4/2023 to 30/3/2024	1/4/2023 to 30/3/2024
Numerator: Number of men who were readmitted within 90 days of their radical prostatectomy	Number of men who were readmitted within 90 days of their radical prostatectomy. Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code. Men are coded as having an emergency readmission if: • they were readmitted between 1 and 90 days since discharge following radical prostatectomy (*admidate*) • they have an "*admimeth*" code starting with a "2" indicating emergency admission • an overnight stay is not required to qualify as readmission	Number of men who were readmitted within 90 days of their radical prostatectomy. Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (RPdate). Men are coded as having an emergency readmission if: • they were readmitted between 1 and 90 days since discharge following radical prostatectomy (*AdmissionDate*) • *AdmissionMethodCategory* = "Emergency" indicating emergency admission • an overnight stay is not required to qualify as readmission
Denominator: Number of men who had a radical prostatectomy	Number of men who had a radical prostatectomy. Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code.	Number of men who had a radical prostatectomy. Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (*RPdate*).
Construction notes	The dataset used to calculate this indicator is RCRD. The other performance indicators use NCRD. See section 2 above for more information.	
Country reporting:	England & Wales reported together	
Organisational Reporting level: Trust / Health Board	Reported at the level of treating surgical centre.	Reported at the level of treating surgical centre.
Subgroup Reporting :	None	None
Risk adjusted:	Yes: age, co-morbidity, cancer stage and deprivation	
Outlier reporting:	No	

5.6 Performance Indicator 6: Genitourinary (GU) complication following surgery

This outcome indicator may reflect the quality of the surgical procedure received.

Table 5.6: Proportion of men experiencing at least one genitourinary (GU) complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy

	England	**Wales**
Dates of diagnosis:	1/9/2021 to 31/08/2022	1/9/2021 to 31/08/2022
Numerator: Number of men who had a genitourinary complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy	Number of men who had a genitourinary complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy. Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code. Genitourinary complications are identified via HES APC using the OPCS-4 procedure codes listed in Appendix 4.	Number of men who had a genitourinary complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy. Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (*RPdate*). Genitourinary complications are identified via PEDW using the OPCS-4 procedure codes listed in Appendix 4.

Denominator: Number of men who had a radical prostatectomy	Number of men who had a radical prostatectomy. Radical prostatectomy is identified via HES APC using the M61 OPCS-4 procedure code.	Number of men who had a radical prostatectomy. Radical prostatectomy is identified via PEDW using the M61 OPCS-4 procedure code and via the cancer registration dataset (*RPdate*).
Construction notes	• Men with an associated diagnosis of bladder cancer (ICD-10 "C67" code) or who received post-operative radiotherapy were excluded.	• Men with an associated diagnosis of bladder cancer (ICD-10 "C67" code) or who received post-operative radiotherapy were excluded.
Country reporting:	England & Wales reported together	
Organisational Reporting level: Trust / Health Board	Reported at the level of treating surgical centre.	Reported at the level of treating surgical centre.
Subgroup Reporting :	None	None
Risk adjusted:	Yes: age, co-morbidity, prostate cancer risk group and deprivation	
Outlier reporting:	Yes	

5.7 Performance Indicator 7: Gastrointestinal (GI) complication following radiotherapy

This outcome indicator may reflect the quality of the radiotherapy interventions received.

Table 5.7: Proportion of men receiving a procedure of the large bowel and a diagnosis indicating radiation toxicity (gastrointestinal [GI] complication) within 2 years of radical prostate radiotherapy		
	England	**Wales**
Dates of diagnosis:	1/9/2021 to 31/08/2022	1/9/2021 to 31/08/2022
Numerator: Number of men receiving a procedure of the large bowel and a diagnosis indicating radiation toxicity (gastrointestinal [GI] complication) up to 2 years following radical prostate radiotherapy	Number of men receiving a procedure of the large bowel and a diagnosis indicating radiation toxicity (gastrointestinal [GI] complication) up to 2 years following radical prostate radiotherapy. Gastrointestinal complications are identified via HES APC using the OPCS-4 procedure codes listed in Appendix 5.	Number of men receiving a procedure of the large bowel and a diagnosis indicating radiation toxicity (gastrointestinal [GI] complication) up to 2 years following radical prostate radiotherapy. Gastrointestinal complications are identified via PEDW using the OPCS-4 procedure codes listed in Appendix 5.
Denominator: Number of men who had radical prostate radiotherapy	Number of men who had radical prostate radiotherapy.	Number of men who had radical prostate radiotherapy.
Construction notes	• Radiotherapy is identified via RTDS using the following criteria: prostate cancer diagnosis code or missing (*radiotherapydiagnosisicd* = C61 or missing) and prostate anatomical treatment site or missing (*rttreatmentanatomicalsite* = Z422 or missing) and treatment region is not metastasis (*rttreatmentregion* ≠ M) and radiotherapy intent is "anti cancer" or missing (*radiotherapyintent* = 2 or missing). • Men with an associated diagnosis of bladder cancer,	• Radiotherapy is identified via the radiotherapy dataset using the following criteria: prostate cancer diagnosis code (*PRIMARY_DIAGNOSIS* = "Malig neop prostate") and treatment intent isn't palliative (*RT_INTENT* ≠ "Palliative"). Radiotherapy was also identified via the cancer registration dataset if the intent of the radiotherapy was primary radical intent, adjuvant, other and not known (*Plannedradiotherapyintentpro* = 1, 2, 8 or 9). • Men with an associated diagnosis of bladder cancer, those who received additional brachytherapy

	those who received additional brachytherapy and those who had received a radical prostatectomy prior to radiotherapy were excluded.	and those who had received a radical prostatectomy prior to radiotherapy were excluded.
Country reporting:	England & Wales reported together	
Organisational Reporting level: Trust / Health Board	Reported at the level of treating radiotherapy centre.	Reported at the level of treating radiotherapy centre.
Subgroup Reporting :	None	None
Risk adjusted:	Yes: age, co-morbidity, prostate cancer risk group and deprivation	
Outlier reporting:	Yes	

5.8 Performance Indicator 8: Genitourinary (GU) complication following radiotherapy

Proportion of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy.

Table 5.8: Proportion of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy

	England	**Wales**
Dates of diagnosis:	1/9/2021 to 31/08/2022	1/9/2021 to 31/08/2022
Numerator: Number of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy	Number of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy. Genitourinary complications are identified via HES APC using the OPCS-4 procedure codes listed in Appendix 6.	Number of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy. Genitourinary complications are identified via PEDW using the OPCS-4 procedure codes listed in Appendix 6.
Denominator: Number of men who had radical prostate radiotherapy	Number of men who had radical prostate radiotherapy.	Number of men who had radical prostate radiotherapy.
Construction notes	• Radiotherapy is identified via RTDS using the following criteria: prostate cancer diagnosis code or missing (radiotherapydiagnosisicd = C61 or missing) and prostate anatomical treatment site or missing (rttreatmentanatomicalsite = Z422 or missing) and treatment region is not metastasis (rttreatmentregion ≠ M and radiotherapy intent is “anti cancer” or missing (radiotherapyintent = 2 or missing). • Men with an associated diagnosis of bladder cancer, those who received additional brachytherapy and those who had received a radical prostatectomy prior to radiotherapy were excluded.	• Radiotherapy is identified via the radiotherapy dataset using the following criteria: prostate cancer diagnosis code (*PRIMARY_DIAGNOSIS* = "Malig neop prostate") and treatment intent isn’t palliative (*RT_INTENT* ≠ "Palliative"). Radiotherapy was also identified via the cancer registration dataset if the intent of the radiotherapy was primary radical intent, adjuvant, other and not known (*Plannedradiotherapyintentpro* = 1, 2, 8 or 9). • Men with an associated diagnosis of bladder cancer, those who received additional brachytherapy and those who had received a radical prostatectomy prior to radiotherapy were excluded.

Country reporting:	England & Wales reported together	
Organisational Reporting level: Trust / Health Board	Reported at the level of treating radiotherapy centre.	Reported at the level of treating radiotherapy centre.
Subgroup Reporting :	None	None
Risk adjusted:	Yes: age, co-morbidity, prostate cancer risk group and deprivation	
Outlier reporting:	No	

6. NHS Organisations

The audit presents organisation-level findings by the NHS organisation of diagnosis or prostate cancer treatment, as appropriate for the specific indicator:

- Diagnosing specialist multidisciplinary team (SMDT):
    - Performance Indicator 1: Diagnosed with metastatic disease
    - Performance Indicator 2: Over-treatment
    - Performance Indicator 3: Under-treatment
    - Performance Indicator 4: Treatment intensification for metastatic disease
- Organisation of prostate cancer surgery or radiotherapy: for indicators concerned with treatment outcomes:
    - Performance Indicator 5: Emergency readmission following surgery
    - Performance Indicator 6: Genitourinary (GU) complication following surgery
    - Performance Indicator 7: Gastrointestinal (GI) complication following radiotherapy
    - Performance Indicator 8: Genitourinary (GU) complication following radiotherapy

Details on allocation to NHS Trust in England:

- Trust of diagnosis is identified using the trust of diagnosis variable in the NCRD.
- Cases in the English data where the organisation of diagnosis is an NHS Wales organisation are excluded from the England analyses, unless the case had treatment in England.

For Wales, the local health board of diagnosis was identified using the trust of diagnosis variable in the cancer registration dataset.

For England and Wales, SMDT of diagnosis was identified based on mapping from Trust to SMDT determined by the NPCA via organisational audit exercises.

A minimum of 10 diagnoses in the audit period were required for reporting at trust or health board level. This was to ensure only trusts providing cancer services were included and also to avoid very small numbers which can lead to unreliable estimates and increase the risk of potential data disclosure.

7. Statistical Analysis

All statistical analyses were conducted using *Stata version 17.*

Most results in the SotN Report are descriptive. The results of categorical data items are reported as percentages (%). Results are typically provided as an overall figure and broken down by NHS organisation of diagnosis (see NHS organisations section). Note that within tables in the SotN Report, the total percentage may not equal 100%, due to rounding.

7.1 Suppression

- Data quality and completeness results have not been supressed.
- Organisations with indicator denominator values less than 10 have been suppressed.

7.2 Risk-adjustment of indicators

The provider level results for some indicators were risk adjusted. The tables of performance indicators state whether risk adjustment has been performed. Multivariable logistic regression was carried out to produce the risk adjusted results. This was used to estimate the probability of a patient having an event, at trust level the individual probabilities were summed to give the expected number of events, and the number of events was then divided by the expected.

Table 7.1 below provides details on the datasets and variables used to compile the variable used for risk adjustment

Table 7: Risk Adjustment Variables

Data Item	**Additional detail**	
	England	**Wales**
Age at diagnosis	Age (NCRD) categorised into 4 groups: <60, 60-69, 70-79, ≥80	Age (Cohort data) categorised into 4 groups: <60, 60-69, 70-79, ≥80
Deprivation	The Index of Multiple Deprivation (IMD) was used to categorise men into five socioeconomic groups (1=least deprived; 5=most deprived) based on the small areas in which they lived (LSOAs, containing ~1500 people). The 5 categories were fifths of the national IMD ranking of these areas. Deprivation categorised into 6 groups: 1- least deprived, 2, 3, 4, 5 – most deprived, missing	
Charlson comorbidity index	The CCI is a commonly used scoring system for medical comorbidities, consisting of a grouped score calculated based on the absence (0) and presence (≥1) of 14 pre-specified medical conditions (**Appendix 2**). The CCI was calculated using information on secondary diagnoses (ICD-10 codes) recorded in HES APC (England) / PEDW (Wales) within the 24-month period prior to a patient's diagnosis. For the purpose of analysis, the CCI is grouped into three categories: • **0** none of the 14 pre-specified comorbidities. • **1** only 1 of the 14 pre-specified comorbidities. • **2+** 2 or more of the 14 pre-specified comorbidities	
Frailty	The Secondary Care Administrative Records Frailty (SCARF) Index describes frailty in relation to 32 different symptoms, signs, diseases and disabilities. The index translates the 32 deficits into ICD-10 codes and counts the number of deficits in HES APC/PEDW records within the 24-month period prior to a patient's diagnosis. For the purpose of analysis, the frailty is grouped into four categories: Fit, mild frailty, moderate frailty and severe frailty.	
Performance status	The World Health Organization (WHO) performance status (PS) classification is a measure of how disease(s) impact(s) a patient's ability to manage on a daily basis, and ranges from a score of 0 (fully active) to 4 (Completely disabled; cannot carry on any selfcare; totally confined to bed or chair) [Oken et al 1982]. For the purpose of analysis, the performance status is grouped into three categories: 0, 1-2 and 3-4.	

Cancer stage	Disease staging (stage I-IV) was derived by our data providers from TNM status.
Prostate cancer risk group	Men were assigned to a prostate cancer risk according to a modified D'Amico classification, which is a three-tiered disease status category, assigned according to their TNM category, Gleason score and PSA, using an adapted version of an algorithm previously developed by the NPCA. The algorithm was adapted to broaden the inclusion criteria of the low-risk group so that anyone T stage 1 or 2, and M category 0 or missing, and N category 0 or missing, with a combined Gleason score of 6 or less was classified as low-risk. The underlining above highlights the expansion of the criteria. For the purpose of analysis, the performance status is grouped into 4 groups: • Metastatic • Locally advanced • Intermediate • Low risk

7.3 Handling of missing data

For the risk-adjustment of indicators 1-3 and 5-8, missing values were classified as a separate "missing" category to ensure all included people contributed to the statistical models.

For the risk adjustment of indicator 4 (Treatment intensification for metastatic disease), missing values for age, co-morbidity, frailty and performance status were imputed with multiple imputation using chained equations, creating ten data sets and pooling model estimates using Rubin's Rules. The imputation models included all the variables in the analysis models.

8. Outlier Process

The outlier process can be found in the separate NPCA outlier policy.

Appendix 1: Routine data sources

Overview of the data sources used for the SotN Report.

Country	Data source	Content
England	Cancer registry (NCRD and RCRD)	Data on all aspects of the cancer registration including information from hospital pathology systems.
England	COSD	Cancer Outcomes and Servives dataset (COSD) items, are submitted routinely by service providers via multidisciplinary team (MDT) electronic data collection systems to the National Cancer Data Repository (NCDR) on a monthly basis.
England	SACT	Systemic Anti-Cancer Therapy (SACT) data contains information on chemotherapy dates, regimen(s) and dose(s).
England	RTDS	Radiotherapy dataset (RTDS) contains information on radiotherapy treatment including dates, prescription region and dose.
England	HES	Hospital Episode Statistics (HES) is the administrative database of all NHS hospital admissions in England; records were supplied by NHS Digital to NCRAS.
Wales	CaNISC	Cancer Network Information System Cymru (Canisc) contains data on all aspects of the cancer registration including investigations. (OLD SYSTEM)
Wales	CDF	Clinical Dataset Form (CDF) contains data on all aspects of the cancer registration including investigations (NEW SYSTEM)
Wales	PEDW	Patient Episode Database for Wales (PEDW) is the administrative database of all NHS hospital admissions in Wales.
Wales	RTH	Radiotherapy data (RTH) contains information on radiotherapy treatment.
England & Wales	ONS	Office for National Statistics (ONS) death data including date of death and cause of death.

Appendix 2: Charlson Comorbidity Index

Reference:

Armitage JN, van der Meulen JH. Identifying co-morbidity in surgical men using administrative data with the Royal College of Surgeons Charlson Score. Br J Surg 2010;97:772-81. doi https://doi.org/10.1002/bjs.6930

Pre-specified conditions included in the assignment of Charlson Comorbidity Index (CCI).

CCI Conditions
Myocardial infarction
Dementia
Diabetes mellitus
Metastatic solid tumour
Congestive cardiac failure
Chronic pulmonary disease
Hemiplegia or paraplegia
AIDS/HIV infection
Peripheral vascular disease
Rheumatological disease
Renal disease
Cerebrovascular disease
Liver disease
Any malignancy

Note: AIDS/HIV diagnoses cannot be identified in HES APC data because of legal requirements for NHS trusts to remove patient identifiers from legally restricted records, including those containing diagnoses of HIV/AIDS. These diagnoses are also not found in linked PEDW data.

Appendix 3: Coding for emergency readmissions

Performance indicator 5: *Proportion of men who had an emergency readmission within 90 days of radical prostate cancer surgery (presented at the level of the surgery centre).*

Men are coded as having an emergency readmission if:

- they were readmitted between 1 and 90 days since discharge following radical prostatectomy
- they have an "admimeth" code starting with a “2” indicating emergency admission, as shown below (from the HES data dictionary)
- an overnight stay is not required to qualify as readmission

Emergency Admission, when admission is unpredictable and at short notice because of clinical need:
21 = Accident and emergency or dental casualty department of the Health Care Provider
22 = General Practitioner: after a request for immediate admission has been made direct to a Hospital Provider, i.e. not through a Bed bureau, by a General Practitioner: or deputy
23 = Bed bureau
24 = Consultant Clinic, of this or another Health Care Provider
25 = Admission via Mental Health Crisis Resolution Team (available from 2013/14)
2A = Accident and Emergency Department of another provider where the patient had not been admitted (available from 2013/14)
2B = Transfer of an admitted patient from another Hospital Provider in an emergency (available from 2013/14)
2C = Baby born at home as intended (available from 2013/14)
2D = Other emergency admission (available from 2013/14)
28 = Other means, examples are: - Admitted from the Accident and Emergency Department of another provider where they had not been admitted - Transfer of an admitted patient from another Hospital Provider in an emergency

Appendix 4: Coding for genitourinary complications

Performance indicator 6: *Proportion of men experiencing at least one genitourinary (GU) complication requiring a procedural/surgical intervention within 2 years of radical prostatectomy (presented at the level of the surgical centre).*

Men are coded as having a genitourinary complication if:

- they had a radical prostatectomy between 1 September 2021 and 31 August 2022
- they had not had radical radiotherapy
- they do not have a record of bladder cancer
- they have a record of one of the following OPCS-4 procedure codes

Men who are both diagnosed and treated between 1 September 2021 and 31 August 2022 are included in this indicator for England, and all those treated between 1 September 2021 and 31 August 2022 are included for Wales.

OPCS-4 Procedure Code and Definition	
M444	Endoscopic removal of blood clot from bladder
M448-9	Other specified/unspecified other therapeutic endoscopic operations on bladder
M455	Diagnostic endoscopic examination of bladder using rigid cystoscope
M458-9	Other specified/unspecified diagnostic endoscopic examination of bladder
M471	Urethral irrigation of bladder
M478-9	Other specified/unspecified urethral catheterisation of bladder
M481	Suprapubic aspiration of bladder
M512	Endoscopic suspension of neck of bladder
M642	Implantation of artificial urinary sphincter into outlet of male bladder
M643	Insertion of prosthetic collar around outlet of male bladder
M646	Reconstruction of neck of male bladder NEC
M648-9	Other specified/unspecified other open operations on outlet of male bladder
M651-5,8-9	Endoscopic resection of prostate/outlet of male bladder
M662	Endoscopic incision of outlet of male bladder NEC
M668-9	Other specified/unspecified other therapeutic endoscopic operations on outlet of male bladder
M679	Unspecified other therapeutic endoscopic operations on prostate
M763	Optical urethrotomy
M764	Endoscopic dilation of urethra
M768-9	Other specified/unspecified therapeutic endoscopic operations on urethra
M792	Dilation of urethra NEC
M793	Calibration of urethra

M794	Internal urethrotomy NEC

Appendix 5: Coding for gastrointestinal complications

Performance indicator 7: *Proportion of men receiving a procedure of the large bowel and a diagnosis indicating radiation toxicity (gastrointestinal (GI) complication) up to 2 years following radical prostate radiotherapy (presented at the level of the radiotherapy centre).*

Men are coded as having a gastrointestinal complication if:

- they had a radical radiotherapy between 1 September 2021 and 31 August 2022
- they had not had radical prostatectomy
- they had not had additional brachytherapy
- they do not have a record of bladder cancer
- they have a record of one of the following OPCS-4 procedure or OCD-10 diagnosis codes

Men who are both diagnosed and treated between 1 September 2021 and 31 August 2022 are included in this indicator for England, and all those treated between 1 September 2021 and 31 August 2022 are included for Wales.

OPCS-4 Procedure Code and Definition	
H201-4,H206,H208-9,H212,H221, H228-9	Endoscopy of colon
H231-6,H238-9,H242,H248-9,H251,H258-9	Sigmoidoscopy of lower bowel
H261-9,H271,H279,H281,H288-9	Sigmoidoscopy of sigmoid colon
H541	Anorectal stretch
H564	Excision of anal fissure
H626	Proctoscopy
M372	Repair of vesicocolic fistula
M375	Repair of fistula of bladder NEC
ICD-10 Diagnosis Code and Definition	
K520	Gastroenteritis and colitis due to radiation
K528-9	Other specified/unspecified noninfective gastroenteritis and colitis
K603-4	Anal/rectal fistula
K624-6	Stenosis/haemorrhage/ulcer of anus and rectum
K627	Radiation proctitis
K628-9	Other specified/unspecified disease of rectum and anus
K632	Intestinal fistula
N321	Vesicointestinal fistula

Appendix 6: Coding for genitourinary complications

Performance indicator 8: *Proportion of men experiencing at least one GU complication requiring a procedural/surgical intervention within 2 years of radical prostate radiotherapy (presented at the level of the radiotherapy centre).*

Men are coded as having a genitourinary complication if:

- they had a radical radiotherapy between 1 September 2021 and 31 August 2022
- they had not had radical prostatectomy
- they do not have a record of bladder cancer
- they have a record of one of the following OPCS-4 procedure codes

Men who are both diagnosed and treated between 1 September 2021 and 31 August 2022 are included in this indicator for England, and all those treated between 1 September 2021 and 31 August 2022 are included for Wales.

OPCS-4 Procedure Code and Definition	
M444	Endoscopic removal of blood clot from bladder
M448-9	Other specified/unspecified other therapeutic endoscopic operations on bladder
M455	Diagnostic endoscopic examination of bladder using rigid cystoscope
M458-9	Other specified/unspecified diagnostic endoscopic examination of bladder
M471	Urethral irrigation of bladder
M478-9	Other specified/unspecified urethral catheterisation of bladder
M481	Suprapubic aspiration of bladder
M512	Endoscopic suspension of neck of bladder
M642	Implantation of artificial urinary sphincter into outlet of male bladder
M643	Insertion of prosthetic collar around outlet of male bladder
M646	Reconstruction of neck of male bladder NEC
M648-9	Other specified/unspecified other open operations on outlet of male bladder
M651-5,8-9	Endoscopic resection of prostate/outlet of male bladder
M662	Endoscopic incision of outlet of male bladder NEC
M668-9	Other specified/unspecified other therapeutic endoscopic operations on outlet of male bladder
M679	Unspecified other therapeutic endoscopic operations on prostate
M763	Optical urethrotomy
M764	Endoscopic dilation of urethra
M768-9	Other specified/unspecified therapeutic endoscopic operations on urethra
M792	Dilation of urethra NEC
M793	Calibration of urethra

M794	Internal urethrotomy NEC