Assessment and Treatment of Patients with Prostate cancer

These guidelines apply to non-trial patients. Patients on clinical trials will be treated in accordance with the clinical trial protocol.

CONTENTS:

Indications

NICE risk group	Criteria	CPG category	Criteria
Low-risk disease	Gleason score ≤ 6 *AND* PSA < 10 ng/ml *AND* stages T1-T2a	***1***	Gleason score 6 (Grade Group 1) *AND* PSA < 10 ng/ml *AND* stages T1-T2
Intermediate-risk disease	Gleason score 7 **OR** PSA 10-20 ng/ml **OR** Stage T2b	***2***	Gleason score 3 + 4 = 7 (Grade Group 2) **OR** PSA 10-20 ng/ml *AND* stages T1-T2
		3	Gleason score 3 + 4 = 7 (Grade Group 2) *AND* PSA 10-20 ng/ml *AND* stages T1-T2 **OR** Gleason score 4 + 3 = 7 (Grade Group 3) *AND* stages T1-T2
High-risk or locally advanced disease	Gleason score 8-10 **OR** PSA > 20 ng/ml **OR** Stage ≥T2c	***4***	***One* of:** Gleason score 8 (Grade Group 4) **OR** PSA > 20 ng/ml **OR** Stage T3
		5	**Any *combination* of:** Gleason score 8 (Grade Group 4), PSA > 20 ng/ml or Stage T3 **OR** Gleason score 9-10 (Grade Group 5) **OR** Stage T4

Footnote: PSA = prostate specific antigen; T = tumour stage

CPG = Cambridge Prognostic Groups

- Androgen deprivation therapy (ADT) with LHRH agonists is offered alongside radiotherapy. This may be given neoadjuvantly for approximately 3 months prior to radiotherapy or may require longer duration if awaiting improvement in lower urinary tract symptoms or high-risk disease. As per RCR 4th edition dose fractionation guidance, for patients treated with prostate-only RT and 6 months of ADT, radiotherapy should commence shortly after starting ADT; for extended-course ADT (>12 months) and prostate and pelvic nodal RT (PNRT), any neoadjuvant, concurrent and adjuvant sequencing can be used.
- Low risk disease (CPG1) - active surveillance is preferred choice.
- Intermediate risk disease (CPG2-3) – ADT for up to 6 months in total (no ADT can be considered for Gleason 3+4 cases)
- High risk disease (CPG 4-5) – ADT for up to 2-3 years in total (as tolerated)

Exclusion criteria / cautions

- Bilateral total hip replacement (relative)
- Previous pelvic radiotherapy
- Inflammatory bowel disease (relative)
- Urinary incontinence / significant bladder instability (relative)

Pre-treatment assessment

History and examination (including DRE, baseline assessment of urinary and bowel symptoms and potency) to be recorded. All co-morbidities to be documented.
Investigations:

- Appropriate prostate biopsy
- MRI prostate (includes pelvis/abdomen; preferably pre biopsy to minimise biopsy artefact confounding)

Staging CT / Bone scan / WBMRI for higher risk cases as per local MDT protocols FBC, PSA, U+E's, LFTS

- Urinary flow rate
- Any other investigation the clinical team considers necessary based on local practice.
- PSMA PET scan may be considered in high risk / very high-risk cases or following equivocal findings on standard staging investigations.
- Staging, histology, and initial PSA to be recorded.
- Rectal spacer: use of rectal spacer is centre dependant and outside the scope of this guideline. See NICE guideline IPG752 for more information.

Overview | Biodegradable spacer insertion to reduce rectal toxicity during radiotherapy for prostate cancer | Guidance | NICE

Consent

Adoption of the RCR National Prostate Radiotherapy Consent Forms is recommended (link)

RT Planning and Radiation Prescription

Organ at Risk Volume Definition

- Rectum — Outline the whole rectum from anal margin (or 1cm below PTV) to rectosigmoid junction.
- Bladder — Outline the whole bladder and contents.
- Bowel — Individual bowel loops (small bowel and colon) are outlined. on all slices up to 2cm above the upper limit of the PTV.
- Femoral heads — femoral heads outlined to the bottom of the curvature of their Heads
- Urethral bulb — Outline Penile Bulb (best seen on MRI)

Dose Homogeneity

Prescription Point - 100% to the median dose in PTV (ICRU 83)

98% of PTV	Minimum 95% dose –targeting achieving 98% dose
50% PTV	Between 99-101%
2% of PTV	Maximum 105% dose

N.B. If the above constraints cannot be achieved, ICRU criteria must be met.

Policy And Radiation Prescription

The clinician must either sign-off or approve treatment plan and associated documentation within the R&V system or protocolised planner.

Intact Prostate and Seminal Vesicles

Patients referred for prostate +/- seminal vesicle radiotherapy routinely treated using IMRT / VMAT.

Patient Positioning and Image Acquisition

- Patient positioned supine with immobilisation and CT scan as per departmental policy for urological malignancies.
- Scanning levels: Top of L3 to 5cm below ischial tuberosities.
- For rectal & bladder preparation, please follow local policy.
- Daily on-set imaging recommended where possible.
- Repeat scan if:
    - Rectal diameter is >4cm in AP direction.
    - The bladder is empty (as per local bladder filling practice)
- Consider fusing recent MRI prostate with CT planning scan to assist with volume delineation.

Radiotherapy Planning Volumes

Approaches include:

1) 2 dose levels as per PACE/Pivotal Boost trials:

Target Volume	Description
CTVp	Prostate only*
CTVpsv	Prostate + proximal 1cm of seminal vesicles
CTVsv	Prostate + proximal 2cm of seminal vesicles (or entire seminal vesicles at Consultant discretion).
SABR Fractionation Margins:	
PTVp	= CTVp + 4-5mm / 3-5mm posteriorly
PTVpsv	= CTVpsv + 3-5mm**
PTVsv	= CTVsv + 5-6mm***
Conventional Fractionation Margins:	
PTVpsv	= CTVpsv + 3-8mm**
PTVsv	= CTVsv + 6-8mm***

*CTVp = low risk patients as per PACE A only. These patients would not routinely be offered RT.
**Permissible range assuming fiducial markers used; minimum margin of 4mm if fiducials not used.
***Permissible range assuming fiducial markers used; minimum margin of 6mm if fiducials not used.

2) 3 dose levels as per CHHIP trial:

Two groups of patients will be defined:

1) Group 1 Low risk of seminal vesicle involvement
    a) clinical stages T1b/c or T2a/b and with PSA + ((Gleasons score -6) x10) <15

2) Group 2 Moderate or high risk of seminal vesicle involvement
    a) clinical stages T1b/c or T2a/b, and with PSA + ((Gleasons score -6) x10) >15
    b) T2c or T3a

Target Volume	Description
GTV	Prostate
CTV1	Prostate + base of SV (proximal 2cm) for group 1
	Prostate + entire SV for group 2
CTV2	Prostate only for groups 1 & 2a
	Prostate + base of SV for group 2b
CTV3	Prostate only for groups 1 & 2
PTV1	CTV1 + 1cm (may reduce posterior margin to 0.7cm)
PTV2	CTV2 + 0.5cm posterior & 1cm all other directions
PTV3	CTV3 + 0cm posterior & 0.5cm all other directions (may remove regions of overlap with rectum)

Dose Fractionation Schedules:

A) Low / more favourable intermediate Risk * (as per PACE (A/B) trial definition)

- T1c -T2c
- Gleason ≤ 3+4
- PSA (ng/mL) ≤ 20

Recommended Dose fractionation to PTVpsv:

- 36.25Gy in 5 fractions over 1-2 weeks (may be without ADT)
- 60 Gy in 20 fractions over 4 weeks (+/- 6months ADT)

B) More unfavourable intermediate risk

- T1c-T2c
- Gleason 4+3
- PSA (ng/mL) ≤ 20

Recommended Dose fractionation to PTVpsv:

- 60 Gy in 20 fractions over 4 weeks (usually with 6months ADT)

C) High / Very High Risk

Recommended Dose fractionation to PTVpsv & PTVsv:

- 60Gy in 20 fractions over 4 weeks (with ADT up to 2-3 years as appropriate)
  - 2 dose levels as per PIVOTAL BOOST trial: 60Gy to PTVpsv, 47Gy to PTVsv

OR

  - 3 dose levels as per CHHIP trial: 60Gy to PTV3, 54.7Gy to PTV2, 48Gy to PTV1
- Alternative: 74Gy in 37 fractions over 7.5 weeks (with ADT up to 2-3 years as appropriate)
  - 74Gy to PTVpsv; 64 - 66.6Gy to PTVsv

PACE RADIOTHERAPY PLANNING AND DELIVERY GUIDELINES

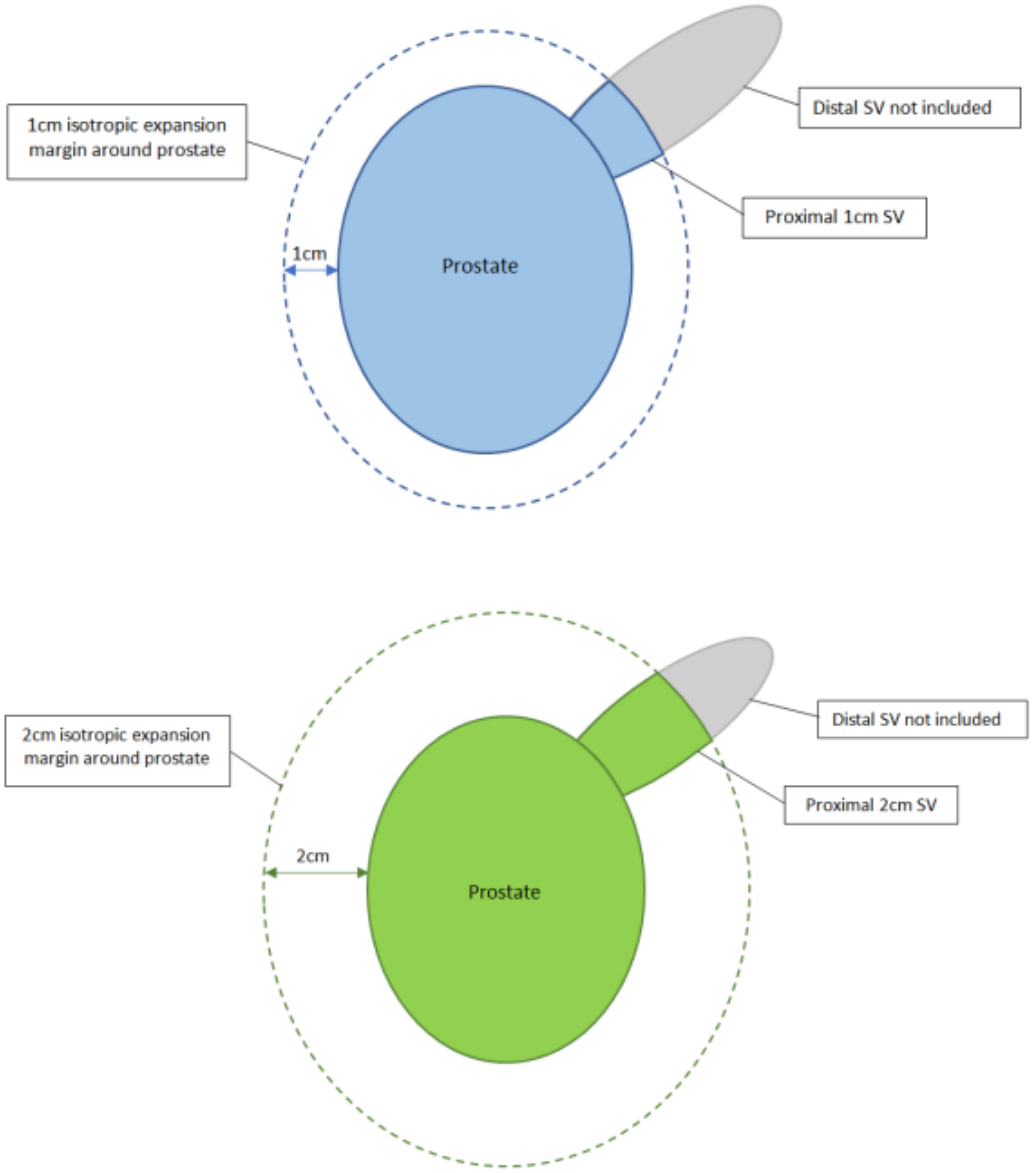


Figure 1. (a) Proximal 1 cm (for CTVpsv) and (b) Proximal 2 cm (for CTVsv) of Seminal Vesicles

Definition of Pelvic Lymph nodes

Indications

- If radiologically involved pelvic lymph nodes (N1 staging), then prostate and pelvic node radiotherapy should be offered with curative intent.
- If high risk of microscopic lymph node involvement may consider prophylactic pelvic lymph node radiotherapy

Dose and fractionation

Elective

• 44–47 Gy in 20 fractions over 4 weeks (Grade D)
• 46 Gy in 23 fractions over 4.5 weeks (Grade A)

Involved Lymph node

- may boost involved lymph node to 51Gy in 20 fractions if OAR doses allow.

- may boost involved lymph node up to 60Gy in 37 fractions if OAR doses allow.

Dose/fractionation regimes recommended by the Royal College of Radiologists (RCR Guidelines) but not listed within local protocols may be used with no requirement to raise a dose concession. Regimes listed either within local protocols or RCR Guidelines may also be used to treat disease of an alternative diagnosis contained within the relevant treatment site where the tumour site is not fixed.

https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfco193_radiotherapy_dose_fractionation_third-edition-prostate-cancer_0.pdf

Target Volume definition

CTV eLN (Elective Pelvic Lymph Node) - outlining as per RTOG guidelines & Pivotal Boost guidelines

- Clinician discretion regarding the extent of common iliac nodal region inclusion.
- External & internal iliacs
- Obturator
- Pre-sacral to lower border of S3 determined on sagittal CT slice
- Para-aortic Lymph nodes. This is non-standard – If involved para-aortic lymph nodes the treatment field can be extended up to the superior border of L2 - please see PEARLS trial.
- The CTV should be extended to include adjacent visible or suspicious lymph nodes, lymphoceles, and pertinent surgical clips.

PTV eLN = CTV LN +5-7mm growth in all directions (PTV however is per departmental practice)

CTV LN Boost (to radiologically or clinically involved lymph node)

- Outline the involved lymph node based on radiological and clinical findings.
- Consider for residual nodes >3mm. CTVnb= GTVnb+3-5mm, and CTVn will need to be amended to ensure CTVnb is encompassed by CTVn.

PTV LN Boost

- CTV LN boost + up to 5mm in all directions

CRITICAL ORGANS AND TOLERANCE DOSES

Prescribed dose	74Gy[1]			60Gy[2]		
OAR	**D (Gy)**	**Optimal**	**Mandatory**	**D (Gy)**	**Optimal**	**Mandatory**
Rectum	30	80%	-	24	70%	80%
	40	65%	-	32	51%	65%
	50	50%	60%	40	38%	50%
	60	35%	50%	48	27%	35%
	65	-	30%	52	-	30%
	70	-	15%	56	-	15%
	74	3%	5%	60	3%	5%
				64	0%	1%
				Dmean ≤35Gy (Optimal Constraint)		
Bladder	50	50%	-	40	50%	-
	60	25%	-	48	25%	50%
	65	-	50%	60	5%	35%
	70	5%	35%			
Bowel	45	78cc	158cc	36	78cc	158cc
	50	17cc	110cc	40	17cc	70cc
	55	14cc	28cc	44	14cc	28cc
	60	0.5cc	6cc	48	0.5cc	6cc
	65	0cc	0cc	52	0cc	0cc
Penile Bulb				22	50%	-
				48	10%	-
Fem head	50	5%	25%	40	5%	50%

1. Dose constraints for 74Gy/37# as per PIVOTAL trial protocol.
2. Dose constraints for 60Gy/20# as per PIVOTAL BOOST/PACE trial protocols.

Prescribed dose	36.25Gy[1]		
OAR	**D (Gy)**	**Optimal**	**Mandatory**
Rectum	18.1	-	50%
	29	-	20%
	36	1cc	2cc
Bladder	18.1	-	40%
	37	5cc	10cc
Bowel	18.1	-	5cc
	30	-	1cc
Penile Bulb	29.5	50%	-
Fem Heads*	14.5	5%	-
Urethra**	42	50%	-
	45	<0.001cc	-

*Report the larger calculated volume only
**Report if visualised

Rules for Target Volume modification if Organs at risk dose constraints not met:

Rectum: Review target volume, check PTV60 not overlapping rectum and that in sagittal plane only overlaps rectum by 5mm**.** Modify target volume if seminal vesicle wraps around rectum (e.g. include proximal 1-2cm)

If despite the above, rectal constraints are not met patient should be managed according to clinical judgement.

Bladder: Likely due to poor bladder fill – consider re-scan with appropriate patient instruction.

Femoral head: New plan to be prepared.

Bowel: If bowel dose exceeded is likely due to a fixed bowel loop in the pelvis – discuss with consultant involved.

Urethral bulb: Constraints for guidance only. Prostate volumes are not to be compromised.

POST HDR Brachytherapy Boost

Following a 15Gy HDR brachytherapy boost.

Patient selection:
Intermediate or high-risk prostate cancer groups as outlined above.

Good urinary flow rates – average voiding flow rate approximately10ml/sec or more – without marked lower urinary tract symptoms or significant post-voiding residual.

Image acquisition:
As above (but usually do not require microlax enema due to the effect of HDR brachytherapy)

Target Volume:
CTV = Prostate + Seminal vesicles (proximal 2 cm)
PTV = CTV + 1cm, with 7mm posterior margin

Radiotherapy Dose:

- 37.5 Gy in 15 fractions (prostate only) over 3 weeks before or after 15 Gy HDR brachytherapy boost (Grade A)
- 46 Gy in 23 fractions (prostate and pelvic nodes) over 4.5 weeks followed by 15 Gy HDR or 115 Gy LDR brachytherapy boost (Grade A)
- For nodal treatment, see section Intact Prostate and Seminal Vesicles
-

Technique: VMAT / Inverse planned IMRT

Energy: 6-10MV photons

CRITICAL ORGANS AND TOLERANCE DOSES

Prescribed dose	37.5Gy[1]	
OAR	D (Gy)	Max Vol (%)
Rectum	15.2	80%
	20.3	70%
	25.3	60%
	30.4	50%
	32.9	30%
	35.5	15%
	37.5	3%
Bladder	25.3	50%
	30.4	25%
	37.5	5%
Bowel	22.8	78cc
	25.3	17cc
	27.9	14cc
	30.4	1cc*
	32.9	0cc
Fem head	25.3	50%

1. Constraints scaled from CHHIP trial protocol.

POST Radical Prostatectomy

Patient Selection Criteria:

- Post radical prostatectomy –following biochemical failure.
- Prostate adenocarcinoma
- 4-6 week Post-operative PSA consistent reading >0.2 mcg/L

- PSA relapse following post-operative surveillance.
    - Biochemical failure = either 2 consecutive rises and PSA > 0.1mcg/L or 3 consecutive rising PSA levels
    - Consider PET scan (PSMA if PSA >0.2ng/mL) and MRI pelvis if recurrence seen on PET
- Aim to treat before PSA= 0.5ng/ml

Image Acquisition:

- Patient positioned supine with immobilisation and CT scan as per local departmental policy for urological malignancies.
- Consider iv contrast if pelvic node irradiation also planned.
- Bladder and Rectum filling - as per prostate radiotherapy policy.
- Scanning levels:
    - Bottom of L5 (top of SIJ's) to 1.5cm below ischial tuberosities.
    - unless considering IMRT and/or pelvic node irradiation where levels extended to top of L3 and 5cm below ischial tuberosities
- Re-scan when diameter of rectum is 3.5 – 5 cm or more or if the bladder is empty.

Target Volumes:

- CTV includes prostate bed for all patients.
- Pelvic node irradiation is at clinician's discretion.
- Information required to define CTV includes:
    - Histological report including prostate size and tumour extent to resection margins.
    - Pre-operative MRI/CT imaging
    - Post-operative MRI if performed to confirm local recurrence.
    - Anatomy on post-operative planning CT

CTV Prostate Bed:

- Based on estimated location of the pre-operative prostate volume, sites of possible microscopic tumour extension and extent of surgical bed
- Includes any surgical clips provided OAR constraints satisfied.
- Original volume of seminal vesicles (including any remnant tissue) only considered target if.
    - pathologically involved.
    - predictive risk of seminal vesicle involvement is > or =15% using the Roach formula

CTV prostate Bed	Inf border	5mm cranial to superior border of penile bulb
	Ant border	Caudal (<2cm above anastamosis): posterior aspect of symphysis pubis Cranial (>2cm above anastamosis): posterior 1/3 bladder wall Except if IMRT: posterior 1-2cm bladder wall

		RTOG consensus guidelines: Int J Radiat Oncol Biol Phys. 2010 Feb 1;76(2):361-8.doi: 10.1016/j.ijrobp.2009.02.006.Epub 2009 Apr 23.
	Post border	Anterior rectal wall
	Lat border	Medial border obturator internus and levator ani muscles
	Sup border	Low risk SV not pathologically involved: base of seminal vesicles. High risk SV or pathologically involved: tips of seminal vesicles. If seminal vesicles absent – sup border determined with reference to estimated position of pre-operative seminal vesicle using longitudinal dimension superiorly from urogenital diaphragm to reflect pre-operative size of prostate, together with position of surgical clips.
PTV Prostate bed	CTV Prostate bed + 10mm all directions (6-8mm posterior margin)	
CTV nodes	At consultant's discretion - as per section: Intact prostate and Seminal Vesicles	
PTV nodes	Include at consultant's discretion - as per section: Intact prostate and Seminal Vesicles	

CRITICAL ORGANS AND TOLERANCE DOSES

Prescribed dose	66Gy			52.5Gy or 55Gy		
OAR	**D (Gy)**	**Optimal**	**Mandatory**	**D (Gy)**	**Optimal**	**Mandatory**
Rectum	30	80%	-	25	80%	-
	40	65%	-	33	65%	-
	50	50%	60%	42	50%	60%
	60	35%	50%	50	35%	50%
	65	-	30%	54	-	30%
	70	-	15%	58	-	15%
	74	3%	5%	-	-	-
Bladder	50	50%	-	42	50%	-
	60	25%	-	50	25%	-
	65	-	50%	54		50%
	70	5%	35%	58	5%	35%
Bowel	45	78cc	158cc	38	78cc	158cc
	50	17cc	110cc	42	17cc	110cc
	55	14cc	28cc	46	14cc	28cc
	60	0.5cc	6cc	50	0.5cc	6cc
	65	0cc	0cc	54	0cc	0cc
Penile Bulb	50	50%	-	42	50%	-
	60	10%	-	50	10%	-
Fem head	50	5%	25%	42	5%	25%

OAR Constraints as per POPS trial.

1. Radiotherapy Planning

Technique: VMAT

Energy: 6MV photons

Dose requirements:

PTV Prostate bed = PTV66Gy:

Prescription: 66Gy in 33# (prescribed to mean dose of PTV66) over 6.5 weeks
55Gy in 20# over 4 weeks (as per POPS trial)
52.4-52.5Gy in 20# over 4 weeks

PROSTATE BED AND PELVIC NODES

Technique: VMAT / Inverse planned IMRT

Energy: 6MV photons

Radiotherapy Dose:

Prescription: **1)** 66Gy in 33# prescribed to mean dose of PTV66, 2Gy per fraction over 6.5 weeks

PTV66: 66Gy in 33# over 6.5 weeks (Prostate Bed)
PTV50: 50Gy in 33# over 6.5 weeks (Nodal PTV)

2) 55Gy in 20# over 4 weeks (Prostate bed)
44Gy in 20# over 4 weeks (Nodal PTV)

If Involved Lymph node, please follow guidance as above

- Deviation from these intended dose levels may be required e.g. to account for OAR DVH and will be made at clinicians' discretion.
- Minimum and maximum (area of at least 2cm^2) dose within the PTV will be 95% and 105%, respectively. Hot spots outside the PTV not to exceed 105%.
- Optimisation to reduce the volume of OAR getting the intermediate to high doses to as low as possible.
    - No dose >105% to any OAR
    - No hotspots (>103%) to occur in small bowel.
- All fields treated daily with full bladder and empty rectum in accordance to bladder and bowel preparation.

Dose/fractionation regimes recommended by the Royal College of Radiologists (RCR Guidelines) but not listed within local protocols may be used with no requirement to raise a dose concession. Regimes listed either within local protocols or RCR Guidelines may also be used to treat disease of an alternative diagnosis contained within the relevant treatment site where the tumour site is not fixed.

Reference

Royal College of Radiologists Evidence-based indications for the use of PET-CT in the United Kingdom 2022

https://www.rcr.ac.uk/system/files/publication/field_publication_files/evidence-based_indications_for_the_use_of_pet-ct_in_the_united_kingdom_2022.pdf

Special scenario

Matching pelvic field radiotherapy to previous prostate or prostate bed radiotherapy field for lymph node recurrence

As per standard arm (arm 3) of the POINTER C trial

Dose
PTV - elective nodal irradiation 44Gy in 20 fractions
PTV – involved lymph node 54Gy in 20 fractions

Gross Tumour Volume

Gross Tumour Volume node (GTVn) is defined as the macroscopically-involved pelvic lymph node(s) identified on the planning CT scan with reference to the diagnostic PET-CT scan or appropriate imaging. Where more than one macroscopically-involved pelvic node is present, these will be numbered GTVn_1, GTVn_2, and GTVn_3, as applicable.

Clinical Target Volume node (involved)

Clinical Target Volume node (CTVn) is defined as a 0-3 mm isometric expansion of GTVn. Where more than one macroscopically-involved pelvic node is present, CTVs will be numbered CTVn_1, CTVn_2, and CTVn_3, as applicable.

Clinical Target Volume pelvic nodal volume

For elective nodal irradiation (ENI) only, CTV pelvic nodal volume (CTVpelv) will include the common iliac (from the L4/5 vertebral interspace or aortic bifurcation, whichever is higher), internal iliac, external iliac (to superior aspect of femoral head), obturator and pre-sacral (from S1-3) nodal regions.
CTVpelv will be delineated as per the PEARLS trial RT guidelines for elective pelvic lymph node volume contouring, with modification of the caudal border [6].
Where GTVn is at/ close to the level of the aortic bifurcation, CTVpelv will be extended if required to ensure that it extends a minimum of 0.5 cm cranial to the superior aspect of GTVn.

Planning Target Volume node

Planning Target Volumes (PTV) will be delineated and reported in line with ICRU 83 and ICRU 91, where applicable [1, 2]. PTV node (PTVn) is defined as a 5 mm isometric expansion of CTVn.
Where more than one macroscopically-involved pelvic node is present, PTVn_1, 2 and 3 will be combined into a single PTVn. The name of PTVn includes the target dose in cGy (see **Table 1**).

Planning Target Volume pelvic nodal volume

For ENI only, PTV pelvic nodal volume (PTVpelv) is defined as a 5 mm isometric expansion of CTVpelv. Each PTV naming includes the target dose in cGy (see **Table 1**).
A 1 cm gap craniocaudally will be left between the caudal aspect of PTVpelv and the cranial aspect of the PTV from the previously delivered prostate/ prostatic fossa RT treatment (see **Figure 2)**.
This is best achieved by ensuring that the most caudal slice of **CTVpelv** is positioned 1.5 cm cranial to the superior aspect of the previous PTV.

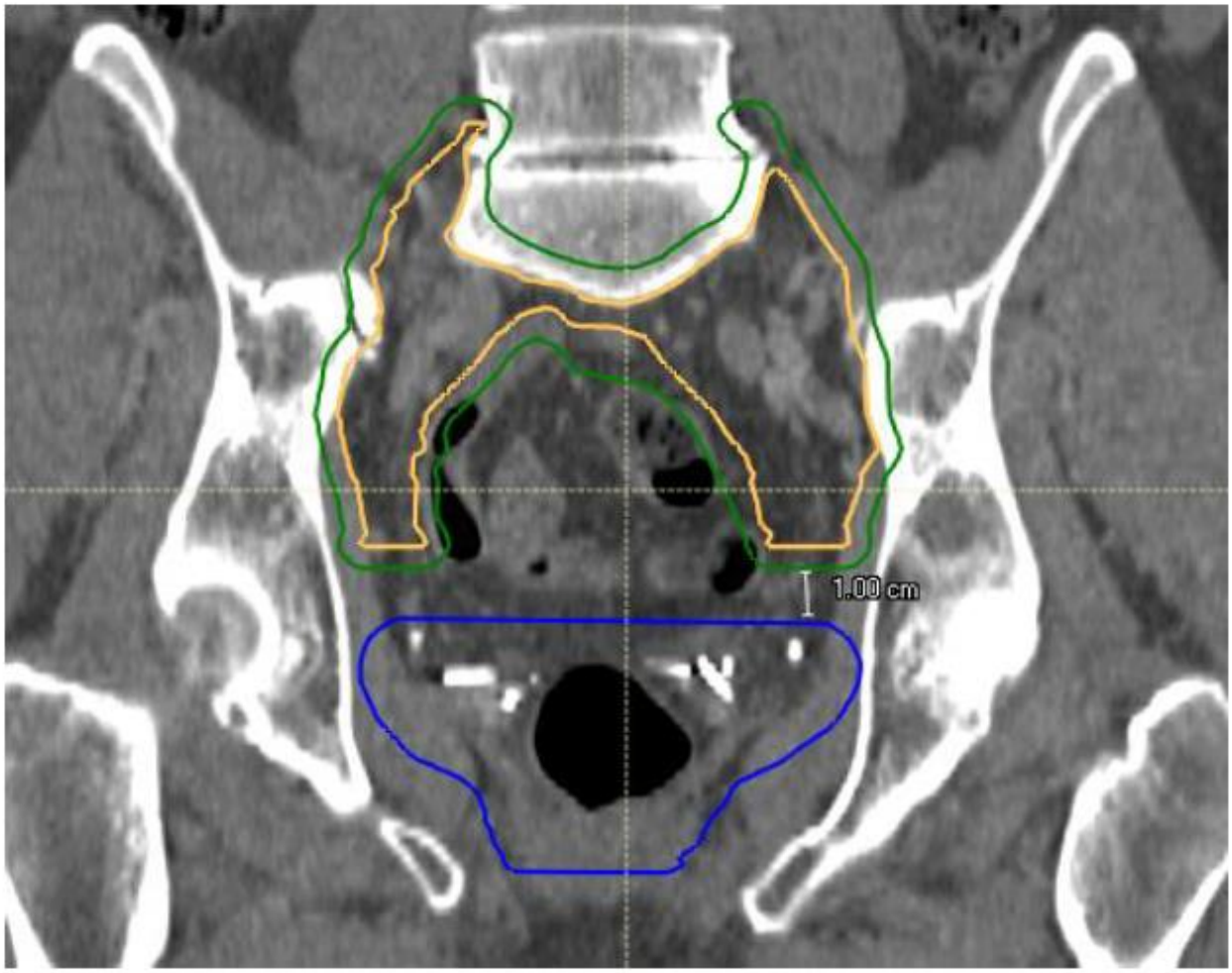
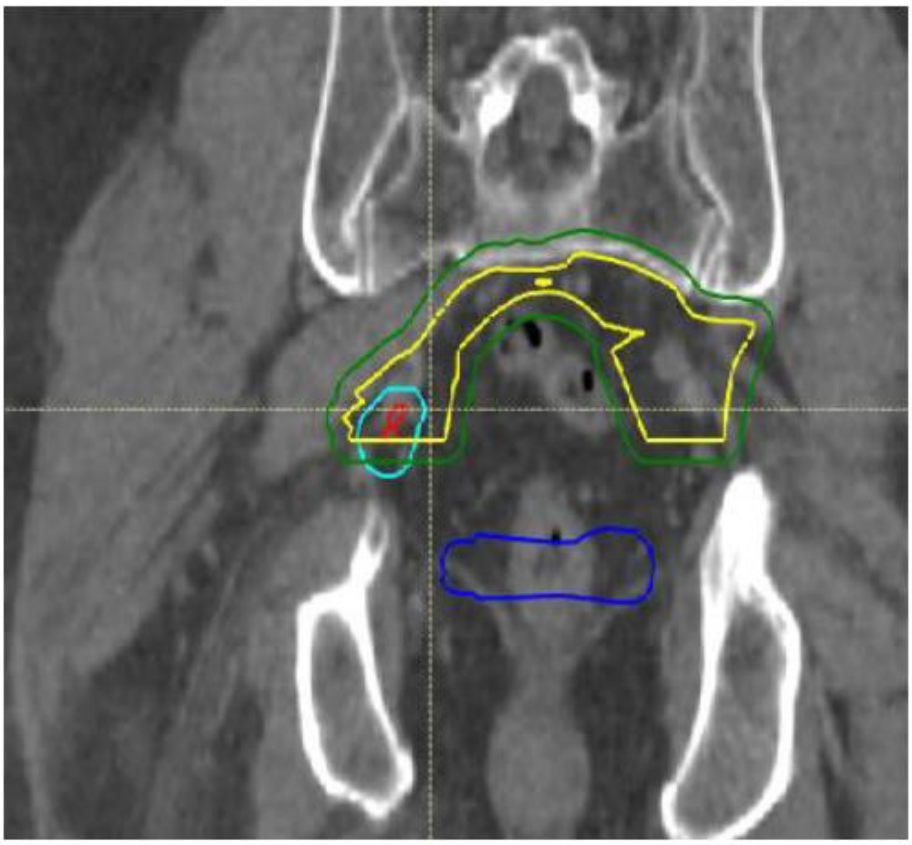


Figure 2: Coronal planning CT image demonstrating the previous prostatic fossa PTV (blue) and the Pointer-PC CTVpelv (yellow) and PTVpelv (green). A 1 cm gap between the caudal aspect of PTVpelv and cranial aspect of the previous prostatic fossa PTV is shown.



IRAS:
REC:
ISRCTN:

Figure 3: Coronal planning CT images showing previous prostatic fossa RT PTV (dark blue) and Pointer-PC GTVn (red), PTVn (light blue), CTVpelv (yellow) and PTVpelv (green). PTVn extends into the 1 cm gap between the caudal aspect of PTVpelv and the cranial aspect of the previous prostatic fossa RT PTV but remains in continuation with PTVpelv

Table 1: Target volume dose fractionation schedules, nomenclature and margins for SBRT, ENI-5 and ENI-20

	Treatment			
Structure	***Arm A: SBRT***	***Arm B: ENI-5***	***Arm C: ENI-20***	***Margins***
GTV involved node(s)	GTVn (GTVn_1, 2, 3, as applicable)	GTVn (GTVn_1, 2, 3, as applicable)	GTVn (GTVn_1, 2, 3, as applicable)	-
CTV involved node(s)	CTVn (CTVn_1, 2, 3, as applicable)	CTVn (CTVn_1, 2, 3, as applicable)	CTVn (CTVn_1, 2, 3, as applicable)	GTVn + 0 mm
CTV pelvic nodal volume (ENI only)	-	CTVpelv	CTVpelv	-
PTV involved node(s)	PTVn_3000 (or 3500 or 4000)*#	PTVn_3000 (or 3500 or 4000)*#	PTVn_5400*#	CTVn + 5 mm
PTV pelvic nodal volume (ENI only)	-	PTVpelv_2500*	PTVpelv_4400*	CTVpelv + 5 mm

*PTVn target dose in cGy to reflect the target dose used

Where more than one macroscopically-involved pelvic node is present, PTVn_1, 2 and 3 will be combined into a single PTVn.

Oligometastatic disease

- If patient has a low metastatic burden, consider radiotherapy for a 8% overall survival benefit at 3years (81% vs 73%).

- Low metastatic burden defined on conventional imaging as
  - 4 or fewer bone metastasis
  - No visceral metastases
  - Any amount of lymph node metastases are allowed.

- Consider for local control in patients where either patient or disease factors make standard radical therapy not appropriate.
- Image acquisition – as per IMRT prostate +/- seminal vesicles protocol except scanning levels from bottom L5 (top of SIJ's) to 1.5cm below ischial tuberosities.
- Require conformal plan with DVH assessment for OAR (bladder, rectum, and femoral heads - delineated as per IMRT prostate =/- seminal vesicles)
- Bladder and bowel preparation required (bladder filling and empty rectum)

- Target volume: CTV = Prostate
  May include base of seminal vesicles if macroscopically involved.
  PTV = CTV + 0.6-0.8 cm posteriorly; 1cm all other directions
  Deviation from proposed volumes may occur at clinician's discretion e.g to account for normal tissue tolerances.
  - Dose 36Gy in 6 fractions, one fraction a week, over 6 weeks.
    55Gy in 20 daily fractions over 4 weeks
    60Gy in 20 daily fractions over 4 weeks

OAR Constraints:

	55Gy/20#	**36Gy/6#**	**Max vol (%)**
Rectum	52Gy	33Gy	50%
	43Gy	27Gy	60%
	26Gy	16Gy	80%
Bladder	43.5Gy	27.8Gy	50%
	52.2Gy	33.3Gy	25%

As per STAMPEDE protocol

- Portal imaging as per departmental protocol; IGRT as per clinician preference

Dose/fractionation regimes recommended by the Royal College of Radiologists (RCR Guidelines) but not listed within local protocols may be used with no requirement to raise a dose concession. Regimes listed either within local protocols or RCR Guidelines may also be used to treat disease of an alternative diagnosis contained within the relevant treatment site where the tumour site is not fixed.

PALLIATIVE TREATMENT FOR SYMPTOMATIC CONTROL

Indication
For control of prostate related symptoms such as bleeding, pain, pressure symptoms.

Target Volume
Prostate and visible tissue on imaging or clinical examination
Margins as per clinical judgement for palliation

Dose (as per RCR dose fractionation)
Recommended palliative RT schedules High-risk localised disease, unsuitable for longer-course fractionation and hormone sensitive disease with low metastatic burden:

• 55–60 Gy in 20 fractions over 4 weeks (Grade A)
• 30–36 Gy in 6 fractions over 6 weeks (Grade A)

Castration-resistant disease with local progression and/or symptoms:

• 21 Gy in 3 fractions, alternate days over 1 week (Grade D)
• 20 Gy in 5 fractions over 1 week (Grade D)
• 30 Gy in 10 fractions over 2 weeks (Grade D)
• 8–10 Gy single dose (Grade D)

Dose/fractionation regimes recommended by the Royal College of Radiologists (RCR Guidelines) but not listed within local protocols may be used with no requirement to raise a dose concession. Regimes listed either within local protocols or RCR Guidelines may also be used to treat disease of an alternative diagnosis contained within the relevant treatment site where the tumour site is not fixed.

MANAGEMENT OF GYNAECOMASTIA (BREAST BUDS)

Prior to entering a patient into a clinical trial or research, ethical approval is gained. This protocol may then not necessarily be followed.

1 **Introduction**

Breast bud irradiation has been shown to reduce the incidence and severity of painful gynaecomastia in patients prescribed diethylstilbestrol and bicalutamide (casodex).

2 **Indication for treatment**

All patients who are to be prescribed diethylstilbestrol or bicalutamide (other than short term neoadjuvant course) should be considered for prophylactic breast bud radiotherapy prior to starting their hormonal therapy.

3 **Treatment**

3.1. Patients are consented in accordance with local consent treatment protocol.

3.2. Patients are immobilised for localisation and treatment and will be supine.

3.3. The treatment field is centred on the nipple and is standardly a 10cm circle, which is marked on set by the treating radiographer.

3.4. The treatment maybe by electrons or orthovoltage, decided by the prescribing clinician.

3.5. If orthovoltage the energy chosen is usually 160kV unless the breast thickness is deemed to be greater than 1.5cm, when 220kV will be chosen.

3.6. If electrons are used, the energy chosen will treat the chest wall and skin to at least 90%, therefore bolus is usually required. (Generally, 12Mev with 1cm of bolus).

The dose is 8Gy single fraction, applied if orthovoltage, to 100% isodose if electrons.

References

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Document Approval

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Final Approval:	John McGrane, Consultant Clinical Oncologist
Initial Issue Date:	07/02/2025
Issue Date:	07/02/2025
Review Date:	07/02/2025 - Or Clinical Need
Version / Status:	**1.0** (Current)
Document Number:	

Document Cross Reference

Document Title:	Author:	Document No.	Issue Date:

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Amendments and Notes

Version:	Date:	Author:	Checked by:	Summary of Changes:
1.0	07/02/ 2025	John McGrane	Task and Finish group	Initial issue into RQMS (specific folder)

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