West Midlands Radiotherapy ODN Clinical Guidance

On-Treatment Image Verification

Revision history

Version	Date	Summary of changes
0.1	October 2022	Initial draft by Gemma Allen
0.2	October 2022	Updated following comments from the protocol implementation group
0.3	December 2022	Updated following comments from the protocol implementation group
0.4	January 2023	Updated following comments from the protocol implementation group
0.5	February 2023	Updated following comments from the protocol implementation group
0.6	February 2023	Updated following Regional protocol change request for Upper GI/Pancreas. Change in document title.
0.7	24th February 2023	Updated following comments from L.Crowney
0.8	14th March 2023	Updated following comments re: on treatment imaging, breast boost and pancreatic section
0.8.1	21st March 2023	Formatting by G.Allen
0.8.2	28th March 2023	Formatting by G.Allen
0.8.2	14th April 2023	Submitted to EAG for Ratification
0.8.2	14th April 2023	Ratified at the EAG
1.0	24th May 2023	Clinical Lead names added. Guidance contributors: L.Crowney (WHAT), J.Walters(WHAT), M.Palmer (RWT), J.Kerr (RWT), M.Matthews(RWT), J.Hamer(SaTH), C.Reid (SaTH), L.Davis (UHNM),S.Jassal (UHNM), A.Forrest(UHCW), S.Melsom(UHB).Amendment to hydration under pelvis.
1.1	25th May	Amendment to 5# breast imaging following comments from S.Melson (UHB)
1.1.1	5th June	Formatting of pages 4&5.
Review Date:	April 2025	

Approved by

This document must be approved by the following people:

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Each department should have policies and processes in place to evaluate dose during therapy in case of anatomical change and/or significant weight loss. Where significant changes have occurred Dose Assessments and Urgent replanning will be required to ensure dose constraints are maintained.

Local protocols must be available describing action levels and concomitant patient imaging doses.

Instructions to be given prior to each EBRT treatment
PELVIS

Micro enemas /laxatives before each EBRT treatment according to local protocols

- Encourage to drink 2 litres in the week before EBRT starts
- Hydration as per local protocols or as per CT
- Pts reminded about fluid intake either by phone call/information leaflet/open evening session/clinic review session

Site	Patient Preparation	Position / immobilisation	Scan details
Prostate	• Empty rectum prior to treatment. • Micro enema and/or Movicol & Semiticone • Empty bladder 1 hour prior to treatment • Immediately after emptying bladder drink 300 -500mls of water • Water to be drunk at least 30mins prior to treatment • Full bladder is required for treatment. • Minimum bladder volume: 200mls (Consultants can authorise a lower volume based on clinical condition) • Maximum bladder volume: 400mls	Supine Combi fix or Kneefix & heel stocks	Daily imaging cone beam CT imaging as per local protocol
			Bladder scanning (ultrasound) – daily or as required to assess bladder volumes.
			KV imaging can be undertaken to assess rectal gas before taking a cone beam CT if required.
			Rectum/bowel to be assessed as per local tolerances.
			Bladder volume accepted depends on dose constraints.
			Nodal volumes assessed as per local protocol.
			Plan adapt can be used to assess doses
			Re-scan up to three times in one day if justified.
			Total number of scans needs to be considered.

Bladder	• Empty rectum prior to treatment • Consider the use of Micro enema and/or Movicol & Semiticone as preferred • Empty bladder (double void) before treatment	Supine Combi fix or Kneefix & heel stocks	Daily imaging cone beam CT imaging as per local protocol
			KV imaging can be undertaken to assess rectal gas before taking a cone beam CT if required.
			Rectum/bowel to be assessed as per local tolerances.
			Nodal volumes assessed as per local protocol.
			Plan adapt can be used to assess doses.
			Re-scan up to three times in one day if justified.
			Total number of scans needs to be considered.
Gynae Endo / Cx	• Empty rectum prior to EBRT • Micro enema and/or Movicol & Semiticone • Empty bladder1 hour prior to treatment • Immediately after emptying bladder drink 300 -500mls of water • Water to be drunk at least 30mins prior to treatment • Full bladder is required for treatment. • Minimum bladder volume: 200mls (Consultants can authorise a lower volume based on clinical condition) • Maximum bladder volume: 400mls	Supine Combi fix or Kneefix & heel stocks (Para-aortic nodes – wing board or arms up)	Daily imaging cone beam CT imaging as per local protocol
			KV imaging can be undertaken to assess rectal gas before taking a cone beam CT if required.
			Bladder scanning (ultrasound) – daily or as required to assess bladder volumes.
			Rectum/bowel to be assessed as per local tolerances.
			Nodal volumes assessed as per local protocol.
			Plan adapt can be used to assess doses.
			Re-scan up to three times in one day if justified.
			Total number of scans needs to be considered.

Anus	• 1 hour prior to treatment empty bladder. • Immediately after emptying bladder drink 300-500mls of water finishing within 30 minutes • Minimum bladder volume: 200mls (Consultants can authorise a lower volume based on clinical condition) • Maximum bladder volume: 400mls	Supine Combi fix or Kneefix & heel stocks Bolus: by consultant choice Anal verge and groins 1.0 – 1.5cm of bolus if visible skin infiltration. Prone (prone pillow/belly board) – if pt is unable to lie supine in a stable position	Daily imaging cone beam CT imaging as per local protocol KV imaging can be undertaken to assess rectal gas before taking a cone beam CT if required. Bladder scanning (ultrasound) – daily or as required to assess bladder volumes. Rectum/bowel to be assessed as per local tolerances. Nodal volumes assessed as per local protocol. Plan adapt can be used to assess doses. Re-scan up to three times in one day if justified. Total number of scans needs to be considered.
Colorectal	• 1 hour prior to EBRT or treatment empty bladder. • Immediately after emptying bladder drink 300 - 500mls of water finishing within 30mins • Minimum bladder volume: 200mls (Consultants can authorise a lower volume based on clinical condition) • Maximum bladder volume: 400mls **<u>Bladder filling is dependent on tumour location so it will be specified on set up information</u>**	Supine Combi fix or Kneefix & heel stocks Bolus: by consultant choice 1.0 -1.5cm of bolus if visible skin infiltration.	Nodal volumes assessed as per local protocol.

Instructions to be given prior to each treatment
Breast & Thorax

	Position / immobilisation	**Scan details**
BREAST	Majority of patients will be scanned • Supine • Breast boards, inclined 5-10' • Bolus (0.5 – 1cm thickness) <5mm skin margins. • Alternatives: • Vac bags can be used, particularly when treating IMC or regional nodal volumes • Orfit thermoplastics might be helpful in Large breasted patients • Some services may consider a prone technique, where equipment exists.	2D or MV-Standard tangential and standard 3 field following the NAL protocol VMAT – CBCT day one -three and then as required. 5# breasts – Minimum of imaging day 1&2 or daily if required CBCT/KV/MV IMC/VMAT/Sclav plans- CBCT daily or day one and then daily if required depending on local protocol or clinician preference Breast boosts -CBCT daily or as required/MV/KV Partial breast – Daily CBCT/MV/KV
	Left sided Tumour Left sided Breast and Supra clavicular nodes IMC volumes for both LT or RT sided tumours Right sided where left was previously treated in DIBH Bilateral treatment	Right sided Tumours Right sided Breast and Supra clavicular nodes

Instructions to be given prior to each treatment

Upper GI - Patients should be asked to fast for a minimum of 2 hours and then drink 200mls of liquid (water) 30 minutes prior to treatment.

Site	Patient Preparation	Position / immobilisation	Scan details
Upper GI **Oesophagus**	As Per CT. Patients should be asked to fast for 2 hours and then drink 200mls of liquid 30 minutes prior to CT planning *and* treatment in an attempt to reproduce the same anatomical position of the stomach due to filling throughout treatment. Variations to this procedure are permitted, particularly for patients with tumours of cervical, upper and middle 1/3 oesophagus where stomach preparation may have negligible benefit, but it is crucial the same stomach preparation procedure is followed before planning and treatment. Patients who have a nasogastric tube inserted and are unable to drink due to dysphagia should use their tube for this purpose.	**Cervical & Upper 1/3rd** Supine with arms down by their side with knee support and immobilisation using a 5 point shell or equivalent. **Middle 1/3, lower 1/3 and GOJ tumours** supine with arms above head on a wing board with knee support. Immobilisation with thermoplastic device or vacuum cushion as per local protocols.	Daily on line imaging performed using 3D cone beam CT or Tomotherapy MVCT as available Local protocols must be available describing action levels and concomitant patient imaging doses.
Pancreas	As Per CT	As Per CT	Virtual simple: On-line 2D imaging #1-3 then weekly if applicable Complex Conformal: On-line - Cone beam CT #1-3 then weekly or Daily on line imaging performed using 3D cone beam CT or Tomotherapy MVCT as available Local protocols must be available describing action levels and concomitant patient imaging doses.

Lung **(non SABR)**		Patients' supine arms up on a wing board and mattress. Vacbag can be used if required. Knee support for comfort. For patients that are unable to get their arms up patients can be scanned on a wing board and vacbag with arms by side. The vacbag is to support the shoulders. For lung apical tumours patients should be scanned in a thermoplastic shell with arms down.	Daily imaging cone beam CT imaging as per local protocol for 10# or more VMAT or Radical plans
Lung SABR		For lung SABR as above but the vac bag is not optional. For lung apical tumours patients should be scanned in a thermoplastic shell with arms down.	KV 2D bony match prior to CT as per department protocol depending on equipment. Daily imaging cone beam CT imaging as per local protocol. 4D scan as per department protocol. Midway and post scan as required. Day 0 3D or 4D scan as department protocol/ clinician preference.
Oligomets SABR			

Instructions to be given prior to treatment **H&N**			
Site	**Patient Preparation**	**Position / immobilisation**	**Scan details**
H&N	Consider denture/mouth bites/gum guards placement as per CT. PEG fitted prior to treatment if possible.	All patients will require a thermoplastic beam directional Shell (BDS) and mould care cushion or vacbag as required. Mouthbite/denture/mouth bites/gum guards placement as per CT. Bolus needs to be in-situ in at the time of treatment.	Complex IMRT planning: A minimum of on line CBCT fractions 1-3 then weekly with systematic error correction with Daily CBCT with on line correction as directed. For reduced CTV-PTV margins around critical structures, daily cone beam CT is recommended. Simple Virtual simulation treatments may be verified with 2D imaging, fractions 1-3 then weekly as directed locally. Each department should have policies and processes in place to evaluate dose during therapy in case of anatomical change and/or significant weight loss. Where significant changes have occurred Dose Assessments and Urgent replanning will be required to ensure dose constraints are maintained. Please refer to local tolerance levels. 6DOF – post KV pair on #1 to check 6FOD couch.

Instructions to be given prior to treatment
Primary CNS

Site	Patient Preparation	Position / immobilisation	Scan details
Primary CNS	Appropriate timing with chemotherapy as required per local protocol. Ensure any metal staples are removed prior to scan appointment.	Thermoplastic shell as per CT.	KV pair or 3DCT #1-3/5 with weekly KV or 3DCT weekly after week 1. Reduced PTV margins (e.g. 3mm) require sufficient on line imaging and immobilisation to prevent rotation of shoulders (e.g 9 point shell). For example, using 3D cone beam CT or Tomotherapy MVCT

Instructions to be given prior to treatment
Lymphoma

Site	Patient Preparation	Position / immobilisation	Scan details
ALL	See site specific information for patient preparation.	Patients to be treated in the supine position see site specific guidelines. Chin extended for neck and SCF sites in a thermoplastic shell.	Dependant on treatment site. See relevant treatment site for details.
Palliative	As per CT		Dependant on the treatment site, PTV margins and patient.

Instructions to be given prior to CT and prior to each treatment
Paediatric cases & Hepatobiliary

Site	Patient Preparation	Position / immobilisation	Scan details
Paediatric	Follow local protocol at UHB		
Hepatobiliary	Follow local protocol at UHB		