

Title of Document:	IR(ME)R procedure (F)
	Use and review of diagnostic reference levels
Directorate:	RADIOLOGY DIRECTORATE

Document type & number:	IRMER
Approval committee:	DIRECTORATE AND GOVERNANCE GROUP
Approval date:	14.05.2025
Issue date following approval/review/	30.05.2025
amendment :	
Review date:	14.05.2028
Version number:	V3
Key amendments:	Date:
Slight wording changes to ensure	
compliance with latest version of IR(ME)R	
(Amendments) 2024 Schedule 2	
Added paragraph "Review"	
Up to date DRL tables inserted. Hyperlink to	
latest Countywide Dose Compliance audit C	
Individuals involved in developing /	
reviewing / amending this document: (titles	
only)	
Radiation Protection Committee	24.03.2025
MPE/RPA	01.03.2025
RPS	11.02.2025
Key staff responsibilities	Post:
Responsible for the level at which LDRLs are	Radiology Clinical Services manager
set	
Provide review of patient dose against local	MPE
and national DRLs	
Ensure correct DRLs are displayed in the	RPS
control rooms	
Perform corrective action where required	Modality Lead Radiographers

In-line with Regulation 6 Schedule 2(f) requirements within IRMER (Amendment)2024, the purpose of this procedure for the use and review of such diagnostic reference levels and Dose reference levels as the employer may have established for radiodiagnostic examination falling within regulation 3 (a), (b), (e) and (f)

The procedure ensures that competitive local dose reference levels (LDRLs) are set and that staff work within these levels. The procedure will document LDRL review period and ensures regular corrective actions are undertaken.



"Diagnostic reference levels" (DRLs) means dose levels in medical radiodiagnostic or interventional radiology practices, or, in the case of radio-pharmaceuticals, levels of activity, for typical examinations for groups of standard-sized individuals or standard phantoms for broadly defined types of equipment.

It is important to note the definition of diagnostic reference levels refers to typical examinations for standard sized patients or phantoms for broadly defined types of equipment.

National DRLs (NDRLs) are set on the basis of wide scale surveys of the **third quartile doses representing typical practice for a patient group** at a range of representative healthcare facilities for a specific type of examination or procedure.

Local DRL's (LDRL's) should always be less than the corresponding NDRL for any given examination.

Practice

LDRLs set are documented in Appendix A. The available LDRLs are also displayed by the control panel in each room. It is the responsibility of the area lead and RPS's to ensure these are displayed appropriately.

LDRLs are set and reviewed annually by the MPE and RPS's.

Departmental examination protocols must indicate which examinations have an established DRL and give its value where this is available.

Any examination protocol should, if possible contain, a proposed appropriate LDRL in conjunction with the medical physics expert. Alternatively, please include a NDRL.

Examinations and equipment following standard protocols (such as standard radiographic procedures) will be assessed by data input from RIS with NDRLs.

Appropriate actions:

Doses recorded below the NDRL/LDRL can be documented within CRIS without any further actions.

Doses recorded above the NDRL/LDRL should be accompanied by a comment in CRIS in regards to patient habitus, weight or further reasoning to explain increased dose and its recognition. Any incidents where there is no accompanying reason for the increased dose should be flagged to the RPS/area superintendent for investigation.

Where there is a local diagnostic reference level (DRL), enforcing authorities have determined that a dose greater than or equal to 10 times the local DRL will help you to determine what incidents are notifiable to the CQC. This applies even when there has



been **no procedural failure**. These incidents must be reported via the incident reporting system DATIX immediately.

Periodic Monitoring

Routine patient dose audit will be completed by the MPE on an annual basis and measurements will be made at least annually on each piece of equipment or whenever changes are made to equipment or procedures that are likely to significantly affect patient dose.

This might be in terms of entrance surface dose, dose area product or screening time. The results will be compared against the local DRLs.

If periodic dose monitoring reveals room mean doses that exceed DRLs, these will be investigated by the Superintendent Radiographer and Radiation Protection Supervisor in collaboration with a Medical Physics Expert.

Annual report provided by Our Medical Physics Provider IRS copies of report on Radiology Team share point, Radiation Protection folder:

M:\Acute\Radiology\Radiation Protection and IR(ME)R\Medical physics\IRS REPORTS (MPE REPORTS)\IRS PATIENT DOSE AUDIT\Countywide

Corrective Action

Modality Lead Radiographers with the assistance of the RPS's and MPE must implement appropriate corrective action where mean doses significantly exceed LDRLs of excess doses are identified.

Review

LDRLs must be reviewed with regard to National and International DRLs. This should be carried out in collaboration with the MPE whenever a Patient Dose Audit Report is produced, or whenever any significant change to practice or equipment occurs.



Schedule 1- Local Diagnostic Reference Levels Date Range 01/01/2023 to 31/12/2023

Appendix A



Conventional Radiography

Examination Name	LDRL DAP (Gycm ²)	LDRL DAP (cGycm ²)
Abdomen AP	1.60	160
Cervical Spine AP	0.08	8
Cervical Spine LAT	0.10	10
Chest AP	0.06	6
Chest LAT	0.17	17
Chest PA	0.05	5
Lumbar Spine AP	0.93	93
Lumbar Spine LAT	1.32	132
Pelvis AP	1.25	125
Shoulder AP	0.10	10
Thoracic Spine AP	0.37	37
Thoracic Spine LAT	0.45	45
Knee AP	0.05	5
Knee LAT	0.06	6
Foot AP	0.01	1
Foot LAT	0.02	2
Pelvis LAT	0.68	68
Wrist AP	0.01	1
Wrist LAT	0.01	1
Hip AP	1.01	101
Hip LAT	1 .18	118
Ankle AP	0.02	2
Ankle LAT	0.02	2

Produced: 03-Apr-2024

Data Range: 01-Jan-2023 - 31-Dec-2023

Review by: 1 year

Data Prepared by: Jason Fazakerley



Fluoroscopy

Examination Name	LDRL DAP	LDRL DAP	LDRL ST
	(Gycm²)	(cGycm²)	(mins)
Barium Meal	2.59	259	0.20
Barium Swallow	3.95	395	0.09
Barium Swallow & Meal	6.61	661	0.19
Cardiac Angio PTCA	16.49	1649	10.93
Cystogram	2.74	274	0.12
EVAR	26.12	2612	18.30
Fluoro Abdomen	0.33	33	0.41
Fluoro guided nerve injection lumbar	0.82	82	0.30
Fluoro Hip	0.23	23	0.26
Fluoro Lower Limb	0.05	5	0.29
Fluoro Lumbar Spine	0.69	69	0.30
Fluoro Pelvis	0.10	10	0.08
Fluoro Upper Limb	0.01	1	0.20
Fluoroscopic guided embolisation	19.51	1951	23.26
Hysterosalpingogram	0.22	22	0.06
Nephrostogram	0.60	60	0.30
Oesophageal Stent Insertion	0.37	37	0.40
Orthopaedic pinning Hip	0.53	53	1.25
Orthopaedic Pinning Lower Limb	0.07	7	0.53
Orthopaedic Pinning Upper Limb	0.03	3	0.33
PICC Line Insertion	0.11	11	0.15
Tunnelled central venous line insertion	0.09	9	0.25
Ureteric stent antegrade	1.30	130	5.36
Video Swallow	1.30	130	2.88
Water Soluble Contrast Enema	3.64	364	0.15
Water Soluble Contrast Swallow	2.54	254	0.15

Produced: 03-Apr-2024
Data Range: 01-Jan-2023 - 31-Dec-2023
Review by: 1 year
Data Prenared by: Jason Fazakerley



Angiography/Interventional

Examination Name	LDRL DAP (Gycm ²)	LDRL DAP (cGycm²)	LDRL ST (mins)
Angio Antegrade Femoral	1.34	134	0.39
Angio Lower Limbs	3.37	337	2.16
Angioplasty Iliac	7.65	765	4.24
Angioplasty Infrapopliteal	3.68	368	5.20
Angioplasty Popliteal	2.15	215	4.29
Angioplasty Superficial Femora	3.37	337	5.49
Arterial Stent Iliac	7.30	730	4.27
Cardiac Angio coronaries	6.24	624	4.14
Cardiac Angio Coronary Stent	16.77	1677	10.93
Cardiac Angio grafts	11.94	1194	12.75
Cardiac Angio PTCA	16.49	1649	10.92
Cardiac Angio ventricle and Cor A	6.50	650	4.20
Cardiac defibrillator implant	0.13	13	3.08
Cardiac Permanent Pacemaker	0.37	37	2.72
Insertion			
Cardiac permanent pacemaker	0.20	20	2.29
revision			
Cardiac pressure wire and Cath	8.30	830	6.68
insertion			
Cardiac Pressure Wire and PCI	12.56	1256	9.90
Duodenal stent insertion	0.42	42	-
Embolisation Mesenteric Artery	14.24	1424	15.05
Enteric stent insertion	1.82	182	2.10
ERCP	2.18	218	2.03
Nephrostomy	0.50	50	0.40
Nephrostomy catheter exchange	0.58	58	0.17
Oesophageal dilatation	0.18	18	0.26
Percutaneous transhepatic	1.32	132	9.52
cholangiogram			
PICC Line Insertion	0.11	11	0.15
Primary PC Coronary Intervention	11.97	1197	9.85
PTA Graft	3.21	321	5.94
Radiologically inserted	0.26	26	0.47
gastrostomy			
Sialogram submandibular	0.22	22	0.29
fluoroscopy			
Stent graft iliac	26.07	2607	13.19



<u>CT</u>

Computed Tomography

Examination Name	LDRL DLP (mGycm)						
	ACT	ACT2	KCT	KCT2	WCT1	WCT2	WCT3
Abdomen and Pelvis	372	475	370	261	344	331	285
Abdomen and Pelvis with Contrast	316	360	348	339	288	318	300
Abdomen with Contrast	-	-	-	-	296	-	-
Adrenal with contrast Both	-	384	377	-	-	-	-
Angiogram Aortic Arch and Caroti	261	168	174	-	331	331	325
Angiogram Lower Limbs	458	-	488	426	317	480	468
Angiogram Upper Limbs	-	-	-	-	200	-	-
Angiogram intracranial- contrast	477	-	-	598	386	463	403
Angiogram renal and abdominal	450	480	419	395	424	490	472
Angiography for TAVI workup	357	-	-	-	461	-	-
Ankle	154	91	71	74	168	170	-
Aorta abdominal with contrast	-	488	228	215	156	202	-
Aorta thoracic with contrast	336	328	177	152	259	151	-
Aorta whole with contrast	264	714	259	254	280	287	312
Calcium Score	52	-	38	-	39	-	-
Cardiac Angiogram Coronary	232	-	158	-	123	-	-
Cervical Spine	246	164	-	-	176	202	262
Chest	108	170	90	97	144	132	118
Chest Abdomen Pelvis	387	376	384	422	277	363	319
Chest Abdomen Pelvis with Contrast	367	534	464	488	362	406	392
Chest HR Axial	120	213	154	156	141	143	123
Chest and Abdomen with Contrast	267	351	332	375	259	296	272
Chest with Contrast	138	214	181	178	206	156	188
Colonography(with contrast)	-	524	450	399	518	513	378
Elbow	-	-	-	-	101	110	-
Enteroclysis (Small bowel study)	-	148	-	-	-	-	-
Facial bones	794	537	258	256	154	191	209
Foot	159	81	67	77	159	155	-
Guided RF ablation lung	-	-	-	-	271	-	-
Guided biopsy	111	-	-	-	114	-	-
Guided biopsy abdomen	126	-	-	-	-	-	-
Guided biopsy thorax	106	-	-	-	73	-	-
Guided drainage abdomen	-	-	-	-	358	-	-
Head	707	762	651	634	666	665	727
Head with Contrast	693	773	680	663	674	698	708
Hip	159	190	267	201	156	175	166
Hip Both	183	-	-	-	153	-	215
Kidney triple phase Both - Contrast	409	708	628	665	-	482	390
Knee	162	126	159	155	191	191	180
Liver triple phase-contrast	-	610	644	649	847	636	-
Lower leg	-	-	-	-	326	-	-
Mandible		_	239	248	-	177	_



Neck and Chest with Contrast	208	336	367	520	282	255	377
Neck with contrast	217	-	272	283	224	181	264

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CAS-03155-N6B3D5

Neck, Chest, Abdomen and Pelvis with Contrast	470	578	798	829	496	528	540
Pancreas dual phase-contrast	359	428	518	356	406	402	356
Pelvis	141	-	-	-	151	207	224
Pelvis with Contrast	161	-	194	337	256	346	-
Pulmonary Angiography	101	201	-	216	100	105	111
Shoulder	114	167	144	177	122	128	155
Sinuses	126	116	89	91	39	127	126
Spine Thoracic	342	-	-	-	250	-	-
Spine lumbar	284	366	-	-	273	252	289
Temporal Bones	271	286	296	198	-	258	258
Upper leg	-	-	-	-	230	-	-
Urinary Tract	104	124	134	139	93	132	108
Urinary tract with contrast	320	372	378	376	267	180	327
Venogram	480	-	-	-	357	-	-
Venogram cerebral	496	-	-	-	350	512	507
Wrist	81	56	90	89	90	98	-

Produced: 03-Apr-2024

Data Range: 01-Jan-2023 - 31-Dec-2023

Review by: 1 year



Nuclear Medicine

ROUTINE RADIOPHARMACEUTICAL ACTIVITIES FOR ADULT PATIENTS

INVESTIGATION	RADIO-PHARMACEUTICAL	MBq (RANGE)	ARSAC DRL MBq	<u>NOTES</u>
BONE Standard Tomography	Tc99m Oxidronate (HDP)	550 (500- 600)	600 800	
	(Technescan HDP) (I.V.)	550 (500- 600)		
LUNG Perfusion (Q) Ventilation (V)	Tc99m MAA (pulmocis) (I.V.) Kr81m GAS (INHALED)	80(70-100) <6000/study	100 6000	Gently swirl vial before drawing up dose
				+ gently invert syringe before injection
MECKELS (Ectopic Gastric Mucosa)	Tc99m Pertechnetate (I.V.)	200 (170- 230)	400	NBM 6 hr prior to scan
STATIC RENAL	Tc99m DMSA (renocis) (I.V.)	70 (60-80)	80	
DYNAMIC RENAL	Tc99m MAG-3 (I.V.)	80 (70-100)	100	20mg/2ml Furosemide iv. 15 mins prior to Mag-3 NB: Give as a slow bolus
BREAST SENTINEL NODE	Tc99m Nanocolloid (Nanoscan)	40 (35-40) next day	40	Inj vol approx 0.2ml with ~0.1ml air bubble behind
	Intradermal	biopsy 20 (15- 20)same day biopsy	20	injectate
ALL OTHER EXAMS	REFER REQUEST TO ARSAC Licence/certificate holder			

Witnessed by: S Godwin Lead NM Radiographer

	8	
APPROVED BY	SIGNATURE	DATE
Dr Manish Pandit – ARSAC Certificate		11.01.2024
/Licence Holder	Manish Pandit	

L. Godini



ALTERNATIVE RADIOPHARMACEUTICAL ACTIVITIES FOR ADULT PATIENTS

(for use when "routine" radiopharmaceutical is unavailable)

INVESTIGATION	RADIO-PHARMACEUTICAL	MBq	ARSAC	<u>NOTES</u>
		(RANGE)	<u>DRL</u> MBq	
BONE Standard	Tc99m Oxidronate (HDP)	550 (500-	600	
Tomography	ressiii exiareriate (ribi)	600)	800	
	(Osteocis) (I.V.)	550 (500-		
		600)		
LUNG Perfusion (Q)	Tc99m MAA (LYOMAA) I.V.)	80(70-100)	100	Gently swirl vial before
Ventilation (V)	Kr81m GAS (INHALED)	<6000/study	6000	drawing up dose
				+ gently invert syringe
NAFCKELC				before injection
MECKELS	none			NBM 6 hr prior to scan
(Ectopic Gastric				
Mucosa) DYNAMIC RENAL	Tc99m DTPA	200 (180-	300	20mg/2ml Furosemide iv
DYNAMIC REMAL	DTPA Technescan /Pentacis)	220)	300	15 mins prior to DTPA.
	(I.V.)	220)		NB: Give as a slow bolus
	(1. v.)			IVD. GIVE as a slow bolus
STATIC RENAL	none			
BREAST	Tc99m Nanocolloid	40 (35-40)	40	Inj vol approx 0.2ml with
SENTINEL NODE	(Nanocol)	next day		~0.1ml air bubble behind
	Intradermal	biopsy	20	injectate
		20 (15-		
		20)same day		
		biopsy		
ALL OTHER EXAMS	REFER REQUEST TO			
	ARSAC Licence/certificate			
	holder			

Witnessed by: S Godwin Lead NM Radiographer

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J. Gadenin	
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APPROVED BY	SIGNATURE	DATE
Dr Manish Pandit - ARSAC Certificate /Licence Holder	Manish Pandit	11.01.2024