National Radiology Data Registry

Executive Summary Report, Jan-Jun 2017

Public Facility

(Facility ID: 100853)

NRDR DIR® Dose Index Registry

American College of Radiology

nrdr.acr.org

NRDR CTC™ CT Colonography Registry American College of Radiology

NRDR GRID™ General Radiology Improvement Database American College of Radiology

NRDR LCSR™ Lung Cancer Screening Registry American College of Radiology

NRDR NMD® National Mammography Database American College of Radiology

Acknowledgements

Code for the automatic determination of patient size from localizer images that enables the production of Size-Specific Dose Estimates (SSDE) in the ACR Dose Index Registry is courtesy of JR Wells, Y Zhang and E Samei of the Duke University Clinical Imaging Physics *Group. (https://cipg.duhs.duke.edu/)* For more information please refer to Christianson O, Li X, Frush DP, Samei E. Automated patient-specific CT dose monitoring system: assessing variability in CT dose. Medical Physics 39(11): 7131-7139. 2012. *(http://onlinelibrary.wiley.com/doi/10.1118/1.4761871/abstract)*
The processing of non-RDSR dose screens for the Dose Index Registry is courtesy of PixelMed Publishing, LLC. The open source code of the PixelMed dose-related tools can be found at pixelmed.com

DIR Executive Summary Report from the American College of Radiology

We are pleased to release the Jan-Jun 2017 Dose Index Registry (DIR) Executive Summary report. This report also contain a preview of QCDR report of DIR Non-MIPS measures.

Criteria for inclusion in the report

For an exam to be included in the report, it had to meet the following criteria:

1. The age of the patient to which the exam was administered had to be 18 years or lower for the pediatric reports and over 18 years for adult reports.
2. The name of the exam had to be tagged using the DIR Exam Mapping Tool or, alternatively, the RPID name and number had to be submitted electronically as part of the DICOM header.
3. An Executive Summary Report is provided for exams which have at least 2,000 and 10,000 total records across all facilities for pediatric and adult reports respectively.
4. High Volume Boxplots are provided for the top 10 high volume exams in the DIR for adults and pediatrics for this reporting period.

The tables and charts in this report describe dose indices at the scan level. The three measures that we currently report are SSDE, CTDIvol and DLP. For the boxplots we calculate the CTDIvol and DLP per scan by determining the maximum value of the scans included in the exam. For example, for a CT Abdomen and Pelvis With and Without IV Contrast, if the scan for the 'Without' phase of the exam had a CTDIvol of 30 mGy and the scan for the 'With' phase had a CTDIvol of 25 mGy, then the CTDIvol per Scan would be 30 mGy. In cases where multiple scans were given for the same body region when fewer scans were required, the CTDIvol per Scan will underestimate the total CTDIvol. Timing runs or monitoring scans are excluded before identifying the scan with the highest dose index.

Components of the Report

Adult Executive Summary Table - The Adult Executive Summary provides a quick overview of Your Facility's data for the most common adult CT exams and a comparison to the overall DIR values. For each of the three dose indices (CTDIvol per scan, DLP per scan and SSDE per scan) your facility values are compared to the DIR values.

Adult High Volume Boxplots - Shows a snapshot of your facility's performance in the DIR top 10 high volume adult CT exams. There are 3 sets of boxplots, one for each dose index, representing the DIR values for an exam. Your facility median is depicted by a red line. Absence of red line means your facility did not perform that exam. The key of the numbered exams are given on the right hand side. SSDE only has values for body exams.

Pediatric Executive Summary Tables - The Pediatric Executive Summary provides a quick overview of Your Facility's data for the most common pediatric CT exams and a comparison to the overall DIR values by age groups. For each of the dose indices (CTDIvol per scan, DLP per scan and SSDE per scan) your facility values are compared to the DIR values for the corresponding age group.

Pediatric High Volume Boxplots - Shows a snapshot of your facility's performance in the DIR top 10 high volume pediatrics CT exams by age groups. There are 3 sets of boxplots, one for each dose index, representing the DIR values for a particular exam for each age group. Your facility median is depicted by a red line. Absence of a red line means your facility did not perform that exam. The key of the numbered exams are given on the right hand side. SSDE only has values for body exams.

2017 Year-To-Date QCDR Preview Report - Please refer to the QCDR page of this report.

Phantom Size

The value of the dose index that you report for each exam is relative to a particular phantom size. To make accurate comparisons, we standardize the values to a certain phantom size. For all head exams, we standardize to a 16cm phantom. For all body exams, we standardize to a 32cm phantom. The relationship of the two phantoms is $CTDI_{32}$ X 2.3 = $CTDI_{16}$.

For more information on DIR data processing refer to Bhargavan-Chatfield M, Morin RL. The ACR Computed Tomography Dose Index Registry: the 5 million examination update. J Am Coll Radiol. 2013 Dec;10(12):980-3. doi: 10.1016/j.jacr.2013.08.030. *(http://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/DIR/DIR%205%20Million%20Examinations%20Update.pdf).*

Important Note

The dose indices reported can be affected by a number of issues that are not necessarily related to a non-optimal protocol. Before modifying any protocol, please consult your medical physicist. Issues that may affect the dose indices include but are not limited to the following:

1. Protocols/orderables that are mapped to a given RPID, may not actually belong to the assigned RPID (e.g., a protocol mapped to a CT HEAD BRN WO IVCON might actually be a perfusion study).
2. If the phantom size is not recorded/transmitted, it is assumed that all body exams use a 32cm phantom and all head exams use a 16cm phantom, which may not be the case. This could affect CTDIvol in either direction (head exams could appear to be half of the true value; body exams could appear to be twice the true value).

Fundamentals of Radiation Dose

CT Dose Index (CTDIvol) approximates the average radiation dose to a cross section of the phantom. Dose Length Product (DLP), based on CTDIvol factors in the length of the scan.

Radiation Units in Computed Tomography

Term	Description	Unit
CT Dose Index (CTDIvol)	Radiation energy absorbed per unit mass; for CT, determined for a standard phantom and not a patient	gray (Gy) or milligray (mGy)
Dose Length Product (DLP)	Absorbed dose multiplied by the length of exposure; for CT, determined for a standard phantom and not a patient	milligray-cm (mGy-cm)
Size Specific Dose Estimate	A patient dose estimate which takes into consideration corrections based on the size of the patient	milligray (mGy)

In modern CT scanners, CTDIvol and/or DLP are reported for each CT scan. Although these parameters are tagged to individual patient exams, they do not represent the patient's dose but rather the radiation dose to one of two standard phantoms. CTDIvol is primarily used as a quality assurance tool to compare the dose from techniques using the same size phantom and to compare CT scanner output from different manufacturers' equipment. It has been used to modify technical parameters in an attempt to lower radiation dose in general.

More recently, the American Association of Physicists in Medicine (AAPM) developed a new CT parameter, the size-specific dose estimate (SSDE) to more accurately estimate average cross-sectional dose to an individual patient by factoring in the size of the patient. This value is determined by applying a conversion factor, based on cross-sectional dimensions of the patient, to the CTDIvol.

For more information about SSDE please refer to *http://www.aapm.org/pubs/reports/RPT_204.pdf.* Several online educational programs on this topic are available that offer free continuing education. See the 'Image Wisely Radiation Safety Cases' on CT Dose and Size-Specific Dose Estimate (SSDE) (https://shop.acr.org/Default.aspx?TabID=55&ProductId=12363982) and Child-sizing CT Dose: Optimizing Patient Care through Quality Improvement (http://www.acr.org/Education/Education-Catalog/Products/12056133).

U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations

Using data from the American College of Radiology's Dose Index Registry, the world's largest registry of dose information, Kanal et al have established U.S. national dose levels for the 10 most common adult CT examinations based on patient size. The study establishes patient-size based diagnostic reference levels (DRLs) and achievable doses (ADs) for the 10 most common CT head, neck and body examinations. A summary table of ADs and DRLs for median size patients is presented below. Except for head and brain without contrast, all exams used water-equivalent diameter as an indicator of patient size. For head and brain without contrast, lateral thickness was used:

		CTDIvol (mGy)		SSDE (mGy)		DLP (mGy-cm)	
Exam Name	**Median Patient Size**	**DRL**	**AD**	**DRL**	**AD**	**DRL**	**AD**
Head and brain without contrast	14-16	56	49	.	.	962	811
Neck with contrast	18-22	19	15	.	.	563	429
Cervical spine without contrast	18-22	28	20	.	.	562	421
Chest without contrast	29-33	12	9	15	11	443	334
Chest with contrast	29-33	13	10	15	11	469	353
Chest pulmonary arteries with contrast	29-33	14	11	17	13	445	357
Abdomen and pelvis without contrast	29-33	16	13	19	15	781	639
Abdomen and pelvis with contrast	29-33	15	12	18	15	755	608
Abdomen, pelvis and kidney without contrast	29-33	15	12	19	14	705	576
Chest, abdomen and pelvis with contrast	29-33	15	12	18	14	947	779

Healthcare facilities can use this information to effectively compare their patientdoses to national benchmarks, optimize their exam protocols so that dose is commensurate with the size of the patient, and helpavoid unnecessary radiation exposure.

References

1. Kanal KM, Butler PF, Sengupta D, et al. U.S. Diagnostic Reference Levels andAchievable Doses for 10 Adult CT Examinations, Radiology 2017, ahead of print. (http://pubs.rsna.org/doi/abs/10.1148/radiol.2017161911?journalCode=radiology)

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	CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
RPID Shortname	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT ABDOMEN	1120	(10/14/19)	(11/15/21)	1120	(391/611/873)	(479/707/1021)	564	(11/14/18)	(10/14/18)
CT ABDOMEN PELVIS	3490	(7/11/17)	(7/12/18)	3490	(362/573/898)	(360/590/914)	2290	(9/12/18)	(8/12/18)
CT ABDOMEN PELVIS ANGIO WO THEN W IVCON	894	(9/14/20)	(9/14/20)	894	(456/699/1050)	(459/717/1063)	398	(10/14/20)	(10/14/20)
CT ABDOMEN PELVIS KIDNEY WO IVCON	7651	(9/13/18)	(8/13/18)	7651	(409/621/910)	(400/612/907)	3174	(8/11/14)	(8/11/15)
CT ABDOMEN PELVIS MULTIPHASE W IVCON	792	(10/14/21)	(11/16/23)	792	(443/687/929)	(488/731/1070)	132	(10/12/16)	(13/20/25)
CT ABDOMEN PELVIS UROGRAPHY WO THEN W IVCON	1719	(9/13/19)	(9/14/19)	1717	(420/618/907)	(431/640/914)	1149	(9/13/19)	(9/13/18)
CT ABDOMEN PELVIS W IVCON	70437	(8/13/18)	(8/12/18)	70321	(406/627/934)	(403/623/936)	34144	(9/12/17)	(9/12/17)
CT ABDOMEN PELVIS WO IVCON	35044	(9/13/19)	(9/13/19)	35008	(415/643/951)	(415/642/957)	16540	(9/13/17)	(9/12/17)
CT ABDOMEN PELVIS WO THEN W IVCON	4469	(9/14/19)	(9/14/19)	4469	(451/668/963)	(437/658/963)	2337	(10/13/18)	(9/13/18)
CT ABDOMEN W IVCON	3179	(8/11/18)	(8/12/19)	3177	(308/482/738)	(304/477/728)	1181	(9/13/17)	(9/13/18)
CT ABDOMEN WO IVCON	1507	(9/13/20)	(9/14/20)	1505	(312/499/775)	(326/529/799)	737	(9/12/17)	(9/13/17)
CT ABDOMEN WO THEN W IVCON	1263	(9/14/20)	(10/15/21)	1262	(287/466/680)	(289/473/693)	622	(10/13/18)	(10/14/19)
CT C SPINE	1126	(15/19/29)	(14/18/27)	1117	(327/413/634)	(293/395/611)	.	(././.)	(././.)
CT C SPINE W IVCON	1004	(13/18/24)	(14/19/25)	1000	(264/373/512)	(279/403/542)	.	(././.)	(././.)
CT C SPINE WO IVCON	17405	(14/21/32)	(14/21/32)	17283	(300/447/687)	(305/451/685)	.	(././.)	(././.)
CT CHEST	3974	(6/9/14)	(6/9/15)	3974	(210/341/551)	(218/345/545)	1540	(6/9/14)	(6/9/13)

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	CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
RPID Shortname	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT CHEST ABDOMEN PELVIS	1377	(8/12/19)	(7/11/18)	1376	(412/645/1041)	(398/629/1009)	384	(10/13/27)	(7/11/19)
CT CHEST ABDOMEN PELVIS W IVCON	10778	(8/12/18)	(9/13/19)	10767	(460/719/1079)	(454/712/1084)	5681	(9/13/17)	(9/13/19)
CT CHEST ABDOMEN PELVIS WO IVCON	1543	(8/13/19)	(9/13/19)	1537	(504/805/1178)	(521/824/1201)	965	(9/12/16)	(9/12/16)
CT CHEST ABDOMEN W IVCON	924	(8/13/19)	(9/13/19)	923	(436/644/982)	(390/625/940)	552	(11/15/20)	(10/14/20)
CT CHEST ANGIO	1225	(9/14/20)	(10/14/20)	1224	(299/491/746)	(338/497/716)	714	(8/12/19)	(8/12/19)
CT CHEST ANGIO W IVCON	3980	(8/13/19)	(8/13/19)	3980	(284/453/697)	(270/444/674)	2333	(8/12/18)	(8/12/18)
CT CHEST ANGIO WO THEN W IVCON	3918	(9/15/21)	(10/15/21)	3917	(334/502/757)	(329/504/763)	1885	(11/14/21)	(11/15/21)
CT CHEST HEART	1340	(6/7/11)	(5/7/9)	1339	(73/105/160)	(71/100/134)	570	(6/7/10)	(6/7/9)
CT CHEST HEART ANGIO WO THEN W IVCON	909	(13/23/38)	(12/24/41)	862	(185/407/740)	(167/443/851)	500	(15/24/33)	(14/24/41)
CT CHEST HEART WO IVCON	2590	(6/7/9)	(5/7/10)	2587	(83/117/162)	(82/117/163)	1747	(6/8/10)	(6/8/10)
CT CHEST HIGH RESOLUTION WO IVCON	1158	(5/9/14)	(5/9/14)	1158	(177/289/476)	(180/299/487)	637	(6/9/14)	(6/9/14)
CT CHEST LOW DOSE	736	(2/2/3)	(2/2/3)	734	(60/80/104)	(63/81/105)	320	(2/2/3)	(2/2/3)
CT CHEST LOW DOSE WO IVCON	1723	(2/3/3)	(2/2/3)	1723	(65/88/114)	(62/87/115)	1055	(2/2/3)	(2/2/3)
CT CHEST PULMONARY ARTERIES ANGIO W IVCON	2027	(8/11/16)	(8/11/16)	2027	(245/355/533)	(247/368/557)	1417	(8/10/14)	(8/11/15)

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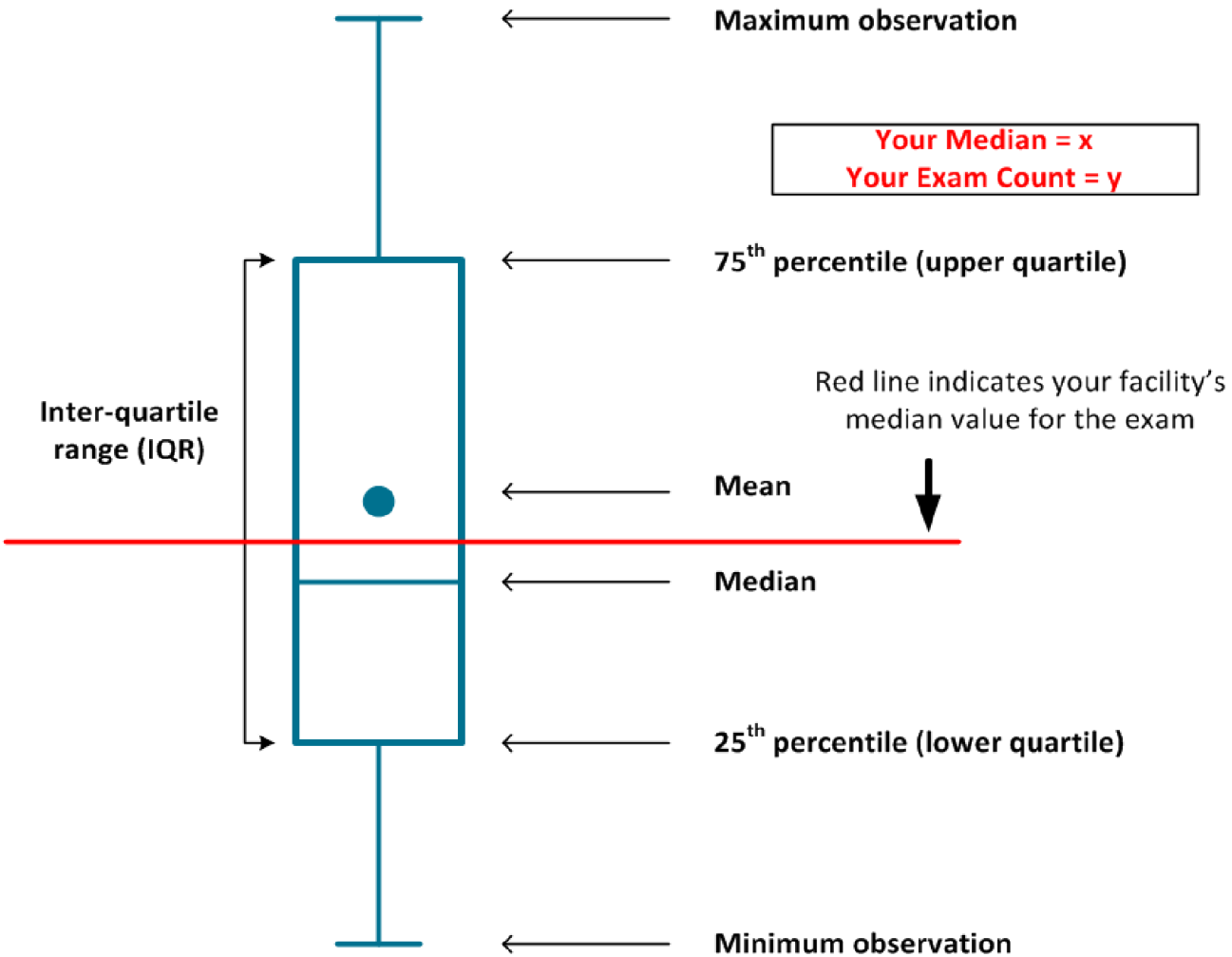
	CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
RPID Shortname	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT CHEST PULMONARY ARTERIES W IVCON	12548	(8/13/18)	(8/12/18)	12548	(266/420/619)	(259/409/600)	4850	(8/12/17)	(8/12/16)
CT CHEST W IVCON	19002	(7/11/16)	(7/11/16)	18979	(256/420/632)	(249/408/627)	9400	(7/10/15)	(7/10/15)
CT CHEST WO IVCON	26840	(6/9/14)	(6/9/14)	26791	(207/331/513)	(201/324/505)	14692	(6/9/13)	(6/9/13)
CT FACE MAXILLOFACIAL WO IVCON	1083	(19/26/39)	(17/26/42)	1079	(348/501/740)	(327/504/802)	.	(././.)	(././.)
CT FACE PARANASAL SINUSES WO IVCON	1592	(12/22/31)	(10/21/31)	1592	(172/356/597)	(162/337/598)	.	(././.)	(././.)
CT HEAD	4250	(46/50/60)	(47/52/61)	4245	(726/839/997)	(755/911/1059)	.	(././.)	(././.)
CT HEAD ANGIO W IVCON	890	(30/39/50)	(30/43/53)	889	(666/913/1250)	(684/926/1308)	.	(././.)	(././.)
CT HEAD ANGIO WO THEN W IVCON	1141	(37/45/58)	(36/46/58)	1141	(798/1115/1426)	(772/1065/1397)	.	(././.)	(././.)
CT HEAD BRAIN	3572	(38/45/51)	(38/45/51)	3572	(621/760/864)	(627/759/864)	.	(././.)	(././.)
CT HEAD BRAIN WO IVCON	111100	(41/50/57)	(42/50/57)	111008	(653/817/972)	(673/835/996)	.	(././.)	(././.)
CT HEAD BRAIN WO THEN W IVCON	898	(40/52/59)	(42/52/60)	898	(622/828/1002)	(671/868/1036)	.	(././.)	(././.)
CT HEAD C SPINE	1629	(48/53/58)	(43/52/58)	1629	(820/946/1190)	(823/937/1162)	.	(././.)	(././.)
CT HEAD C SPINE WO IVCON	2113	(37/44/58)	(37/46/58)	2112	(669/863/1206)	(681/878/1195)	.	(././.)	(././.)
CT HEAD FACIAL BONES	888	(25/34/45)	(20/30/45)	888	(462/640/840)	(384/590/838)	.	(././.)	(././.)
CT HEAD MAXILLOFACIAL WO IVCON	2436	(18/29/45)	(17/29/44)	2433	(334/560/822)	(325/550/797)	.	(././.)	(././.)
CT HEAD NECK ANGIO	1549	(32/46/55)	(31/45/55)	1554	(910/1203/1587)	(901/1178/1591)	.	(././.)	(././.)

Executive Summary Jan-Jun 2017 -Adult

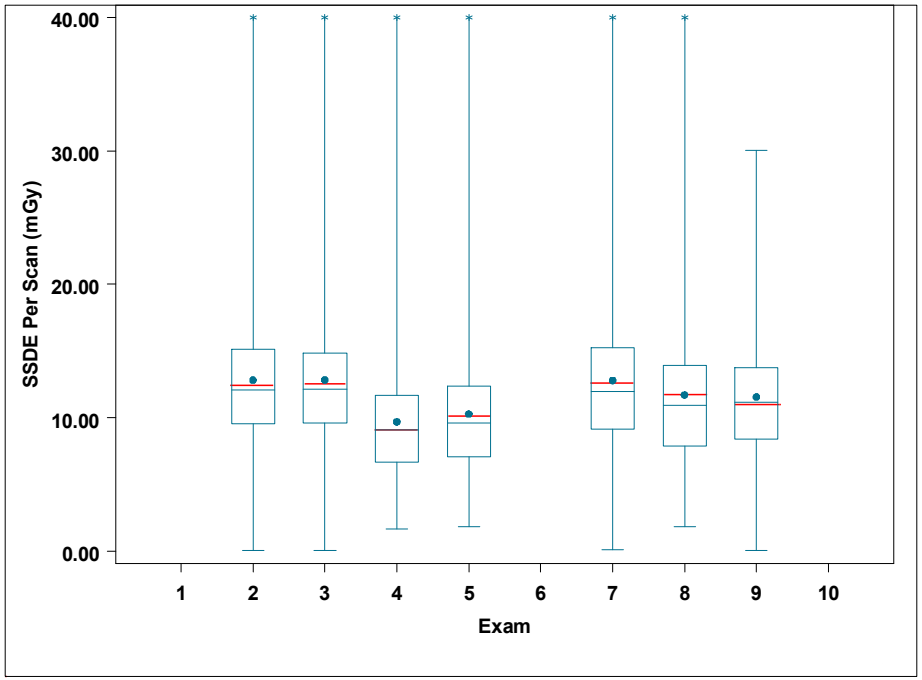
	CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
RPID Shortname	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT HEAD PARANASAL SINUSES WO IVCON	2894	(10/19/29)	(10/17/27)	2885	(158/272/469)	(160/265/460)	.	(././.)	(././.)
CT L SPINE WO IVCON	6221	(17/25/35)	(17/25/35)	6208	(483/721/1025)	(483/723/1039)	2586	(20/28/38)	(20/28/39)
CT LE WO IVCON	1537	(7/11/18)	(7/11/18)	1531	(195/338/614)	(198/341/608)	.	(././.)	(././.)
CT NECK ANGIO W IVCON	1387	(14/20/30)	(13/19/28)	1374	(416/619/926)	(402/584/873)	.	(././.)	(././.)
CT NECK SOFT TISSUE OF THE NECK	907	(11/14/18)	(11/15/20)	907	(314/404/509)	(310/419/575)	.	(././.)	(././.)
CT NECK W IVCON	5896	(10/14/19)	(10/15/20)	5883	(284/410/557)	(289/422/590)	.	(././.)	(././.)
CT NECK WO IVCON	728	(10/14/19)	(10/14/19)	727	(259/378/510)	(270/391/540)	.	(././.)	(././.)
CT PELVIS W IVCON	961	(9/14/21)	(9/14/20)	959	(283/468/719)	(297/471/707)	499	(10/14/19)	(10/14/19)
CT PELVIS WO IVCON	1717	(10/15/22)	(10/15/23)	1710	(301/480/706)	(312/491/737)	818	(10/15/22)	(11/16/23)
CT T SPINE WO IVCON	1653	(15/22/32)	(15/22/31)	1651	(532/791/1134)	(537/810/1174)	725	(17/25/34)	(17/25/34)
CT UE WO IVCON	730	(8/14/25)	(8/13/23)	730	(167/296/579)	(170/304/547)	.	(././.)	(././.)

Box-and-whiskers Plot



Your Facility's Performance on the 10 High Volume DIR Exams (Adult)

SSDE per Scan



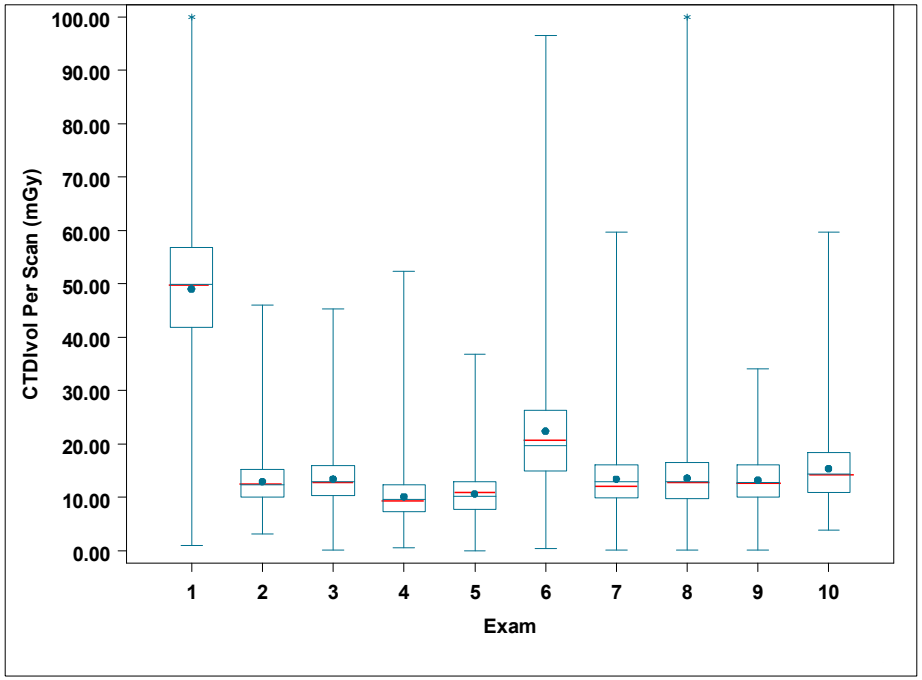
: Your Facility Median

Exam Key

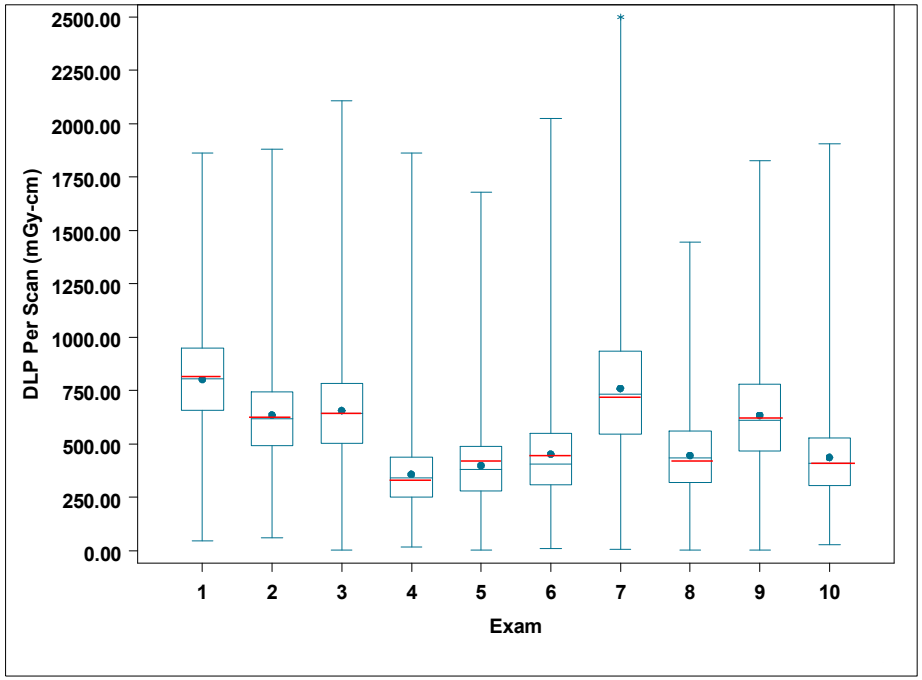
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT ABDOMEN PELVIS WO IVCON
4 = CT CHEST WO IVCON
5 = CT CHEST W IVCON
6 = CT C SPINE WO IVCON
7 = CT CHEST ABDOMEN PELVIS W IVCON
8 = CT CHEST PULMONARY ARTERIES W IVCON
9 = CT ABDOMEN PELVIS KIDNEY WO IVCON
10 = CT NECK W IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per Scan



DLP per Scan



		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT ABDOMEN PELVIS	0-2	No Data	No Data	(1/2/3)	No Data	No Data	(36/49/75)	No Data	No Data	(2/3/4)
CT ABDOMEN PELVIS	3-6	No Data	No Data	(2/2/4)	No Data	No Data	(59/81/124)	No Data	No Data	(3/3/5)
CT ABDOMEN PELVIS	7-10	No Data	No Data	(2/3/5)	No Data	No Data	(92/132/215)	No Data	No Data	(3/4/6)
CT ABDOMEN PELVIS	11-14	No Data	No Data	(4/6/8)	No Data	No Data	(168/252/384)	No Data	No Data	(5/6/10)
CT ABDOMEN PELVIS	15-18	No Data	No Data	(5/7/11)	No Data	No Data	(256/356/572)	No Data	No Data	(6/8/12)
CT ABDOMEN PELVIS W IVCON	0-2	No Data	No Data	(2/3/13)	No Data	No Data	(48/80/496)	No Data	No Data	(3/4/6)
CT ABDOMEN PELVIS W IVCON	3-6	No Data	No Data	(2/3/4)	No Data	No Data	(65/91/135)	No Data	No Data	(3/4/5)
CT ABDOMEN PELVIS W IVCON	7-10	No Data	No Data	(3/4/6)	No Data	No Data	(101/151/230)	No Data	No Data	(4/5/7)
CT ABDOMEN PELVIS W IVCON	11-14	No Data	No Data	(4/6/9)	No Data	No Data	(193/282/424)	No Data	No Data	(5/7/10)
CT ABDOMEN PELVIS W IVCON	15-18	No Data	No Data	(6/8/12)	No Data	No Data	(273/395/608)	No Data	No Data	(7/9/12)
CT ABDOMEN PELVIS WO IVCON	0-2	No Data	No Data	(2/10/18)	No Data	No Data	(68/350/860)	No Data	No Data	(3/7/18)
CT ABDOMEN PELVIS WO IVCON	3-6	No Data	No Data	(2/3/4)	No Data	No Data	(66/95/145)	No Data	No Data	(3/4/5)

Executive Summary Jan-Jun 2017 -Pediatric

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT ABDOMEN PELVIS WO IVCON	7-10	No Data	No Data	(3/4/6)	No Data	No Data	(99/155/235)	No Data	No Data	(3/5/7)
CT ABDOMEN PELVIS WO IVCON	11-14	No Data	No Data	(4/6/9)	No Data	No Data	(189/290/445)	No Data	No Data	(5/7/10)
CT ABDOMEN PELVIS WO IVCON	15-18	No Data	No Data	(6/8/13)	No Data	No Data	(271/398/640)	No Data	No Data	(7/9/13)
CT C SPINE WO IVCON	0-2	No Data	No Data	(3/12/21)	No Data	No Data	(46/181/592)	NA	NA	(././.)
CT C SPINE WO IVCON	3-6	No Data	No Data	(3/5/11)	No Data	No Data	(41/82/193)	NA	NA	(././.)
CT C SPINE WO IVCON	7-10	No Data	No Data	(4/7/14)	No Data	No Data	(72/136/262)	NA	NA	(././.)
CT C SPINE WO IVCON	11-14	No Data	No Data	(7/13/22)	No Data	No Data	(150/264/456)	NA	NA	(././.)
CT C SPINE WO IVCON	15-18	No Data	No Data	(12/18/28)	No Data	No Data	(250/385/612)	NA	NA	(././.)
CT CHEST ABDOMEN PELVIS W IVCON	0-2	No Data	No Data	(2/2/4)	No Data	No Data	(52/77/129)	No Data	No Data	(3/4/6)
CT CHEST ABDOMEN PELVIS W IVCON	3-6	No Data	No Data	(2/2/4)	No Data	No Data	(72/93/149)	No Data	No Data	(3/3/5)
CT CHEST ABDOMEN PELVIS W IVCON	7-10	No Data	No Data	(2/3/5)	No Data	No Data	(107/162/236)	No Data	No Data	(3/4/6)

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT CHEST ABDOMEN PELVIS W IVCON	11-14	No Data	No Data	(4/5/8)	No Data	No Data	(205/300/476)	No Data	No Data	(4/6/9)
CT CHEST ABDOMEN PELVIS W IVCON	15-18	No Data	No Data	(6/9/14)	No Data	No Data	(357/539/835)	No Data	No Data	(7/10/14)
CT CHEST W IVCON	0-2	No Data	No Data	(1/2/3)	No Data	No Data	(21/32/58)	No Data	No Data	(2/3/4)
CT CHEST W IVCON	3-6	No Data	No Data	(1/2/3)	No Data	No Data	(34/53/91)	No Data	No Data	(2/3/4)
CT CHEST W IVCON	7-10	No Data	No Data	(2/3/4)	No Data	No Data	(52/80/142)	No Data	No Data	(2/3/5)
CT CHEST W IVCON	11-14	No Data	No Data	(3/4/7)	No Data	No Data	(88/149/252)	No Data	No Data	(3/5/6)
CT CHEST W IVCON	15-18	No Data	No Data	(4/7/11)	No Data	No Data	(159/276/488)	No Data	No Data	(4/6/10)
CT CHEST WO IVCON	0-2	No Data	No Data	(1/2/6)	No Data	No Data	(22/46/168)	No Data	No Data	(2/3/6)
CT CHEST WO IVCON	3-6	No Data	No Data	(1/2/3)	No Data	No Data	(29/41/68)	No Data	No Data	(2/2/3)
CT CHEST WO IVCON	7-10	No Data	No Data	(2/2/4)	No Data	No Data	(44/67/104)	No Data	No Data	(2/3/5)
CT CHEST WO IVCON	11-14	No Data	No Data	(2/3/5)	No Data	No Data	(66/108/170)	No Data	No Data	(3/4/6)
CT CHEST WO IVCON	15-18	No Data	No Data	(3/5/8)	No Data	No Data	(117/178/287)	No Data	No Data	(4/5/8)

Executive Summary Jan-Jun 2017 -Pediatric

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT FACE MAXILLOFACIAL WO IVCON	0-2	No Data	No Data	(7/27/40)	No Data	No Data	(103/443/1512)	NA	NA	(././.)
CT FACE MAXILLOFACIAL WO IVCON	3-6	No Data	No Data	(7/12/23)	No Data	No Data	(93/194/341)	NA	NA	(././.)
CT FACE MAXILLOFACIAL WO IVCON	7-10	No Data	No Data	(9/14/23)	No Data	No Data	(152/239/378)	NA	NA	(././.)
CT FACE MAXILLOFACIAL WO IVCON	11-14	No Data	No Data	(14/22/30)	No Data	No Data	(253/377/567)	NA	NA	(././.)
CT FACE MAXILLOFACIAL WO IVCON	15-18	No Data	No Data	(16/23/34)	No Data	No Data	(292/448/693)	NA	NA	(././.)
CT HEAD	0-2	No Data	No Data	(16/22/29)	No Data	No Data	(198/309/533)	NA	NA	(././.)
CT HEAD	3-6	No Data	No Data	(19/26/32)	No Data	No Data	(327/395/617)	NA	NA	(././.)
CT HEAD	7-10	No Data	No Data	(18/32/35)	No Data	No Data	(337/495/780)	NA	NA	(././.)
CT HEAD	11-14	No Data	No Data	(32/39/55)	No Data	No Data	(495/696/1074)	NA	NA	(././.)
CT HEAD	15-18	No Data	No Data	(39/52/60)	No Data	No Data	(483/823/1070)	NA	NA	(././.)

Executive Summary Jan-Jun 2017 -Pediatric

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT HEAD BRAIN WO IVCON	0-2	No Data	No Data	(14/20/27)	No Data	No Data	(201/300/435)	NA	NA	(././.)
CT HEAD BRAIN WO IVCON	3-6	No Data	No Data	(18/24/31)	No Data	No Data	(277/405/535)	NA	NA	(././.)
CT HEAD BRAIN WO IVCON	7-10	No Data	No Data	(23/29/38)	No Data	No Data	(366/492/645)	NA	NA	(././.)
CT HEAD BRAIN WO IVCON	11-14	No Data	No Data	(27/36/48)	No Data	No Data	(453/604/801)	NA	NA	(././.)
CT HEAD BRAIN WO IVCON	15-18	No Data	No Data	(34/45/55)	No Data	No Data	(561/739/939)	NA	NA	(././.)
CT HEAD FACIAL BONES	0-2	No Data	No Data	(9/12/16)	No Data	No Data	(132/210/273)	NA	NA	(././.)
CT HEAD FACIAL BONES	3-6	No Data	No Data	(7/12/19)	No Data	No Data	(114/200/324)	NA	NA	(././.)
CT HEAD FACIAL BONES	7-10	No Data	No Data	(9/14/23)	No Data	No Data	(119/223/399)	NA	NA	(././.)
CT HEAD FACIAL BONES	11-14	No Data	No Data	(11/18/29)	No Data	No Data	(167/320/558)	NA	NA	(././.)
CT HEAD FACIAL BONES	15-18	No Data	No Data	(14/23/37)	No Data	No Data	(254/462/697)	NA	NA	(././.)

Executive Summary Jan-Jun 2017 -Pediatric

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT HEAD MAXILLOFACIAL WO IVCON	0-2	No Data	No Data	(8/17/25)	No Data	No Data	(83/241/359)	NA	NA	(././.)
CT HEAD MAXILLOFACIAL WO IVCON	3-6	No Data	No Data	(7/13/21)	No Data	No Data	(102/187/337)	NA	NA	(././.)
CT HEAD MAXILLOFACIAL WO IVCON	7-10	No Data	No Data	(10/15/25)	No Data	No Data	(157/250/447)	NA	NA	(././.)
CT HEAD MAXILLOFACIAL WO IVCON	11-14	No Data	No Data	(12/18/30)	No Data	No Data	(181/316/601)	NA	NA	(././.)
CT HEAD MAXILLOFACIAL WO IVCON	15-18	No Data	No Data	(16/26/40)	No Data	No Data	(286/494/738)	NA	NA	(././.)
CT HEAD PARANASAL SINUSES WO IVCON	0-2	No Data	No Data	(3/7/16)	No Data	No Data	(45/76/245)	NA	NA	(././.)
CT HEAD PARANASAL SINUSES WO IVCON	3-6	No Data	No Data	(4/7/14)	No Data	No Data	(58/101/225)	NA	NA	(././.)
CT HEAD PARANASAL SINUSES WO IVCON	7-10	No Data	No Data	(5/8/17)	No Data	No Data	(70/127/260)	NA	NA	(././.)

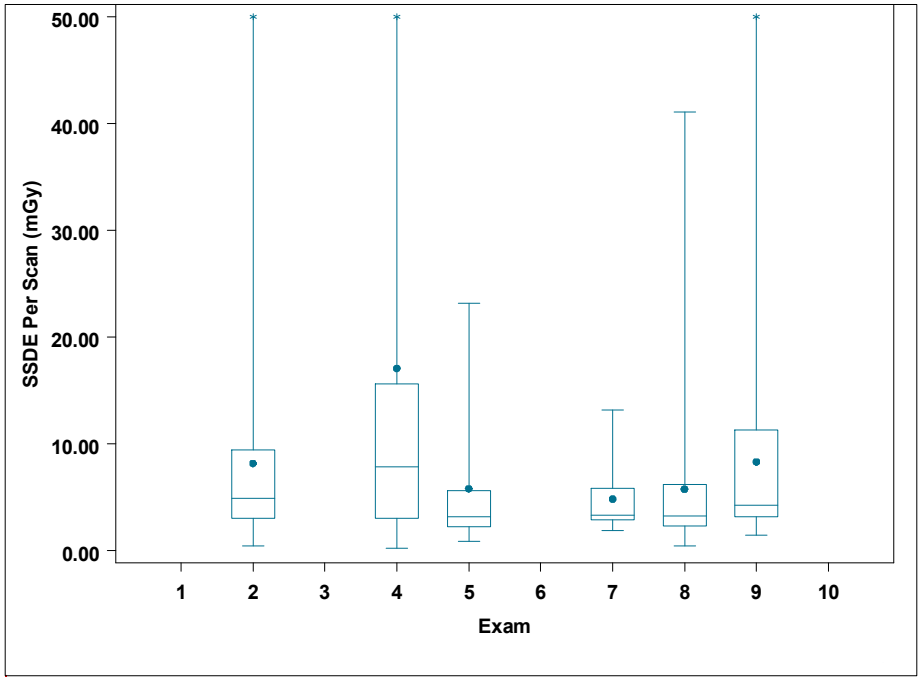
Executive Summary Jan-Jun 2017 -Pediatric

		CTDIvol Per Scan			DLP Per Scan			SSDE Per Scan		
		Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites	Your Facility (100853)		All DIR Sites
ShortName Report	Age Group	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)	N	(25th-Med-75th)	(25th-Med-75th)
CT HEAD PARANASAL SINUSES WO IVCON	11-14	No Data	No Data	(6/10/18)	No Data	No Data	(87/152/290)	NA	NA	(././.)
CT HEAD PARANASAL SINUSES WO IVCON	15-18	No Data	No Data	(8/13/23)	No Data	No Data	(123/224/403)	NA	NA	(././.)
CT NECK W IVCON	0-2	No Data	No Data	(2/3/5)	No Data	No Data	(39/61/95)	NA	NA	(././.)
CT NECK W IVCON	3-6	No Data	No Data	(3/4/5)	No Data	No Data	(53/78/114)	NA	NA	(././.)
CT NECK W IVCON	7-10	No Data	No Data	(4/5/8)	No Data	No Data	(82/123/184)	NA	NA	(././.)
CT NECK W IVCON	11-14	No Data	No Data	(5/7/12)	No Data	No Data	(137/192/321)	NA	NA	(././.)
CT NECK W IVCON	15-18	No Data	No Data	(7/11/15)	No Data	No Data	(195/303/434)	NA	NA	(././.)

Your Facility's Performance on the 10 High Volume DIR Exams (Pediatric)

Age group 0-2

SSDE per Scan



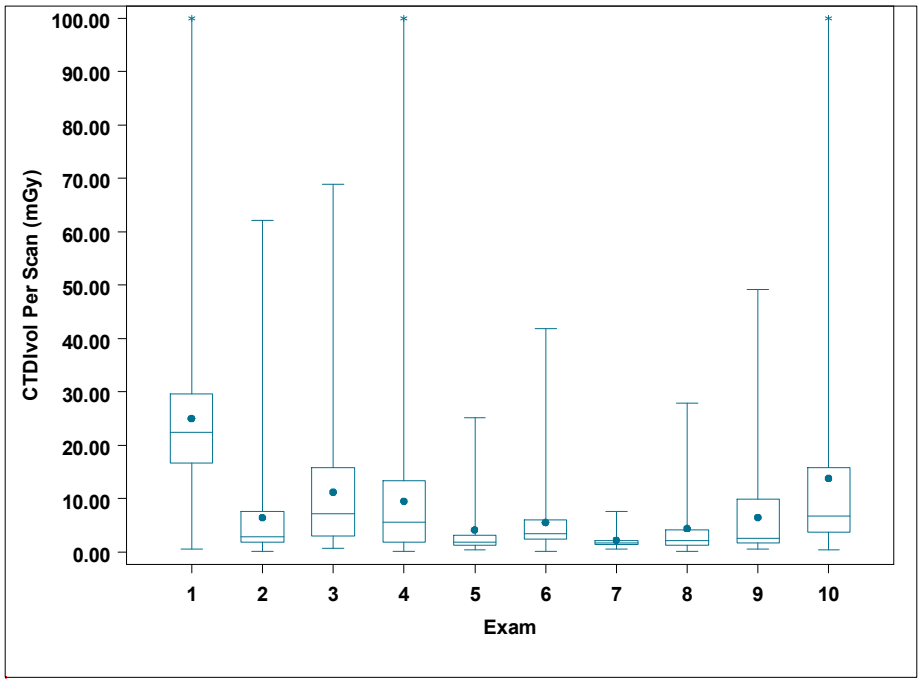
—— : Your Facility Median

Exam Key

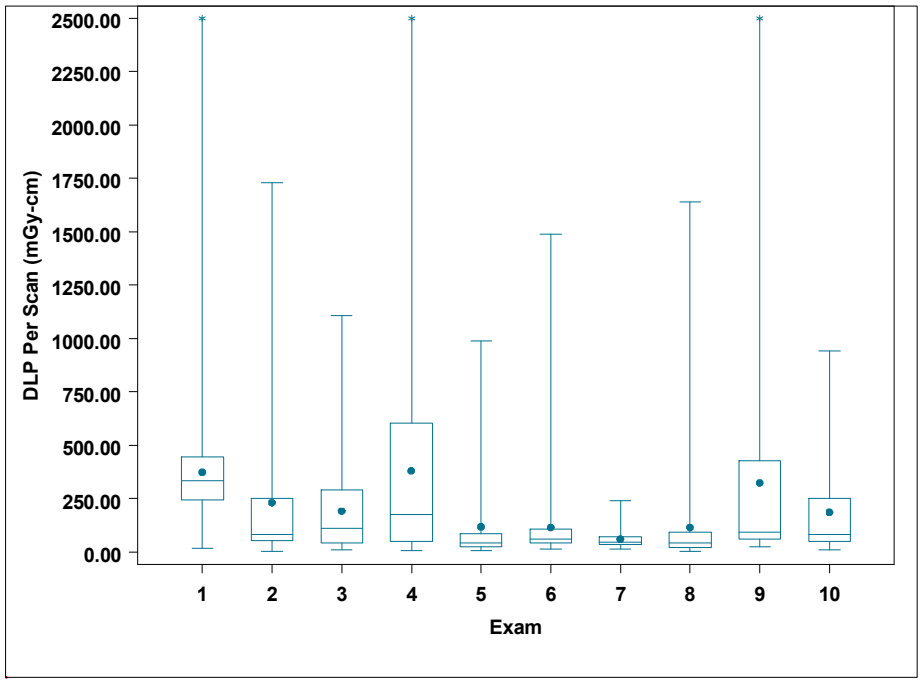
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT C SPINE WO IVCON
4 = CT ABDOMEN PELVIS WO IVCON
5 = CT CHEST W IVCON
6 = CT NECK W IVCON
7 = CT ABDOMEN PELVIS
8 = CT CHEST WO IVCON
9 = CT CHEST ABDOMEN PELVIS W IVCON
10 = CT HEAD PARANASAL SINUSES WO IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per scan



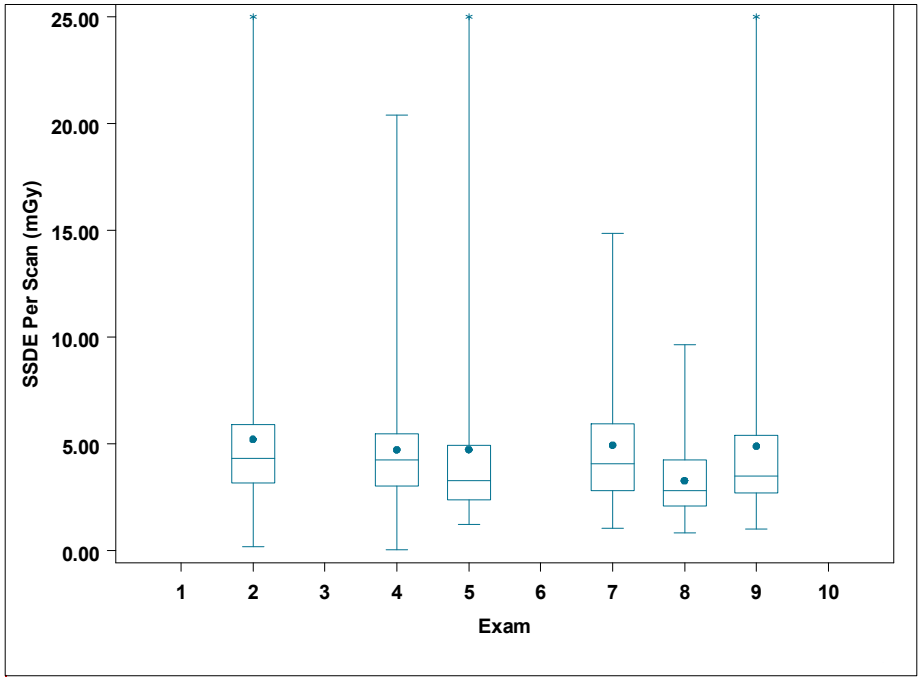
DLP per Scan



Your Facility's Performance on the 10 High Volume DIR Exams (Pediatric)

Age group 3-6

SSDE per Scan



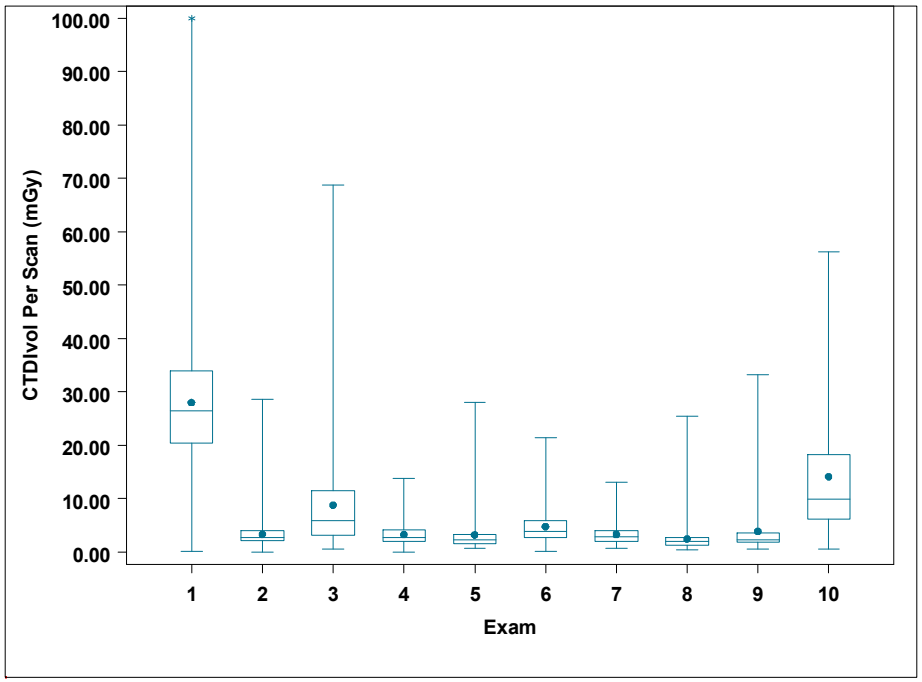
—— : Your Facility Median

Exam Key

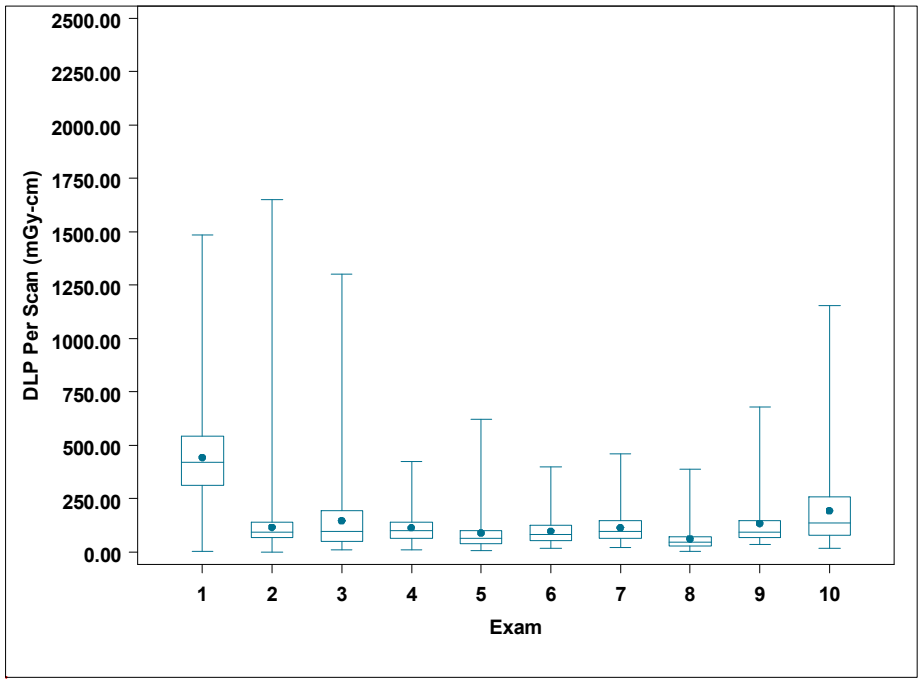
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT C SPINE WO IVCON
4 = CT ABDOMEN PELVIS WO IVCON
5 = CT CHEST W IVCON
6 = CT NECK W IVCON
7 = CT ABDOMEN PELVIS
8 = CT CHEST WO IVCON
9 = CT CHEST ABDOMEN PELVIS W IVCON
10 = CT HEAD PARANASAL SINUSES WO IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per scan



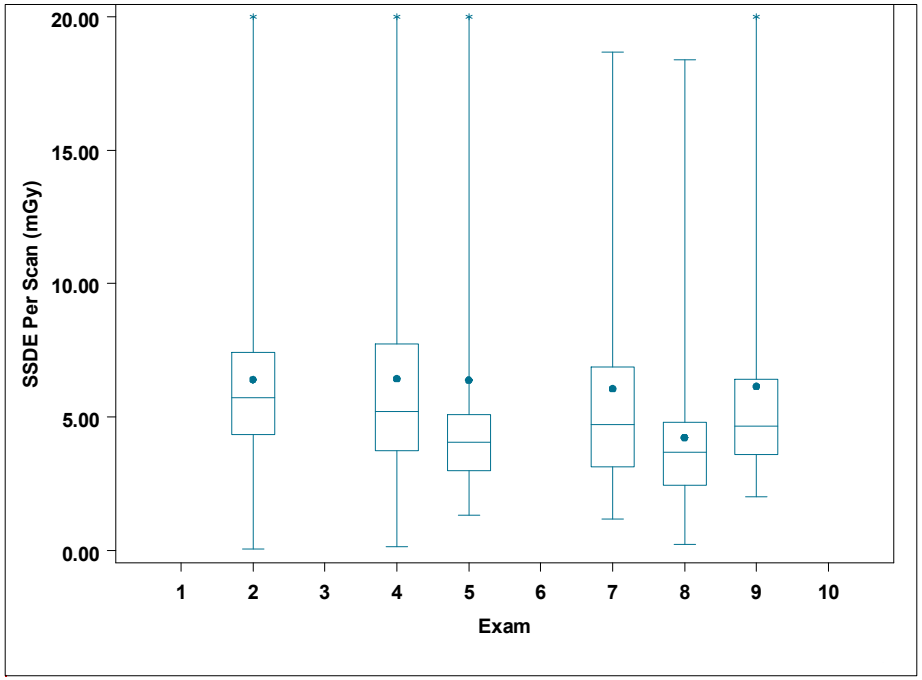
DLP per Scan



Your Facility's Performance on the 10 High Volume DIR Exams (Pediatric)

Age group 7-10

SSDE per Scan



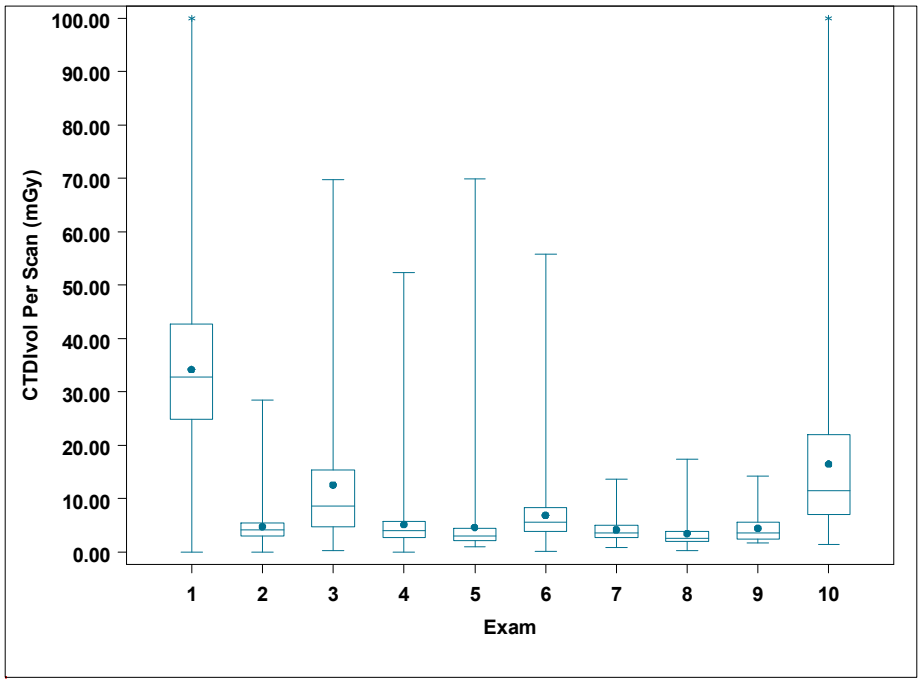
: Your Facility Median

Exam Key

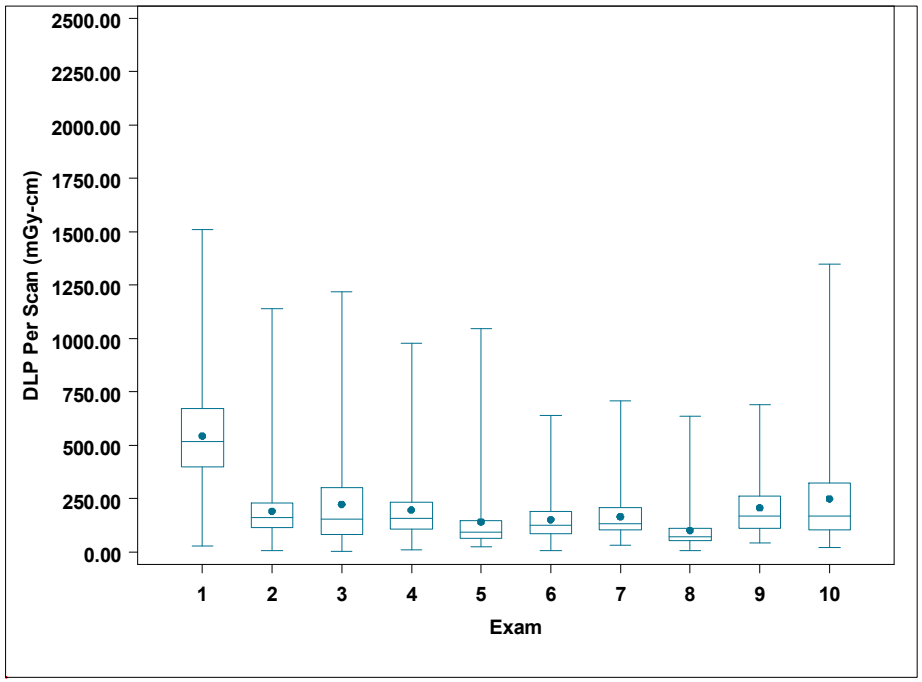
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT C SPINE WO IVCON
4 = CT ABDOMEN PELVIS WO IVCON
5 = CT CHEST W IVCON
6 = CT NECK W IVCON
7 = CT ABDOMEN PELVIS
8 = CT CHEST WO IVCON
9 = CT CHEST ABDOMEN PELVIS W IVCON
10 = CT HEAD PARANASAL SINUSES WO IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per scan



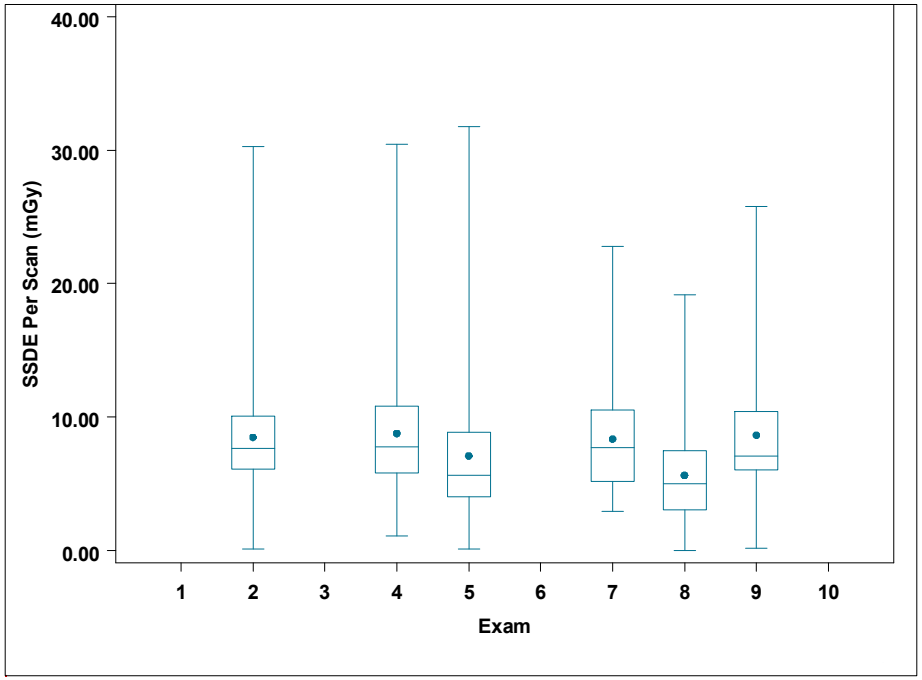
DLP per Scan



Your Facility's Performance on the 10 High Volume DIR Exams (Pediatric)

Age group 11-14

SSDE per Scan



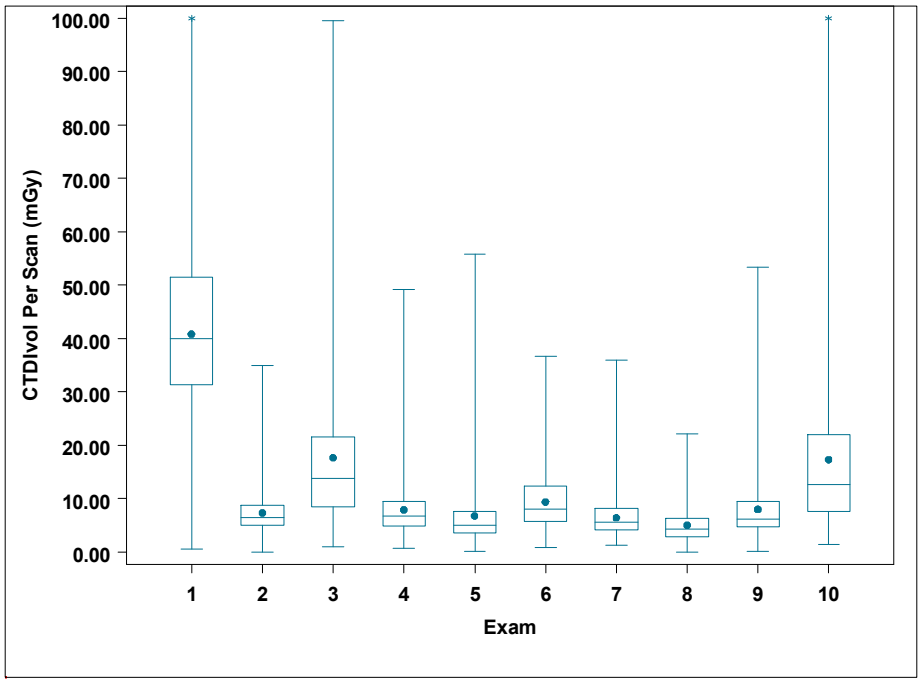
—— : Your Facility Median

Exam Key

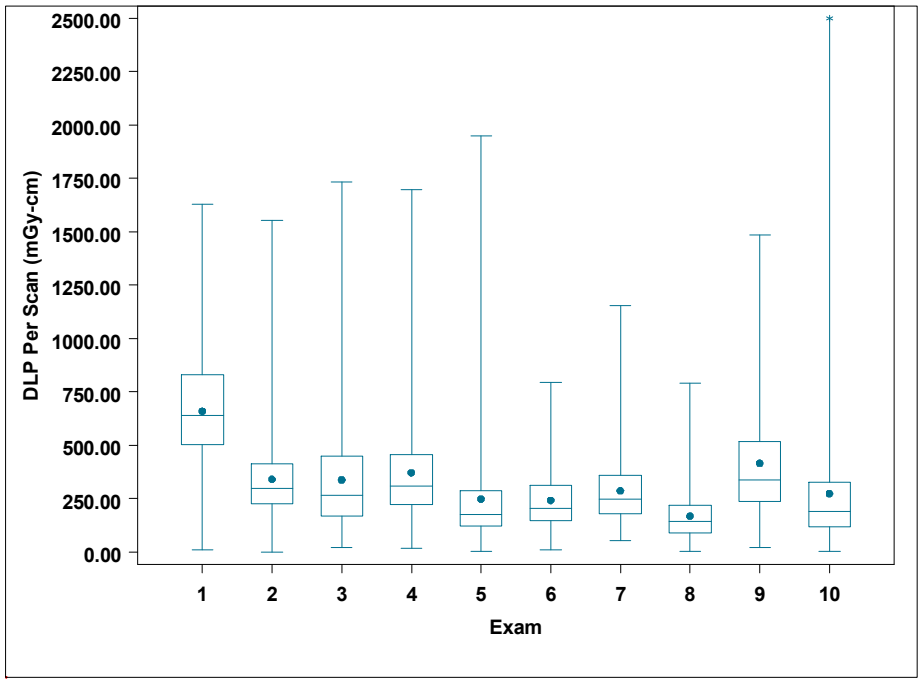
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT C SPINE WO IVCON
4 = CT ABDOMEN PELVIS WO IVCON
5 = CT CHEST W IVCON
6 = CT NECK W IVCON
7 = CT ABDOMEN PELVIS
8 = CT CHEST WO IVCON
9 = CT CHEST ABDOMEN PELVIS W IVCON
10 = CT HEAD PARANASAL SINUSES WO IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per scan



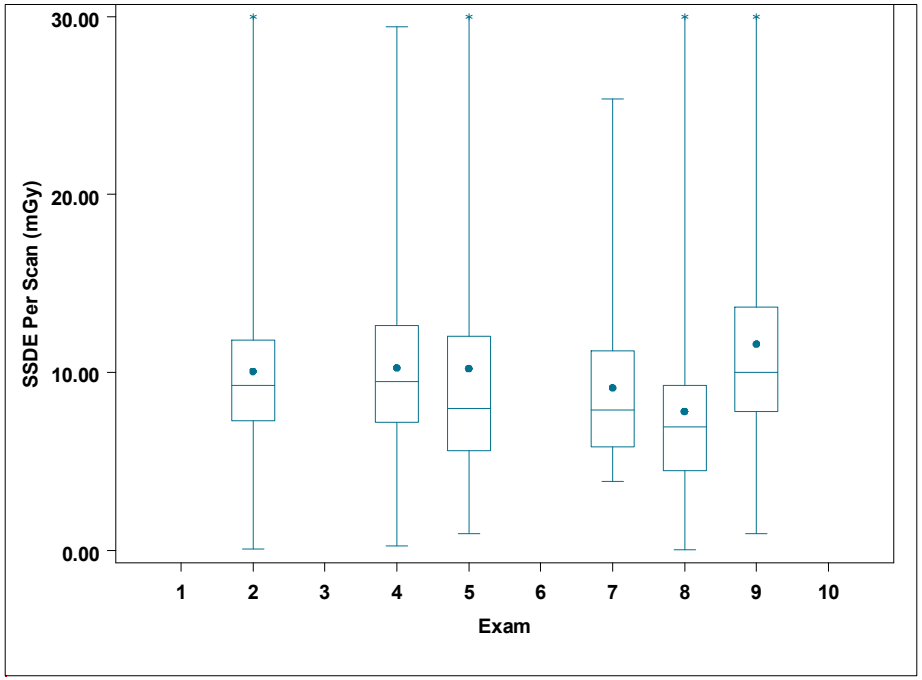
DLP per Scan



Your Facility's Performance on the 10 High Volume DIR Exams (Pediatric)

Age group 15-18

SSDE per Scan



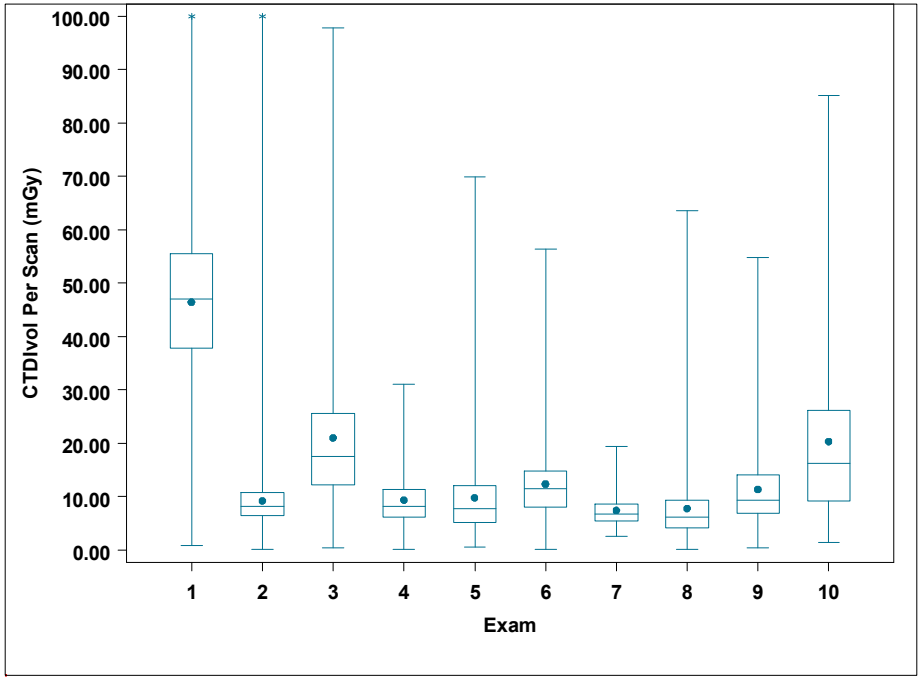
—— : Your Facility Median

Exam Key

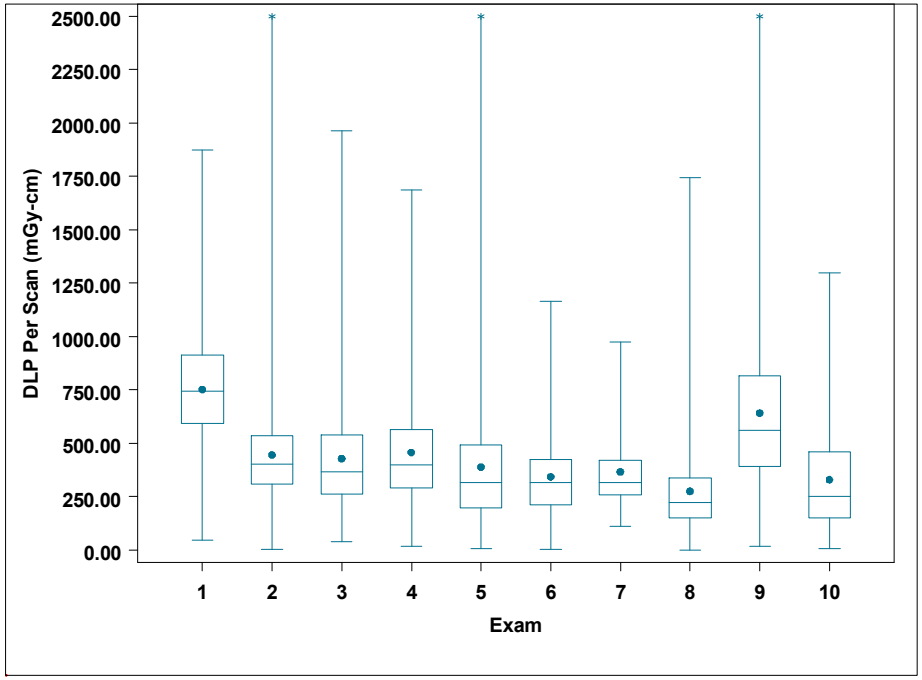
1 = CT HEAD BRAIN WO IVCON
2 = CT ABDOMEN PELVIS W IVCON
3 = CT C SPINE WO IVCON
4 = CT ABDOMEN PELVIS WO IVCON
5 = CT CHEST W IVCON
6 = CT NECK W IVCON
7 = CT ABDOMEN PELVIS
8 = CT CHEST WO IVCON
9 = CT CHEST ABDOMEN PELVIS W IVCON
10 = CT HEAD PARANASAL SINUSES WO IVCON

* *Extreme outliers were excluded for this exam for optimal presentation.*

CTDIvol per scan



DLP per Scan



Calculating the New Non-MIPS Measures from DIR

Beginning in 2017, the six Non-PQRS measures (ACRad 9-ACRad 14) from the Dose Index Registry (DIR) have been condensed into three new Non-MIPS measures (ACRad 31-ACRad 33) detailed below:

Measure	Title	Description
ACRad 31	Percent of CT Abdomen-Pelvis exams with contrast (single phase scan) for which Dose Length Product is at or below the size specific diagnostic reference level	Percent of CT Abdomen-Pelvis exams with contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level. Note: Calculated at facility/TIN level and assigned to all NPIs who read CT under that TIN
ACRad 32	Percent of CT Chest exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level	Percent of CT Chest exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level. Note: Calculated at facility/TIN level and assigned to all NPIs who read CT under that TIN
ACRad 33	Percent of CT Head/Brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size specific diagnostic reference level	Percent of CT Head/Brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level. Note: Calculated at facility/TIN level and assigned to all NPIs who read CT under that TIN

Dose Length Product (DLP) is a standardized parameter to measure scanner radiation output to a patient and is a useful index to compare protocols across different practices and scanners. Providing comparative data across exam types to a physician or site will help adjust imaging protocols to obtain diagnostic images using the lowest reasonable dose. While DLP itself is not a measure or estimate of actual patient radiation dose, it is closely related to doses received by patients.

The benefits of computed tomography are immense and certainly exceed the risks. However, this is only true when they are ordered appropriately and studies are optimized to obtain the best image quality with the lowest radiation dose.

Benchmarking Methodology

The new Non-MIPS measures from DIR calculate the percentage of exams that are equal to or lower than the benchmark (size specific diagnostic reference level for DLP). Reports contain comparisons of each facility's score relative to other peer facilities. For CMS reporting, physician or physician group performance is based on data across all locations at which they practice and will be benchmarked against other groups.

In 2017, ACR published U.S. Diagnostic Reference Levels and Achievable Doses for ten Adult CT Examinations (http://pubs.rsna.org/doi/abs/10.1148/radiol.2017161911?journalCode=radiology). The size specific DRLs published in this paper for DLPs were used to calculate the percentage of a facility's exams that are at or below the published DRLs. The summary of the DLP DRLs from the published paper are given below for reference.

Head exams are categorized using lateral thickness from scout images submitted by facilities. Body exams are categorized using the effective diameter that ACR calculates from scout images. For now, if exams do not include thickness information because the facility did not submit scout images, they will be compared with the average DRL for that body part. Going forward, we intend to exclude exams for which we did not receive scout images.

Table of DRLs for Abdome Pelvis with IV Contrast exams (used for calculating ACRad 31):

Effective diameter	DLP DRL
21-25[a]	394
25-29	524
29-33	755
33-37	1056
37-41	1266
>=41	1598
All[b]	995

[a]This category is used for all pediatric exams irrespective of the size. After ACR publishes the pediatric DRL paper, pediatric exams will be compared to pediatric DRLs.

[b]This category is used for adult exams where either the patient thickness was less than the smallest size category in this table or we did not receive a valid scout image to calculate patient thickness. In the 2018 reporting year these exams will be excluded from denominator as invalid exams.

Benchmarking Methodology (contd.)

Table of DRLs for Chest without IV Contrast exams (used for calculating ACRad 32):

Effective diameter	DLP DRL
21-25[a]	270
25-29	317
29-33	443
33-37	610
37-41	760
>=41	957
All[b]	545

Table of DRLs for Head brain without IV Contrast exams (used for calculating ACRad 33):

Lateral thickness	DLP DRL
12-14[a]	936
14-16	962
16-18	1020
18-20	1069
>=20	1192
All[b]	1011

[a]This category is used for all pediatric exams irrespective of the size. After ACR publishes the pediatric DRL paper, pediatric exams will be compared to pediatric DRLs.
[b]This category is used for adult exams where either the patient thickness was less than the smallest size category in this table or we did not receive a valid scout image to calculate patient thickness. In the 2018 reporting year these exams will be excluded from denominator as invalid exams.

Benchmarking Methodology (contd.)

To calculate the denominator for each of the DIR Non-MIPS measures we applied the following inclusion criteria:

1. Exams must be mapped to a RPID
2. Exams must be single scan
3. Exams must provide a non-zero value for both DLP and CTDIvol
4. Exams must have a DLP value greater or equal to CTDIvol
5. Exams must provide age
6. Exams must provide scout or localizer image to ACR for us to be able to calculate thickness

The published DRL paper used adult exams only. ACR is currently working on a pediatric DRL paper. To calculate the percentage of exams that met the benchmarks for pediatric patients and for adults who had thickness below 12 cm for head or 21 cm for chest or abdomen pelvis we used the DRLs for the smallest category as shown below:

Non-MIPS Measure	Thickness	DLP DRL
ACRad 31	21-25	394
ACRad 32	21-25	270
ACRad 33	12-14	936

Deciles: We ranked the percentages of each measure in 10 ascending groups called deciles. Deciles have a value from 0 to 9, with higher deciles indicating better performance for each measure.

QCDR Preview Report for your facility

Non-MIPS Measure	Number of valid exams[1]	Number of multiscan exams	Denominator[2]	Numerator[3]	Percentage at or below DRL[4]	Decile rank (range: 0-9)
ACRad 33: CT HEAD BRAIN WO IVCON	1	0	1	1	100	9

Review your pediatric data*

*No pediatric data available to show for QCDR measures. As mentioned before, for patients age 18 or under we used the DLP DRL of the smallest size range of a body part to calculate the measure. If the DLP used for a pediatric patient was greater than the DRL for the smallest-sized adult for a body part, that exam did not meet the performance benchmark.

[1]Number of valid exams: number of exams that were mapped, had non-zero DLP and CTDIvol, CTDIvol<DLP and age was not missing

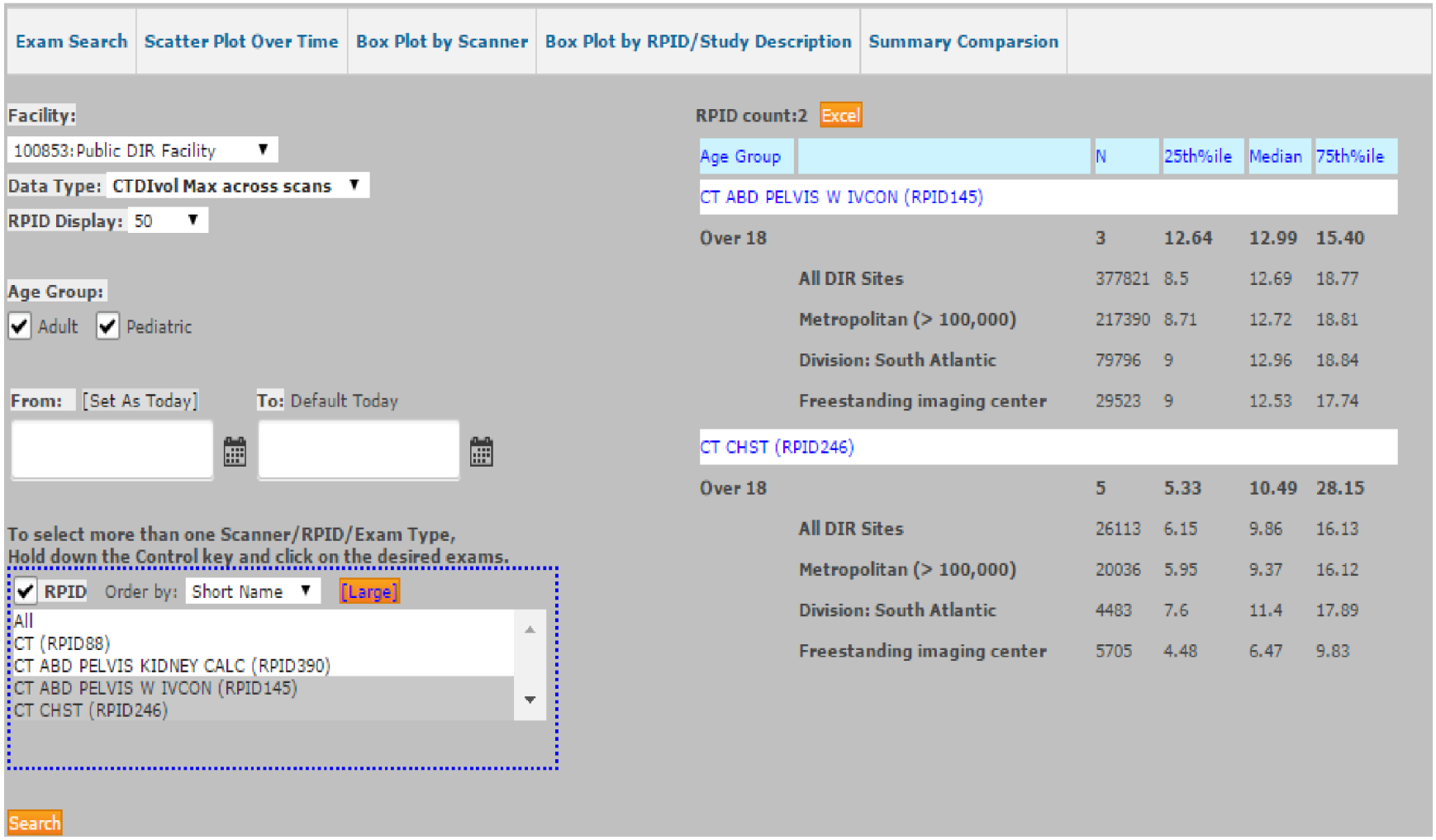
[2]Denominator: Number of valid exams-Number of multiscan exams

[3]Numerator: Number of exams among the denominator that are at or below the size specific DRL

[4]Percentage at or below DRL: (Numerator/Denominator)*100

Interactive Standardized Dose Index Report

Summary Comparsion



The Standardized DIR report enables you to visualize the distribution of your exams in almost real-time. It incorporates localizers with the CTDIvol received from the facility and removes timing runs and bolus tracking. For more detailed information refer to *http://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/DIR/Standardized%20DIR%20Report%20User%20Guide.pdf*

Maintenance of Certification (MOC): Practice Quality Improvement (PQI)

With the implementation of Continuous Certification and its annual look-back approach, diplomates must have completed at least one PQI Project or Participatory Quality Improvement Activity in the previous three years at each annual look-back.A PQI Project or Activity may be conducted repeatedly or continuously to meet PQI requirements. *(http://www.theabr.org/moc-dr-comp4)*

We are pleased to announce that our registries have been approved by the American Board of Radiology for fulfilling MOC Part IV requirements.We have provided a list of participating physicians and their NPIs.

Promote your participation in NRDR™! Download your marketing toolkit today.

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