

UW Madison Accreditation and Regulatory Compliance: CT imaging

University of Wisconsin Madison

Department of Radiology

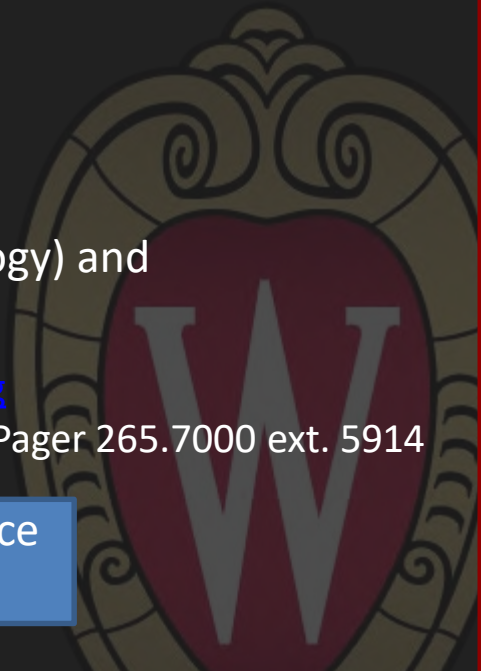
9/15/2017

Tim Szczykutowicz (UWSMPH Assistant Professor Radiology) and
Pete Wasmund (UWHC CT Imaging Manager)

Contact for this talk: tszczykutowicz@uwhealth.org or PWasmund@uwhealth.org

Primary contact in the event of an active audit: Pete Wasmund Phone 890.6993 Pager 265.7000 ext. 5914

This talk will be on the CT wiki under “compliance
resources” for future reference



Overview of Slide Set

- This slide set contains elements of performance/regulations/requirements etc. provided by bodies including The Joint Commission, the American College of Radiology, and the State of Wisconsin.
- After each item, we will list how UWHC is in compliance, we will show an example of the compliance, and we will list contact names and # for individuals tasked with carry out the compliance if appropriate.



The Joint Commission

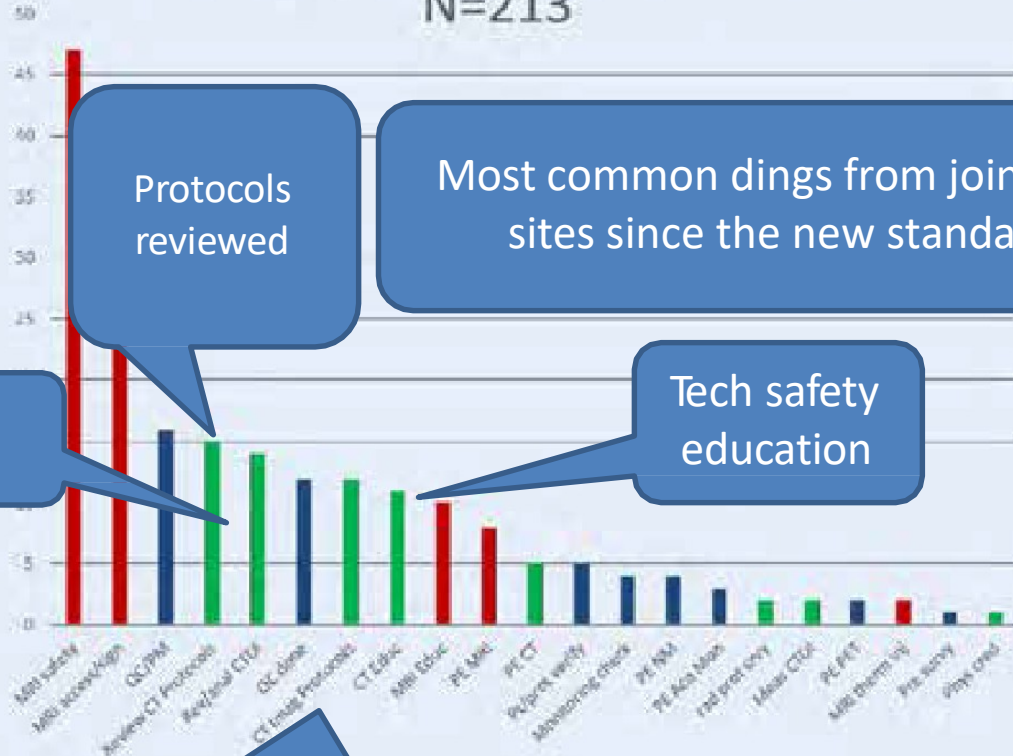
- Effective in July of 2015, TJC published a number of new requirements for diagnostic imaging services (MR, PET, CT)
 - https://www.jointcommission.org/diagnostic_imaging_standards/
- The document lists standards related to environment of care, human resources, provision/treatment/services, medical management, and performance improvement
 - Under each standard, there are “elements of performance”...these are the things TJC auditors will be checking for



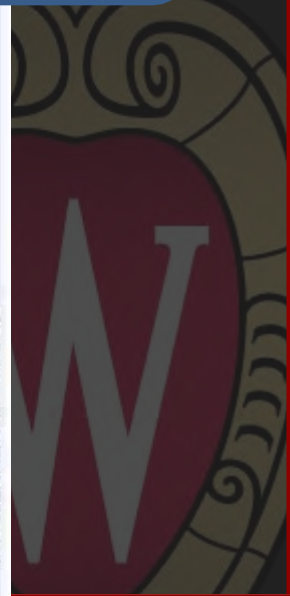
Yes, we need to worry about this stuff, CT makes up ~half the “dings” joint commission auditors find in radiology



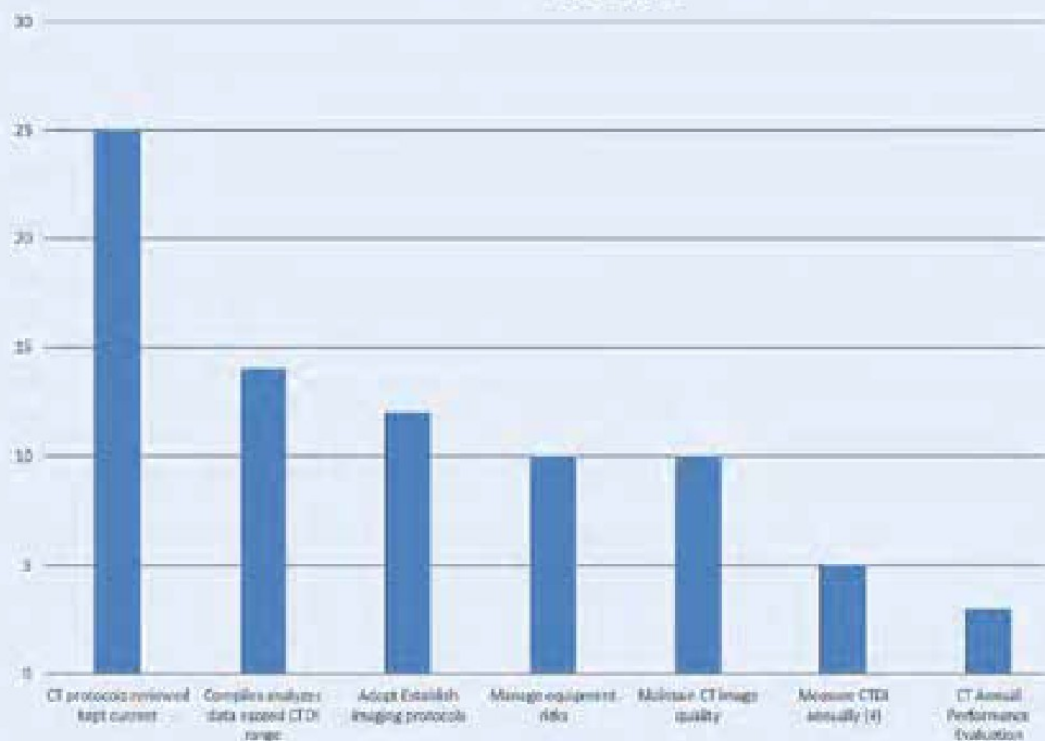
Total RFIs Scored 7/1/15-3/1/17 N=213



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RFI Dose Related Standards
7/1/15-3/1/17



TJC – environment of care

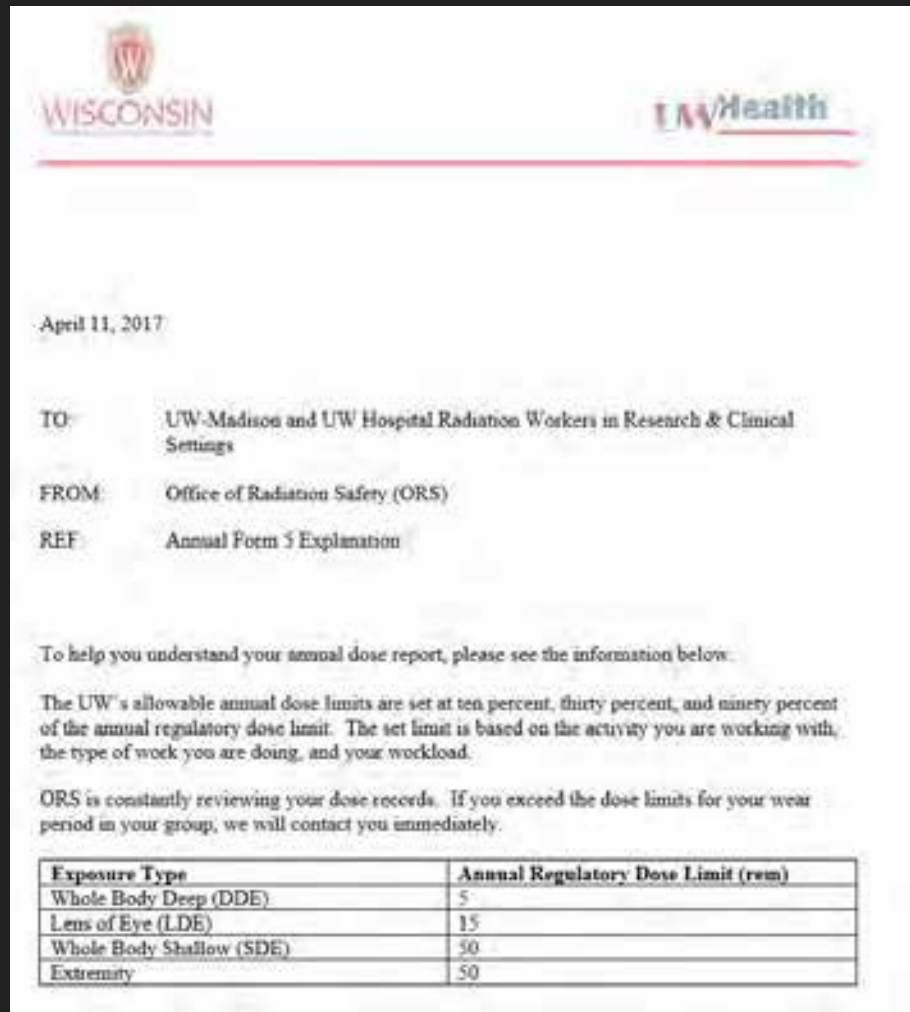
Key Personnel	Standards	TJC Requirements	UWHC Compliance
Radiation Health Physicist	EC.02.02.01 A. 17	For [critical access] hospitals that provide computed tomography (CT), positron emission tomography (PET), or nuclear medicine (NM) services: The results of staff dosimetry monitoring are reviewed at least quarterly by the radiation safety officer, diagnostic medical physicist, or health physicist to assess whether staff radiation exposure levels are “As Low As Reasonably Achievable” (ALARA) and below regulatory limits.	For radiation generating devices , it is 375mRem- deep dose, 1125mRem - lens dose and 3750mRem - skin or ring dose per wear period. If anyone exceeds these ALARA criteria, we contact the individual person to find how the exposure occurred. We do the investigation to find out the cause of elevated readings, whether the badge was left in procedure room or misplaced, if they did more procedures or were they exposed to radiation as patient, Do they wear a lead apron ? After the investigation is complete, we work closely with the individual to reduce future doses.

Badging at UW

- Badge Information can be found here
 - <https://ehs.wisc.edu/dosimetry-2/>
 - There is a video here that covers the different badge types (ring/whole body-chest/collar



- What do all the numbers mean...
 - Our radiation safety office has published a guide to your badge dosimetry report
 - Contact radiationsafety@wisc.edu for more information



Our radiation safety folks will only send you a report if **your dose is over 0.1 rem**

INCEPTION DATE: 01/01/1987

Landauer Individual Dose Report

Please enter Account Number and Serial Number from your dosimeter and click the "Submit" button.

Individual Dose Report (IDR) - System Demonstration

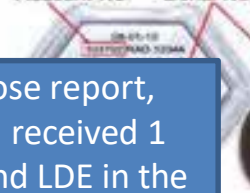
Individual Dose Report (IDR) - Glossary

Account Number *

Serial Number *

Submit

Account No. Serial No.



Account No.

Serial No.

Current year (Yr) for this Account No. and located with your Submitter's ID.



Example dose report, apparently I received 1 mrem DDE and LDE in the beginning of 2017

Want to see your dose report? Instructions for doing so are here <https://ehs.wisc.edu/dosimetry-2/>

To protect your privacy, no personal information is displayed.

History Results

The doses are displayed as shown.

Dose Results

Total Records: 8

Doses as of 2017/09/15 09:03 LST

Dose Period	Total DDE	Total LDE	Total SDE
2017	1	1	1
2018	1	1	1
Life	2	2	2

History Details

Dosimeter Dose

Total Records: 8

Doses as of 2017/09/15 09:40 CST

Account	Subaccount Name	Subaccount Code	Begin Wear Date	End Wear Date	Dosimeter Type	Dosimeter Location	Total DDE	Total LDE	Total SDE	Delta	Total Neutron	Fast Neutron	Thermal Neutron	Extremity	Frequency	Control Subtracted	Not in Assigned Dose	Unassigned	Note	Not Accurate	Derived	Status
195350	MEDICAL PHYSICS	MP1	2017/04/01	2017/06/30	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED
195350	MEDICAL PHYSICS	MP1	2017/01/01	2017/03/31	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED
195350	MEDICAL PHYSICS	MP1	2016/10/01	2016/12/31	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED
195350	MEDICAL PHYSICS	MP1	2016/07/01	2016/09/30	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED
195350	MEDICAL PHYSICS	MP1	2016/04/01	2016/06/30	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED
195350	MEDICAL PHYSICS	MP1	2016/01/01	2016/03/31	Fa	Chest	1	1	1						Quarterly						MEASUR	REPORTED

To protect your privacy, no personal information is displayed

History Results

The doses are displayed in tables

Dose: RasmRn

Total Records: 4

Doses as of 2017/05/15 10:03 CST

Dose Period	Total DCR	Total
Q22017	2	2
Q317	2	2
Q417	0	0
Lifetime	2	2

Total Handover	Extremity
	000
	000
	00
	000

Example dose report from a medical
physic resident, they did their nuc med
rotation in the second quarter of 2017...as
you can see here their dose reports
reflects that

Page 1 of 1 Print View

Export Results to: Excel Export View Details

History Details

Dosimeter: Dose

Total Records: 11

Doses as of 2017/05/15 10:03 CST

Account	Subcontract Name	Subcontract Code	Begin Injur Date	End Injur Date	Dosimeter Type	Dosimeter Location	Total DCR	Total DCR	Total DCR	Rate	Total Handover	Fast Handover	Thermal Handover	Extremity	Frequency	Control Subcontract	Not in Assigned Dose	Unused	Rate	Not Accountable	Dosimeter	Status
10000	MEDICAL PHYSICS	MP1	2017/01/01	2017/03/31	Pa	Chest									Quarterly							SHIPPED
10000	MEDICAL PHYSICS	MP1	2017/07/01	2017/09/30	U	Right Finger									Quarterly							SHIPPED
10000	MEDICAL PHYSICS	MP1	2017/04/01	2017/06/30	Pa	Chest	2	3	3						Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2017/04/01	2017/06/30	U	Right Finger								100	Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2017/01/01	2017/03/31	Pa	Chest	M	M	M						Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2017/01/01	2017/03/31	U	Right Finger								M	Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2016/10/01	2016/12/31	Pa	Chest	M	M	M						Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2016/10/01	2016/12/31	U	Right Finger								M	Quarterly							MEASURE REPORTED
10000	MEDICAL PHYSICS	MP1	2016/07/01	2016/09/30	Pa	Chest	M	M	M						Quarterly							MEASURE REPORTED

Page 1 of 1 Print View

Export Results to: Excel Export

Dose report explained

- Dose equivalents below the minimum reportable dose for the current monitoring Period are recorded as “M.” The minimum reportable dose varies according to the dosimeter type and radiation quality.

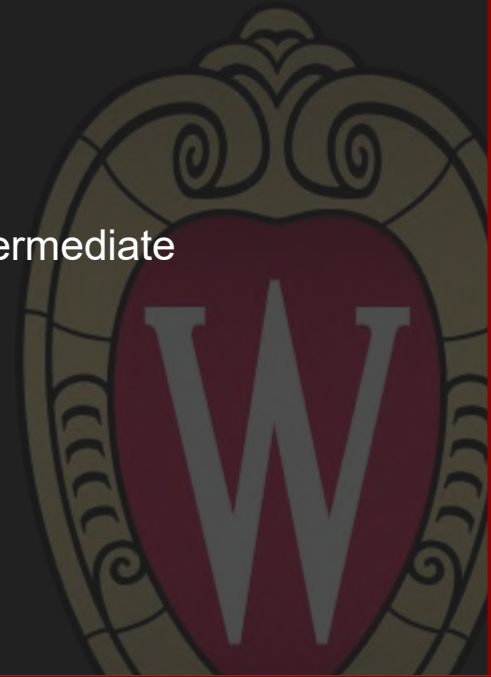
Photon (x or gamma ray): 1 mrem (10 μ Sv)

Beta: 10 mrem (100 μ Sv)

Neutron: 20 mrem (200 μ Sv) fast and 10 mrem (100 μ Sv) thermal/intermediate

Fetal: 1 mrem (10 μ Sv)

Ring: 30 mrem (300 μ Sv)



TJC – environment of care

Key Personnel	Standards	TJC Requirements	UWHC Compliance
CT Imaging Manager Radiology Engineering Program Coordinator	EC.02.04 .01 A. 10	The [critical access] hospital identifies quality control and maintenance activities to maintain the quality of the diagnostic computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), and nuclear medicine (NM) images produced. The [critical access] hospital identifies how often these activities should be conducted. (See also EC.02.04.03, EP 15)	Process for manufacturer preventative maintenance is detailed in (http://ei-sharepoint/sites/SMPH/CTProtocols/_layouts/15/viewlsts.aspx), document 7.6 Control of equipment, Section 5.3 Calibration System. Reports of maintenance activities are available from Radiology Engineering or Program Coordinator

This is what GE sends us after we “i-link” something

Note – these GE invoices all say \$0 since we pay a flat “premium” for parts and labor annually for each scanner. This does not cover parts we break though...like driving a patient transport into a CT scanner...

This is not an invoice

GE Healthcare

Service Report

Facility Name: UNIVERSITY OF WISCONSIN HOSPITAL & CLINICS

Service Request #: 1-214210797361

Equipment ID: 605263GT660

Serial #: 1

Service Type: Corrective

Product Description: OPTIMA CT660 GT1700
MKE2.5

Model: OPTIMA CT660 GT1700
MKE2.5

Initial Equip Status: Up

Contact Name:

Contact Phone:

Contact Email:

Problem Description: We were performing our weekly QA exam with the phantom, and when we got to our hi contrast resolution series 4 portion of the QA, the phantom looks off center, and the image is partially cut off. We ended, redid the exam, recentered the phantom, and when we got to series 4 of the weekly QA it still looks to be off center and the image is cut off. Is this of concern? Image:40026-4-4

Open Date/Time(GMT): 09-Aug-2017 22:42

Closed Date/Time(GMT): 10-Aug-2017 14:12

Labor:

Activity#	Date	Start Time (GMT)	End Time (GMT)	Total Hours	Billable Standard Hours	Billable Overtime Hours	Billable Premium Hours
1-214210797402	10-Aug-2017	10-Aug-2017 14:07	10-Aug-2017 14:11	0.07	0.00	0.00	0.00
Total Activity Labor Hours:				0.07	0.00	0.00	0.00
Total Service Request Labor Hours:				0.07	0.00	0.00	0.00

Travel:

Activity#	Date	Start Time (GMT)	End Time (GMT)	Total Hours	Billable Standard Hours	Billable Overtime Hours	Billable Premium Hours
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GE Healthcare Proprietary & Confidential

Generated on: 15-Sep-2017

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09/15/2017 10:28 AM

Control	Description	Manufacturer	Model	Serial	Time				
Work Order	Request Description	Result Description	Fault Description		Labor				
Status	Worker	Account	Issue Date	Start Date	Complete Date	Safety	Materials	Misc	Total
			Facility		Department		Tax	Credits	
Work Order Description									
074118	MAGNIG SYSTEM, CT	GE HEALTHCARE			OPTIMA 660	608263CT660			0
1-217333	Service Request	Serviced by Vendor							\$0.00
Closed:	69272	61-00220	08/31/2018	08/31/2018	09/02/2018	Passed			\$0.00
	Beckman, Heidi	CHS-UH			RADIOLOGY- COMPUTED TOMOGRAPHY - CSC 3252				\$0.00
							\$0.00	\$0.00	\$0.00
GE Service Request #: 1-197099851621 Problem Description: CD Thor 9/1 0709CT Caller is not able to launch login. Engineer Name: David, McKenney Problem Found: caller is not able to launch login. TSE unable to contact customer at the phone number listed in the activity. Action Taken: TSE called customer twice at the phone number in the activity. No answer. Must have rang for over 5 minutes. Someone is logged in the scanner. The scanner finished fast cals at 17:57hrs. Split field activity to site FE for call back tomorrow morning.									
Engineer Name: John, Kretschmar Problem Found: EA3 admin account is corrupted Action Taken: restored reconfig file from system state. Verification Details: logged out of scanner and was able to sucessfully log into scanner as expected									
074118	MAGNIG SYSTEM, CT	GE HEALTHCARE			OPTIMA 660	608263CT660			0
1-218777	Mfr Service Bulletin	Serviced by Vendor							\$0.00
Closed:	8486	61-00220	09/22/2018	09/22/2018	09/22/2018	Not Applicable			\$0.00
	Heindl, Timothy	CHS-UH			RADIOLOGY- COMPUTED TOMOGRAPHY - CSC 3252				\$0.00
							\$0.00	\$0.00	\$0.00
Removed Exam Split option, reloaded option and configured for HES mode.									
074118	MAGNIG SYSTEM, CT	GE HEALTHCARE			OPTIMA 660	608263CT660			0
1-218784	Checkout/Repair	Serviced by Vendor			Unpredictable Failure				\$0.00
Closed:	8486	61-00220	09/14/2018	09/14/2018	09/16/2018	Not Applicable			\$0.00
	Heindl, Timothy	CHS-UH			RADIOLOGY- COMPUTED TOMOGRAPHY - CSC 3252				\$0.00
							\$0.00	\$0.00	\$0.00

The last slide was GE
sends us, here is how we
record each of these
events

ST4118	MAJOR SYSTEM CT	GE HEALTHCARE	OPTIMA 800	808263CT800	3	
1-223579	Checkout/Repair	Serviced by Vendor	Immediate Failure		\$0.00	
Closed	\$400	5/1-80228	1/15/2016	1/15/2016	Not Applicable	\$0.00
	Head, Trolley	CHS-JH	RADIOLOGY - COMPUTED TOMOGRAPHY - CNC 3252		\$0.00	
5-200711248442 Clock is 5 minutes slow. Completed by GE SR Attached						
ST4118	MAJOR SYSTEM CT	GE HEALTHCARE	OPTIMA 800	808263CT800	3	
1-224958	Preventive Maintenance	PM Completed by Vendor			\$0.00	
Closed	\$400	5/1-80228	1/15/2016	1/15/2016	Not Applicable	\$0.00
	Head, Trolley	CHS-JH	RADIOLOGY - COMPUTED TOMOGRAPHY - CNC 3252		\$0.00	
5-199585200845 PM Completed by GE SR Attached						
ST4118	MAJOR SYSTEM CT	GE HEALTHCARE	OPTIMA 800	808263CT800	3	
1-225151	Checkout/Repair	Serviced by Vendor	Immediate Failure		\$0.00	
Closed	\$400	5/1-80228	1/15/2016	1/15/2016	Not Applicable	\$0.00
	Head, Trolley	CHS-JH	RADIOLOGY - COMPUTED TOMOGRAPHY - CNC 3252		\$0.00	
5-200857144248 IP address change and In Site Checkout Completed by GE SR Attached						
ST4118	MAJOR SYSTEM CT	GE HEALTHCARE	OPTIMA 800	808263CT800	3	
1-227188	Checkout/Repair	Serviced by Vendor	Immediate Failure		\$0.00	
Closed	\$400	5/1-80228	5/4/2016	5/4/2016	Not Applicable	\$0.00
	Head, Trolley	CHS-JH	RADIOLOGY - COMPUTED TOMOGRAPHY - CNC 3252		\$0.00	
5-128588040791 review logs. Completed by GE SR Attached						

Asset Last/Next Test Dates Report

Dates shown effective as of 09/15/2017 09:59 AM

Next Run is on 09/15/2017 10:29 AM

Control #	DeviceType	Model	Manufacturer	Sn#	InstallDate	LastCompleteDate	NextDueDate	Freq
Facility: CHS-UH								
236765	DEFIBRILLATOR, EXTERNAL	R-SERIES	ZOLL	AF14F037425	09/11/2014	09/13/2017	03/13/2018	Semia
271485	ELECTROSURGICAL UNIT, GENERAL	CERTUS 140	NEUWAVE MEDICAL	NM15NEA00371	10/13/2015	10/14/2015	ns	ns
074083	IMAGING SYSTEM, CT	OPTIMA CT580 W	GE HEALTHCARE	608263WBCT2	10/15/2012	07/24/2017	10/24/2017	Qtly
074117	IMAGING SYSTEM, CT	750HD	GE HEALTHCARE	608263CT750	06/15/2013	07/03/2017	07/03/2018	Annua
074118	IMAGING SYSTEM, CT	OPTIMA 660	GE HEALTHCARE	608263CT660	07/01/2013	07/14/2017	07/14/2018	Annua
074142	IMAGING SYSTEM, CT	OPTIMA 660	GE HEALTHCARE	608890ECCT	01/05/2015	06/29/2017	06/29/2018	Annua
074158	IMAGING SYSTEM, CT	REVOLUTION	GE HEALTHCARE	608263REVCT	10/16/2015	05/31/2017	9/30/2017	Qtly
074171	IMAGING SYSTEM, CT	750HD	GE HEALTHCARE		01/23/2016	04/26/2017	04/26/2018	Annua
064788	IMAGING SYSTEM, WORKSTATION	AW4.2	GE HEALTHCARE		04/01/2006	02/28/2010	ns	ns
074041	INSUFFLATOR, SURGICAL, CO2	6400	BRACCO	6400-80465	02/15/2005	01/28/2014	ns	99
029339	MONITOR, PHYSIOLOGICAL	3150	IVY BIOMEDICAL SYSTEMS	13010605	03/18/2013	05/28/2015	ns	ns
070921	POWER INJECTOR	ENVISION	MEDRAD	10959	01/01/1998	08/17/2017	08/17/2018	Annua
074043	POWER INJECTOR	STELLANT D	MEDRAD	27302	01/15/2007	12/09/2016	12/09/2017	Annua
074044	POWER INJECTOR	STELLANT D	MEDRAD	27298	01/15/2007	11/10/2016	11/10/2017	Annua
074045	POWER INJECTOR	STELLANT D	MEDRAD	25965	06/12/2007	12/05/2016	12/05/2017	Annua
074077	POWER INJECTOR	STELLANT D	MEDRAD	30325	02/15/2009	11/10/2016	11/10/2017	Annua
029349	POWER INJECTOR	STELLANT D	MEDRAD	10107	03/18/2013	11/15/2016	11/15/2017	Annua
040365	SURGICAL, NAVIGATION SYSTEM	CAS-One	MET Laboratories	120	01/04/2017	n/a	01/04/2018	Annua
CHS-UH Total: 18								
Grand Total: 18								

Parameters

Service Center : 4102 Clinical Engineering Archived Records : Not-included

In addition to service events, we also keep track of preventive maintenance events (PMs) for all our equipment

Note: at UWHC we get CT scanner PMs every 4 months and power injector PMs every year

TJC – environment of care

Key Personnel	Standards	TJC Requirements	UWHC Compliance
Med Physics Radiology Engineering	EC.02.04 .03 C. 15, A. 17 A. 19 & A. 23	The [critical access] hospital maintains the quality of the diagnostic computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), and nuclear medicine (NM) images produced.	RPS provides testing. Reports sent to Radiology Engineering for documentation storage.

Radiological Physics Services (Ranallo) provides testing for UWHC – Radiology and Meriter CT
UWSMPH-Radiology (Szczykutowicz) provides testing for UWHC Rad Onc, Madison VA, Fort Atkinson
All other community sites use a non UW affiliated physics provider

CT Scanner Annual QA: St. Mary's Janesville Hospital DHO (GE Optima RT 580)

Timothy P. Szczykutewicz, Ph.D., DAIR

Report Date: 09/11/2017

Testing Date: 09/05/2017

Department of Radiology
1005 WINR

1111 Highland Avenue
University of Wisconsin-Madison, WI 53706
tszczykutewicz@urhealth.org
cell: 716-560-7751
office: 608-263-5729

Background of this scanner

Scanner testing was requested for this location via the physics team at Turrell Bay Cancer Wisconsin. A new BAA and service agreement was executed between the University of Wisconsin Turrell Bay before testing in 2016.

I arrived on site at 9 AM. Todd Meyers (local physics support for RO) performed a full test. I finished testing around 2-45 PM. Before leaving, I verbally communicated to Todd Meyers that the scanner was safe for clinical use and that a full report would follow. Todd Meyers ran three tests in my presence at the start of the day. I used some of those results in my own report. I used the Meyers method for raising the noise limit due to the use of the flat table top. I agree with his and the new limit I find appropriate.

The testing performed was all compliant with AAPM task group report 46 (this report is in the ITT environment) as well as Joint Commission and American College of Radiology Requirements, that since there were no diagnostic protocols on the scanner, as this scanner will not be used for diagnostic scanning, no diagnostic clinical protocols were reviewed and the ACR phantom ports were not performed. All other tests were performed with the exception of the parts of TG-46 that require a diagnostic protocol.

Last year (2016), the scanner had an improperly displayed "no sign" outside the scan room upon my 2017 visit.

Last year (2016) the scanner's own external lasers were disabled. They are still disabled. The LAP lasers were functional this year and were used for all testing of the laser to localizer to scan testing.

1. OVERVIEW AND RECOMMENDATIONS

Todd Meyers and I had discussed the use of door interlocks in the CT scan environment. I do not advise door interlocks for any CT room in diagnostic or therapy setting. The following text is from NCRP Report 147 section 2.2.3.3 Door Interlocks, Warning Lights, and Warning Signs. Door interlocks that interrupt x-ray production are not desirable since they may disrupt patient procedures and thus result in unnecessary repeat examinations.

I showed Todd Meyers a free on line resource while on-site, the UW daily/monthly/weekly QA manual and accompanying resources, all found at <https://www.radiology.wisc.edu/protocols/CT/resources.php>. I also showed him and discussed briefly our dose check manual which can be found at the same location. We discussed the need and relevance of dose limits and alarms using the dose check feature for the RO environment. I advise

you to set an alert value of 1 Gy. I also advise we schedule a t-conn or meeting to discuss some protocol tweaks to your CT scan protocols. I will elaborate on some suggestions in the protocol review section of this report.

I forgot to test the room intercom, this should be tested. It can be tested by making sure an operator can communicate with a person lying on the couch (they must be lying on the couch since the intercom is inside the scanner bore and likely will not work if the intercom is tested with a person simply inside the room but not on the couch). This should be tested monthly by local staff as well.

Table 1 lists all test performed and the outcome.

Table 1. Overview of tests performed

Test	Result
room safety features	Pass
scanner safety features	Pass
artifact check	Pass
low contrast detection	Pass
Spatial Resolution	Pass
Noise	Pass
CT Number Check	Pass
Dose (scanner output)	Pass
Actual beam width	Pass
Slice Thickness	Pass
Lasers	Pass
Table Movement	Pass
Lasers to scout to image consistency	Pass
Monitor luminance/uniformity	Pass
Geometric distortion	Pass
Spatial accuracy	Pass

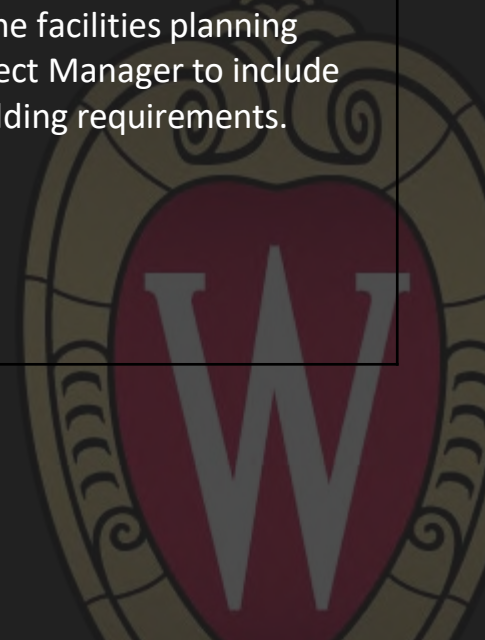
No gantry tilt testing was performed, the tilt option on this system was disabled at the request of the local physics team. In this setting, that is a good idea.

Note, all images acquired during this testing were not sent to any external networks/databases. All data needed for this test was captured by TPS while on-site. However, if possible, I recommend saving the data for future reference. The protocol used for testing were stored under the "service" tab in location "service cat 7". Some scan time changes were made during the testing.

Physics reports must meet a list of required testing criteria – determined by TIC and ACR

TJC – environment of care

Key Personnel	Standards	TJC Requirements	UWHC Compliance
Project Manager RPS	EC.02.0 6.05 A.4 & A.6	For computed tomography (CT), positron emission tomography (PET), or nuclear medicine (NM) services: Prior to installation of new imaging equipment, replacement of existing imaging equipment, or modification to rooms where ionizing radiation will be emitted or radioactive materials will be stored (such as scan rooms or hot labs), a medical physicist or health physicist conducts a structural shielding design * assessment to specify required radiation shielding.	Preconstruction risk assessment will be completed by the facilities planning Project Manager to include shielding requirements.





Radiation Shielding Evaluation CT Scanner Room E3365 At the University of Wisconsin 600 Highland Avenue Madison, Wisconsin...

John R. Vetter, PhD
A.B.R. Certified Diagnostic Radiologist
Medical Physics Department
University of Wisconsin
August 14, 2017

I. Introduction and Methods

This report provides an evaluation of the radiation protection for the replacement of the CT Scanner in Room E3365, at The University of Wisconsin, Madison, Wisconsin. The General Electric 16 slice CT scanner was replaced with a General Electric 64 slice Revolution GSI scanner. The Revolution scanner has a longer patient table, requiring expansion of the room by moving the control room wall outward into the general control area. All other radiation shielding will remain in place. The existing walls and doors consist of 2' thick lead brick. Shielding calculations were performed to ensure the design of this lead

Location	Occupancy Factor (T)	Design Goal (max. weekly dose / occupancy factor, P/T)	Distance from Isocenter	Unshielded Dose Per Patient	Unshielded Weekly Dose
A - Control Room Wall/Window	100%	100 μ Sv/week	4.9 m	42.7 μ Sv	6.8 mSv
B - CT Scanner Room E3365	100%	100 μ Sv/week	3.9 m	66.6 μ Sv	10.7 mSv
C - Corridor	20%	100 μ Sv/week	2.6 m	165.1 μ Sv	26.4 mSv
D - Corridor Door	12.5%	100 μ Sv/week	3.2 m	175.4 μ Sv	28.1 mSv
E - Workroom	100%	20 μ Sv/week	4.2 m	22.9 μ Sv	3.8 mSv
F - Corridor	20%	100 μ Sv/week	4.6 m	79.7 μ Sv	12.8 mSv
G - Corridor Door	12.5%	100 μ Sv/week	4.8 m	58.4 μ Sv	9.3 mSv
Area Above the Scanner Room at Maximum CT Scatter Dose	100%	20 μ Sv/week	4.2 m	45.9 μ Sv	7.3 mSv
Area Below the Scanner Room at Maximum CT Scatter Dose	100%	20 μ Sv/week	5.0 m	32.4 μ Sv	5.2 mSv

Difference between these to columns is what the lead/concrete/drywall/wood shielding does for us (reduces dose)

Example shielding report. At every location one of you or a patient or an office work is going to be, physics calculates how much dose they will get



In Wisconsin, we have to send our shielding plans to the state to get approved



May 6, 2015

John Vetter, PhD, Medical Physicist
UW Medical Physics Department
1005 Wisconsin Institute for Medical Research
1111 Highland Avenue
Madison, WI 53705-2275

RE: Radiation shielding – New PET-CT in existing CT Room #1142
American Family Children's Hospital
1675 Highland Avenue
Madison, WI

AMENDED PLAN March 6, 2015

Dear Dr. Vetter:

We have reviewed the shielding plan package that was submitted on 11/3/2014 for approval of the installation of the new PET-CT scanner in CT Room #1142 at the American Family Children's Hospital, Madison, WI. Radiation shielding must meet or exceed the **MINIMUM** shielding required in Wisconsin Administrative Code, DHS 157, Radiation Protection and NCRP Reports #147 & #151.

The shielding plan, dated March 6, 2015 is approved. We agree with the amended plan results calculated and submitted by John R. Vetter, Ph.D., Diagnostic Medical Physicist. The alteration of the uptake room, patient bathroom and shielding to the operator wall are duly noted.

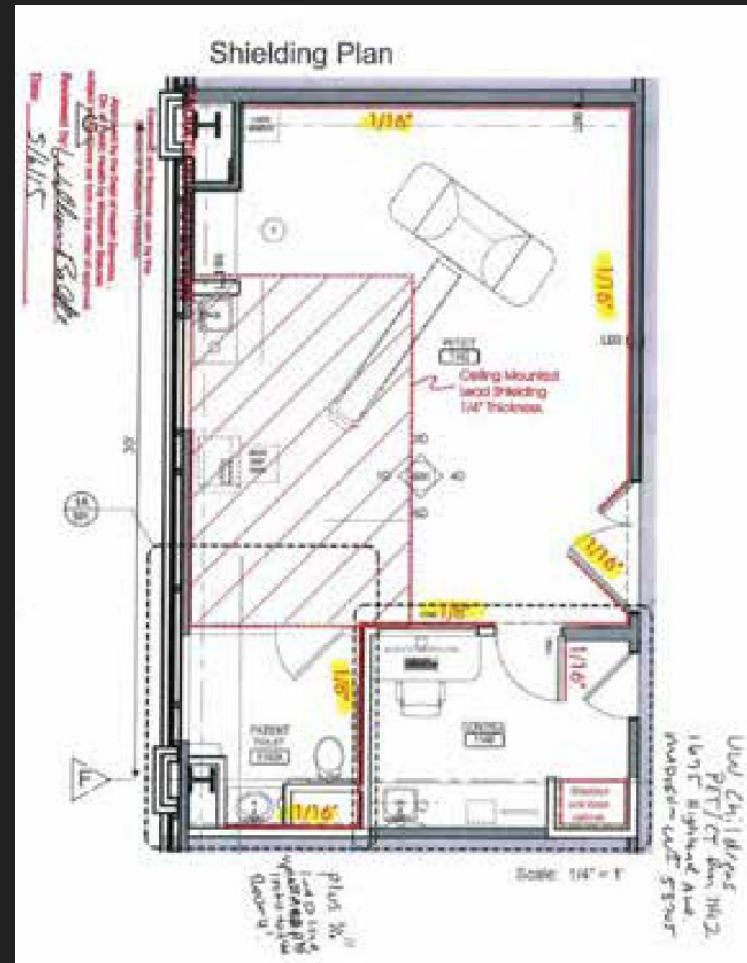
The department may require additional shielding after initial approval if plan specs change or if subsequent analysis of operating conditions indicates the possibility of a person receiving a dose in excess of the limits prescribed in Code.

If you have any questions, feel free to call our office.

Sincerely,

William Balke

William Balke
Radiation Engineering Specialist Supervisor
Section of Radiation Protection
william.balke@wisconsin.gov
608-267-4787



TJC – human resources

Key Personnel	Standards	TJC Requirements	UWHC Compliance
Med Physics	HR.01.02.05 C. 20	The [critical access] hospital verifies and documents that diagnostic medical physicists who support computed tomography (CT) services have board certification in diagnostic radiologic physics or radiologic physics by the American Board of Radiology, or in Diagnostic Imaging Physics by the American Board of Medical Physics, or in Diagnostic Radiological Physics by the Canadian College of Physicists in Medicine, or meet all of the following requirements:	The credentials of our medical physics support can be verified online using the American Board of Radiology: http://www.theabr.org/find-a-radiologist?name=Ranallo&location=Madison WI

Verify Board Certification Status

Find the certification status of certified physicians. Only those that the ASIR has certified will appear in the search results.

First Name [Optional]	Last Name*	State [Optional]	
	RANALLO	All States	Search

SEARCH TIPS:

- Geographic data is not available for those with lifetime certification - mostly attained before 2002.
- Physicians may be listed under the location where they were certified rather than where they now work.
- [Need help?](#) Watch an instructional video about searching and understanding ASIR certification verification.

Page 1

Dr. Frank Nunzio Ranallo

View/Print

Practice Locations: Madison, WI

Certificate	Status ⓘ	Valid Through ⓘ	Maintenance ⓘ	MOC Requirements ⓘ
Diagnostic Medical Physics	Valid	03/02/2021	Not Required	Not Required

Dr. John Robert Vetter

View/Print

Practice Locations: Sun Prairie, WI

Certificate	Status ⓘ	Valid Through ⓘ	Maintenance ⓘ	MOC Requirements ⓘ
Diagnostic Medical Physics	Valid	01/02/2020	Not Required	Not Required

Dr. Timothy Peter Szczukowicz

View/Print

Practice Locations: Madison, WI

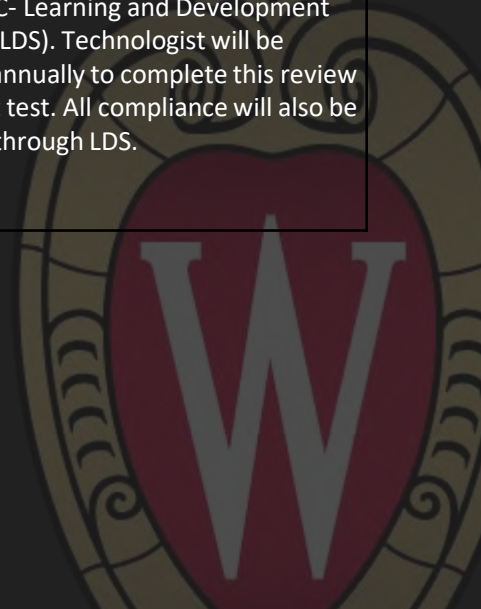
Participating in MOC

Certificate	Status ⓘ	Valid Through ⓘ	Maintenance ⓘ	MOC Requirements ⓘ
Diagnostic Medical Physics	Valid	03/02/2019*	Maintained	Meeting



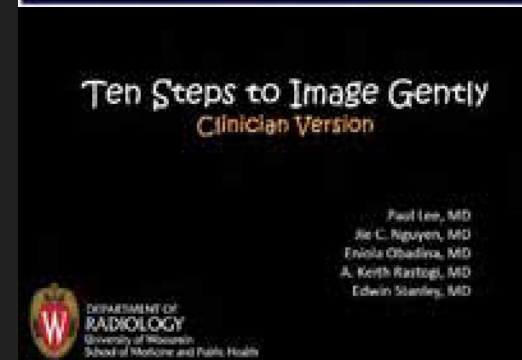
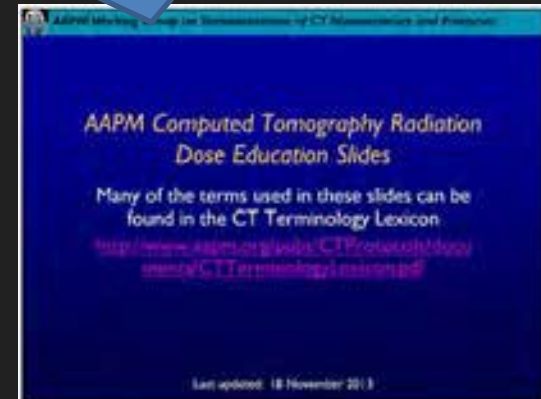
TJC – human resources

Key Personnel	Standards	TJC Requirements	UWHC Compliance
Radiology Manager	HR.01.05.03 C. 14	The [critical access] hospital verifies and documents that technologists who perform diagnostic computed tomography (CT) examinations participate in ongoing education that includes annual training on the following: Radiation dose optimization techniques and tools for pediatric and adult patients addressed in the Image Gently® and Image Wisely® campaigns Safe procedures for operation of the types of CT equipment they will use	GE has produced a PPT for Computed Tomography dose which will be loaded to UWHC- Learning and Development System (LDS). Technologist will be alerted annually to complete this review and post test. All compliance will also be tracked through LDS.



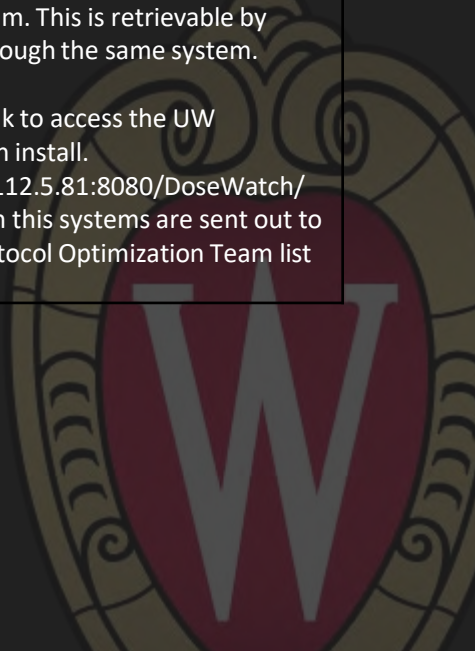
Official slide set we have on LDS (this is the one you need to review annually and attest to)

Other training options



TJC – provision of care/treatment/services

Key Personel	Standards	TJC Requirements	UWHC Compliance
Radiology CT manager CT Lead Technologist Radiology CT Physicist	PC.01.02.15 C. 5, A. 10,& A. 12	The [critical access] hospital documents in the patient's record the radiation dose index (CTDIvol, DLP, or size-specific dose estimate [SSDE]) on every study produced during a diagnostic computed tomography (CT) examination. The radiation dose index must be exam specific, summarized by series or anatomic area, and documented in a retrievable format.	Compliance with this standard is met through sending CT dose slides to our PACS system. This is retrievable by patient through the same system. Use this link to access the UW DoseWatch install. http://10.112.5.81:8080/DoseWatch/ Alerts from this systems are sent out to the CT Protocol Optimization Team list serv.



Please remember
always to send dose
slides, sometime
people forget,
especially on split
exams!

As a back up, we have dose watch
which saves all irradiation event
data and can be searched by
patient ID

-we also use dose watch for all
quality control monitoring of
dose, technologist workflow,
technologist compliance with
protocols, etc.

Exam Description: CT ABDOMEN PELVIS W IV

Dose Report					
Series	Type	Scan Range (mm)	CTDIvol (mGy)	DLP (mGy-cm)	Phantom cm
1	Scout	-	-	-	-
200	Axial	168.750-168.750	20.83	20.80	Body 32
2	Helical	14.500-1475.125	17.57	879.96	Body 32
Total Exam DLP:				900.76	

1/1

TJC – provision of care/treatment/services

Key Personnel	Standards	TJC Requirements	UWHC Compliance
CT Protocol Optimization team	PC.01.03.01 A. 25 & A. 26	The [critical access] hospital establishes or adopts diagnostic computed tomography (CT) imaging protocols based on current standards of practice, which address key criteria including clinical indication, contrast administration, age (to indicate whether the patient is pediatric or an adult), patient size and body habitus, and the expected radiation dose index range.	Here is a link to our Quality management system. (http://ei-sharepoint/sites/SMPH/CTProtocols/_layouts/15/viewlsts.aspx) Here is a citation to the quality management system we employ to fulfill this aim. Szczekutowicz, Timothy P., et al. "Compliance with AAPM Practice Guideline 1. a: CT Protocol Management and Review—from the perspective of a university hospital." Journal of Applied Clinical Medical Physics 16.2 (2015).



At UW, we review our protocols using a multi specialty in house team and also bring in external physics, technologists, and radiologist advisors from around the world. Full details at https://www.radiology.wisc.edu/protocols/CT/advisory_boards.php

Physician Advisory Board

The initial Physician Advisory Board meeting occurred as part of the 2015 JAPR Annual Meeting in Washington DC, with six clinical medical physicists from around the United States collaborating and sharing their unique expertise for improving the UW CT protocols. The board members were from many different practice areas including academic centers, a children's hospital, consulting firms, and a consortium. This effort is in addition to the CT physics input the project receives from the GE CT North Headquarters located a one-hour drive from Madison in Waukesha, Wisconsin. The UW CT team also has multiple ongoing research projects with the GE CT portfolio.

July 30, 2016 Meeting

Zuhair Akbari, Ph.D., DABR, DABMP
Vice President of Technical Operations
West Physics

Ermensand Christakoulou, PhD
Diagnostic Physicist
Radiology Dept.
Ums Michigan Medical Center
Ann Arbor, MI

Jessica S. Elsomets, MS
Assistant Professor
Radiology Dept.
Ums Michigan Medical Center
Ann Arbor, MI

Technologist Advisory Board

Five clinical CT technologists from two locations within the UW Health network and two individuals from the GE Applications team met on February 7, 2017 to review the scanning instructions of the protocols to make them more universally applicable outside of the UW Health system. The board member's backgrounds included working at rural sites having one technologist to sites covering multiple modalities, as well as working at trauma centers and academic institutions.

February 7, 2017 Meeting

Collaborators



Carrie Bartels, RT(R)(CT)
Imaging Specialist (CT) Senior
Department of Radiology
UWMC



Amanda Clans, RT(R)(CT), BS
Global Clinical Applications Leader CT, HCT
GE Healthcare



Dan Hallmark, RT(R)(CT)

Medical Advisory Boards

The CT Protocol Optimization team regularly enlists the help of clinical radiologists from across the country with CT expertise in the areas of body, chest and cardiovascular, musculoskeletal, neuroimaging, and pediatrics. The first iteration of this group met in 2015 to collaborate and share their unique expertise for improving upon the first generation of CT protocols.

May 12, 2017 Meeting

Body



Vincent H. Hellebrink, MD
Assistant Professor, Radiology
Hellebrink Institute of Radiology, Washington University
St. Louis, MO



Revi K. Kara, MD
Associate Professor of Radiology
University of Michigan Hospitals
Ann Arbor, MI



Compliance with AAPM Practice Guideline 1.a: CT Protocol Management and Review — from the perspective of a university hospital

Timothy P. Szczykutowicz,^{1,2a} Robert K. Bour,¹ Myron Pozniak,¹
Frank N. Ranallo^{1,2}

Department of Radiology,¹ University of Wisconsin Madison School of Medicine and Public Health, Madison; Department of Medical Physics,² University of Wisconsin Madison School of Medicine and Public Health, Madison, WI, USA
tszczykutowicz@wischealth.org

Received 16 April, 2014; accepted 3 November, 2014

The purpose of this paper is to describe our experience with the AAPM Medical Physics Practice Guideline 1.a: “CT Protocol Management and Review Practice Guideline”. Specifically, we will share how our institution’s quality management system addresses the suggestions within the AAPM practice report. We feel this paper is needed as it was beyond the scope of the AAPM practice guideline to provide specific details on fulfilling individual guidelines. Our hope is that other institutions will be able to emulate some of our practices and that this article would encourage other types of centers (e.g., community hospitals) to share their methodology for approaching CT protocol optimization and quality control. Our



A Team Approach for CT Protocol Optimization

By Timothy P. Szczykutowicz, PhD and Myron Pozniak, MD

Readers who wish to get credit for completing this article may go to the CPE management Web page.

EXECUTIVE SUMMARY

- This article demonstrates that using several protocol change scenarios to illustrate how combining the expertise of a radiologist, CT technologist, a medical physicist, scheduler, and IT personnel would result in a better outcome for protocol optimization, management, and review.
- While a team can develop a protocol change, it is not a given that they would then be capable of disseminating that change in a well-documented manner.

Recent guidelines published by the American Association of Physicists in Medicine (AAPM), the American College of Radiology (ACR), and The Joint Commission require that changes made to CT protocols are reviewed and executed with input from a radiologist, a CT technologist, and a medical physicist.^{1–4} For many, this is a new hurdle. Although not formally discussed in the literature, anecdotally we have learned from colleagues at many institutions that changes are often made “at the scene” by one or two of the three

change scenarios to illustrate how combining the expertise of a radiologist, CT technologist, a medical physicist, scheduler, and IT personnel would result in a better outcome for protocol optimization, management, and review.^{5,6} In addition to the expert focus each of these individuals brings to the table, combining their individual skill sets into a CT protocol optimization team results in an organizational structure with a greater likelihood of successfully developing an acceptable protocol set.

Develop a system for disseminating

We document all non trivial changes to UW protocols and record these changes using corrective and preventative action (CAPA) forms

Corrective and Preventive Action (CAPA) Database

1	7/15/2013	Myron Pozniak	Large Body Protocols	Tim Szczykutowicz	Noise Index changed to adjust for increase in dose	9/3/2013
2	7/15/2013	Myron Pozniak	HCC Liver Modifications	Tim Szczykutowicz/Myron Pozniak	Added a 3 minute delay series to the Biphasic protocol according to a regulation	12/18/2013
3	7/15/2013	Myron Pozniak	Trauma CAP	Myron Pozniak	Adjusting the Chest MIP reformat from a 2.5x1.25 to 1.25 x1.25	9/11/2013
4	8/6/2013	Frank Ranallo	Smart Prep on Peds Patients	Tim Szczykutowicz	Adjusting all size pediatric patients mA on smart preps	9/12/2013
5	8/7/2013	Myron Pozniak	Adding Pelvis to Renal Donor	Myron Pozniak	this protocol change is on hold	12/18/2013
6	8/28/2013	Myron Pozniak	Small Body Protocols	Tim Szczykutowicz	Dose raised in all small body protocols and tech education	10/10/2013
7	8/30/2013	Kara Gill	2 Largest Pediatric Body Sizes	Tim Szczykutowicz	2 largest pediatric body sizes decreased in dose	10/1/2013
8	9/9/2013	Myron Pozniak	660 Protocols	Tim Szczykutowicz	Optimized each sections protocols to suit the new scanner.	11/13/2013
9	9/17/2013	Tim Szczykutowicz	Error found on VCT neuro protocols	Tim Szczykutowicz	Errors fixed.	9/18/2013
10	9/23/2013	Ken Schrieblman	Need Higher kVp for spine with metal protocols	Tim Szczykutowicz	New higher kV protocols were made.	12/18/2013
11	9/30/2013	Myron Pozniak	Protocol 6.62	Tim Szczykutowicz	Dose raised for the parch phase.	1/7/2014
12	10/4/2013	Myron Pozniak	Protocol 6.44	Tim Szczykutowicz	Parenchymal phase was too noisy so dose was increased to lower noise	3/7/2014
13	10/4/2013	Ken Schrieblman	Increasing kVp on MSK extremity work	Tim Szczykutowicz/Frank Ranallo	Increasing the kVp on some extremity work to compensate for metal.	11/11/2013
14	10/8/2013	Frank Ranallo	ww/wl incorrect for body protocols	Tim Szczykutowicz	Rads were using wrong WW/WL to view images which were seen as noisy	3/7/2014



Protocol Change Checklist (For adding, deleting, or changing protocols)

Protocol Name(s) _____
 Scanner(s) _____
 CAPA No. _____
 Date _____

X

Lead Radiologist

Task	Responsible Party	Form No.	Done
Complete CAPA sheet (attached). DO NOT sign Protocol Release Authorization sheet until the protocol change has been entered and checked.	Carrie Bartels	F201	
Update CAPA database	Carrie Bartels	F202	
Update Protocol Revision History file	Carrie Bartels	----	
Update Master Protocol list (for adding or deleting a protocol entry)	Lisa Aumann	---	
Update Design Philosophy document (if applicable)	Lisa Aumann (or Evelyn Lovett)	PT26	
Change Epic prototyping process if applicable	Carrie Bartels	----	
Notify Billing Department (only if affected by protocol change)	Carrie Bartels & Pete Wozniak	---	
Update Master Protocol Physics worksheet if applicable	Tim Szoughnovicz	---	
Update validation worksheets, including the following information: - Last Revision Date - Master Protocol File	Tim Szoughnovicz & Rob Bloor	F493	
Evaluate potential impact on variables and validation	Tim Szoughnovicz & Rob Bloor	F493	
Update Master Protocol Deviation list	Tim Szoughnovicz & Rob Bloor	ED3	
Notify Technicians of change and train as appropriate (occurs once a month if NOT urgent)	Carrie Bartels	---	
Update protocol word document if needed	Tim Szoughnovicz	---	
Notify Faculty and Residents of change	Myron Pomniak	---	
When all above are complete, enter protocol in scanner and document in Protocol Release sheet	Carrie Bartels	F201	
Check protocol entry for accuracy and document in Protocol Release sheet	Tim Szoughnovicz	F201	
Release this document for signature	Carrie Bartels	F201	

*Complete this checklist and the CAPA sheet BEFORE the protocol change gets loaded on the scanner. Then enter the protocol, have physicist check, fill out the Protocol Release sheet and then have everyone sign the workbook.



Corrective and Preventive Action (CAPA) Worksheet

Issue Number _____
 Type _____
 Source _____
 Originator _____
 Date Initiated _____
 Assignee _____
 Date Assigned _____
 Problem Statement _____
 Investigation _____
 Root Cause _____
 Design Philosophy Update _____
 Commitment Actions _____
 Corrective Actions _____
 Preventive Actions _____
 Effectiveness Check _____
 Planned Implementation Start Date _____
 Planned Implementation and Effectiveness Check Completion Date _____

Protocol Name _____
 Revision _____
 Date _____
 Description _____

X

Lead Radiologist

X

Clinical Section CT - Lead Radiologist

X

Medical Physics

X

Lead Technologist

File provided to Document Control Coordinator
 Controlled documents were updated

Scanner Name	Protocol Entered	Check Complete
CT1		
CT2		
CT3		
CT4		
ED		
TAC		
AFCM		
DHC		
ISP		
EP		

Note: you may need to email the community about any changes made to the wiki or to the UW protocol set.

Letter on our
public
website
detailing how
we meet the
protocol
review
requirement
from TJC



School of Medicine
and Public Health
A UNIVERSITY OF WISCONSIN AFFILIATION

Department of Radiology

September 16, 2016

To: New Users of University of Wisconsin-Madison CT Protocols

Re: Protocol Review Compliance with Joint Commission Requirement PC.01.0.01.A26

The process of CT scanning protocol development at the University of Wisconsin-Madison has been ongoing since the introduction of the first scanner 40 years ago. Fifteen years ago, the effort became more robust as the UW radiologists incorporated detailed contrast administration instructions into the protocols. In 2005, UW medical physicists became routinely involved in meetings with radiologists and technologists leading to substantial revisions of the technical scan and reconstruction parameters of UW's CT protocols. In addition to all protocol changes being reviewed by at least one radiologist, physicist, and technologist, annual reviews are also conducted for all protocols by both internal and external radiologists, physicists, and technologists to investigate other opportunities for protocol improvements.

The medical physicists' expertise in the technology and the physics of CT has resulted in substantial improvements in image quality and a reduction in patient dose. The contribution of the technologists is also constant and essential. Technologists perform the scans and provide important feedback to the radiologists and the physicists as to the realistic application of any recent adjustments. The technologists also have a better grasp of practical scanning limitations. This process of routine collaboration among the radiologists, technologists, and physicists has led to the development of a very robust CT protocol set. As technology changes and the medical sciences advance, UW's protocols continue to evolve. Running the UW protocols unaltered should help you be in compliance with the above-referenced Joint Commission requirement.

The ultimate objective in our CT protocol optimization process is to produce consistently diagnostic images at lowest doses. The process is now highly codified with robust documentation of all modifications, and image quality is constantly monitored. Our radiologists are routinely prompted to evaluate the individual CT studies that they read, and that feedback is collected and analyzed by the medical physicists. We now have in excess of 70,000 evaluation responses, which are used to validate the proper performance of the protocols and also to guide us in making improvements. The fusion of the clinical expertise of our radiologists, the technical oversight of our physicists, and the practical feedback of our technologists is essential to the success of this entire program.

Sincerely,

The CT Protocol Optimization Team



TJC – performance improvement

Key Personnel	Standards	TJC Requirements	UWHC Compliance
CT Protocol Optimization team	PI.02.01.01 A. 6	The [critical access] hospital reviews and analyzes incidents where the radiation dose index (CTDIvol, DLP, or size-specific dose estimate [SSDE]) from diagnostic CT examinations exceeded expected dose index ranges identified in imaging protocols. These incidents are then compared to external benchmarks.	RPS (Medical Physics) and Radiology CT physics are responsible for providing notification and alert values to UWHC Radiology to enter onto the scanner. Additionally, these alerts will be entered onto DW. When patient exams trigger these thresholds, an email will be sent from the DoseWatch server to the CT Protocol Optimization Team and will be addressed using the CAPA system outlined in our quality management system. When the thresholds are exceeded on the scanner, the technologist will notify the imaging manager or authorized exceeding user to proceed with the study and then notify the CT Protocol Optimization team such that an investigational action can be taken. The action will be documented using the quality management system. A link to our quality management system is (http://el-sharepoint/sites/SMPPH/CTProtocols/_layouts/15/viewlsts.aspx)



Dose Check and Dose Benchmarking Manual

Copyright © 2016

REF Rev: 2.0



Manufacturer:
School of Medicine and Public Health
University of Wisconsin-Madison
650 Walnut Street
Madison, WI 53726

Manufactured in USA

This manual is a 1 stop shop for TJC compliance. It lists our expected dose index ranges, it lists out alarm values, it lists external dose values for comparison. It also describes the rationale behind how we set up dose check and how it meets TJC requirements for capturing dose events.

Note, we also have a tool to capture dose events. Here is a screen shot of it. It can be found on the CT wiki under the side bar listing for “dose event documentation”.



Location:

-- select a location --

Accession Number:

uwmc100001

Comment:

Large patient, rad advised to change kV from 120 to 140 and decrease mAs from 15 to 10

Submitter Name:

John Doe

SUBMIT DOSE EVENT



Dose Event Documentation

Click this link to log a dose event.

<https://ctwiki.uwhealth.org/mediawiki/download/doseevent.png>

Compliance definition: To provide guidelines for technologists to notify when a dose alert event occurs on the CT scanner over defined limits. These limits are either set on a series/group level and referred to as notification levels, or set at a study level and are referred to as Alert levels. This nomenclature is used by MTA XR 25.

PROCESS FLOW OF DOSE CHECK ALERTS

1. RPS (Medical Physics) and Radiology CT physics are responsible for providing notification and alert values to UW Health Radiology/ Medical Imaging to enter onto the scanner. Currently these values are available for free public download at <https://www.radiology.wisc.edu/protocols/CT/resources.php> as listed in the DoseCheck manual.
2. When the thresholds are exceeded on the scanner, scanner will notify the technologists via a pop-up error message. This message will require the technologists to comment on the reason for the dose alarm going off. If the event is over the alert value, the technologist will be asked to enter the admin password. Some sites will not provide all technologists with this password, please consult your local imaging manager for your sites policy on this. Detailed instructions for entering a dose event on this webpage are found below.

Notifying the CT protocol optimization team when a dose event occurs [\[edit\]](#)

You will need the following information:

- Accession Number
- Comment (why do you think the alarm went off)
- Your name (if you want to be kept in the loop as to the resolution for this event)

After you enter this information on the link provided above, the CT protocol optimization team will be notified and take further action. If you want to additionally email your manager/physics/attending radiologist feel free to do so.

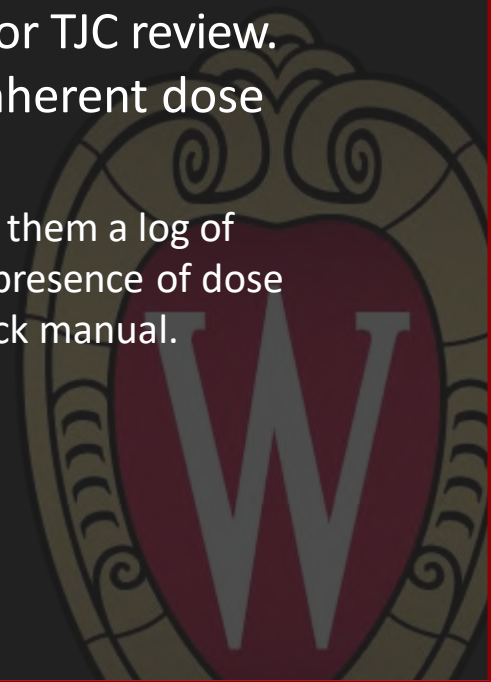
This page was last modified on 18 September 2017, at 11:41.

This page has been accessed 51 times.

[Privacy policy](#) [About CT Wiki](#) [Disclaimers](#)

Dose Events and UW Madison

- Note, when UW protocols are used and there are no scan time changes made, our dose check values should NEVER be tripped. We have been running over 2 years without 1 reportable dose incident for TJC review. This is possible because we setup our protocols to have inherent dose limits using the scanner maximum mA settings.
 - This will not settle well with auditors who expect to have you show them a log of dozens/hundreds of dose events. Again, our ability to mitigate the presence of dose events is explained in the introduction section of our UW DoseCheck manual.



American College of Radiology

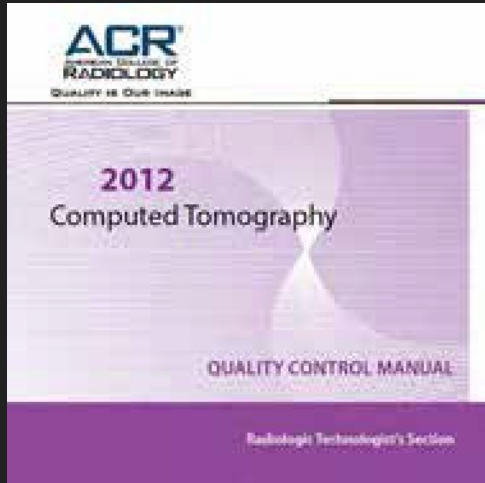


Table 1. Technologist's QC Tests: Minimum Frequencies

PROCEDURE	MINIMUM FREQUENCY	APPROXIMATE TIME IN MINUTES
Water CT Number and Standard Deviation	Daily	5
Artifact Evaluation	Daily	5 (or less)
Wet Laser Printer Quality Control	Weekly (if film is used for primary interpretation)	10
Visual Checklist	Monthly	5
Dry Laser Printer Quality Control	Monthly (if film is used for primary interpretation)	10
Display Monitor Quality Control	Monthly	5

- Daily/Monthly/Weekly QA
 - Our QA manual is on the wiki (link on side bar under compliance section)
 - All daily and weekly scanner tests are pre-built on the scanner
 - Log forms are available in a binder near scanner
 - CT Manager responsible for storing these

Daily, Weekly, & Monthly QA Testing on UW CT Scanners

Scanning & Analysis of Phantom Scans

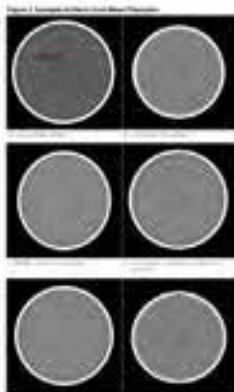
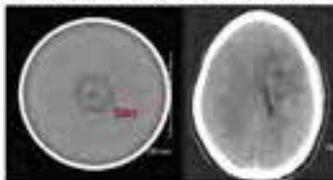
Procedure for Daily QA:

Scanning & Acquiring Images:

1. Set up the QA phantom:
 - a. Place it on the phantom holder and level it. (see the image below regarding positioning)
 - b. The phantom holder has some "slop" in it. You can move the phantom to so that it angles to the right or to the left. Different holders have different amounts of "slop".
 - c. You need to adjust the phantom so that it is straight and not angled. To do this use the lasers to align the phantom properly as shown in the images below. First move the phantom into/out of the bore until the laser light is just skimming the phantom edge as shown below. Then move the phantom holder with your hand until the edge of the phantom looks like the middle image below, with the laser just touching the back edge of the phantom **EQUALLY** from right to left. The left image shows improper positioning with the laser light only shining on the left side of the edge and the right image shows improper positioning with the laser light only shining on the right side of the edge.



Various types of artifacts may appear on these images. The most common is a ring artifact. Below is an example of a ring artifact and the effect it can have on a clinical image:



Procedure for when a test fails:

Water center mean CT #: Contact physics if the measurement is outside of specifications.

Water center standard deviation: Contact physics if the measurement is: (1) outside of specifications for more than 1 day in a week or (2) if the measurement is more than 0.2 HU outside of the tolerance. This means that the measurement is greater than 5.0 or less than 3.6.

Visual artifacts: If any artifacts are observed with either the centered or uncentered phantom images in either axial or helical mode, run a fast calibration and then re-run the artifact test. If any artifacts remain, **CONTACT GE SERVICE IMMEDIATELY** and also notify physics and the CT manager. The scanner should not be used for clinical imaging if an artifact is present.

Low contrast resolution: Contact physics if the measurement is: outside of specifications for more than 1 day in a week or (2) more than 0.2 HU outside the tolerance. This means that the measurement is greater than 5.5.

Difference Plexiglas/water: Contact physics if the measurement is outside of specifications.

High contrast resolution (1.6, 0.8, and 0.6 bar sizes): Contact physics if the measurement is: outside of specifications.

Slice thickness (5, 2.5, and 1.25 mm): Contact physics if the measurement is outside of specifications.

Laser light accuracy (internal, 50/270 degree, 0 degree): Contact physics if the measurement is: outside of specifications for more than 1 day in a week (2) more than 1 mm out of bounds for any single day.

Monthly Visual Checklist – Gantry Checks & Checks of Control Console: **CONTACT GE SERVICE IMMEDIATELY** if any feature of the scanner is not working. Notify the CT manager and physics as well. The CT manager and physics can determine if the scanner is safe to use until the issue with the scanner is repaired.

Full manual is on the wiki, it covers all aspects of daily, weekly, and monthly QA program

Role of individual technologist in UW Health's Compliance with TJC and ACR rules

- All techs must report dose check events
- All techs expected to perform daily/weekly/monthly QA must run the scans and fill out the required forms
- All techs must complete required annual CT safety training
 - And ensure that training was documented (use LDS system if at UWHC)
- A tech (lead CT tech) must be involved in the review of all CT protocols
 - Not needed individually for all scanners/sites, the team at the main hospital at UWHC does this for all UW affiliated sites
 - But if your site changes a protocol, it needs to be reviewed and documented
- All techs must send dose screen shots to PACS for every order (i.e. the same dose sheet may have to be sent >1 time when we exam split)
- All techs must be aware of the items in this document, we don't want any deer in headlight moments when an auditor is on site...

