

Deploying a dose management strategy across multiple sites

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Disclosure Information

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Presentation objectives

- I. Understand the challenges of implementing a **Dose Management Strategy (DMS)**, in different locations
- I. Learn more about practical examples of DMS, implemented across multiple sites

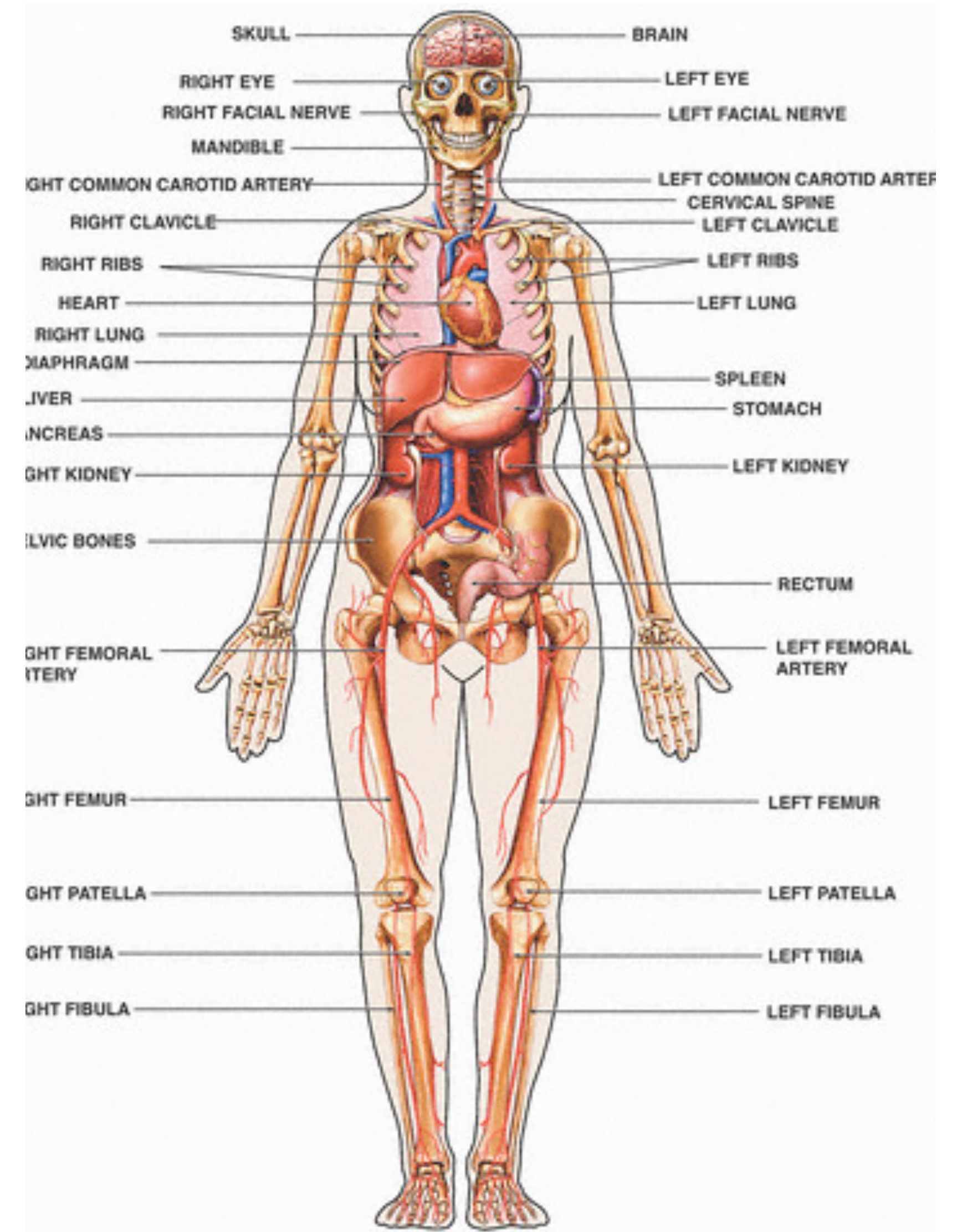
DMS scope (1/2)

- **CT** multislice ≥ 6 detector rows
- **6** countries
- **36** CT sites
- **3** CT manufacturers
- **12** CT models
- **27** CT systems with dose reduction algorithms



DMS scope (2/2)

- **53** radiologists
- **70** radiographers
- **11** anatomic areas
- **29** CT protocols
- **22.000** examinations on average per month



DMS Rationale (1/2)

- Assign **dose management teams**
- Assess **existing workflow & dose awareness culture**
- Create a **communication plan**
- Set **goals & milestones**
- Foster a **dose awareness culture**
- Use dose **tracking, monitoring, analyzing software**

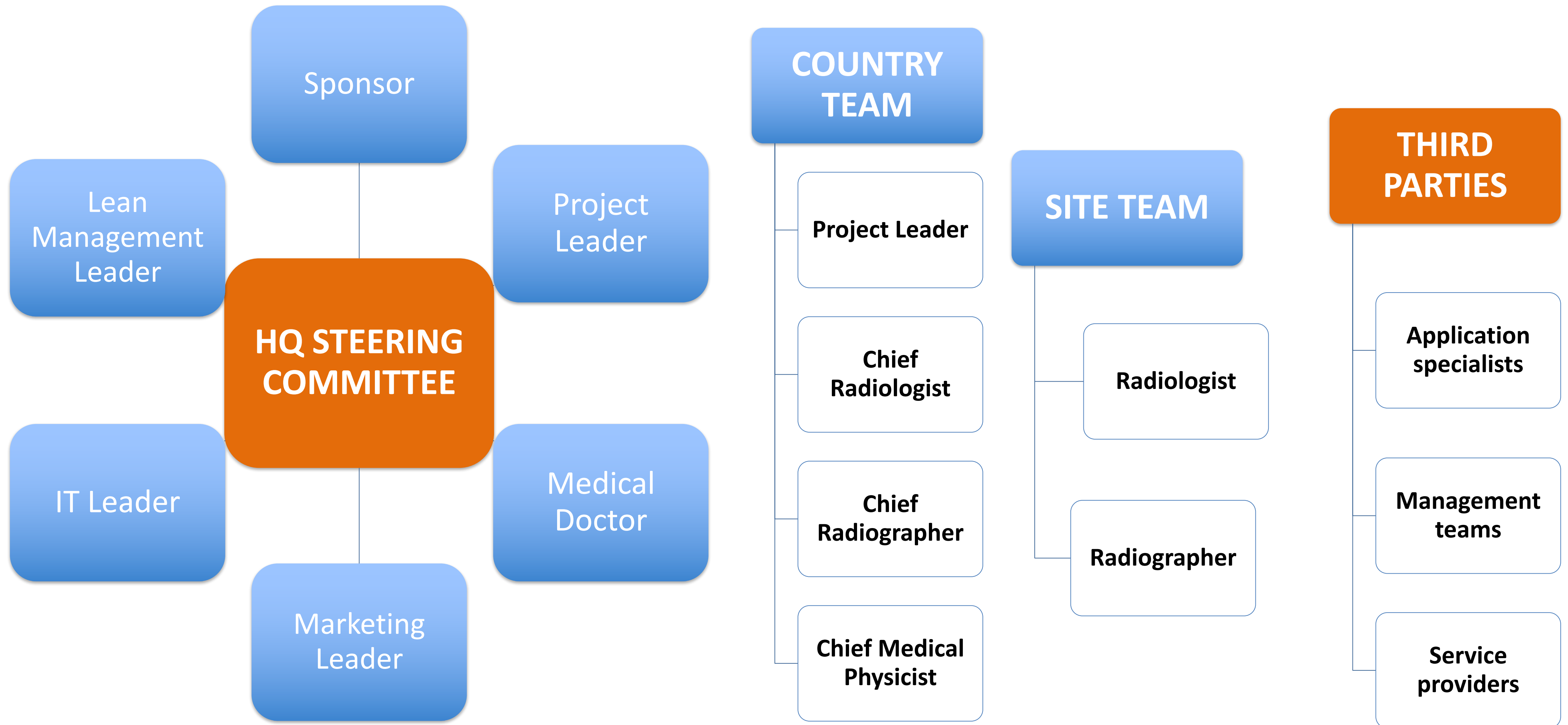


DMS Rationale (2/2)

- **Justification:** dose alerts
- **Standardization:** QC, protocols and practice
- **Optimization:** CT operation, protocols and practice
- **Reporting**
- **Dose** benchmarking
- Implement **best practices**



DMS Teams



Goals

- Create **standardized CT protocols list**
- Set **DRLs** for 29 protocols
- Set **% targets** for standard use of protocols, justification of dose alerts, linked protocols, protocols compliance to DRLs
- **Dose awareness culture**
- **Dose benchmarking**
- **Image quality testing**
- **Gold protocols**



Dose Awareness Culture

- Assessment of **dose awareness culture through questionnaire**
- Automatic **alerts** of high dose examinations
- **Justification** of each alert
- Monthly dose team **meetings**
- Continuing **education** for radiologists & radiographers



Communication plan

- Creation of **communication material**
- Target group I: **medical centers**
- Target group II: **medical practitioners, patients**



Recorded CT Dose Units

Dose units in CT

CTDI_{vol} - CT Dose Index volume

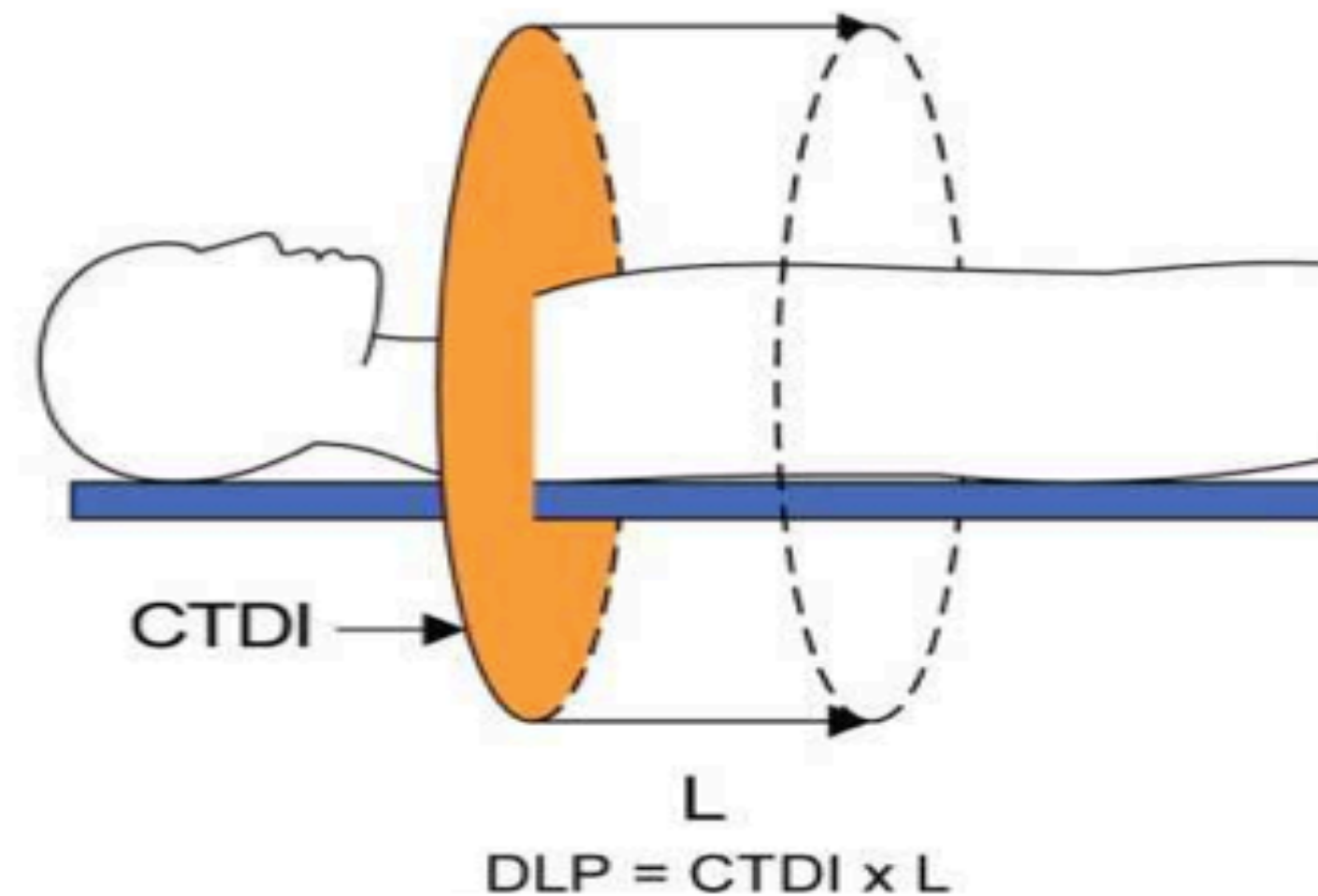
Unit: **mGy**

Definition: Density of radiation received for a given axial slice level. It depends directly on the acquisition parameters

DLP – Dose Length Product

Unit: **mGy.cm**

Definition: CTDI_{vol} x Scanning Length



Dose Tracking, Monitoring, Analysis

- Connect CT systems to **dose tracking software**
- Software tools to **link site protocols to standardized protocols**
- Software tools to **set local dose reference levels**
- Software tools to **monitor and analyze high dose alerts** and **patient cumulative dose**
- Use **data consolidation** and **statistical analysis tools** for protocol optimization and dose reduction



Standardization (1/2)

- Monthly and annual **quality controls** of CT systems
- **Workflow**
- **CT protocols list**



Standardization (2/2)

STANDARDIZED PROTOCOLS LIST PARAMETERS

Region/ Anatomy	Protocol Name	ID	Clinical Indication	Diagnostic Task	NS	Scan Mode	Scan Range	BMI	75p CTDI DRL	75p DLP DRL
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- Choose **most frequent protocols**
- **Link** individual site CT protocols to above list



Optimization

- **Compare** dose values to DRL's
- **Adjust** protocol parameters accordingly
- **Image Quality testing** with phantoms & blind studies



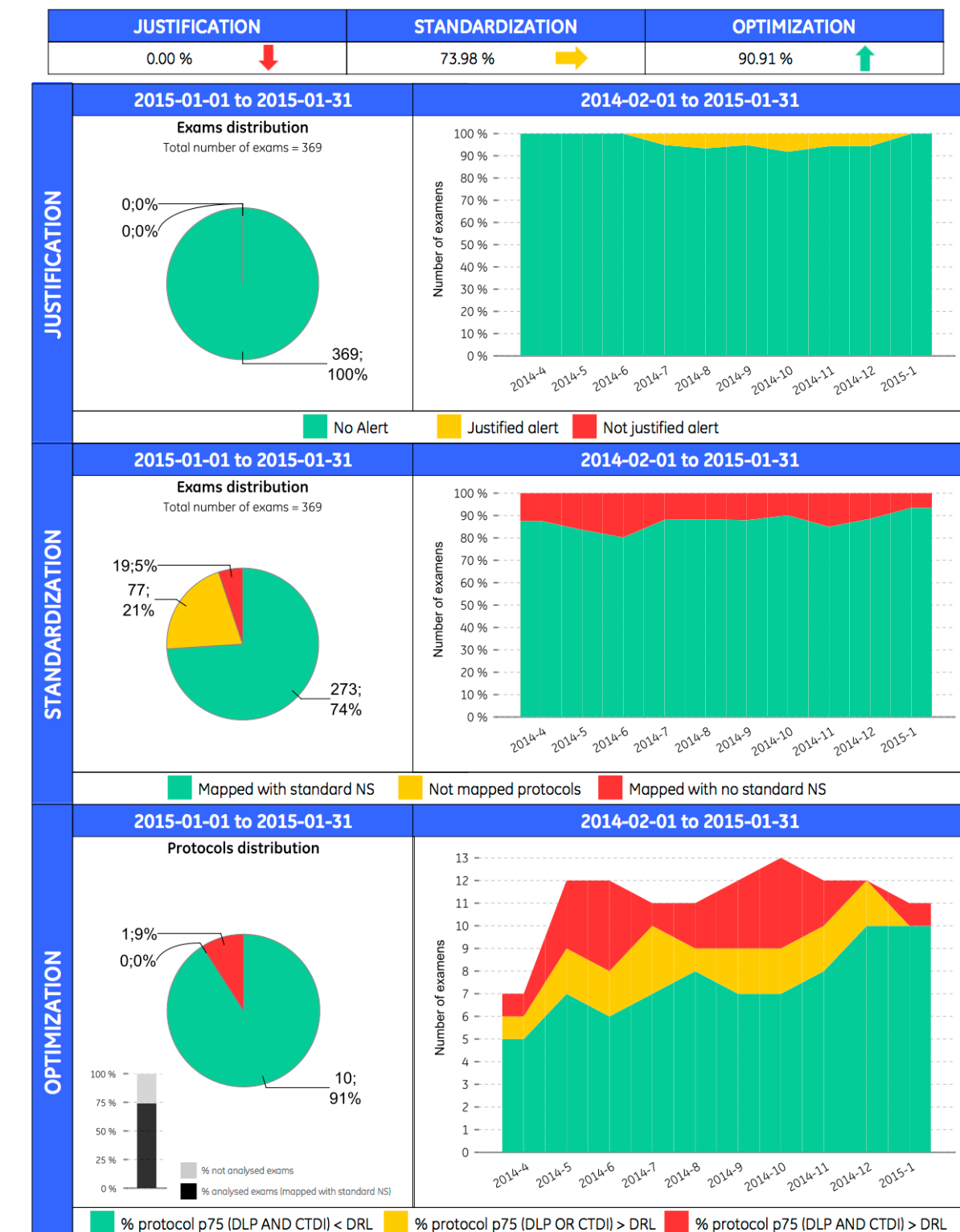
JSO Report

MONTHLY AND PERIODIC DATA

% of high dose examinations and % of **J**ustified alerts

% of performed examinations with **S**tandardized protocols

% of protocols **O**ptimized



Powered by DoseWatch
global solution for patient dose tracking and optimization in medical imaging
*DoseWatch is a registered trademark of General Electric Company



Protocols Compared to DRLs

Dose Reference Level (DRL) analysis - 2015-01-01 to 2015-01-31

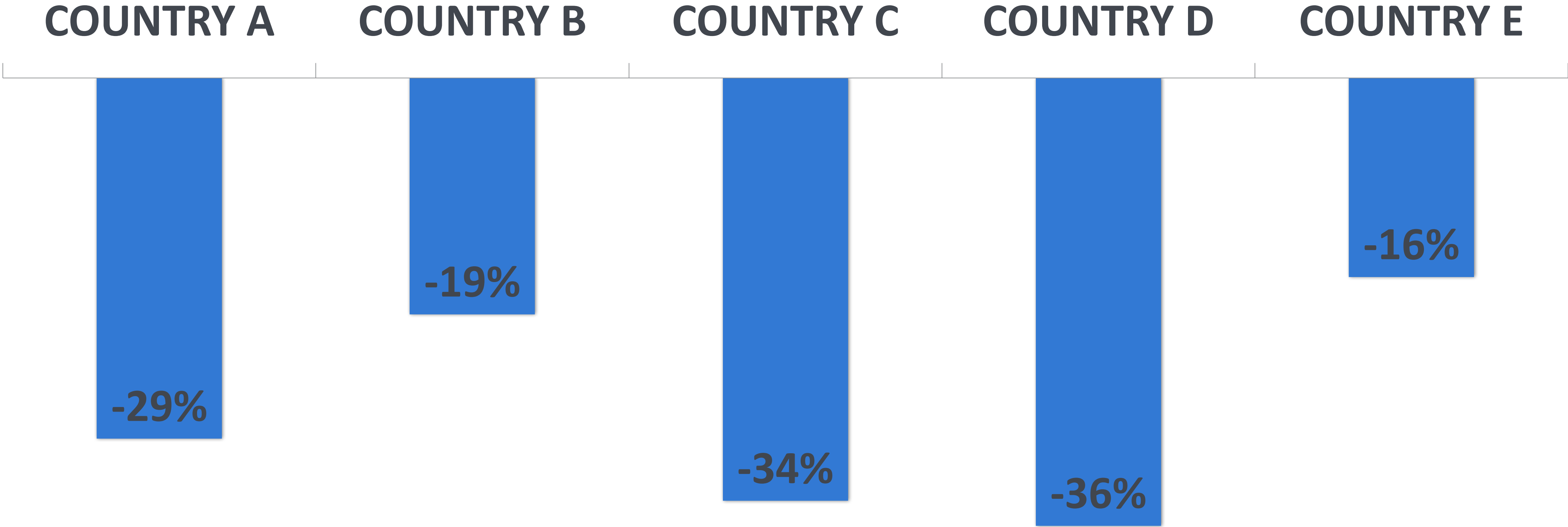
Device	RPID	NS (TNI)	Protocol name	# Exams	P75 of Max series CTDIvol (mGy.cm)	P75 of Total DLP (mGy)	Max CDTI DRL (mGy.cm)	Total DLP DRL (mGy)	CTDI diff	DLP diff
Brightspeed 16	RPID242	1	7.1 Coluna lombar SmartmA	83	28.19	721.98	45.00	850.00	-37.36 %	-15.06 %
Brightspeed 16	RPID22	1	1.5 Cranio helicoidal	68	37.59	696.45	55.00	900.00	-31.66 %	-22.62 %
Brightspeed 16	RPID16	1	5.1 Torax rotina S/C 1.75:1 pitch booster	44	7.28	266.04	10.00	330.00	-27.25 %	-19.38 %
Brightspeed 16	RPID37	1	3.1 Coluna cervical helicoidal SmartmA	32	19.91	389.84	20.00	400.00	-0.47 %	-2.54 %
Brightspeed 16	RPID206	1	2.2 Seios paranasais	21	9.40	132.86	10.00	150.00	-6.00 %	-11.43 %
Brightspeed 16	RPID1253	2	4.3 Puhno	8	11.82	232.26	20.00	500.00	-40.90 %	-53.55 %
Brightspeed 16	RPID1241	2	9.2 Joelho bilateral	5	14.92	411.06	20.00	500.00	-25.40 %	-17.79 %
Brightspeed 16	RPID4	2	6.1 Abdomen Pelvis (sem e com)	4	18.07	1292.35	17.00	1150.00	6.29 %	12.38 %
Brightspeed 16	RPID1241	2	9.5 Tornozelo bilateral	4	8.21	141.62	20.00	500.00	-58.98 %	-71.68 %
Brightspeed 16	RPID856	3	6.3 Abdomen Pelvis (sem, com e tardio:3 series)	2	8.32	1245.34	17.00	1650.00	-51.06 %	-24.52 %
Brightspeed 16	RPID953	4	6.5 Abdomen Pelvis (sem, com 2 fases e tardio:4 series)	2	9.45	1226.98	17.00	2150.00	-44.41 %	-42.93 %

This table shows a DRL analysis for all protocols mapped with a standard NS (TNI). The P75 values (Max series CTDIvol or Total DLP) that are above the DRL threshold are displayed in red writing.

% protocol p75 (DLP AND CTDI) < DRL	
% protocol p75 (DLP OR CTDI) > DRL	
% protocol p75 (DLP AND CTDI) > DRL	

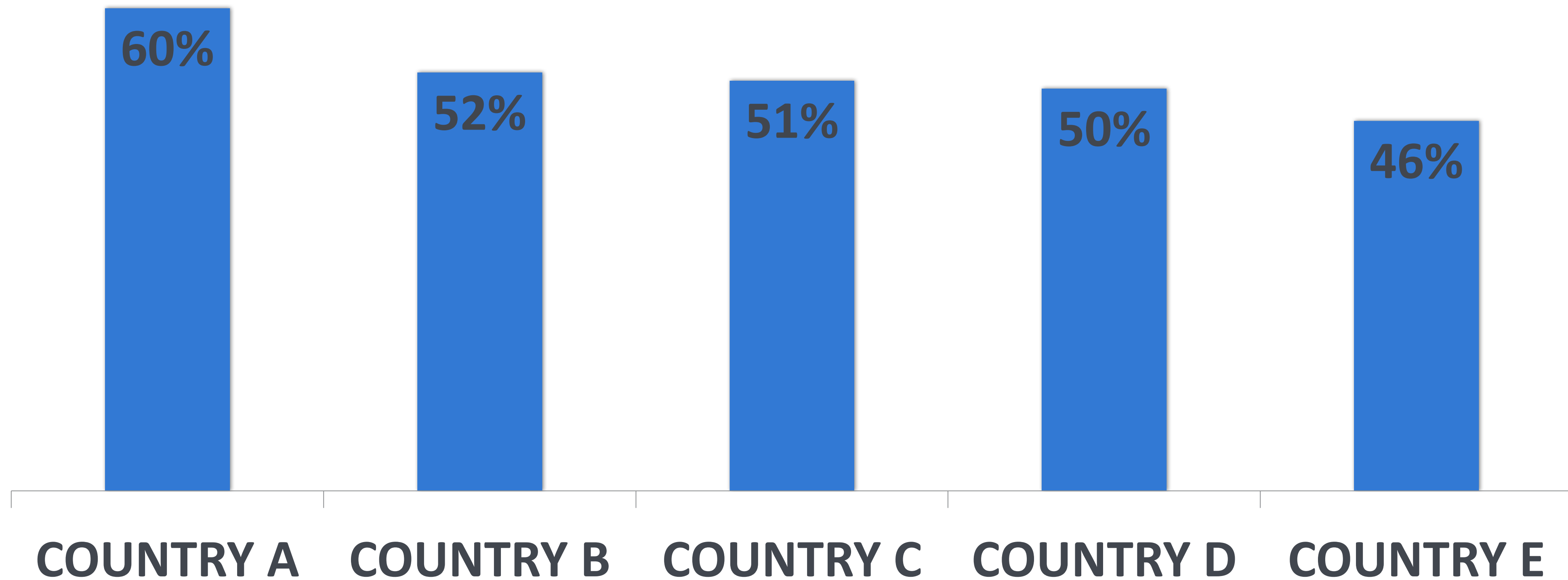


% DLP Reduction



% Optimization

% PROTOCOL p75 (DLP AND CTDI) < DRL



Dose benchmarking

SINUS PROTOCOL					
COUNTRY	SYSTEM	75% CTDIvol (mGy)	75% DLP (mGy.cm)	DRL CTDIvol (mGy)	DRL DLP (mGy.cm)
A	CT Scanner A – 64 slice	3,10	43,33	13	190
D	CT scanner B – 64 slice with dose reduction option	4,29	75,75		
E	CT scanner C – 64 slice with dose reduction option	7,06	108,02		
C	CT scanner D – 64 slice	10,96	176,51		



Challenges (1/2)

- Country **legislation & NHS rules**
- Differences in national **mentalities & CT dose perception**
- CT dose culture between **radiologists of different generations**
- Workload differences between **private & public sector**



Challenges (2/2)

- Team spirit and **collaboration**
- **Agreement** on standardized CT protocols & practices
- Clinical and technical **assessment** of protocols
- CT protocol parameters **corrections** to reduce dose



Participants feedback

“We would like to inform you that the latest changes we have applied in Head, Neck and Sino-nasal CT scans have a **very good image quality, which is considered much better than the previous image protocols.**

We would like to thank you very much and we will keep in touch for any protocol regulations and changes we might need in the future.”

Sincerely yours,

Radiologist

“**Standardizing CT protocols** is key because it means that all centers across all countries will operate in the same way. That **means I can work anywhere throughout the organization.**”

Radiographer



Conclusion

With **dedicated teams, continuing education, standardization** and

a **clear dose management strategy,**

dose tracking will lead to dose reduction

