INFINITT Case Study



Radiation Dose Reduced by 13%

Mean ED (Effective Dose) of CT – Abdomen studies between the 1st and the 4th quarter of 2015 [Source: the Department of Radiology at Seoul National University Hospital]



INFINITT Case Study



Customer profile

- 1,800 beds, 9 CT devices
- 4,500 diagnostic imaging studies conducted a day on average

Challenges

- Before implementing DoseM, radiation dose varied significantly from one device to another, even for the same study type.
- Some patients were absorbing an excessive dose.
- Manually recorded dose data was not accurate or reliable.

Solution

The radiology department implemented DoseM, INFINITT Healthcare's web-based dose monitoring system, in Dec. 2014.

Based on dose data collected automatically by DoseM, the radiology department can now:

- Identify high-dose devices and revise scanning protocols.
- Manage and track dose systematically using statistics and comparison features.
- Consult benchmark and historical data when prescribing a diagnostic imaging study.

Results

Mean ED (Effective Dose) of a CT – Abdomen study decreased by an average of 13% from the 1st quarter of 2015 to the 4th quarter of the same year.

About Seoul National University Hospital

Seoul National University Hospital (SNUH) was established in 1885 as the first national hospital in Korea. Today the hospital is comprised of the main hospital, the Children's Hospital, the Cancer Hospital, the Dental Hospital, and the Clinical Research Institute. SNUH treats approximately 2,000 inpatients and 8,000 outpatients a day, and performs an average of 4,500 diagnostic imaging studies per day.

Challenges

Radiation Dose can vary among CT devices-- even for the same study type –depending on the protocol settings used. In general, greater quantities of radiation yield higher quality diagnostic images, so protocols selected for optimal image quality often put patients at risk of receiving excessive radiation dose.

Chang-Hyun Lee, a professor in the radiology department at Seoul National University Hospital, told us, "Previously, we recorded dose data by hand, either from the DICOM Header in PACS or from OCR capture of the series information on the images. This manual recording method was labor intensive and prone to human error, making it difficult to review protocols and find the right balance between image quality and optimal dose."

Expectations

The hospital decided to adopt a system that automatically captures radiation dose data. Armed with accurate dose data and thorough internal analysis, SNUH expected to identify high-dose devices and revise the scanning protocols. Also they wanted to be able to review a patient's dose history before ordering a study, and to select an appropriate modality that would minimize the patient's radiation exposure.

Why INFINITT DoseM?

DoseM is a web-based dose monitoring system that provides various statistics and comparison features for improved dose management.

"Comparing DoseM with other systems, we concluded that it would do more than just meet our needs for more accurate data. We felt it would help us achieve our ultimate goal of minimizing a patient's radiation exposure," Dr. Lee explained. "In addition, the fact that we are currently using INFINITT PACS ensured us a better integration result with DoseM."

How DoseM works

Transfer Only Dose Information INFINITT PACS Server A Transfer DICOM Images DoseM DoseM Modality Server Web Viewer Other PACS Servers Route DICOM Images **DoseM Server Internal Workflow** Export Value By Patient Effective CTDIvol / DLP Dose RDSR (CT) Convert By Study MPPS DAP (DR · XA · RF **DICOM Header** By Modality AGD / OD **OCR** Capture **DICOM** Images Absorbed (MG) Dose By Room Interface

DoseM Workflow



DoseM collects DICOM files or RDSR (Radiation Dose Structured Report) from the imaging device directly or from the PACS, automatically calculates DAP (Dose Area Product), CTDI (Computed Tomography Dose Index), DLP (Dose Length Product), and AGD (Average Glandular Dose), and then converts the value to effective dose by multiplying a conversion factor. When interfaced with INFINITT PACS, DoseM extracts dose data only from PACS without saving the DICOM images.

Calculated dose values are displayed via assorted graphs by patient, by study, by device and by diagnostic imaging room, making it easy to comprehend and compare dose data. The data can also be saved and exported to MS Excel.

01

Displays detailed information for each device

Detailed information is displayed on each device including: the device location, the cumulative number of studies conducted, the mean ED (Effective Dose), and the mean DLP (Dose Length Product).

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Device List	Analysis							
Modality	Device Model	Room Nan	ne Study Co	ount M	lean ED (mSv)	Mean DLP (mGycm)	Mean DAP (mGycm	М
	A Machine			4823	7.5539	637.2882		^
СТ	D Machine	Room 3		4494	12.4050	955.5602		
СТ	B Machine	Room 2		3749	7.6451	626.1134		
СТ	C Machine	Room 5		2310	10.9047	802.0252		-
СТ	E Machine	Room (5	2079	7.1611	621.0532		
СТ	F Machine	Room	в	1900	3.1771	258.0405		
CT	I Machine	Room	7	1875	6.8841	550.4855		
СТ	P Machine	Room	10	1761	3.3247	244.0483		
СТ	G Machine	Room	9	1732	8.3883	616.1647		
CT <	S Machine	Room	11	1597	3.0685	5 229.4031	>	Ť



Lists dose statistics by study time

Studies conducted on the same day are listed by examination time and dose data is shown in a graph. If you click on a specific study in the graph, it shows detailed information on series, patients and devices, which can be helpful in finding the cause of excessive radiation dose.



03

Shows average absorbed dose statistics by device for each study

Average absorbed dose values and ratios of devices for a specific study are displayed on a line or circle graph.

This feature helps in identifying devices with above average absorbed dose levels.

If the protocols are deemed normal after being reviewed, then users can conclude the device is defective and take appropriate measures.



Additional Features

01

Interface with various medical information systems

Based on the international standard protocol, HL7, DoseM interfaces with a variety of hospital information systems, such as RIS and EMR, and facilitates data sharing. Users can confirm a patient's cumulative dose as well as check the estimate of radiation when prescribing a diagnostic imaging study. Meanwhile the RIS and EMR transmit the patient's personal information (name, gender, birth date, weight and height) to DoseM. If INFINITT RIS or PACS is already in use, dose data for a current study and a patient's cumulative dose over the past year can be viewed without any need to execute DoseM. If INFINITT PACS is in use, only the dose data is extracted from PACS and transmitted to DoseM without saving DICOM images. This way, the facility can keep network traffic down and storage costs can be reduced significantly.

[Study Report Example]

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Mean dose	3456.5600	4000.0000	18% 🛔	Mean dose (mSv)	4500.5000	4000.0000	15%	•				
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	32.21	10 259	•	X-Ray Angio	3	10.2220	25					
12%	mSv			X-Ray Fluoro	5	10.2220	25					
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[Patient Report Example]

"In the aftermath of the Japanese nuclear accident in 2011, there has been an increase in public concern over medical radiation exposure. With patient safety our top priority, we not only share dose data captured by DoseM across the department, but also review and discuss it in monthly QA committee meetings."

- Chang-Hyun Lee, a professor of Radiology at Seoul National University Hospital

02

Reporting Options

DoseM provides two types of reports: a Patient Report and a Study Report. The Patient Report is given to a patient in order to inform him/her about his/her dose history. The Study Report contains more in-depth data that is shared across a hospital or enterprise and used for clinical research.

03

Confirm national or local DRL

DRLs (Diagnostic Reference Levels) are standard dose levels evaluated by national bodies, whereas local DRLs are determined by each individual hospital. Dr. Lee added, "When DoseM color codes a study as exceeding DRLs, our radiologists and physicians are able to immediately recognize it and try to identify the cause, which could be a multi-code, repetitive studies, etc."

04

Transmit dose data to ACR DIR

DoseM, complying with REM standards (Radiation Exposure Monitoring), enables hospitals to transmit their CT dose indices to the American College of Radiology (ACR) Dose Index Registry. The patients' private data are automatically anonymized. Then, users are provided with periodic feedback reports that show the average absorbed dose value of participating institutions, calculated by study type. With the reports, users are able to compare their radiation exposure levels with other similar hospitals and to modify dose management protocols accordingly. DoseM also passed the REM technology tests in the North America IHE (Integrating the Healthcare Enterprise) Connectathon in 2016.

Changes

Seoul National University Hospital uses dose data to identify devices that emit excessive radiation dose and to confirm protocols. Based on the data, they can revise protocols to deliver the least amount of dose possible while maintaining appropriate diagnostic image quality. Protocol settings for pediatrics are even more stringent.

In addition to adjusting protocol settings, physicians consult dose data when prescribing a diagnostic imaging study. When a patient's cumulative dose is already high, they prescribe a non-radiation study or use a lowradiation device. Dr. Lee said, "DoseM enables us to manage dose proactively. With DoseM, we are realizing our department's ultimate goal of delivering the best, reliable care with the least amount of dose possible."

Results

Mean ED (Effective Dose) of CT–Abdomen studies decreased by 13% on average between the 1st quarter and the 4th quarter of 2015.

Mean ED (Effective Dose) of CT Liver 3D (Contrast) studies decreased by more than 21% during the same period of time.



[Source: the Department of Radiology at Seoul National University Hospital]

INFINITT Health Care

INFINITT Healthcare is a global healthcare IT company based in Korea that develops medical image and information management solutions. Through 9 overseas affiliates, it provides solutions and service to more than 4,000 medical organizations in 45 countries.

