RADYOLOG GÖZÜYLE MEDİKAL FİZİKÇİ

Dr. Gökçe Kaan ATAÇ
Ufuk Üniversitesi Radyoloji AD.

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- YENİ HASTANE
- DİJİTAL RADYOGRAFİ
- YENİ TEKNOLOJİ
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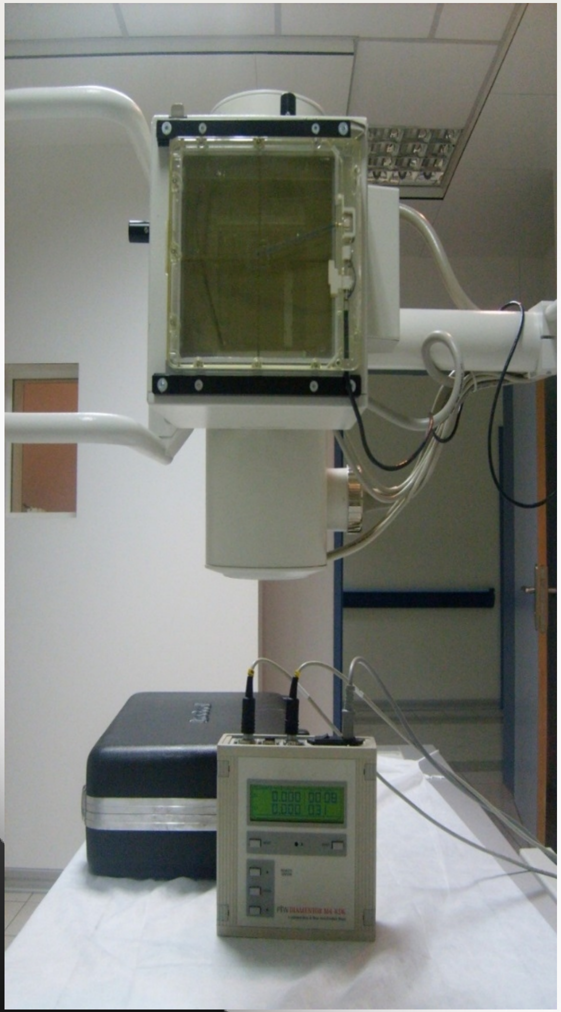

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Diagn Interv Radiol. 2014 Jan-Feb;20(1):100-4. doi: 10.5152/dir.2013.12122.

Dose audit for patients undergoing two common radiography examinations with digital radiology systems.

İnal T[1], Ataç G.

Author information

Abstract

PURPOSE: We aimed to determine the radiation doses delivered to patients undergoing general examinations using computed or digital radiography systems in Turkey.

MATERIALS AND METHODS: Radiographs of 20 patients undergoing posteroanterior chest X-ray and of 20 patients undergoing anteroposterior kidney-ureter-bladder radiography were evaluated in five X-ray rooms at four local hospitals in the Ankara region. Currently, almost all radiology departments in Turkey have switched from conventional radiography systems to computed radiography or digital radiography systems. Patient dose was measured for both systems. The results were compared with published diagnostic reference levels (DRLs) from the European Union and International Atomic Energy Agency.

RESULTS: The average entrance surface doses (ESDs) for chest examinations exceeded established international DRLs at two of the X-ray rooms in a hospital with computed radiography. All of the other ESD measurements were approximately equal to or below the DRLs for both examinations in all of the remaining hospitals. Improper adjustment of the exposure parameters, uncalibrated automatic exposure control systems, and failure of the technologists to choose exposure parameters properly were problems we noticed during the study.

CONCLUSION: This study is an initial attempt at establishing local DRL values for digital radiography systems, and will provide a benchmark so that the authorities can establish reference dose levels for diagnostic radiology in Turkey.

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Table 2. ESD values in comparison with European Union diagnostic reference levels for posteroanterior chest and anteroposterior kidney-ureter-bladder radiography examinations

	Entrance surface dose value (mGy)			
Examination	Diagnostic reference level	Mean±SD	Minimum	Maximum
Posteroanterior chest	0.3	0.346±0.2	0.024	1.087
Anteroposterior kidney-ureter-bladder	10	1.948±1.1	0.264	6.288

SD, standard deviation.

Table 3. Exposure factors and focal-skin distance values for posteroanterior chest and anteroposterior kidney-ureter-bladder radiography examinations

	kVp		mAs		Focal-skin distance (cm)	
Examination	Mean	Range	Mean	Range	Mean	Range
Posteroanterior chest	98.14	64.5–150	12.06	0.25–31.7	148.41	135.1–162.5
Anteroposterior kidney-ureter-bladder	74.32	64.5–87.5	26.45	0.98–66.1	89.14	76.6–103.4

kV, kilovolt; mAs, milliamper per second.

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- RADYOGRAFİ VE
- BT HASTA DOZU
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- disseminate information on challenges in estimating radiation dose to patients in different diagnostic and interventional procedures, compare doses with international standards
- train participants in justification and optimization to reduce patient doses without affecting diagnostic quality
- train participants in protection aspects in radiotherapy and nuclear imaging
- facilitate the creation of a network for the exchange of information on medical radiation protection among medical physicists in developing and developed Member States.

According to the United Nations Scientific Committee on Effects of Atomic Radiation (UNSCEAR) report of 2008, 3.6 billion diagnostic X-ray examinations are performed each year globally and medical exposure accounts for 98 per cent of the contribution

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16 – 27 September 2013

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According to the United Nations Scientific Committee on Effects of Atomic Radiation (UNSCEAR) report of 2008, 3.6 billion diagnostic X-ray examinations are performed each year globally and medical exposure accounts for 98 per cent of the contribution from all man-made radiation sources. Further, about 6 million radiotherapy treatments take place annually. It is the largest contributor to the population dose worldwide next only to natural background. Computed tomography (CT) scans are the major contributor, with other major contributions from X-ray based interventional procedures and nuclear medicine studies.

Traditionally, medical physicists have played a significant role in radiation protection activities and have responsibilities under international and national standards. With millions of health professionals involved in the above mentioned billions of imaging examinations and millions of therapeutic applications, the need to develop leadership in radiation protection in medicine with emphasis on patient protection is acute.

PARTICIPATION

This course would seek to target experienced medical physicists working in hospitals in imaging departments and those involved in imaging in radiotherapy. Scientists and students from all countries which are members of the United Nations, UNESCO or

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Responsibilities in radiation protection

Patient dose assessment in computed Tomography, digital and analogue radiography, interventional procedures, mammography and in nuclear imaging

Patient dose management versus

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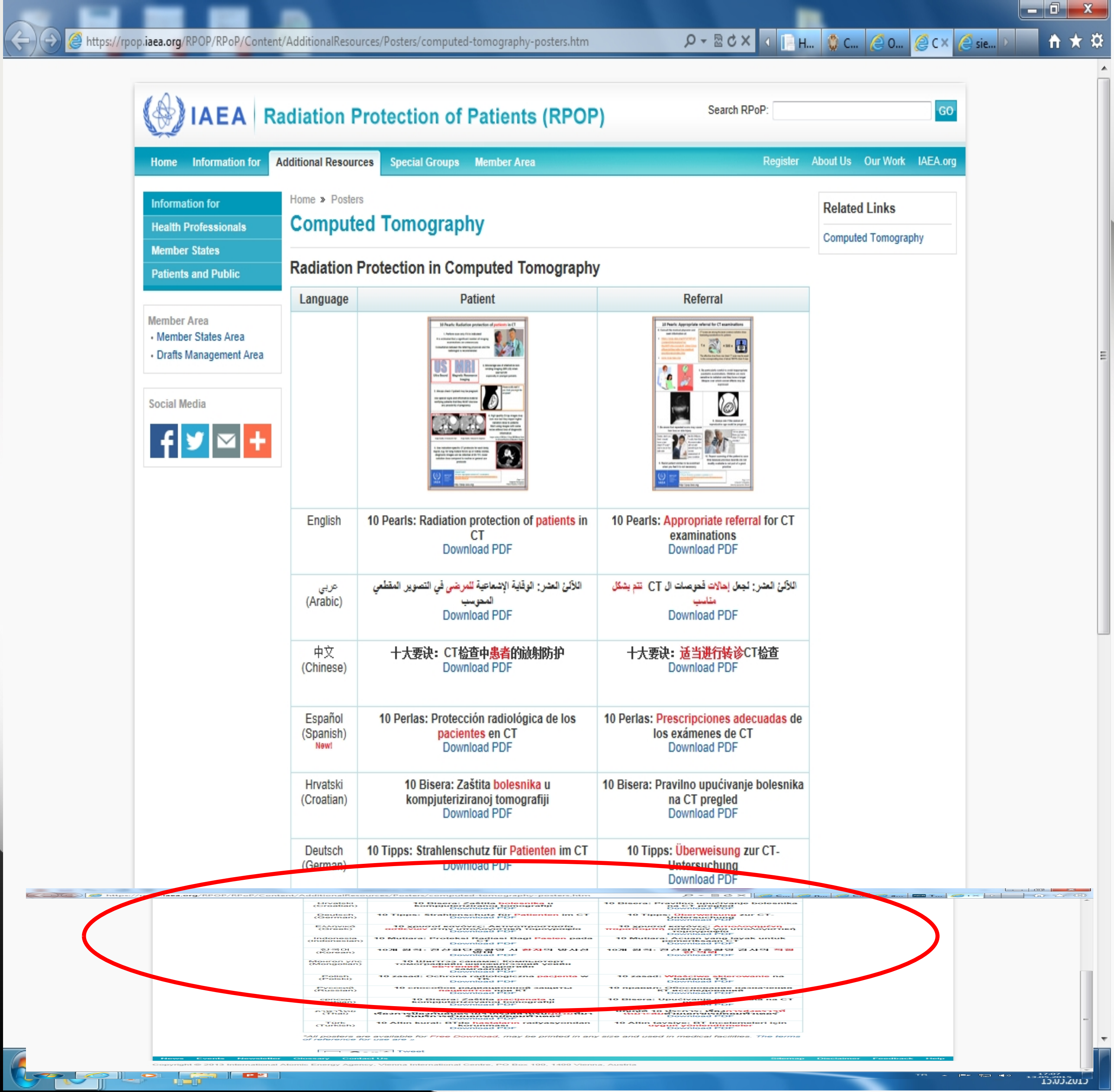

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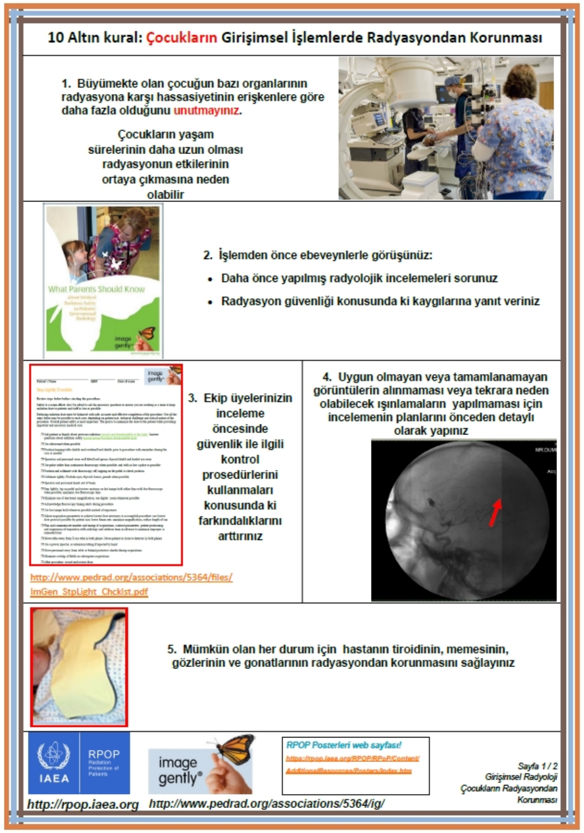
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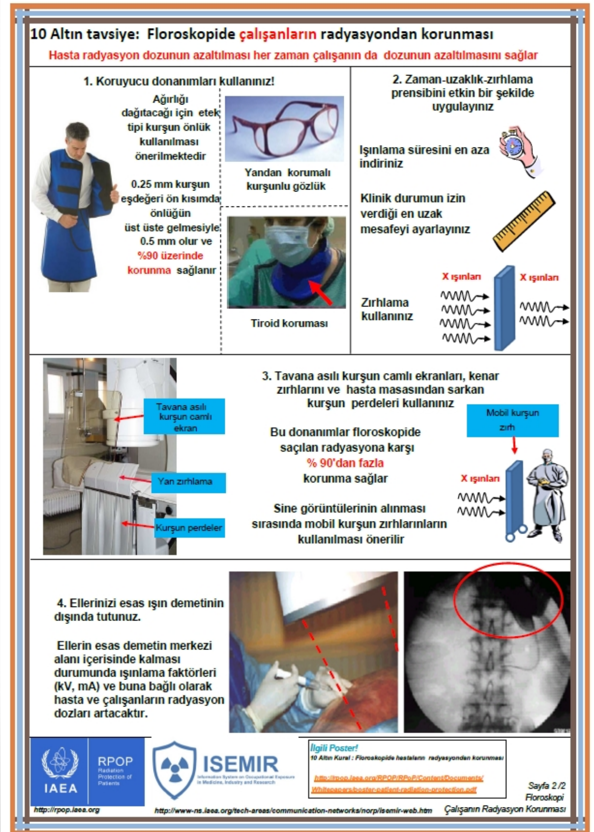
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Işınlama süresini en aza indiriniz
Klinik durumun izin verdiği en uzak mesafeyi ayarlayınız
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X ışınları
Zırhlama kullanınız
Tavana asılı kurşun camlı ekran
Yan zırhlama
Kurşun perdeler
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Mobil kurşun zırh
Bu donanımlar floroskopide saçılan radyasyona karşı % 90'dan fazla korunma sağlar
X ışınları
Sine görüntülerinin alınması sırasında mobil kurşun zırhlarının kullanılması önerilir
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Ellerin esas demetin merkezi alanı içerisinde kalması durumunda ışınlama faktörleri (kV, mA) ve buna bağlı olarak hasta ve çalışanların radyasyon dozları artacaktır.
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Floroskopi
Çalışanın Radyasyon Korunması


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C. Bu incelemeye şimdi ihtiyacım var mı?
D. Bu inceleme en gerekli olanı mı?
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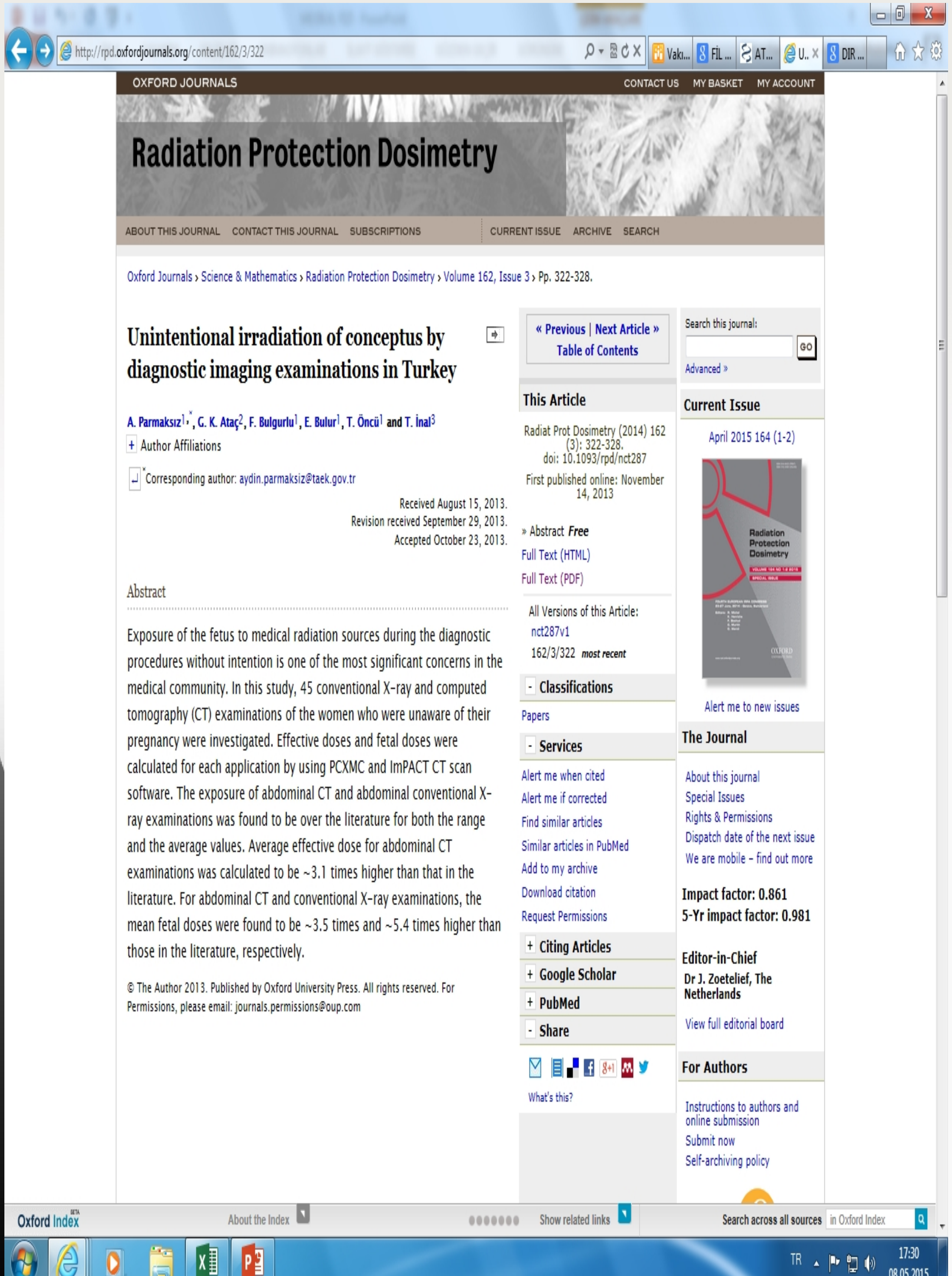
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Radiation Protection Dosimetry

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Oxford Journals › Science & Mathematics › Radiation Protection Dosimetry › Volume 162, Issue 3 › Pp. 322-328.

Unintentional irradiation of conceptus by diagnostic imaging examinations in Turkey

A. Parmaksız[1,*], G. K. Ataç[2], F. Bulgurlu[1], E. Bulur[1], T. Öncü[1] and T. İnal[3]
+ Author Affiliations
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Abstract

Exposure of the fetus to medical radiation sources during the diagnostic procedures without intention is one of the most significant concerns in the medical community. In this study, 45 conventional X-ray and computed tomography (CT) examinations of the women who were unaware of their pregnancy were investigated. Effective doses and fetal doses were calculated for each application by using PCXMC and ImPACT CT scan software. The exposure of abdominal CT and abdominal conventional X-ray examinations was found to be over the literature for both the range and the average values. Average effective dose for abdominal CT examinations was calculated to be ~3.1 times higher than that in the literature. For abdominal CT and conventional X-ray examinations, the mean fetal doses were found to be ~3.5 times and ~5.4 times higher than those in the literature, respectively.

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Table 4. Approximate fetal exposures from common diagnostic procedures[13].

Examination	Mean (mGy)	Maximum (mGy)
CT	[redacted]	
Abdomen		
Chest		
Head		
Lumbar spine		
Pelvis		
Conventional X ray		
Abdomen	1.4	4.2
Chest	<0.01	<0.01
Intravenous urogram	1.7	10
Lumbar spine	1.7	10
Pelvis	1.1	4
Skull	<0.01	<0.01
Thoracic spine	<0.01	<0.01

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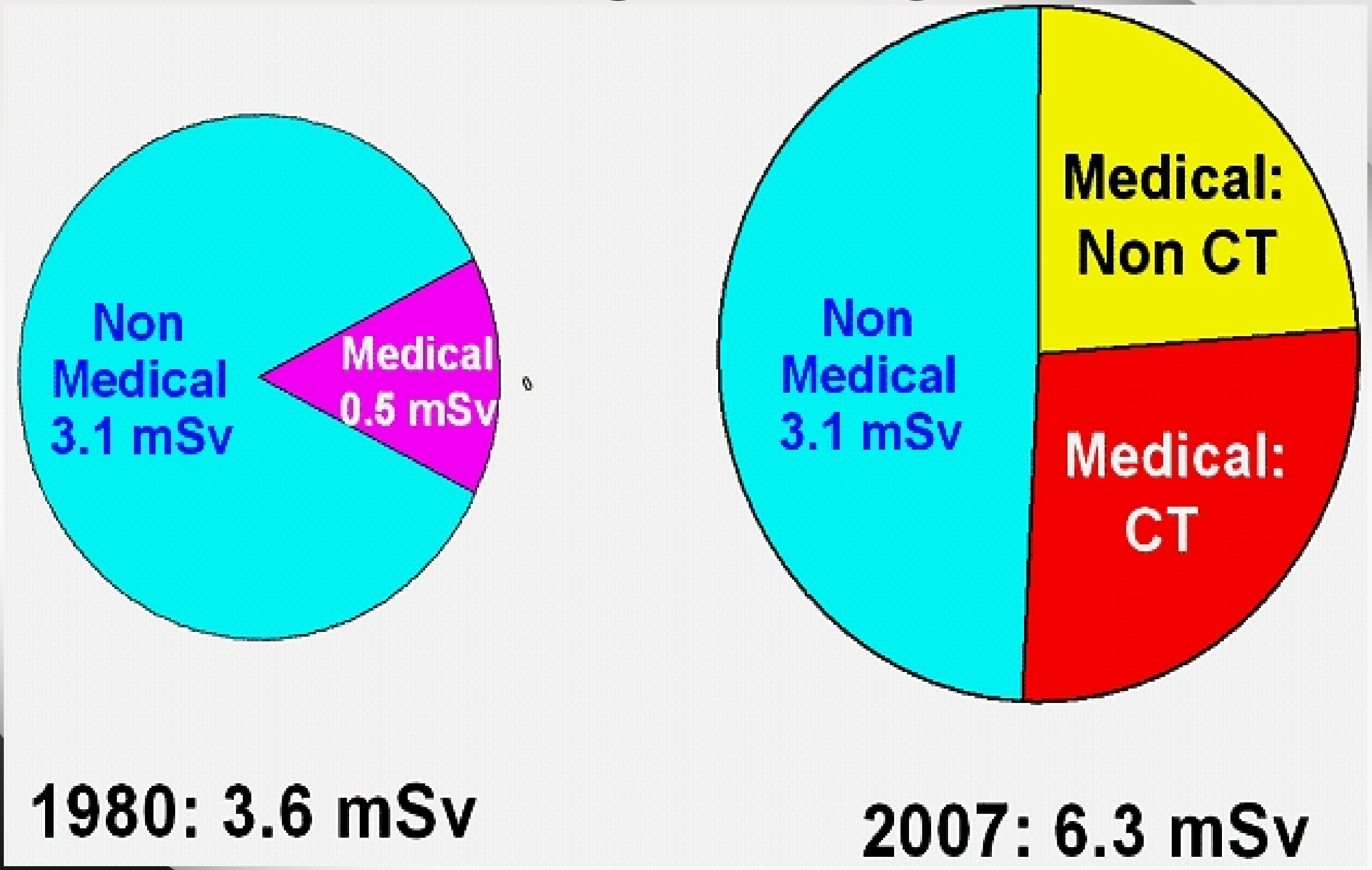

Brenner DJ, Hall E. Computed Tomography — An Increasing Source of Radiation Exposure. N Engl J Med 2007; 357:2277-2284

*

DOSE OPTIMIZATION IN CT PROTOCOLS

E. BULUR[a], K.G. ATAÇ[b], T. INAL[c], F. BULGURLU[a], A. PARMAKSIZ[a], T. ÖNCÜ[a]

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[b] Ufuk University Medicine Faculty, Radiology Department, Turkey.
[c] Ankara University Electronic Engineering Department, Turkey.

E-mail address of main author: emine.bulur@taek.gov.tr

Abstract

The manufactures of CT equipment provide standard examination protocols including exposure parameters. These large variations of exposure parameters permit dose optimization of CT examinations. The primary aim of this study is to optimize CT scanning protocols after measuring CTDI values at five CT units which are located in Ankara. Measurements were performed with a set of calibrated pencil type ionization chamber and electrometer used with standard head and body phantoms. Radiation exposure was performed on a 16-row MDCT scanner with 5 different routine protocols. Scan protocols were used to image ACR phantom whereby image quality was assessed. Tube current and voltage parameters (mA and kV) were systematically reduced until the CT image quality was not significantly decreased. By reducing the tube current in 5 steps from 240mA to 115mA, we could decrease weighted CT Dose Index ($CTDI_W$) from 78.5 to 42.7, respectively. For dose optimization in CT protocols, all measured CTDI values were compared with EU and ACR reference dose levels. After optimizing the protocol, image quality tests phantoms were scanned once again in order to assure the image quality by new optimized scanning parameters. All CT systems quality assurance and performance tests were done before starting scanning protocol optimization process.

1. INTRODUCTION

Computed tomography used intentionally in diagnostic radiology has been used as a powerful medical imaging technique since it was first installed in 1974 [1]. CT utilization has been continuously increasing in recent decades. It is expected that the rate of increase will not stop in the future. As the modality has expanded, though, concerns about dose have become more prominent in the media and everyone now wants to measure dose information. Current dose reporting methods use the CT dose index (CTDI) to provide dose comparisons for scan protocols.

As for all advanced technological instruments, computed tomography is a useful device provided that it is applied through the hands of specialists or competent persons. Reduction of CT dose with acceptable diagnostic image quality is known as optimization [2]. Optimization was effected through the establishment of the limits at which image quality is detrimentally reduced by dose reduction. This work established the mA and kV changes necessary to achieve the optimization

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IAEA, Vienna (2011).

Figure:(a) User Initialization of Lesion and Parenchyma area. (b)Lesion detection at t=5 sec(c) Lesion detection at t=8 sec, (d) Lesion detection at t=12 sec, (e) Lesion detection at t=15 sec, (f) Time curve anaysis for lesion characterization.

IAEA ACTIVITIES IN IMAGING MEDICAL PHYSICS

H. Delis, G.L. Poli, A. Meghzifene. *Dosimetry and Medical Radiation Physics Section, Division of Human Health, Department of Nuclear Sciences and Applications, International Atomic Energy Agency*

The International Atomic Energy Agency (IAEA) has been working on strengthening the medical physics capacity throughout the world since the early sixties. Taking into account the acute need for medical physics support in radiotherapy in the past, the IAEA has focussed its support to that field.

In diagnostic imaging, the role of the medical physicist has been long limited to quality control and radiation safety. This has changed significantly in the past year, especially in some well-developed health care systems, and the clinically qualified medical physicist (CQMP) is a member of the multidisciplinary health care team working towards the best outcome of the patient diagnosis or treatment.

The definition of the medical physicist working in a clinical environment is clearly stated in the International Basic Safety Standards [1], and the roles and responsibilities of the CQMP are explicitly described [2]. However, worldwide harmonization is far from being achieved and the IAEA has been working towards this direction. Additional guidelines aim to further promote this harmonization in the education and training requirements of the CQMP [3-6].

The IAEA represents one of the main resources for the medical physicists, and often, especially in developing countries the only one. For this reason, additional work is done in producing guidelines to support the CQMP in the clinical environment. Specifically for Nuclear Medicine and Diagnostic Radiology, several publications have been produced to support the CQMP with quality assurance and dosimetry tasks [7].

Furthermore, more targeted training activities are implemented under the support of the Department of Technical Cooperation, in the form of fellowships and national or regional training courses. These activities aim to train medical physicists not only to work in a clinical environment, but also to act as future trainers. This train-the-trainers mechanism has been

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PRACTICAL WAY FOR AWARENESS OF PATIENT DOSE IN CT: CONVERSION OF CTDI-DLP TO EFFECTIVE DOSE ESTIMATION

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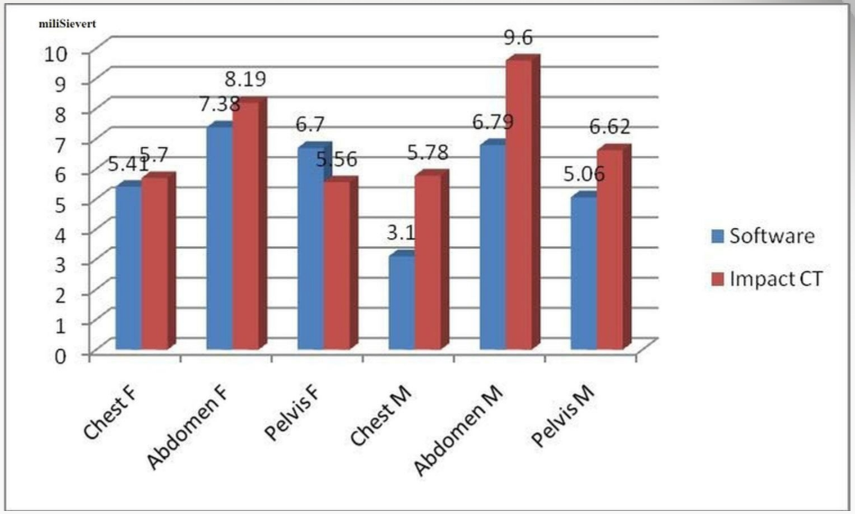
Background: Computed Tomography has the biggest part of contribution to radiation from medical sources. By developing a practical tool; to estimate patient effective doses (ED) in Computed Tomography (CT) examinations through a new developed software which uses age and sex specific dose conversion coefficients and CT specific dose data, to enable medical exposure more understandable by comparing with the regional background radiation.
Materials and methods: Effective dose calculation software for CT examinations was developed based on Excel structure. EDs of 100 patients underwent chest and abdomen-pelvis CT examinations were retrospectively calculated by using software and ImPACT CT Scan software to evaluate the performance.
Results: Mean ED for chest and abdominal examinations was calculated as 5,7 mSv and 13,8 mSv for female patients and 5,8 mSv and 16,4 mSv for male patients respectively with new method. The results of dose calculations performed with the developed software were found to be quite close to the results of ImPACT CT scan software for abdomen and chest examinations of female patients but male patients. The ratio between average effective dose and local background radiation were between 1 to 22 for chest and 3 to 63 for abdominal examinations.
Discussion: The new software helped to calculate the EDs with some deviations comparing to the standard method. Comparison to the local background radiation show very large range of ratios between different cities. A practical tool for calculating EDs for CT examinations was developed which helps especially physicians to calculate EDs simply. It is observed that even for similar exposure protocols, EDs may show difference between anatomical regions.

IMPACT OF BREAST TOMOSYNTHESIS AND FULL FIELD DIGITAL MAMMOGRAPHY ON HOSPITAL PERSONNEL, MAMMOGRAPHY WORKFLOW, AND IMAGING INFRASTRUCTURE



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Ahead of Print

Radiology Physics -Original Article

Patient doses of Computed Tomography examinations in Turkey

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Diagn Interv Radiol ; : -
DOI: 10.5152/dir.2015.14306

Abstract

PURPOSE
To establish the first diagnostic reference levels (DRLs) for computed tomography (CT) examinations in adult and pediatric patients in Turkey and to compare these with international DRLs.

MATERIALS and METHODS
CT performance information and examination parameters (for head, chest, high resolution chest [HRCH], abdominal, and pelvic protocols) from 1607 hospitals were collected via a survey. Dose length products and effective doses for standard patient sizes were calculated from the reported volume CT dose index (CTDIvol.).

RESULTS
The median number of protocols reported from the 167 responding hospitals (10% response rate) was 102 across five different age groups. Third quartile CTDIvol values for adult pelvic and all pediatric body protocols were higher than the European Commission standards but were comparable to other published studies conducted internationally.

CONCLUSION

The radiation dose indicators for adult patients were similar to those reported in the literature, except for those associated with head protocols. CT protocol optimization is necessary for adult head and pediatric chest, HRCH, abdominal, and pelvic protocols. The findings from this study are recommended for use as national DRLs in Turkey.

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EUROPEAN SOCIETY OF RADIOLOGY

ESR EUROSAFE IMAGING

Our Contribution to the EuroSafe Imaging Call of Action
Turkish Society of Radiology

Radiation awareness of radiology workers in Turkey

1. What is the skin entrance dose for an average conventional chest -x-ray film screen combination?	0,1mGy
2. Which tissue sensitivity factor was decreased on ICRP 103 recommendation?	Gonads
3. Which on is the authority for Radiation protection issues in Turkey?	TAEA
4. Which one is not one of the main radiation protection principles	ingestion of abundant vit C and protein
5. Which one is not one of the main radiation protection principles for patient protection?	measurement and evaluation of doses
6. Which one is the main radiation source for the public in developed countries?	background radiation
7. Which one is the main source of medical exposure to the public?	CT
8. What should someone do to decrease the patient dose in radiography?	increased mA protocol
9. Which one does not decrease the pediatric patient dose in radiography?	use of table grid
10. Which one should not be done for the lowest dose for radiologist-technologist in fluoroscopy?	max image/second
11. Which one should not be done for the lowest patient doses in fluoroscopy?	pulling the image receptor to the most remote location
12. Which one should not be done to decrease the CT dose to the patient?	higher kV, mAs and lower pitch
13. How much higher patient dose may be produced with Chest radiography comparing to chest CT?	500
14. How much higher patient dose may be produced with AP abdomen radiography comparing to Chest radiography?	50
15. Which one is the average amount of effective dose to patient for chest CT exam?	5-20 mSv

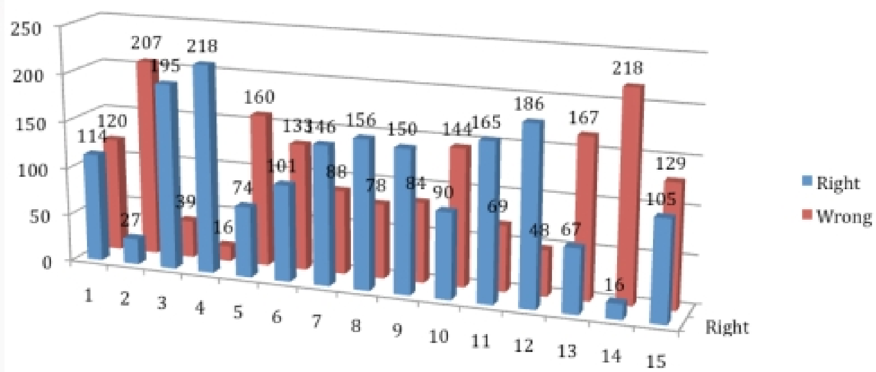

Fig. 1: Table shows the wrong and right answers to each of the 15 questions for a total of 234 applicants. Most of the respondents failed on 2nd, 13th, 14th and 15th questions asking dose levels about radiographic and CT procedures. The fifth question was about principles of radiation protection of the patient.
Fourth question was about main radiation protection and 12th was for decreasing the patient dose on CT.

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ICRP: ICRP Publication 117

www.icrp.org/publication.asp?id=ICRP%20Publication%20117

Publications
Annals of the ICRP
and more

Bu sayfayı çevirmek ister misiniz? Seçenekler

Çevir | Hayır

Radiological Protection in Fluoroscopically Guided Procedures outside the Imaging Department

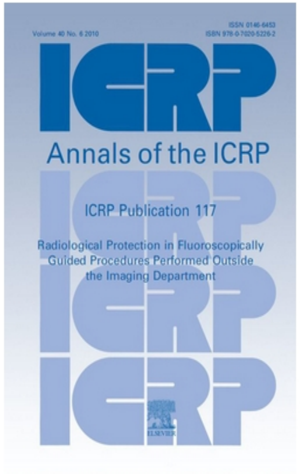
ICRP Publication 117

Ann. ICRP 40(6), 2010

M.M. Rehani, O. Ciraj-Bjelac, E. Vaño, D.L. Miller, S. Walsh, B.D. Giordano, J. Persliden

Abstract - An increasing number of medical specialists are using fluoroscopy outside imaging departments, but there has been general neglect of radiological protection coverage of fluoroscopy machines used outside imaging departments. Lack of radiological protection training of those working with fluoroscopy outside imaging departments can increase the radiation risk to workers and patients. Procedures such as endovascular aneurysm repair, renal angioplasty, iliac angioplasty, ureteric stent placement, therapeutic endoscopic retrograde cholangio-pancreatography, and bile duct stenting and drainage have the potential to impart skin doses exceeding 1 Gy. Although tissue reactions among patients and workers from fluoroscopy procedures have, to date, only been reported in interventional radiology and cardiology, the level of fluoroscopy use outside imaging departments creates potential for such injuries.

A brief account of the health effects of ionising radiation and protection principles is presented in Section 2. Section 3 deals with general aspects of the protection of workers and patients that are common to all, whereas specific aspects are covered in Section 4 for vascular surgery, urology, orthopaedic surgery, obstetrics and gynaecology, gastroenterology and hepatobiliary system, and anaesthetics and



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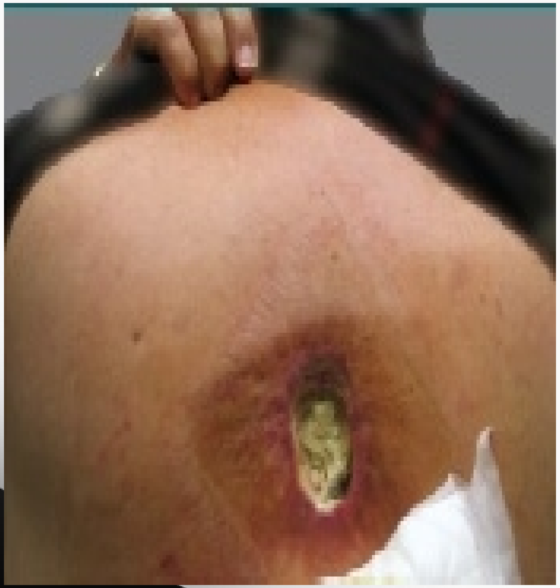

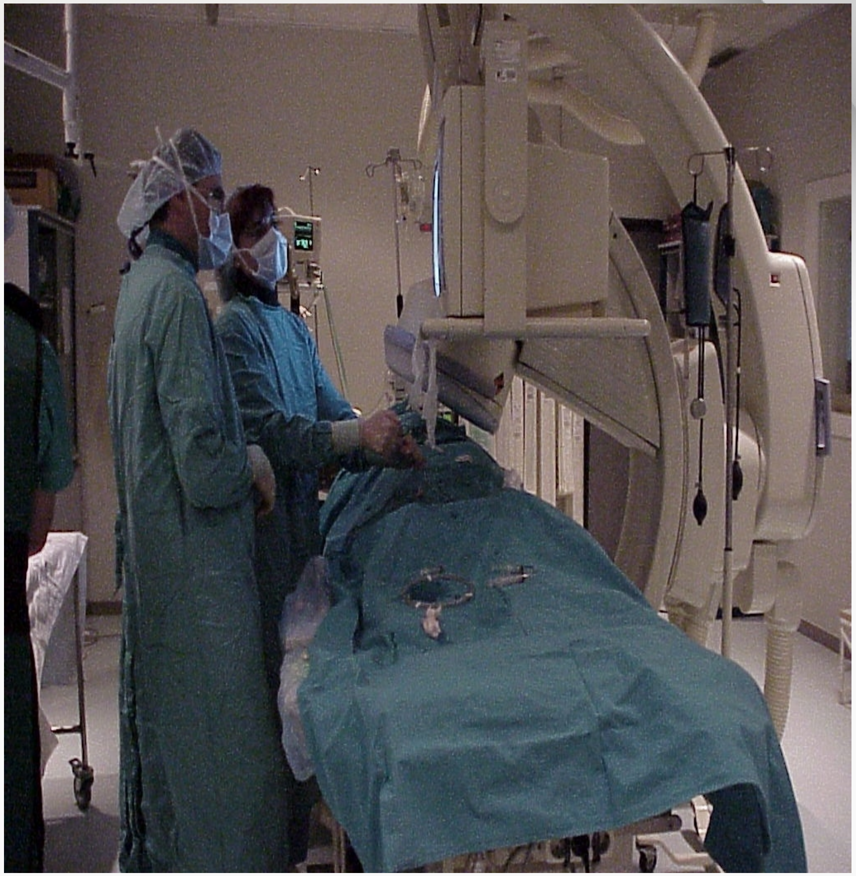

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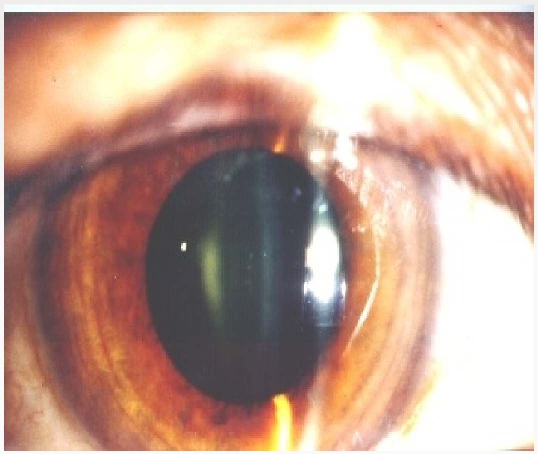
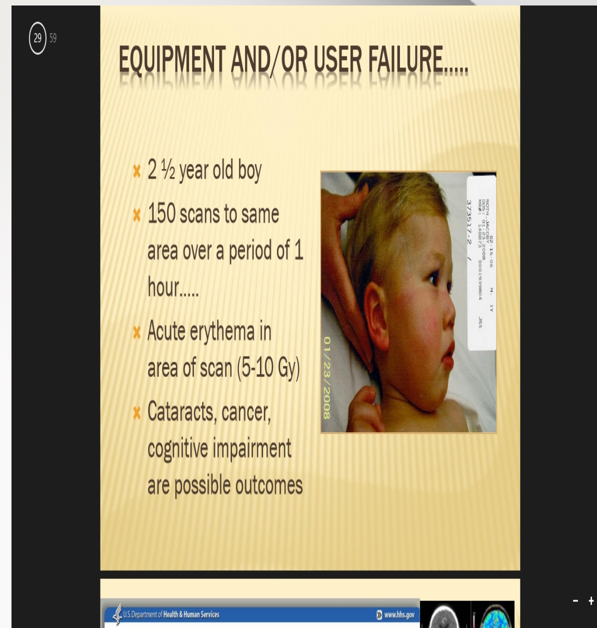
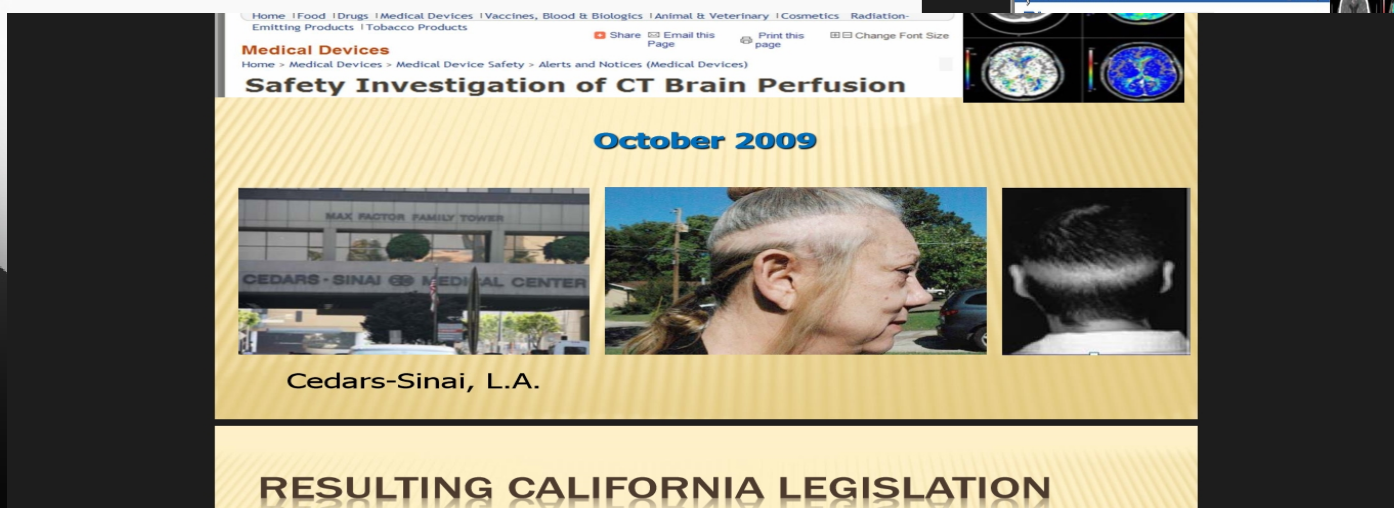
DETERMİNİSTİK







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MONİTÖRLER

Australas Phys Eng Sci Med (2013) 36:231–241
DOI 10.1007/s13246-013-0203-3

SCIENTIFIC PAPER

Performance evaluation of soft copy display systems according to AAPM TG18 protocol

T. Olgar · E. Kamberli

Table 1 Details of display devices evaluated in this study

	Monitor ID	Model	Pixel matrix	Chromaticity	Using area
Hospital A	1–2/3–4/5–6	3 Dual-head Barco Coronis	(1,536 × 2,048) (3MP)	Monochromatic	General purpose radiology
Hospital B	7–8	Dual-head Barco Coronis	(2,048 × 2,560) (5MP)	Monochromatic	Mammography
	9–10	Dual-head Dome e5	(2,048 × 2,560) (5MP)	Monochromatic	Mammography
	11–12	Dual-head Eizo FlexScanL768	(1,280 × 1,024) (1.3 MP)	Colour	Computed tomography (CT)
	13	1 HP2009v	(1,600 × 900) (1.44 MP)	Colour	Direct radiography (DR)
	14	1 HP LP1965	(1,280 × 1,024) (1.3 MP)	Colour	Emergency radiology
Hospital C	15–16	Dual-head Totoku ME551i2	(2,048 × 2,560) (5MP)	Monochromatic	Mammography
	17–18	Dual-head Barco Coronis	(2,048 × 2,560) (5MP)	Monochromatic	Mammography
Hospital D	19–20	Dual-head Dell 2007FP	(1,600 × 1,200) (2MP)	Colour	Magnetic resonance imaging (MRI)
	21–22	Dual-head Philips 190S	(1,280 × 1,024) (1.3MP)	Colour	Magnetic resonance imaging (MRI)
Hospital E	23–24/25–26	2 Dual-head Barco Nio	(1,600 × 1,200) (2MP)	Monochromatic	General purpose radiology
	27–28	Dual-head Barco Coronis	(2,048 × 2,560) (5MP)	Monochromatic	Mammography
	29–30	Dual-head Barco Coronis	(1,600 × 1,200) (2MP)	Monochromatic	Computed tomography (CT)
	31–32	Dual-head Barco Coronis	(2,048 × 2,560) (5MP)	Monochromatic	Computed tomography (CT)
Private mammography center	33	HP Touchsmart IQ530	(1,680 × 1,050) (1.7MP)	Colour	Mammography

MP Mega Pixel, *ID* Identification

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GELECEKTEN…

- PACStan doz takibi
- Kişisel dozun belirlenmesi
- Doz veritabanı
- Düzenli izlenen ve azalan DRLler

GÖREVLER

- Hastanın korunması
  - Gerekçelendirme
  - Optimizasyon
  - Doz düzeyleri
- Eğitim
- İdari sorumluluklar

Meghzifene A. European Journal of Radiology 76 (2010) 24–27

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