REDUCING THE PATIENT DOSE IN TWO TYPES OF CONTRAST RADIOLOGICAL TESTS – INTERVENTIONAL (ANGIOGRAPHY) AND CONVENTIONAL (IRIGOGRAPHY) THROUGH DEVELOPMENT THE NEW WORKING PROTOCOLS

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Introduction

In 2009 the national survey was conducted by the National Center of Radiobiology and Radiation Protection in department of Diagnostic Imaging.

In the University Hospital – Plovdiv was registered enhanced patient dose (product dose-area) for two types of X-ray contrast studies – angiography of the lower limbs and irigography.

Also enhanced exposure time was reported to the national reference levels for a given procedures.

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Purpose

- **To identification of the causes for enhanced patient dose.**
- **Reduction of the patient dose to the national reference diagnostic levels for both X-ray contrast studies – angiography of the lower limbs and irigography.**
- **Reduction of the exposure time to the national reference diagnostic levels for both X-ray contrast studies – angiography of the lower limbs and irigography.**
- **To establish the protocol, describing the action of the working time, conducting the study.**

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Materials and Methods

Dose assessment for both X-ray contrast studies was carried out by measurements of dose area product (DAP).

- Angiography of the lower limbs were performed on angiographic X-ray Siemens, Polystar. It is equipped with DAP meter of PTW, DIAMENTOR.

- Irigography were performed on diagnostic Radiography / Fluoroscopy (R/F) unit Siemens, Siregraf D2. It is equipped with DAP meter of VacuTec, VacuDAP.

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Materials and Methods

The data were collected when examining the standard patients – about 70 kg weight and 170 cm height.

For angiography of the lower limbs the data from 40 patients were used.

For irigography the data from 40 patients were used.

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Results

The working protocols were made for each unit and for each of studies. We determined the optimum procedure for these X-ray units, also for the staff working with them. The patient dose depends both of technical parameters of the study and human factor.

We have made an impact analysis of these factors to establish the protocol.

Following and observing of these protocols we reduced the patient dose and the exposure time to the national reference levels without affected to the quality of the ongoing investigation.

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Results

Table 1 - The values of the reference patient dose, the value of increased patient dose, the value patient dose at the moment and the percentage deviation in irigography procedures are shown

	National referents levels	Patient dose 2009г.	Patient dose 2010г.	% deviation
Dose – area product /μGy.m²/	4000	4557	3856	-1,18 %
Exposure time /min/	4,2	5,0	4,0	-1,25 %

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Results

The table 2 - the values of the reference patient dose, the value of increased patient dose, the value patient dose at the moment and the percentage deviation in angiography of lower limbs procedures are shown

	National referents levels	Patient dose 2009г.	Patient dose 2010г.	% deviation
Dose – area product /μGy.m²/	45	64	45	-1,42 %
Exposure time /min/	1,9 – 3,0	3,0	2,6	-1,15 %

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Results

The following protocols were introduced to the workflow:

For angiography of lower limbs:

1. Preliminary information of the objective condition of the patient
2. Reducing the number of unfounded studies
3. Preliminary determination and specifying the area of interest for reducing the radiation field
4. Smaller X-ray field (collimation)
5. Using the minimum additional magnification according to the clinical aim
6. Positioning of the image intensifier closer to the patient
7. Compulsory use of the appropriate individual radiation protection resources
8. Reducing the exposure time which is achieved with increasing the experience and qualifications of workers

For irigography:

1. Preliminary information of the objective condition of the patient
2. Reducing the number of unfounded studies
3. Preliminary determination and specifying the area of interest for reducing the radiation field
4. Smaller X-ray field (collimation)
5. Using the minimum additional magnification according to the clinical aim
6. Compulsory use of the appropriate individual radiation protection resources
7. Reducing the exposure time which is achieved with increasing the experience and qualifications of workers

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Conclusions

Development and use of the new operating protocols of the working team on each X-ray diagnostic unit under radiological tests will help not only to reduce the dose to the patient but also the dose to the staff.

The training of staff (especially radiologists) is essential for reducing the patient dose for both X-ray contrast studies. The cooperation in Department of Diagnostic Imaging between working staff and medical physicists will significantly the quality of work and will reduce patient dose.

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