Digitalization of the Existing X-Ray Machine in the bus (fluorobus) in the Special Hospital for Lung Diseases in Brezovik

The solution needs to consolidate work at the hospital and field acquisition station in the bus. Data about the patient need to be entered at one place – that is, acquisition station in the bus. Acquisition station is located by the X-ray machine control desk and in addition to entering data about the patient it serves to acquire digital image from the X-Ray Machine.
The structure of entered data is defined by legal regulations. Basic demographic data are memorized in the digital archive.

Digital camera is linked with the X-ray machine by electronics and software, so the simultaneous exposition takes place which needs to ensure additional reduction of the repetition of exposition errors. Necessary image resolution is minimum 2048 x 2048 pixels, 14 bits. Digital acquisition of image must take place through the USB 2.0. The transfer of image from the camera to the monitor must happen in less than 3 seconds.

Before final archiving, the system must ensure additional adjustment (correction) of the light, contrast and cropping and also the possibility to enter demographic data about the patient directly to the snapshot.

The capacity of the system must be 40-80 patients per hour of operation.

In addition, the system must contain software that will archive snapshots and burn them to CD/DVD at the end of working hours depending on the quantity of data, so that the burnt CD/DVD may be sent to hospital to be read. In the Special Hospital for Lung Diseases in Brezovik it is necessary to install the second part of software that automatically uploads data from the CD into its base, automatically updates the existing base for the purpose of uniformity and co-existence of data base while images are after that viewed from the CD. Software for automatic archiving of images to CD/DVD must have the system of automatic numeration of discs. This particularly ensures protection of storage and prevents doubling of data and information. Statistical data on the image about accuracy and presence of the disease need to be entered by checking in of the ATD card from the program into the base (two readings per each snapshot), while calls to the patients must be directed by automatic generation of the report and list of patients with addresses.

The solution must support DICOM 3.0 standard and DICOM dry technology laser print – Dry Imager.

HIGH RESOLUTION DIGITAL CAMERA WITH APPROPRIATE OPTICS *for usage on X-Ray machines*

Description

Sensor size	min. 22.2 x 14.8 mm
Mega pixels	min. 10
Sensor type	CMOS
Image processor	DIGIC II or equivalent
Photo size	min. 3500 x 2000
Format of recording	RAW + JPEG, RAW, JPEG
Autofocus	min. 6 autofocus dots
Measurement	TTL min. 30 zone
Exposition	Over Remote interface
ISO sensitivity	ISO 100 - 1600
Lid	30 - 1/4000 sec
Balance of white colour	Auto + 7 manual modes
Connection / Communication	USB 2.0, Video out

Additional Equipment and Cables

- Permanent charging for digital camera
- Electronics for automatic synchronous exposition, linked with the preparation wheel and pipes rotation and interface on digital camera (remote control)
- Lead glass for the protection of digital camera

COMPUTER EQUIPMENT

- **For entering of data and recording in the bus**

Processor model	Minumum Dual Core 1.6 GHz
Memory	2GB DDR2 667MHz
Hard disk	2x 250 GB
Optical device	DVD RW
Graphics card	integrated
Integrated sound card	5.1 integrated
Network	1 Gbps LAN
Case	Minimum 460W
Keyboard + mouse	Basic optical set
Installed software	Windows XP Professional
Monitor	TFT 22“ pieces 1

- **Imaging Server for Viewing Materials and Filing**

Processor model	Minumum Dual Core 1.6 GHz
Memory	2GB DDR2 667MHz
Hard disc	2x 500 GB
Optical device	DVD RW
Graphics card	Minimum 512 MB RAM, PCI Express

Integrated sound card	5.1 integrated
Network	1 Gbps LAN
Case	Minimum power 460W
Keyboard + mouse	Basic optical set
Installed software	Windows XP Professional
Monitor	TFT 22“ pieces **2**

- **Laser printer which supports resolution print 1200 dpi.**
- Cable channels. The set of extended channels for the VGA keyboard and mouse.
- 2 x UPS 800 VA – minimum 480 W

APPLICATION SOFTWARE

Minimum 24 month guarantee (without operating system)

- Software of the **acquisition station in the bus** needs to contain the following:

a. Data base of the patients
b. Software for entering demographic data in the bus – with automatic opening of new operation
c. Software for communication and control of digital camera with controlled exposition
d. Software for imaging processing with at least the following tools for image processing:

- Histogram control – for the clarity of image, adjustment of contrast
- Continued adjustment of the grayness level (Window Level)
- Continued zooming in and zooming out of image (full screen and random window)
- Sharpening of edges
- Cropping the region of interest
- Positive/negative view (inversion of image) with the possibility for autoadjustment in *ini* file
- Rotation and turning of image (horizontally and vertically)
- Panning (moving image on the screen)
- Automatic entering of demographic data and marking of the side (R, L), with the possibility of selection of the side and position of the patient (AP and PA snapshot)

e. Software for automatic burning of data on CD or DVD

- Software for imaging server at the hospital needs to contain the following:

a. Data base about the patients

b. Software for uploading data from brought CD or DVD media
c. System for automatic uploading into permanent archive without the option of doubling of data, where access to the archive must be restricted only to persons with user name and password.

- Tools for Image Processing on Imaging Server must have the following functions:

a. Zoom (in and out), moving image to the center
b. Rotation of image in all directions
c. Changing of light (window level)
d. Measurement of distance, surface of change
e. Inversion of image white/black
f. Cropping
g. Export of image in some of the Windows formats

- **Filing of Data from Imaging Server must have the following options:**

a. Printing of the ATD card with checked boxes and image in the attachment
b. Paper print
c. Printing on dry laser – Dry Imager
d. Printing of several images on one film
e. Electronic transmission of data on some of the media
f. E-mailing
g. The possibility to connect several users to the image server

OTHER EQUIPMENT

- **Dry Laser Imager**

a. Resolution: min 500 dpi
b. Supports minimum 2 formats of films at the same time (2 trays)
c. Formats of the film: 35x43cm and the other smaller ones (26x36 or 20x25 cm)
d. Grey scale: min. 14 bits
e. Dicom 3.0 input
f. Guarantee period: 12 months
g. Film: **35x43 cm – box 100 pcs**
h. **26x36 cm – box 150 pcs**

- ***Air conditioning – split system***

a. Minimum 12U

OTHER CONDITIONS:

- Delivery time maximum **30 days** upon signing of contract
- Delivery and installation at ***Special Hospital for lung Diseases in Brezovik, Niksic, Montenegro***
- Education for staff provided within Special Hospital for lung Diseases in Brezovik
- Warranty period minimum ***12 months***
- Local or regional service provided within ***24 hours***
- Phone support on local language provided