DEDICATION

To my parents, my family,
who have always supported
my efforts, to my colleagues
and
My friends
With ever lasting
appreciation

-

Acknowledgement

I am greatly debated to The Director of Kalba Hospital Mr. Obied Saeed Bin Furaish for his kind support, encouragement and valuable advice which enabled me to complete this work.

Iam greatly debated and thankfull to the people of Grand Store–Medical Division for their financial and technical support.

I am greatly debated to my collogues of Radiology Department at Kalba Hospital for their major contribution in this study who are offered their valuable help, encouragement.

My thanks and gratitude extends to include:

1- Dr.Motasim Ahmed Alsid (Supervisor).

2- Mr.Hussien Ahmed Hassn (co. Supervisor).

for their interest, constructive advice and valuable information.

My thanks also to.Mr. Abdelrrazak- Biomedical Engineer of Kalba Hospital and staff of Information Technology Department.

Abstract

The Computed Radiography now adays are more frequently used in the modern X-ray departments, because it used Photostimuble storage phosphor instead of film/intensifying screen which needs processing.

This leads to measure change in the concept of technology application and the quality control system. This study has been conducted on Kalba, Old and new Hospital X-ray departments, its comparative study between CR and conventional radiography. The study carried out on the period of ten months.

The main objectives of this study was to evaluate the impact of CR in the field of radiology. The results of this study was accounted by using reject films analysis which has been evaluated by an expert radiologists and technologists.

The results show that there is high rate of rejected films in conventional radiology 3.3% compare to CR 0.56%. Also the X-ray parameters has been evaluated in term of quantity and quality for the patient; application of CR gives reduction of dose range from 25% to 50% while preserving the slandered quality of the image.

Using of CR facilitate the use of :PACS and hence teleradiology in the hospital. The application of CR increases the productivity while reducing the running cost of X-ray department. Also the application of CR will reduce the radiation dose to the patients as well as the repetition rate respect to conventional which will speed the process of services.

مستخلص البحث

إن إدخال نظام أجهزة الأشعة المحوسبة أصبح الآن من أكثر أجهزة الأشعة الرقمية المستخدمة في أقسام الأشعة الحديثة وذلك لامتيازه عن أجهزة الأشعة العادية والتي يستخدم فيها الحافظات التي بداخلها الألواح الحساسة والأفلام وأجهزة التحميض لتظهير الأفلام والتي استعيض عنها فى نظام الأشعة المحوسبة بتقنية ما يسمى بالألواح الفسفورية هذا مما أدى إلى حدوث تغير كامل فى مفهوم استخدام هذه التقنية وأيضا في أنظمة مراقبة الجودة في أقسام الأشعة .

هذه الدراسة أجريت بقسمي الأشعة بمستشفى كلباء الجديد والقديم وهى عبارة عن دراسة مقارنة بين النظام الرقمي الذي نستخدم فيه الأشعة المحوسبة بالنظام العادي وقد استغرقت هذه الدراسة عشرة أشهر وقد أجريت لمعرفة مدى أهمية إدخال النظام الرقمي والذي تستخدم فيه الأشعة المحوسبة فى أقسام الأشعة والفوائد المرجوة من استخدام هذه التقنية . وقد تم رصد هذه الدراسة بنظام حساب الصور المرتجعة بقسمي الأشعة الجديد والقديم وتم تحليل المعلومات بواسطة لجنة من أخصائي الأشعة بالقسم وكبار التقنيين وكانت النتيجة كما توقع الباحث حيث كانت نسبة أعادة الفحوصات بالنظام العادي بين 3.3% والنظام الرقمي 0.56% كما تم أيضا إعادة تقييم لعوامل الأشعة من كمية ونوع الأشعة للمريض من خلال تخفيضها بنسبة تتراوح بين 25% إلى 50 % وقد كانت هى انخفاض الجرعة الإشعاعية التي يتعرض لها المريض علاوة على الحصول على صورة قياسية .

استخدام تقنية النظام الرقمي أتاح تطبيق نظام أرشفة وتناقل الصور الرقمي بقسم الأشعة بالمستشفى . إدخال هذا النظام كان له الأثر الكبير فى تغيير المفاهيم السائدة من قبل في إدارة قسم الأشعة مما أنعكس إيجابا على سلاسة العمل وذلك من خلال زيادة الإنتاجية وتقليل التكلفة التشغيلية من خلال المقارنة مع التكلفة التشغيلية للنظام العادي من استهلاك للأفلام والأحماض ومشاكل التخزين وضياع الأفلام .

أن وجود هذا النظام بأقسام الأشعة قد أفاد في عدة مجالات وعلى سبيل المثال لا الحصر تخفيض الجرعة الإشعاعية التي يتعرض لها المريض هذا بالإضافة تقليل

إعادة الفحص الشعاعى نتيجة للأخطاء الفنيـة كمـا موجـود بالأشعة العادية.

ABBREVIATIONS

NEMA - ACR *American College o Radiology &national Electrical Manufacturers Association*	
A&D	Analog-to-digital converter
A/E	Accident and Emergency
AEC	Automatic Exposure Control
AP	Antero – posterior
bpp	Bit per Pixel
Bbs	Byte per second
CD	Compact Disc
CCD	Coupled Device
CPU	Central Processing Unit
CR	Computed Radiography
CT	Computed Tomography
ray- X CXR	Chest
DAC	Digital-to-Analog Converter
adiographyR italDig	DR
DSA	Digital Subtraction Angiography
DSL	Digital Subscriber Line
DVD	Digital Versatile Disk
EMR	Electronic Medical Record
EPR	Electronic Patient Record
ystemS nformationI Hospita	HIS
HL7	Health Level 7

ICU	Intensive Care Unit
ID	Identification
Imaging Plate	IP
ISDN	Integrated Service Digital Network
ISO	International Standards Organization
Information Technology	IT
Joint Photographic Experts Group	JPEG
Local Area Network	LAN
Liquid Crystal display	LCD
Line Pair	lp
Look Up Table	LUT
Megabyte	Mbyte
Magnetic Optical Disk	MOD
Magnetic Resonance Imaging	MRI
Optical Density	OD
Operating Room	OR
Open System Interconnection	OSI
Personal Computer	PC
Photostimulable phosphor	PSP
Quality Assurance	QA
Quality Control	QC
Redundant Array of Inexpensive Disks	RAID
Radiology Information System	RIS
Signal-to-Noise Ratio	SNR
Sending Site	SS

Transport Control Protocol/Internet Protocol	TCP/IP
Virtual Private Network	VPN
Wide Area Network	WAN

PACS and Imaging Informatics Glossary

1. Backup archive

The PACS controller and archive server saves every patient's images from five to seven years .If adisaster occurs, the controller can retrieve images immediately from the backup archive to maintain the clinical operation.

2. Communication networks

PACS is system integration, all components in the system are connected through communication networks. The networks use TCP/IP (Transport control protocol/internet protocol) communication protocols.

3. Diagnostic workstation

Workstations, they make diagnosis and review patient images. Two 2000 lines LCD monitors are usually needed for radiologists to make primary diagnosis.

4. ePR

Electronic patient record (ePR) or Electronic medical record (eMR) is an effort to re-design HIS with patient as the focus.

5. HIS, RIS, PACS Integration

In order for PACS to operate effectively and efficiently, HIS, RIS and PACS have to be integrated. They are usually integrated with a DICOM broker in which pertinent patient data and radiology reports are translated from one system to the other.

6. Image Acquisition Gateway

There are many imaging modalities in radiology operation. In general, they are not connected to the PACS controller and server directly but to an image acquisition gateway as a staging buffer.

7. Image archive

After an image acquire from the modality, it goes to the image acquisition gateway, then the PACS controller and archive.

8. Image size

The medical image size and the amount of data generated in an examination vary, care has to be taken to investigate the image load for the transmission and archive requirement.

9. Image/data security

Image/data security considers three parameters:

Authenticity— that sends the image.

Privacy — that can access the image.

Integrity —has the image be altered since it was generated.

10. Imaging Informatics

A branch of science to manage, extracts, and process pertinent information from large image databases.

11. Internet/Intranet

Internet is a technology used for network communication TCP/IP is the most commonly used protocol

12. PACS Controller and Archive Server

PACS controller and archive server has three major functions in PACS operation. It monitors the dataflow of the complete system operation, archive all image and related data, and distribute them timely to proper workstations and application servers for review and other clinical functions.

13. RIS

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Radiology Information system (RIS) is an information system tailored for radiology operation. It connects to both HIS and PACS for effective and efficient clinical operation.

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