ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA
VOL. LXV, N 1, 13 SECTIO D 2010

Al-Noor Specialist Hospital, Makkah, Saudi Arabia, Al-Noor Specialist Hospital, King Abdullah Medical City

ZOHAIR JAMIL GAZZAZ, KHALID OBEID DHAFAR, ABDUL FATAH SINDY, MIAN USMAN FAROOQ, SHAKEEL AHMAD MIAN

X-Rays Referral In An Emergency Department

Work Attributed to Emergency department of Alnoor Specialist Hospital, Makkah, Saudi Arabia

INTRODUCTION

Since the discovery of X-rays in 1895, the field of diagnostic radiology has grown quickly. (1) The utilization of radiological investigations is increasing world-wide at a rate of 5 to 10% per year. (2-6) Conventional radiology constitutes more than 80% of the daily work of any radiology department and thus forms a sizeable amount of effort and cost. (7,8)

In human tissue, the ionization by X-rays can cause damage to DNA and cells, but it can also penetrate the body to allow noninvasive visualization of the internal anatomy.(9) Contemporary medicine relies heavily on radiological and medico nuclear investigations and procedures. However, the often essential information derived from such investigations is obtained at a risk that few doctors are fully aware of. Use of radiation for medical examinations and tests is the largest manmade source of radiation exposure. According to United Nations, an average of 2.4mSv/year radiations come from natural sources. The medical sources of radiation were about one fifth of the natural radiation in 1987, closes to half in 1993, and almost 100% of natural radiation in 1997 in most affluent countries. (10)

Emergency departments are major source of requests for radiographs. The aim of this study was to identify the level of referrals from the emergency department for X-rays and to estimate its overutilization in the sense of suspected positive findings in a tertiary care referral unit, ie Al-noor Specialist Hospital, Makkah, Saudi Arabia.

MATERIAL & METHODS

This study was performed at the ED of a 520 bed tertiary care referral teaching hospital in Makkah, Saudi Arabia, the Al-Noor Specialist Hospital with an annual average of about 229,200 ED visits. The ED typically contains 72 nurses and a total of 40 doctors, including consultants, specialists

and residents. ED doctors could call resident or specialist of the day or on call (ROD, SOD) of all specialties, to take second opinion for the patients with expected admissions or complications. Only the (SOD) could admit a patient as per hospital policy and depending upon the patient's condition. Al-Noor Hospital's ED is fully equipped with a total department area of 2315 m2 having 54 beds in different areas including Triage Area, Adult Care Area (ACA), Ob/Gyne, Critical Care Area (CCA) and Paediatrics Care Area (PCA). This ED also has an Emergency Pharmacy, Radiology Department and Laboratory. There is a surgical facility with an Operation room, and ENT, Eye and Dental procedure rooms are also present for emergency patients.

This is a retrospective study comprising data collected from emergency department(ED) cards/ files of patients who visited the ED during one month period of April, 2006G. The ED cards were reviewed for age, gender, nationality, no of X-rays advised and their findings, final discharging diagnosis according to International Classification of Diagnosis version-10 (ICD-10) and final outcome. The age was divided into 0-24, 25-44, 45-64, >64, gender was expressed as male, female, while nationality was detailed as Saudies, non-Saudies. The subjects exposed to X-rays had been enumerated, and their body was divided into regions, ie lower limb, upper limb, chest, head, neck, abdomen, thoraco-lumbo-sacral spine, pelvis and premium. Regions were enlisted from smallest to largest number of times they exposed to X-rays. The clinical notes of each X-ray written by radiologist had been reviewed for findings suspected by the ED physician before advising X-rays or findings coherent with his initial working diagnosis considered as positive. Each patient's final diagnosis was categorized according to ICD-10 and arranged in Major Diagnostic Categories (MDCs). Data were analyzed by using Microsoft Excel 2003 version.

We declare that we have no financial or personal relationship(s) which may have inappropriately influenced us in writing this paper.

RESULTS

A total number of 660(22%) patients out of 2980 had been referred to radiology department for X-ray from ED of Alnoor Specialist Hospital during study period. Majority 288(43.3%) were below 24yrs of age while males 372(56.3%) and Saudis 400(60%) were predominant. Table 1

Table 1. Demographic data

Age groups (years)	0-24	288	43.6
	25-44	208	31.5
	45-64	112	16.9
	>64	52	7.8
Gender	M	372	56.3
	F	288	43.6
Nationality	S	400	60
	N/S	260	40

The discharged patients were 572(86.6%), and 4(0.6%) were died. Six hundred and twenty (93.9%) patients got exposures rang of 1-4 while only four (0.6%) got more than eight exposures to X-rays.

Table 2. Outcome of Patients

		no	%
Outcome	Discharged	572	86.6
	Admitted	72	10.9
	DAMA	8	102
	Referred	4	0.6
	Dead	4	0.6
No. of exposures	1-4	620	93.9
	5-8	36	5.4
	>8	4	0.6

It was found that lower limb was exposed 384times (26%), followed by chest 320(21.7%). Overall 240(16.3%) X-rays had positive findings with majority of upper limb 60(50%) followed by chest 72(22.5%). Pelvis and perineum had no positive X-ray out of 16(1.1%). Table 3

Table 3. Details of region versus exposure with positive findings

	Regions	No. of X-rays	%	No. of positive X-rays	%
1	Lower limb	384.0	26.1	24.0	6.3
2	Chest	320.0	21.7	72.0	22.5
3	Head(skull)	176.0	12.0	32.0	18.2
4	Neck	116.0	7.9	0.0	0.0
5	Abdomen	268.0	18.2	36.0	13.4
6	Upper limb	120.0	8.2	60.0	50.0
7	Thoraco-lumbo-sacral spine	72.0	4.9	16.0	22.2
8	Pelvis and perinium	16.0	1.1	0.0	0.0
	Total	1472.0	100.0	240.0	16.3

A total of 13 Major Diagnostic Categories (MDCs) were found for the patients and injury and poisoning were predominant (S00-T98) 224(33.9%) followed by respiratory disorders (J00-J99)104(15.7%).Endocrine (E00-E99), neoplasm (C00-D48) and congenital malformation (Q00-Q99) cases were equal, ie 4 (0.6%).

Table 4. Subjects' details according to Major Diagnostic Categories (MDCs)

s/n	Major Diagnostic Categories	ICD-10	no	%
1	Injury, poisoning and certain other consequences of external causes	S00-T98	224	33.9
2	Diseases of respiratory system	J00-J99	104	15.7
3	Symptoms, signs and abnormal clinical and laboratory findings not elsewhere classified	R00-R99	76	11.5
4	Diseases of digestive system	K00-K99	60	9
5	Diseases of circulatory system	I00-I99	52	7.8
6	Diseases of genitourinary system	N00-N99	48	7.2

7	External causes of morbidity and mortality	V00-Y98	48	7.2
8	Diseases of musculoskeletal system and connective tissue	M00-M99	20	3
9	Diseases of nervous system	G00-G99	8	1.2
10	Diseases of skin and subcutaneous tissues	L00-L99	8	1.2
11	Endocrine, nutritional and metabolic diseases	E00-E99	4	0.6
12	Neoplasm	C00-D48	4	0.6
13	Congenital malformations, deformities and chromosomal abnormalities	Q00-Q99	4	0.6
	Total		660	100

DISCUSSION

It is both ethically and economically desirable to restrict the use of diagnostic medical radiation to only those who will benefit from it. However, patients should not refuse diagnostic tests based on an exaggerated estimation of the risks because most of these tests involve low doses of radiation. It is probable that risks derived from studies of the atomic bomb survivors, who were exposed to high doses of radiation, overestimate the risks at low doses. No evidence of thyroid cancer, leukemia or non-Hodgkin lymphoma has been found in patients exposed to diagnostic levels of ionizing radiation. For most diagnostic tests, the risks arising from radiation exposure are too small to be observed and the benefits will almost always outweigh the risk. There is increasing evidence that the risks associated with medical diagnostic radiation exposure are substantially less than that predicted from high-dose radiation (11). Our study was limited, retrospective with one month emergency patients who referred for radiography, i.e. X-ray contrary to the prospective one of Richards in which, study period was one week with study sample (1436) of whom 637(44%) were radiographed, which is higher than our study, i.e. 22% out of total ED visits. In our study only emergency cards of those patients were studied who got X-ray while in his, all the emergency cards had been studied in detail. His study had been conducted by only emergency departments notes, illustrating that the commonest site of body requiring radiological assessment was extremities (34%) similar to ours (12). Another study which is of one week, prospective and conducted in three emergency departments in which (31.6%) patients were referred for X-rays and 1231sets of X-rays were done which is more than ours, out of these skull X-rays were studied in detail which were 112(9%) of the total, and only (4.5%) of these were positive which is less than our study which had shown that their emergency doctor's have less ability to predict X-rays outcome than ours (13). The study of Fry, which is a comparison of abnormality rate among the limb X-rays prescribed by the triage nurses and doctors, had shown as a whole abnormality rate (38.6%) lower than ours, on the other hand upper limb positive percentage i.e. (51%) was nearly similar while that of lower limb, i.e. (31%) was much higher than our study (14). Moreover, in our study patient's complaints were also categorized according to International Classification for Diagnosis version 10, i.e. ICD-10 and arranged in Major Diagnostic Categories (MDCs) which is not mentioned in any above study.

CONCLUSION

X-ray prediction of our accident and emergency physicians were better than other studies but still there is a need of clear guidelines for prescribing X-rays in our ED setup.

REFERENCES

1. Report of a joint IAEA/WHO Expert Committee. The medical uses of ionizing radiation and radioisotopes. WHO Technical Report Series; 492 Geneva: WHO, 1972.
2. Evans KT. The radiologist's dilemma. Br J Radiol. 1977;50:299-301.
3. Editorial. Clinical audit in diagnostic radiology. Br Med J. 1977;6085:479-80.
4. Hall FM. Overutilization of radiological examinations. Radiology. 1976;120:443-8.
5. Editorial. Reducing tests. Lancet. 1981;2:539-40.
6. Beentjes LB, Timmermans CWM. Age- and sex-specific radiographic examination frequency in the Netherlands. Br J Radiol. 1990;63:691-7.
7. Palmer PES, Cockshott WP. The appropriate use of diagnostic imaging: avoidance of the red goggle syndrome. J Am Med Asso. 1984;252:2753-4.
8. Racoveau NT. Towards a basic radiological service. World Health Forum. 1981;2:521-4.
9. Gingold EL. Physics of conventional radiography. In: Katz DS, Math KR, Groskin SA, editors. Radiology secrets. Hanley & Belfast, INC; 1997. p. 1.
10. Picano E. Sustainability of medical imaging: education and debate. Br Med J. 2004;328:578-580.
11. Smart RC. What are the risks of diagnostic medical radiation? Med J Aust. 1997; 166: 589-591.
12. Richards PJ, Tins B, Cherian R, Rae R, Dharmahrajah R, Phair IC, Mccall I. The emergency department: an appropriate referral rate for radiology. Clinical radiology. 2002 (57):753-758.
13. Warren RA, Ferguson DG. Why do accident and emergency doctors request X-rays? Arch Emerg Med. 1984;1(3):143-50.
14. Fry M. Triage nurses order x-rays for patients with isolated distal limb injuries: a 12-month ED study. J Emerg Nurs. 2001;27(1):17-22.

ABSTRACT

OBJECTIVE: This study highlighted referral rate for X-rays with positive findings in an Emergency department of a tertiary care hospital in Makkah, Saudi Arabia.

MATERIAL & METHODS: This was a retrospective review of Emergency department(ED) cards/files of patients visited (ED) of Alnoor Specialist Hospital, Makkah, Saudi Arabia, during the month of April, 2006G.

RESULTS: The total of 660(22%) out of 2980 ED patients were included in the study and 1472 X-rays of different regions were done for them. Majority 288(43.3%) were below 24yrs of age while males 372(56.3%) and Saudis 400(60%) were predominant. The discharged patients were 572(86.6%), and 4(0.6%) were died. Six hundred and twenty (93.9%) patients got exposures rang of 1-4 while only four (0.6%) got more than eight exposures to X-rays. It was found that lower limb was exposed 384times

(26%), followed by chest 320(21.7%). Overall 240(16.3%) X-rays had positive findings with majority of upper limb 60(50%) followed by chest 72(22.5%). Pelvis and perineum had no positive X-ray. Patients from injury and poisoning were predominant 224(33.9%) followed by respiratory disorders 104(15.7%).

Conclusion; Eighty four percent X-rays had no positive findings. Majority of X-rays were done for lower limb. Neck, pelvis and perineum X-rays had no positive findings.

Key Words. X-ray, Emergency, Radiology, Makkah