ORIGINAL ARTICLE

ANALYSIS OF REJECTED FILMS AT THE UNIVERSITY OF MAIDUGURI TEACHING HOSPITAL (UMTH)

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ABSTRACT

Objective of the study: To analyse reject films at the University of Maiduguri Teaching Hospital as a tool for patient dose optimisation.

METHODOLOGY:

Eight Hundred and seventeen (817) radiographs rejected at the University of Maiduguri Teaching Hospital Radiology Department between January 2008 and July of the year were analyzed according to body parts for reasons for their reject.

RESULTS:

The most common causes of film reject as observed were positioning errors (24%), under-exposure and over exposure were responsible for 19.30% and 17.6% repeats respectively. Chest X-rays were observed to have the highest reject rate of 41.56%.

CONCLUSION:

This study has established reject rate and reasons for rejection of films at UMTH, which may be useful for improving Radiography practice, thus patient dose optimisation

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INTRODUCTION

Reject analysis is the critical evaluation of rejected radiographs which is performed in order to calculate the average reject rate, and to establish the main reasons for rejected films.

Reject analysis is defined as the critical evaluation of radiographs which are used as part of the imaging service but do not play a useful part in the diagnostic process.

In diagnostic radiography, one of the objectives is to ensure patient satisfaction with the services provided. Reject analysis as an essential part of quality assurance which indicate weak areas of radiographic and radiologic practice in the department and secondly, it will enable one to note any improvements after quality assurance measures have been put into practice.
In 1990, the average reject rate in the UK was 10% of all films and this implies that nationally rejected films are responsible for an unnecessary increase in the radiation dose to the patients, staff, and members of the public and increased film and processing costs[1]

There is a growing global concern for reduction in radiation doses in diagnostic radiology which is justified by the level of doses incurred during X-ray examinations. The concern originates from the fact that, when considering stochastic effects even small radiation doses carry some risks. Therefore clinically unjustified, avoidable repeat or unoptimized X-ray examinations may unnecessarily lead to increased risk of adverse health effect and hence need to be minimized[2].
The aim of this study was to evaluate reject films between January - April 2008 at the University of Maiduguri Teaching Hospital as a tool for patient dose optimization.

MATERIALS AND METHODS

A prospective method of data collection was adopted using radiographic films that have been described as being of poor diagnostic quality. A total of eight hundred and seventeen (817) films

rejected within the period of four (4) months (January - April, 2008) were analyzed. These were obtained from the archive of the radiology department UMTH after consent has been granted by hospital research ethics committee.

Three conventional radiography rooms used for the study each has the same type of x-ray machine. The x-ray cassettes for the systems were Kodak X-omat cassette (rare earth screens, 400 speed), and Agfa-gevaert (calcium tungsten screen, 200 speed). Three-phase, six pulse General Electric (GE) generator Silhouette VE system, RAD-12/Diamond x-ray tube GE, with added filtration of 1.5mmAI, focal spot 0.6-1.2, and maximum tube voltage of 150kVp. The processor used was mediphot 903 working at temperature range of 33 - 38°C for 90sec.

Each film was assessed on a viewing box under similar conditions of room light and temperature. The evaluation was done by the Chief Radiographer. Rejected radiographs were analysed and categorized according to body parts which included chest, skull, extremities, abdomen, pelvis, spine x-rays, and contrast examinations. The reasons for the reject were also categorized as overexposure, underexposure, rotation, positioning error, poor breathing, fog, roller marks, static marks, unexposed films and others (finger marks, absence of markers, double exposure, blurring, artifacts). Data was analysed using SPSS version 16 software.

RESULTS

The data collected was categorized according to body parts and reasons for reject. The most common causes of film rejects were positioning errors (24%), underexposure (19.30%) and over exposure (17.6%) respectively (Table 1).

From the distribution of rejected films according to body part being examined, 41.56% of the films rejected were chest X-rays, followed by spine (15.64%) and skull (12.24%) respectively (Table 2).

Table 3 presents the reasons for the reject and the body parts involved. Chest x-rays were the most common repeated view, and mainly were due to overexposure, underexposure, and positioning errors, each involving 115,129, and 115 radiographs respectively.

TABLE 1: COMMON REASONS FOR REJECTING FILMS IN UMTH

REASON	REJECTED FILM	PER. (%)
Over-exposure	269	17.6
Under-exposure	295	19.30
Rotation	107	7.00
Positioning error	378	24.00
Poor breathing	67	4.38
Fog	174	11.34
Rollers	61	3.99
Static marks	6	0.39
Unexposed	89	5.82
Others	82	5.37

TABLE 2: DISTRIBUTION OF REJECTED FILMS ACCORDING TO BODY PART UNDER EXAMINATION

BODY PART	NUMBER REJECTED	PER. (%)
Chest	635	41.56
Skull	187	12.24
Extremities	90	5.89
Abdomen	161	10.54
Pelvis	123	8.05
Contrast	93	6.09
Spine	239	15.64

TABLE 3: VARIOUS FACTORS LEADING TO REJECTION OF RADIOGRAPHS

REASON FOR REJECT	OVER EXPOSURE	UNDER EXPOSURE	POSITI-ONING ERROR	ROTA-TION	POOR BREATHING	FOG	STATIC MARK	ROLLERS	UN-EXP-OSED	OTHERS	TOTAL
Body parts											
Chest	115	129	115	102	67	37	5	19	11	35	635
Skull	23	43	62	4	0	22	0	3	21	9	187
Extremities	19	23	24	0	0	10	0	8	1	5	90
Abdomen	25	30	38	0	0	32	0	10	16	10	161
Pelvis	26	18	38	0	0	26	0	2	3	10	123
Contrast	19	7	25	0	0	13	0	4	24	1	93
Spine	42	45	76	1	0	34	1	15	13	12	239
Total	269	295	378	107	67	174	6	61	89	82	1,528

DISCUSSION

This study highlights the reasons for rejection of films, and identified the common factors responsible for producing poor quality radiographs. Previous studies have shown that wasted films due to error which occur during taking of x-ray films, as well as technical film waste are unavoidable. Their proportion in relation to the total number of radiographs produced should not exceed more than 5% of reject role[3-5].

The most common causes of film rejection found in this study include overexposure, underexposure, and positioning errors. These findings agree with those three of Tabari el tal,[5,10] that positioning errors and anatomical cut-off were the most frequently occurring reasons for rejection followed by improper exposure and patient motion. These errors are also bound to occur due to the limited radiographers at UMTH expected to attend to a huge number of anxiously waiting patients. However, lack of daily quality control (QC) tests on the processor could also be responsible for producing over or under developed radiographs.

In the distribution of rejected films according to body part, it is noted that chest radiographs have the highest percentage of reject (41.56%). This is because majority of the cases done in the department were chest examinations.

This is in keeping with the findings of Tabari el tal[5]. The incidence of high rate of rejection of chest radiographs could be attributed to the clinical conditions of patient who come for chest X-ray. Majority of the patients for chest examinations are HIV, AIDS and TB patients. Some of these patients are usually very weak and hence find it difficult to assume the proper erect position resulting in radiographs of suboptimal quality.

Other causes of poor radiographic image quality include blurring due to patient movement, scratches, fog, finger nail marks, static marks, roller marks etc.

RECOMMENDATIONS

Film Reject analysis programme should be done monthly and the department should have quality assurance (QA) & quality control (QC) programme policy procedures that are well documented. This helps in the determination of the quality of work and it is in keeping with NNRA benchmark for accreditation of radiology facilities.

Staff should be encouraged to participate in continuous professional development programmes such as courses, seminars and workshops, especially if a new equipment is introduced in the department.

Computed Radiography unit should be introduced to replace the conventional system of processing radiologic image to eliminate darkroom related causes of film reject.

CONCLUSION

This prospective study has noted that positioning errors, errors in selection of exposure factors and fog account for a substantial number of rejected films studied in UMTH. Financial loses, wastage of films and processing chemical, wastage of patient and staff time and increase in radiation dose to both patients and staff are some of the important implications.

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