

X-Ray Special Investigations Rebook Analysis (XSIRA)

¹Thomas Adejoh, ²Sobechukwu W.I. Onwuzu, ³Geofery Luntsi,

³Flavious B. Nkubli and ¹Nwamaka C. Ikegwuonu

¹Radiology Department, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria;

²Medical Imaging Unit, Department of Medical Centre, University of Nigeria, Nsukka, Nigeria;

³Department of Medical Radiography, College of Medical Sciences, University of Maiduguri, Nigeria;

Abstract:

Objective: To establish a quality control tool which assesses the rate of rebook in special investigations involving conventional radiography.

Materials and methods: This was a prospective, observational and interactive study between the researchers and the professionals involved in carrying out the special investigations; Radiologists, Radiographers and departmental Nurses. The work was carried out between June 2012 to June 2014. The cause of rebook as determined by the Radiologist was noted. The Radiographers and Nurses were separately interviewed for their opinions on the causes of rebook. Divergence in opinion amongst the three professionals was excluded. However, concurrence of any two was included. Simple statistical tools like measures of central tendency and dispersion were used to analyze the data.

Results: 537 examinations involving hysterosalpingography, HSG (44.7%; n = 237), intra-venous urography (28.7%; n = 152), micturating and retrograde urethro-cystography (19.3%; n = 102), barium enema (4.5%; n = 24) and colostography (2.8%; n = 15) were attempted between June 2012 and June 2014 by the centre in focus. But only 530 (98.7%) met the inclusion criteria. Rebooked cases were 95 (18.0% rebook rate). The factors responsible for rebooks were Radiologists (50.5%; n = 48); patients (39.0%; n = 37), Radiographer (4.2%; n = 4) and machines (6.3%; n = 6). Difficulty in cannulation during HSG, catheterization for RUCG and intravenous line insertion (30%; n = 28) by the Radiologists; hypertension in patients (14.0%; n = 13); booking for HSG beyond 10 days by the Radiographers (4.0%; n = 4); and X-Ray machine and darkroom processor faults (6.0%; n = 6) were noted as the major specific causes of rebook

Conclusion: Good professional practice, proper clerking of patients and prompt repair of faulty X-ray machines will reduce the rebook rate for special examinations.

Keywords: Rebook, Radiographer, Radiologist, Special investigations, XSIRA

I. Introduction

The vast technological advancement which has occurred over the past decades within the field of medical imaging has led to improvement in quality diagnostic outcomes [1]. This improvement also entails that Radiology departments is well-managed to ensure that patients can access radiological services with minimal delay [2]. Unfortunately, it is becoming common in the Radiology department to encounter patients in a state of dissatisfaction with radiological services due to lengthy waiting time [3], repeat X-ray examinations after the initial X-Ray examinations are rejected due to poor image quality [4], or because of a rebook of their investigations. All these factors will take its toll on their time, resources and sense of satisfaction [3].

Special radiologic examinations most times require patients to adhere strictly to controlled feeding regimen which alters their lifestyle momentarily and impose some level of stress on them prior to the examination [5]. Examinations such as hysterosalpingography (HSG) are preferably done during the follicular phase of the menstrual cycle [6]. This therefore requires that patients be booked for the procedure within ten days from the onset of their last menstrual period [7]. A rebook of such patients invariably is a halt of the examination till the next menstrual period. Rebooking of patients, just like film reject, leads to repeat visit to the hospital, extra cost and stress on patients and loss in man hours [4].

This situation necessitated the need to explore the causes of rebook for special X-ray investigations observed in our centre. Rebook analysis will provide information that may help to achieve a re-appraisal of professional ethics and a conscious effort to guarantee patients satisfaction, as well as sound reduction in cost and lengthy waiting time [4]. X-ray Special Investigations Rebook Analysis (XSIRA) is a quality control tool created by the researchers. It may be useful in assessing the extent of service delivery in diagnostic radiology.

II. Materials and methods

This was a prospective study involving a parri passu observation and interaction of the researchers with Radiologists, Radiographers and Nurses specifically involved in the special investigations. This work involving film-screen radiography was done in a tertiary level hospital in Nigeria between June 2012 to June 2014. The cause of rebook as determined by the Radiologist was noted by the researchers. The Radiographers and Nurses were then separately and in confidence, asked for their opinions. Divergence in opinion amongst the three professionals was excluded. Concurrence of any two of them was included. Rebook as a result of industrial action was excluded from the population of attempted investigations. Simple statistical tools like measures of central tendency and measures of dispersion from SPSS v.16 were used to analyze the data.

III. Results

A total of 537 special examinations were booked within the two-year period. 7 (1.3%) were excluded due to lack of agreement as regard the reason for rebook. 530 investigations involving hysterosalpingography (44.7%; n = 237), intra-venous urography (28.7%; n =152), micturating and retrograde urethro-cystography (19.3%; n =102), barium enema (4.5%; n = 24) and colostography (2.8%; n =15) met the inclusion criteria and were used in the analyses. 95 rebooks were established giving a rebook rate of 18.0% (Table 1).

The factors responsible for rebooks are: Radiologists (50.5%; n = 48); patients (39.0%; n = 37), Radiographer (4.2%; n = 4) and machine (6.3%; n = 6). These are shown in Table 2.

Difficulty in cannulation for HSG, catheterization for RUCG and setting of intra-venous line for IVU by radiologists (30%; n = 28), hypertension in patients (14.0%; n=13), booking for HSG beyond 10 days by the Radiographer (4.0%; n = 4) and X-ray machine faults (6.0%; n = 6) were noted as the major specific causes of rebook (Table 3)

Table 1: Frequency of special investigations in the department

Examination	Successful	Rebooked	Total Exam (%)	Rebook rate (%)	Age Range of patients	Mean + Standard deviation of age (years)
HSG	175	62	237 (44.7)	26.1	21-50years	34.74 ± 5.57
IVU	135	17	152 (28.7)	11.2	4days-95yrs	37.50 ± 21.72
MCUG & RUCG	96	6	102 (19.3)	6	2days-90years	33.00 ± 24.40
Barium Enema	17	7	24 (4.5)	29.2	5days-72years	36.13 ± 25.12
Colostography	12	3	15 (2.8)	20	3-54weeks	0.5 ± 0.33
Total	435	95	530 (100)	18.0	2days-95years	34.70 ± 17.81

Table 2: Factors responsible for rebook

Variable	Radiologist	Patient	Radiographer	Machine	Total
HSG	28	27	4	3	62 (65%)
IVU	4	10	0	3	17 (18%)
Barium Enema	7	0	0	0	7 (7.4%)
MCUG & RUCG	6	0	0	0	6 (6.3%)
Colostography	3	0	0	0	3 (3.3%)
Total	48 (50.5%)	37 (39.0%)	4 (4.2%)	6 (6.3%)	95 (100%)

Table 3: Specific reasons for rebook

Factors	Challenge	HSG	IVU	MCUG & RUCG	Colostography	Barium enema	Total (%)
Radiologist	Conflicting schedules	8	2	0	3	7	20 (21)
	Difficulty in cannulation/catheterization/securing intra-venous line	20	2	6	0	0	28 (30)
Radiographer	≥Day 10 booking	4	0	0	0	0	4 (4)
Machine	Machine fault	2	2	0	0	0	4 (4)
	Darkroom problems	1	1	0	0	0	2 (2)
Patient	Reacted to contrast/ restless	4	3	0	0	0	7 (7.3)
	Hypertension	8	5	0	0	0	13 (14)
	Poor bowel preparation	0	2	0	0	0	2 (2)
	Vaginal discharge	7	0	0	0	0	7 (7.3)
	Bleeding per vaginam	7	0	0	0	0	7 (7.3)
	Cervical excoriation	1	0	0	0	0	1 (1.1)
Total		62	17	6	3	7	95 (100%)

IV. Discussion

The rebook rate for the five special investigations done at the centre under review was 18.0%. Within a two-year period ninety-five patients (18%) were rebooked out of a total five hundred and thirty-seven initially booked cases for various special investigations. The actual reason for rebook could not be ascertained in seven cases (1.3%). Barium enema (29.2%) and MCUG/RUCG (6.0%) accounted for the highest and least rebook rates respectively. The patients involved in the investigations were **aged 2 days to ninety-five years**.

The Radiologist, Radiographers and Nurses participated in the special investigations and only Nurses did not contribute to rebook of patients. Radiologists (50.5%) and machine (6.3%) constituted the highest and least cause of repeats. The duties of the Nurses however, were peripheral and they were basically the measurements of vital signs, ensuring that equipment were sterilized and available as well as trolley setting. Difficulty in cannulation for HSG, catheterization for MCUG/RUCG and setting of intra-venous line for IVU by radiologists (30%); hypertension in patients (14.0%); booking for HSG beyond 10 days by the Radiographer (4.0%); and X-ray machine and darkroom processor faults (6.0%) were noted as the major specific causes of rebook.

XSIRA as a quality control tool has established a rebook rate of 18.0% for the centre. Because it is an emerging quality control tool, similar works for comparison were not within reach. However, film reject analysis (FRA), a synonymous and quite-popular quality control tool for X-Ray films may remotely be used as a basis for comparison although with caution because while XSIRA deals with pre-investigation and atimes rectitude, FRA deals with post-investigation and attitude. The FRA reviewed established a reject rate of 8.86% in Nigeria [8], 14.1% in Ghana [4] and 11.4% in Iran [9].

If any degree of comparison is permissible at all in this heterogeneous situation it would be inferred that the 18.0% rebook rate from XSIRA is higher than the values from FRA. However, while XSIRA is high the corresponding FRA from Nigeria is the lowest. This could be due to differences in centre since both centres are separated by more than 200 km by road.

The 30% rebook for cases as a result of the inability of the Radiologist to cannulate, catheterize or set IV line is the highest specific cause of rebook (table 3). Although seemingly high, it might be justifiable if the risks of progressing with the procedure outweighs the benefit. Moreover, Radiologists are advised not to attempt a procedure in which they are not too well-skilled. It is however doubtful if skill was the underlying factor in **those Instances** as similar cases were successfully concluded in the past. In this instance, patient's emotional and physical condition, equipment concern and management issues may be salient points complicating efficiency [10].

A staff having conflicting schedule when patients have been scheduled for an investigation is hardly justifiable (table 3). Remote possibilities for this could be as a result of heavy workload or

negligence. While workload can be managed with proper managerial skills, negligence needs personal introspection because, professionals in Nigeria are issued license to practice after having been “found worthy in character and learning.” It has been noted that Radiologists, in whatever branch of the specialty, whether diagnostic or interventional, can find themselves just as vulnerable as other specialties to falling foul of patients’ expectations, realistic or not. And the most likely action in which a radiologist will fall foul of the civil law is in negligence [10].

Patients may resort to litigation where they perceive that there is no adequate care or harm has resulted from negligence. Interestingly, as established by records no history of legal suit was reported in the department against any staff. This was not surprising because, **from the observation of the researchers**, the staff met the minimum recommended criteria for deflecting such legal actions; diligence, empathy as well as appropriate communication with the patients [11].

To reduce rebook it has been advised that adequate filling of the uterus with contrast media be done during HSG[6], radiographs especially of barium enemas should be reviewed to resolve questionable findings before releasing the patient from the department [10] and alternative investigations should be contemplated where there are difficulty in cannulation for HSG as well as where there are co-morbidities rather than a rebook [7].

Studies consistently show that health care providers are understandably reticent about discussing errors, because they believe that they have no appropriate assurance of legal protection. This reticence, in turn, impedes systemic and programmatic efforts to prevent medical errors [11]. A systematic case review process set up by each hospital may break the tide of reticence and reveal facts necessary to initiate remedial actions. Nevertheless, in all situations a Radiologist will be judged on what may have been the reasonable actions of a body of his peers at the incident in question. Although in medicine there are disparate views of what might be best practice but hopefully in most situations, there will be a consensus view on what might be reasonable practice [10].

Therefore, maintaining good patient and health personnel relationship with the provision of adequate facilities will also improve the quality of service, and will reduce waiting time in Radiology Department during special investigations to a minimum level [5].

We recommend the use of XSIRA as a quality control tool on a regular basis to identify shortcomings in service delivery. In addition, both the Radiographers and the Radiologists are to exhibit better synergy in patient booking schedules in order to rule out any possible logistics challenge that may **lead to conflicting schedules**. Furthermore, some days of the week may be set aside for special radiologic investigations and physicians from other departments could be invited to assist with cannulation, IV line insertion and catherization.

V. Conclusion

The study established that the Radiologist, patient, Radiographer, and even the X-ray machine were responsible for rebooking or rescheduling of patients for special examinations. An XSIRA rate of 18.0% was equally established.

References

- [1]. Ofori EK, Antwi WK, Arthur L, Yeboah CA, Dzefi-Tetty K. Analysis and Economic Implications of X-ray Film Repeat/Reject in Selected Hospitals in Ghana. *West African Journal of Radiology*,2013;20(1):14-18
- [2]. Leddy KM, Kaldenberg DO and Becker BW. Timeliness in Ambulatory Care Treatment: An Examination of Patient Satisfaction and Wait times in Medical Practices and Outpatient Test and Treatment Facilities. *Journal of Ambulatory Care and Management*,2003;26(2):138-49.
- [3]. Onwuzu WI Sobechukwu, Ugwuja C. Mabel and Adejoh Thomas. Assessment of Patient’s Waiting Time in the Radiology Department of a Teaching Hospital. *ARPN Journal of Science and Technology*,2014;4(3): 183-186.
- [4]. Owusu-Banahene J., Darko E.O. , Hasford F., Addison E.K. and Okyere Asirifi J. Film reject analysis and image quality in diagnostic Radiology Department of a Teaching hospital in Ghana. *Journal of Radiation Research and Applied Sciences*, 2014;7(4):589-594
- [5]. Nwobi I.C, Luntsi G, Ahmadu M.S., Nkubli F.B, Kawu H.D, Dauda F, Moi A.S., Abubakar G. M and Tahir M.B. The Assessment of Patients’ Perception and Satisfaction of Waiting Time at the University of Maiduguri Teaching Hospital. *Australian Journal of Industry Research*,2014;1(3):31-38
- [6]. Okafor CO, Okafor CI, Okpala OC and Umeh E. The Pattern of Hysterosalpingographic Findings In Women Being Investigated For Infertility In Nnewi, Nigeria. *Nigerian Journal of Clinical Practice*,2010; 13(3):264-267

- [7]. Eze U. Cletus, Ohagwu C. Christopher, Abonyi C Livinus, Njoku Jerome, Irurhe K. Nicholas and Igbinedion O. Fanny. A Spectrum of Hysterosalpingographic Findings in Infertile Women in Benin City, Nigeria. *Journal of Reproduction and Infertility*, 2013; 4(2):13-18
- [8]. Eze KC, Omodia N, Okegbunam B, Adewonyi T, Nzotta CC . An audit of rejected repeated x-ray films as a quality assurance element in a radiology department. *Nigerian Journal of Clinical Practice*, 2008; 11(4):355-358.
- [9]. Shalemaei RR (2011). Films reject analysis for conventional radiography in Iranian main hospitals. *Radiation Protection Dosimetry*, 2011;147 (1-2):220-2.
- [10]. Barclay, I (2000). What gets a radiologist sued? *Imaging*, 12 (4): 262–265
- [11]. Hillary Rodham Clinton, and Barack Obama (2006). Making Patient Safety the Centerpiece of Medical Liability Reform. *New England Journal of Medicine* 354:2205-2208.