

REPORT TURNAROUND TIME (ReTAT) IN A NUCLEAR MEDICINE DEPARTMENT: ROOT CAUSE ANALYSES AND ACTION PLANS FOR PROCEDURES REPORTED BEYOND BENCHMARK

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ABSTRACT

BACKGROUND: Report turn-around time (ReTAT) is an important indicator of quality healthcare. Availability of effective hardware and software technologies have shortened ReTAT from hours to minutes. Purpose of this audit in a nuclear medicine section was to explore the reasons for small percentage of procedures reported beyond the benchmark and to make strategies to avoid such delays. **MATERIAL AND METHODS:** This audit was conducted at Nuclear Medicine section of Aga Khan University Hospital Karachi, Pakistan and ReTAT data from 1.1.2017 till 30.11.2017 was collected. % ReTAT within and beyond institutional benchmark were analyzed. Root cause analyses (RCA) for delays were done and strategies to avoid such delays were made. **RESULTS:** During study period total 5905 procedures were performed (Outpatient clinic: 2811; Outside referral: 2828; Inpatient: 262; Emergency Room: 04). Overall % ReTAT within benchmark was 97.15% (range: 95.15 - 100%) and for ER procedures it was 100%. ReTAT beyond benchmark was found in 168 (2.85%) procedures. Delay was considered justified for procedures with imaging protocols beyond 24 hour in 55/168 (33%). In 113/168 (67%) procedures, delays were considered unjustified caused by either prior registration or delayed submission of patient's files to reporting suite. For justified delays and prior registration we have made a strategy to acknowledge these procedures in RIS. For delayed submission of patient's folder to reporting suites, allocation of scans according to duty roster into the bin of reporting physician and system generated alerts to NM section head for un-reported procedures 8 hour after registration are planned. The impact of these strategies will be evaluated in a follow-up audit. **CONCLUSION:** A timely available imaging report has a significant impact upon patient's management. Our % ReTAT is well within institution's bench mark (around 97% against >90% benchmark). By conducting this audit we performed root cause analyses for small percentage of procedures reported beyond ReTAT benchmark. We have made strategies for each explored cause and planned to perform a follow-up audit to measure the target outcomes.

Key words: Report turnaround time; nuclear medicine; benchmark; justified delay; unjustified delays

Introduction

In today's health care environment, imaging like radiology and nuclear medicine play the fundamental role in patient management and reporting is expected to be better, comprehensive, and faster than before. A final report by a credentialed reader (like radiologist

or nuclear medicine physician) represents the fundamental contribution to the care of a patient. The American College of Radiology's guidelines for communication of diagnostic imaging findings suggest that radiologists are able to provide quality patient care only if their reports are available to the healthcare team in a timely fashion.¹ Although the definition of

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timeliness is subjective and depends on the clinical setting, a report can be defined as timely if it is available to the healthcare team at the time it is needed. Generally report turnaround time (ReTAT) is defined as time between imaging study completion and report finalization.² But American College of Pathologist College defines TAT as “the period of time from test ordering to the time the results are made to the emergency department (ED).³ Department of Radiology, Aga Khan University Hospital (AKUH), Karachi, Pakistan considered ReTAT as time from registration of a procedure in Radiology Information System (RIS) till appearance of final report by credentialed radiologist and nuclear physicians on picture archiving and communication system (PACS). The benchmark ReTAT set for emergency room (ER) and critical care area is 90% within 4 hour and for inpatient and outside referral (OSR) is 90% within 24 hour. The nuclear medicine section of AKUH has 02 credentialed nuclear physicians who supervise all procedures and report when images are available on PACS after completion of the acquisition. Due to this working dynamics, the expected ReTAT would be 100% but in reality it is >90% but <100%.

The purpose of this clinical audit is to find out the reason(s) for reports having ReTAT beyond benchmark and make strategies to avoid this gap.

Material Methods

This clinical audit was conducted over 11 month period from 1st January 2017 till 30th November 2017. The primary objective was to find out reasons(s) for reports having ReTAT beyond benchmark and make strategies to avoid this gap. Since this audit was a quality improvement project, no approval from ethical research committee (ERC) was required.

Setting: This quality improvement audit was performed at Section of Nuclear Medicine, Department of Radiology, Aga Khan University Hospital (AKUH), Karachi, which is the 1st Joint Commission Accredited (JCIA) tertiary healthcare facility of Pakistan. The NM Section has a team of 02 credentialed nuclear physicians and 05 technologists. The procedures performed include nuclear medicine imaging and bone mineral densitometry (BMD). These procedures

are performed from Monday to Saturday (8 am till 6 pm) while BMDs are also performed on Sunday and holidays (8.0 am till 5 pm). Usually procedures are booked through an e-request (in-patient) generated by referring clinical department or manually by a receptionists to the patients (on telephone or personally). However, prior booking is not required for patients referred from ER or critical care unit and even walk in patients are entertained who agreed to manage a waiting time.

Work-Flow: Once imaging is completed, images are uploaded on PACS and case sheets of patients (having registration slip, history and consent forms) are delivered to reporting nuclear physicians. Reporting nuclear physician reads the case sheets, views the images on PACS and dictates the report using voice recognition system (VRS). After report finalization, reporting physician sends the case sheets to the technologists to archive the documents as per AKUH policy. As a routine all completed procedures are reported on the same day. Emergency nuclear medicine procedures are also performed under supervision of on-call nuclear physician who communicates the findings to primary team and dictates the report simultaneously.

Data Collection: The % ReTAT data of nuclear medicine for the audit duration (1.1.17 till 30.11.17) were retrieved from RIS. The NM procedures reported beyond ReTAT were filtered out and root-cause-analysis (RCA) for delay of individual procedures was done. Reasons were categorized as justified for a particular procedure and unjustified like falling away from established work flow dynamics.

Results

During the study period (1st January - 30th November 2017), total 5905 procedures were performed with a median/month of 562 procedures (Tab. 1). Out-patient clinics of AKU referred 2811 patients (median/month: 267) while 2828 patients (median/month: 264) were out-side referrals (OSR). In-patient services referred 262 patients (median/month: 23) while emergency room (ER) had referred 04 cases. Overall and monthly

average % ReTAT of all NM procedures (Benchmark: >90% within 24 hour) during study period were 97.15% (Range: 95.15 – 100%) (Tab. 1) and 97.31 ± 1.1 % respectively (Fig. 1). % ReTAT for patients referred from outpatient clinics was 97.29 (95.14 - 99.25%), for OSR 96.99% (93.77 - 99.32%), for in-patient 97.34% (90 -100%) and for ER it was 100% (Tab. 1). Average monthly % ReTAT based on referral was 97.37% for outpatient clinics, 100% for ER, 97.63% for Inpatient and 96.93% for OSR procedures (Fig. 2). The procedures reported within benchmark had a scatter (mean \pm 2 SD) of 95.05% to 99.58% (Fig. 3).

NM procedures monthly data	January –November 2017 (n=5905)		
	Total	Median/Month	Range (Minimum-maximum)
All NM Procedures	5905	562	289-622
Outpatient (Clinics)	2811	267	124-308
ER	04	NA	00-01
Inpatient	262	23	15-31
OSR	2828	264	143-331
NM % ReTAT Jan-Nov 2017	Reported within benchmark	% ReTAT	(Minimum-maximum)
%ReTAT of all NM procedures	5737	97.15%	95.15----100%
%ReTAT Outpatient (Clinics)	2735	97.29%	95.14----99.25%
%ReTAT ER	04	100%	NA
%ReTAT Inpatient	255	97.34%	90.00---100%
%ReTAT OSR	2743	96.99%	93.77---99.32%

NM = Nuclear Medicine
ER = Emergency Room
OSR = Outside Referrals
ReTAT= Reporting Turnaround Time

Table 1: Study Demographics

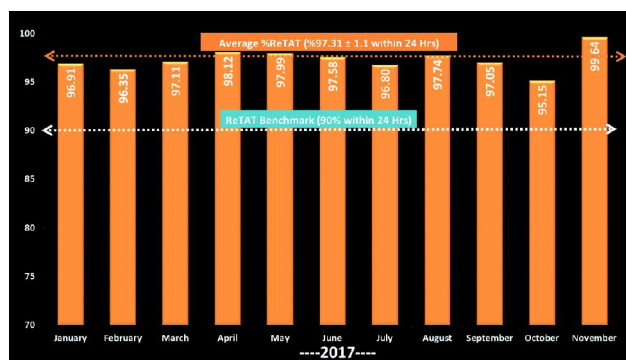


Figure 1: Average monthly % reporting Turnaround time of all Nuclear Medicine procedures from 1st January 2017 till 30th November 2017.

Reasons	N=168 (2.85%)	Median delay beyond 24 hours (Range)
Procedures with delayed imaging beyond 24 hours	55 (33%)	24.18 (0.27 to 73.48)
Technical delay or earlier registration	113 (67%)	2.59 (0.03 to 48.37)

Table 2: Procedures reported beyond 24 hours of reporting Turnaround time benchmark.

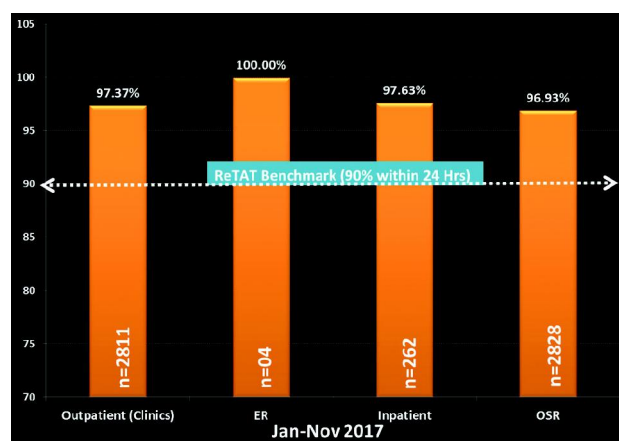


Figure 2: Average monthly % reporting turnaround time of Nuclear Medicine procedures for outpatient clinics, emergency room, inpatients and outside referrals.

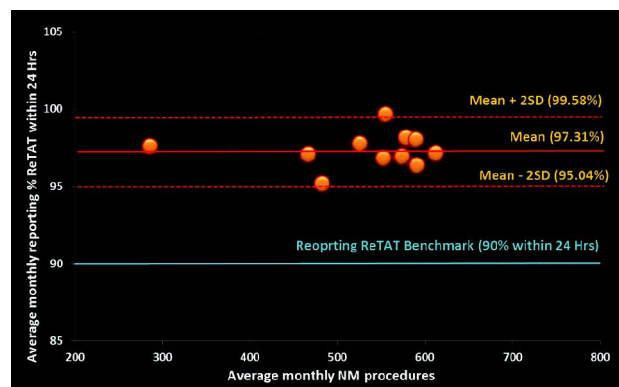


Figure 3: Blond Altman analysis of scatter plot for average monthly reporting turnaround time of Nuclear Medicine procedures from January till November 2017 against institute's benchmark (90% within 24 hours).

During study period 168/5905 (2.8%) procedures were found to have % ReTAT beyond the benchmark. These include 2.70% of total procedures referred from out-patient clinics, 2.67% of total in-patient and 3.01% of total OSR. No delay was found in procedures referred from ER (Fig. 4). Out of these, 55/168 (33%) procedures were found to have imaging protocols beyond 24 hours (like HIDA imaging for biliary atresia, iodine whole body imaging, MIBG imaging) and these were considered as justified delay. In remaining

113/168 (67%) procedures, an earlier registration by patient and / or delayed submission of patient's folder to reporting NM physician were the reason(s) for delay and considered unjustified delay.

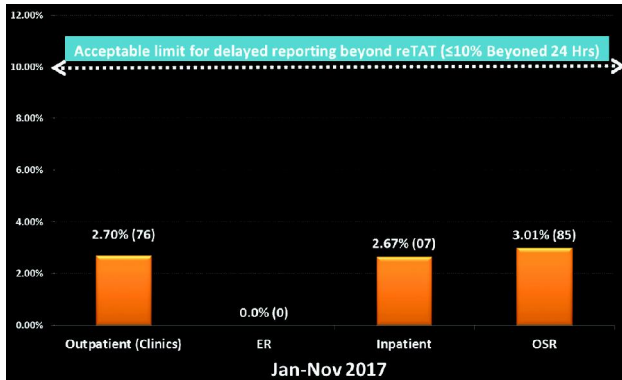


Figure 4: % delayed of reporting in Nuclear Medicine procedures beyond 24 hours of turnaround time.

Discussion

In medicine a timely available report has a great impact on patient's management by avoiding the delay in decision making. During last 15 years, robust developments on technological frontiers like introduction PACS and VRS have shortened the ReTAT. Now ReTAT has become an important quality indicator in healthcare system with benchmark in few hours to minutes instead of days. AKUH is the first JCI accredited healthcare facility of country and ReTAT is one of numerous parameters ensuring quality care of patients at AKUH.

Nuclear medicine section has been maintaining % ReTAT well beyond the institution's benchmark. Our results demonstrate an over-all ReTAT of 97.31% against a benchmark of >90% within 24 hour. The purpose of audit was to find out the reason for 2.8% of procedures which were not reported within 24 hour. RCA of these 168/5905 (2.8%) cases revealed 55 (33%) procedure's reporting was delayed due to an extended imaging protocol beyond 24 hours. These were considered justified delay. Exclusion of these cases would reduce the number of procedures not reported within 24 hour from 168 (2.8%) to 113 (1.9%). Predominant reason for delayed reporting in remaining 113 patients was delayed submission of patient's folder to reporting suite by the technologists. This could be minimized by system generated alerts to

NM section head for procedures not reported within 08 hours after registration. Similarly those procedures which were registered ahead for some reasons will also be acknowledged in RIS. So by adopting these strategies, we do expect to achieve 100% ReTAT in NM which will be studied in a follow-up audit in future. This audit also shows that % ReTAT for ER procedures (against a bench mark of >90% within 4 hour) was 100% which is in accordance with published data as well.⁴ Although the number of ER procedures were small but this draws our attention towards a perfect work flow dynamic among registration desk, technologist and reporting physicians. The purpose of adopting above mentioned strategies is to achieve similar precise work flow dynamic for rest of NM procedures to achieve 100% ReTAT within institution's benchmark.

A timely available imaging report has a significant impact upon patient's management. Our % ReTAT is well within institution's bench mark (around 97% against >90% benchmark within 24 hour). By conducting this audit we performed root cause analyses for small percentage of procedures reported beyond ReTAT benchmark. We have made strategies for each explored causes and planned to perform a follow-up audit to measure the target outcomes.

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