

Impact of Waiting Time and Turnaround Time on Patient Diagnosis

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Abstract—The practice of modern medicine cannot be undertaken without certain investigative facilities. Radio diagnosis is one such important arena of hospital which contributes directly to patient care. It provides, along with laboratory, a vital diagnostic backup to all the specialities which cannot practice effectively without their support. Henceforth, their service becomes an integral part of all hospitals, with the exception of very small hospitals and nursing homes. Radiology has expanded vastly in recent decades. An imaging department now incorporates: X-ray, Ultrasonography, CT scan and Magnetic resonance imaging (MRI). Such departments can function only in super speciality units, as they need planning design of specially constructed buildings, expensive equipment's, highly trained radiotherapists, surgeons, physicists and technicians who experienced surgical therapies. The new wonder gadgets of radiological imaging are radionuclide scanning (gamma camera), ultrasonography (USG), digital subtraction angiography (DSA), computerised axial tomography (CAT), MRI, PET Scan.

Cardio Science, Gynaecology, Neuroscience, Onco Science, and Gastroenterology. Our facility is home to distinguished doctors and specialists who deliver outstanding tertiary healthcare, ensuring each patient receives unparalleled medical expertise and personalized attention, addressing diverse healthcare needs with excellence and compassion. At Paras Health, our experienced doctors form the backbone of our commitment to exceptional healthcare. With a diverse array of specialties and a shared dedication to patient well-being, our medical team stands ready to provide compassionate care tailored to your unique needs. Early detection is key, so don't delay - prioritize your health by consulting our radiology experts at Paras Health. In such a dynamic city, a 24/7 open Mult speciality hospital is not a luxury — it's a necessity. Emergencies don't follow business hours, and timely access to expert care can be the difference between life and death.

OVERVIEW OF ORGANISATION

Paras HEC, Ranchi, serves as Jharkhand's foremost corporate healthcare hub, embodying our steadfast commitment to exceptional medical services. Through a collaboration between Paras Health and HEC Pvt Ltd, we provide state-of-the-art infrastructure featuring advanced Cath labs, MRI facilities, and modular OTs, complemented by round-the-clock emergency and trauma care services. With a capacity of 300 beds, Paras HEC offers a comprehensive range of 22+ specialties and centres of excellence, including

From road accidents and cardiac arrests to maternity complications and paediatric emergencies, quick medical intervention is critical. A hospital that remains functional every hour of the day, staffed with specialists across multiple disciplines, ensures prompt treatment and better health outcomes. With its diverse population — including students, working professionals, families, and elderly citizens — Ranchi needs dependable, round-the-clock medical support. Paras Health answers that need with a strong commitment to continuous care.



Figure: 1(a)



Figure: 1(b)

I. INTRODUCTION

Radiology plays a crucial role in modern healthcare by enabling timely and accurate diagnosis. However, delays in imaging and reporting and timely dispatch of reports remains a major challenge. Statistics regarding the type of workload in relation to machine time widely varies from hospital to hospital. Establishing criterion for diagnosis, investigation and treatment in the most important aspect to establish norms, for nothing can be evaluated if there are no set standards

for comparison. In measuring quality, “process” measurement involves methods which the organisation uses to provide services- i.e., the processes are proper and performed correctly. It involves comparison with standard operating protocols and determination of relative values on a scale of set standards that aren’t applicable. Process quality manoeuvre is written documented procedures for patients going to critical care, triage assessment, insurance procedures, surgical treatment procedures. Several categories of data are indicators for sub-

standard care, poor quality of care delivery highlighting inadequate staffs, staffing schedules, patient congestion, insufficient resources or the poor performance of concerned authorities and lack of knowledge. Our state-of-the-art imaging facilities and highly skilled radiologists provide precise insights into your condition. From X-rays and CT scans to MRIs and ultrasounds, we offer a comprehensive range of radiology services. Our patient-centric approach ensures a comfortable and efficient experience.

II. REVIEW OF LITERATURE

A thorough search across multiple databases is necessary to ensure the evaluation's quality and thoroughness. Because they provide top-notch, peer-reviewed research relevant to specific fields like information technology, engineering, and health sciences, major journal databases are crucial. The following significant databases were searched in order to locate relevant information for developing a real-time patient tracking system in healthcare facilities. The Directory of Open Access Journals (DOAJ), Science Direct, Springer Link, PubMed, Google Scholar, and Research Gate. These databases ensure a broad spectrum of theoretical and practical research and offer valuable information needed to develop a practical solution.

These databases were selected because they offer unique insights that are essential for creating real-time patient location tracking and monitoring systems, as well as thorough coverage of a wide range of subjects pertinent to this project. This diverse book record guarantees a comprehensive assessment that incorporates technical, clinical, and management perspectives, which is necessary to build an effective real-time dashboard. This search also helped us identify potential study gaps, so the review offers a solid foundation as well as innovative directions for future research in this field. By employing this systematic approach to search terms and literature selection, the study prevented information overload and ensured that only the most important and relevant articles were included in the review. In addition to sharpening focus, this process allowed for a comprehensive investigation of the crucial elements that make real-time patient location tracking and monitoring systems crucial in healthcare institutions.

III. RESEARCH OBJECTIVES

To measure waiting time and turnaround time in radiodiagnosis department for consecutive 2 months
To assess their impact on diagnosis and treatment planning

Used to compare the stipulated TAT proposed by our department with the observed TAT and WT in our study.

Streamlining the clinical pathway within the department and interdepartmental units.

IV. METHODOLOGY

Observational method: (Retrospective/Prospective)

Study setting: Radiology department of a tertiary care hospital

- Male and female patients were selected from multi-dimensional modalities at random for each day (monday to Saturday) and data reflected for consecutive 2 months
- A total of approx..1500 patients were evaluated with equal distribution of male and female patients chosen randomly
- To a greater extent only OPD patients were included and segmented to different modalities
- Emergency patients, sunday and night shifts/early morning were excluded due to prioritization of immediate scanning and aberrant patient flow
- Laboratory and x-ray units are outsourced, (data are not easily accessible)

Study population: X-ray, CT scan, MRI, Ultrasound

Variables collected: Time of billing, test started, report generated time, waiting time, turnaround time

Metrics assessed: Waiting time “The period an individual endures while awaiting a service or outcome where no productive activity occurs”

Turnaround time “The total duration from the initiation of a process to its completion, encompassing all steps and potential delays”

- Turnaround Time (TAT): The total time from “PAPER to BRAIN”—the moment a test is ordered until the clinician interprets the result.
- Clinician's View: Order entry to results reporting.
- Laboratory's View: Specimen receipt to result verification.

Phases of Diagnostic TAT

TAT is illustrated into three distinct phases as discussed in TAT Analysis:

A copy of above data is attached in the annexure section of the research paper.

V. RESULTS AND DISCUSSION

W-TAT: Waiting time

R-TAT: Reporting time

DIAGNOSTICS STANDARD TAT	MARCH-2026		APRIL-2026	
	W-TAT	R-TAT	W-TAT	R-TAT
CT SCAN (6 HRS)	0.48	3.81	0.109	2.31
MRI (6 HRS)	0.17	5.08	0.1413	5.07
X-RAY (4 HRS)	0.07	2.182	0.86	1.26
US (2 HRS)	0.53	1.37	1.73	2.154

VI. FINDINGS

Factors influencing waiting times and turnaround times:

Patient related factors- Delayed consent and approval, high patient volume, urgency/purpose of referral

Resource availability- Operating room unavailability, staffing shortages and routine patterns

Clinical workflow processes- workflow operations and automation, drills, process complexity and communication gaps, sample rejections labelling errors, reporting issues, lack of personalized alerts

Laboratory and imaging backlogs- stockouts, inefficient sample collection and processing, interdepartmental transfer delays

Longer waiting times reduces efficiency and patient satisfaction.

Increased TAT leads to delayed diagnosis

Emergency cases benefit from faster reporting systems and slow routine health check prioritization

Reduced morbidity rates when there is an indicative for minimized TAT values

30% cases showed delayed treatment due to reporting delays

There is a significant correlation found between longer TAT scores and delayed clinical decisions.

Average waiting time:2.5 hours

CT scan: 6 hours

X-ray: 4 hours

MRI: 5 hours

US: 2 hours

Time taken for sample collection (laboratory) in the month of March'26 is 6.3 minutes

OPD TAT be 91.59% (March'26)

IPD TAT be 89.53% (March'26)

Shooting bottlenecks with FAQs and proper signages improves clinical pathway congestion and longer queues

Manual workflow inefficiencies, information chaos and high patient load contributes to further delay in the patient flow

VII. RECOMMENDATIONS

Implement PACS/RIS/LIS (in-house/outsourced)

Use AI-assisted reporting tools and enable trained staffs

Deployment of trained workforce and reduction in non-technical job performance

Improved scheduling and routine chores

Prioritize work on task basis (e.g. critical care, emergency)

Continuous monitoring, evaluation and control operations (waiting times, TAT)

Impact and benefits include: Early intervention, preventive progression, reduced healthcare costs, enhanced patient trust and satisfaction, optimized resource allocation

Lean management and process optimization: Streamline workflows, enhance efficiency and waste reduction

Technology adoption: Leverage AI, automation and advanced diagnostics to refine patient care and operations

Staffing and training: Empowerment of staffs and upskilling, evidence-based communication practices

Foster seamless coordination and interdepartmental communication to ensure coordinated care and diagnostic accuracy

Patient flow management: Optimize patient journeys, reduce wait times, minimize delays in diagnosis and treatment.

VIII. CONCLUSION

Identifying primary drivers of pathway and vehicle to adopt for time motion study is a necessary requirement during the induction in the workspace and orientation of project study. There are documented procedures and validated effectiveness of adopted protocols that needs to be assessed in metrics. Highlighting the critical challenges in the area of chaos and shooting the bottlenecks during FAQs and word of mouth of patient demands and needs. Shooting the operational bottlenecks reduces anxiety and panic of patients, decreases inflated healthcare costs, adverse health outcomes and increased morbidity. There is a need of unified vision to foster collaboration with the common goals of the organization. Explore the immediate and long-term impacts of intervention and the setbacks observed during implementation of procedures. Investigate scalability in diverse contexts and examining role of varied factors in influencing patient outcomes and treatment plan.

Benchmarks and Strategies

Benchmarks: A common goal is a 90% completion of under 60 minutes for standard procedures according to NABH documented protocols.

Reduction Strategies: My paper suggest improving TAT by:

- Optimizing workflows and automating manual steps.
- Prioritizing urgent "STAT" requests from the Emergency Department and critical in-patients
- Adopting new technologies like AI for faster radiological reporting

FUTURE RESEARCH:

AI/ML for predictive diagnostics

Non-invasive diagnostic tools

Automated reporting systems

GenNext telemedicine and remote monitoring

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Outpatient flow analysis and waiting time in a radiology department

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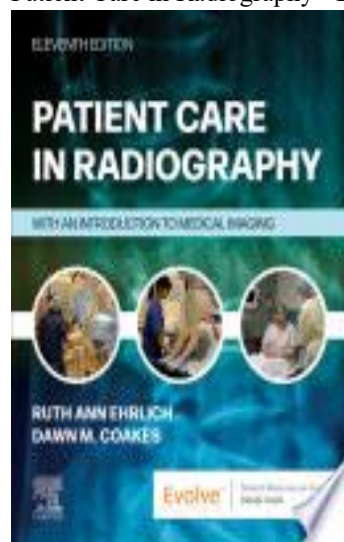
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E-book

Patient Care in Radiography - E-Book: Patient Care in Radiography - E-Book



[Ruth Ann Ehrlich](#), [Dawn M. Coakes](#)

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ANNEXURE AND GALLERY:

SAMPLE COLLECTION रॉयल कलेक्शन	- LABORATORY लेबोरेटरी - PHYSIOTHERAPY फिजियोथेरेपी - IP BILLING आईपी बिलिंग - IP PHARMACY आईपी फार्मसी - CAFETERIA कैंफेटेरिया	- CARDIAC CARE UNIT कार्डियक केयर युनिट - CTVS-ITU सीटीवीएस-आईटीयू - CATH LAB कैथ लैब - OT COMPLEX ओटी कॉम्प्लेक्स
GROUND FLOOR-BLOCK D - EMERGENCY इमरजेंसी - MINOR OT माइनर ओ.टी. - RADIOLOGY रेडियोलॉजी - ENDOSCOPY & BRONCHOSCOPY एंडोस्कोपी एंड ब्रॉन्कोस्कोपी - DIALYSIS डायलिसिस - PFT, DAY CARE पीएफटी, डे केयर - UROFLOWMETRY यूरोफ्लोमेट्री - RADIATION ONCOLOGY रेडिएशन ऑन्कोलॉजी	FIRST FLOOR-BLOCK E PRIVATE & SEMI PRIVATE WARD प्राइवेट एवं सेमी प्राइवेट वार्ड	SECOND FLOOR-BLOCK D
GROUND FLOOR-BLOCK E	FIRST FLOOR-BLOCK D - GENERAL WARD जनरल वार्ड - PARAS BLISS (MOTHER & CHILD UNIT) पारस ब्लिस (मॉटर एंड चाइल्ड यूनिट)	THIRD FLOOR-BLOCK E - MEDICAL RECORD DEPARTMENT मेडिकल रिकॉर्ड डिपार्टमेंट - ONCOLOGY WARD ऑन्कोलॉजी वार्ड
	SECOND FLOOR-BLOCK E	FOURTH FLOOR-BLOCK E ADMINISTRATIVE BLOCK एडमिनिस्ट्रेटिव ब्लॉक



APRIL 2026 TAT -
FINAL - Copy.xlsx



MARCH TAT.xlsx



