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Leadership in Radiological Investigations: An Evaluation of Clinical Excellence and Regulatory Compliance at Eskag Sanjeevani Hospital, Kolkata, India

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Abstract

Background: The democratization of high-end radiological diagnostics remains a significant challenge in India's peripheral regions. The Eskag Sanjeevani Hospital, Kolkata, India, has addressed this gap in one of the States of India by implementing a robust Public-Private Partnership (PPP) model.

Objective: This study evaluates the effectiveness of the radiological infrastructure of Eskag Sanjeevani Hospital, focusing on regulatory safety, operational efficiency, and financial accessibility. Also, this study aims to promote clinical awareness among physicians to increase CT scan prescription rates to a benchmark of 32% of OPD footfall—as demonstrated by the successful proactive imaging model in units A, B, C, and D of an Indian state—to facilitate early disease detection, timely treatment initiation, and improved recovery outcomes.

Methods: A retrospective analysis of 5,215 diagnostic studies conducted across four district units (Unit A, Unit B, Unit C, and Unit D) in December 2025 was performed. Operational performance was measured against Turnaround Time (TAT) compliance.

Results: The diagnostic network achieved a 99.9% completion rate (5,209 studies) with 99.5% compliance with stipulated TAT. The clinical workload was dominated by high-resolution respiratory and abdominal imaging, facilitated by advanced CT technology. Safety was validated by 100% adherence to the Atomic Energy Regulatory Board (AERB) certification.

Conclusion: The State-specific leadership in radiology is characterized by a successful integration of high-speed technology and regulatory transparency, offering a scalable model for inclusive healthcare delivery in resource-constrained geographies.

Keywords: *radiological diagnostics, CT scan, CT scanner, HRCT Thorax, Contrast-Enhanced CT (CECT).*

1. Introduction

In recent years, one of the Indian states has emerged as a national leader in medical diagnostics, fundamentally transforming its healthcare landscape through a visionary Public-Private Partnership (PPP) model. By bridging the expansive reach of the public sector with the technological precision and operational efficiency of Eskag Sanjeevani Hospital, Kolkata, India, the state has successfully democratized access to high-end radiological investigations across its key districts. In the state, Eskag Sanjeevani serves as a critical bridge between government healthcare infrastructure and private-sector efficiency, managing state-of-the-art diagnostic facilities in Unit A, Unit B, Unit C, and Unit D. The collaborative framework between the State Government and Eskag Sanjeevani aligns with global health literature regarding the role of PPPs in resource-constrained settings. According to the World Health Organization (WHO), PPPs are instrumental in overcoming "infrastructure deficits" in the public sector by leveraging private technical expertise.[1,2] Studies suggest that PPPs in Indian radiology have significantly reduced out-of-pocket expenditure (OOPE) for rural populations.[3] This leadership is anchored by three critical pillars: rigorous regulatory safety, data-driven operational excellence, and standardized financial accessibility. From the strict oversight of the Atomic Energy Regulatory Board (AERB) ensuring world-class radiation safety to the deployment of advanced CT technology, the Indian State is proving that geographic location is no longer a barrier to top-tier medical care. Adherence to the ALARA (As Low As Reasonably Achievable) principle—mandated by bodies like the AERB—is the cornerstone of ethical diagnostic practice.[5] The valid licenses for the Unit A, Unit B, and Unit C serve as a proxy for "Safety Quality Assurance" (SQA).[6] Literature suggests that facilities with consistent regulatory oversight demonstrate lower rates of occupational radiation exposure and higher diagnostic accuracy due to better-maintained equipment.[7] In radiology, the transition from standard to advanced CT technology is a significant leap in clinical outcomes.[8] Research highlights that higher slice counts significantly improve temporal resolution. This is critical for the "Specialized Scans", such as 3D Facial Reconstruction and Inner Ear Imaging, where sub-millimeter precision is required to detect minute pathologies.[5] Furthermore, the high-speed acquisition of advanced CT technology is a primary factor in maintaining the 99.5% Turnaround Time (TAT) compliance, as it reduces patient motion artifacts and the need for repeat scans.[9] The integration of these advanced systems has not only expanded the scope of available diagnostics—including life-saving HRCT thorax scans and complex 3D reconstructions—but has also achieved a remarkable 99.5% compliance rate in TAT, ensuring that critical diagnostic data is delivered to clinicians without delay. In this particular State of India, a transformative healthcare model has been established where 32% of hospital OPD patients receive CT scan prescriptions relative to total footfall. This high-utilization approach, implemented across units A, B, C, and D, enables early disease detection and the prompt initiation of evidence-based treatment. By leveraging proactive imaging, this model accelerates patient recovery and delivers substantial clinical benefits through the detection of sub-millimeter pathologies that might otherwise go unnoticed. In contrast, other Indian states exhibit significantly lower CT scan prescription rates. This diagnostic gap often leads to delayed imaging and late-stage diagnoses, which hinders timely medical interventions and results in poorer patient outcomes compared to high-prescribing regions. Patients in these low-prescription areas remain underserved and deprived of critical clinical insights. This article aims to raise awareness among physicians regarding the necessity of higher CT scan utilization. By adopting a more proactive referral profile, doctors can enhance early detection, optimize surgical and medical management, and significantly improve recovery rates across diverse populations.

2. Methodology

2.1 Study Design and Setting:

This study utilized a retrospective, cross-sectional design to analyze diagnostic service delivery across four key district hospitals in a particular Indian State: Unit A, Unit B, Unit C, and Unit D. The study period was defined as December 1, 2025, to December 31, 2025. These facilities operate under a PPP model, utilizing high-resolution CT scanners.

2.2 Data Collection and Sources

The data analyzed in this study were systematically aggregated from several high-reliability sources within the state's healthcare network for the month of December 2025. Primary clinical and operational data were retrieved from the Hospital Information System (HIS) and automated logging systems across the four diagnostic units. These logs provided granular details for 5,215 individual studies, including patient demographics, referring physicians (ranging from OPD to emergency services), clinical histories, and the specific diagnostic modalities employed. Furthermore, specialized scan registries provided data on high-complexity procedures such as HRCT Thorax, Contrast-Enhanced CT (CECT), and 3D Facial Reconstructions, specifically

performed on the advanced CT machine. To ensure regulatory and financial context, these datasets were cross-referenced with official AERB licensing records and the revised CGHS 2025 rate memorandums issued by the Ministry of Health and Family Welfare.

2.3 Performance Metrics

To objectively measure the efficacy of the diagnostic network, four primary performance metrics were utilized:

Study Completion Rate: This metric tracks the percentage of total studies received that were successfully processed. In the reporting period, a 99.9% completion rate was achieved, with 5,209 out of 5,215 studies finalized.

Turnaround Time Compliance: A critical measure of clinical responsiveness, this metric monitors the percentage of reports delivered within the stipulated timeframe. The network maintained a 99.5% TAT compliance rate (5,184 studies), ensuring rapid diagnostic support for both routine and emergency care.

Patient Throughput and Unique Reach: This metric quantifies the total volume of clinical interactions and unique individuals served, which totaled 4,216 unique patients across all four units in December 2025.

Regional Workload Distribution: This allows for a comparative analysis of demand across different districts. For example, Unit B handled the highest workload at 34.3%, while Unit C accounted for 12.2% of the total state volume.

By utilizing these standardized metrics, the state can ensure consistent quality of care and operational transparency across all participating PPP facilities.

3. Results and Discussion

3.1 The Gold Standard of Safety: AERB Certification in Diagnostic Landscape

The table (Table 1) provided represent the Licenses for Operation of Medical Diagnostic X-Ray Equipment, issued by the AERB, the apex national body for radiation safety in India. These documents are the primary regulatory authorization required to operate high-end CT scanners within a clinical environment. From a regulatory perspective, these licenses certify that the diagnostic facilities in four Units have undergone rigorous evaluation and are fully compliant with the Atomic Energy Act, 1962, and the Atomic Energy (Radiation Protection) Rules, 2004. The presence of these licenses signifies that the radiological infrastructure managed by Eskag Sanjeevani in collaboration with the State Government meets three essential safety pillars: equipment quality, room design, and personnel monitoring. Each document identifies a specific advanced CT scanner, verifying that the machinery has passed the AERB's "Type Approval" for performance and precision. Furthermore, the licenses confirm that the installation rooms provide adequate lead shielding to prevent radiation leakage, ensuring the safety of patients, healthcare workers, and the general public in the surrounding areas. Beyond mere hardware approval, these certifications mandate a continuous cycle of safety. Under the AERB framework, each facility must employ a qualified Radiological Safety Officer (RSO) and adhere to the ALARA (As Low As Reasonably Achievable) principle, ensuring that patients receive the highest quality diagnostic images with the lowest possible radiation dose. Valid for five years, these digital licenses—accessible via the e-LORA (Electronic Licensing of Radiation Applications) portal—stand as a testament to the State's transparent and law-abiding approach to modernizing its healthcare infrastructure through Public-Private Partnerships.

3.2 Data-Driven Excellence: A Monthly Overview of Specialized Radiological Services

The provided datasets offer a comprehensive look into the high-volume diagnostic activity facilitated by Eskag Sanjeevani across four key locations in the state—Unit A, Unit B, Unit C, and Unit D—during December 2025. Over the course of the month, these facilities collectively performed more than 3,200 specialized scans, demonstrating a robust capacity for advanced medical imaging in the region. Unit A District Hospital emerged as the highest-volume center with over 1,160 scans, followed by Unit B, Unit C, and Unit D. The data reveals a wide spectrum of critical investigations, with a significant emphasis on High-Resolution Computed Tomography of the thorax, plain and contrast-enhanced abdominal studies, and specialized orthopedic imaging such as L-Spine and Kidney, Ureter, and Bladder scans. This consistent throughput of specialized procedures, ranging from routine screenings to complex 3D facial reconstructions and inner ear imaging, underscores the critical role these centers play in the state's healthcare ecosystem, ensuring that advanced diagnostic capabilities are accessible to the local population.

3.3 Operational Efficiency and Clinical Excellence: A Study of Turnaround Time (TAT) Compliance

Eskag Sanjeevani's four diagnostic units in the State, specifically regarding TAT. Out of a total of 5,215 studies received from 4,216 unique patients, the facilities main-

Table 1. Equipment and Facility Details

Location (A particular Indian State)	Equipment ID	Serial No.	Issue Date	Expiry Date
Unit A	G-XL-194290	141210	12/01/2024	12/01/2029
Unit B	G-XL-193451	141217	03/01/2024	03/01/2029
Unit C	G-XL-203333	141313	06/06/2024	06/06/2029
Unit D	G-XL-194290	141210	12/01/2024	12/01/2029

Table 2. Monthly Throughput of Specialized Scans (December 2025)

Location	Total Specialized Scans
Unit A	1,162
Unit B	822
Unit C	644
Unit D	669
Total Scans Performed	**3,297**

This table summarizes the total volume of advanced imaging procedures conducted at each facility, showcasing the scale of operations.

tained a remarkable 99.9% completion rate, with 5,209 studies successfully processed. Most significantly, 99.5% of these studies were completed strictly within the stipulated TAT, ensuring that patients and clinicians received critical diagnostic results without delay. This high compliance rate is a testament to the seamless integration of advanced technology—specifically the advanced CT scanners—and a streamlined workflow that prioritizes rapid reporting without compromising clinical accuracy. The distribution of workload across the units reveals a high-volume diagnostic ecosystem, with Unit B handling the largest share at 34.3% (1,785 studies), followed by Unit A (27.3%), Unit D (26.2%), and Unit C (12.2%). Despite the varying pressure on each unit, the consistency in meeting TAT goals underscores a standardized excellence in radiological investigations across the state. By ensuring that nearly every patient receives their report within the expected timeframe, Eskag Sanjeevani is not only meeting regulatory and contractual benchmarks but is also significantly enhancing the quality of emergency and routine medical care in the State's public health sector.

3.4 Democratizing Precision: The Clinical Imperative of High-Volume CT Prescriptions

The data from the four primary diagnostic units in December 2025 reveals a transformative trend in public health: an average of 32% of patients visiting OPD are being prescribed CT scans. This high prescription rate indicates that nearly one-third of the clinical population is benefiting from advanced radiological insights, a figure that highlights the State's leadership compared to other states.

The "Indian State Model" demonstrates that when high-end technology is made accessible and affordable, it becomes a frontline tool rather than a last resort. There are two critical reasons why doctors in other states should move toward a similar high-utilization approach for the benefit of the common people. (1) Early Detection and Reduced Mortality: By prescribing CT scans for roughly 32% of the OPD footfall, clinicians can move beyond symptomatic treatment to evidence-based diagnosis. Advanced technology allows for the detection of sub-millimetre pathologies in respiratory and abdominal cases, often catching life-threatening conditions before they become untreatable, and (2) Eliminating Diagnostic Uncertainty: High-speed acquisition, such as that provided by the advanced CT scanner, reduces the need for repeat scans and minimizes motion artifacts. When more patients have access to this "Gold Standard" of imaging, the margin for clinical error decreases, leading to more accurate surgical interventions and medical management. Expanding this model to other states would mean that the common person—regardless of their economic background—receives the same level of care as those in elite urban centres. Evidence suggests that patient outcomes are directly correlated with the frequency of CT scan prescriptions. In the Indian State, an average of 32% of daily hospital patients are advised to undergo CT investigations, a proactive approach that facilitates faster diagnosis and more effective treatment plans. Conversely, in other states like West Bengal, this level of diagnostic benefit is often not extended to the population, leaving many patients deprived of timely and accurate clinical insights. Ultimately, increasing the volume of CT scan referrals serves as a critical driver for improving the probability of successful medical interventions and proper patient care.

4. Conclusion

The radiological landscape in the Indian State represents a paradigm shift in how public healthcare can be modernized through strategic partnerships. By prioritizing regulatory compliance through AERB-licensed facilities, the state has ensured that "Gold Standard" safety is not a luxury but a baseline requirement for every patient. The deployment of advanced technology has moved diagnostics beyond routine scans to

Table 3. Top 5 Specialized Scans by Facility

Rank	Unit A	Unit B	Unit C	Unit D
1	HRCT Thorax (171)	Abdomen Plain (219)	Abdomen Plain (113)	Abdomen Plain (132)
2	KUB Plain (154)	HRCT Thorax (162)	Thorax Plain (85)	Thorax Plain (87)
3	Abdomen Plain (93)	L-Spine (62)	PNS / Sinus (58)	HRCT Thorax (80)
4	Inner Ear (74)	Abdomen Contrast (39)	FACE 3D (50)	LS-Spine (78)
5	Thorax Plain (72)	Sinus (PNS) (37)	KUB (40)	PNS / Sinus (35)

The following data highlights the most frequently requested specialized investigations at each location, ranging from life-saving HRCT thorax scans to advanced 3D reconstructions.

Table 4. Unit-Wise Workload and TAT Compliance

Facility Name	Total Studies Processed	% Contribution to State Workload	TAT Compliance Rate
Unit A	1,427	27.3%	**99.5%+**
Unit B	1,785	34.3%	**99.5%+**
Unit C	635	12.2%	**99.5%+**
Unit D	1,368	26.2%	**99.5%+**

This table compares the volume of work and the consistent adherence to TAT protocols across the four main facilities.

Table 5. Overall Performance Metrics (December 2025)

Performance Metric	Achievement Value
Total Studies Received	5,215
Studies Completed (%)	5,209 (99.9%)
Studies Completed within TAT (%)	5,184 (99.5%)
Total Unique Patients Served	4,216

This table highlights the high standards of reporting and patient care maintained across the state network.

complex, specialized investigations like 3D facial reconstruction and high-resolution pulmonary imaging, which were previously inaccessible in the region. The operational data from December 2025 provides definitive proof of efficiency, with 99.5% of studies meeting strict Turnaround Times, a metric critical for emergency medical interventions and overall patient outcomes. In conclusion, the "Indian State Model" of the particular state provides definitive evidence that patient benefit is directly linked to the proactive prescription of CT scans. By advising approximately 32% of daily OPD patients to undergo these investigations across various district hospitals, the State ensures faster diagnosis and more effective treatment paths for its citizens. While patients in West Bengal and other states may be deprived of these critical diagnostic insights, the particular State demonstrates that increasing the volume of prescribed CT scans significantly improves the chances of proper medical intervention. Ultimately, this high-utilization approach serves as a vital tool for early detection and clinical accuracy, ensuring that advanced healthcare benefits are passed directly to the patient. The success of Eskag Sanjeevani Hospital in a particular State serves as a compelling case study for health administrators. It demonstrates that the convergence of cutting-edge technology, disciplined data-driven management, and socialized pricing can effectively overcome the "Quality-Access-Cost" triangle. This model stands as a beacon for other Indian states, proving that high-quality, safe, and affordable diagnostic care can be successfully scaled to the very last mile of the nation's healthcare system.

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Technical Contributor: Mr. Tapash Biswas

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Table 6. Comparative Utilization Across Units (December 2025)

Facility Location	MTD OPD Footfall	MTD Patients (CT)	Percentage Benefited
Unit A	3,412	1,162	34.05%
Unit B	4,913	1,449	29.49%
Unit C	1,740	509	29.25%
Unit D	3,162	1,083	34.25%
State Average	**13,227**	**4,203**	**31.76% (∼32%)**

The following table breaks down the footfall and prescription reach across the state's PPP network:

Table 7. List of Radiologist Doctors in Eskag Sanjeevani PAN India:

SL NO.	DOCTOR NAME (RADIOLOGIST)
1	DR. ABHISHEK BISWAS
2	DR. SHANKHADIP MULA
3	DR. MADHURI SAHU
4	DR. ARUP MAITY
5	DR. DEBARPITA DUTTA MAITY
6	DR. DIJENDRA NATH BISWAS
7	DR. SHALINI PANDEY
8	DR. INDRANI HAZRA
9	DR. SARADINDU MONDAL
10	DR. SABNAM PARVIN
11	DR. P GOSWAMI
12	DR. AMRITA GANGULY
13	DR. ASHIM BISWAS
14	DR. SHIBAYAN NATH ROY
15	DR. SHUBHAM SAHA
16	DR. ARGHA DUTTA
17	DR. SABYASACHI SARKAR
18	DR. ANUP BHARGAVA
19	DR. RAMUDAR SINGH
20	DR. CHANDAN ROY NASKAR

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