Audit on Timeframe of CT Pulmonary Angiograms at Tallaght University Hospital

Dr. Muhammad Mahmoud, Dr. Sara Azhari, Professor William Torreggiani

Introduction

Pulmonary embolism (PE) remains a significant cause of morbidity and mortality worldwide, characterized by the obstruction of pulmonary arterial flow by thrombotic material, most commonly originating from deep venous thrombosis (DVT) of the lower extremities. Despite advancements in diagnostic modalities and therapeutic strategies, PE continues to pose diagnostic and management challenges due to its heterogeneous clinical presentation and the potential for rapid hemodynamic deterioration. Early identification and risk stratification are critical to guiding appropriate anticoagulation, thrombolytic therapy, or interventional procedures.

In patients with suspected pulmonary embolism (PE), timely performance and reporting of computed tomography pulmonary angiography (CTPA) are essential, as definitive radiological confirmation is critical prior to the initiation of anticoagulation or thrombolytic therapy—particularly in cases complicated by comorbidities or overlapping clinical features [1].

According to NICE guidelines, inpatient CTPA should be completed and reported within one working day from the time the request is received and accepted [2]. This audit was conducted to assess compliance with this standard at Tallaght University Hospital.

Methodology

Retrospective data was searched on NIMIS PACS for the month of June 2025 to include all inpatient CT PAs that were done at Tallaght University Hospital during this month. The date and time of the following was noted:

- Scan request,
- Scan being performed
- Provisional report by a Registrar (in the case that this was done)
- Final report by a Consultant Radiologist

Results

There were a total of 117 CT PA scans performed in June 2025 at Tallaght University Hospital and 80 (68%) of these were reported (i.e. final report by a Consultant) within 24 hours of the request. Only 12 of the 117 scans (i.e. 10%) were positive for PE.

All 117 scans were reported by a Consultant within 24 hours of the scan being performed, with the exception of 1 in which the provisional report by a Registrar was done within the 24 hour timeframe.

Results (Continued)

Presence of PE

Yellow: Negative 105/117 (90%)

Black: Positive 12/117 (10%)

Time from Request to Final Report

Green : Within 24hrs 80/117 (68%)

Purple : Greater than 24 hrs 37/117 (32%)

Discussion

The overwhelming majority of CT PAs included in this audit were negative for PE indicating a possible over-ordering of scans. There was suboptimal adherence to NICE guidelines with only 68% of the scans being performed and reported within 24 hours of the scan being booked. On further analysis of the data, there were 4 scans that were reported by a Consultant within 1 working day of the request, but not within 24 hours for reasons such as the request being made on a weekend. Furthermore, there were 3 scans that were reported more than 24 hrs after the request in which the scan showed a PE.

Conclusion

We recommend education of clinical and radiological staff and the need to re-audit in 2-3 months' time to complete the audit cycle.

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Mammogram first pathway for triple assessment clinic, a closed loop audit to reduce over-investigation

Project Team: Dr Rakesh Ahmed (Radiology Registrar), Ms Karina Delaney (Data Manager), Prof Sylvia O' Keeffe (Consultant Radiologist)

ST JAMES'S HOSPITAL

National Radiology QI Programme NQAIS Data

Background

St James's Hospital is a tertiary referral centre for breast care and cancer management. The majority of referrals to breast clinic pass through triple assessment clinic (TAC) which traditionally involves same day clinical exam, imaging, and biopsy if indicated. However, the increasing workload from referrals in recent years secondary to improved awareness and identification of breast pathology has led to difficulty in maintaining provision of this service. The primary aim of this closed-loop audit was to identify excessive diagnostic imaging requests and improve workflow by introducing solutions to recognised imaging overutilisation.

Baseline Findings

2999 patients attended TAC between the 1st January 2025 and the 31st of July 2025. 2527 (81.32%) of patients had a mammogram and 2132 (71.09%) of patients had an ultrasound. The impression of likelihood of malignancy at clinical exam, imaging, and biopsy are displayed in **Figure 1**. 598 (19.95%) clinical exams, 184 (7.29%) ultrasounds, and 58 (29.74%) biopsies performed were classified as suspicious or malignant.

Measure

We included all patients aged >35 referred to TAC for a breast lesion in our single centre review. Data was gathered into a prospectively maintained database by a combination of entry from our electronic patient record system (PowerChart, Cerner Corporation, United States) through a dedicated breast clinic proforma completed at the time of review and from HIPE-coded NQAIS sources. Mammogram and ultrasound order rates were collected. Likelihood of malignancy at clinical exam, imaging, and biopsy were recorded on a scale of one to six, one representing normality and six representing a known malignant lesion.

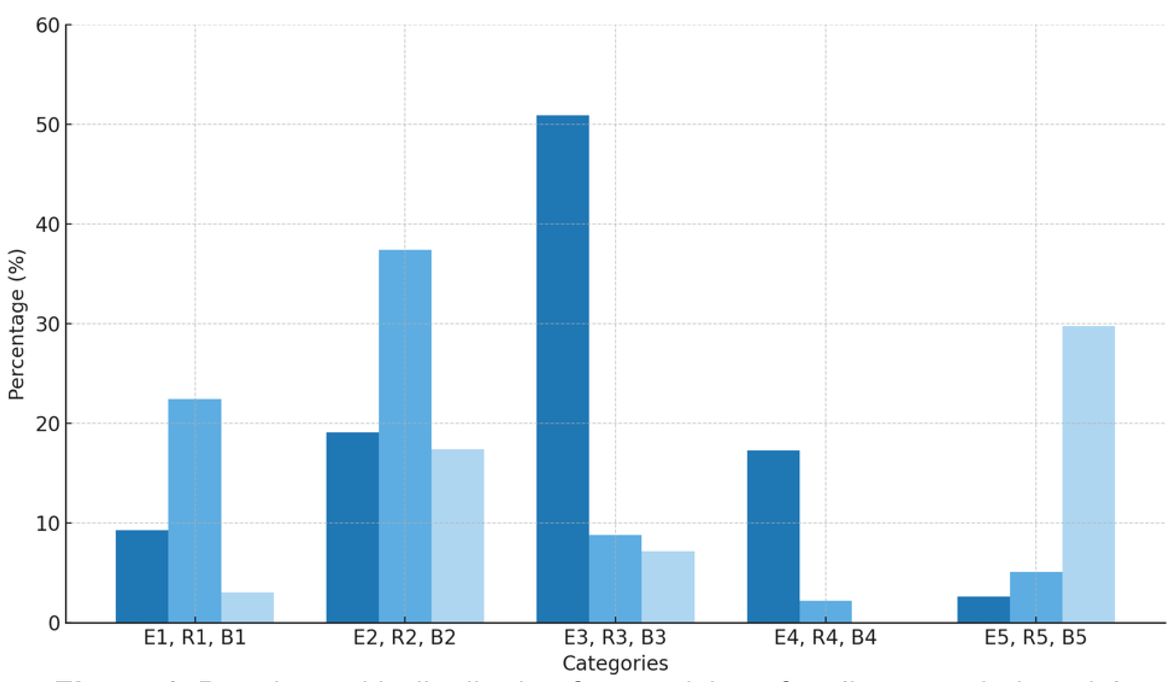


Figure 1. Bar chart with distribution for suspicion of malignancy during triple assessment

Analysis

In the first cycle of our audit, a significantly smaller proportion of ultrasounds were ranked as suspicious or malignant when compared to clinical exam or biopsy. Additionally, a high rate of ultrasound request at clinic was identified at 71.09%. Together this evidence suggested that there was an over-utilisation of ultrasound in our service. A novel mammogram-first pathway for patients aged >35 attending TAC was introduced where mammogram with a radiologist report available was performed two weeks in advance of clinic. The rationale behind this pathway is that a scan reported as normal before clinic provides reassurance to both the clinician and patient and therefore diminish requests for unnecessary ultrasound.

In the second cycle of our audit, the ultrasound rate fell to 63.77% **(Figure 2).** Only 35 (13.21%) clinical exams and 18 (7.23%) ultrasounds were ranked as suspicious or malignant. A significantly higher proportion (20%) of physical exams were recorded as normal providing evidence that our new mammogram-first pathway was successful in providing clinical reassurance **(Figure 3**).

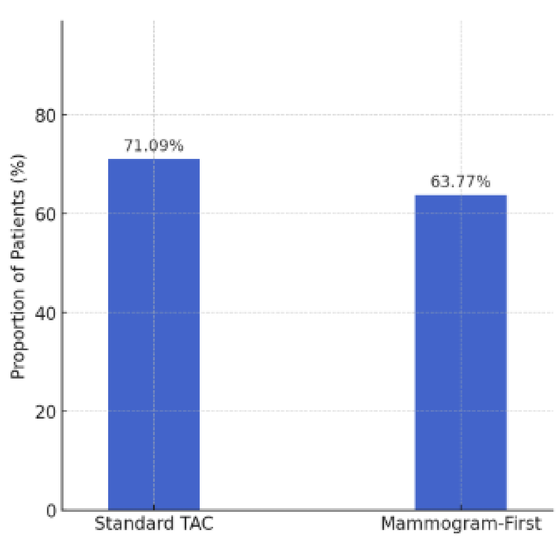


Figure 2. Change in ultrasound rate

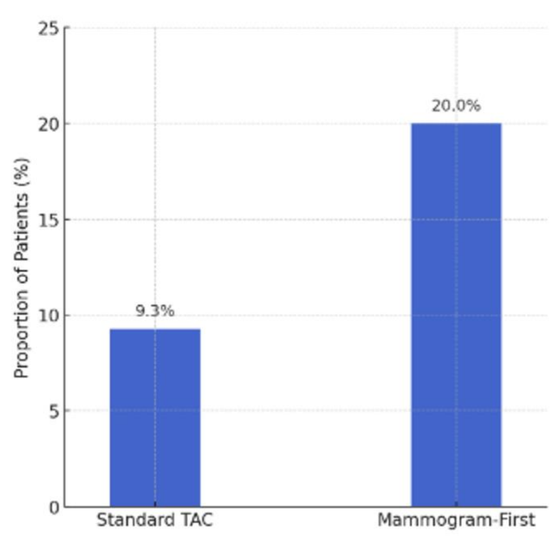


Figure 3. Change in normal physical exam finding rate

Improvements

This change served to simultaneously reduce radiographer, radiologist, and breast clinic workload whilst minimising redundant ultrasound orders and facilitating the provision of truly urgent ultrasounds in a timely manner. Furthermore, preventing over-investigation has reduces unnecessary stress and anxiety from the patient perspective.

Control

Our mammogram-first pathway has demonstrated that it can reduce workload, save cost, and alleviate patient anxiety and we therefore intend to continue this change in our practice. All patients aged >35 are now routinely scheduled for pre-clinic mammogram and further appointment by the breast administration team. The responsibility of reporting these scans has been added to the radiologist rota. We aim to follow the consequences of this promising pathway by monthly re-audit to monitor improvements and ensure that suspicious or malignant lesions are not under-imaged.

Small Changes, Big Impact: Reducing MSK Injection Waiting Times In A Public Hospital Radiology Service

Sian Kneafsey, James O'Riordan, John Kavanagh, Darra Murphy, Ciaran Johnson, Peter Beddy, Kevin Sheahan.
Department of Radiology, St James' Hospital, Dublin, Ireland.

Background

Long waits for musculoskeletal (MSK) steroid injections are a persistent challenge in many public radiology departments, often resulting in delayed care and patient dissatisfaction. This project aimed to demonstrate how small, targeted operational changes can significantly reduce waiting times and manage demand more effectively, even in resource-constrained environments.

We set out clear goals:

1. To reduce the waiting time from 25 months to 6 months within a 6-month time frame. This was aiming high, but would put us in line with recommended HSE guidelines
2. To improve the patient experience, with more efficient throughput and flow through the department (each patient spending 50 minutes for a 5-minute procedure)
3. To maintain the quality of care and patient safety,
4. To achieve this without any additional funding available

Baseline Findings

In January 2025 our service had a 25 month waiting time for new patients, with 895 patients awaiting the procedure. We had a fixed capacity with Increasing annual demand as shown in Figure 1, showing referral rate compared to completed procedures 2020 to 2024.

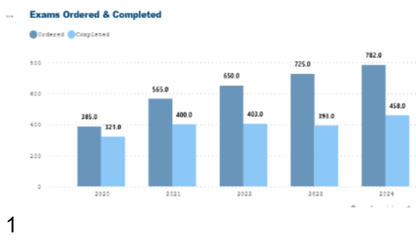


Fig. 1

Our predictive modelling estimated waiting times to reach 28 months with 1000 patient on the waiting list by July 2025.

Method

Beginning in February 2025, we commenced a radiology-led quality improvement initiative using Lean methodology.
We began by holding a meeting of key stakeholders, undertaking value stream mapping (VSM) and a Gemba walk.

A VSM tool the spaghetti diagram (Fig 2) captures the 'chaos' within the existing workflow, mapping out staff movement

Fig. 2

Analysis

1. Move to Two-Room workflow from a single room flow. This allowed us to implement parallel processing, where one nurse prepares the next patient while the consultant completes the previous procedure—eliminating downtime and achieving a more continuous flow.

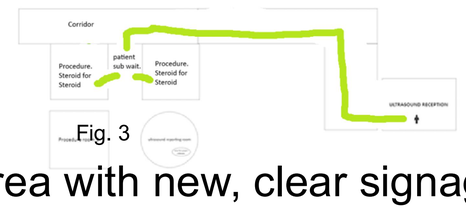


Fig. 3

2. Motion Waste Reduction:
We introduced a sub-waiting room area with new, clear signage directing patients to this location. We relocated the patient forms the nurses used from the main reception to the area immediately outside the procedure rooms. These eliminated unnecessary motion waste with improved spaghetti diagram (Fig. 3)

3. Digitisation of Waiting List:
The existing paper-based referral process was fully digitised by the clerical team into a Microsoft Excel database, creating a single source of information. This provided transparency on demand versus capacity, enabling better long-term planning.

4. Waste Reduction:
We redesigned specific packs, cutting items from 21 to 11. This further speeding up setup and reducing waste.

Analysis (cont.)

4. Validation of Waiting List: A significant inefficiency was the high non-attendance rate among patients. To help resolve this, each patient was sent an additional information leaflet and received a follow up a telephone call to confirm attendence. Patients who no longer required an injection were removed, ensuring that available capacity was directed solely toward value-added care.

5. Enhanced Roles: Each nurse working within the clinic now makes sure the patient's limb is exposed and the trolley is set up. Healthcare assistants were also underutilised and did not help in the turnaround of the room.

These were all individually small, practical changes that added up to a big impact.

Improvements

- These interventions doubled the capacity from 8 to 16 injections per week and the throughput now slightly exceeds referral volumes,
- The validated list was reduced from 895 to 595 patients.
- 73% reduction in patient lead time (13 minutes from 49)
- Streamlined processes led to fewer missed appointments and better clinic utilisation.
- ALL without additional staffing or major restructuring

By July 2025, the waiting list had a 45% reduction and waiting times reduced by 33%, achieved in only 6 months.

	Patients	Waiting Time
January 2025	895	25 months
PREDICTED July 2025	1000	28 months
TRUE July 2025	495 (44.7% reduction)	8.45 months

Fig. 4

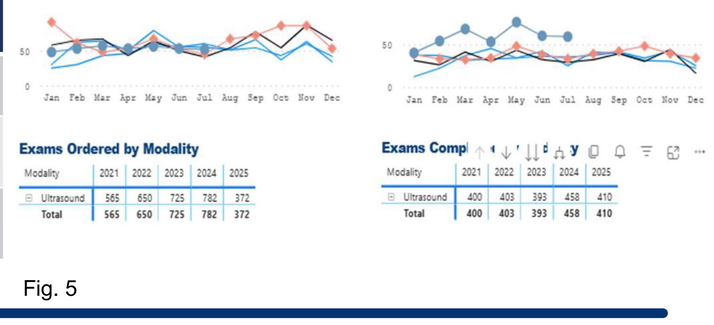


Fig. 5

Challenges and Next Steps

Sustaining engagement over the medium to long term requires structured governance and feedback mechanisms. We aimed to address this through clear communication, regular feedback loops, and by visibly sharing data to demonstrate impact. We ensured that a monthly email updating everyone on the current state of the service was sent. We used this time to inquire about any issues with the current setup and the service's performance.
To enable a sustainable increase in capacity there is an opportunity to increase procedural capability by training radiology registrars to perform less technically complex injection. This will increase overall throughput and improves long-term service resilience.

Conclusion

- This project highlights how radiology departments can drive impactful change using existing resources.
- Understanding service capacity versus patient demand is fundamental to delivering timely, safe, and cost-effective care.
- By focusing on practical service redesign and operational efficiency, even small adjustments can deliver measurable improvements in patient care and system performance

This initiative offers a scalable model for other radiology departments facing similar pressures.

On-call ED 5 year CT activity

– Extended hours and late night CT comparison

Wexford General Hospital Radiology Department

FSS Bhaile Átha Cliath
agus an Oirdheiscirt
HSE Dublin and South East

National Radiology QI Programme NQAIS Data

IMAGE WISELY™
Radiation Safety in Adult Medical Imaging

Background

Project Statement: To evaluate the ongoing impact on out-of-hours activity post introduction of nighthawk off-site radiologist reporting.

Wexford General Hospital (WGH) Radiology Department has experienced dramatic increases in workload in recent years, particularly on call. Outsourcing of CT vetting and reporting to Medica which commenced on 01/05/2024.

Protocols were introduced in an effort to protect the extremely limited pool of on-call CT radiographers by establishing stringent use of evidence-based justification principles and adherence to appropriateness criteria, as increased on-call activity has been shown to result from the introduction of off-site Consultant Radiologist vetting and reporting of these studies but data suggests these have not been effective or adhered to.

Data Collection Process

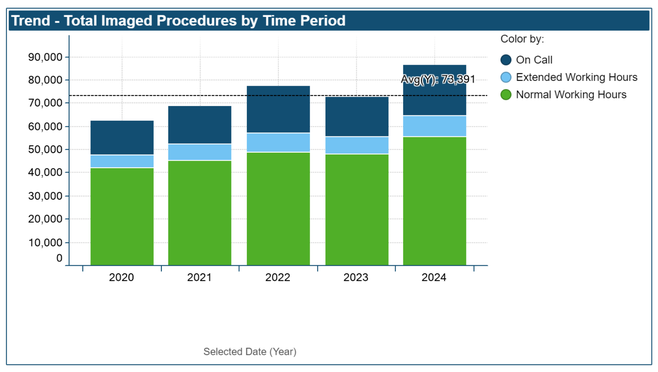
Change Healthcare Metrics 2 database was used to extract relevant data over a 5 year period. Total imaging procedures as a marker of overall activity were recorded.
As a surrogate for on call activity, modality was limited to CT, patient class to ED, and time period either “Extended Working Hours”, “Normal Working Hours” or “On Call” to analyse out of hours activity.

Results

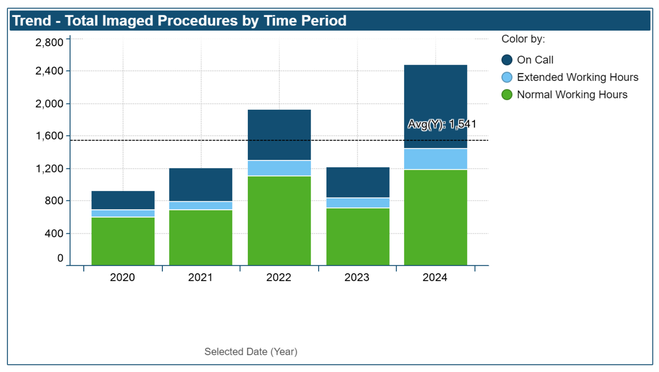
- Overall department activity has increased significantly year on year.
- Out of hours imaging contributes to an ever increasing percentage of overall activity.
- On-call ED CT has increased by **335%** over the past 5 years, extended working hours CT has increased by 170%, and working day ED CT by 102%. When compared with the last comparable year (2022, 2023 omitted due to effects on activity due to WGH fire) on-call has increased by 66%, Extended working hours activity by 32% and working day activity by 7.6%.
- On-call activity is taking up an increasing percentage of daily activity. In 2024 over half of all activity was out of hours for the first time ever.

ED CT	2020	2021	2022	2023	2024
On Call	239	412	625	390	1039
Extended Working Hours	94	107	193	127	254
Normal Working Hours	583	673	1095	695	1178

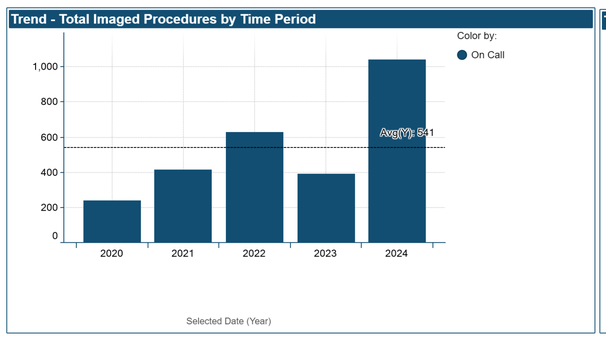
TOTAL IMAGED PROCEDURES YEARLY 2020-24



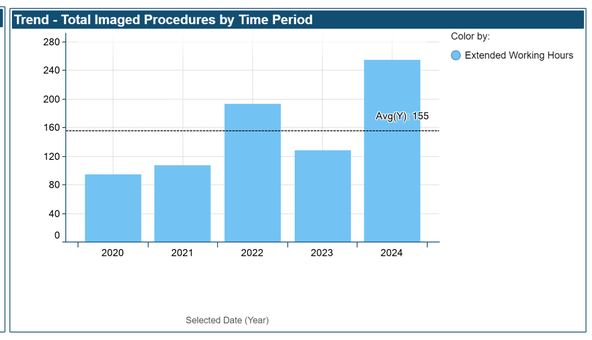
TOTAL ED CT YEARLY 2020-24



ED CT ON CALL YEARLY 2020-24



EXTENDED WORKING DAY ED CT YEARLY 2020-24



Improvements?

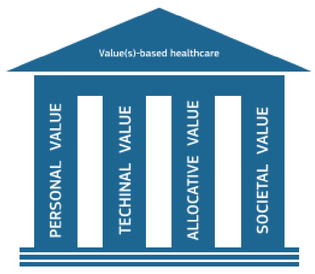
Quality for whom?

Sláintecare.
Right Care. Right Place. Right Time.

Aims:
One universal health service for all, providing the

- Right Care ? → Unjustified & inappropriate imaging in many instances
- In The Right Place? → Model 3 EDs in charge of complex surgical/medical cases demanding complex subspecialty imaging?
- At The Right Time? → 2-5am? Safe for patients & staff?

?Value Based Healthcare

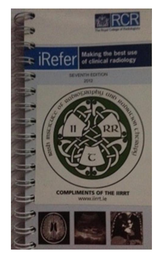


ALLOCATIVE VALUE: Equitable distribution of resources across all patient groups.
TECHNICAL VALUE: Achievement of best possible outcomes with available resources.
PERSONAL VALUE: Appropriate care to achieve patients’ personal goals.
SOsocietal VALUE: Contribution of healthcare to social participation and connectedness.

This comprehensive meaning of ‘value’ offers a wider perspective than the interpretation of ‘value’ as purely monetary in the context of cost-effectiveness.

Controls & Conclusions

- Promote development & adherence to strict local referral policies.
- System-wide recognition of risks associated with inappropriate / unnecessary medical imaging.
- Patient & referring physician education on appropriateness criteria, ionising radiation risks and limitations of medical imaging.
- The law of unintended consequences – incidental findings, repeated follow-up & irradiation, downstream effects on service as a whole.
- Temper /realign expectation with sustainable and appropriate realities employing evidence-based medicine principles.
- Implementation of order comm assistance and appropriateness criteria software at a national level should be escalated through the new regional authorities.
- Significant uplift in CT radiographer numbers locally and nationally is required to sustain spiralling demands.



An Audit of the Safety and Complication Rates of CT-Guided Lung Biopsies in a Level 3 Hospital

Project Team: E, Mooney, Medicine, Mullingar Regional Hospital, M, Sheehy, Medicine, Mullingar Regional Hospital, S, Glynn, Medicine, Mullingar Regional Hospital, J, Slattery, Radiology, Mullingar Regional Hospital

National Radiology QI Programme NQAIS Data

Background

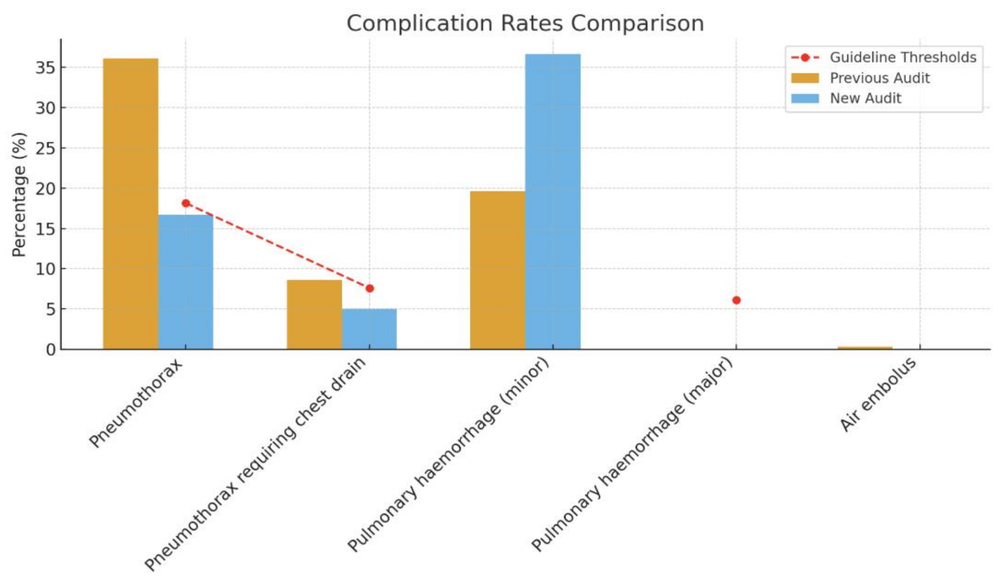
Computed Tomography (CT)-guided transthoracic needle biopsy is a minimally invasive diagnostic procedure for pulmonary nodules. Procedure-related complications are monitored with immediate CT and delayed Chest X-Ray (CXR). The aim of this project was to re-audit complication rates in a Level 3 hospital and to compare these findings with international standards.

Baseline Findings

Baseline data was sourced from a previous local audit of CT-guided lung biopsies performed between 2007 and 2017 which reported the following complication rates; pneumothorax occurred in 36.1%, with 8.6% requiring chest drain insertion; pulmonary haemorrhage occurred in 19.6%, with none being haemodynamically significant; air embolus occurred in one case (0.3%).

Measure

A retrospective review was undertaken of all CT-guided lung biopsies performed between January and December 2024. All data, including imaging and reports, were accessed via the National Integrated Medical Imaging System (NIMIS). Nodules were characterised by size and CT appearance (solid, semi-solid and ground-glass). Complications assessed included pneumothorax, pulmonary haemorrhage and air embolus. Findings were compared with complication rate thresholds defined by the Society of Interventional Radiology (pneumothorax 15.3–22%, drain insertion 5.8–9.4%, and major pulmonary haemorrhage 6.1%).



Analysis

60 biopsies were performed on 56 patients (30 female, 26 male). Nodule sizes were <10 mm in 7 cases (11.7%), 10–19.9 mm in 29 cases (48.3%), 20–29.9 mm in 11 cases (18.3%), 30–39.9 mm in 4 cases (6.7%), and ≥40 mm in 9 cases (15%). In terms of appearance, 54 cases (90%) were solid, 2 cases (3.3%) were semi-solid and 4 cases (6.7%) demonstrated ground-glass change.

Analysis (continued)

No complications were observed in 31 cases (51.7%). Pneumothorax occurred in 10 cases (16.7%), with 2 visible on CT only and 8 visible on CXR; 3 cases (5%) required chest drain insertion. Pulmonary haemorrhage occurred in 22 cases (36.7%), with 12 detected on CT only; all were minor and required no intervention. No cases of air embolus were identified. Overall, complication rates remained within internationally accepted thresholds, confirming the safety of the procedure at this institution.

Complication	Previous Audit	New Audit	Guideline Thresholds (SIR)
Pneumothorax	36.1%	16.7%	15.3–22%
Pneumothorax requiring chest drain insertion	8.6%	5%	5.8–9.4%
Pulmonary haemorrhage	19.6% (all minor)	36.7% (all minor)	≤6.1% (major haemorrhage)
Air embolus	0.3% (1 case)	0%	Very rare, no set threshold

Table 1: Comparison of baseline data, newly collected data and guideline standards

Improvements

This re-audit demonstrates that complication rates for CT-guided lung biopsies at this institution remain within internationally accepted thresholds. However, several improvements were identified to optimise patient safety and data quality. These include the introduction of standardised documentation to ensure consistent recording of complications, refinement of post-procedural imaging pathways, and enhancement of the consent process to ensure patients are fully informed of potential risks and outcomes. Additional measures include ongoing staff training in the recognition and management of complications, regular multidisciplinary review of complex cases, and the development of a structured follow-up protocol to monitor outcomes.

Control

To ensure sustainability of these improvements, documentation templates will be integrated into institutional practice to facilitate reliable data capture and repeat auditing. Refinements to imaging and consent processes will be adopted as standard protocols to ensure consistency. Regular multidisciplinary meetings and staff training will maintain procedural competency and encourage shared learning. Repeat audit cycles will provide ongoing monitoring to ensure that standards are maintained. This re-audit confirms that CT-guided lung biopsies at our institution are safe, with complication rates consistent with international standards, reinforcing the value of this service in the diagnosis and work-up of pulmonary nodules.

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