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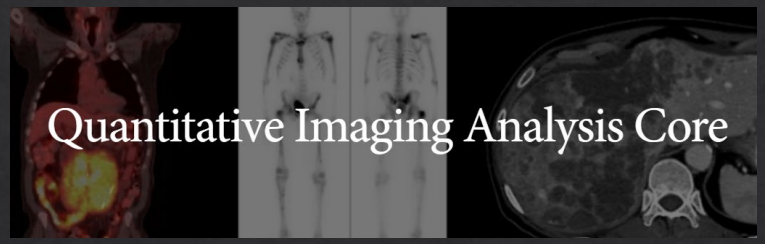



# IMPROVING QUANTITATIVE REPORT TURN-AROUND TIME USING DIGITAL TECHNOLOGY FOR CLINICAL TRIALS


RSNA® 2023
LEADING THROUGH CHANGE
Annual Meeting: Nov. 26–30

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# INTRODUCTION

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## QIAC

- Assessing tumor metrics → vital for oncology disease evaluation and treatment planning
- **Quantitative imaging analysis core (QIAC)** → established in 2014 at MDA to enhance tumor assessments, providing separate quantitative reports
- Using **tumor metrics criteria** → RECIST 1.1 , RANO, Lugano, etc.
- **Imaging Research Specialists (IRS)** (non-board-certified radiology-trained foreign medical graduates) --> generate a preliminary report --> finalized by a **board-certified radiologist**
- QIAC reports help **clinicians** make **therapeutic decisions** → whether to continue or terminate the therapy for the patients under clinical trials
- **QIAC Web App** → central platform to facilitate the ordering of tumor metric assessments, performing tumor measurements, and storing and retrieving this data

## Dual Digital Alert System

- A feedback loop from the clinicians → **expedited reports** were not being finalized on time → an issue with patient wait times in the clinic and patient satisfaction
- **Dual Digital Alert System** and **automatic rescheduling of the radiologist** → deployed in October 2021 at MDA:
  - To improve the **turn around time** for QIAC reports
  - To help in **therapeutic decision making**
  - To decrease **wait time** and to improve **patient satisfaction**

**GOAL:** Design and Implementation of a Dual Digital Alert System and automatic rescheduling of the radiologist to the QIAC workflow to improve the efficiency of QIAC report delivery

**Streamlining** the workflow

Supporting **timely and informed therapeutic decision-making** for patients in clinical trials

Improving **patient satisfaction**

Ensuring that the **QIAC reports would be available** when needed

Decreasing **patient wait time**

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# QIAC Workflow

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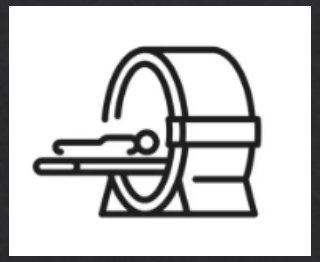
Submit QIAC service request

Scan order

OneConnect Order



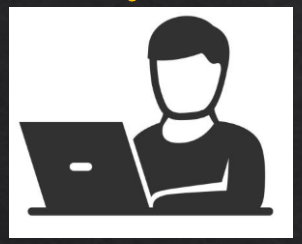
CT, MRI,PET

Images

PACS

Images

Evaluate scans using tumor metrics criteria



Study Coordinator Research Nurse

Disagreement

QIAC order

QIAC Web App

Return to IRS

Disagreement

Preliminary Report

IRS

Return to IRS

Preliminary Report

View the finalized report and make therapeutic decisions

Clinician/PI

View Report

OneConnect Report

Finalized Report

QIAC Radiologist

Review, validate, and approve the preliminary reports

Communication via email/phone

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# MATERIAL and METHODS

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Collaborative work with our Institutional Research Information Systems division

Designing and implementing a web-based system designed to facilitate this process

Establishing a dedicated leadership team to outline specific requirements

Validating the functionality of the system through real-time testing

Update the code to send a pager and email notification using the last submitted date and time for each QIAC report

Making the functionality configurable so that the time to reassign or send reminders can be changed for each QIAC Radiologist

Using of Agile Methodology of IT Project Management to implement this functionality

The QA Team tested this functionality using available Pagers within the institution where each Test Radiologist (Primary or Secondary or in Pool) was assigned a separate Pager

Several reports were created and tested for the accuracy of the code before it was implemented.

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# QIAC Workflow

## Pre and Post implementation of Digital Alert System

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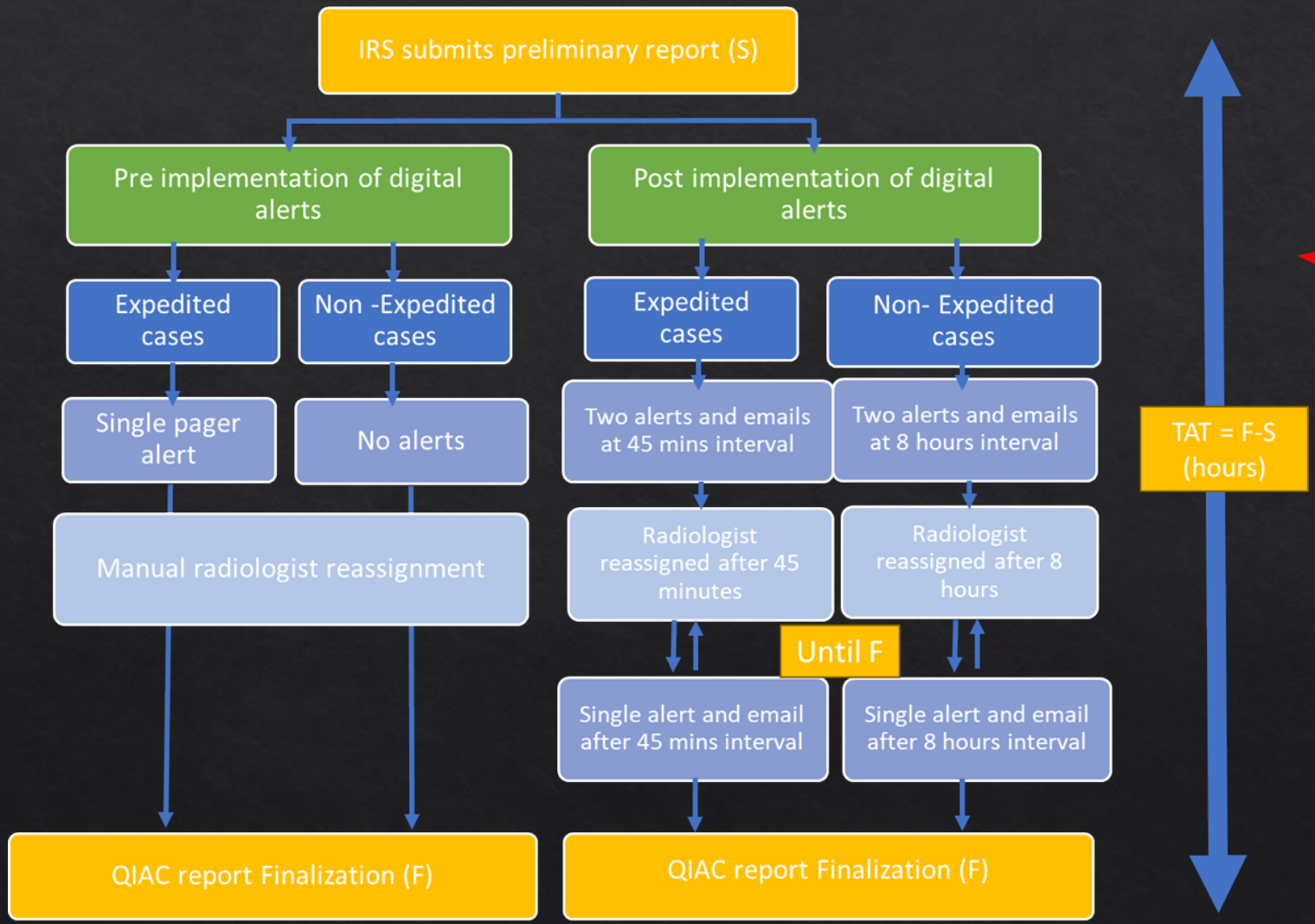
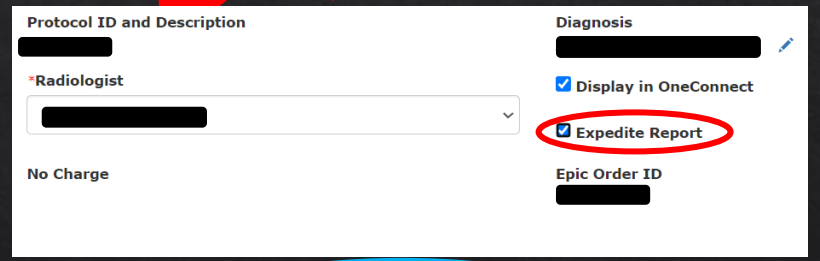



**Expedited reports:** patient with a clinical appointment on the same day




**Non-expedited reports:** patient with appointments on the next or consecutive days or if it was a retrospective study

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# QIAC Workflow

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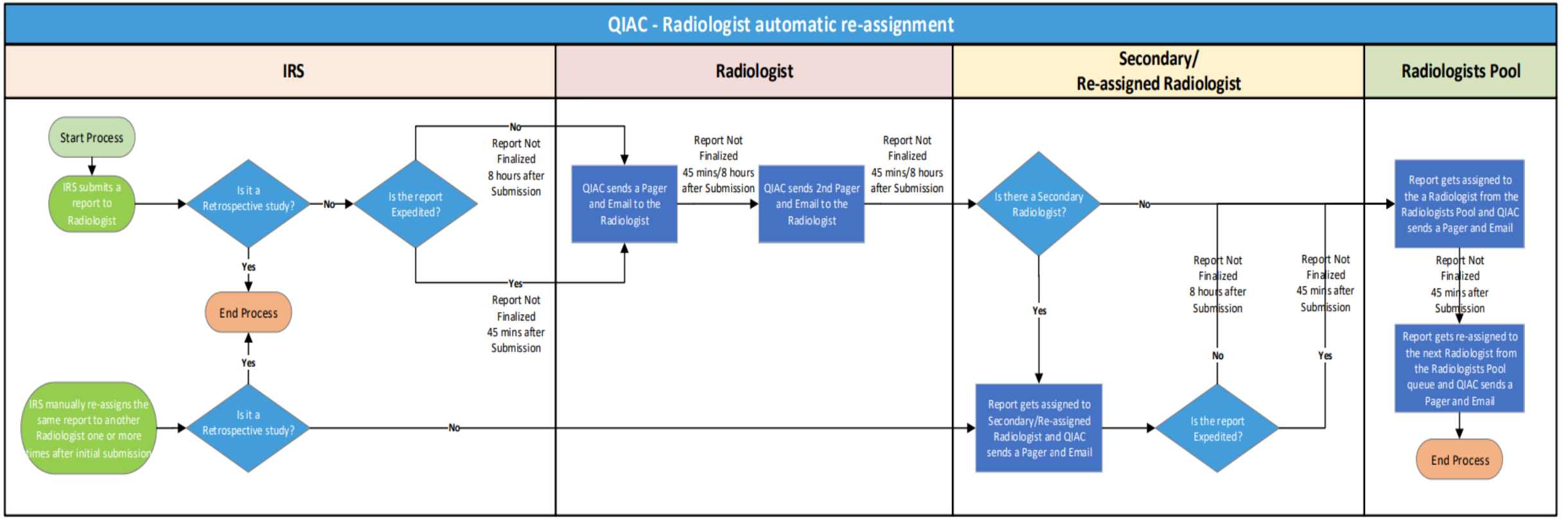
## QIAC digital alert system and reassignment workflow




**Note:**

- Manual re-assignment can happen anytime and will always take precedence over the automatic re-assignment process. The automatic re-assignment process will stop and the manual re-assignment process will start when IRS re-assigns any report manually.
- The process ends any time when a report is 'Final' -or- changed back to 'In Progress' -or- released to 'Pending'.
- A re-assignment will occur inside normal business hours (8 AM – 5 PM) or be deferred to the start of the next business day or Monday of next week.

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# MATERIAL and METHODS

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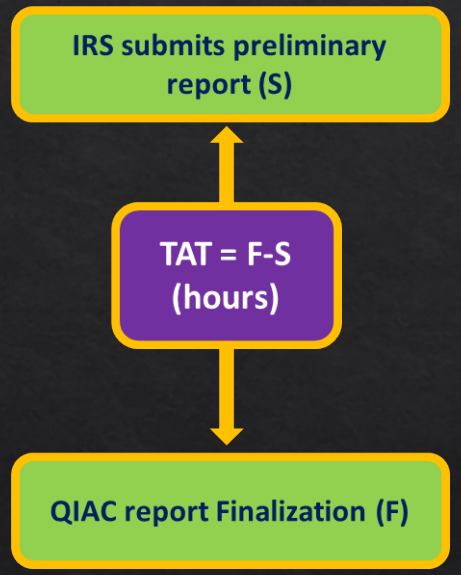
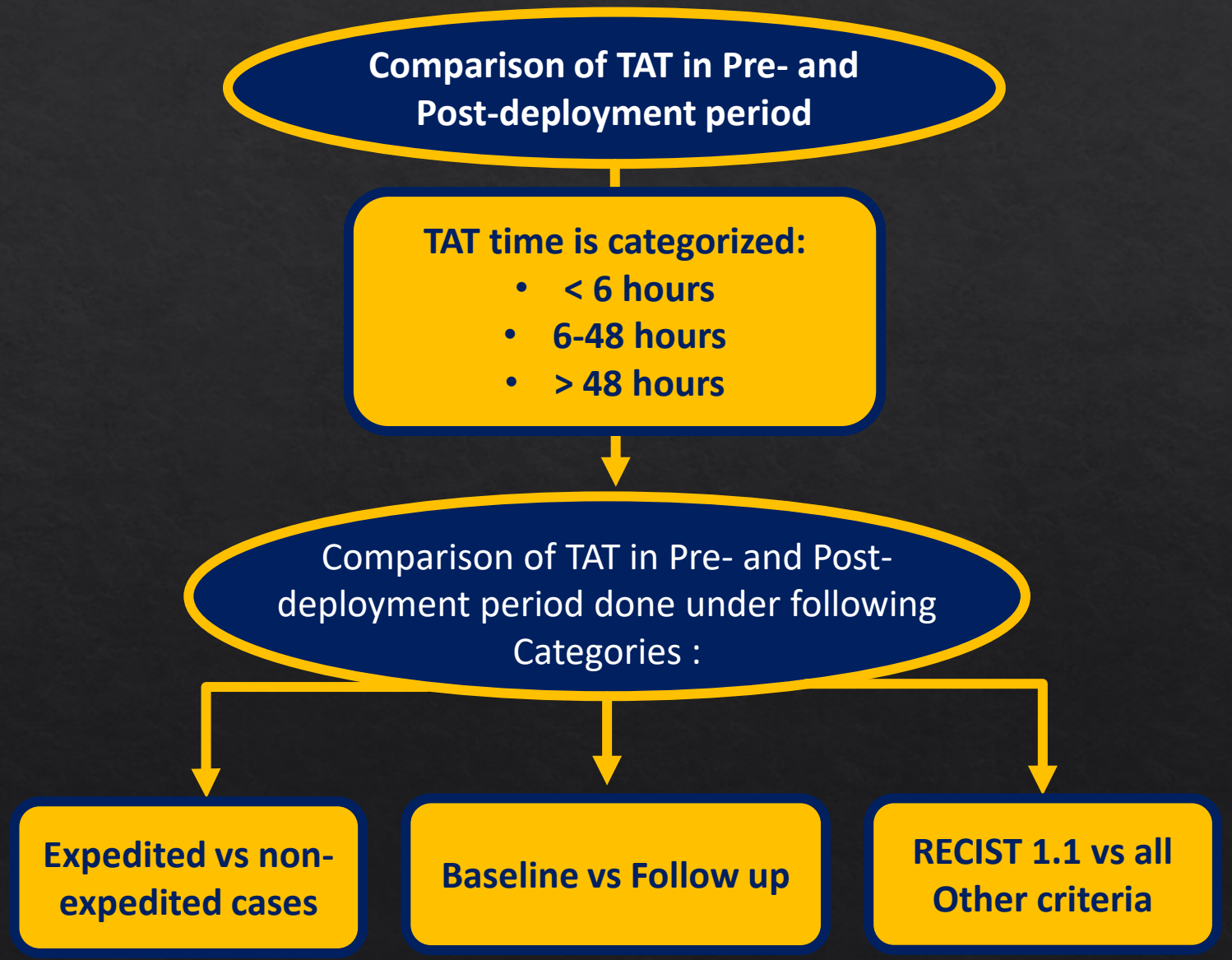
## Outcome measure – TAT

- TAT → Turn around time in hours
  - F :Time of report finalization
  - S :Time of report submission by IRS
  - **TAT = F – S**




- Pre-deployment cases → collected over a period of 1 year from October 2020 to October 2021
- Post-deployment cases → collected over a period of 6 months from August 2022 to February 2023



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# MATERIAL and METHODS

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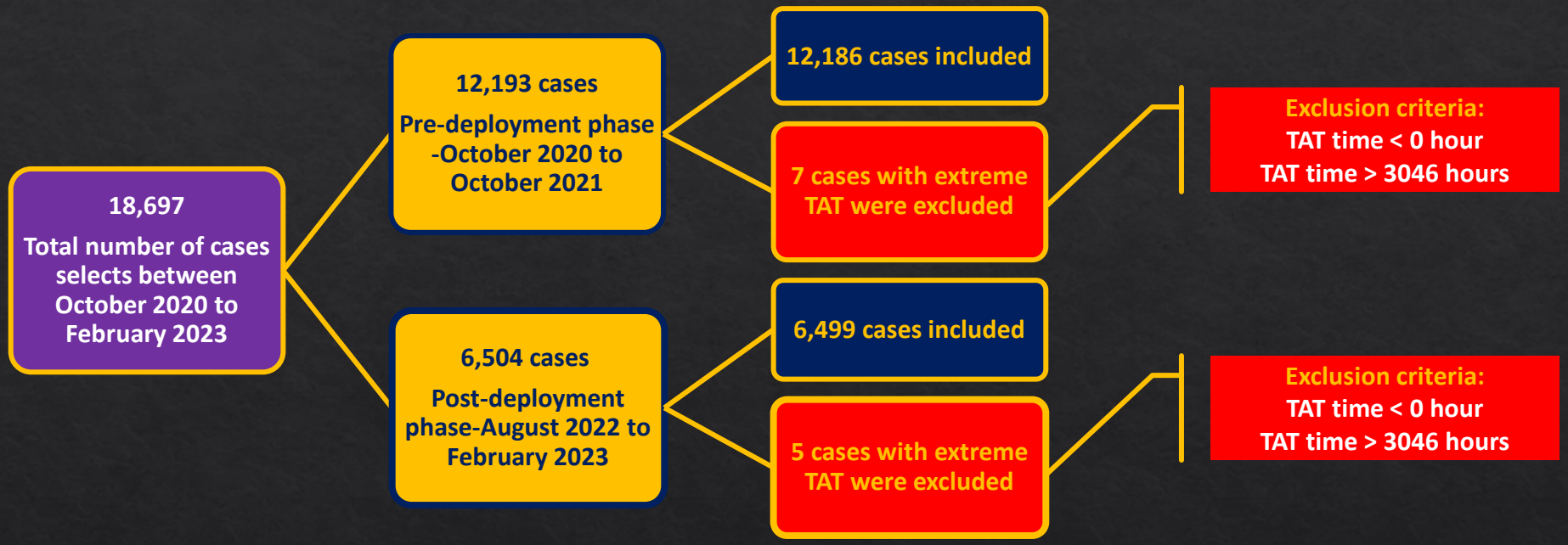


## Statistical Analysis:

- Statistical analyses were carried out using R (version 3.6.3, R Development Core Team, Vienna, Austria)
  - TAT was summarized using mean, SD, median, the 25th and 75th quantiles, minimum, maximum
- TAT was compared between pre- and post- deployment phases (or other levels) using Wilcoxon Rank Sum test
- The categorical TAT was summarized using frequencies and percentages and compared using Chi-squared test
  - P-value < 0.05 was considered statistically significant

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# RESULTS

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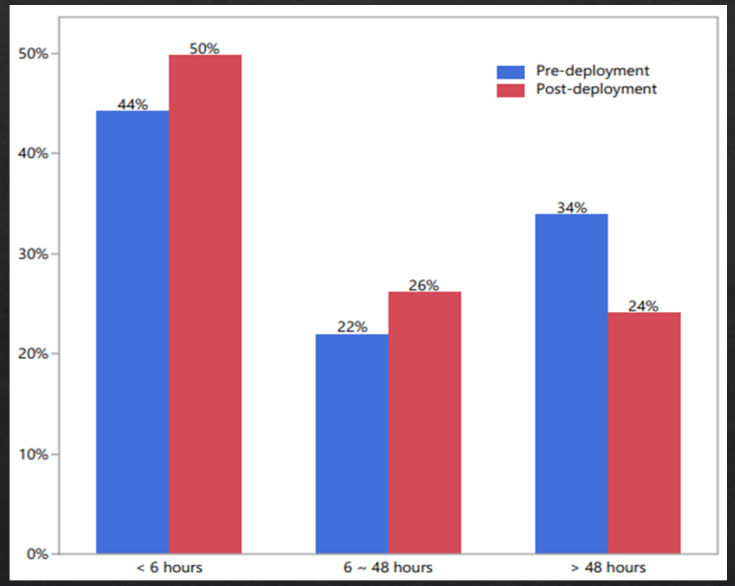
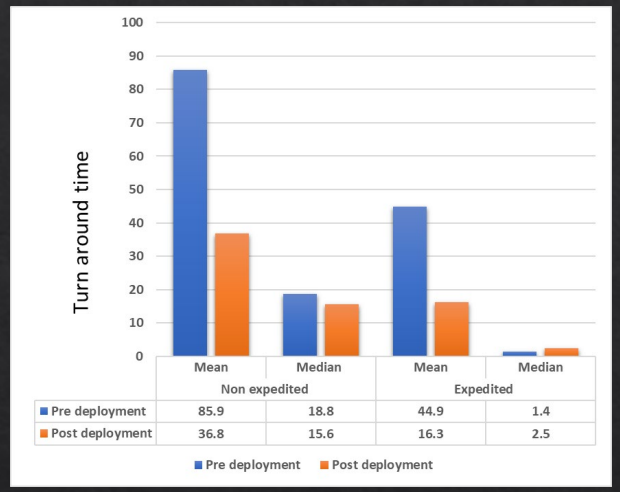
## Timewise distribution of TAT for expedited and non-expedited reports




There was a significant overall increase in the number of cases finalized in <6 hours (50%) and a decrease of 10% noted in cases finalized beyond 48 hours in the post-implementation versus the pre-implementation period

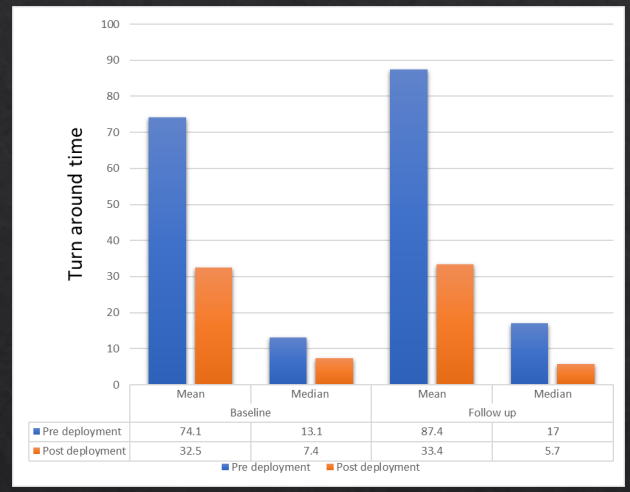
## Comparison of TAT (hours) by Expedited Status in Pre- and Post-deployment period




| | Non expedited | | Expedited | |
|---|---|---|---|---|
| | Mean | Median | Mean | Median |
| Pre deployment | 85.9 | 18.8 | 44.9 | 1.4 |
| Post deployment | 36.8 | 15.6 | 16.3 | 2.5 |

Pre deployment  Post deployment

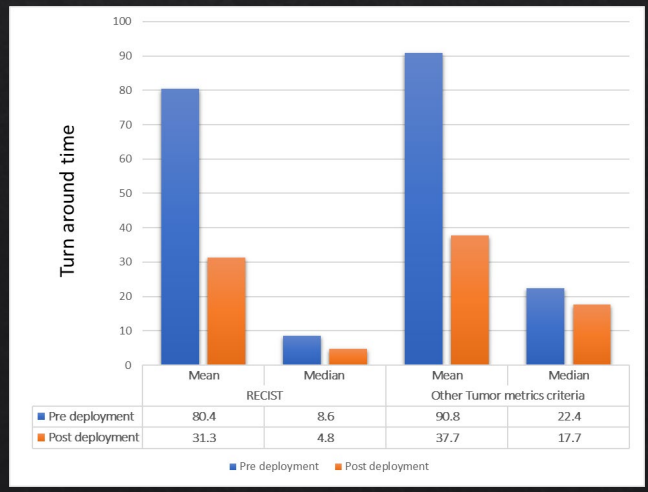
## Comparison of TAT (hours) by Baseline Status in Pre- and Post-deployment period




| | Baseline | | Follow up | |
|---|---|---|---|---|
| | Mean | Median | Mean | Median |
| Pre deployment | 74.1 | 13.1 | 87.4 | 17 |
| Post deployment | 32.5 | 7.4 | 33.4 | 5.7 |

Pre deployment  Post deployment

## Comparison of TAT (hours) by Tumor metrics criteria in Pre- and Post-deployment period




| | RECIST | | Other Tumor metrics criteria | |
|---|---|---|---|---|
| | Mean | Median | Mean | Median |
| Pre deployment | 80.4 | 8.6 | 90.8 | 22.4 |
| Post deployment | 31.3 | 4.8 | 37.7 | 17.7 |

Pre deployment  Post deployment

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# DISCUSSION and CONCLUSION

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The outcomes of our study underscore the noteworthy influence of the newly implemented digital alert system, resulting in a substantial reduction in TAT time during the post-implementation phase.

The observed decrease in both mean and median TAT times across different categories—expedited and non-expedited cases, baseline and follow-up evaluations, and across various tumor metrics criteria—highlights the system's effectiveness in accelerating the radiology reporting workflow and making a substantial improvement in therapeutic decision making and overall patient satisfaction.

## Limitations

- Monitoring the availability of radiologists posed challenges
- Releasing and re-approving the reports due to disagreements
- Reassignment of cases to a second radiologist without regard to department specialization

## Future Projects

- Integrate the digital alert system with existing scheduling tools used by the radiology department
- Real-Time Status Indicators that allows radiologists to update their availability on QIAC
- To ensure the reassignment to proper department, we can assign specialization tags to radiologists based on their areas of expertise