

# Improving Percentage of Mobile Chest Radiographs from Emergency Department (Red Zone) with Turnaround Time ≤ 45mins

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## Selection of Opportunities for Improvement

Delay in mobile chest radiographs (CXR) turnaround time (TAT) affects the management of critically ill patients at Emergency Department (ED). Verification study showed that only 63.4% of mobile CXR from ED with TAT ≤ 45mins. This topic was chosen based on the SMART criteria.

Criteria	Reason
<b>S</b> -eriousness	Delay in TAT leads to overcrowding, increased cost of care and increased length of stay (1,2). Various causes were identified previously (3,4)
<b>M</b> -easurable	Data can be collected online via Radiological Information System (RIS)
<b>A</b> -ppropriate	Mobile CXR is crucial for acute management in ED
<b>R</b> -emediable	Available resources for remedial measures
<b>T</b> -imeliness	Remedial measures can be implemented within short period

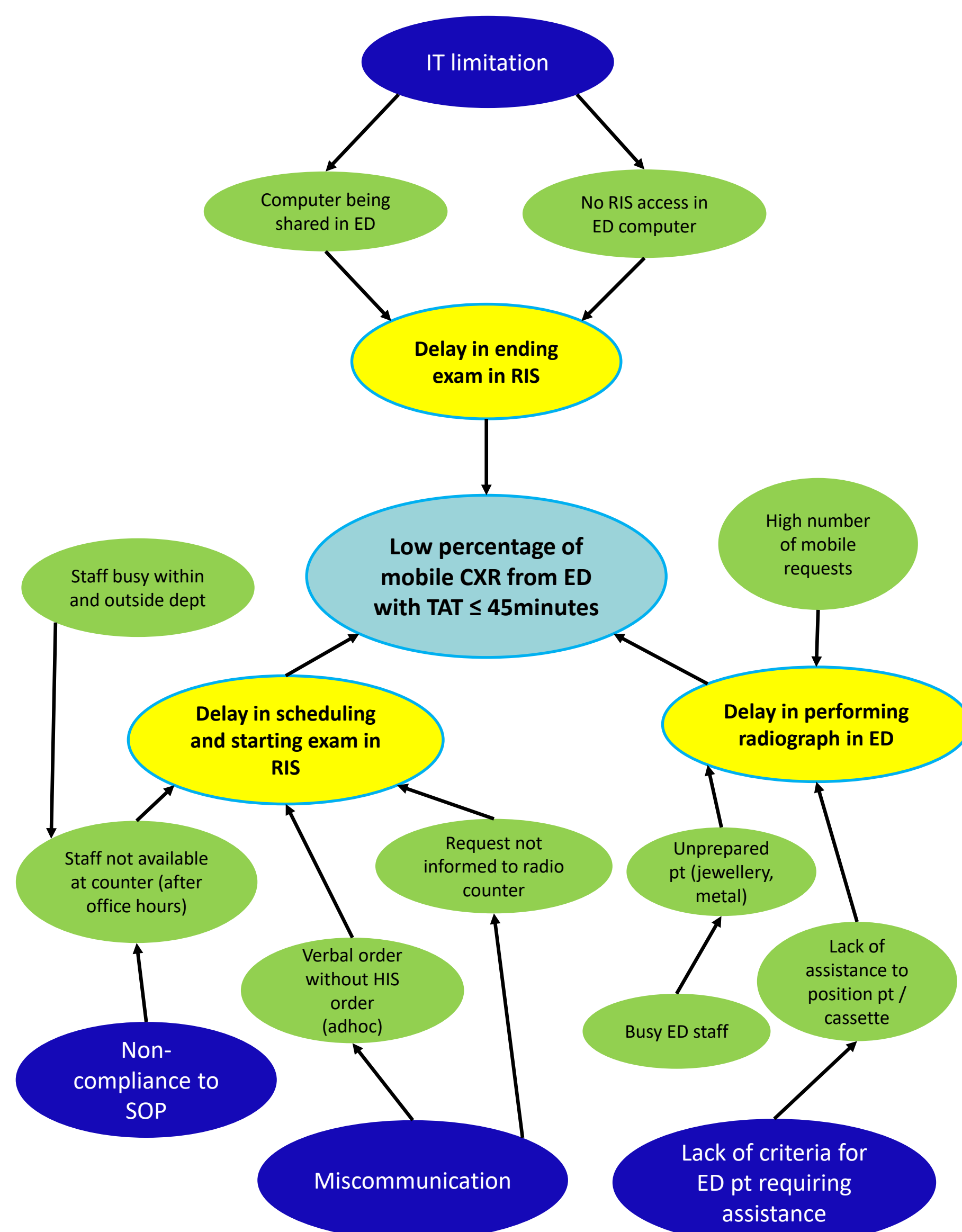


Figure 1. Bubble chart showing the various factors contributing to the problem of low percentage of mobile CXR with TAT ≤ 45mins.

## Key Measures for Improvement

### General Objective:

To improve percentage of mobile chest radiographs CXR from ED with TAT ≤ 45mins.

### Specific Objectives:

- To verify the low percentage of mobile chest radiographs from ED with TAT ≤ 45mins.
- To identify factors contributing to above problem.
- To formulate and implement effective remedial measures.
- To evaluate the effectiveness of remedial measures.

### INDICATOR :

Percentage of mobile CXR from ED with TAT ≤ 45mins

$$\frac{\text{Number of mobile CXR from ED with TAT} \leq 45\text{mins}}{\text{Total number of mobile CXR from ED}} \times 100\%$$

### STANDARD: ≥ 80%

(based on Hospital Performance Indicators for Accountability)

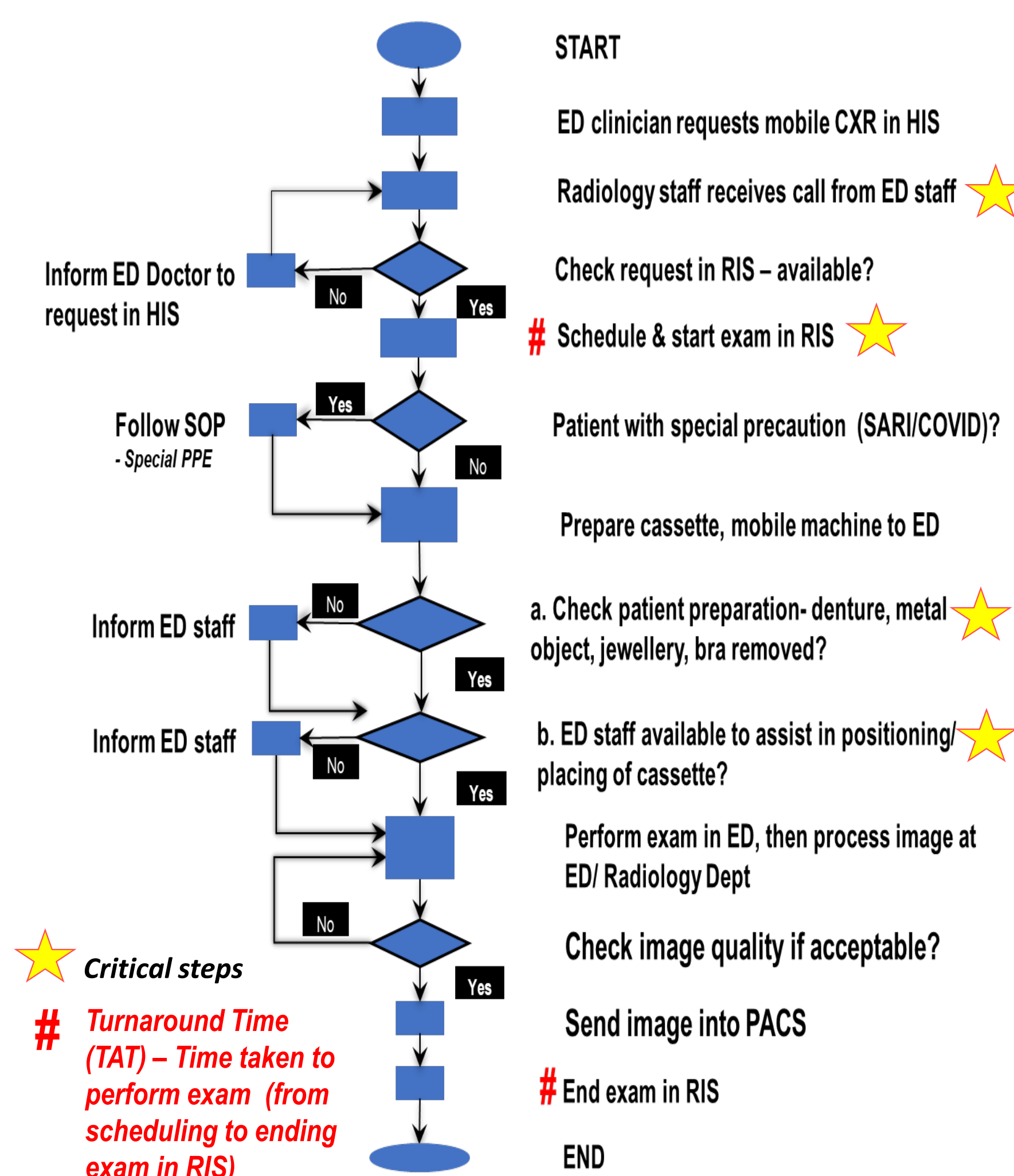


Figure 2. Four critical steps (yellow star) identified from the process of care, which formed the model of good care (MOGC).

## Process of Gathering Info

Item	Description
Study design	Cross sectional
Site	Resuscitation zone Emergency Department (ED), Hospital Shah Alam
Study sample	All mobile CXR requests from ED HSAS who met the inclusion criteria
Sampling technique	Convenience sampling
Study period	Verification study: July – Dec 2021 Pre-remedial data: Feb – April 2022 Remedial measures: May - July 2022 Post-remedial data: August – Oct 2022
Study tool	Phone call logbook at Radiology Counter Observation and data collection sheet

Table 1. Summary for process of gathering information.

## Analysis and Interpretation

The four critical steps identified formed the model of good care (Table 3). Data for critical steps was collected before remedial measures (Table 3). Pre-remedial study showed the percentage of mobile CXR from ED with TAT ≤ 45mins was 70.4%. Various contributing factors then identified and appropriate remedial measures implemented.

## Strategies for Change

Contributing factors to problem	Remedial measures
1. Non-compliance to Standard Operating Procedure (SOP) by radiology staff (not available at counter to receive call)	Continuous medical education (CME) regarding mobile CXR SOP
2. Interdepartmental miscommunication (no call from ED, verbal ad hoc CXR order without HIS order)	Internal memo to ED regarding mobile CXR SOP
3. Lack of criteria for ED patients requiring assistance during mobile CXR	Interdepartmental discussion & internal memo listing the criteria of ED patients requiring assistance for mobile CXR
4. IT limitation - no RIS access in ED computer.	RIS software installation in the ED computer.

Table 2. Summary of contributing factors identified and remedial measures implemented.



Images show the various remedial measures implemented. Top left: CME for staff. Top right: Installation of RIS in ED computer. Bottom left and right: Internal memos for SOP and criteria for ED patients requiring assistance during mobile CXR.

## Effect of Change

Post-remedial study noted improvement in the critical steps which form the model of good care (Table 3).

Critical Step in MOGC	Standard	Pre-remedial	Post-remedial
Radiology staff receives call from ED	100%	26.8%	100%
Radiology staff schedules and starts exam in RIS	100%	100%	100%
Patient is prepared for CXR before arrival of mobile team	100%	92.0%	91.3%
ED staff available to assist in patient positioning/ placing of cassettes.	100%	32.0%	35.8%

Table 3. Model of good care – before & after remedial measures

The percentage of mobile CXR from ED with TAT ≤ 45mins was increased from 70.4% to 83.7% post remedial measures (Figure 3).

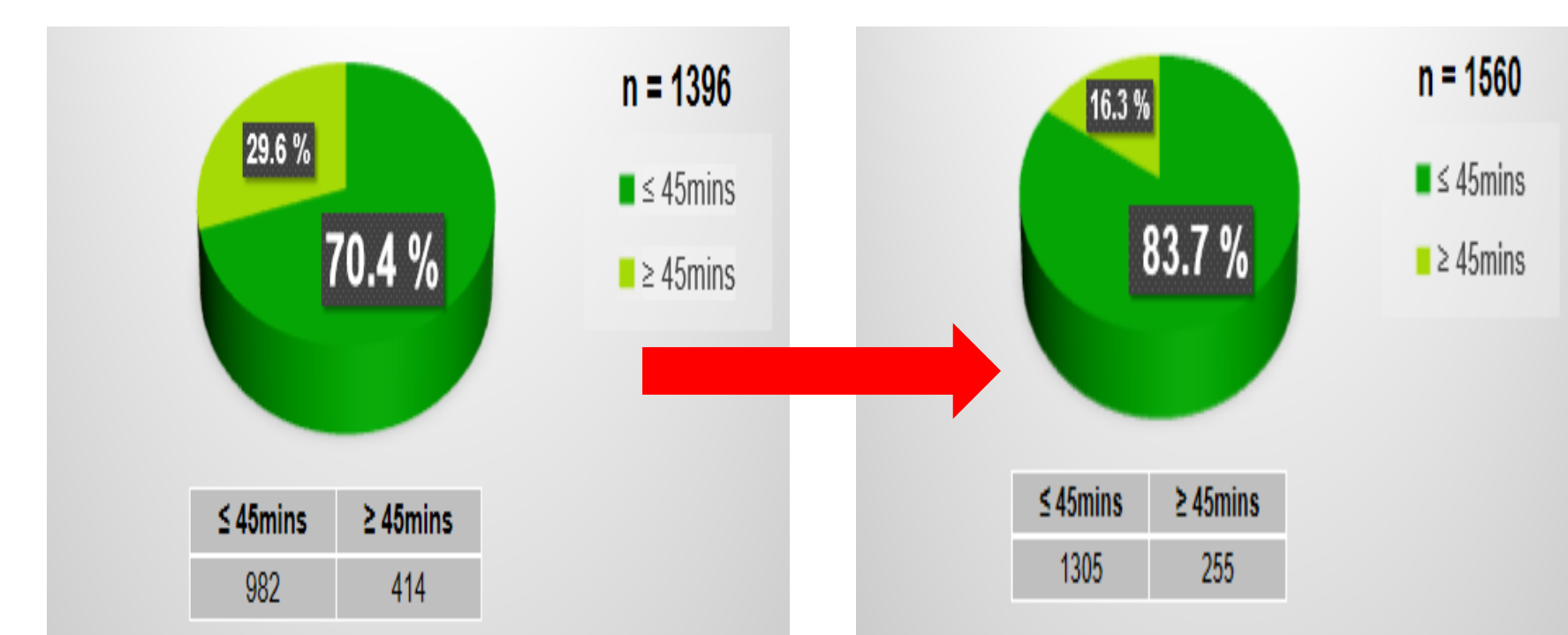


Figure 3. Percentage of mobile CXR from ED with TAT ≤ 45mins during pre-remedial and post-remedial studies.

There was improvement in the ABNA (Achievable benefit not achieved) post remedial measures (Figure 4).

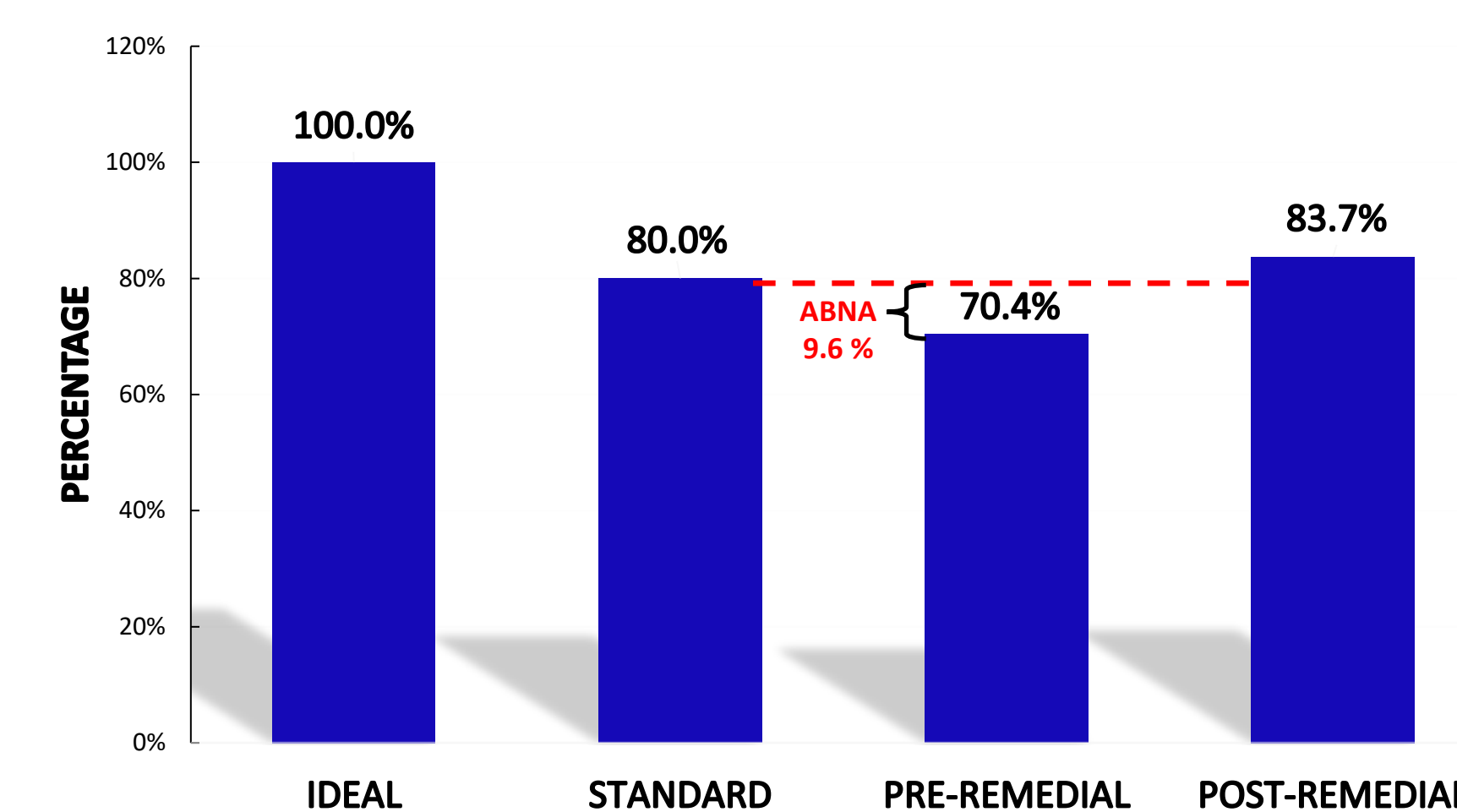


Figure 4. ABNA graph.

## The Next Step

- ✓ Hold regular CME and incorporate mobile CXR SOP into orientation for new radiology staff.
- ✓ Improve radiology roster (dedicated mobile team for ED).
- ✓ Collaborate with ED team for next cycle.
- ✓ Share project outcome at state level radiology network, exploring the possibility of implementing similar QA project in other hospitals.

## Acknowledgement

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