



# Streamline the Workflow for Emergency Cardiac Chest Pain Patients to Provide Timelier Assessments

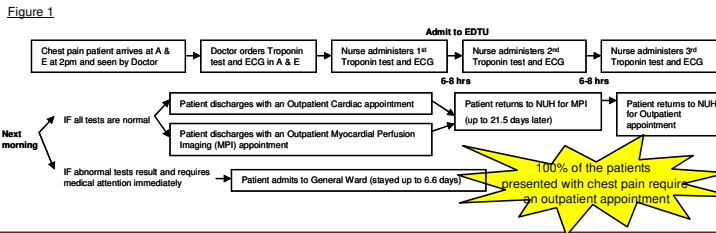


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## BACKGROUND

The proportion of patients presented with chest pain was the top diagnosis at Accidental and Emergency (A & E) department. Disposition of these patients in Extended Diagnostic Treatment Unit (EDTU) and General Wards per month was 101 and 80 respectively. The average length of stay (ALOS) in EDTU as 24 hours at 95<sup>th</sup> percentile and 19.3 hours at 50<sup>th</sup> percentile. The ALOS in General Wards as 6.6 days at 95<sup>th</sup> percentile and 2.8 days at 50<sup>th</sup> percentile. ECG and blood tests were administered on patients during their stay in EDTU, if non-diagnostic, it does not serve as sufficient discriminators for optimal decision making for A & E Physicians. Thus it is important to improve the ability to triage patients with acute coronary syndrome (ACS) more rapidly and accurately for optimal management of patients in A & E. The Value Stream Map for chest pain patients admitted to A & E before the improvement was as follow:



## OBJECTIVES

1. Streamline the workflow for emergency Cardiac patients to provide timelier and adequate assessments to reduce avoidable admissions and length of stay for Cardiac chest pain patients.
2. Ensure that patients receive evidence-based care by initiating MPI tests early in EMD

## METHODOLOGY

The approaches which were adopted to streamline the workflow for emergency Cardiac patients were as follows:

**DOWNTIME (8 WASTES)**

Waste	Description
Inventory	Excess stock of Troponin tests, ECG machines, etc.
Waiting	Waiting for Troponin results, waiting for ECG, waiting for MPI appointment.
Transportation	Transporting patients to EDTU, Nuclear Lab, etc.
Motion	Unnecessary movements of staff and patients.
Processing	Redundant tests, unnecessary consultations.
Inventory	Excess stock of medications, supplies.
Waiting	Waiting for patient admission, waiting for test results.
Transportation	Transporting patients to different departments.
Motion	Unnecessary movements of staff.
Processing	Redundant tests, unnecessary consultations.
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**PATIENTS' EXPERIENCE**

Area	Current State	Target State
Waiting time	11 days	1.2 day
Number of visits	2	1
Cost of care	High	Low
Patient satisfaction	Low	High

**Go and See** sessions in A & E, EDTU, Nuclear Lab and Diagnostic Cardiac Lab were organized to bring the team down to the front line to capture wastes in the process and observe patients' experience.



**Value Stream Mapping** was used to analyze the current state and designing a future state for better flow across multiple processes

**CELL CONCEPT: IMPROVEMENT TOOLS / PRINCIPLES**

Cell Concept	Standard Work
Cell Concept	Visual Management
Cell Concept	5S
Cell Concept	Best Practices/Evidence
Cell Concept	Built-in Quality
Cell Concept	Standard Work
Cell Concept	Visual Management

**Paradigm breaking exercise**

Question	Answer
What is the current state? <td>11 days wait, 2 visits, high cost, low satisfaction.</td>	11 days wait, 2 visits, high cost, low satisfaction.
What is the target state? <td>1.2 day wait, 1 visit, low cost, high satisfaction.</td>	1.2 day wait, 1 visit, low cost, high satisfaction.
What are the breakthrough solutions? <td>Early MPI test, streamlined workflow.</td>	Early MPI test, streamlined workflow.

**Paradigm breaking** exercise helped the team to think out of the box and come up with breakthrough solutions.

Principles in **Cell Concept** guided the team during solutioning. The team took references from the best practises from other countries and developed new workflows.

**PLAN DO CHECK**

Plan	...
Do	...
Check	...
Act	...

**PLAN DO CHECK**

Plan	...
Do	...
Check	...
Act	...

**Rapid Experiments** were conducted to quickly test the viability of the ideas in the real environment and generate new insights.

## IMPLEMENTATION

1. Patients received a more conclusive clinical diagnosis of their heart condition as MPI was administered within 24 hours from the day patient was admitted with atypical chest pain at A & E.
2. Inclusion and exclusion criteria guides for the management of chest pain patients for A & E Doctors were created (Figure 2) to ensure a smoother workflow at A & E.
3. Radiographers created additional resource for A & E referrals and were able to perform MPI within 24 hours from the time patient was admitted (Figure 3 & 4).
4. Developed a more well coordinated and seamless workflow between A & E and Nuclear Laboratory on the management of chest pain patients. There was better patient experience as it reduced anxiety as a result of earlier MPI.
5. Overall, the improved workflow **reduces admission to the Ward, reduces re-admission to A & E, reduces number of Clinic visits, promote safe discharges and cost reduction to patients.**

Figure 2: Inclusion and exclusion criteria for EMD Doctors

Figure 3: Recipe Card for Acute Rest MPI

Figure 4: Recipe Card for Stress MPI

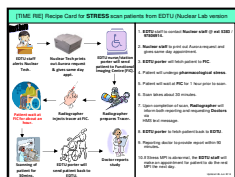
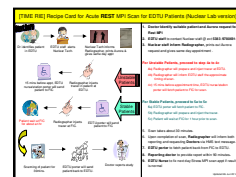
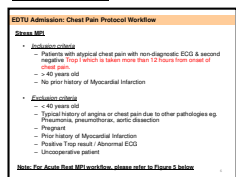
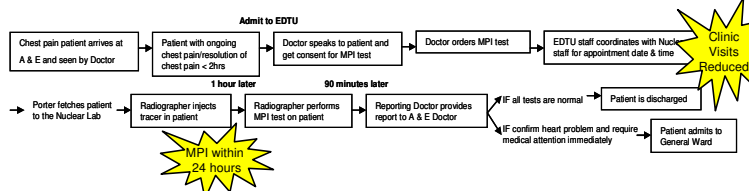


Figure 5: Overall Workflow for Patients with Ongoing Chest Pain / Resolution of Chest Pain within 2hrs



## RESULTS

The team achieved results which were beyond expectation.

1. Appointment wait time for Myocardial Perfusion Imaging (MPI) (Figure 6)
  - At 95<sup>th</sup> percentile: Reduced from **21.5 days to 1.2 day** (target 14 days)
  - At 50<sup>th</sup> percentile: Reduced from **11 days to 1 day** (target 5 days)
2. Before the project, all chest pain patients who were discharged from A & E would be given a Cardiac outpatient appointment. After the project, 75% were able to be discharged without the need for a Cardiac outpatient appointment. The team managed to **save 70 outpatient cardiac appointments** over 12 months (Figure 7).

Figure 6: MPI Appointment Wait Time

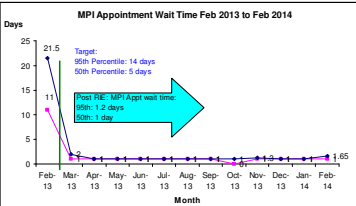
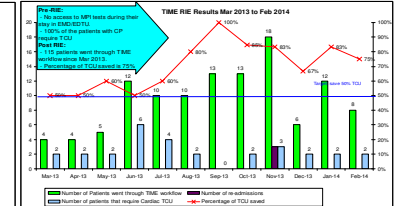


Figure 7: Overall RIE Result Mar 2013 to Feb 2014



## SUSTAINING THE GAINS & LESSONS LEARNT

### Sustainability

- The team conducted regular review meetings for 12 months to follow-up on the progress, challenges, and review results.
- All key stakeholders were engaged during the meeting to provide feedback on a regular basis.
- Concerns and challenges faced were addressed promptly.

### Key Success Factors

- Team leaders' constant updates to their respective Head of Department in A & E and Cardiac Department provided good support and assurance to the team's progress.
- The team was very clear that the solutions were patient centric and they all worked cohesively towards a common goal.
- Effective use of continuous improvement methodology.