Optimise MRI Utilisation Across the SingHealth Cluster

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Background

The Radiological Sciences Academic Clinical Programme (RADSC ACP) Clinical Task Force was formed to optimise radiological sciences services across all the hospitals within the SingHealth Cluster and to rationalise the MRI machines utilisation.

MRI machines are an expensive investment, which are being extensively used in patient care for initial diagnosis, monitoring of response and subsequent follow-up assessments. With the changing population demographics, disease patterns and advances in treatment options, the demand for healthcare services is expected to grow for subsequent years. At the same time, with the emphasis on Academic Medicine, MRI also serves as a useful tool for Research.

Thus, we reviewed the intra-institution capacity and current utilisation to understand the ground complexities and develop a strategy to optimise MRI utilisation. This is to support the patient care, research and educational objectives of the Academic Medical Cluster mission. Based on the preliminary background gathered, all institutions had different methodologies for calculating MRI utilisation.

Mission Statement

There were four objectives established:

- To define and align the measurement method for MRI utilisation rate.
- To formulate a standardised measure for MRI utilisation rate across the cluster, taking into account specific considerations for different clinical subspecialties and contexts of different institutions.
- To develop a standardised approach to track and report utilisation rates across SingHealth taking into account the clinical and academic missions of the ACP.
- To optimise MRI utilisation across the cluster.

Methodology

The workgroup aligned the MRI utilisation metric across SingHealth to achieve a common "ruler" for comparable analysis of utilisation rates through the following steps:

1. Reviewed the methodologies used in various local and overseas healthcare institutions, including private enterprises.
2. Developed a MRI utilisation time-capture tool.
3. Conducted a workshop to address the challenges faced by the different institutions.
4. Adopted a prioritisation matrix to identify pilot initiatives.
5. Piloted Institutions' initiatives that addressed the challenges they faced.
6. Shared best practices by various institutions.
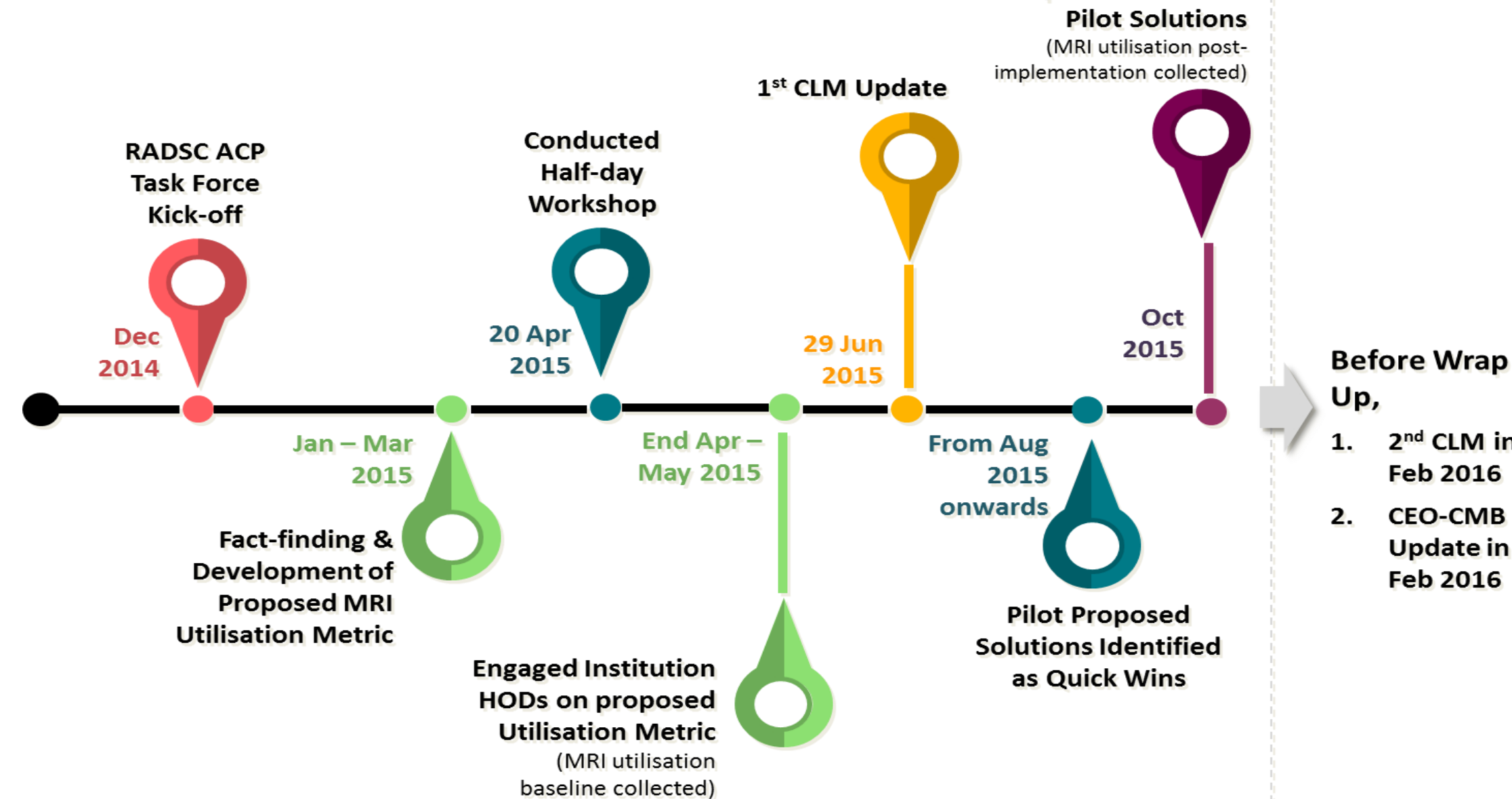
The key measurement used was the MRI utilisation rate; by applying a standardised operating hours of 08:30-17:00 from Monday to Friday, excluding overtime cases.

We also had the following other measurements for the specific initiatives implemented:

- Percentage of late-comers for inpatients and outpatients
- Percentage of outpatients rescheduled or delayed

Intervention

The table below summarises the initiatives piloted by different institutions:

*Implemented prior to formation of RADSC ACP Task Force

| Pilot Initiatives (with corresponding Objective):	SGH	KKH	NNI	KKH
A. Collaboration talks between Radiographers and Ward Nurses to acknowledge and understand expectations OBJECTIVE: Align expectations between MRI team and Ward Nurses to ensure proper preparation done at Inpatient Wards	✔	✔		
B. Established advanced roles for Radiographers & provide recognition OBJECTIVE: Recruitment & Retention of Radiographers & Radiologists	* ✔			
C. Stratification of hand-injected contrast cases* to identify target group for radiographers **to administer** hand-injected intravenous contrast, **with proper training & certification** for competency. OBJECTIVE: "Right-site" activities for Best Practice by enabling radiographers to administer intravenous contrast			✔	
D. Establish Booking Guide for Outpatients using retrospective data **for protocoled booking by clerks** OBJECTIVE: Achieve effective scheduling to correct time, correct machine with available manpower	* ✔	* ✔	✔	
E. Improve outpatient preparation letter which includes date, time, prep requirements and navigating guide OBJECTIVE: Ensure patients are adequately prepared when they arrive for MRI appointment	* ✔		✔	✔
F. Improve porters' checklist to help ward staff better prepare patients OBJECTIVE: Align expectations between MRI team & Ward Nurses to ensure inpatients are prepped properly at Wards	* ✔		✔	
G. Implementing SMS reminders which includes link to patient preparation info on NHCS website OBJECTIVE: Ensure minimal no-shows & late-comers for outpatients	* ✔	* ✔	✔	

Results

1. Standardised measurement for MRI utilisation rate

$$\text{MRI Utilisation Rate}$$
$$= \frac{\text{Sum of all machines (Average Procedure Time} * \text{Total no. of MRI Examinations by Procedure Code)}}{\text{Total Operating Hours for all machines}}$$
$$+ \frac{\text{Sum of all machines (Total Procedure Time for Research, Education \& Failed Scans)}}{\text{Total Operating Hours for all machines}}$$

Key Components in Integrated Metric:

- Includes clinical service, research scans, educational load and abortive scans
- Clinical service load is measured based on average procedure time of each procedure code
- Average Procedure Time includes pre-, post-procedure and actual scan durations
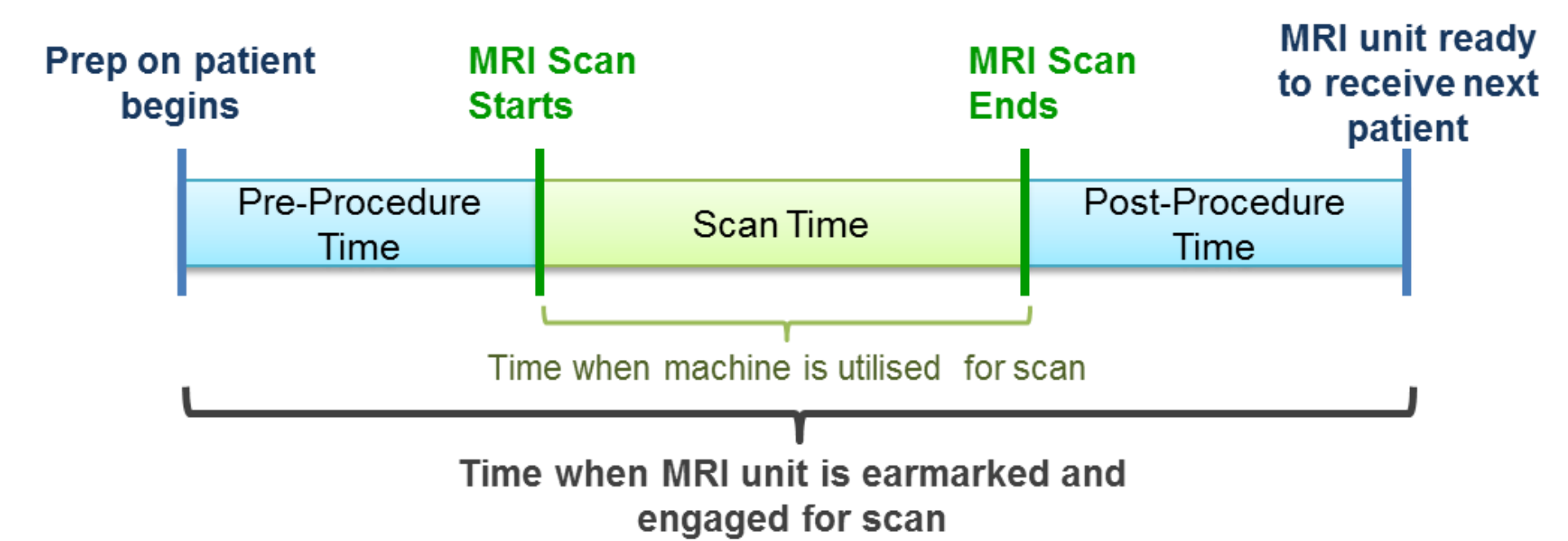
- Overtime load refers to procedures beginning outside of the operating hours used to calculate utilisation. For example, a MRI scan is considered overtime load when Start Time of Pre-Procedure falls outside of the operating hours .
- Operating hours refers to either Institutions' actual operating hours or the standardised operating hours (8:30am – 5pm, Monday to Friday).

2. Time Capture Tool to capture data for each case

Data auto-populates into dashboard to provide summary of MRI utilisation
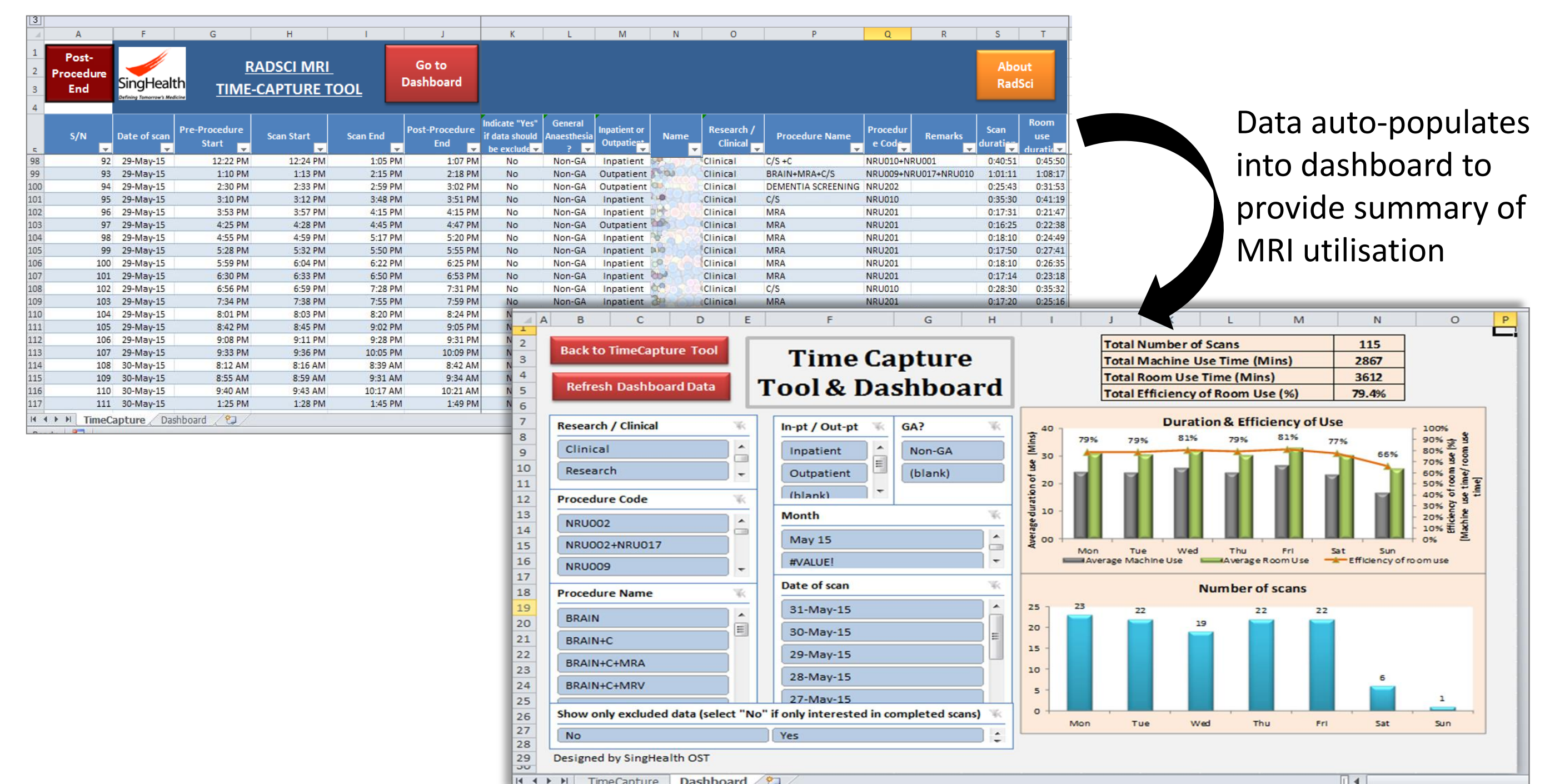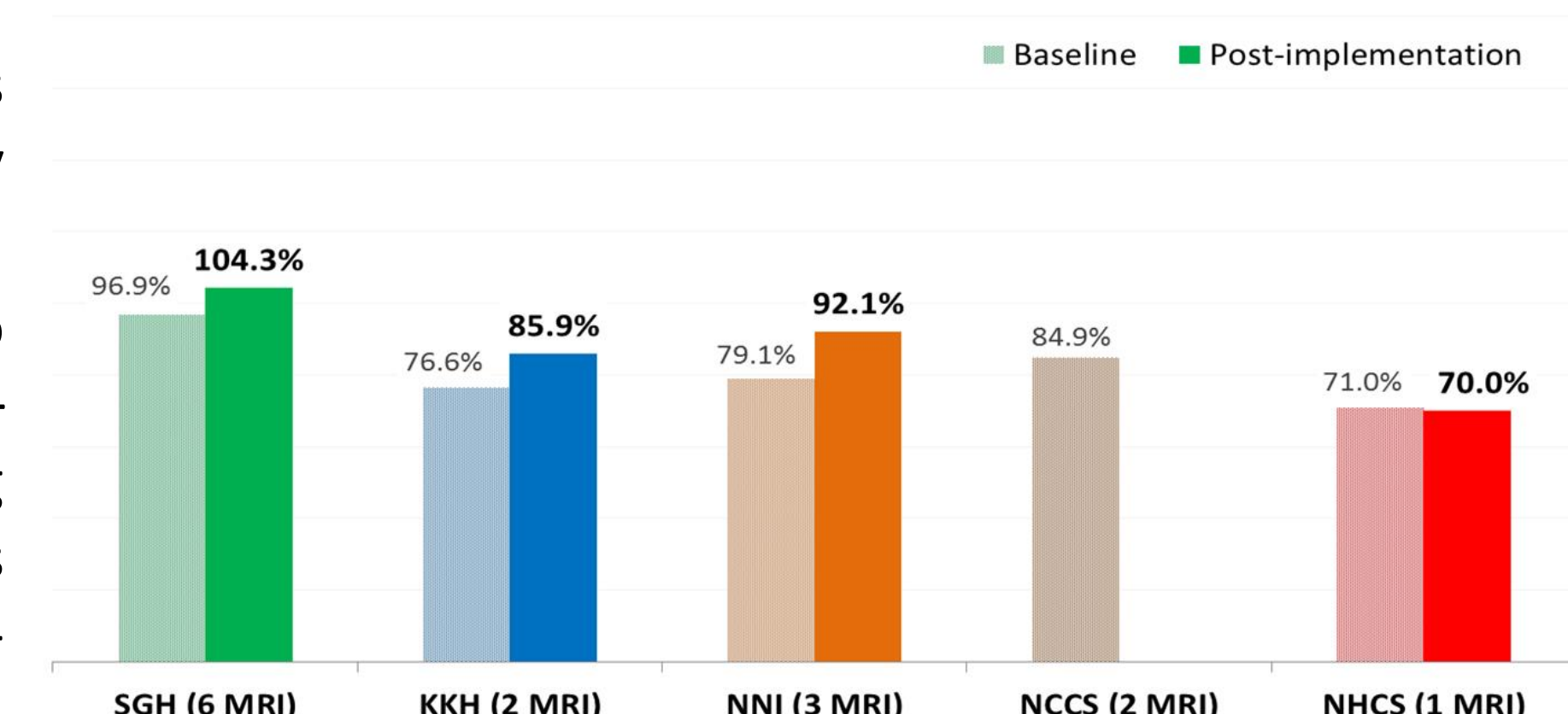
3. Pilot Initiatives by various Institutions

There were collaborative discussions between radiographers and ward nurses at SGH and KKH to acknowledge and better understand expectations. Effectiveness of this intervention was assessed in KKH and resulted in a decrease in late-comers from 64.7% to 10.2% and 26.1% to 4.2% for inpatients and outpatients, respectively.

Standardised protocol-driven booking of outpatient scans by clerks and the improvement of patient preparation material led to a decrease in re-scheduling and delays. The improvement of ward staff checklist for patient preparation reduced the occurrence of delays from 22 to 15 in a month at NNI.

The final initiative was the implementation of SMS reminders with hyperlinks to patient preparation information on the NHCS website to reduce no-shows and outpatient late-comer numbers.

Following the pilot initiatives,

- SGH, KKH and NNI utilisation rates increased in Oct 2015 as compared to baseline in May 2015
- Standardising operating hours to the "golden" period (8:30am – 5pm, Mon-Fri) and excluding overtime load allows comparable analysis cluster-wide

	SGH (6 MRI)	KKH (2 MRI)	NNI (3 MRI)	NCCS (2 MRI)	NHCS (1 MRI)
Baseline	96.9%	76.6%	79.1%	84.9%	71.0%
Post-implementation	104.3%	85.9%	92.1%		70.0%

Conclusion

The workgroup has established a uniform MRI utilisation metric across SingHealth and piloted several initiatives, which resulted in an increase in the MRI utilisation rates. Best practices were also shared across the RADSC ACP platform.