Project Title

Magnetic Resonance Imaging Preliminary Image Evaluation (MagPIE)

Project Lead and Members

Project lead: Dr Chuah Joo Hong

Project members: Ong Kian Boon, Michelle Aye Myat Myat Htun, Anton Lin Weixiang, Clara Chooi Chi Yuen, Nia Nasyitah Binte Zulkifli, Yap Tiang Siew, Melissa Liang Meishi

Organisation(s) Involved

Ng Teng Fong General Hospital

Healthcare Family Group Involved in this Project

Medical, Allied Health

Applicable Specialty or Discipline

Diagnostic Radiography, Radiology

Project Period

Start date: Jan 2021

Completed date: Dec 2021

Aims

To reduce the time that the clinician was informed of new acute strokes on Saturday extended working hours (8:00 am to 12:00 pm) from 46.3 hours to 2 hours by 1 st December 2021.

Background

See poster attached

Methods

See poster attached

Results

See poster attached

Lessons Learnt

See poster attached

Conclusion

See poster attached

Project Category

Care & Process Redesign

Quality Improvement, Lean Methodology, Workflow Redesign

Training & Education, Learning Culture

Keywords

MRI Preliminary Image Evaluation, Acute Stroke Identification

Name and Email of Project Contact Person(s)

Name: Ong Kian Boon

Email: kian_boon_ong@nuhs.edu.sg

MAGNETIC RESONANCE IMAGING PRELIMINARY IMAGE EVALUATION (MagPIE)

✓ SAFETY
✓ QUALITY
✓ PATIENT EXPERIENCE
✓ PRODUCTIVITY
❑ COST

MEMBERS:
DR BERNARD WEE BOON KEE, HOD (SPONSOR)
DR KEI PIN LIN, MRI DOS (PROCESS OWNER)
DR CHUAH JOO HONG, CONSULTANT
ONG KIAN BOON, SNR RADIOGRAPHER
MICHELLE AYE MYAT MYAT HTUN, SNR RADIOGRAPHER
ANTON LIN WEIXIANG, SNR RADIOGRAPHER
CLARA CHOOI CHI YUEN, SNR RADIOGRAPHER
NIA NASYITAH BINTE ZULKIFLI, SNR RADIOGRAPHER
YAP TIANG SIEW, SNR RADIOGRAPHER
MELISSA LIANG MEISHI, PRN RADIOGRAPHER (FACILITATOR)

Define Problem, Set Aim

Problem/Opportunity for Improvement

The median report turnaround time for inpatient MRI Stroke Screens on Saturday extended working hours with new acute strokes was 46.3 hours from Jan to Apr 2021. This is above the hospital's target of 2 hours for reports with R1 acuity.

Reducing the MRI Brain and MRI/MRA Stroke Screen report turnaround time for patients with new acute strokes leads to improvement in treatment time and thus patient outcome.

Aim

To reduce the time that the clinician was informed of new acute strokes on Saturday extended working hours (8:00 am to 12:00 pm) from **46.3** hours to **2** hours by 1st December 2021.

Establish Measures

Outcome Measure:

Time from end exam to the time that the clinician was informed of the acute stroke results for MRI Brain and MRI/MRA Stroke Screens.

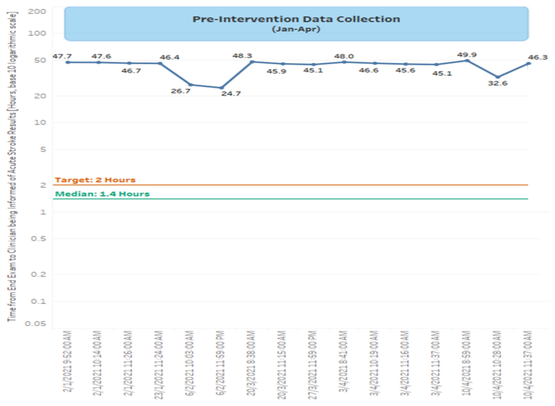
Process Measure:

Radiographers' competency in preliminary image evaluation of acute strokes after in-house post training by a radiologist.

Balancing Measure:

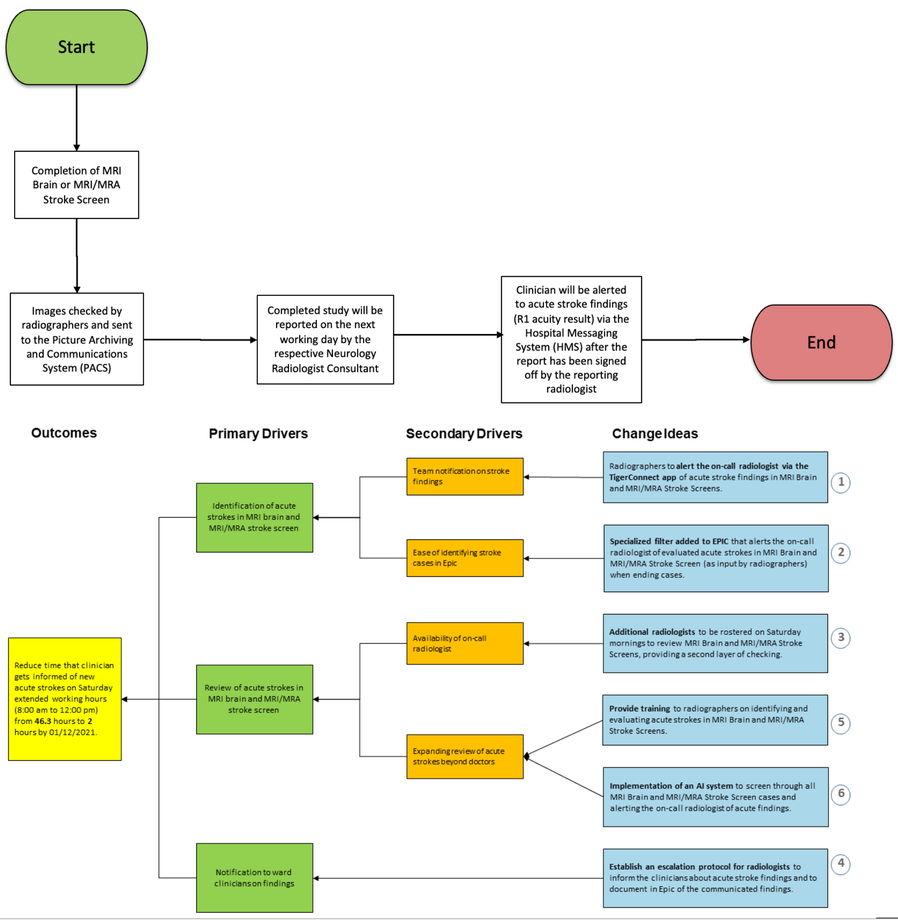
The number of false positive evaluation of acute strokes as identified by radiographers.

Radiologist satisfaction and radiographers' feedback on training of preliminary image evaluation.

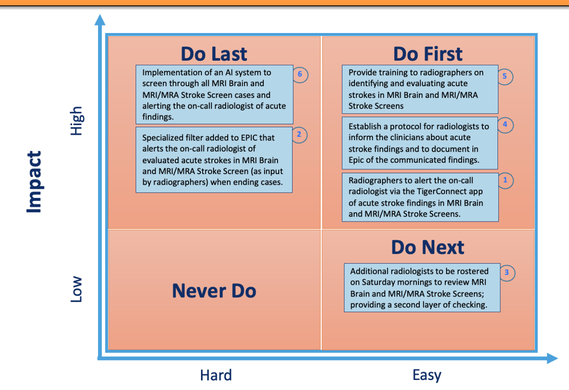


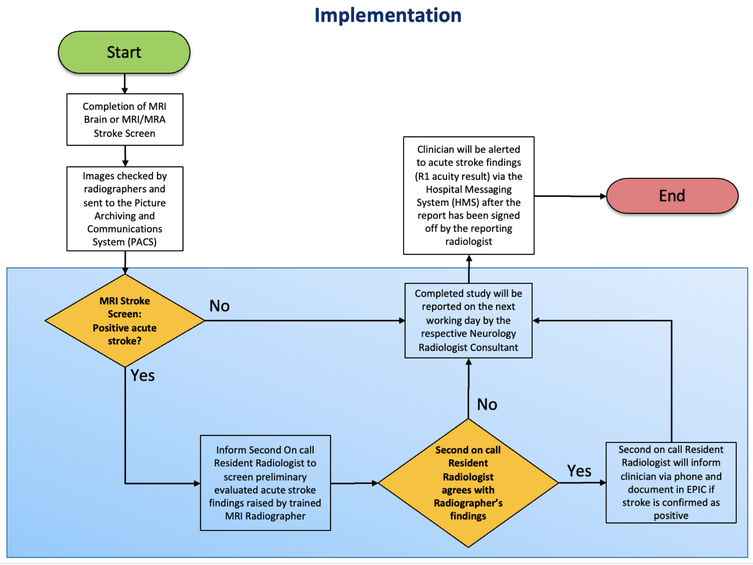
Analyse Problem

Pre-Implementation



Select Changes

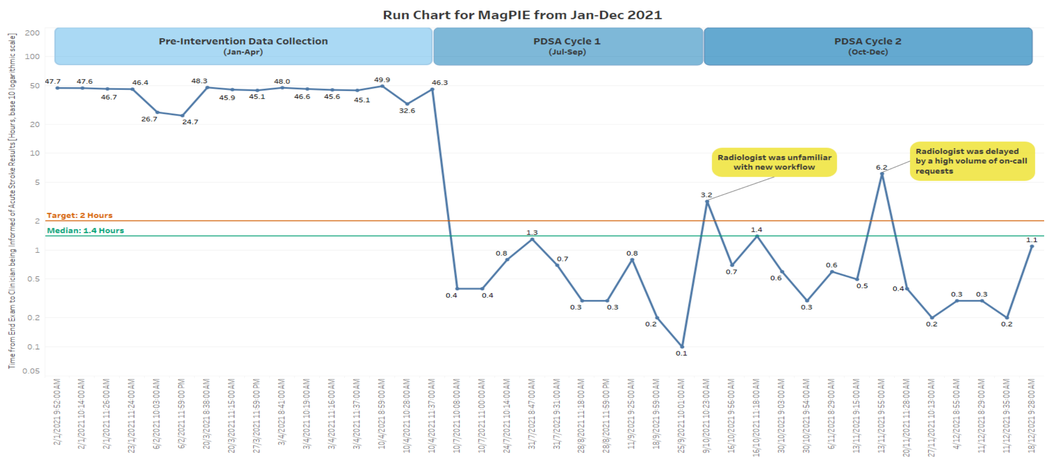




Test & Implement Changes

Cycle	Plan: "What will happen if we try something different?"	Do: "Let's try it."	Study: "What happened"	Act: "What's next?"
1	Training radiographers to identify acute strokes in MRI Brain and MRI/MRA Stroke Screens. This is to enable radiographers to alert radiologists of acute stroke evaluations during their Saturday duty, thereby reducing the reporting turnaround time. Doing so enables acute stroke patients to be treated earlier and quicker.	Training was conducted by Dr Chuah Joo Hong from May 2021 to June 2021 to all radiographers. No data collection was performed during these two months. The first PDSA cycle started from July to September 2021. Besides collecting data on the reduced reporting turnaround time, records were also made for acute stroke evaluated by radiographers done during the Saturday duty. This list will be checked by Dr Chuah Joo Hong to verify the accuracy of radiographers' evaluation. This is to monitor the radiographers' competency (process measure) in acute stroke evaluations in MRI Brain and MRI/MRA Stroke Screens after training.	Data collected from the Epic Chronology End Exam report was studied. Although the reporting turnaround time was reduced successfully and met the project's objective of 2 hours, there was one inaccurate interpretation by the radiographers. The data showed that further measures were needed to reduce the occurrence of false positives in evaluating acute strokes.	The first PDSA measures will be **adapted** to decrease the rate of error in the second cycle. A second on-call radiologist will be included to screen through acute stroke evaluations by radiographers, who will then vet the images to ensure it is a true positive stroke case. If so, this case will then be forwarded to the primary on-call radiologist. This will reduce the rate of inaccuracies by the radiographers.
2	Verification by a second on-call radiologist on the preliminary evaluated acute stroke findings by trained radiographers, as mentioned in the first cycle. Radiographers to continue evaluating MRI Brain and MRI/MRA Stroke Screens and gain the experience to evaluate acute stroke findings quickly and with more confidence. This may mean there is the possibility that the reporting turnaround time can be reduced further. Data collection will be similarly done as per first PDSA cycle.	Inclusion of a second on-call radiologist to screen. The second PDSA cycle starts from October to December 2021. There were no unexpected events during the second PDSA cycle. The second on-call residents concurred with the evaluations of the trained radiographers.	The reporting turnaround time continued to meet or stay below the project's objective of 2 hours. There were only 2 outliers due to staffing shortages. The data showed that the trained radiographers gained experience in evaluating all acute strokes and the second on-call resident Data also showed that there were no further false positives for acute strokes.	The results of the second PDSA cycle shows that this is effective and can be **adopted** for spreading to the relevant Radiological departments, if so desired.

Run Chart for MagPIE from Jan-Dec 2021



Spread Changes, Learning Points

Solution	Spread Details	Spread Timeline	Who
What is the solution?	How is the team going to spread it?	What is the start and end time?	Who is responsible for the spreading of changes?
Extend the MagPIE: Stroke Screen training methodology by radiologists to incoming MRI trainee radiographers.	All future MRI trainee radiographers will receive the same training package after a pre-determined period of working experience.	When the MRI section receives a new trainee, dependent on Radiology department's manpower arrangements.	Radiologists and MRI-in-charges.
Apply the results of MagPIE: Stroke Screen to all inpatient MRI Brain and MRI/MRA Stroke Screen examinations.	All trained MRI radiographers will independently inform the on-duty or on-call radiologist of any acute stroke findings, if detected during the scanning process.	It can be started once all radiologists are informed that MRI radiographers will inform them of any acute stroke findings for MRI Brain and MRI/MRA Stroke Screen examinations.	Director of service for MRI and MRI-in-charges.
Extend coverage of MagPIE: MagPIE training by radiologists to MRI radiographers to be able to identify other R1 cases.	Training will be given by radiologists to identify other pre-determined R1 cases, for example, cauda equina and necrotizing fasciitis, after a competency period has been met.	Training can be started once a radiographer passes a pre-determined competency period i.e. has proven to have good accuracy in identifying acute strokes.	Radiologists and MRI-in-charges.
Success of MagPIE in NTFGH: Application of MagPIE to other institutions.	MagPIE case study can be presented to various conferences and/or serve as a professional development course to other institutions, enabling MagPIE to be implemented in other institutions as well.	Presentation of MagPIE can be started once a presentation opportunity arises in a Radiology conference, after completion of project.	Director of services for MRI and institution stakeholders

Strengths

- MagPIE offers not only career development opportunity for radiographers, but also help radiologists during manpower shortages.

Limitations/Areas of Improvement

- Risk of false positive still remains (To explore periodic assessment of radiographers' competency; non-blinded)
- Time and manpower is needed to train radiographers (a comprehensive training package is required to build radiographers' competency over time)

Conclusion

- The success in significantly reducing report turnaround time coupled with benefits to radiographers and radiologists show the undeniable advantage of adopting MagPIE.

Ng Teng Fong General Hospital

Jurong Community Hospital