

Cardiac MRI waiting list backlog reduction with rapid scanning and AI-enabled reporting

Jessica Artico^{1,2}, Reem Laymouna^{1,2}, Paige Fox^{1,2}, Hibba Kurdi^{1,2}, Aderonke Abiodun^{1,2}, Hunain Shiwani^{1,2}, Iain Pierce^{1,2}, Hui Xue³, Peter Kellman³, Roshan Weerackoney^{1,2}, Mark Westwood^{1,2}, Thomas A Treibel^{1,2}, Charlotte Manisty^{1,2}, James C. Moon^{1,2}, Rhodri Davies^{1,2,4}

1. University College London; 2. Barts Heart Centre, London; 3. National Institutes of Health, Bethesda; 4. University Hospital of Wales, Cardiff

Background

NHS target: 30% increase in elective activity to ease waiting lists

Innovative digital solutions needed to achieve this

Cardiac MRI is a key investigation in cardiovascular medicine, but it is time-consuming:

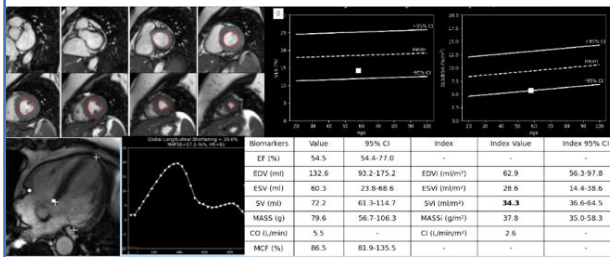
- 1 hour slot to scan each patient
- + 20 minutes to analyse images and produce a report

Objectives

Use rapid scanning protocols, combined with AI to:

- Increase throughput of cardiac MRI
- reducing waiting lists
- improve cost-effectiveness

Inline AI analysis



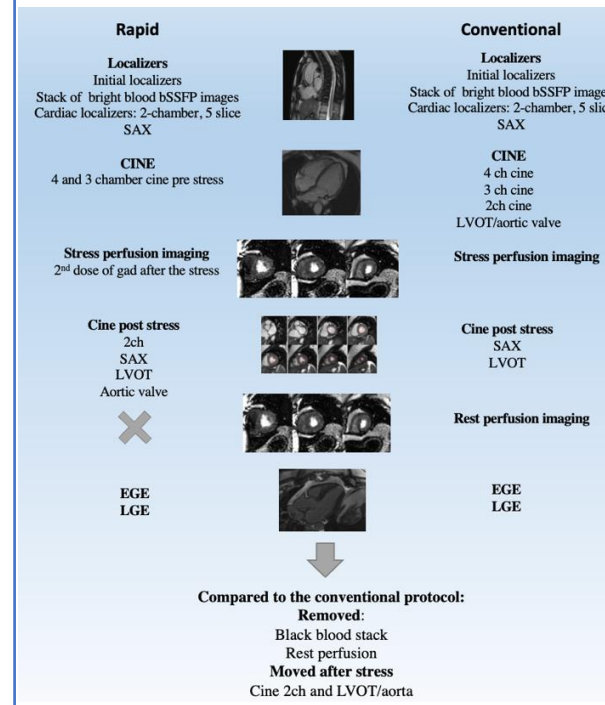
Methods

Recruited 215 patients, allocated to:

- n=85 for standard protocol
- n=130 for rapid protocol with AI

Use fully automated and clinically validated AI tools for functional analysis and perfusion mapping ^{2,3}

Rapid and conventional protocols



Results

	Standard Protocol	Rapid Protocol with AI	
Scanning Time (minutes)	36 [24-52]	23 [14-31]	P<0.001
Reporting Time (minutes)	21 [5-40]	10 [3-23]	P<0.001
Image quality (n="good")	125/132 (95%)	80/85 (94%)	P=NS

Clinical Impact

Rapid approach saved

- 13 minutes scanning
- 10 minutes reporting time.

Following the trial, rapid CMR became routine for 1 in 4 patients.

Booking slots reduced to 50 minutes (from 1 hour)

Daily activity increase of +3 patients a day.

Next Challenge

This work was done at a large, established CMR centre

The next challenge will be to implement at smaller centres

References

1. NHS Delivery Plan for tackling the COVID-19 backlog of elective care. Feb 2022.
2. Xue, et al. JAHA. 2022 Feb 15;11(4):e023849
3. Davies, et al. JCMR. 2022 Mar 10;24(1):16