Stress Cardiac Magnetic Resonance (CMR)

Implementation of Rapid CMR Protocol in the COVID-19 era: improving scanning efficiency and increasing scanning capacity

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Funding Acknowledgements: Type of funding sources: None.

Background: During the COVID-19 pandemic, many non-urgent elective cardiac MRI (CMR) appointments were cancelled to minimise the risk of infection to patients coming to hospital. At the time of the first lockdown, our scanning schedule allowed on average 228 scans/month. Non-urgent elective studies were cancelled from April-June 2020, resulting in 684 scans added to the waiting list.

Upon reactivation of our clinical CMR service, we developed a service quality improvement initiative consisting of using a 'Rapid CMR' protocol to reduce scanning time without compromising the test's diagnostic accuracy, increase our scanning capacity and improve efficiency in reducing the backlog of requests.

Purpose: To demonstrate the increased scanning capacity generated by the adoption of the "Rapid CMR" protocol.

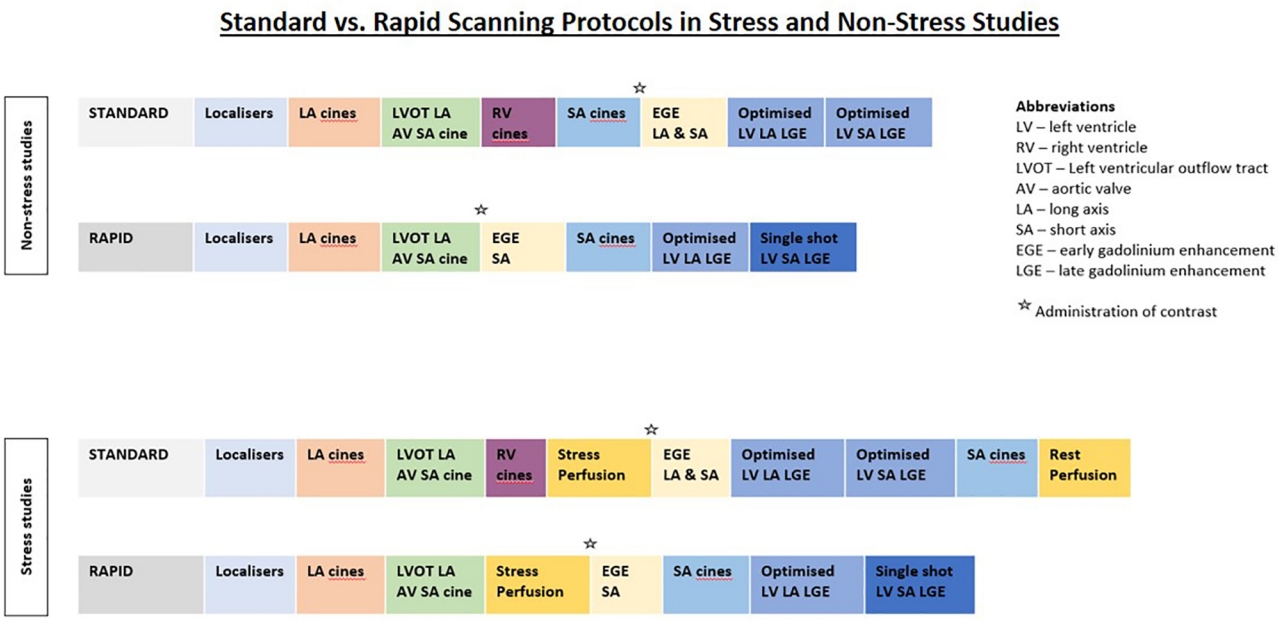
Methods: The Rapid CMR protocol was implemented in November 2020 to all scans requiring cines, late gadolinium enhancement ± adenosine stress (non-stress and stress studies). The protocol was modelled on prior published experiences[1,2]. Patients who underwent these scans with additional imaging (e.g. T2-STIR imaging) were excluded. Data was collected from Nov 2020 to Jan 2021 and compared with the same time period the previous year when the standard protocol was used (cf. Image 1). Data collected included scan duration (time from first to last image), whether the Rapid CMR studies maintained diagnostic quality (yes/no), and the did-not-attend (DNA) rate.

Results: With the Rapid CMR protocol 254 patients were scanned (114 non-stress, 140 stress), compared with 286 patients scanned with standard protocol in November 2019 to January 2020 (155 non-stress, 131 stress).

Median scanning time in minutes for non-stress was 29 (IQR 25-34; Rapid) vs 37 (IQR 33-41; standard); ($p < 0.001$). For stress studies the median scanning time in minutes was 32 (IQR 28-36; Rapid) vs 41 (IQR 29-45; standard; ($p < 0.001$). The rate of suboptimal imaging due to patient factors (such as breathing or arrhythmia) was similar for each protocol (14.4% Rapid, 20.2% standard; $p = 0.04$). All Rapid studies were of diagnostic quality (Table 1). Saving c.8 minutes per scan led to an improved scanning time and schedule capacity of 21%. Fewer patients were scanned with the Rapid protocol due to pandemic related issues: patient reluctance to accept appointments (unfilled slots), cleaning measures between patients (on average ~5 mins per slot reducing overall capacity), and a higher DNA rate: 15.3% (Rapid) vs 6.5% (standard); $p < 0.001$.

Conclusion: The Rapid CMR protocol resulted in a statistically significant reduction in scanning time (-8 min for both stress and non-stress CMRs) increasing our schedule capacity and improving efficiency by 21%, whilst maintaining diagnostic quality. The implementation of the Rapid CMR protocol is a feasible and effective strategy to tackle the backlog of CMR clinical request accumulated during the pandemic.

Abstract Figure. Image 1. Scanning Protocols



Abstract Table 1. Rapid CMR study

Table 1. Scanning time for patients with the Rapid and standard CMR protocol

	Nov 2020 to Jan 2021 (Rapid Protocol)		***Nov 2019 to Jan 2020 (Standard Protocol)***	
Number of appointments	660		694	
Schedule capacity	68 scans per week (272 per month)		57 scans per week (228 per month)	
DNA	101 (15.3%)		45 (6.5%)	
Non-stress & Stress studies	388 (134 excluded)		347 (61 excluded)	
Diagnostic Studies	All		All	
Suboptimal Studies (due to patient factors)	56 (14.4%)		70 (20.2%)	
	Non-stress		**Stress**	
	Rapid	***Standard***	***Rapid***	***Standard***
n	114	155	140	131
Scanning time (minutes)				
Median (IQR)	29 (25-34)	37 (33-41)	32 (28-36)	41 (29-45)
Time difference, min	8 (p<0.001)		9 (p<0.001)	