

CMR Commissioning in England BSCMR/BSCI Suggested new CMR codes and tariffs.

BSCMR/BSCI, September 2009

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1. CMR current position

For CMR related income to be collected in the NHS currently, there must be either provider to provider tariffs in place or prior arrangements with PCTs. CMR has a single OPCS code, U10.3, but this does not map to any tariff. There is in addition, 12 codes under SNOMED CT, but they are not currently implemented and there is no map to tariffs.

From 04/2009, in Payment by Results, imaging is being unbundled in HRG version 4 with emerging tariffs given. By default, CMR (U10.3) was to map to MRI 1 area (RAO1 or RAO2 with contrast). The reimbursement associated with this (£170 or £230) was not adequate for the costs of CMR. As an interim solution, there was a proposal to map U10.3 to RAO7 (MRI 3 areas plus extensive repositioning, £347). This was considered somewhat arbitrary and simplistic and is not currently being implemented. The reasons for the complexity of CMR are outlined in appendix 1, previous evidence submitted to the PbR team.

Note: Here and elsewhere, all costs need multiplying by local market forces factors (MMF) which range from 1.0 to 1.42 in England, and by a further factor (1.24?) if CMR becomes part of specialist services.

In collaboration, it has been proposed that BSCMR in partnership with BSCI develop a system of new codes and tariffs for CMR that reflect the complexity, cost and range of CMR. This process is taken forward in collaboration with the following:

Dr David Hackett (cardiology advisory group to the national advisory group)
UK Cardiac Imaging Council, British Cardiovascular Society
Nathan Abbot (Development Branch Payment by Results)
NHS Information Centre
NHS Connecting for Health
Julie Speller, Tariff Scope and Structure Development Manager of the Development Branch

The new suggested codes and tariffs

Code	Descriptor	Relative value	Cost (averaging £527 nationally)
CMR1	CMR: morphology/function no contrast	2.35	£444
CMR2	CMR1 + flow/velocity	2.6	£491
CMR3	CMR1 + stress imaging	2.95	£558
CMR4	CMR1 + flow/velocity + stress	3	£567
CMR1C	CMR morphology/function + contrast	2.6	£491
CMR2C	CMR1C + flow/velocity	2.86	£541
CMR3C	CMR1C + stress imaging	3	£567
CMR4C	CMR1C + flow/velocity + stress	3.35	£633
CMR5C	Complex congenital	3.35	£633
CMR6C	Interventional CMR	3.35	£633

*all costs require multiplying by MMF.

2. Developing new codes and tariffs:

CMR imaging is different from MR imaging of any other part of the body. The reasons for this relate to complexity of scanning, staff skills, magnet time, post-processing, equipment etc., and are summarised in Appendix 1.

To develop CMR codes and tariffs, the following issues needed to be considered:

1. There is a range of different CMR scans protocols applied to different patient groups. Coding should reflect this.
2. Costing imaging is complex and could be done in a number of ways:
 - a. From the ground up – including every item (consumables, magnet time, analysis time, staff time, capital repayment, PACS costs etc)
 - b. By benchmarking existing contractual arrangements in the UK
 - c. By generating relative imaging costs compared to an established imaging cost (e.g. compare complexity of new imaging procedure to brain MRI)
 - d. By benchmarking with a different healthcare system

To derive a fair value for CMR, we used a 4 step approach:

Step 1. Benchmark average CMR scan to HRG4.

Brain MRI or brain MRI + C are equally good comparators with CMR as there are procedural similarities, quantifiable differences and a known cost. So we analysed both, table 1 and table 2.

Both approaches generated the same value. Based on this, the average CMR scan is:

- 2.65 times more resource consuming brain MRI, equating to £526
- 2.25 times more resource consuming than brain MRI + C, equating to £528

Averaging these, we estimate CMR cost £527 on average.

Table 1: Brain MRI (RAO1) compared to CMR

	Brain MRI (RAO1 - £173)	CMR (average scan)	%cost increase
Magnet	State-of-the-art scanner, lifetime 7 years	State-of-the-art scanner, lifetime 5 years	+£200K capital or +15% per scan
Additional equipment	standard	ECG gating, dedicated coils (ideally), advanced cardiac sequences, Advanced post processing Power injector Perfusion pump	+£200K capital or +10% per scan
Throughput	24 patient (8 hours, 20minutes per scan)	10 patients (9am-5pm, average casemix)	+140%
Non-consultant Staffing	Radiographer + 1 junior (AFC 6 + HCA)	Radiographer (agenda for change 7) plus 1 doctor in training	+10%
Consultant staffing	Not present	Present in the control room in ~25% of scans	+20%
reporting	Minimal post processing, rapid	Extensive post processing, complex analysis, can be time consuming	+10%
Summary			+205%, 3.05 more complex = £527.65

Table 2: Brain MRI +C (RAO2) compared to CMR

	Brain MRI+C (RAO2 - £234)	Cardiac MRI (average scan)	%cost increase
Magnet	State-of-the-art scanner, lifetime 7 years	State-of-the-art scanner, lifetime 5 years	+£200K capital or +15% per scan
Additional equipment	standard	ECG gating, dedicated coils (ideally), advanced cardiac sequences, Advanced post processing Power injector Perfusion pump	+£200K capital or +10% per scan
Throughput	16 patient (8 hours, 30minutes per scan)	10 patients (9am-5pm, average casemix)	+60%
Non-consultant Staffing	Radiographer + 1 junior (agenda for change 6 + HCA)	Radiographer (agenda for change 7) plus 1 doctor in training	+10%
Consultant staffing	Not present	Present in the control room in ~25% of scans	+20%
reporting	Minimal post processing, rapid	Extensive post processing, complex analysis, can be time consuming	+10%
Summary		Brain MRI + C	+125%, 2.25 x more complex, £526

Step 2: Assign relative values to different CMR scans

To reflect complexity of CMR, rather than have one tariff, we ‘increased granularity’. We used the USA CMR coding, (CPT codes – current procedural terminology) each assigned a relative value compared to a baseline procedure. This has been the product of extensive, exhaustive study and analysis and it is unlikely that we could improve on the accuracy of the relative values assigned. It generates the following codes and relative values:

Table 3: relative values

Code	Descriptor	Relative value
CMR1	Cardiac magnetic resonance imaging for morphology and function <i>without contrast</i> material;	2.35
CMR2	CMR1 + flow/velocity quantification	2.6
CMR3	CMR1 + stress imaging	2.95
CMR4	with flow/velocity quantification and stress	3
CMR1C	CMR for morphology and function without contrast material(s) followed by contrast material(s) and further sequences	2.6
CMR2C	CMR1C + flow/velocity quantification	2.86
CMR3C	CMR1C + stress imaging	3
CMR4C	CMR1C + flow/velocity quantification and stress	3.35

Step 3: Add 2 additional codes for newer, complex techniques.

Two additional codes are proposed for the latest, most complex techniques. These do not have relative values in the US system, so have been put at the top end of the scale.

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CMR1C	CMR for morphology and function without contrast material(s) followed by contrast material(s) and further sequences	2.6
CMR2C	CMR1C + flow/velocity quantification	2.86
CMR3C	CMR1C + stress imaging	3
CMR4C	CMR1C + flow/velocity quantification and stress	3.35
CMR5C	Complex congenital	3.35
CMR6C	Interventional CMR	3.35

Step 4: Estimate national scan frequencies

Under the above codes, BSCMR estimate the following activity likely nationally:

Code	Descriptor	Relative value	Estimated national frequency
CMR1	CMR: morphology/function no contrast	2.35	10%
CMR2	CMR1 + flow/velocity	2.6	5%
CMR3	CMR1 + stress imaging	2.95	5%
CMR4	CMR1 + flow/velocity + stress	3	5%
CMR1C	CMR morphology/function + contrast	2.6	40%
CMR2C	CMR1C + flow/velocity	2.86	10%
CMR3C	CMR1C + stress imaging	3	10%
CMR4C	CMR1C + flow/velocity + stress	3.35	2%
CMR5C	Complex congenital	3.35	11%
CMR6C	Interventional CMR	3.35	2%

The above estimates means the average relative value of UK CMR practice would be 2.79. To make an average CMR value of £527, the comparator cost is £189, (between brain MRI and brain MRI + C). This leads to the following reimbursements:

Code	Descriptor	Relative value	Cost (averaging £527 nationally)
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*all costs require multiplying by MMF.

3. Benchmarking under HRG4

Local benchmarking:

Currently, a variety of PCT negotiated reimbursements exist nationally, in the order of £525 to £850. Some providers are not currently reimbursed for internal CMR – just provider to provider CMR. This creates distortion and either results in referrals to high tariff centres or inadequate local access for patients to CMR.

Benchmarking other imaging modalities:

Nuclear: Nuclear medicine codes have been undergoing considerable changes and it is not easy to benchmark against this technology.

4. Conclusion

CMR has recognised patient benefits and should be supported within the NHS. The current situation results in patchy provision at widely differing reimbursement levels. There is only one current code (U10.3) without a map to a tariff. Having consulted and benchmarked nationally and internationally, UK national expert groups working in collaboration conducted a 4 step analysis of CMR.

This generated:

- a) 10 CMR codes
- b) a relative tariff structure for these
- c) a proposed mean UK tariff for CMR of £527
- d) an assigned tariff for each CMR code.

We recommend these to the DH for your consideration.

5. Appendix 1

Reasons why Cardiovascular MR is different from conventional MR imaging

Compiled by the British Society of Cardiovascular Magnetic Resonance,
12th February, 2009

Cardiovascular MRI

Cardiovascular MR is the most complex form of MR currently clinically undertaken in the NHS. It is conducted in a few (20 or so) centres nationally, often on dedicated scanners where no general MR work is performed. Cardiovascular MR is a highly versatile technique. It can be used as to replace multiple other tests, as the gold standard investigation for a number of indications and is also typically the investigation of choice in the most complex clinical scenarios or where other test results conflict. All medical specialist societies (BCS, RCR, BSCMR, BSCI) are in agreement that is an essential clinical tool in cardiology and cardiothoracic surgery.

Below, we break down key features of cardiovascular MR that lead to the high clinical value for the selected patients in which it is used, and also mean that CMR requires special consideration for reimbursement

1. **Equipment.** Cardiovascular MR requires additional equipment over and above that used for routine general MR including
 - a. An top-end MR scanner not more than 3 years old (£200,000 above the price of a standard MR scanner)
 - b. ECG gating, dedicated coils (ideally), advanced cardiac sequences, (typical cost £100,000)
 - c. Advanced post processing and viewing software/hardware (typical additional cost £75,000)
 - d. Power injector, (£25,000) perfusion pump (£10,000)
 - e. Resuscitation equipment.
2. **Staff.** Cardiovascular MR is conducted by senior radiographer staff (typically Agenda for Change band 7 or higher staff). In almost all centres, a doctor is present in the control room. For complex congenital heart disease and stress (dobutamine, adenosine perfusion), accounting for ~25% of all scans nationally, the consultant will be in the room for the scan for the duration of the scan. For some scans (neonates under general anaesthesia or interventional cardiovascular MR), a whole team is required.
3. **Scan protocol.** All cardiovascular MR is conducted with reference to the cardiac orientation (double oblique), and extensive pilot scanning is necessary to arrive at those planes. Scanning is highly interactive with both the patients and the images required. Multiple sequences are used including:
 - a. Anatomy (white/black blood)
 - b. Function (long/short axis)
 - c. Velocity (throughplane/in-plane) and Flow
 - d. Perfusion
 - e. Angiography
 - f. Early enhancement
 - g. Late enhancement using T1 optimisation – much more complex than usual CMR because of the ECG gating.

Additional sequences and techniques including: Real-time CMR, 4D navigated whole heart, coronary arteries, myocardial tagging, oedema or fat imaging, coronary angiography.

4. Magnet Time.

Because of the above complexity, a typical cardiovascular MR protocol would involve 2 to 6 of the above scans and take between between 40 and 80 minutes, on average 60 minutes, which in the most complex scans is approximately 3-4 times longer than general MR.

5. **Post processing.** Virtually all cardiovascular MR scans require substantial post processing. Nearly all scans require cardiac volume and function analysis. This requires dedicated software purchase and, in skilled hands typically takes 15 minutes per scan. Additional processing time is required for selected cases including:
 - a. Great vessel MIPs
 - b. Flow quantification and Qp:Qs calculation
 - c. Multiplanar reformatting (coronary or other angiography)
 - d. T2 or T2* analysis for iron overload
 - e. Other, complex analysis (tagging, dyssynchrony, regional strain/thickening)

Report generation is therefore much more time-consuming than for standard MRI.

The BSCMR wants to invite members of the DOH tariff development teams to visit one or more of the CMR centres represented by BSCMR/BSCI to see CMR imaging performed in action. This will illustrate that the arguments made in this document represent the reality of CMR scanning.

Further information:

[NHS horizon scanning viability CMR](#)

[NHS horizon scanning perfusion CMR](#)

[Indications for CMR:](#)

[BSCMR](#)

[BSCI](#)

[SCMR](#)

[Wikipedia](#)

[British Cardiac Society report on advanced imaging](#)