

The Provision of Cardiac Imaging in the Community

A Position Statement from the Imaging Council of the British Cardiovascular Society

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In 2021 the British Society of Echocardiography (BSE) produced a position statement regarding the provision of transthoracic echocardiography in the community¹. Since then, there has been significant expansion in the estate available for the community delivery of all forms of diagnostic imaging, with an associated enthusiasm to provide cross-sectional cardiac imaging in this environment as well. As several of the themes highlighted in the 2021 BSE document are relevant to all forms for cardiac imaging, this statement is an update that seeks to encapsulate cardiac imaging provision in the community as a whole.

It is recognised that the closer to the patient it is possible to perform a diagnostic test then the more likely it is that the test will be successfully undertaken (e.g., mobile mammography units for breast cancer screening). However, this desire to minimise the friction present between the patient and access to the test must be balanced against the ability to deliver a high-quality and safe service, that is able to produce a report of maximal clinical utility. This is particularly relevant for cardiac imaging which requires additional training for those acquiring the images as well as for those interpreting them and requires specialised equipment. For echocardiography, a cardiac physiologist will typically both acquire and report the images whereas for cardiac computed tomography (CT) and magnetic resonance imaging (MRI) these images will typically be acquired by a radiographer and interpreted by a doctor specialised and accredited in cardiac CT or MRI. Nuclear Cardiology requires specialised equipment and specialised handling of potentially hazardous radioisotopes. This service is unlikely to be offered in the community in the foreseeable future and this statement will therefore focus on the 3 cardiac imaging specialties of echocardiography, cardiac CT and cardiac MRI.

It is evidently desirable that all patients can obtain rapid and efficient access to high quality cardiac imaging. However, in order to deliver this service in the community (i.e., at a site remote from the immediate support and backup of an in-patient hospital facility) certain aspects of the provision of a high-quality service become even more critical. At their core, the key dependencies required stem around ensuring excellent, free-flowing, communication between all healthcare staff ensuring that those working in the community do not work in isolation but are instead an integral component of the wider local cardiology infrastructure. These features of a high-performing service have also been endorsed by the recent NHS England Cardiology GIRFT Programme National Specialty Report², through its recommendation for the creation of regional Cardiology 'Managed Clinical Networks'.

¹ <https://www.bsecho.org/Public/News/Articles/2021/2021-12/202112-PSB004.aspx>

² https://gettingitrightfirsttime.co.uk/medical_specialties/cardiology/

The key safety net items to consider in a community cardiac imaging service are:

1. Clinical standards

BSE (echo), BSCI (cardiac CT) and BSCMR (cardiac MRI) have produced guidance to assist with the creation and ongoing running of a high-quality department³. It would be expected that any community service hoping to adhere to best practice would follow this guidance.

2. Adequate supporting Information Technology (IT) infrastructure

It is important that real-time image transfer is available from the community site to the networked local cardiovascular imaging service. This ensures that e.g., even when community echocardiographers are working in physical isolation, they always have access to a second 'pair of eyes' to allow for co-reporting of difficult cases and avoids the unnecessary duplication of scans as patients transfer between healthcare settings. It is recommended that the same IT solution is in operation across the networked local and ideally regional cardiology services with images stored as part of a continuous NHS record of care. However, if this is not possible then it is essential that an appropriate mechanism to allow for real-time encrypted transfer of images between sites should be in place.

3. Escalation pathways for predictable medical problems

Patient safety must remain the key priority. Despite triage of referrals, it is recognised that patients in whom a cardiac study is requested are a potentially high-risk group and so may arrive for their scan unwell or have an issue identified during the scan which requires prompt medical attention. Accordingly, no community service should operate without a set of clear standard operating procedures (SOP) in place that outline the plan to be followed should certain predictable medical issues be picked-up during an appointment. The range of SOPs recommended is not limited to the examples outlined below, but at a minimum must clearly describe how the following foreseeable medical problems are addressed:

- Patients found to be in an atrial arrhythmia with a rapid ventricular rate
- Possible type A aortic dissection or other suspected aortic pathology identified during the scan (e.g. intramural haematoma, penetrating aortic ulcer or large aneurysm (>5.5cm) with acute symptoms)
- Unknown symptomatic severe left ventricular systolic dysfunction
- Unknown symptomatic severe valvular dysfunction
- Unknown second or third-degree heart block
- Unknown cardiac tumour, mass, or thrombus
- Unknown significant pericardial effusion
- Possibility of active endocarditis

Where same day medical input is required, it is insufficient for the community service to simply create a report asking for the referring doctor to arrange this. Neither is a blanket statement such as 'call 999' adequate as this will almost certainly result in unnecessary and potentially avoidable

³ United Kingdom standards for non-invasive cardiac imaging: recommendations from the Imaging Council of the British Cardiovascular Society. Treibel TA, et al. Heart 2022;0:1–15. doi:10.1136/heartjnl-2022-320799

patient distress as they navigate between healthcare settings. Creation of these SOPs will require granular level input from the wider local cardiology network and other key stakeholders if necessary (e.g., local ambulance services). Lastly, it is important to emphasize that other than training in immediate life support, cardiac physiologists and radiographers are generally not qualified to deal with medically unwell patients. Accordingly, a lack of planning around how to address a set of predictable (if uncommon) medical scenarios could result in significant and unnecessary stress being placed upon the cardiac physiologist/radiographer.

4. Support for staff

It is essential that staff working in a community setting do not only work in this environment but instead rotate through the main local hospital site alongside time in other parts of the local cardiac service network. This movement of personnel ensures that best practice is spread, and high standards are maintained for all team members. In addition, it is expected that people working in a community setting are allowed sufficient time in their job-plan for quality assurance provision and to attend local departmental governance meetings related to their imaging modality. Support should also be available to assist staff with travel between sites. It is recommended that imaging lists are staffed by those of sufficient seniority with experience and in leading lists where there is a diverse range of cardiac pathology.

In setting up a new community cardiac imaging service, if it is anticipated that a greater number of scans are to be performed overall (rather than simply shifting the location where they are performed), then an increase in workforce must be in place before the service can begin. In addition, prior experience demonstrates that when, for example, an existing echocardiography department is required to provide a new community echocardiography service then the overall efficiency of that department will decrease. This is because the institution of split-site working removes the ability to nimbly rotate staff at short notice when unforeseen problems arise. The increase in staffing requirements includes not only cardiac physiologists/radiographers, but also administrative staff, nursing staff, and others involved in the delivery of cardiac imaging (e.g., imaging cardiologists / radiologists).

In order for all of the above issues to be addressed, any CDC should be run by and remain within the governance structure of the secondary/tertiary provider.

5. Accommodating trainees

All centres that undertake community cardiac imaging should accommodate trainees (i.e. cardiac physiologists, radiographers and imaging doctors). It is expected that these trainees will not be able to cover the entire breadth of knowledge required in the community setting and so will rotate though this environment alongside time in other parts of the local cardiac service network.

6. Issues specific to Imaging Modalities

Echo

The estate available for the provision of community echocardiography should not alter from the details outlined in the BSE departmental accreditation documentation⁴. In particular, it is essential that all practitioners performing transthoracic echocardiography are accredited to at least BSE level 2 TTE. Machines should be permanently located at a fixed community location and be able to offer the full range of scanning capability (for example, global longitudinal strain and 3D imaging) with appropriate maintenance of equipment and service contracts. There should be dedicated space and separate computer access for reporting. Given the increasing incidence of musculoskeletal issues in the cardiac physiologist workforce⁵, it is essential that echo-specific patient couches and scanning chairs are provided.

When considering increased CDC capacity through extended working hours, it is vital that negotiations consider the maximum capacity of the service provider and acknowledge the national shortage in the cardiac physiologist/clinical scientist workforce that naturally creates local recruitment difficulties. As such, allocation of workforce funding does not guarantee recruitment of additional staff.

Cardiac CT

Cardiac CT requires a more sophisticated and more expensive CT scanner than is normally required for a 'general' CT service. Any scanner used for cardiac CT must have greater than 64 slices and must have a rotation time of <0.35s. Electrocardiogram (ECG) gating is essential, and the scanner must have a full cardiac acquisition package plus an appropriate workstation on which to review and report the images obtained. It is recommended that heart rate is controlled to a rate <60bpm on all cardiac CT studies if possible. This typically required administration of intravenous or oral beta blockers. It is also recommended to administer sublingual glyceryl trinitrate (GTN) to all patients undergoing cardiac CT to obtain maximal coronary vasodilatation. These drugs need to be prescribed and delivered by an appropriately trained and accredited. If a service is planned without medical supervision this needs to be planned in collaboration with the governance structures of the local cardiology network (including pharmacy) and requires that healthcare staff have extensive experience in cardiac CT and are trained and licensed to prescribe and administer the drugs required and capable of dealing with any possible complications, including cardiac resuscitation. Finally, the same high-quality analysis and reporting software should be available for onsite, immediate reporting with immediate access to the images and report for the referring centre.

⁴ <https://www.bsecho.org/Public/Accreditation/Departmental-accred/Departmental-accreditation.aspx>

⁵ <https://www.bsecho.org/Public/Resources/Workforce/Report-1.aspx>

Cardiac MRI

Cardiovascular magnetic resonance (CMR) involves highly specialised skills, equipment and expertise, which is substantially greater than for general MRI services. The British Society for CMR updated the standards for provision of CMR in 2021⁶, and these should be followed when performing CMR scanning in the community. Specific training and expertise is required in CMR (over and above general radiology / cardiology imaging training), because of the complex nature of many of the conditions it is used for. It is not appropriate for clinicians with general radiology / cardiology expertise to perform CMR. In addition, the dedicated cardiac equipment needs to be a higher specification and with dedicated cardiac coils, MR sequences, cardiac monitors and infusion pumps. Full details are available in the BSCMR standards document:

⁶ <https://www.bscomr.org/event-bscomr-standards-document/>

Summary

In conclusion, the responsibility for addressing the critical components outlined above is collective and lies with all stakeholders within the local cardiac network. In fact, it is this collaboration that is the most essential component to ensure that a community cardiac imaging service can thrive.

Members of the Working Group

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