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National Horizon Scanning Unit
Horizon scanning prioritising summary

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Catheterisation guided by MRI: Cardiac catheterisation guided by MRI in children and adults with congenital heart disease.

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PRIORITISING SUMMARY

REGISTER ID: **0000067**

NAME OF TECHNOLOGY: **CATHETERISATION GUIDED BY MAGNETIC RESONANCE IMAGING (MRI)**

PURPOSE AND TARGET GROUP: **CARDIAC CATHETERISATION GUIDED BY MRI IN CHILDREN AND ADULTS WITH CONGENITAL HEART DISEASE**

STAGE OF DEVELOPMENT (IN AUSTRALIA):

- ☐ Experimental
- ☐ Investigational
- ☐ Nearly established
- ☐ Established
- ☒ Established *but* changed indication or modification of technique
- ☐ Should be taken out of use

AUSTRALIAN THERAPEUTIC GOODS ADMINISTRATION APPROVAL

- ☐ Yes
- ☐ No
- ARTG number
- ☒ Not applicable

INTERNATIONAL UTILISATION:

COUNTRY	LEVEL OF USE		
	Trials Underway or Completed	Limited Use	Widely Diffused
UK	✓		
France	✓		

IMPACT SUMMARY:

The tools commonly used in the diagnosis of congenital heart disease and in cardiac imaging are echocardiography and fluoroscopically-guided cardiac catheterisation. Both are used to assist in the planning of palliative or corrective cardiac surgical procedures (Razavi et al. 2003). A significant proportion of patients with complex congenital heart disease will require more than one palliative or corrective procedure. Cardiac catheterisation is invasive and expensive.

Limitations of the current technology can include poor two-dimensional soft tissue contrast and high levels of radiation exposure. Poor soft tissue contrast hinders the positioning of guide wires, catheters, balloons and interventional devices. Inaccurate visualisation of the heart anatomy can hamper interventional cardiac catheterisation, increasing the duration of the procedure, the radiation dose and the risk of complications (Razavi et al. 2003). The risk from increased radiation exposure is higher in children than adults, as children with congenital heart disease undergo repeated fluoroscopically-guided cardiac catheterisations (Razavi et al. 2003).

The ability of both techniques to measure blood flow and quantify myocardial function is limited and the diagnostic value of echocardiography diminishes as juvenile patients grow (Geva, 2000).

MRI-guided cardiac catheterisation is capable of real-time imaging and 3-dimensional visualisation of cardiovascular anatomy. The technique has been described as having excellent soft-tissue contrast, and accurate measurement of blood flow and myocardial function (Lardo, 2000). The method is non-invasive and radiation-free. The electrical charge is 10-20% higher than that for an echocardiogram but less than for a diagnostic catheterisation. Numerous uses of cardiac MRI, of value to paediatric cardiology, have been described (Geva, 2000).

One UK case series study described cardiac catheterisation guided by MRI, and combined with radiographic support, in 16 patients, (Razavi et al., 2003). Twelve patients underwent diagnostic cardiac catheterisation, two had interventional cardiac catheterisation and in two patients MRI was used to plan radiofrequency ablation. In 14 patients, MRI guided some or all of the cardiac catheterisation. In the two patients who underwent radiofrequency ablation, catheters were guided fluoroscopically and the outcome was assessed by MRI. All patients who were allocated MRI received lower radiation dosages than controls. In the 12 patients who underwent both the MRI and fluoroscopic procedures, MRI catheterisation was able to enter substantially more chambers and vessels than fluoroscopy in 10/12 (83%) patients (an average of 3.7 chambers/vessels vs 1.9).

The number of separations in Australia for patients with congenital heart disease, in 2001-02, was 1,023 (AR-DRG number, F68Z (AIHW, 2003)).

Given that MRI technology is established in Australian hospitals, the costs associated with implementing MRI include the cost of a radiologist and anaesthetist. The use of MRI for this new indication is unlikely to impact significantly on costs although there may be additional costs associated with training personnel to use MRI guided catheterisation, particularly with paediatric cases.

There is some debate between paediatric cardiologists and radiologists surrounding who should perform and interpret cardiac MRI examinations on patients with congenital heart disease. The potential to incorporate this technology into routine practice will rely on individuals with extensive knowledge and expertise in both specialities.

CONCLUSION:

There is a small evidence base to support the safety and effectiveness of the use of MRI-guided cardiac catheterisation.

HEALTHPACT ACTION:

It is therefore recommended that this technology be archived.

SOURCES OF FURTHER INFORMATION:

Crochet, D., Lefevre, M. et al (1990). '[Comparison of magnetic resonance imaging, echocardiography and catheterization in the diagnosis of congenital heart diseases]', *Arch Mal Coeur Vaiss,* 83 (5), 681-686.

Lardo, A. C. (2000). 'Real-time magnetic resonance imaging: diagnostic and interventional applications', *Pediatr Cardiol,* 21 (1), 80-98.

Razavi, R., Hill, D. L. et al (2003). 'Cardiac catheterisation guided by MRI in children and adults with congenital heart disease', *Lancet,* 362 (9399), 1877-1882.

Rickers, C., Seethamraju, R. T. et al (2003). 'Magnetic resonance imaging guided cardiovascular interventions in congenital heart diseases', *J Interv Cardiol,* 16 (2), 143-147.

SEARCH CRITERIA TO BE USED:

*Magnetic Resonance Imaging
Angiocardiography
*Echocardiography
*Heart Catheterization/methods
Heart Defects, Congenital/*diagnosis/*therapy
Heart Diseases/*diagnosis
Magnetic Resonance Angiography/instrumentation/methods
Radiology, Interventional