Name of Policy:
MRI Phase-Contrast Flow Measurement

Policy #: 222
Category: Radiology

Latest Review Date: March 2009
Policy Grade: Active Policy but no longer scheduled for regular literature reviews and updates.

Background/Definitions:
As a general rule, benefits are payable under Blue Cross and Blue Shield of Alabama health plans only in cases of medical necessity and only if services or supplies are not investigational, provided the customer group contracts have such coverage.

The following Association Technology Evaluation Criteria must be met for a service/supply to be considered for coverage:
1. The technology must have final approval from the appropriate government regulatory bodies;
2. The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes;
3. The technology must improve the net health outcome;
4. The technology must be as beneficial as any established alternatives;
5. The improvement must be attainable outside the investigational setting.

Medical Necessity means that health care services (e.g., procedures, treatments, supplies, devices, equipment, facilities or drugs) that a physician, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury or disease or its symptoms, and that are:

1. In accordance with generally accepted standards of medical practice; and
2. Clinically appropriate in terms of type, frequency, extent, site and duration and considered effective for the patient’s illness, injury or disease; and
3. Not primarily for the convenience of the patient, physician or other health care provider; and
4. Not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient’s illness, injury or disease.
Description of Procedure or Service:
Magnetic resonance imaging is based on the phenomenon of nuclear magnetic resonance (MR), whereby a signal can be produced from nuclei such as hydrogen in a strong magnetic field. With the application of cardiac gating and echo-planar imaging, topographic images can be reconstructed giving valuable diagnostic information. This signal can be used to reconstruct an image of the distribution of signal strength within the body. There are four techniques that are often utilized in cardiovascular MRI: spin echo imaging; phase contrast imaging; steady-state free-precession imaging; and gradient echo or cine MRI.

Phase contrast imaging is used to quantify blood velocity and flow as in the case of valvular stenosis or insufficiency and shunts.

Policy:
Effective for dates of service on or after March 23, 2005:
MRI phase-contrast measurement meets Blue Cross and Blue Shield of Alabama’s medical criteria for coverage in evaluation of patients for cardiac shunts and valvular heart disease when:

- Patient has inconclusive echocardiogram; and/or
- Patient has symptoms suggestive of LV systolic dysfunction but no definite evidence of LV systolic dysfunction; and/or
- There is discordance between clinical assessment and echocardiographic data.

MRI phase-contrast measurement does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is considered investigational when:

- Used solely to determine the patient’s cardiac output measurement; or
- Used solely to determine if the patient has ischemic heart disease.

Blue Cross and Blue Shield of Alabama does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Cross and Blue Shield of Alabama administers benefits based on the members' contract and corporate medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.

Key Points:
Cardiac MRI phase-contrast measurement is used to calculate velocity and flow, providing additional quantitative information in the evaluation of the heart. Flow quantification is analogous to Doppler ultrasound in which moving blood can be given a positive or negative value, depending on the direction of flow.

Flow quantification in MR depends on a property called spin phase, in which phase differences in flowing blood are measured, with each phase being proportional to velocity. The data collected from phase-contrast measurement is then processed into two images: a magnitude
image, which is used for anatomic orientation, and a velocity image, in which pixels of moving blood will have either a positive or negative value, depending on the direction of flow. By convention, black values show flow toward the viewer, whereas white values show flow away from the viewer. It is not necessary to administer a contrast medium to the patient to determine flow measurements because of the differences in flow direction.

Clinically, **flow quantification** is used most commonly to measure flow and velocity across valvular abnormalities. From these measurements, regurgitant fractions can be calculated. These measurements can be used to estimate the severity of a lesion and follow disease progression over time. **Flow quantification** is also used to evaluate shunts and can provide a measurement of flow across the shunt and shunt fraction.

**MRI phase-contrast flow measurement** can be helpful in diagnosing aortic stenosis (AS). Serial echocardiograms are helpful for assessing changes in LV hypertrophy and function. Therefore, in patients with severe AS, an echocardiogram every year may be appropriate. However, in patients with echocardiograms of suboptimal quality, cardiac magnetic resonance imaging may be used to assess LV volume, wall thickness, mass, and systolic function as well as severity of AS. In centers with specific expertise in cardiac magnetic resonance imaging, serial magnetic resonance imaging may be performed in place of serial echocardiograms.

In patients with aortic regurgitation, **MRI phase-contrast flow measurement** may also be used to quantify the severity of valvular regurgitation, as well as an accurate assessment of LV volume, mass, and systolic function.

Cardiac MRI should be regarded as complementary to other imaging modalities. The availability of transthoracic and transesophageal echocardiography, their portability, and the experience in this field will keep them as first line investigations for many years. Cardiac MRI cannot measure coronary artery calcification and has not achieved the spatial resolution of the most modern computed tomography systems. Widespread use of computed tomography and nuclear medicine for multiple follow up cardiac studies is limited by the cumulative radiation doses acquired. MRI is currently of particular value in assessing following up congenital cardiac anomalies and in visualizing abnormalities of the aorta.

Echo Doppler will in most cases be adequate to assess valvular disease. MRI quantification of stenotic and regurgitant lesions can be helpful in specific situations. For example, it is difficult to estimate the severity of an eccentric mitral regurgitant jet of blood using standard echo criteria. MRI in this situation is able to more reliably quantify regurgitation, because the imaging planes are not as limited.

The 2003 ACC/AHA/ASE Guideline Update for the Clinical Application of Echocardiography notes, “MRI has the capability to detect the presence of stenotic and regurgitant lesions and has several advantages. However, MRI instrumentation is substantially more expensive and not as widely available [as echocardiography].”

The ACCF/AHA in 2005 published a Clinical Competence Statement on cardiac imaging using computed tomography and magnetic resonance. Clinical indications for cardiac magnetic
resonance (CMR) in valvular heart disease, states that echocardiography remains the preferred imaging modality for the routine determination of valve morphology and flow abnormalities. CMR is starting to be used in the care of patients with regurgitant lesions. Valvular regurgitation is usually recognized as a signal void on cine CMR. A quantitative assessment of single-valve lesions can be obtained by calculating the regurgitant volume from the difference of RV and LV stroke volumes or the use of phase-velocity data from the ascending aorta and main pulmonary artery to calculate regurgitant volumes. CMR has also been shown to provide data for the estimation of gradients and areas in mitral and aortic stenosis.

March 2009 Update
There is no new literature identified that would alter the coverage statement of this policy.

Key Words:
MRI phase-contrast flow measurement, MRI flow quantification, flow quantification, quantitative flow measurement, velocity flow mapping

Approved by Governing Bodies:
FDA approved

Benefit Application:
Coverage is subject to member’s specific benefits. Group specific policy will supersede this policy when applicable.

ITS: Home Policy provisions apply
FEP contracts: Special benefit consideration may apply. Refer to member’s benefit plan. FEP does not consider investigational if FDA approved. Will be reviewed for medical necessity.
Pre-certification/Pre-determination requirements: Not applicable

CURRENT Coding:
CPT code:

Effective for dates of service on or after January 1, 2010:
75565  Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)

PREVIOUS Coding:
75556  Cardiac magnetic resonance imaging for velocity flow mapping
(Deleted effective January 1, 2008)
Effective for dates of service on or after January 1, 2008:
75558 Cardiac magnetic resonance imaging for morphology and function without contrast material; with flow/velocity quantification (Code deletes effective January 1, 2010)

75560 Cardiac magnetic resonance imaging for morphology and function without contrast material; with flow/velocity quantification and stress (Code deletes effective January 1, 2010)

75562 Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with flow/velocity quantification (Code deletes effective January 1, 2010)

75564 Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with flow/velocity quantification and stress (Code deletes effective January 1, 2010)

References:


**Policy History:**

Medical Policy Group, January 2005 (2)
Medical Review Committee, March 2005
Medical Policy Administration Committee, April 2005
Available for comment April 13-May 27, 2005
Medical Policy Group, March 2007 (1)
Medical Policy Group, March 2009 (1)
**Medical Policy Group, June 29, 2011: Active Policy but no longer scheduled for regular literature reviews and updates.**

This medical policy is not an authorization, certification, explanation of benefits, or a contract. Eligibility and benefits are determined on a case-by-case basis according to the terms of the member’s plan in effect as of the date services are rendered. All medical policies are based on (i) research of current medical literature and (ii) review of common medical practices in the treatment and diagnosis of disease as of the date hereof. Physicians and other providers are solely responsible for all aspects of medical care and treatment, including the type, quality, and levels of care and treatment.

This policy is intended to be used for adjudication of claims (including pre-admission certification, pre-determinations, and pre-procedure review) in Blue Cross and Blue Shield’s administration of plan contracts.