

and placed on the right side of the chest (above the level of the heart) and on the left side of the chest, and a ground electrode is placed on the abdomen. Bedside monitors are an adjunct to patient care and should never be substituted for direct assessment and auscultation of heart sounds. The nurse should assess the patient, not the monitor.

### **Nursing Alert**

Electrodes for cardiac monitoring are often color coded: white for right, green (or red) for ground, and black for left. Always check to ensure that these colors are placed correctly.

### **Echocardiography**

Echocardiography involves the use of ultra-high-frequency sound waves to produce an image of the heart's structure. A transducer placed directly on the chest wall delivers repetitive pulses of ultrasound and processes the returned signals (echoes). It is the most frequently used test for describing cardiac anatomy and detecting cardiac dysfunction in children. In many cases, a prenatal diagnosis of CHD can be made by fetal echocardiography.

Although the test is noninvasive, painless, and associated with no known side effects, it can be stressful for children. A full echocardiogram can take an hour and the child must lie quietly in the standard echocardiographic positions. Therefore, infants and young children may need a mild sedative; older children benefit from preparation for the test. The distraction of a video or movie is often helpful.

### **Cardiac Magnetic Resonance Imaging**

Cardiac magnetic resonance imaging (MRI) is often used to define unresolved anatomic pathways when a child may have poor acoustic windows or a complex structure that is difficult to visualize by ultrasound alone. In today's practices, cardiac MRI is increasingly used in conjunction with other imaging modalities for assessment of blood flow, and evaluation of myocardial perfusion and viability ([Prakash, Powell, Krishnamurthy, et al, 2004](#)).

Cardiac catheterization is an invasive diagnostic procedure in which a radiopaque catheter is introduced through a large bore