Closer Look at Cardiac Function and Resynchronization

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Coding cardiac conditions and treatments can be difficult for coders, due both to the intricacies of the muscle and its workings and the lack of specificity and documentation in the medical record. This article reviews common cardiac illnesses and the resulting resynchronization. However, before we can appreciate the intricacies of cardiac resynchronization, it's important to develop an understanding of cardiac function; that is, what the heart does, why and how it functions the way it does, what can go wrong, and how technology can make it better.

How the Beat Goes On

Deoxygenated blood from the head, neck, and arms flows to the right atrium via the superior vena cava as blood from the abdomen and its organs and the legs collects in the right atrium through the inferior vena cava. The blood is then pumped under low pressure through the tricuspid valve into the right ventricle, where the pressure is about 35-40/0 millimeters of mercury (mm Hg). From there, it moves through the pulmonic valve to the pulmonary artery, where the blood pressure is about 40/15 mm HG, to the lungs.

Once in the lungs, gas exchange takes place, and oxygenated blood is delivered from the pulmonary veins into the left atrium under very low pressure (5/0 mm Hg). When the left atrium contracts, the blood flows through the mitral valve into the left ventricle. Then, the left ventricle contracts strongly and blood is ejected through the aortic valve at a pressure of about 120 mm Hg.

For the heart to function properly, the timing, contractility, and pressures have to be right. And all these factors depend on a healthy heart musculature and its conduction system. Unlike the rest of the body, the heart muscle cells also act as a conduction system. Some of the fibers are more like nerve, which makes up the electrical system.

The sino-atrial node initiates the cardiac cycle. When it fires, impulses travel over the surface of every muscle fiber in both atria. The atria contract in a unified manner toward the ventricles, thus pushing blood toward the atrioventricular valves (the tricuspid on the right and the mitral on the left). But the pressure in the ventricles must be low enough at that time for the valves to be able to open.

When the initial impulse spreads to the atrioventricular node, it fires. The impulse generated spreads down the right and left bundles of HIS to the branch bundles and then extends to the Purkinje fibers through the conduction system and to the base of the heart. Here, the muscle fibers receive the effect of the impulse and can contract in a unified manner again toward the pulmonic and aortic valves from the apex to the base (the atrioventricular area).

The sino-atrial node produces the first part of the heartbeat and the atrioventricular node forms the second part. However, if illness or trauma harm the conduction or muscular systems of the heart, the beat does not go on.

Muscular and Conduction Problems

For example, ischemic heart disease (inadequate flow to a portion of the heart wall) results in a weak area in the wall. Both the forces able to be generated as well as the conduction of electrical impulses through that portion of muscle tissue will suffer. If the muscle dies, as in myocardial infarction, it won't participate in the unified contraction and can bulge outward while the rest of the heart is trying to propel blood out of the chamber. Significantly decreased flow represents cardiac pump failure due to ischemic cardiomyopathy.

Additionally, if ischemic heart-conduction muscle cells are scarred, they can set up a focus of irritability that may institute electrical impulses on their own, which results in an ectopic focus of originating a beat. This can lead to myriad conduction

problems, one of the worst of which is ventricular fibrillation, a cause of instant death.

Beside the ischemic origins of neuromuscular problems in the heart, there can be conduction problems originating from electrolyte imbalance, problems originating from heat or cold, endocrine abnormalities, and effects to chronic lung disease, along with many other factors.

If the heart isn't beating well enough to provide blood to the body because of too few beats (bradycardia, sick sinus syndrome, heart block) or dyscoordinate beats (atrial flutter or fibrillation), a pacemaker can help with timed, coordinated beats. Similarly, if the heart develops potentially fatal arrhythmias (ventricular tachycardia, ventricular fibrillation), a defibrillator can be placed to identify the abnormality and shock the heart out of the arrhythmias.

Installing Pacemakers and Defibrillators

Pacemakers and defibrillators are installed through essentially the same techniques. An incision is made on the anterior chest wall under the clavicle, down through the fatty layer, and a pocket is made below this incision to accept the pulse generator (used in both devices). Through a needle stick to the subclavian vein, a wire is guided by fluoroscopic control from the subclavian vein to the superior vena cava and into the right atrium.

Then electrodes are passed into the heart and placed in both the right atrium and right ventricle. Both of these are sensory and stimulating, meaning they measure the electrical activity and can respond to abnormalities through initiating impulses of their own. When installing a defibrillator, a third electrode is passed through the coronary vein, which empties into the right atrium. This vein is used as access for an electrode to reach the surface of the left ventricle, which is not directly accessible from the right side of the heart unless there is a septal defect. With stimulating, defibrillating electrodes in both the right and left ventricle regions, a coordinated shock to the heart can be initiated when a potentially fatal arrhythmia is sensed.

Coding Cardiac Resynchronization Therapy

Cardiac resynchronization therapy is often referred to as "CRT-D," meaning cardiac resynchronization therapy defibrillators. CRT-D is a treatment for cardiac dysfunctional ventricular contractions and ventricular tachyarrhythmia, which are often found in patients with congestive heart failure and sudden cardiac death.

Cardiac resynchronization therapy is assigned to ICD-9-CM code 37.94, for the implantation or replacement of automatic cardioverter/defibrillator, total system. This procedure involves the implantation of three leads (electrodes). One defibrillation lead is positioned in the right ventricle. Another pacing/sensing lead is positioned in the right atrium. CRT-D requires the implantation of a third lead within the coronary sinus vein on the outside wall of the left ventricle. Code 37.94 does not differentiate between two or three leads. This is similar to the coding of AICD (artificial internal cardiac defibrillator) procedure implants. Conventional pacemaker and AICD implants only have two leads, fed directly into the right chamber of the heart.

Below, we'll look at coding common heart illnesses that benefit from resynchronization.

Acute Coronary Syndrome

Acute coronary syndrome is a relatively new term that has gained support in the medical community in the past few years. However, it can be difficult to determine what physicians mean when they use that term, because it represents the entire spectrum of heart-originated pain, from stable angina to unstable angina to subendocardial or non-Q-wave myocardial infarction to a full blown transmural myocardial infarction.

Acute coronary syndrome is derived from evolving concepts of the relationships between angina and infarction, which used to be easily distinguished. Angina had no cell death while infarction had cell death. Through greater understanding of the chemical and biologic changes at the cellular level, it has become clearer that these conditions are part of the same disease process.

The physician is responsible for determining whether it was a stable or unstable angina event or semi- or transmural myocardial infarction and documenting it clearly in the medical record. Without this documentation, a coder will be unable to assign the appropriate code to portray the severity of the acute coronary event.

Physicians occasionally document "acute coronary syndrome," which can be a coding challenge. Coders need to know that this condition is not coded to the acute myocardial infarction code series, but instead to 411.89, Other acute and subacute forms of ischemic heart disease, other. Code 411.89 is also assigned for documentation listing a diagnosis of acute ischemic syndrome.

When indexing this condition, first look under the word "Disease."

> Coronary (see also Ischemic, heart) 414.9
> Ischemia, ischemic
> Heart (chronic or with a stated duration of 8 weeks) 414.9
> Acute or with a stated duration of 8 weeks or less (see also Infarct, myocardium) 410.9
> Without myocardial infarction 411.89

Keep in mind that if acute coronary syndrome or acute ischemic syndrome evolves into an acute myocardial infarction, a code from category 410.XX, Acute myocardial infarction would be assigned instead.

Ischemic Cardiomyopathy

Another roadblock to the accuracy of coding heart disease is physicians' tendency to use the term "CMP" to represent cardiomyopathy because it takes less time.

Cardiomyopathy literally means "sick heart muscle" and it can have a myriad of causes. When the etiology is not specified, the code assigned is "primary cardiomyopathy." An examination of the incidence of types of cardiomyopathies at different age ranges reveals that most primary cardiomyopathies occur in young people and most secondary cardiomyopathies occur in the elderly. In the Medicare population, almost all cardiomyopathies are hypertensive or ischemia and these codes are rarely assigned because of inadequate physician documentation. Further, the term "dilated" just refers to the shape of the heart and only differentiates from hypertrophic (very often congenital) or constrictive. It does not tell us the etiology.

To address this issue with your medical staff, teach them how important it is for their own quality and risk controls to document the likely cause of a patient's cardiomyopathy. Then you can apply the correct codes and they can justify a more specific amount of evaluation and management services.

Code assignments for coronary artery disease (CAD) with ischemic cardiomyopathy can be confusing, because some coders argue that the index leads to code 414.9 for this diagnosis. When coding these conditions, assign code 414.8, Specified form of chronic ischemic heart disease, along with the associated coronary atherosclerosis diagnosis (which was diagnosed in this scenario from a prior cardiac catheterization), assign code 414.01 Coronary atherosclerosis of the native coronary artery. Both codes 414.8 and 414.01 would be assigned to fully describe this scenario.

Unstable Angina Post-CABG

For many people who require coronary artery bypass grafting (CABG), the operation performed usually involves multiple vessels. Patients with one or two localized obstructions in larger vessels are more often treated with angioplasty and stent insertion now. As a result, after a bypass operation is completed, the patient may re-develop angina. The coder needs to know if the angina is a result of the progression of coronary atherosclerosis in the coronaries still being used beyond where the bypasses have been plugged in or if it is due to an occlusion of one of the bypasses

Request that the cardiologist walk you through the documentation whether the recurrence of angina is due to continued CAD distal to the bypasses or because of obstruction of either the bypass vein or the internal mammary. After that, it's easy to be specific. If you can't check with the cardiologist or there is no way to determine which vessel is having a problem, the coder must default to the 414.00 code.

Unstable angina status post CABG occurs often, but what is the principal diagnosis? Can CAD be assigned as principal diagnosis? Would this be coded to native or bypassed veins? *Coding Clinic* provides guidance by telling us that although a CABG was done, the correct code assignment would be 414.00, Coronary atherosclerosis, of unspecified type of vessel, native or graft, as the principal diagnosis. You would also assign code 411.1, Intermediate coronary syndrome for the unstable angina and also code V45.81, Aortocoronary bypass status as secondary codes. Without more specific information from the physician,

the 414.0X would be assigned to unspecified. According to *Coding Clinic* 14, no. 2 (1997), if the angina has been previously linked to the CAD, it is appropriate to sequence the CAD as principal diagnosis.

Stent Stenosis

Finally, for a single, limited, or a few small areas of narrowing, angioplasty (balloon dilation or laser reaming) and the insertion of a stent may be used to restore good blood flow to the heart muscle.

The stent is an internally placed, "spring-loaded" device that keeps the re-opened vessel clear. If flow is poor in or out of the stent, there may be enough turbulence or stasis to promote clot formation and occlusion. In this case, the physician must inform the coder whether the recurring symptoms are due to occlusion of the stent or disease downstream from the stent.

The ICD-9-CM coding of stent stenosis can be a difficult scenario for coders because there are two logical choices:

- code 996.74, Other complications of internal (biological) (synthetic) prosthetic device, implant, and graft, due to other vascular device, implant and graft
- 996.72, Other complications of internal (biological) (synthetic) prosthetic device, implant, and graft

It's important first to review *Coding Clinic* 17, no. 1 (2000) because this advice has changed with the new indexing of coronary artery stent stenosis diagnoses. Beginning with October 2000, coronary stent occlusion has a specific index to code 996.72 and the new code 996.72 supersedes the prior advice to assign 997.74 code. The correct answer for discharges or encounters as of October 2000 would be to assign 996.72, Coronary stent stenosis. You can index coronary artery stent stenosis in the following manner:

Complications,

Cardiac,

Device, implant, graft NEC 996.72

Note: This article was adapted from a November 2001 AHIMA Audio Seminar. To purchase the audiocassette or Internet archived version, go to the AHIMA Catalog online at [...]

Reference

American Hospital Association. *Coding Clinic* 18, no. 3. Chicago, IL: American Hospital Association, 2001.

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