When the circuit is working properly, the heart beats at a regular, smooth pace. When something interrupts the circuit, the heartbeat can become irregular, and an arrhythmia occurs.

Types of arrhythmias
There are many types of arrhythmias, which can be grouped into three general categories: supraventricular (atrial) arrhythmias, ventricular arrhythmias, and bradyarrhythmias.

Atrial arrhythmias
- Premature atrial contractions (PACs) — early beats that start in the atria
- Supraventricular tachycardia (SVT) — a rapid, usually regular rhythm, starting from above the ventricles (SVT begins and ends suddenly)
- AV nodal reentrant tachycardia (AVNRT) — a rapid heart rate due to more than one pathway through the AV node
- Atrial fibrillation — a condition in which many impulses begin and spread through the atria, competing for a chance to travel through the AV node
- Atrial flutter — an atrial arrhythmia caused by one or more rapid circuits in the atrium
- Wolff-Parkinson-White syndrome — a condition in which an electrical signal may arrive at the ventricle too quickly due to an extra conduction pathway or a shortcut from the atria to the ventricles

Ventricular arrhythmias
- Premature ventricular contractions (PVCs) — early beats beginning in the ventricles. These occur when the electrical signal starts in the ventricles, causing them to contract before receiving signals from the atria.
- Ventricular tachycardia (V-tach) — a life-threatening condition in which electrical signals start from the ventricles in a fast and irregular rate
- Ventricular fibrillation — an irregular, disorganized firing of impulses from the ventricles

What is an arrhythmia?
An arrhythmia (also called dysrhythmia) is an abnormal rhythm of the heart, which can cause the heart to pump less effectively.

Arrhythmias can cause problems with contractions of the heart chambers by:
- Not allowing the ventricles (lower chambers) to fill with an adequate amount of blood, because an abnormal electrical signal is causing the heart to pump too fast.
- Not allowing a sufficient amount of blood to be pumped out to the body, because an abnormal electrical signal is causing the heart to pump too slowly or too irregularly.

In any of these situations, the heart may not be able to pump an adequate amount of blood to the body with each beat due to the arrhythmia’s effects on the heart rate. The effects on the body are often the same, whether the heartbeat is too fast, too slow, or too irregular.

How does an arrhythmia occur?
The pumping action of the heart is powered by an electrical pathway that runs through the nerves in the walls of the heart. With each heartbeat, an electrical signal is generated and travels from the top of the heart to the bottom.

The signal begins in a group of cells in the right atrium (the upper right chamber of the heart) called the sinoatrial node (SA node). From there, the signal travels through special pathways to stimulate the right and left atria, causing them to contract and send blood into the ventricles (the bottom chambers of the heart).

The current continues through its circuit to another group of cells called the atrioventricular node (AV node), which is between the atria and the ventricles. From there, the electric current moves on to another pathway called the bundle of His, where the signal branches out to stimulate the right and left ventricles, causing them to contract and send blood to the lungs and the rest of the body.
**Bradyarrhythmias**
- Sinus node dysfunction — a slow heart rhythm due to an abnormal SA node
- Heart block — a delay or complete block of the electrical impulse from the SA node to the ventricles

**What are the symptoms of arrhythmias?**
The following are the most common symptoms of arrhythmias. However, each child may experience symptoms differently. Symptoms may include:
- Weakness
- Fatigue
- Palpitations
- Low blood pressure
- Dizziness
- Fainting
- Difficulty feeding

The symptoms of arrhythmias may resemble other medical conditions or heart problems. Always consult your child’s doctor for a diagnosis.

Another indication of an arrhythmia is a change in the electrocardiograph (ECG) pattern. However, ECG changes are not seen unless an ECG test is performed or a child is being monitored in the hospital or other facility. Because symptoms such as those listed above may indicate the presence of an arrhythmia, an ECG is commonly done on children with one or more of the symptoms.

**How are arrhythmias diagnosed?**
In addition to a complete medical history and physical examination of your child, there are several different types of procedures that may be used to diagnose arrhythmias. Some of these procedures include the following:

**Electrocardiograph (ECG)**
An ECG is a measurement of the electrical activity of the heart. By placing electrodes at specific locations on the body (chest, arms, and legs), a picture, or tracing, of the electrical activity can be obtained as the electrical activity is received and interpreted by an ECG machine. An ECG can indicate the presence of arrhythmias or other types of heart conditions. There are several variations of the ECG test, including:

**Exercise ECG, or stress test**
The child is attached to the ECG machine as described above. However, rather than lying down, the child exercises by walking on a treadmill or pedalling a stationary bicycle while the ECG is recorded. This test is done to assess changes in the ECG during stress such as exercise.

**Holter monitor**
An ECG recording done over a period of 24 or more hours. Three electrodes are attached to the child’s chest and connected to a small, portable ECG recorder by lead wires. The child goes about his or her usual daily activities (except for activities such as taking a shower, swimming, or any activity causing an excessive amount of sweating which would cause the electrodes to become loose or fall off) during this procedure. There are two types of Holter monitoring:
- **Continuous recording**
  The ECG is recorded continuously during the entire testing period.
- **Event monitor, or loop recording**
  The ECG is recorded only when the patient starts the recording when symptoms are felt or when an abnormal rhythm is detected.

Holter monitoring may be done when an arrhythmia is suspected but not seen on a resting ECG. Arrhythmias may be short-lived in nature and not seen during the shorter recording times of the resting ECG.

**Electrophysiology study (EPS)**
An invasive test in which a small, thin tube (catheter) is inserted in a large blood vessel in the leg or arm and advanced to the heart. This gives the doctor the capability of finding the site of the arrhythmia’s origin within the heart tissue, thus determining how to best treat it.

Anti-Arrhythmic medication is ceased before this test is attempted

**Tilt table test**
A test recommended for children who have frequent fainting (syncope) episodes. The test displays how the heart rate and blood pressure respond to a change in position—lying down to standing up. During this test, medication may be given intravenously to help prevent a fainting episode once the cause has been identified by the doctor.
Treatment of arrhythmias

Medications
Many types of prescription anti-arrhythmic medications are available to treat arrhythmia. The doctor will determine which is best by considering the type of arrhythmia, possible underlying medical causes, and any medications a child is taking. Sometimes, anti-arrhythmic medications can increase symptoms and cause unwanted side effects, so their use and effectiveness should be closely monitored by the doctor, you, and your child.

Electrophysiology studies (EP) and Radiofrequency Ablation (RFA)
An electrophysiology study (EP test or EP study) is a minimally invasive procedure which tests the electrical conduction system of the heart to assess the electrical activity and conduction pathways of the heart. The study is indicated to investigate the cause, location of origin, and best treatment for various abnormal heart rhythms. This type of study is performed by an electrophysiologist and using a single or multiple catheters situated within the heart through a vein or artery.

Radio frequency ablation (RFA) is a procedure where part of the electrical conduction system of the heart or other dysfunctional tissue is ablated using the heat or cold generated from the high frequency alternating current to treat an arrhythmia. Anti-Arrhythmic medication is ceased before this study is attempted.

Pacemakers and defibrillators
A pacemaker (or artificial pacemaker, so as not to be confused with the heart’s natural pacemaker) is a medical device that uses electrical impulses, delivered by electrodes contacting the heart muscles, to regulate the beating of the heart. The primary purpose of a pacemaker is to maintain an adequate heart rate, either because of the heart’s native pacemaker is not fast enough, or there is a block in the heart’s electrical conduction system. Modern pacemakers are externally programmable and allow the cardiologist to select the optimum pacing modes for individual patients. Some combine a pacemaker and defibrillator in a single implantable device. Others have multiple electrodes stimulating differing positions within the heart to improve synchronisation of the lower chambers.

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In an emergency, always contact 000 for immediate assistance.

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All information contained in this sheet has been supplied by qualified professionals as a guideline for care only. Seek medical advice, as appropriate, for concerns regarding your child’s health.