

Arrhythmias

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Throughout the course of modern medicine doctors, engineers, and pharmacologists alike have tried to improve health of the general population. One such problem that is prevalent in today's society is the commonly occurring arrhythmia.

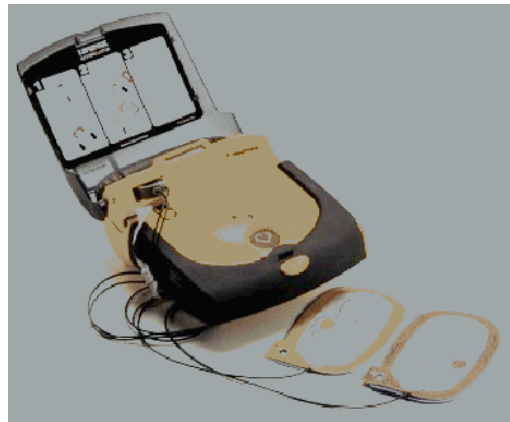
Arrhythmias occur when the heart has abnormal electrical activity. These range from five of the following types:

- Bradycardia – less than 60 bpm
- Tachycardia – More than 100 bpm
- Automaticity – Ectopic Focus (an impulse occurs without waiting for the sinoarterial node)
- Re-Entry – Impulse travels recurrently around the heart
- Fibrillation – An entire chamber of the heart is involved with multiple micro-reentry circuits

One of the most common forms of arrhythmia is a heart attack. This is a serious issue. According to the American Heart Association 1.2 million Americans have a diagnosed heart attack every year. And on average, 250,000 Americans die from out-of-hospital cardiac arrests every year.

The device known as an Automated External Defibrillator (aka AED) has been very successful in addressing this issue. It is a portable defibrillator that can be used by the general public (although minimal training is required). Essentially, one follows written or spoken instructions via the device to eliminate ventricular fibrillation and ventricular tachycardia.

AED's operate by evaluating the ECG (electrocardiogram) of the patient. From this reading, the device can determine what type of shock and how many joules to administer. Although this is effective, it doesn't tackle the remaining arrhythmias



In order to proficiently fix the remaining arrhythmias, pharmacology must be implemented. Using the Vaughan-Williams Antiarrhythmic Classification, different types of drugs are used depending on the cardiac action potential. The five classes are as follows:

- Class I – Sodium Channel Blockade
- Class II – Beta-Blockade
- Class III – Potassium-Channel Blockade
- Class IV – Calcium-Channel Blockade
- Class V – Work by other or unknown mechanisms.

Since AED's can only handle the two major types of arrhythmia's I have the following proposal: Include all Antiarrhythmic Agents with AED devices using Needle-Free Injection technology. This requires minimal implementation and could save countless lives through pre-first responders. Additional software and hardware would be required along with increased training for the device. This is a minimal price to pay for an increased awareness and efficiency when dealing with arrhythmias.

References:

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