

Cardiac Monitoring: An Overview

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EDITORIAL

Cardiac monitoring generally refers to continuous or intermittent monitoring of heart activity, generally by electrocardiography, with assessment of the patient's condition relative to their cardiac rhythm. It is different from hemodynamic monitoring, which monitors the pressure and flow of blood within the cardiovascular system. The two may be performed simultaneously on critical heart patients. Cardiac monitoring with a small device worn by an ambulatory patient (one well enough to walk around) is known as ambulatory electrocardiography (such as with a Holter monitor, wireless ambulatory ECG, or an implantable loop recorder). Transmitting data from a monitor to a distant monitoring station is known as telemetry or biotelemetry. Cardiac monitoring in the ED setting has a primary focus on the monitoring of arrhythmia, myocardial infarction and QT-interval monitoring.

It is a noninvasive diagnostic tool and monitoring is categorized by the rating system developed by the American College of Cardiology Emergency Cardiac Care Committee. Some digital patient monitors, particularly those used by EMS services, have a defibrillator as part of the device. These monitors/defibrillators often contain all of the features of an ICU monitor, plus manual (and often semi-automatic AED) defibrillation. This is especially useful for EMS services, which require a small, easy-to-use monitor and defibrillator, as well as patient transportation. Most monitor defibrillators also feature transcutaneous pacing capabilities via big AED-like adhesive pads that are attached to the patient in an anterior-posterior arrangement and can be used for monitoring, defibrillation, and pacing.

Waveform capnography, invasive blood pressure, and Masimo Rainbow SET pulse oximetry are all common monitoring metrics on monitor defibrillator systems. Physio Control's Lifepak 12, 15, and 20 monitor defibrillators, Philips' Heartstart MRx, and ZOLL Medical's E, R and X Series are all examples of monitor defibrillators. Cardiac event monitors are divided into two categories: manual (or dumb) and automatic. Automatic ECG event monitors can monitor the patient's ECG and record abnormal events without the need for the patient to intervene. Manual ECG event recorders require the patient to be symptomatic in order to activate the device and record an event, rendering them worthless if the patient is sleeping, for example. The implanted loop recorder, a third categorization,

has both automated and manual capabilities. The trans-telephonic cardiac event monitor is an example of automatic monitoring. This monitor communicates with ECG technicians on a regular basis via telephone, sending ECG rhythms for continuing monitoring.

Normally, the trans-telephonic cardiac event monitor can store about five "cardiac events" that last 30-60 seconds.

Heart rate monitoring

The heart rate can be monitored as part of electrocardiography, but it can also be easily recorded using dedicated heart rate monitors. Performers of various sorts of physical exercise frequently use such heart rate monitors.

The following are the features of a generic cardiac monitor:

- Heart rate and rhythm are shown on a graph.
- Alarms will sound if the temperature rises or falls above or below a pre-determined threshold.
- The ability to recognize the presence of an arrhythmia.

Cardiovascular monitors come in a variety of styles. The Holter monitor is an external monitor that measures and records heart activity for 1-2 days using wires with patches that attach to the skin. Wearing an Event Recorder for up to 30 days is possible. A wearable monitor that detects, records, and transmits heart rhythms for up to 30 days is known as a Mobile Cardiac Telemetry unit. An insert-able cardiac monitor is a long-term device that is implanted under the skin and detects and records abnormal heart rhythms automatically for up to 5 years.

Monitoring of the fetal heart rate

Monitoring the foetal heart rate is becoming more common in antepartum pregnant patients' standard care. In 2002, electronic foetal monitoring was used in 85 percent of pregnancies in the United States. Other technologies, such as analysing the voltage generated by the contracting uterine muscle measured at the skin surface or recording both the foetal ECG and the mother's ECG and filtering out the mother's ECG, are emerging in electronic foetal monitoring.

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Exercise monitors with wearable heart rate monitors

Reflectance photo plethysmography is used in the new wearable heart rate monitors to indirectly measure heart rate. The monitor uses a Light Emitting Diode (LED) to illuminate the skin tissue and

a photodetector to detect the intensity of light reflected. Electrode-based heart rate monitors are more reliable than wearable optical heart rate monitors. The wearable optical heart rate monitors' accuracy varies depending on the type of exercise. This error is exacerbated by skin tone and motion artefacts.