Using The HESS Pacemaker Adjustment App

Healthcare Education Simulation Station

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PLEASE READ

DISCLAIMER

The information in the HESS is not intended or implied to be a substitute for professional medical expertise, advice, diagnosis or treatment.

There is no representation and no responsibility for the accuracy of information contained within the HESS.

The HESS is only intended to be used as an instructional aide by qualified medical educational professionals.

About The HESS Pacemaker Adjustment App

The HESS Pacemaker Adjustment App was created to let healthcare professionals practice adjusting cardiac pacemaker settings for a variety of cardiac situations in a safe and “low stakes” environment. The Pacemaker Adjustment App can help increase understanding, confidence and comfort levels for those healthcare professionals who need to adjust a pacemaker on an actual patient.

Tablets Suitable To Run The HESS Pacemaker Adjustment App

The HESS Pacemaker Adjustment App can run on Android tablets with Version 8 or above of the Android operating system and with a screen size of at least 7 inches.

HESS Vitals Accepted By The HESS Pacemaker Adjustment App

The HESS Pacemaker Adjustment App will recognize and use the following vitals transmitted from the HESS Instructor tablet.

1. Pacemaker Adjustment "Electrophysiology" Vitals

The Pacemaker Adjustment Vitals include cardiac electrophysiology values including P Wave, R Wave and Ventricular Noise (mV) values and variabilities, Atrial and Ventricular Capture Threshold (mA) values and variabilities, and Atrial and Ventricular failure rates.

The Pacemaker Adjustment App will not run without the Pacemaker Adjustment "Electrophysiology" Vitals being transmitted by the HESS Instructor tablet.

2. EKG Vitals

The EKG Vitals that the Pacemaker Adjustment App recognizes and uses are the EKG Pulse Rate (BPM) – which is used as the Intrinsic Heart Rate – and the Primary EKG Waveform.

The Pacemaker Adjustment App will not run without the EKG Vitals being transmitted by the HESS Instructor tablet.

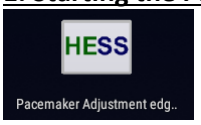
NOTE: The Pacemaker Adjustment App is only designed to use a "Normal" Primary EKG Waveform. Unpredictable and inaccurate results will occur by using other Primary EKG Waveforms. To instruct about other EKG Waveforms, HESS Apps such as the HESS EKG App or HESS ICU Monitor App are likely better options.

3. Blood Pressure (BP) Vitals (optional)

The BP Vitals that the Pacemaker Adjustment App recognizes and uses are the BP Systolic and Diastolic (mmHG) values. The BP Vitals are optional.

Using The HESS Pacemaker Adjustment App

1. Starting the Pacemaker Adjustment App



The HESS Pacemaker Adjustment App can be started by touching the HESS Pacemaker Adjustment App icon on the Android tablet.

2. Choosing the Pacemaker Mode

The pacemaker mode (DDD, DOO, AAI, VVI or Disconnected (DSC) can be selected by a) first touching the right-hand button which will show a pulldown list of the modes, b) choosing the desired mode from the pulldown list, and c) touching the left-hand button to “switch” to the chosen mode.

3. Starting the Cardiac Waveform/Vitals Display

AFTER both the EKG and Pacemaker Adjustment Electrophysiology Vitals have been transmitted successfully from the HESS Instructor App, the “power” button can be used to start and stop the cardiac waveform and the Vitals display.

The current pulse rate and any BP Vitals transmitted will display to the left of the cardiac waveform. Any pacemaker stimulus spikes will appear white within the cardiac waveform.

4. Setting the Pacing Rate

The pacemaker Pacing Rate can be changed by using the + and – buttons under the “Rate” heading . Each touch of + or – will increase or decrease the Pacing Rate by 5 BPM (between 20 and 200 BPM limits).

5. Setting/Seeing the Output and Sensing

The Atrial and Ventricular Output and Sensing levels (depending on the pacemaker mode) are displayed above the cardiac waveform. These levels can be changed with the respective + and – buttons. The increments of change will vary based on the current values – increments being either 0.1, 0.5 or 1.0.

When the pacemaker is Sensing or Pacing during a specific cardiac cycle, the small dots above the Atrial or Ventricular areas will flash green or blue to indicate the Sensing or Pacing.

HESS Pacemaker Adjustment App Settings

The HESS Pacemaker Adjustment App has the following Settings available via the Android “3 dots menu” in the upper right corner of the Pacemaker Adjustment App screen:

1. Startup Mode

Sets the pacemaker mode that the Pacemaker Adjustment App will default to upon startup – DDD, DOO, AAI, VVI or disconnected (DSC).

2. View Diagnostic Data

Displays current Atrial and Ventricular electrophysiology values, current sensing and capture information and current Atrial and Ventricular failure rate values – to enable analysis of the behavior of the Pacemaker Adjustment App.

3. Device Address

The Pacemaker Adjustment App receiving address for the Vitals – which must match the transmission address for the Vitals in the HESS Instructor App. Device Addresses are 4 characters made up of the characters 0-9 and A-F. **DO NOT USE** “0000” or “FFFF” as Device Addresses. “0000” and “FFFF” have special uses within the HESS. Using these special Device Addresses can cause unpredictable results.

HESS Pacemaker Adjustment App Usage Notes

1. Bluetooth Reset Button

If, after numerous attempts, the Pacemaker Adjustment App is still not receiving Vitals transmissions – even though the Instructor transmission and the Device receiving addresses match – the "Bluetooth Reset" button in the upper right corner of the screen can be used to reset the Android tablet's Bluetooth functions. This often will resolve Bluetooth oriented issues without having to stop or disrupt the app.

2. Issues When Using Very Low Heart Rates

The Pacemaker Adjustment App is "driven" by a simulated cardiac cycle. The Pacemaker Adjustment App will finish any currently established cardiac cycle before moving to new Vitals values even if the new Vitals transmissions have been successfully received. In cases of very low heart rates – such as 10 BPM or lower – it can take some time before changes appear. As an example, in an extreme case of a heart rate set to 1 BPM, the cardiac cycle would be 60 seconds in duration and it could take 1-2 minutes for changes transmitted to take effect. This can make the app appear unresponsive even though it is working properly.

3. Cardiac Waveform And Stimulus Spike Display

The Pacemaker Adjustment App is not a perfect representation of the real world – especially when the pacemaker values are such that Sensing and/or Capture are not occurring.

If Sensing and/or Capture are not occurring, the stimulus spikes and/or cardiac waveform will reflect a "problem" – in that a normal or paced heart rate and cardiac waveform will not appear correctly. This display will indicate to the learner that there is a "problem"….. , however, the display in these non-Sensing, non-Capture situations may not accurately reflect the display that would actually occur in real life.

Once Sensing and Capture levels are set so that proper Sensing and Capture are occurring, the display will reflect a normal or paced heart rate, any stimulus spikes, and a proper cardiac waveform.

4. When Done, "Power Off" Tablets – Don't Just "Suspend" Them

The Android tablets should be completely "powered off" when stored or the battery will drain to 0% charge. Completely drained batteries can then take 20-30 minutes of charging just to get the tablet to power up for usage. Even if the tablet screen is dark it can be misleading because the tablet may only be "suspended". Pressing the power button for ½ second will indicate if the tablet is completely powered off – by either "unsuspending" the tablet screen if the tablet is only "suspended" – or remaining dark if the tablet is completely powered off.