



Effect of digital cellular phones on tachyarrhythmia analysis of automated external defibrillators.

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Abstract:

Objectives: Emergency services personnel, family members, laypersons or patients often carry and use mobile phones on sites of emergencies. As there are reported effects on implanted pacemakers and cardioverter defibrillators, the influence of digital cellular phones on automated external defibrillators was studied.

Methods: Twelve automated external defibrillator models were bench tested for their correct decision to or not to advise a shock, while being exposed to electromagnetic interference from a handheld cellular phone with 2 W or a portable cellular phone with 8 W transmitting power. The phones were programmed by a special subscriber identity module card to maximum output power with a carrier frequency of 906.2 MHz. The tests were conducted with a burst frequency of 217 Hz in speech mode and 2-8 Hz in discontinuous transmitting exchange mode. The sensitivity and specificity of electrocardiogram analysis systems were tested, with shockable and non-shockable rhythms provided by an electrocardiogram simulator and on two human subjects with normal sinus rhythm.

Results: A total of 8640 tests were recorded, each automated external defibrillator was tested a total of 720 times. The automated external defibrillators demonstrated a sensitivity of 100% and a specificity of 100%, representing a positive likelihood ratio of 8641 and a negative likelihood ratio of 0.000. In this setting all automated external defibrillators analysed correctly even under worst-case testing conditions, and performed excellently without any single failure. In some devices, voice prompts were distorted beyond comprehension, as the coil of the automated external defibrillator speaker received the pulsed signals.

Conclusion: Shock advisory systems of automated external defibrillators are not susceptible to electromagnetic interference of 900 MHz cellular phones. Voice prompts, however, could be distorted by the operation of nearby digital mobile phones. During automated external defibrillator training this issue needs to be addressed