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Automated external defibrillators appropriately recognize ventricular fibrillation in electromagnetic fields.

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OBJECTIVES: Automated external defibrillators (AEDs) are increasingly available in industrial settings, but many industries have high electromagnetic fields (EMFs), which can interfere with the function of electronic devices. This study evaluated the performance of several AEDs when exposed to high EMFs. **METHODS:** Three commercially available AEDs were evaluated in the setting of a public utility coal-fired electrical generation plant. Each AED was placed in three areas of high EMF ranging from 310 to 1,600 milligauss. A signal generator, used to simulate various cardiac rhythms, was connected to the AEDs. Rhythms simulated were ventricular fibrillation, asystole, and normal sinus rhythm. Each of the AED's interpretations of various rhythms were evaluated in the different EMF settings. **RESULTS:** Rhythms of ventricular fibrillation, asystole, and normal sinus rhythm were correctly recognized by each AED in each of the three areas of high EMF. Each AED appropriately recommended defibrillation when presented with ventricular fibrillation. No misinterpretations or inappropriate defibrillations were observed. **CONCLUSION:** Electromagnetic fields generated by an electrical power plant did not interfere with three commercial AEDs' abilities to correctly interpret simulated rhythms and recommend appropriate defibrillation.

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Safety aspects for public access defibrillation using automated external defibrillators near high-voltage power lines

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Background: Automated external defibrillators (AEDs) must combine easy operability and high-quality diagnosis even under unfavorable conditions. This study determined the influence of electromagnetic interference caused by high-voltage power lines with 16.7-Hz alternating current on the quality of AEDs' rhythm analysis.

Methods: *Two AEDs frequently used in Austria were tested near high-voltage power lines (15 kV or 110 kV, alternating current with 16.7 Hz). The defibrillation electrodes were attached either to a proband with true sinus rhythm or to a resuscitation dummy with generated sinus rhythm, ventricular fibrillation, ventricular tachycardia or asystole.*

Results: *Electromagnetic interference was much more prominent in a human's than in a dummy's electrocardiogram and depended on the position of the electrodes and cables in relation to the power line. Near high-voltage power lines the AEDs showed a significant operational fault. One AED interpreted the interference as a motion artifact, even when underlying rhythms were clearly detectable. The other AED interpreted 16.7-Hz oscillation as ventricular fibrillation with consequent shock advice when no underlying rhythm was detected.*

Conclusion: *The tested AEDs neither filter nor recognize a technical interference of 16.7 Hz caused by 15-kV power lines above railway tracks or 110-kV overland power lines, as run by railway companies in Austria, Germany, Norway, Sweden and Switzerland. These failures in AEDs' algorithms for rhythm analysis may cause substantial harm to patients undergoing public access defibrillation. The proper function of AEDs needs to be reconsidered to guarantee patients' safety near high-voltage power lines.*

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EMI Emissions per CISPR 11 class A