

# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Cardiac Arrest Survival Post-Electrocution – Management in a Low-Resource Emergency Department in Ghana

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**Study/Objective:** To highlight the necessity of Basic-Life-Support trainings and availability of defibrillators in improving outcomes in post-electrocution cardiac arrest in low-resource settings.

**Background:** Since commercial electricity became available, the potential danger of injury has continued to increase. Degrees of electrical injuries range from minor burns, to cardiac arrest, and death. Electrocution is cardiac arrest resulting from an electric shock. In Ghana, many cases of electrocution are declared dead with little or no resuscitative measures. The recently established Emergency Department (ED) of Komfo Anokye Teaching Hospital (KATH) now receives and resuscitates these patients.

**Methods:** There is currently no documented literature on successful management and survival of cardiac arrest patients post-electrocution in Ghana. Therefore, we sought to describe the management of three patients, two adult males and a female child, who presented to KATH-ED in a space of nine months with cardiac arrest following electric shock.

**Results:** The electrocution of the two adult patients occurred at work, and the children at home by naked-wire. None of them had any form of cardiopulmonary-resuscitation (CPR) at the scene, or enroute to the hospital. They all presented in cardiac arrest and rushed to the resuscitation zone of the ED. They all had CPR initiated on arrival; all had shockable rhythms - one with pulseless ventricular tachycardia (torsades des pointes), and the other two patients with ventricular fibrillation. They were defibrillated with at least two shocks, delivered with resultant return of spontaneous circulation; successfully intubated and managed for other injuries. They were all discharged home after a few days, regaining full consciousness and scheduled for outpatient follow up.

**Conclusion:** Early recognition of cardiac arrest, immediate initiation of CPR, and availability of defibrillators improve outcomes in cardiac arrest post-electrocution. Although the outcomes were favorable in these cases (with no by-stander initiated CPR), they highlight the necessity of Basic-Life-Support training for the general population.

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## A Complex Systems Analysis of the Lac-Mégantic Runaway Train Derailment

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**Study/Objective:** To bring a complex system analysis to a Canadian anthropogenic disaster/public health emergency.

**Background:** On July 6, 2013, an unmanned (runaway) freight train with 5 locomotives and 72 oil tank cars descended 11 km (7 mi.) on a downhill grade, accelerating to 101 km (63 mi.) as it entered the town of Lac-Mégantic, Quebec, Canada. Encountering a sharp curve, 63 tank cars derailed, ruptured, deformed, exploded, and burned in a 2-day conflagration. Dozens of buildings were razed, 2,000 persons were displaced, and 47 citizens were killed in the raging fires. Hazardous materials contamination affected the air and water quality, and created an ecological catastrophe. The public health, medical, and psychological consequences, as well as community strengths and indicators of resilience were actively monitored.

**Methods:** A complex system analysis of the derailment was conducted drawing upon multidisciplinary expertise in train crash engineering, public health, medical crash trauma, mental health and psychosocial support, disaster health, and complexity sciences. A synthesis of key components of the event was developed by blending direct on-scene response experience with in-depth review of investigative reports, news stories, and websites of agencies involved in disaster response and railway safety. A complexity science “lens” was applied to the analysis to connect the causal sequence to the public health and environmental consequences.

**Results:** For this non-intentional, human-generated (anthropogenic), technological/transportation disaster, distinguishing features included a complex web of causation, revealing failures of governance and management on the part of Transport Canada and the MMA Railway; unrepaired mechanical defects, a compounding sequence of human errors, and flagrantly dangerous train securement, leading to a preventable runaway derailment with loss of life and property, and massive ecological harm.

**Conclusion:** Two-thirds of the Lac-Mégantic area population sustained human and/or material losses in this highly impactful disaster. Data from ongoing studies of the environmental, behavioral, and psychological impacts demonstrate a high degree of community resilience.

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