



## AUTOMATED CARDIAC ARREST DETECTION AND ALERTING SYSTEM USING A SMARTPHONE AND A STANDARD BLUETOOTH CHEST STRAP HEART RATE MONITOR DURING EXERCISE: THE “PARACHUTE” APP

Poster Contributions

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**Background:** Aerobic exercise is a healthy behaviour and prolongs life, but during vigorous exercise the incidence of sudden cardiac arrest, although small in absolute, is increased several times compared with resting. Runners and cyclists (>100 millions in US) often exercise where there is low probability that a cardiac arrest will be witnessed and early access to emergency granted within a short time, such as in the countryside, parks or rural landscapes. A simple tool to detect exercise-related cardiac arrest, not requiring dedicated and expensive hardware, taking advantage of standard athletes' gear (a smartphone and bluetooth chest strap heart monitor) would be potentially lifesaving. We designed and tested a first-in-class smartphone app, able to detect unwitnessed cardiac arrest occurring during exercise, which automatically alerts emergency and chosen contacts via SMS, by so doing speeding up the rescue process. If this system confirms accurate and reliable, it can shorten time to defibrillation, leading to find more shockable rhythms in such unwitnessed cardiac arrests.

**Methods:** We report the diagnostic test data using the PARACHUTE app, running on Apple iPhone, with either the Polar H7 or Wahoo Tickr bluetooth-smart chest heart rate monitor. The system was tested in 10 athletes, running and cycling, to address the absence of false alerting (specificity), and using a portable ECG simulator (Fluke PS 420) cabled to the chest strap to test the capability of the system to recognize simulated ventricular fibrillation (VF) (sensitivity) in the moving or still subject.

**Results:** Athletes have run for 32 hours and cycled for 52 hours and no false alert SMS was sent. The simulation of 2 different types of VF was always recognized by the system (100/100 simulations) which sent the alert SMS only in cases (n=50) of subject also lying down still for at least 25 seconds).

**Conclusions:** Our tests do indicate that the PARACHUTE app reliably detects cardiac arrest during exercise and appropriately sends SMS alerting, including GPS data, in the tested conditions. This easy commercially-available system could represent a revolution in the hardly moving field of exercise-related unwitnessed cardiac arrest.