

CARDIOPULMONARY RESUSCITATION IN MICROGRAVITY USING THE LUCAS 2 COMPRESSION DEVICE

John Sczepaniak*¹, Catherine Nakao¹, Naoyuki Ishikita^{2,3}, Kyle Freiman¹, Katherine Ngo¹

¹ Sczepaniak Health and Medical Enterprises, San Diego, CA, USA

² STONY, 3910-9 Mikage, Shibukawa, Gunma 3770008, Japan

³ National Hospital Organization, Shibukawa Medical Center (in Shiroy, Shibukawa, Gunma, Japan).

* likely presenter

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INTRODUCTION:

While the cardiopulmonary resuscitation procedure (CPR) is commonly practiced on Earth, it is ineffective in a weightless environment without modification. The Lucas TM 2 CPR device latches around the patient and delivers motorized chest compressions, solving issues that occur from using traditional CPR methods in zero gravity.

METHODS:

The Lucas TM 2 CPR device was strapped to a CPR manikin, which was tied to a backboard on-board a Boeing 727 modified for a parabolic flight. A tape measure was attached to the CPR device and its piston was positioned over the manikin's chest. During the experiment, the piston performed multiple compressions on the manikin's chest, which were recorded via a GoPro camera that was attached to an experimenter's forehead. The Lucas TM 2 CPR device ran on battery power and was active for ~47 minutes. Chest compression depths were graded by viewing the tape measure via Adobe Premiere Pro CC (a video editing software) and a 32" full array LED TV. Statistical analysis was performed using the ANOVA and T-test.

RESULTS:

Measuring the depth compression using a tape measure, Earth gravity (n=27) averaged 4.02 centimeters (s=0.067), Martian gravity (n = 42) averaged 4.09 centimeters (s = 0.09), Lunar gravity (n = 33) averaged 4.10 centimeters (s = 0.075), and zero gravity (n = 39) averaged 4.03 centimeters (s = 0.159). A t-test showed that Earth gravity and zero gravity were not significantly different (p = 0.834) and that lunar gravity and Martian gravity were not significantly different (p = 0.500). Compression rate for earth, martin, lunar and zero G CPR were 108.8, 107.9, 106.8, and 106.0 compressions per minute respectively.

DISCUSSION:

The Lucas 2 CPR device provided similar compression depth in 1Gz and 0Gz environments. Inadequate compression depths reported here are likely due to improper plunger placement. Compression rates were similar in these four environments. An experienced operator should be able to deliver adequate CPR in space using the Lucas 2 CPR device.

FINANCIAL DISCLOSURE or CONFLICT OF INTEREST

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