University of Utah
UNDERGRADUATE RESEARCH JOURNAL

A NEW PROTOCOL FOR FIRST RESPONDERS FOR HYPOTHERMIC PULSELESSNESS IN PEDIATRIC PATIENTS

Isabel Shimanski, NRP (Chris Stratford, MS, BSN, RN, NRP)
Department of Health Promotion and Education

ABSTRACT

In the summer of 1986, a two-and-a-half-year-old girl, named Michelle, was submerged in a creek near Salt Lake City for a total of 62 minutes from initial submersion to removal by rescuers [7]. The young girl showed no signs of life, and was found pulseless, flaccid, cyanotic[i], and with fixed and dilated pupils[ii] [7]. Despite the grim presentation of the girl, emergency medical services (EMS) made resuscitative efforts and transported her to Primary Children's Medical Center in Salt Lake City [7]. Fortunately for Michelle, the physicians at Primary Children's quickly placed her on an extracorporeal rewarming and circulation device, and three hours after initial submersion, manual chest compressions were discontinued as she was stable enough to circulate blood independent of the external rewarming machine [7]. Ultimately, after an extended admission to Primary Children's, Michelle was able to function at the appropriate developmental age-level by three-and-a-half years old [7]. Following Michelle's miraculous survival and recovery, the use of extracorporeal membrane oxygenation (ECMO) in pediatric hypothermic cardiac arrest became a focus for pediatric emergency physicians; however, because this condition is so rare, it is often difficult to study.

The purpose of this review, in conjunction with several emergency physicians at Primary Children's Medical Center and the University of Utah Hospital in Salt Lake City, is to evaluate the effectiveness of ECMO introduction into pediatric patients suffering from hypothermic cardiac arrest. Ultimately, the research involved in this study was used to modify the Utah State EMS protocol for hypothermic cardiac arrest in children in order to incorporate appropriate treatment and transport decisions for emergency medical technicians (EMTs) and paramedics with the objective of increasing survival and positive outcome rates in these patients. Following implementation of the aforementioned protocol, trainings were conducted for fire and EMS agencies across the Wasatch Front to decrease the number of patients that are incorrectly treated annually.

TABLE OF CONTENTS

ABSTRACT i
1 INTRODUCTION 1
1.1 ACCIDENTAL HYPOTHERMIA 1
1.2 ECMO 1
1.3 HYPOTHERMIC CARDIAC ARREST 3
1.4 ECMO IN HYPOTHERMIC CARDIAC ARREST 4
2 DISCUSSION 5
2.1 PREHOSPITAL PROTOCOLS 5
2.2 A NEW PROTOCOL 6
2.3 LIMITATIONS OF NEW PROTOCOL INITITATION 10
3 KEYS TO SUCCESS 11
4 METHODS 11
5 IMPLEMENTATION 12
6 RESULTS 15
7 CONCLUSION 15
APPENDIX I: PEDIATRIC ECMO FACILITIES IN THE UNITED STATES 16
APPENDIX II: TRAUMA DESIGNATIONS 17
REFERENCES 20
ACKNOWLEDGMENTS 24

[i] Cyanosis: Blue skin, indicating hypoxia, or low levels of oxygen in the body
[ii] Fixed and dilated pupils: An indication of brain death