

A History and Overview of Telecommunicator Cardiopulmonary Resuscitation (T-CPR)

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ABSTRACT

Few events in pre-hospital medicine inspire as much attention and resources as out-of-hospital cardiac arrest (OHCA), yet the survival rate for such events has remained stagnant and unacceptably low. The first links in the chain of survival are early recognition and early CPR; yet EMS services do not arrive to the scene of a medical call for on average 7 minutes. Emergency dispatchers are generally the first trained individuals involved in medical emergencies; they can provide pre-arrival instructions, specifically telecommunicator CPR (T-CPR), and represent the potential to double the bystander CPR rate and increase return of spontaneous circulation. Yet, according to survey data, fewer than half of all public safety answering points (PSAPs) provide any T-CPR and even fewer provide hands-only CPR instruction.¹ This article will provide a brief overview, history and introduction to the evidence supporting the use of T-CPR to improve outcomes in OHCA.

KEYWORDS: Cardiac Arrest, Emergency Medical Dispatch, Telecommunicator CPR, Emergency Medical Services

INTRODUCTION

Although the actual incidence is not tracked in Rhode Island, extrapolations would suggest that every year an estimated 1,000 people suffer an out-of-hospital cardiac arrest (OHCA), when their heart stops beating normally.² Of these, approximately 40% are witnessed.³ Although an estimated 25–50% of all OHCA's are due to a treatable arrhythmia like ventricular fibrillation (VF), the rate of survival to hospital discharge after a witnessed OHCA is estimated to be 31.4%.³ This number has remained stagnant for years, with the exception of isolated, high performance EMS systems. Factors that increase the survival rate for witnessed cardiac arrest include bystander CPR, early AED and early advanced cardiac care. Multiple studies have shown that bystander CPR doubles rates of survival in OHCA;^{4,5} however, the rate of bystander CPR in Rhode Island is an abysmal 20% in recent data analysis⁶ and across the country remains a stagnant 40%.⁵ In other words, in Rhode Island, up to 80%

of cardiac arrest victims must wait for the arrival of EMS services before CPR is initiated.

Survival decreases by around 5% for each minute between cardiac arrest and the initiation of CPR and yet EMS response times in urban settings are on average 7.0 (SD 4.4) minutes, 7.7 (SD 5.4) minutes in suburbia and 14.5 (SD 9.5) minutes in rural settings.⁷ Anoxic brain injury can occur after just a few moments following cardiac arrest. Bystander CPR, whereby CPR is performed by untrained bystanders prior to EMS arrival, can bridge this gap, buying valuable time for the initiation of Advanced Cardiac Life Support (ACLS) protocols. Unfortunately although the general public widely recognizes the importance of CPR, bystander CPR rates remain low nationally.⁵

One proven way to increase the rates of bystander CPR is through the use of telecommunicator CPR (T-CPR). Across the country, from Rochester to Seattle, communities have dramatically increased their cardiac arrest survival rate with programs that include evidence-based, quality-controlled, physician-led, dispatcher-assisted CPR. Arizona now has an overall survival rate of 35% for VF cardiac arrest.⁸ In Rochester, victims of witnessed VF arrest have a 50% chance of survival.⁹ In Seattle/King County, WA, the survival rate for witnessed VF arrest in one analysis was 62%.¹⁰

WHAT IS T-CPR?

T-CPR is defined as the “provision of CPR instructions by emergency dispatchers and call-takers to 9-1-1 callers who potentially encounter cardiac arrest.”¹¹ T-CPR is real-time, over the phone CPR instruction given to bystanders by trained emergency dispatchers with a goal of having “hands on the chest” within 3 minutes of the 9-1-1 call.

T-CPR is part of a group of standardized, scripted pre-arrival instructions. These pre-arrival instructions are designed to provide immediate, life-saving interventions prior to the arrival of EMS, by bystanders under the instruction of trained medical dispatchers. Pre-arrival instructions, when provided by certified Emergency Medical Dispatchers (EMDs) have been proven safe, effective, and lifesaving.¹¹ Trained 9-1-1 operators coach people through immediate measures such as CPR as well as for other emergencies like bleeding control, choking, or assistance for drug overdose victims, meanwhile collecting key information for

emergency responders prior to their arrival. T-CPR has been included in the American Heart Association guidelines for resuscitation care since 2010, and has been graded as the highest level (Class I) recommendation in the most recent 2017 guidelines.¹² Pre-arrival instructions such as T-CPR enable emergency medical dispatchers to be the true first responders to medical emergencies, buying valuable time for patients suffering life-threatening illness or injury.

T-CPR employs a rapid triage assessment of the victim, using a “no, no, go” paradigm. This consists of a two-question screening: 1) Is the patient conscious? 2) Is the patient breathing normally? If the answer is no to both questions, the telecommunicator gives brief, easy to understand instructions to the caller. Generally this involves getting the patient to a flat, hard surface, placing hands on the chest and pushing hard and fast with coaching by the telecommunicator.

HISTORY OF T-CPR

Modern CPR has evolved over the last half century alongside the evolution of organized EMS, medical dispatch and the specialty of Emergency Medicine. Though the first documented instances of chest compressions occurred as early as the 1800s, CPR as we know it today was created in the mid-20th century. In the early 1960s, the American Heart Association (AHA) formerly endorsed CPR and created the first program to teach what was then called “closed chest cardiac massage” to physicians in the hospital setting.¹³ By the 1960s, EMS was becoming more organized, and CPR quickly became standard instruction for newly minted EMS providers. The provision of CPR training to laypeople soon followed. The very first documented instruction of laypeople in CPR took place in Cleveland in 1961,¹⁴ and the 1970s marked the first large-scale rollout of CPR training to the lay public. In 1972, Leonard Cobb held the first public CPR training in Seattle, WA¹⁴ and by the end of the 1970s ACLS was developed at the third national conference on CPR.¹³ It was some years later that emergency medical dispatchers began offering instructions to callers.

The very first documented pre-arrival instructions were provided in 1975 by paramedic Bill Tune in Phoenix, AZ.¹⁵ Paramedic Tune gave spontaneous, unscripted instructions to the mother of a child who was not breathing. The child survived and Phoenix began routinely offering non-standardized, non-scripted, pre-arrival instructions.¹⁵ However, despite this (and likely other undocumented occurrences), T-CPR was not widely adopted until later, following the development of the EMD and standardized EMS dispatch protocols. Utah boasted the first formal training program for emergency dispatchers and also was the first state to require use of medically approved dispatch protocols in 1983. This was the same year the US Department of Transportation issued a sample curriculum and protocol for EMD training.¹⁵ Throughout the 1980s multiple jurisdictions across the US

began using pre-arrival instructions for critical events like CPR, choking and childbirth and T-CPR began to be formally incorporated into dispatch center protocols.

EVIDENCE TO SUPPORT USE OF T-CPR

Survival from OHCA requires complex systems of care and chain of survival that begins with early access to CPR and an Automatic Defibrillator (AED), continued with robust pre-hospital management of cardiac arrest and care at the hospital. Dispatcher-assisted bystander CPR has been shown to improve survival especially when integrated with other links in the chain like AED use, more CPR education and advanced systems of care.^{11,16}

Studies have shown that bystander CPR increases rates of survival by over 200% in OHCA.⁴ Though most Americans are familiar with CPR,¹⁷ rates of bystander CPR remain very low.⁵ T-CPR pre-arrival instructions have been shown to double the rates of bystander CPR,¹⁶ are nearly as effective as CPR provided by a trained medical professional,¹¹ are expected by the general public¹⁷ and have been shown to be feasible and effective.

Phoenix, AZ, provides an example of the positive survival effects of institution of effective T-CPR programs. Phoenix previously provided pre-arrival CPR instructions at regional dispatch centers but had not adopted formal, evidence-based guidelines for identification of OHCA, quality improvement or training. They instituted a T-CPR bundle of care based on AHA guidelines for T-CPR, including guideline-based protocols, training, data collection and feedback to two regional dispatch centers and analyzed before-and-after outcome data. Among the favorable outcomes seen in before-and-after analysis were: 9.3% increase in provision of T-CPR (95% CI, 4.9%–13.8%), all rhythm survival increase from 9% to 12% (aOR 1.47 [95% CI, 1.08–2.02]), survival after shockable rhythm 35% from 24.7% (aOR 1.70 [95% CI, 1.09–2.65]), and a favorable functional outcome of 8.3%, up from 5.6% (aOR 1.68 [95% CI, 1.13–2.48]).¹⁸ Other cities have observed increases in bystander CPR, survival to discharge and good neurologic outcome after the initiation of T-CPR and T-CPR quality improvement/training protocols.¹⁹

Across the country, from Rochester to Seattle, communities have dramatically increased their cardiac arrest survival rate with programs that include dispatcher-assisted CPR, but T-CPR alone is not a panacea. There are, and likely will remain, many barriers to performance of bystander CPR including patient positioning and location and the ability of the bystander to physically perform effective compressions. Based on the experience of high-performance systems such as Seattle/Kings County and Rochester, T-CPR must be a part of a vibrant, robust EMD program with quality assurance and improvement, data collection and tracking and physician involvement. Public Safety Answering Points (PSAPs), the call centers responsible for answering calls to

an emergency telephone number for emergency services, must be provided the oversight, budget, staffing and training to accomplish the goals of evidence-based EMD, including T-CPR. Future directions of EMD may include CPR instructions provided via smart phone, use of drones to deliver AEDs and provide CPR instruction and feedback, and smart-phone, social media-based deployment of CPR-trained Samaritans to public OHCA. These ideas have been explored and imagined in various settings and are the subject of active research efforts.

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Conflicts of Interest

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