ABSTRACT

Successful cardiac arrest management requires the simultaneous coordination of a number of advanced treatments. In order to improve this process and related patient outcomes, Greenville County Emergency Medical Services (GCEMS) implemented multiple protocol and training changes between 2011 and May 2012. Changes included the introduction of streamlined guidelines and treatment processes, increased scope of care for paramedics, shift to an evidence-based training program, and introduction of an annual survivor conference. These modifications were targeted both the professionalism of paramedics and EMS system culture. Impact of the new cardiac arrest management program was assessed at both the individual and population health levels.

The purpose of this retrospective study was to examine the efficacy of the system and cultural changes put into place by GCEMS. With the cooperation of Greenville Health System, we examined patient outcomes and records to analyze and assess the effectiveness of the system changes and guidelines. Key outcome measures such as patient neurological status, hospital readmission frequency, and cost measures were used to evaluate the impact of these changes.

STUDY METHODOLOGY

1. Develop study sample using specific inclusion criteria
2. Collect data for complete continuum of care
3. Perform 10% check to check for systematic errors
4. De-identify data
5. Analyze using Stata Software

PROBLEM STATEMENT

Cardiac Arrest is one of the leading causes of death and hospitalization in the country. In order to improve cardiac arrest outcomes, Greenville County Emergency Medical Services developed and implemented an evidence-based training and cultural shift. Steps were taken to properly assess and analyze the immediate and long-term impact of these changes.

INTRODUCTION

On an international, national, and local scale out-of-hospital cardiac arrest (OHCA) is one of the biggest public health threats. National and international guidelines have been developed and consistently updated to help improve the survival rate of OHCA. Despite these efforts, overall survival of OHCA patients has remained steady at approximately 7.8% for the last thirty years (Bay, 2012). If a patient does survive OHCA, the post arrest quality of life is another cause of concern. The ideal outcome of treating a patient of OHCA is a “neurologically intact survivor” and no permanent damage to organs. Across the world, only 5-15% of patients resuscitated have a neurologically intact survival rate (Steur, 2009). Emergency response teams, particularly paramedics and other emergency response technicians are key to improving OHCA outcomes. Emergency response services serve as the link between the initial attacks and the onset of major treatment. Emergency response teams are the boots on the ground dealing with this public health threat and, therefore, have a great opportunity to positively impact outcomes.

A NEW EVIDENCE BASED APPROACH

Culture Change
- Survivor Ceremonies to show work has tangible benefit
- Quality CPR is vital
- Paramedic autonomy increased

Streamline Protocol
- Transport Cardiac Arrest patients exclusively to PCI Hospitals
- Run 12-Leads on every post-arrival transport
- Standardized Therapeutic Hypothermia inclusion criteria for every receiving hospital

Focused Simulation Lab Training
- More days focused specifically on post-resuscitation skills
- Approach like going to get ROSC and continue care
- 25 minutes resuscitation
- 1 round of ACLS medications
- Airway
- Angle glacial device or endotracheal tube
- Patient in artery
- At a private residence

TABLE 1. Analysis of Evidence Based Protocol Changes

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control</th>
<th>Treatment</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventricular Rhythm</td>
<td>9.5</td>
<td>9.0</td>
<td>0.251</td>
</tr>
<tr>
<td>All Cardiac Arrests</td>
<td>11.4*</td>
<td>5.3</td>
<td>0.016</td>
</tr>
</tbody>
</table>

TABLE 2. Outcomes of All Cardiac Arrests

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control</th>
<th>Treatment</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventricular Rhythm</td>
<td>20.0*</td>
<td>10.9</td>
<td>0.000</td>
</tr>
<tr>
<td>All Cardiac Arrests</td>
<td>25.0*</td>
<td>3.9</td>
<td>0.000</td>
</tr>
</tbody>
</table>

RESULTS

Regression Analysis (Linear Probability Model) Controlling for Age, Race, and Gender using Dummy Variables

DISCUSSION

Life-saving Cultural Shifts
- Survivor Ceremonies create a meaningful, hopeful culture of care.
- Shifting priority to high-quality CPR emphasizes the importance of fundamental skills.
- Training community partners in bystander CPR has potential to make a significant impact.

Simulation Lab training is now regularly focused on Cardiac Arrest training.

Shockable Rhythms: Biggest Opportunity for Improvement
- Ventricular Fibrillation and Ventricular Tachycardia are both shockable rhythms.
- Care options available to EMS are more likely to be effective on these types of cardiac arrest.
- The already high survivability of these particular rhythms allows for a bigger margin of improvement.

Full Care Reduction: Direct and indirect impacts
- Reducing full care decreases unnecessary cost to the patient, community, and hospital.
- Family and friends do not get false sense of hope from seeing their loved being transported to the hospital.
- Hospital care providers have less emotional and mental stress because they are not having to deal with processing life after death.
- Streamlined EMS processes allow paramedics to be ready to respond to new cases faster.
- Subjects who did as admitted patients did not change significantly from the control to treatment; however, the number that died in the emergency room did increase.

The Power Behind Evidence Based Practices
- Effective use of protocol and protocol changes
- Increased autonomy among paramedics improves job satisfaction and performance
- The significant changes in protocol paired with the increase in survival rates indicate the effectiveness of the “terminate in field” protocols put into place.

KEY ARTICLES FROM LITERATURE REVIEW


ADVANCED EMS TREATMENT AND SURVIVAL AFTER CARDIAC ARREST

Callie Heyne | Spencer Staub | Tom Moz, PhD | Windsor Sherrill, PhD, MHA, MBA
Department of Public Health Science, Clemson University

This study was obtained IRB approval through a collaborative review by Greenville Health System and Clemson University.

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WORK CITED