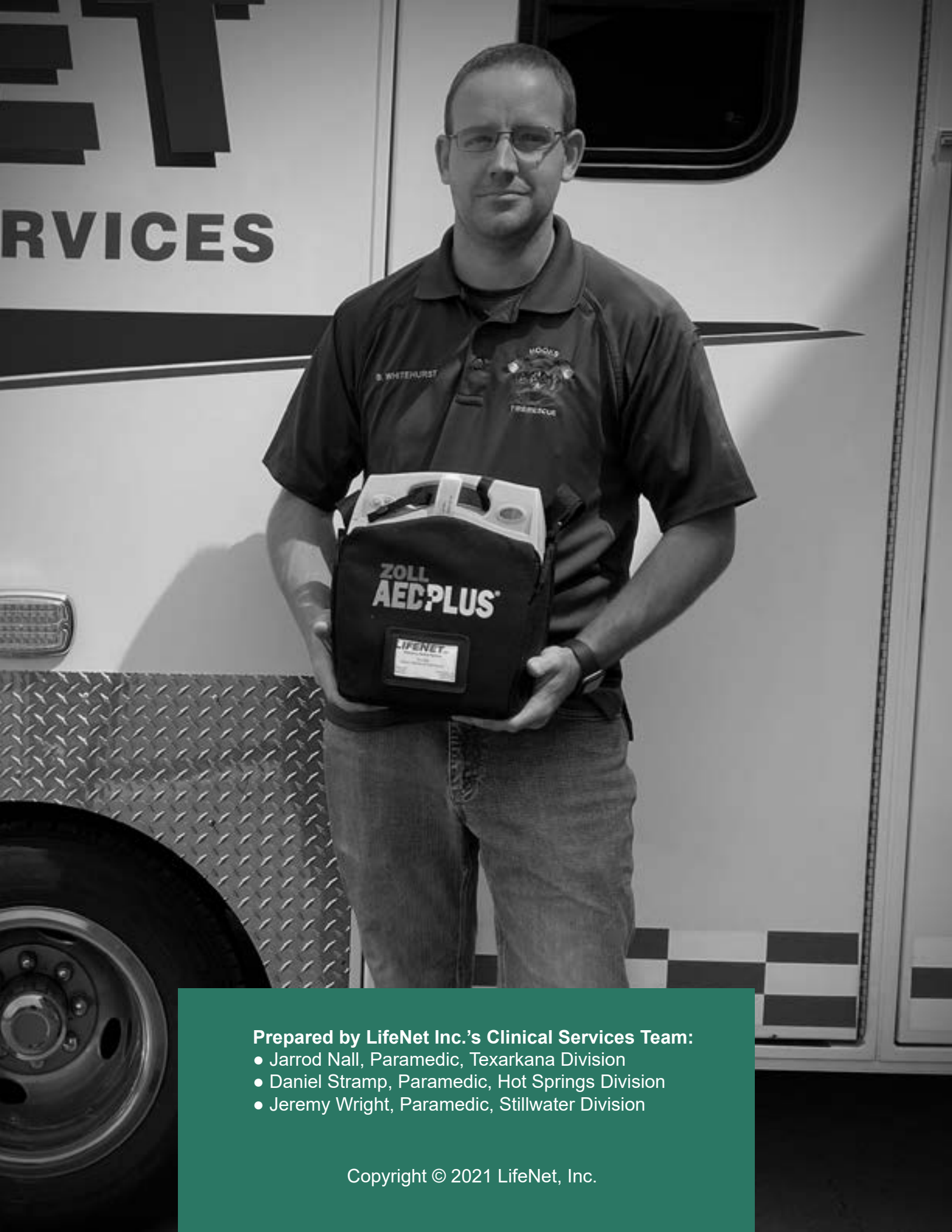




LIFENET

2020 ANNUAL SUDDEN CARDIAC ARREST REPORT



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When administered correctly, bystander CPR increases the likelihood that a person's blood will continue flowing to the brain and other organs until the person is brought to the hospital, improving their chances of survival.



TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
DEFINITIONS	5
INTRODUCTION	6
TIMING IS EVERYTHING	7
MEASURING CPR EFFICIENCY	11
INTEGRATED POST CARE	12
MEDICAL DIRECTION	13
2020 SCA SURVIVAL RATE DATA	14
System-Wide 2020 SCA Data	14
Witnessed vs. Non-Witnessed SCA Events	15
SCA Disposition by Division	16
Witnessed V-Fib Survival Percentages	16
System-Wide SCA Results by Year	16
Neurological Outcome Results by Division	16
2020 Sudden Cardiac Arrest Survivor Data	17
APPENDIX	19
System Wide (Adult - Medical)	19
Texarkana, USA (Adult - Medical)	19
Texarkana, Texas (Adult - Medical)	20
Texarkana Division (Adult - Medical)	20
Hot Springs Village, Arkansas (Adult - Medical)	21
Malvern, Arkansas (Adult - Medical)	21
Hot Springs, Arkansas (Adult - Medical)	22
Hot Springs Division (Adult - Medical)	22
Stillwater Division (Adult - Medical)	23
Denison, TX (Adult - Medical)	23

EXECUTIVE SUMMARY

Sudden Cardiac Arrest (SCA) is one of the leading causes of death in the United States. Since 2005, LifeNet has used the Utstein Style to measure and report on cardiac arrest data. LifeNet clinical staff review and report on every adult SCA patient whose arrest is deemed to be of a medical, non-traumatic, origin.

Patients experiencing SCA fall into two categories: Witnessed SCA and Not-Witnessed SCA. Patients who have a witnessed SCA event generally have the best chance of survival because someone is present to activate EMS, thus beginning the steps in the “Chain of Survival”.

Once a LifeNet medical crew makes contact with an SCA victim, the paramedic determines if the victim can be resuscitated. Then they initiate an aggressive resuscitation attempt that includes cardiopulmonary resuscitation (CPR) in which artificial ventilation and external chest compressions are performed. In addition, paramedics establish intra-venous and/or intra-osseous access and administer medications and manually defibrillate when necessary to attempt to stimulate the heart and achieve a return of spontaneous circulation (ROSC). Generally, patients who achieve ROSC are transported to the emergency department for further resuscitation and care. Patients who do not respond to pre-hospital resuscitative efforts are considered to be deceased and documented as a field termination.

In 2020, paramedics throughout LifeNet’s service areas responded to 1,186 non-traumatic SCA events. ALS resuscitation was attempted on 470 (40%) of those SCA events. Of the 470 resuscitation attempts, 281 patients (60%) were transported to the hospital, while 189 resuscitation attempts (40%) ended with field terminations. There were 70 patients (15%) who survived to hospital discharge. The national average in this overall survival category is 8% - 10%.

In the Texarkana Division, resuscitation was attempted on 191 of the 546 patients who suffered SCA. These attempts include 107 transports and 84 field terminations. There were a total of 72 patients who had ROSC while 30 patients survived to discharge for a survival of 16%.

In the Hot Springs Division, resuscitation was attempted on 179 of the 435 patients who suffered a SCA. These attempts include 120 transports and 59 field terminations. There were a total of 58 patients who had ROSC, while 23 patients survived to discharge, for a survival of 13%.

In the Stillwater Division, resuscitation was attempted on 60 of the 100 patients who suffered a SCA. These attempts include 28 transports and 32 field terminations. There were a total of 19 patients who had ROSC, while 12 patients survived to discharge, for a survival of 20%.

In Denison, TX, resuscitation was attempted on 40 of the 106 patients who suffered a SCA. These attempts include 26 transports and 14 field terminations. There were a total of 11 patients who had ROSC, while 5 patients survived to discharge, for a survival of 13%.

When comparing LifeNet’s SCA data with other EMS systems, it is important to note that other systems report their survival percentages based on “Witnessed V-Fib” events only. LifeNet’s Witnessed V-Fib survival percentage for 2020 is 33%.

LifeNet System Wide 2020 SCA Statistics



1,186

Non-Traumatic
SCA events LifeNet
responded to in 2019



40%

LifeNet attempted ALS
resuscitation on 470
SCA patients



60%

LifeNet transported 281
SCA patients to the
hospital



40%

189 resuscitation
attempts ended in field
terminations



15%

70 SCA patients
survived to hospital
discharge



8-10%

National average of
patients surviving to
discharge



33%

LifeNet’s Witnessed
V-Fib survival
percentage

DEFINITIONS

Asystole

The cessation of all electrical activity in the heart.

Base Station Physician (BSP)

On-duty hospital physician responding by radio, telephone, or cell phone contact.

Bystander

Person who performs cardiopulmonary resuscitation on a cardiac arrest patient and is not a member of the organized emergency response system.

Call Response Interval

Interval of time starting when the call for help is answered at a LifeNet communications center until paramedics arrive at the scene. Also referred to as call received/receipt until at scene interval.

Cardiac Etiology

A cardiac arrest presumed related to heart disease.

Cardiopulmonary Resuscitation (CPR)

Widely used method of resuscitation utilizing a series of closed chest compressions and manually assisted ventilations.

Computer Aided Dispatch (CAD)

A dispatch system utilized by LifeNet EMS to manage emergency and non-emergency call taking and dispatch operations.

Death Determined at Scene (DAS)

Circumstances in which the condition of a cardiac arrest victim is such that resuscitation attempts are determined to be futile.

First Responder Organization (FRO)

An identified organization of trained personnel used for rapid incident response.

Other Lethal Rhythm (OLR)

Various non-arrest rhythms that will not sustain life.

Public Access Defibrillation (PAD)

The provision of defibrillation by non-traditional “first responders” such as security guards, lifeguards, etc...

Pulseless Electrical Activity

An organized cardiac rhythm where no pulse/cardiac output is present.

Resuscitation Not Attempted

Patients for whom paramedics do not attempt resuscitation on. Current LifeNet policy states if a patient has evidence of being dead for a period of time where resuscitation attempts would have no hope of success, the paramedics do not attempt resuscitation.

Additionally, resuscitation is not attempted on patients with a Do Not Resuscitate (DNR) order.

Return of Spontaneous Circulation (ROSC)

Resumption of sustained perfusing cardiac activity after cardiac arrest. Signs of ROSC include spontaneous breathing, coughing, or movement, and a palpable pulse or a measurable blood pressure.

Sudden Cardiac Arrest (SCA)

The sudden collapse of a victim found to be pulseless and breathless.

Unwitnessed Arrest

The patient is found after the arrest has occurred.

Utstein Criteria

Internationally recognized data template for reporting out-of-hospital cardiac arrest.

Ventricular Fibrillation / Ventricular Tachycardia (VF/VT)

A state of disorganized electrical activity in the heart.

Witnessed Arrest

Patient collapse was seen or heard by a bystander.

INTRODUCTION

According to the Center for Disease Control and Prevention (CDC), someone has a heart attack every 40 seconds in the United States, and each minute, more than one person dies from a heart disease-related event.

According to the American Heart Association's (AHA) *Heart Disease and Stroke Statistics - 2018 Update*, there are more than 356,000 out-of-hospital cardiac arrests annually in the U.S., nearly 90% of them fatal. The majority of these events occur at a home or residence (68.5%), followed by public settings (21%) and nursing homes (10.5%).

Because SCA is one of the leading causes of death in our nation, the emergency management of this devastating event remains one of the core purposes of any emergency medical services (EMS) system.

In many cases, a SCA event occurs due to ventricular fibrillation, an abnormal heart rhythm that causes the heart muscle to fibrillate or quiver in a chaotic motion. If left untreated, this condition leaves the heart muscle unable to pump blood and death occurs within minutes. Survival from SCA depends on the interval between the patient's collapse and the delivery of the first defibrillatory shock. This becomes remarkably time dependent, where seconds and minutes equal living, dying, or becoming neurologically impaired due to lack of oxygen being sufficiently supplied to a patient's brain.

Creating optimal opportunity for successful resuscitation includes:

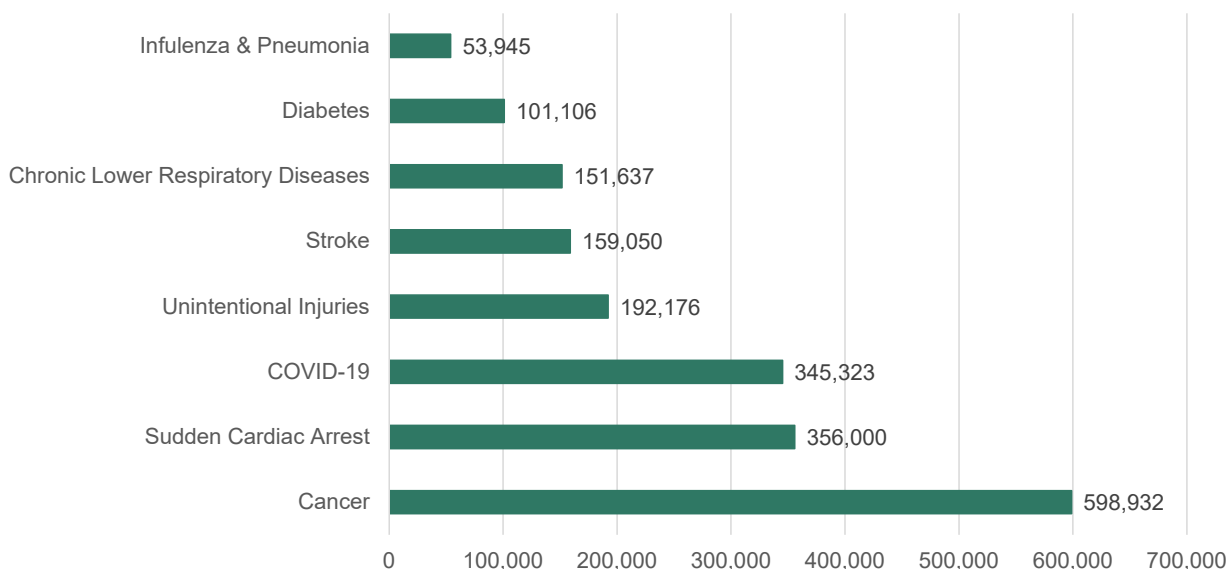
1. Early recognition
2. Early access to EMS
3. Early initiation of CPR
4. Early access to defibrillation
5. Timely response and superior skill from EMS
6. Focused post-arrest care in the event of ROSC

According to the AHA, clinical and epidemiological studies have confirmed:

1. Almost every adult (over 90% in most studies) who survives sudden non-traumatic cardiac arrest was resuscitated from Ventricular Fibrillation (VF).
2. The success of defibrillation is remarkably time dependent.

The probability of defibrillating (shocking) someone back to a perfusing heart beat declines between 2% to 10% per minute, starting with the estimated probability of 70% to 80% survival at time zero. These statistics show that a patient who has not been shocked within 10 minutes from their collapse has a high probability of not surviving the SCA event. Other studies demonstrate that CPR prior to defibrillation can significantly improve the likelihood of defibrillation success.

Common Causes of Death in the US in 2020



SOURCES:
Provisional Mortality Data, United States, 2020 (April 9, 2021)
https://www.cdc.gov/mmwr/volumes/70/wr/mm7014e1.htm?s_cid=mm7014e1_w

Sudden Cardiac Arrest: A Healthcare Crisis (June 1, 2021)
<https://www.sca-aware.org/about-sca>

TIMING IS EVERYTHING

Out-of-Hospital Chain of Survival

The cornerstone to providing optimized care to SCA patients and increasing survival rates is timely and effective interventions from the moment someone notices symptoms. The bystander or family member who witnesses the SCA

event must not only recognize the symptoms, but must also call for help. Bystander CPR and use of an Automatic External Defibrillator (AED) must start before, and continue until, the arrival of skilled EMS crews.



**Early Access
& Recognition of
Symptoms**



**Early CPR
with High-Quality
Chest Compressions**



**Early
Defibrillation**



**Early
Advanced Care**



**Post
Resuscitation
Care**



Chain of Survival Link 1: Early Access & Recognition of Symptoms

Enhanced 911

LifeNet's 911 call system has "enhanced 911". This means the caller's address and phone number are displayed on the EMS dispatcher's computer screen, reducing response time. The system also helps callers who speak foreign

languages, can't speak, or don't know their location.

Improved Addresses in Rural and Urban Areas

Many communities have delays in emergency response because house numbers aren't assigned or properly displayed. To implement and use an enhanced 911 system, all locations in a community must have proper addresses that are also properly displayed.

Qualified Emergency Medical Dispatchers (EMDs)

EMDs are able to give CPR (and other medical) instructions by phone, enabling callers to care for SCA victims until help arrives. Without trained EMDs, victims may face delays that could mean the difference between life and death. Each of LifeNet's communication centers has at least one EMD qualified person on duty at all times.

Awareness of Early Warning Signs

Early access only happens if the community knows who to call and when to call. Many people deny (or don't know) the symptoms of a cardiovascular emergency. Instead of phoning 911 first, some people call loved ones or their own doctor. This wastes precious time. One of LifeNet's primary awareness efforts is to assist the community in learning the warning signs and when to call 911 first.



In 2020, LifeNet produced an educational video and handout on the 10 Steps to Properly Display Your 9-1-1 address. To watch the video and learn more, visit our website at [LifeNetEMS.org/911address](https://www.lifenetems.org/911address).



Chain of Survival Link 2: Early CPR

When CPR is performed, rescue breathing and chest compressions circulate oxygen rich blood to vital organs. This buys time for the victim until defibrillation can be given. Early CPR as a link in the chain of survival

is stronger when bystanders or callers know CPR and EMDs can give CPR instructions by phone.

LifeNet does not conduct in-house CPR certification classes for the public. When contacted, we direct people to either their local American Heart Association training site or to the American Red Cross for the proper training. However, LifeNet does teach “Hands-only CPR” at churches, civic groups, businesses, and events throughout our service areas.

In 2019, CPR was performed prior to arrival of EMS on 272 (76%) of the arrests that LifeNet responded to. Pre-arrival CPR was done by a first responder in 28% of the calls, a bystander in 13% of the calls, a healthcare provider in 24% of the calls, and a family member in 36% of the calls.



Chain of Survival Link 3: Early Defibrillation

Early defibrillation means delivering an electric shock to the heart within minutes of a cardiac arrest. Defibrillation is performed with a device called a defibrillator.

Automated external defibrillators (AEDs) are user-friendly, computerized defibrillators that use voice prompts to lead a rescuer through the steps of defibrillation. Trained rescuers can use AEDs to give a potentially lifesaving electrical shock to a victim’s heart during cardiac arrest.

Early access and use of an AED prior to EMS arrival on scene is important. According to the American Heart Association, “a victim’s chance of survival decreases by seven to ten percent for every minute that passes without defibrillation.” Most studies recommend an AED be applied within four minutes of witnessing a SCA event.

In urban areas, LifeNet’s average response time to deliver an ALS crew to the emergency scene is about 6.5 minutes, and it can take the medical personnel an additional one to two minutes to deliver defibrillation (shock) once at the patient’s side.

In 2019, an AED was used 21 times in LifeNet’s Texarkana Division, 15 times in LifeNet’s Hot Springs Division and three times in LifeNet’s Stillwater Division. Patients who received both pre-arrival CPR and AED shock had a survival rate of 27%, compared to a survival rate of only

17% for patients with a witnessed SCA event where only CPR was performed.

LifeNet has created programs designed to equip lay rescuers with AEDs and train them to perform Bystander CPR and use the device. This helps ensure the people most likely to arrive first at a medical emergency are equipped to help. These people include firefighters, law enforcement and security officers, industrial facility staff, retirement community workers, churchgoers, and others.

LifeNet’s AED Matching Grant Fund asks a not-for-profit partner agency to fund half of the cost of a new Zoll AED, while LifeNet funds the other half. Organizations requesting an AED upon approval of matching funds must schedule an AED training class taught by LifeNet.

LifeNet’s AED Loaner Program allows area nonprofits the opportunity to check-out a loaner AED for business and community events at no cost.



Chain of Survival Link 4: Early Advanced Care

Early advanced care means having highly skilled, qualified, and equipped paramedics who are able to quickly respond to an SCA event and begin treating the victim as soon as possible. LifeNet paramedics can administer drugs, perform

advanced airway procedures, and utilize other interventions and protocols to help stabilize patients who suffer a cardiovascular emergency.

Ideally, advanced cardiovascular care should be available within the first eight minutes of collapse or the onset of symptoms, assuming CPR and early defibrillation were started before EMS arrived on scene. This gives victims the greatest chance of long-term survival. By providing an all Advanced Life Support (ALS) response system, LifeNet ensures a trained paramedic arrives on the scene of each SCA response call.

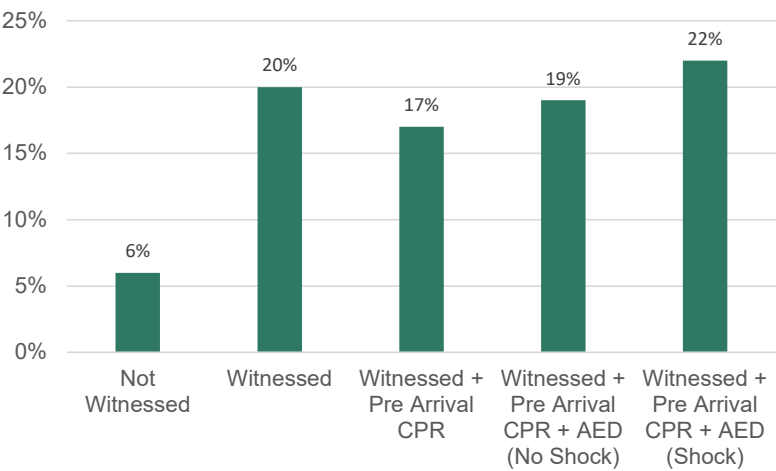


Chain of Survival Link 5: Post Resuscitation Care

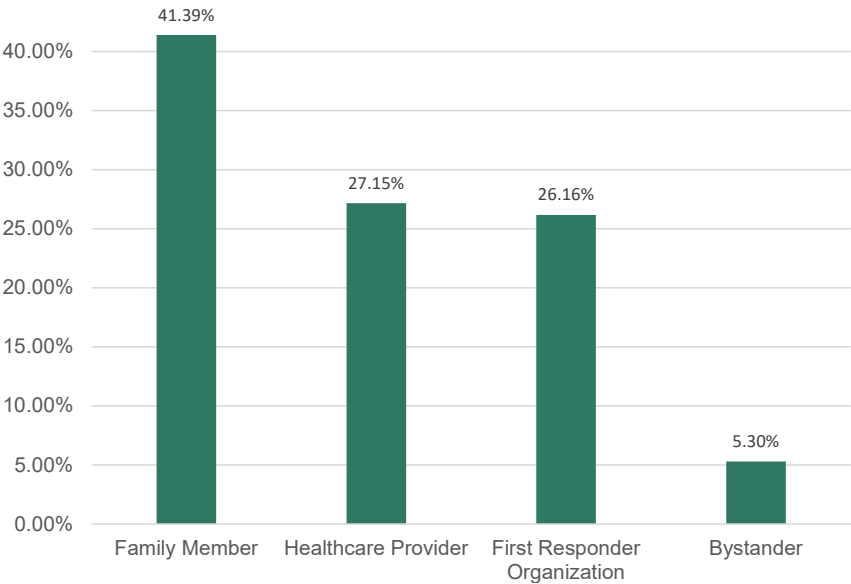
Post-cardiac arrest resuscitation care refers to a comprehensive system of care for patients after ROSC once they arrive at the hospital.



Impact of Pre-Arrival AED & CPR on SCA Survival



Who Performed Pre-Arrival CPR?



SCA in the Workplace

According to a report from the US Occupational Safety & Health Administration (OSHA), there are about 10,000 cardiac arrests in the workplace each year in the United States.

OSHA AED Placement Recommendations

- Installed to ensure response within 3-5 minutes.
- Areas where many people work closely together, such as assembly lines and office buildings
- Close to a confined space
- Areas where electric-powered devices are used.
- Outdoor worksites where lightning may occur
- Health units where workers may seek treatment for heart attack symptoms
- Company fitness units and cafeterias
- Remote sites, such as off-shore drilling rigs, construction projects, marine vessels, power transmission lines, and energy pipe lines

Alarminglly, only 50% of people can locate an automated external defibrillator (AED) at work?

LifeNet offers AED and Bystander CPR classes to groups of 10 or more people at no cost. Learn more by visiting our website at www.LifeNetEMS.org/bcpr-aed-class/



AED Use in 2020

In 2020, an AED was used 10 times in the Texarkana Division, 10 times in the Hot Springs Division, 3 times in Denison, and 2 times in the Stillwater Division. Across all divisions, an AED was present at the scene 145 times. Approximately 22% of attempted resuscitations had an AED deployed prior to the ambulance arrival.

In the urban areas, LifeNet's average response time to the emergency scene is about 6.5 minutes. The delivery of our personnel's defibrillation (shock) once at the "patient's side" is most often within the first 2 minutes.

In some communities and facilities, LifeNet personnel or first responders with AEDs can't reach cardiac arrest victims within the critical four minutes after collapse. For these situations, LifeNet has advocated establishing automated external defibrillator (AED) programs. AED programs equip lay rescuers with AEDs and train them to perform CPR and use AEDs. This helps ensure that the people most likely to arrive first at a medical emergency are equipped to help.

AED Matching Grant

Through LifeNet's AED Matching Grant program, not-for-profit agencies and first responder organizations fund half of the cost of a new Zoll AED, while LifeNet funds the other half. Partner agencies must be non-profit or not-for-profit organizations that reside within LifeNet's ground service areas.

For organizations in Payne County, Oklahoma, the Western Payne County Ambulance Trust Authority (WPCATA) provides a limited number of AEDs at no cost to recipient entities.

Upon approval of matching funds, organizations must:

- Schedule a Bystander CPR & AED Use training class taught by LifeNet
- Present a check to LifeNet for their half of the AED.

To learn more about how to apply for an AED Matching Grant, visit www.LifeNetEMS.org/aed-matching. Organizations not eligible to receive a matching grant can purchase an AED through LifeNet at our bulk discounted rate. To learn more, visit www.LifeNetEMS.org/Zoll or call 903-831-1803.

LifeNet LifeSaver Award

The LifeNet LifeSaver Award recognizes people who have saved a life, regardless of the risk, through the application of first aid knowledge and skills.

Possible nominees include individuals, or groups of individuals who:

- Performed Bystander CPR or applied an AED that resulted in a successful ROSC
- Successfully controlled the bleeding of a patient whose bleeding was life threatening.
- Successfully maintained the airway of a patient whose airway was compromised and life threatening.

To learn more about how to nominate someone for this award visit: LifeNetEMS.org/lifenet-lifesaver-award/

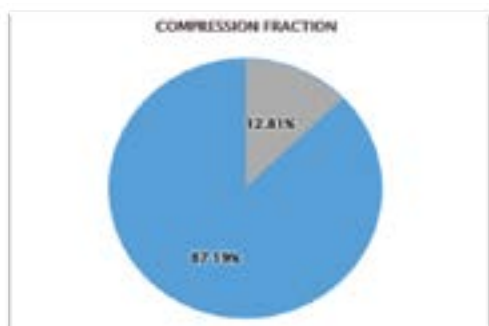
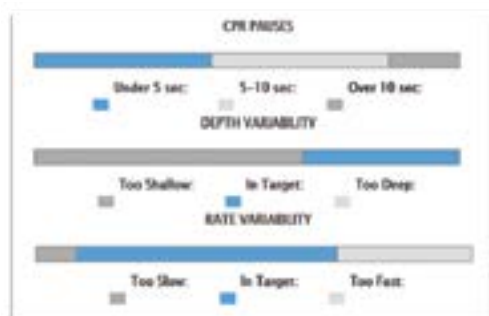


MEASURING CPR EFFICIENCY

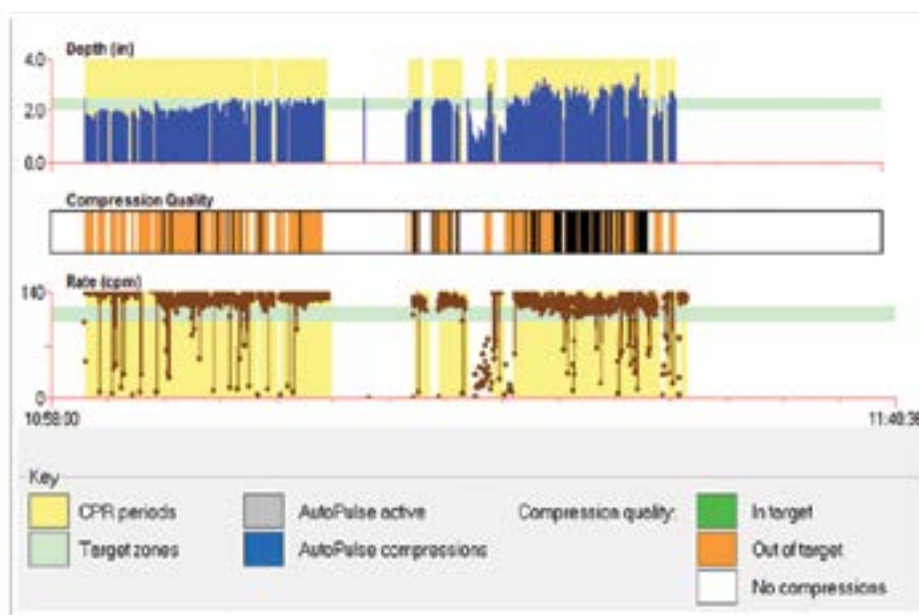
As more is learned about resuscitation science, it has become abundantly clear that CPR quality is the key to improving survival rates for SCA victims. Therefore, capturing and monitoring CPR performance during the event is extremely important.

LifeNet utilizes the the ZOLL X Series® Cardiac monitor/defibrillator. It is equipped with the ability to not only provide real-time CPR quality feedback but to also record the data for review later. Through various visual and audio prompts, the CPR feedback module is designed to help guide the rescuers to provide high quality CPR. In order to facilitate this capability, LifeNet issues feedback capable pads to all area responders for use with their AEDs.

Sample Zoll Online CaseReview® Reports



Once a cardiac arrest event has concluded, the LifeNet field crew can then review their performance via ZOLL's RescueNet Code Review® software on their tablet PC. As a part of LifeNet's ongoing quality improvement initiatives, the field crews also receive feedback from the Quality Improvement department regarding their performance and compliance. An example of a CPR performance report graph is pictured below:



ZOLL Online CaseReview® provides an in-depth look at the performance of resuscitation on a specific patient and can also be used to monitor trends. This program creates charts and graphs that provide an easy to read summary of specific parameters such as compression fraction, CPR pauses, and depth and rate variability. These summarized data can then be passed on to the field crew as part of the quality improvement process.

According to studies and guidelines published by the American Heart Association in 2015, chest compressions should be delivered at a rate of “100-120/min” and “at least 2 inches” in depth. LifeNet Clinical Managers regularly review CPR data and focus improvement efforts on rate, depth, and reducing “hands-off” time when it comes to compressions and avoiding over-ventilation.

INTEGRATED POST CARDIAC ARREST CARE

By using medications designed to help a struggling heart pump more efficiently, post arrest care is essentially a focused treatment plan designed to prevent a person who has been “clinically dead” from suffering the same fate again.

While protocols for post arrest care vary from region to region, several treatments are considered to be the “standard of care.” Mainstays of this treatment plan include: appropriate oxygenation and ventilation, vasopressor agents and glucose evaluation and control.

In an effort to stabilize the patient post arrest, LifeNet personnel focus on obtaining a 12 lead ECG, administering vasopressor agents, providing ventilatory support, and monitoring dextrose evaluations.

Once a patients’ heartbeat has been restored (ROSC), the focus then becomes maintaining the heartbeat. Paramedics perform a series of evaluations, including blood pressure

management. When the blood pressure is too low, vasopressor agents (such as Dopamine) are infused into the patient to achieve a higher blood pressure.

LifeNet field staff also utilize End-Tidal CO₂ (ETCO₂) as a guide while treating the SCA patient. Generally speaking, a victim of SCA will often have a low ETCO₂ reading. When this measurement rebounds, it can be the first sign that the patient has achieved ROSC. ETCO₂ is also a good tool for managing ventilations when the patient is not breathing on his or her own.

Obtaining a 12 lead ECG is important in the post-arrest care of an SCA victim. The 12 lead can show heart muscle ischemia and damage and may point to what caused the SCA event to begin with. This information is critical and can be transmitted to the receiving hospital from the monitor prior to EMS arrival. This heads-up gives the hospital staff time to prepare the cath lab to receive the patient.



MEDICAL DIRECTION

Clinical Oversight and Direction

Medical Direction is the key to LifeNet's success in the field. LifeNet has four medical directors who each approve medical protocols and determine those which are standing-orders as opposed to those which require online approval. LifeNet EMTs and paramedics operate vicariously through the medical director with the establishment of Clinical Protocols and Procedures.

LifeNet encourages a strong reliance on standing-order protocols that are best practices and evidence-based. However, the Medical Directors can determine those protocols and procedures that require direct approval by a physician. Receiving facility physicians are the primary source for online medical direction for most patient encounters. LifeNet's Medical Directors can serve as an online resource for unique situations, when appropriate. LifeNet's Medical Directors maintain relationships with area peers involved in patient care and communicate adjustments in clinical approach, equipment, and technologies.

The Medical Director has the final authority regarding the clinical privileges of field staff and can remove privileges if a clinical performance concern cannot be addressed satisfactorily through education and training from support staff. The mechanisms LifeNet employs to monitor individual and system performance are intended to avoid such situations.

LifeNet utilizes a Clinical Steering Committee (CSC) to direct clinical and quality initiatives within the company and to monitor the performance of the LifeNet systems as a whole. Participants include key contributors from each division who are routinely involved in, or responsible for, quality improvement and clinical development. These include regional Medical Directors, Clinical Managers, Operations Directors, Leads for each Communications Center and General Managers. Ad-hoc contributors include Field Training Officers or any field staff involved in research, QI, or technology implementation. Examples of CSC activities include: protocol development, research, facilitation of medical device trials, and advising the LifeNet Board and CEO regarding purchase decisions for clinical enhancement. Each meeting involves ongoing review of quality initiatives and system performance so that trends identified in any one region may be compared to those of others and with peer agencies in data-sharing opportunities.

LifeNet strives to maintain relative consistency in clinical approach among regions. However, each Medical Director is at liberty to approve or facilitate variation from those norms when they better fit the practices or expectations of regional medical communities. The activities and outcomes of the CSC go hand-in-hand with Medical Advisory Boards (or their equivalent) in each region. Information shared between those groups mutually contributes to the foundation of appropriate medical care and oversight.

Matthew Young, MD

Medical Director, Texarkana Division

Dr. Young is the current Medical Director of Emergency Services for Texarkana Emergency Center. He has actively served on the Bioterrorism/Disaster Planning Committee, Texarkana College EMS Advisory Board, and the LifeNet Medical Advisory Committee. He was appointed to a non-funded position as the Medical Director of the Texarkana College EMS Program and is a member of the American Medical Association, American College of Emergency Physicians, Texas Medical Association, Bowie County Medical Society, the National Congressional Committee Physician's Advisory Board, and the National Association of EMS Physicians.

Patrick Cody, DO

Medical Director, Stillwater Division

Dr. Cody is a board certified emergency physician within the Norman Regional Health System. He is the program director for the Osteopathic Emergency Medicine Residency Program and the Medical Director for EMSStat ambulance service (Norman, OK), the City of Norman Fire Department, the City of Norman Communications Center, the Oklahoma City Community College EMS program and the Gomer Jones Cardiac Care Clinic inside the University of Oklahoma Gaylord Family Stadium. He is also the physician for the Norman Police Department SWAT team. His research interests are focused on pre-hospital care and its intersection with disaster medicine.

Karl Wagenhauser, MD

Medical Director, Hot Springs/Garland County

Dr. Wagenhauser serves as Medical Director for the Hot Springs Fire Department and AED program. He is a licensed physician specializing in Emergency Medicine and is currently on staff at CHI St. Vincent Hospital in Hot Springs. He is Board Certified in Emergency Medicine and a Fellow of the American College of Emergency Physicians. No stranger to EMS, he cultivated an interest in prehospital care early in his career, working as an EMT-Intermediate for his college ambulance service while still an undergraduate. He was one of the first two physicians in the State of Arkansas to successfully complete the EMS Certificate Examination, a subspecialty certification recognized by the American Board of Emergency Medicine.

Andrew Bryan, MD

Medical Director, Malvern/Hot Spring County

Dr. Bryan attended medical school at the University of Arkansas for Medical Sciences and did his residency at Louisiana State University Emergency Medicine. He is Board Certified in Emergency Medicine through the American Board of Emergency Medicine and active in the American College of Emergency Physicians. Dr. Bryan is currently on staff at CHI St. Vincent Hospital in Hot Springs as well as Baptist Health Medical Center-Hot Spring County.

LIFENET'S 2020 SCA SURVIVAL RATE DATA

System-Wide 2020 SCA Data

Since 2005, LifeNet has classified all instances of SCA using the Utstein Style for uniform reporting of cardiac arrest. The term "Utstein style" is synonymous with consensus reporting guidelines for resuscitation. It originated from an international multidisciplinary meeting held at the Utstein Abbey near Stavanger, Norway, in June 1990.

The Utstein Style was first proposed for emergency medical services in 1991 to provide a uniform method of collecting and reporting cardiac arrest statistics. By using these quality improvement strategies, we are not only able to measure our success nationally, but we are also able to use the information to assist in planning and education.

Data is collected using information from our electronic patient care reports (ePCRs) prepared by LifeNet paramedics. Clinical managers extract the data from ePCRs used to document a SCA event and then sift through that data to collect the needed information. Additionally, each division's clinical manager follows up on each patient transported to find out if he or she survived to discharge.

System-wide, 929 adult patients (less than 1% of LifeNet's service area's population of 288,020) were recorded as having sudden death out of the hospital. This number includes all unresponsive, breathless, and pulseless adult patients that stimulated 911 activation.

In the LifeNet system, resuscitation is not attempted on patients with obvious signs of death, patients with a valid out-of-hospital DNR, or any patient that is believed to be not viable (no reasonable expectation of survival). When a patient is believed to be viable, aggressive resuscitation efforts are performed until the patient has ROSC and is transported or the efforts are deemed futile and the resuscitative efforts are terminated. In some circumstances, a patient may be transported while resuscitation is ongoing.

Of the 1,186 SCA patients LifeNet responded to in 2020, resuscitations were attempted on 470 (40%) with 281 patients (60%) transported to the hospital while 189 patients (40%) ended with field terminations.

Return of Spontaneous Circulation (ROSC) occurred in 160 patients (34%). ROSC is resumption of sustained, perfusing cardiac activity after cardiac arrest. Signs of ROSC include breathing, coughing, or movement and a palpable pulse or a measurable blood pressure.

A total of 70 patients survived to hospital discharge. The overall survival percentage for LifeNet EMS in 2020 is 15%.

LifeNet measures and reports its survival percentage based on all cardiac arrests. Other systems measure and report their survival percentage based only on "witnessed - v-fib" arrests. Using this format, LifeNet's 2020 survival percentage is 33%.

As noted earlier in this report, LifeNet understands the importance of building the Chain of Survival in the community to improve survival rates. In Seattle, Washington, where CPR training is widespread and EMS response and time to defibrillation is short, the survival rate for witnessed - v-fib cardiac arrest is reported to be about 50%. In New York City, where few victims receive bystander CPR and time to EMS response and defibrillation is longer, survival from sudden witnessed - v-fib cardiac arrest has been reported as low as one to two percent.





Texarkana 2020 SCA Data

Texarkana, Arkansas

- 123 SCA Victims
- 51 Attempted Resuscitations
- 8 Patients Survived to Discharge
- 16% Survival Rate

Texarkana, Texas

- 196 SCA Victims
- 65 Attempted Resuscitations
- 11 Patients Survived to Discharge
- 17% Survival Rate



Hot Springs 2020 SCA Data

Hot Springs, Arkansas

- 156 SCA Victims
- 74 Attempted Resuscitations
- 13 Patients Survived to Discharge
- 18% Survival Rate

Hot Springs Village, Arkansas

- 29 SCA Victims
- 10 Attempted Resuscitations
- 0 Patients Survived to Discharge
- 0% Survival Rate

Malvern, Arkansas

- 78 SCA Victims
- 25 Attempted Resuscitations
- 1 Patients Survived to Discharge
- 4% Survival Rate

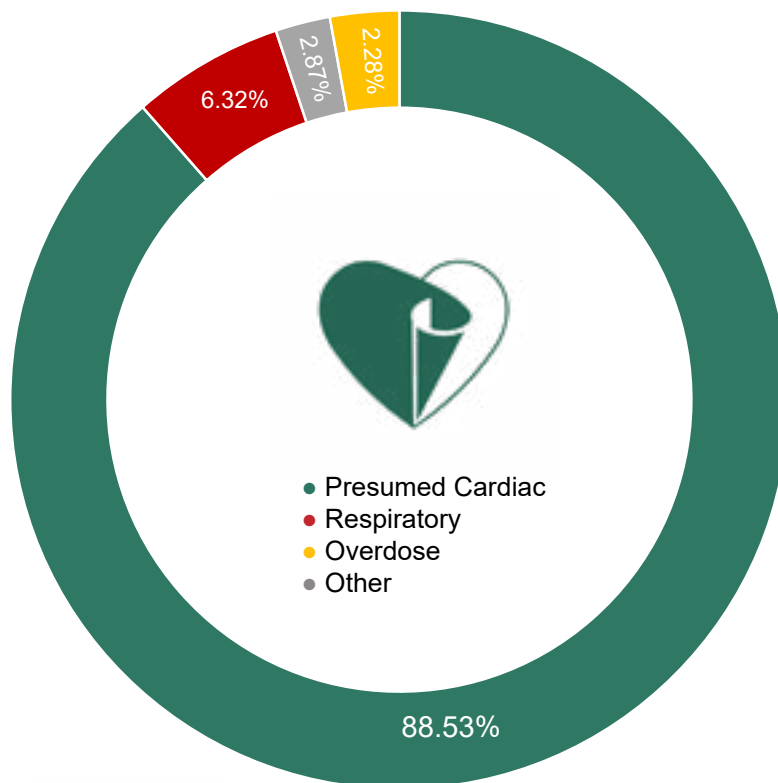


Stillwater 2020 SCA Data

Stillwater, Oklahoma

- 82 SCA Victims
- 19 Attempted Resuscitations
- 12 Patients Survived to Discharge
- 23% Survival Rate

Origin of SCAs System Wide in 2020



703
Men



483
Women

Of the 1,186 SCA events LifeNet responded to during 2020, 88.53% were presumed to have started from a cardiac issue, 8.32% from a respiratory issue, and 2.28% were from an overdose. Men accounted for 703 SCA victims, while 483 women were SCA victims.

Witnessed vs. Non-Witnessed SCA Events

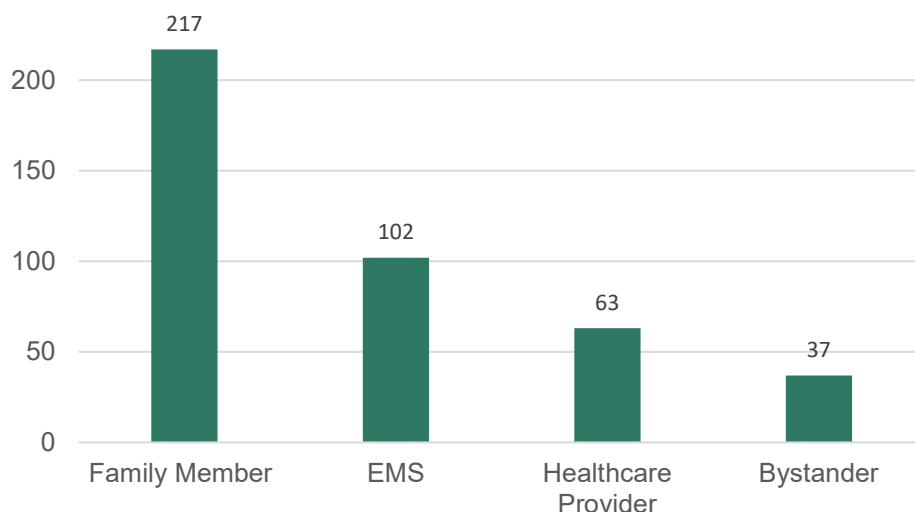
Of the 1,186 SCA events in 2020, 767 were not witnessed, while 419 were witnessed. Of the witnessed events, 217 were witnessed by a family member, 37 by a layperson bystander, and 63 by another healthcare provider. In 102 of the SCA events, EMS was on scene prior to the arrest and witnessed the event.



353
Witnessed



576
Not-Witnessed



System-Wide SCA Results by Year

Criteria	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Non-Traumatic SCD	447	610	610	641	690	622	745	825	801	913	846	918	947	929	1186
Resuscitations NOT Attempted	261	388	403	446	473	436	494	529	520	593	532	539	567	517	716
	58%	64%	66%	70%	68%	70%	66%	64%	65%	65%	63%	59%	60%	56%	60%
Resuscitations Attempted	186	222	207	195	217	186	251	296	281	320	314	379	380	412	470
	42%	36%	34%	30%	31%	30%	34%	36%	35%	35%	37%	41%	40%	44%	40%
Resuscitation Attempts Transported to ED	131	154	155	141	147	131	175	206	188	211	211	228	231	251	281
	70%	69%	75%	72%	68%	70%	70%	70%	67%	66%	67%	60%	61%	61%	60%
Resuscitation Attempts that ended in Field Termination	55	68	52	54	70	55	76	90	93	109	103	151	149	161	189
	30%	31%	25%	28%	33%	70%	30%	30%	33%	34%	33%	40%	39%	39%	40%
Resuscitation Attempts that achieved ROSC	47	67	85	75	84	70	107	116	111	132	131	130	146	150	160
	25%	30%	41%	38%	39%	38%	43%	39%	40%	41%	42%	34%	38%	36%	35%

SCA Disposition 2020 by Division

Criteria	Hot Springs	Texarkana	Stillwater	Denison	System
Total Patients Recorded	435	546	100	105	1186
Total DOS	256	355	40	65	716
Total Resuscitations Attempted	179	191	60	40	470
Transported to ED	120	107	28	26	281
Total Field Terminations	59	84	32	14	189
Total Patients with ROSC	58	72	19	11	160
Survived to Discharge	23	30	12	5	70
Pct Survived to Discharge	13%	16%	20%	13%	15%

System-Wide Witnessed V-Fib Survival Percentages

Service Area	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Texarkana, USA	27%	20%	33%	17%	28%	29%	42%	32%	21%	38%	32%	38%
Hot Springs, AR	23%	22%	40%	27%	57%	50%	47%	27%	22%	46%	32%	25%
Texarkana Division	21%	20%	29%	24%	27%	40%	31%	30%	19%	33%	29%	34%
Hot Springs Division	16%	20%	28%	27%	45%	40%	39%	41%	25%	29%	32%	19%
Payne County Division	n/a	n/a	n/a	50%	27%	50%	0%	57%	50%	8%	33%	83%
Denison, TX	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	29%
LifeNet System	20%	20%	28%	27%	34%	41%	23%	36%	25%	28%	32%	33%

Neurological Outcome Results by Division

Criteria	Hot Springs	Texarkana	Stillwater	Denison	System
Total Patients Recorded	435	546	100	105	1186
Total Resuscitations Attempted	179	191	60	40	470
Total Discharged from Hospital	23*	30	12	5	70*
Good Neurological Outcome	11	21	10	4	46
Fair Neurological Outcome	7	3	0	1	11
Poor Neurological Outcome	4	6	2	0	12

*= unknown neurological outcome

• Good Neurological Outcome

Indicates the patient returned to pre-arrest function with minor or no deficits.

• Fair Neurological Outcome

Indicates the patient has some significant disabilities as a result of the SCA event.

• Poor Neurological Outcome

Indicates that the patient is neurologically devastated as a result of the SCA event.

2020 Sudden Cardiac Arrest Survivor Data

Date	Region	Resp Time	Age	Gender	Witnessed by	AED Used	Initial Rhythm	Destination	Neuro
2/3/2020	HS	0:12	52	F	Family Member	Yes, w/o Defib	PEA	SVH	Fair
2/13/2020	TXK	0:04	33	F	HCP	Yes, w/o Defib	VF	WRMC	Poor
2/17/2020	HS	0:03	64	M	Family Member	No	PEA	SVH	Poor
2/18/2020	TXK	0:04	70	M	Bystander	No	VF	CSMH	Good
2/22/2020	TXK	0:01	79	M	HCP	No	VF	PRMC-North	Fair
2/25/2020	HS	0:11	55	F	Bystander	No	OLR	SVH	Good
2/25/2020	TXK	0:07	75	F	LifeNet EMS	No	VF	WRMC	Good
3/1/2020	SWO	0:06	62	M	LifeNet EMS	No	PEA	SMC	Good
3/1/2020	TXK	0:09	54	M	Family Member	No	ULR	CSMH	Good
3/4/2020	TXK	0:09	46	M	LifeNet EMS	No	VF	CSMH	Good
3/6/2020	HS	0:03	37	M	Family Member	No	VF	SVH	Poor
3/8/2020	TXK	0:21	73	M	LifeNet EMS	No	VF	WRMC	Poor
3/9/2020	HS	0:13	81	M	LifeNet EMS	No	PEA	NPH	Fair
3/11/2020	TXK	0:11	67	M	LifeNet EMS	No	VT	LZ	Good
3/17/2020	TXK	0:06	74	M	Family Member	No	VT	WRMC	Fair
3/20/2020	Denison	0:06	66	F	HCP	Yes	VF	TMC	Fair
3/23/2020	HS	1:59	43	F	HCP	No	PEA	BMC-LR	Poor
4/4/2020	SWO	0:05	72	M	Family Member	No	PEA	SMC	Good
4/5/2020	TXK	0:19	80	F	Family Member	No	ULR	NCMC	Good
4/7/2020	TXK	0:07	79	F	HCP	Yes, w/o Defib	AED NS	CSMH	Good
4/7/2020	TXK	0:05	65	M	HCP	Yes, w/o Defib	ULR	CSMH	Good
4/14/2020	TXK	0:06	54	M	Not Witnessed	No	PEA	WRMC	Good
4/20/2020	HS	0:05	56	M	HCP	No	VF	SVH	Fair
4/27/2020	TXK	0:06	41	M	LifeNet EMS	No	PEA	WRMC	Good
5/2/2020	SWO	0:07	84	M	Not Witnessed	No	VF	SMC	Good
5/4/2020	TXK	0:19	61	M	Family Member	Yes, w/o Defib	PEA	CSMH	Good
5/12/2020	SWO	0:11	52	F	LifeNet EMS	No	Asystole	SMC	Good
5/13/2020	TXK	0:08	55	F	Family Member	No	PEA	PRMC	Good
5/20/2020	TXK	0:10	66	M	HCP	No	AED NS	CSMH	Good
5/20/2020	SWO	0:08	48	M	LifeNet EMS	No	VF	SMC	Good
5/23/2020	TXK	0:05	63	F	HCP	Yes, w/o Defib	AED NS	CSMH	Good
5/24/2020	HS	0:10	55	M	Not Witnessed	No	VT	SVH	Good
5/28/2020	HS	0:07	57	M	LifeNet EMS	No	Asystole	SVH	Good
5/29/2020	Denison	0:08	44	F	LifeNet EMS	Yes	Asystole	TMC	Good
6/2/2020	TXK	0:05	61	F	HCP	Yes, w/o Defib	Asystole	WRMC	Poor
6/2/2020	HS	0:12	34	M	HCP	No	OLR	SVH	Fair
6/5/2020	HS	0:08	89	M	LifeNet EMS	No	VT	NPH	Good
6/5/2020	Denison	0:04	49	M	Family Member	Yes	VF	TMC	Good
6/6/2020	HS	0:07	69	M	HCP	No	PEA	NPH	Good
6/8/2020	TXK	0:06	81	F	LifeNet EMS	No	PEA	WRMC	Good
6/14/2020	SWO	0:06	55	F	Family Member	No	VF	SMC	Good
6/21/2020	SWO	0:15	68	M	LifeNet EMS	No	OLR	SMC	Good
6/24/2020	Denison	0:06	85	M	LifeNet EMS	Yes	PEA	TMC	Good
6/27/2020	HS	0:10	22	F	LifeNet EMS	No	Asystole	NPH	Good

Across the LifeNet System, we resuscitated 70 patients from clinical death to ultimately be discharged from the hospital. Forty-six (46) of these survivors were reported to have good neurological function. “Good” neuro outcome is equivalent a CPC 1. “Fair” neuro outcome is equivalent a CPC 2. “Poor” neuro outcome is equivalent to CPC 3 and CPC 4

Date	Region	Resp Time	Age	Gender	Witnessed by	AED Used	Initial Rhythm	Destination	Neuro
7/4/2020	TXK	0:04	79	F	LifeNet EMS	No	PEA	WRMC	Fair
7/5/2020	HS	0:09	37	M	Not Witnessed	No	OLR	SVH	Good
7/9/2020	TXK	0:05	29	M	Bystander	No	VF	CSMH	Good
7/16/2020	HS	0:12	40	M	Not Witnessed	Yes, with Defib	OLR	SVH	Fair
7/18/2020	HS	0:05	68	M	Not Witnessed	Yes, w/o Defib	AED NS	SVH	Fair
7/26/2020	SWO	0:06	28	F	Family Member	No	VF	SMC	Good
7/31/2020	Denison	0:05	39	F	Not Witnessed	Yes	PEA	TMC	Good
8/14/2020	SWO	0:04	53	M	Family Member	No	VF	SMC	Good
8/16/2020	HS	0:06	44	M	Family Member	No	OLR	SVH	Unk
8/20/2020	TXK	0:06	71	M	Family Member	Yes, w/Defib	VT	WRMC	Good
8/25/2020	TXK	0:34	70	M	LifeNet EMS	No	Asystole	PRMC	Poor
8/26/2020	TXK	0:06	64	M	Bystander	No	Asystole	WRMC	Poor
10/5/2020	SWO	0:02	38	M	LifeNet EMS	No	PEA	LZ	Poor
10/29/2020	HS	0:07	70	F	HCP	Yes, w/Defib	VT	SVH	Good
11/3/2020	SWO	0:06	67	M	Not Witnessed	No	Asystole	SMC	Poor
11/13/2020	HS	0:03	41	F	Bystander	No	OLR	SVH	Good
11/15/2020	HS	0:17	75	M	Family Member	No	Asystole	BMC	Fair
11/21/2020	TXK	0:06	33	M	Bystander	No	PEA	WRMC	Good
11/23/2020	HS	0:06	75	M	Not Witnessed	No	PEA	SVH	Poor
11/26/2020	TXK	0:16	78	F	Family Member	No	PEA	WRMC	Poor
11/30/2020	SWO	0:06	48	M	LifeNet EMS	No	VF	SMC	Good
12/4/2020	TXK	0:11	69	M	LifeNet EMS	No	VF	CSMH	Good
12/4/2020	TXK	0:08	38	M	Family Member	Yes, w/o Defib	OLR	CSMH	Good
12/12/2020	HS	0:13	79	M	Not Witnessed	No	OLR	NPH	Good
12/13/2020	TXK	0:03	56	M	LifeNet EMS	No	PEA	WRMC	Good
12/29/2020	HS	0:15	64	M	Family Member	Yes, w/ Defib	Asystole	SVH	Good

Appendix Key

Asystole

Absence of Electrical Activity

“Good” Neuro Outcome

Equivalent to a CPC 1

“Fair” Neuro Outcome

Equivalent to a CPC 2

“Poor” Neuro Outcome

Equivalent to a CPC 3 and CPC 4

PEA

Pulseless Electrical Activity

VT/VF

(Pulseless) Ventricular Tachycardia
/ Ventricular Fibrillation

Appendix Notes

Hot Springs Division

Includes data for all calls run within the Hot Springs Division. This area includes Garland County, part of Hot Spring County, and all of Hot Springs Village.

Hot Springs, AR

Includes data for all calls run in Hot Springs, AR.

Hot Springs Village, AR

Includes data for all calls run in Hot Springs Village, AR.

Malvern, AR

Includes data for all calls run in Malvern, AR.

Stillwater Division

Includes data for all calls run within the Stillwater Division. This area includes Western Payne County, OK.

Appendix Notes

System Wide

Includes data for all calls run across all of LifeNet's service areas.

Denison, TX

Includes data for all calls run in Denison, TX.

Texarkana, USA

Includes data for all calls run in Texarkana, TX and Texarkana, AR.

Texarkana, TX

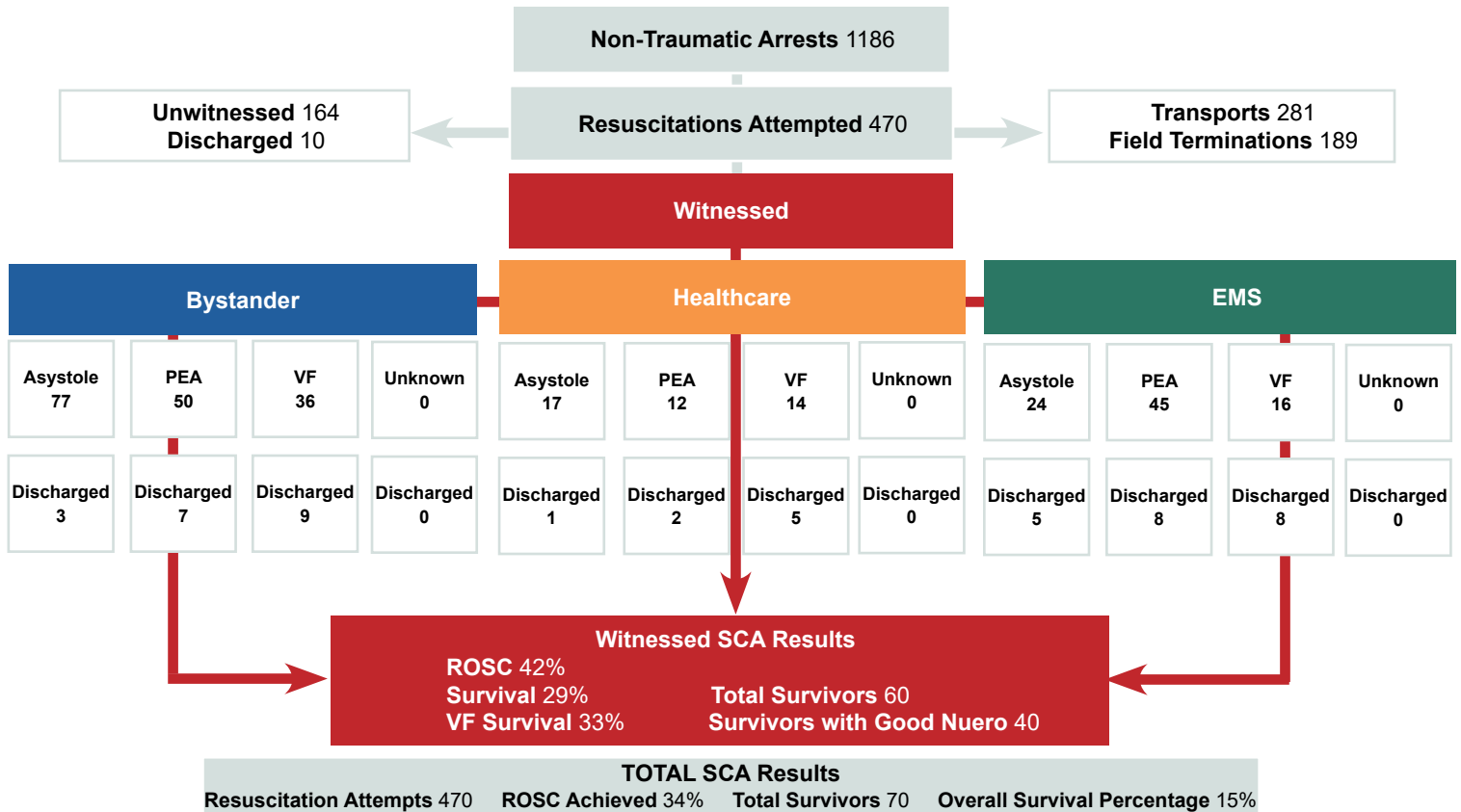
Includes data for all calls run in only Texarkana, TX.

Texarkana Division

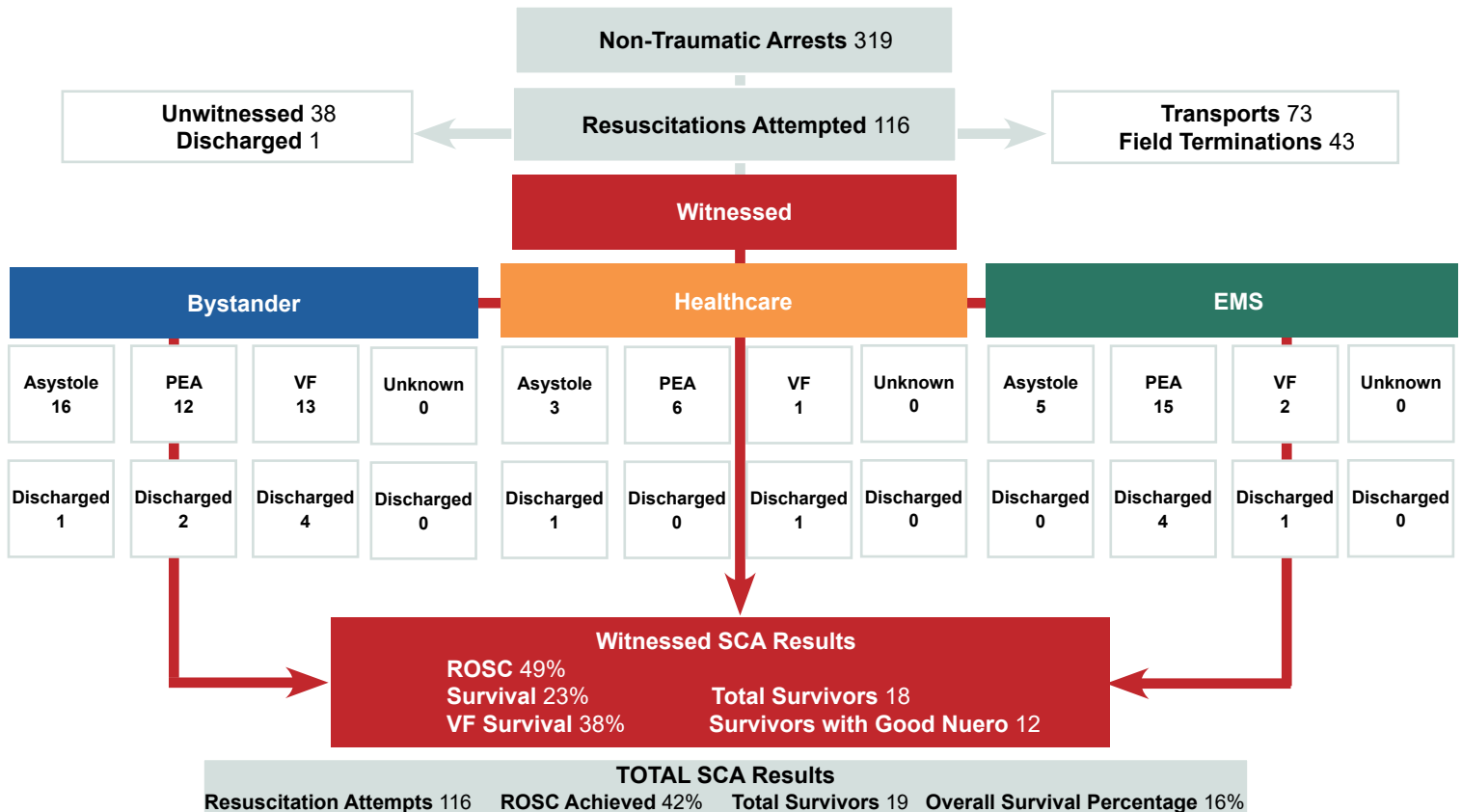
Includes data for all calls run within the Texarkana Division. This area includes Miller County in Arkansas along with Bowie, Red River, and parts of Cass County in Texas.

APPENDIX

System Wide (Adult - Medical)

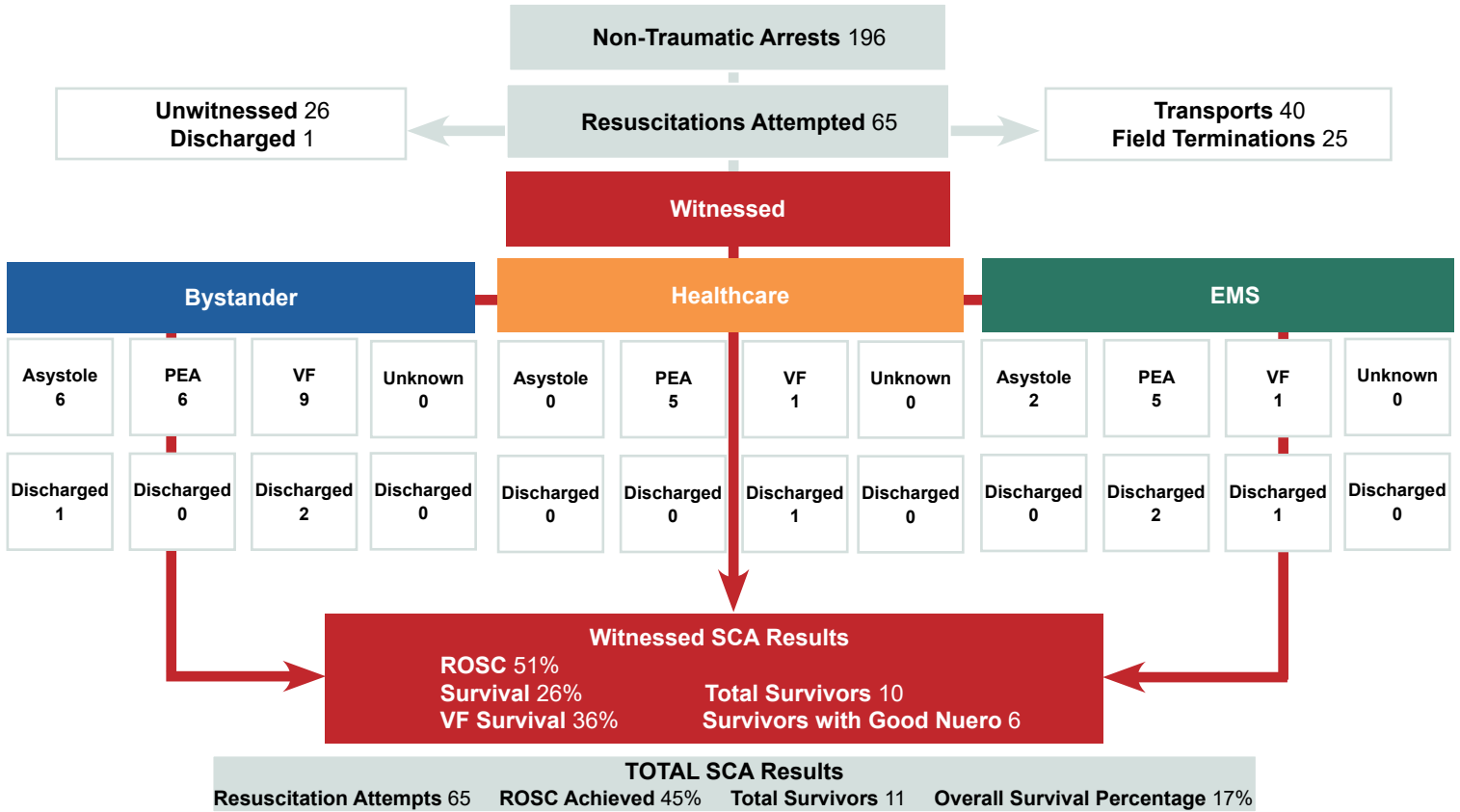


Texarkana, USA (Adult - Medical)

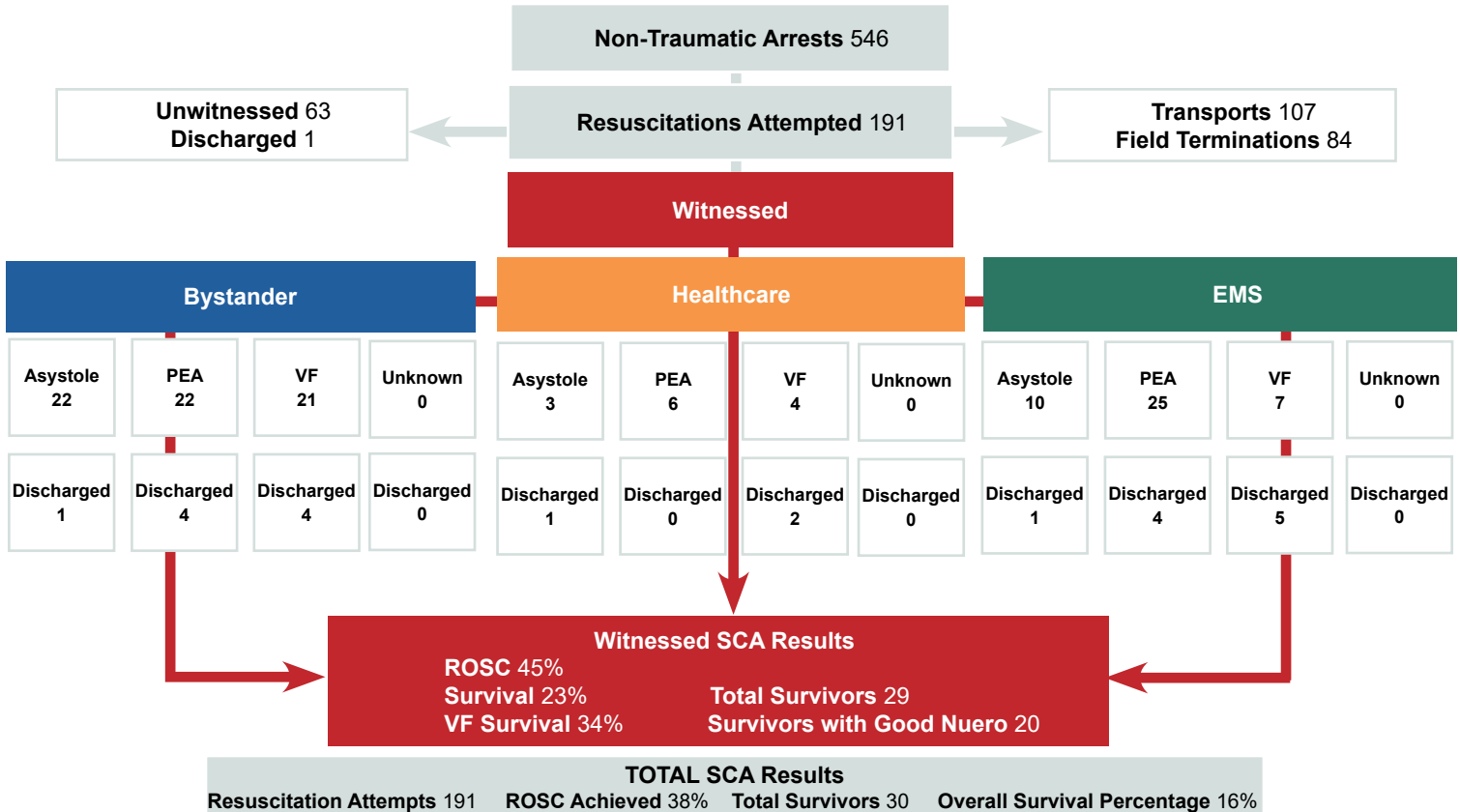


APPENDIX

Texarkana, Texas (Adult - Medical)

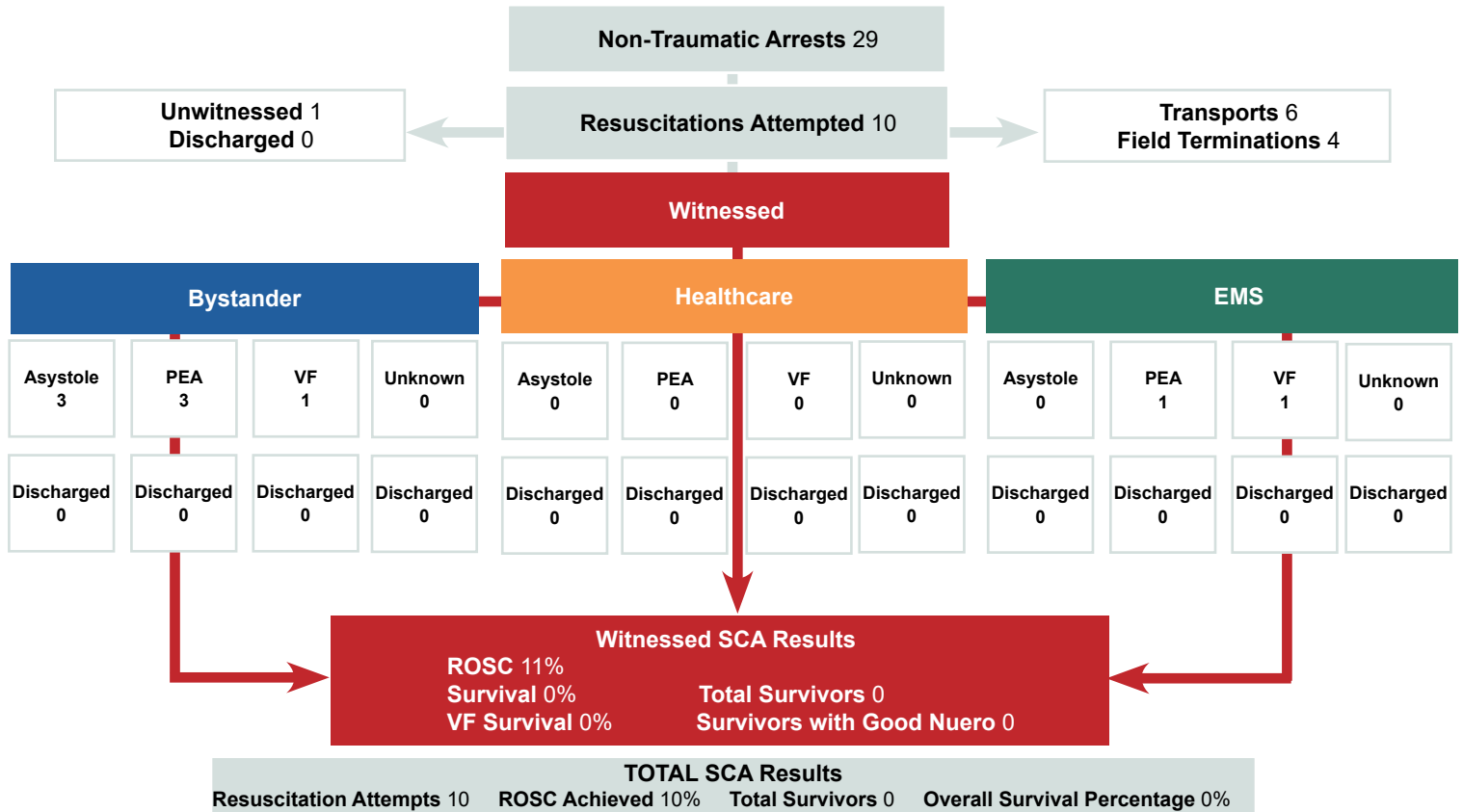


Texarkana Division (Adult - Medical)

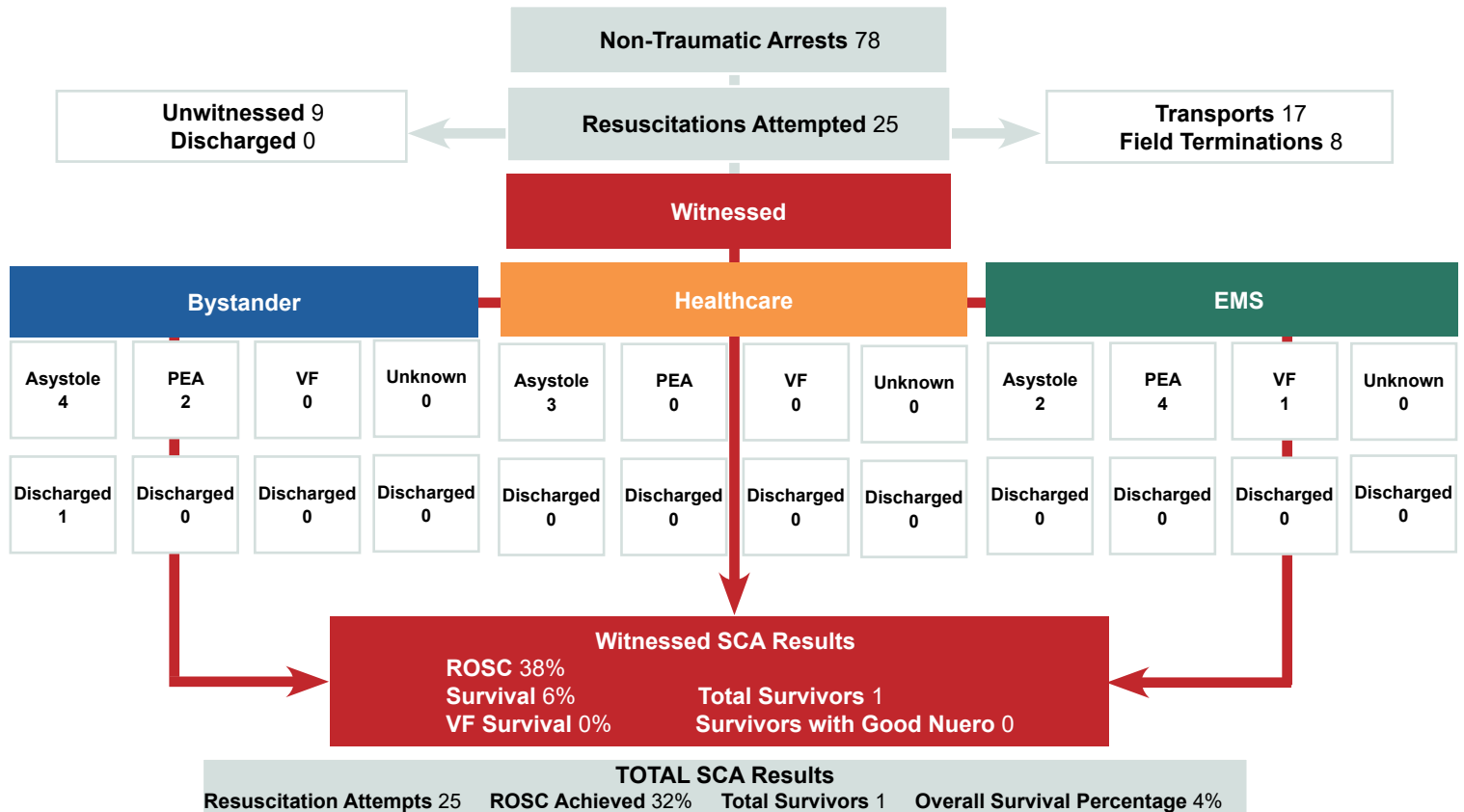


APPENDIX

Hot Springs Village, Arkansas (Adult - Medical)

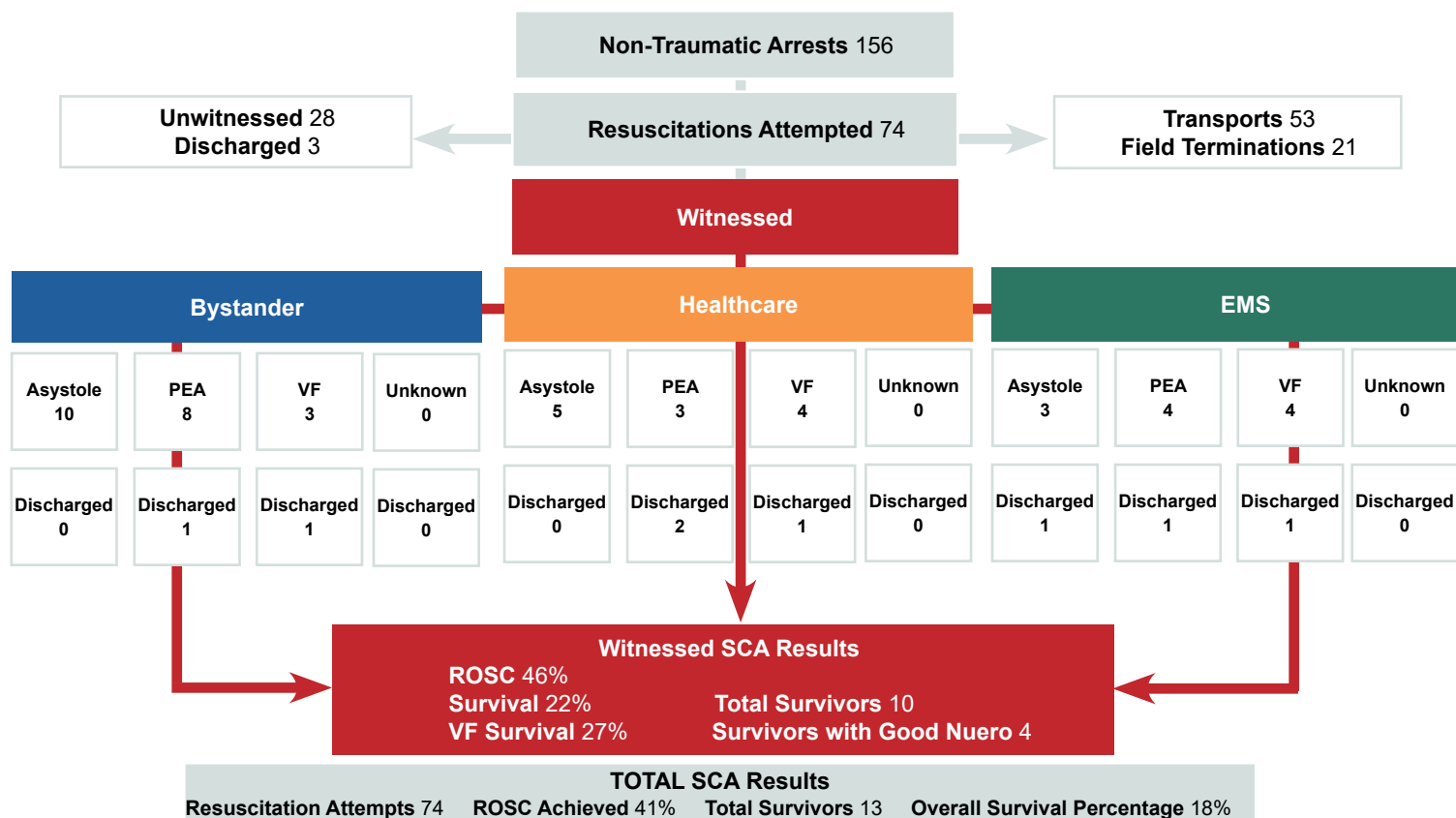


Malvern, Arkansas (Adult - Medical)

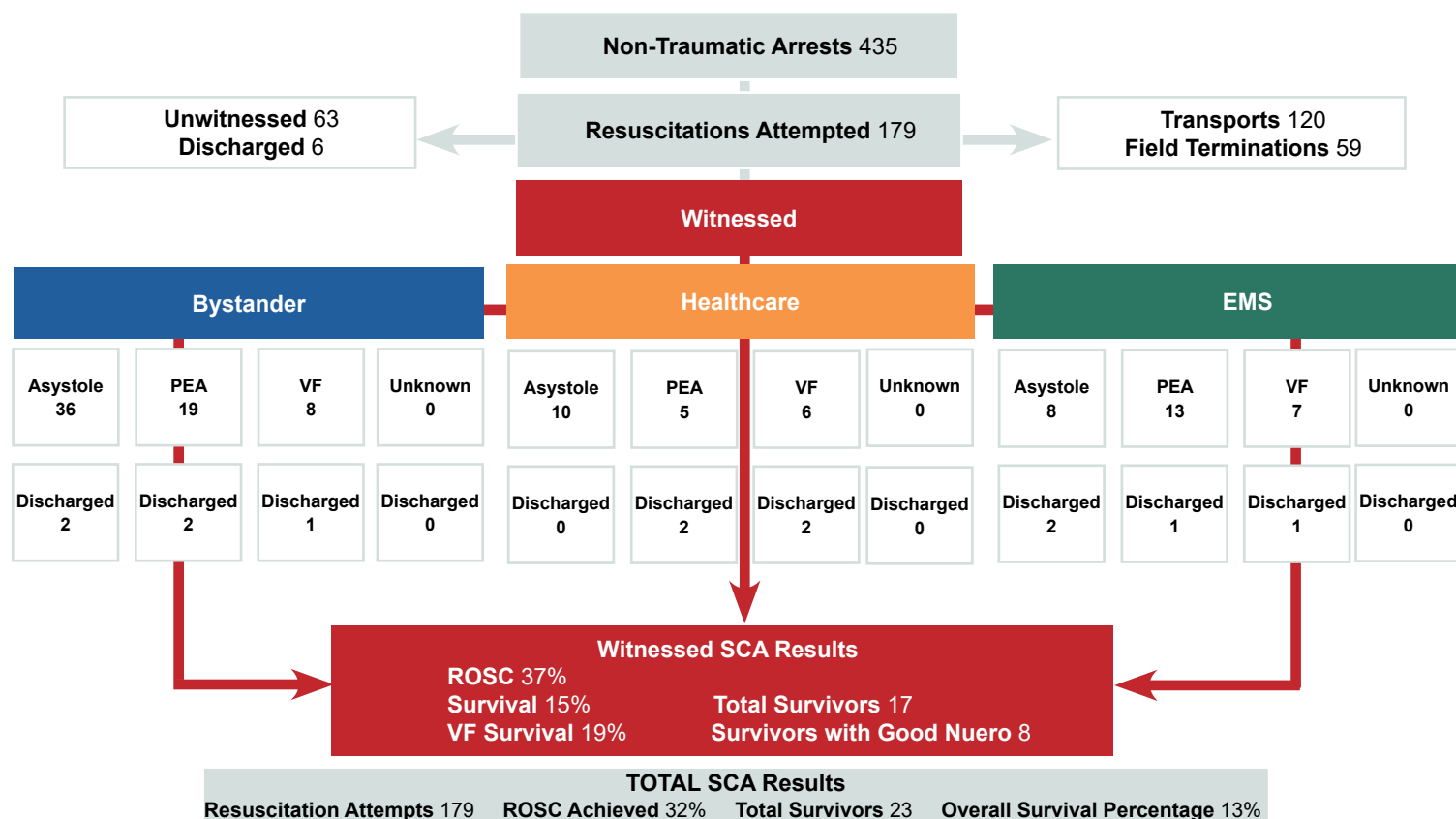


APPENDIX

Hot Springs, Arkansas (Adult - Medical)

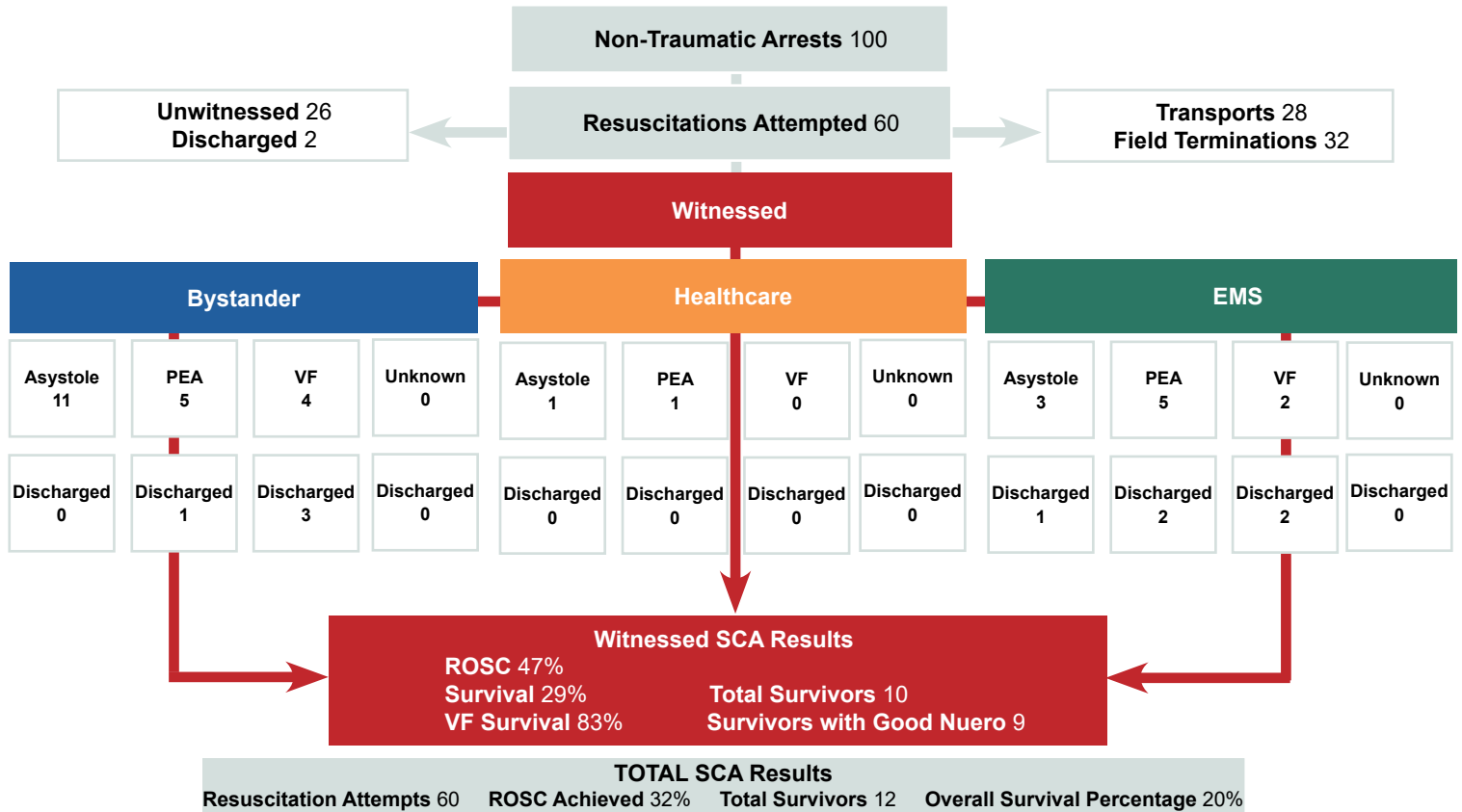


Hot Springs Division (Adult - Medical)

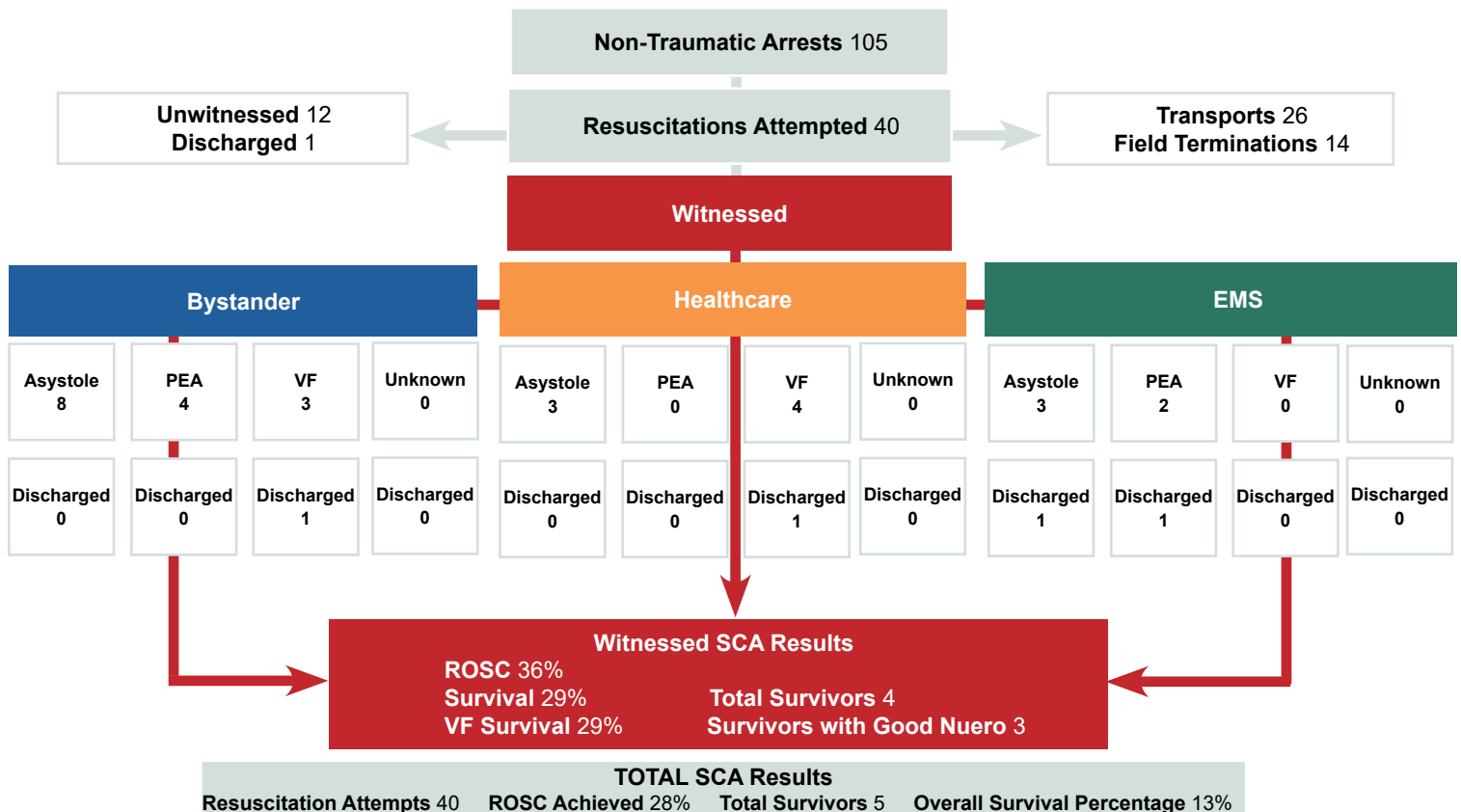


APPENDIX

Stillwater Division (Adult - Medical)



Denison, TX (Adult - Medical)



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