



# **LIFENET**

**2018 ANNUAL SUDDEN CARDIAC ARREST REPORT**



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*The process of saving a life from cardiac arrest involves everyone. Bystanders, CPR, and the use of AED's at the scene are the real lifesavers. EMS professionals and the hospitals continue the care. It takes everyone in the chain of survival to maintain the survival of our patients.*

*Matt Young, M.D.  
Medical Director  
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# EXECUTIVE SUMMARY

Sudden Cardiac Arrest (SCA) is one of the leading causes of death and a major public health problem in the United States. Since 2005, LifeNet, Inc. has used the Utstein Style to measure and report on cardiac arrest data. As part of this process, 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 an SCA event that is witnessed by another person generally have the best chance of survival because someone is present to summon EMS, thus beginning the steps in the “Chain of Survival”.

Once a LifeNet medical crew makes contact with an SCA victim, they must determine if the patient has any reasonable chance of survival. When the paramedics determine a patient may have a chance to survive, and that no obvious reasons to withhold treatment are present, they initiate an aggressive resuscitation attempt. This 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 2018, LifeNet, Inc. ambulances responded to 947 non-traumatic SCA events. ALS resuscitation was attempted on 380 (40%) of those SCA events. Of the 380 resuscitation attempts, 231 patients (61%) were transported to the hospital while 149 resuscitation attempts (39%) ended with field terminations. There were 56 patients (15%) who survived to hospital discharge. The national average in this overall survival category is 8% to 10%.

**In the Texarkana Division**, resuscitation was attempted on 166 of the 479 patients who suffered a SCA. These attempts include 84 transports and 82 field terminations. There were a total of 55 patients who had ROSC, while 24 patients survived to discharge, for a survival of 14%.

**In the Hot Springs Division**, resuscitation was attempted on 165 of the 376 patients who suffered a SCA. These attempts include 118 transports and 47 field terminations. There were a total of 72 patients who had ROSC, while 28 patients survived to discharge, for a survival of 17%.

**In the Stillwater Division**, resuscitation was attempted on 49 of the 92 patients who suffered a SCA. These attempts include 29 transports and 20 field terminations. There were a total of 19 patients who had ROSC, while four patients survived to discharge, for a survival of 8%.

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. For example, New York, NY reports a survival percentage of 2%-3%, while Seattle, WA reports in the range of 50%. LifeNet’s Witnessed V-Fib survival percentage for 2018 is 28%.

## LifeNet System Wide 2018 SCA Statistics



**947**

Non-Traumatic SCA events LifeNet responded to in 2018



**40%**

LifeNet attempted ALS resuscitation on 380 SCA patients



**61%**

LifeNet transported 231 SCA patients to the hospital



**39%**

149 resuscitation attempts ended in field terminations



**15%**

56 SCA patients survived to hospital discharge



**8-10%**

National average of patients surviving to discharge



**28%**

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 respirations.

## **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**

*(formerly dead on scene, DOS)*

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 associated with significant respiratory effort after cardiac arrest. Signs of ROSC include 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 agreed upon 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:

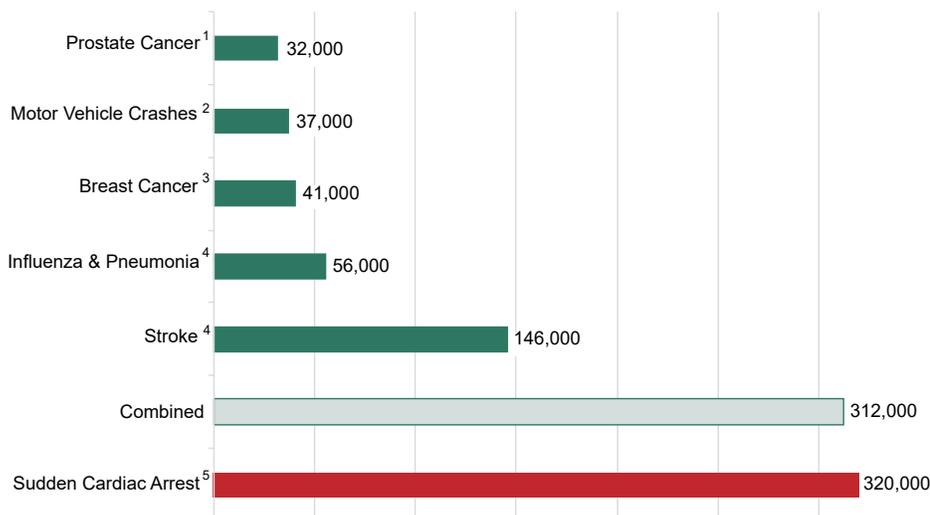
1. Early recognition
2. Early access to EMS
3. Early initiation of CPR
4. Early access to defibrillation
5. Timely response and superior skill from EMS
6. Focused post-arrest care in the event of ROSC

## 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 2017



### SOURCES:

- (1) Prostate Cancer: Statistics, 2019, [www.cancer.net/cancer-types/prostate-cancer/statistics](http://www.cancer.net/cancer-types/prostate-cancer/statistics)
- (2) U.S. DOT Announces 2017 Roadway Fatalities Down, 2018, [www.nhtsa.gov/press-releases/us-dot-announces-2017-roadway-fatalities-down](http://www.nhtsa.gov/press-releases/us-dot-announces-2017-roadway-fatalities-down)
- (3) Breast Cancer Facts & Figures, 2017, [www.cancer.org/research/cancer-facts-statistics/breast-cancer-facts-figures.html](http://www.cancer.org/research/cancer-facts-statistics/breast-cancer-facts-figures.html)
- (4) Mortality in the United States, 2017 [www.cdc.gov/nchs/products/databriefs/db328.htm](http://www.cdc.gov/nchs/products/databriefs/db328.htm)
- (5) Latest AHA Statistics on Cardiac Arrest Survival Reveal Little Progress, 2019, [www.sca-aware.org/sca-news/latest-aha-statistics-on-cardiac-arrest-survival-reveal-little-progress](http://www.sca-aware.org/sca-news/latest-aha-statistics-on-cardiac-arrest-survival-reveal-little-progress)



# 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

Early access means:

- Recognizing that a cardiovascular emergency exists
- Immediately phoning EMS

Elements that strengthen early access are:

### 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.





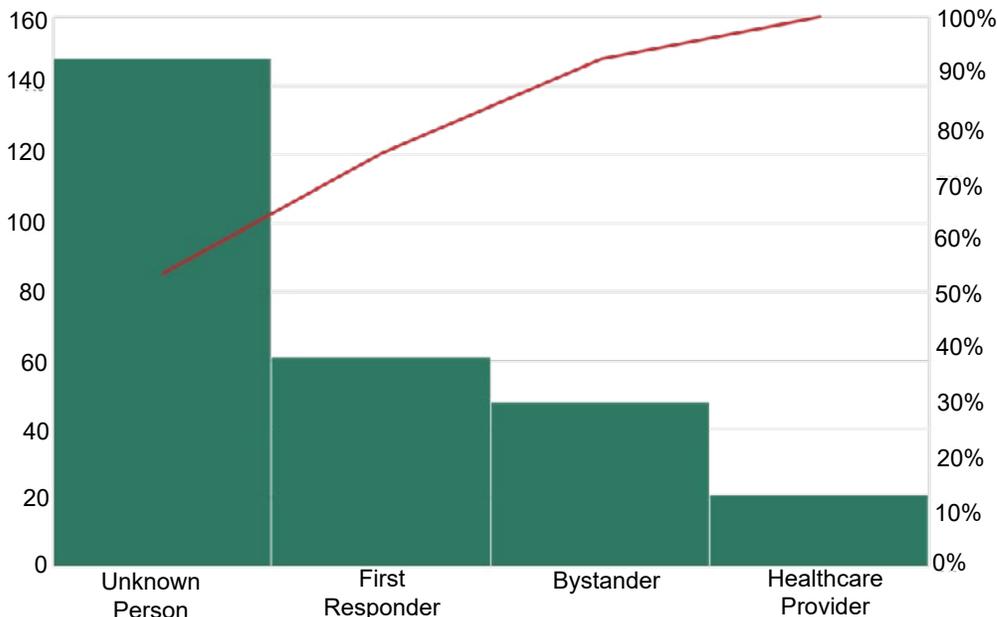
## Chain of Survival Link 2: Early CPR

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.

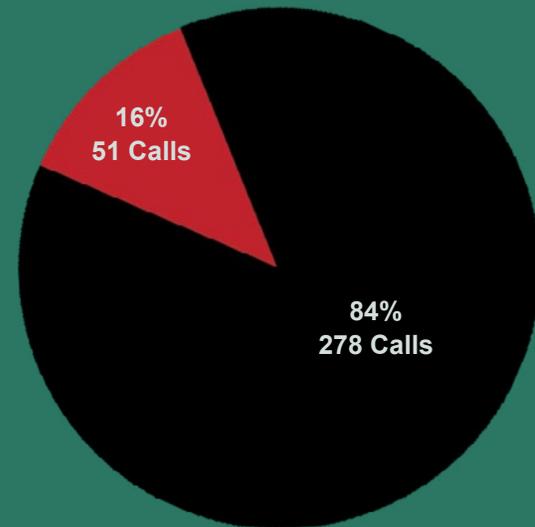
LifeNet does not conduct in-house CPR certification classes for the public. When contacted, we direct people to either their local American Heart Association training site or to the American Red Cross for the proper training. However, LifeNet does teach “Hands-only CPR” at churches, civic groups, businesses,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

In 2018, CPR was performed prior to arrival of EMS on 278 (84%) of the SCA calls LifeNet responded to. Pre-arrival CPR was done by a first responder in 22% of the calls, a bystander in 17% of the calls, a healthcare provider in 8% of the calls, and it is unknown who performed the CPR in 53% of the calls.

## Who Performed Pre-Arrival CPR?



2018 Pre-Arrival CPR



- CPR Performed Prior to EMS Arrival
- CPR Not Performed Prior to EMS Arrival

***“It is clear that high-quality CPR is the primary component in influencing survival from cardiac arrest.”***

-American Heart Association

## 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 10 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.

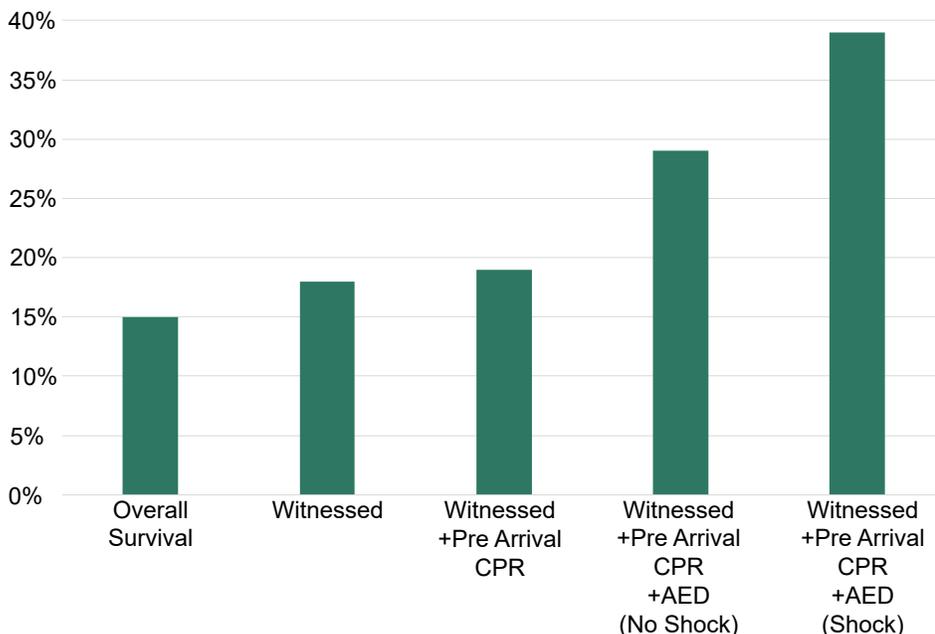
In 2018, an AED was used 22 times in LifeNet's Texarkana Division, 15 times in LifeNet's Hot Springs Division and four times in LifeNet's Stillwater Division. Patients who received both pre-arrival CPR and AED shock had a survival rate of 39%, compared to a survival rate of only 19% for patients with 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, church goers, and others.

LifeNet's AED Matching Grant Fund asks a 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.

## Impact of Pre-Arrival AED & CPR on SCA Survival



## How Does an AED Work?

An AED is a device used to treat a patient in cardiac arrest whose heart is beating irregularly (fibrillating). If the heart does not return to a regular rhythm within 5-7 minutes, this fibrillation could be fatal. To stop the fibrillation, an AED is used to administer an external electric shock through the chest wall to the heart with the use of conductive adhesive pads.

An AED uses built-in computers to analyze the patient's heart rhythm and interpret the rhythms that require defibrillation shocks.

Audible and/or visual prompts guide the user through the process. Most AEDs require an operator to initiate the delivery of the shock in some way, usually by pushing a button.

According to the U.S. Department of Health, "while AEDs are reasonably uncomplicated to use, they should be used only by persons who have received proper AED training and education and who have been certified to use an AED by a competent authority."

LifeNet offers AED and Bystander CPR classes to groups of 10 or more people at no cost.



Everyday heroes are the people who step up during an accident or an emergency and make a difference. In July of 2018, LifeNet had the opportunity to extend the LifeNet Lifesaver Award to Weston Phelps, a 10 year old whose quick actions helped save the life of a child. Help also came from another LifeNet Award recipient, Kristen Janes, a nurse, who did CPR until LifeNet medical crews arrived on scene. Weston and Kristen's quick actions in activating the Chain of Survival highlight the importance of having trained bystanders throughout the community.



*When someone collapses from cardiac arrest, everything that happens after that moment can impact a person's chances of survival.*

*American Heart Association*



### **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 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.

### **LifeNet LifeSaver Award**

The LifeNet LifeSaver Award recognizes people who have saved a save 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 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: [www.LifeNetEMS.org/lifenet-lifesaver-award/](http://www.LifeNetEMS.org/lifenet-lifesaver-award/)

# MEASURING CPR EFFICIENCY

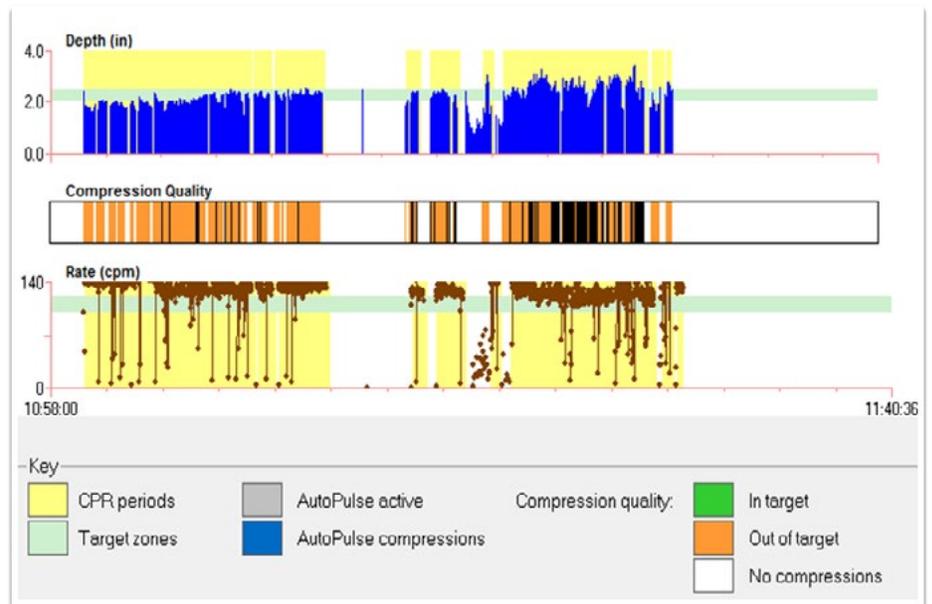
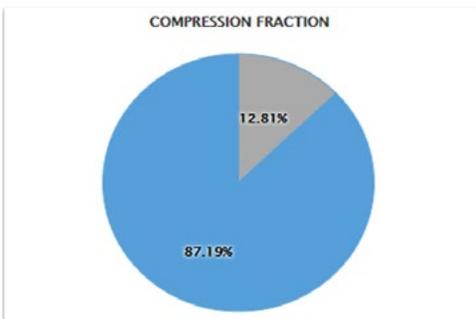
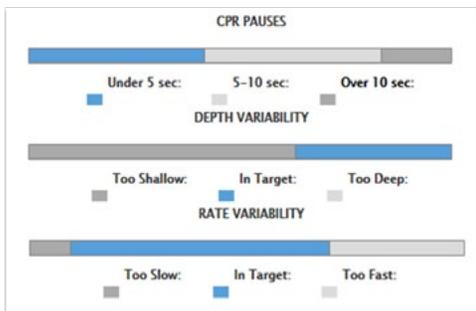


As more is learned about resuscitation science, it has become abundantly clear that CPR quality is the key to improving survival rates for SCA victims. Therefore, capturing and monitoring CPR performance during the event is extremely important.

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, and in some cases incorporating treatments such as Therapeutic Hypothermia, 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 CO<sub>2</sub> (ETCO<sub>2</sub>) as a guide while treating the SCA patient. Generally speaking, a victim of SCA will often have a low ETCO<sub>2</sub> reading. When this measurement rebounds, it can be the first sign that the patient has achieved ROSC. ETCO<sub>2</sub> 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 minotor prior to EMS arrival. This heads-up gives the hospital staff time to prepare the cath lab to receive the patient.

## MEASURING SUCCESS UTSTEIN STYLE

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.



*Utstein-style  
guidelines  
standardize  
reporting of the  
process of care  
and outcomes for  
patients with cardiac  
arrest.*

*American Heart Association*





## System-Wide 2018 SCA Data

System-wide, 947 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.

Of the 947 SCA patients, resuscitations were attempted on 380 (40%) with 231 patients (61%) transported to the hospital while 149 patients (39%) ended with field terminations.

Return of Spontaneous Circulation (ROSC) occurred in 146 patients (38%). 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 56 patients survived to hospital discharge. The overall survival percentage for LifeNet EMS in 2018 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 2018 survival percentage is 28%.

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.

## System-Wide SCA Results by Year

Criteria	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Non-Traumatic SCD	447	610	610	641	690	622	745	825	801	913	846	918	947
Resuscitations NOT Attempted	261	388	403	446	473	436	494	529	520	593	532	539	567
	58%	64%	66%	70%	68%	70%	66%	64%	65%	65%	63%	59%	60%
Resuscitations Attempted	186	222	207	195	217	186	251	296	281	320	314	379	380
	42%	36%	34%	30%	31%	30%	34%	36%	35%	35%	37%	41%	40%
Resuscitation Attempts Transported to ED	131	154	155	141	147	131	175	206	188	211	211	228	231
	70%	69%	75%	72%	68%	70%	70%	70%	67%	66%	67%	60%	61%
Resuscitation Attempts that ended in Field Termination	55	68	52	54	70	55	76	90	93	109	103	151	149
	30%	31%	25%	28%	33%	70%	30%	30%	33%	34%	33%	40%	39%
Resuscitation Attempts that achieved ROSC	47	67	85	75	84	70	107	116	111	132	131	130	146
	25%	30%	41%	38%	39%	38%	43%	39%	40%	41%	42%	34%	38%
Total Resuscitation Attempts that Survived to Discharge	18	21	27	23	23	24	39	48	38	52	72	49	56
	10%	9%	13%	12%	11%	13%	16%	16%	14%	16%	23%	13%	15%

## SCA Disposition 2018 by Division

Criteria	Hot Springs Division	Texarkana Division	Stillwater Division	System Wide
Total Patients Recorded	376	479	92	947
Total DOS	211	313	43	567
Total Resuscitations Attempted	165	166	49	380
Transported to ED	118	84	29	231
Total Field Terminations	47	82	20	149
Total Patients with ROSC	72	55	19	146
Total Resuscitation Survived to Discharge	28	24	4	56
Pct Resuscitation Survived to Discharge	17%	14%	8%	15%

## System-Wide Witnessed V-Fib Survival Percentages by Year

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



## Texarkana 2018 SCA Data

### Texarkana, Arkansas

- 99 SCA Victims
- 46 Attempted Resuscitations
- 8 Patients Survived to Discharge
- 17% Survival Rate

### Texarkana, Texas

- 234 SCA Victims
- 79 Attempted Resuscitations
- 12 Patients Survived to Discharge
- 15% Survival Rate



## Hot Springs 2018 SCA Data

### Hot Springs, Arkansas

- 145 SCA Victims
- 66 Attempted Resuscitations
- 17 Patients Survived to Discharge
- 26% Survival Rate

### Hot Springs Village, Arkansas

- 84 SCA Victims
- 29 Attempted Resuscitations
- 4 Patients Survived to Discharge
- 14% Survival Rate

### Malvern, Arkansas

- 49 SCA Victims
- 15 Attempted Resuscitations
- 4 Patients Survived to Discharge
- 27% Survival Rate

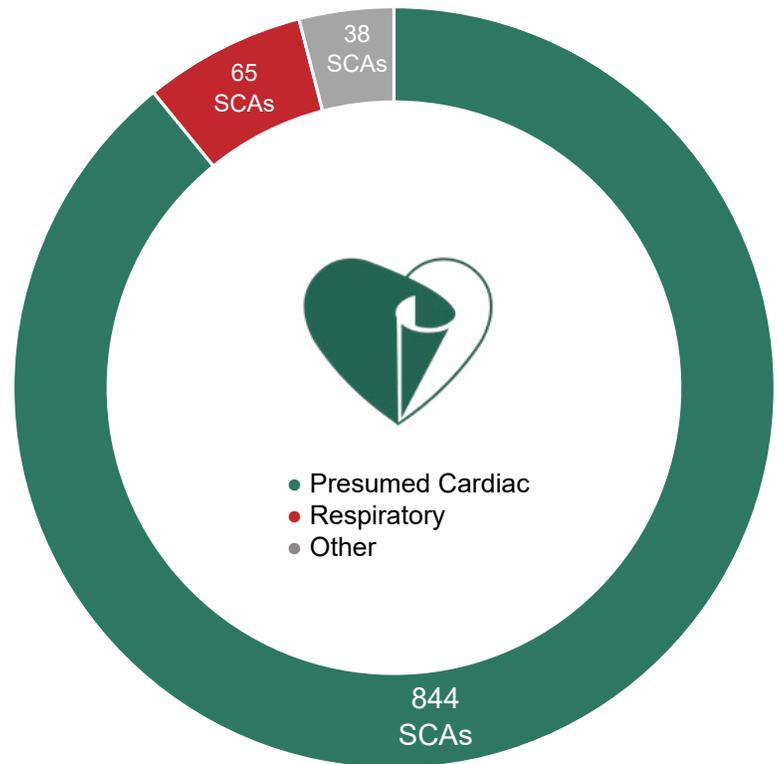


## Stillwater 2018 SCA Data

### Stillwater, Oklahoma

- 92 SCA Victims
- 49 Attempted Resuscitations
- 4 Patients Survived to Discharge
- 8% Survival Rate

## Etiology (Origin) of SCAs System Wide in 2018



580  
Men



367  
Women

Of the 947 SCA events LifeNet responded to during 2018, 844 were presumed to have started from a cardiac issue, 65 from a respiratory issue, and 38 from another issue. Men accounted for 580 SCA victims, while 367 women were SCA victims.

## Witnessed vs. Non-Witnessed SCA Events

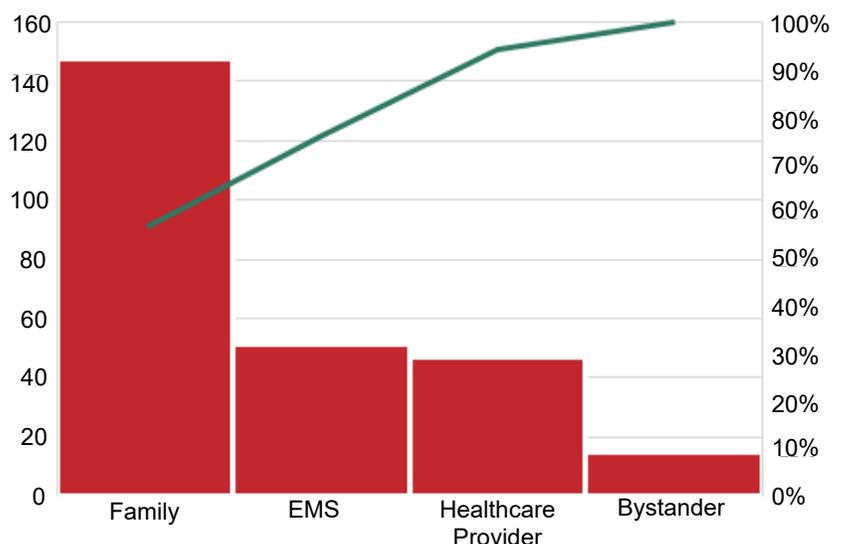
Of the 947 SCA events in 2018, 607 were not witnessed, while 340 were witnessed. Of the witnessed events, 148 were witnessed by a family member, 15 by a layperson bystander, and 47 by another healthcare provider. In 51 SCA events, EMS was on scene prior to the arrest and witnessed the event.



340  
Witnessed



607  
Not-Witnessed





## Neurological Outcome Results by Division

Criteria	Hot Springs Division	Texarkana Division	Stillwater Division	System Wide
Total Patients Recorded	376	479	92	947
Total Resuscitations Attempted	165	166	49	380
Total Discharged from Hospital	28	24*	4	56*
Good Neurological Outcome	14	21	4	39
Fair Neurological Outcome	7	1	0	8
Poor Neurological Outcome	7	1	0	8

\*= unknown neurological outcome

Neurological outcomes are divided into three categories.

- 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.



*To be in cardiac arrest is the most critically ill human condition. Every able-bodied person should be able to respond to cardiac arrest by at least recognizing it, calling 911, and doing chest compressions.*



*Robert Neumar, M.D., Ph.D., immediate past chair of the AHA's Emergency Cardiovascular Care Committee Heart Association*

# 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**

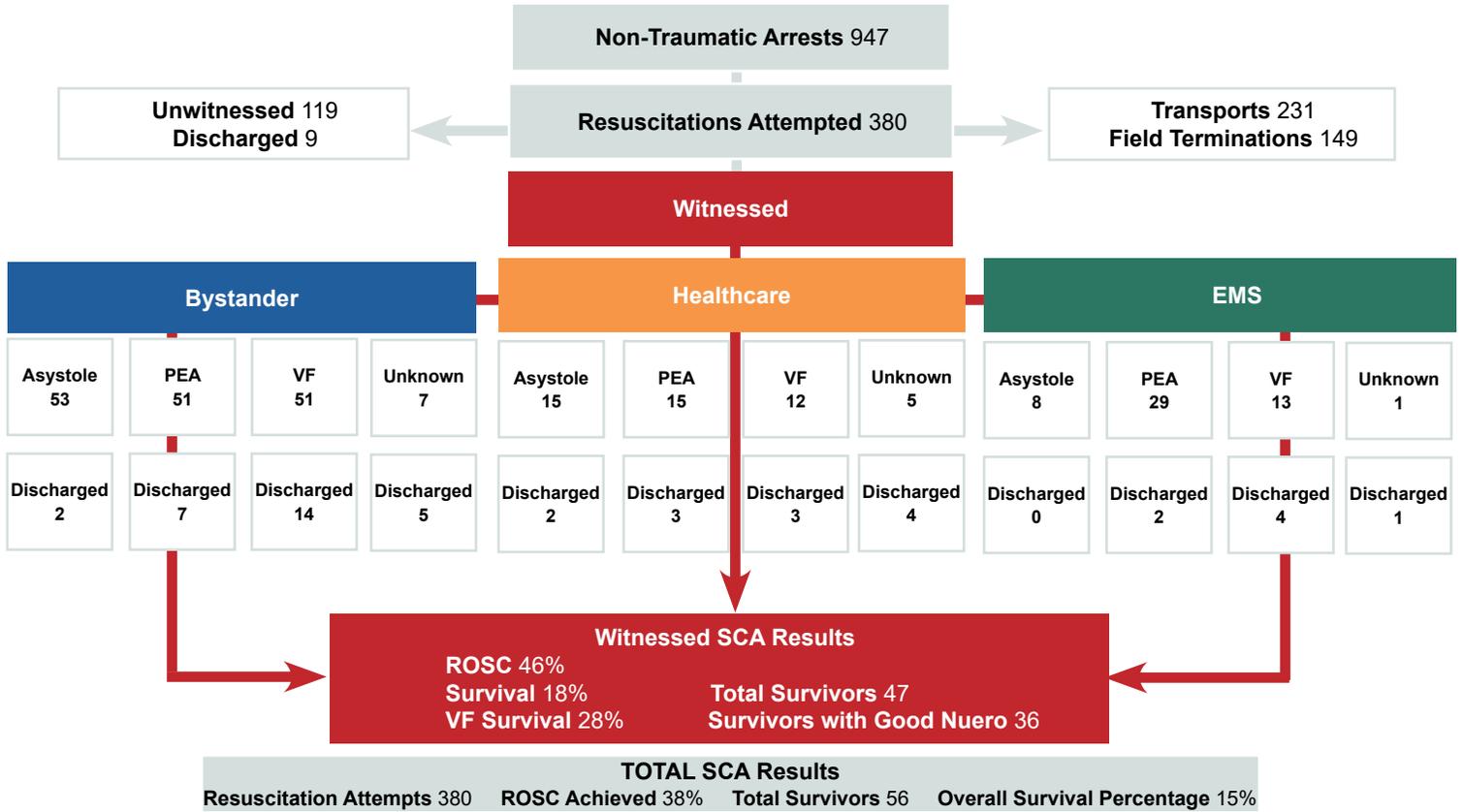
Dr. Wagenhauser serves as Medical Director for the Hot Springs Fire Department and AED program. He is a licensed physician specializing in Emergency Medicine and is currently on staff at CHI St. Vincent Hospital in Hot Springs. He is Board Certified in Emergency Medicine and a Fellow of the American 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**

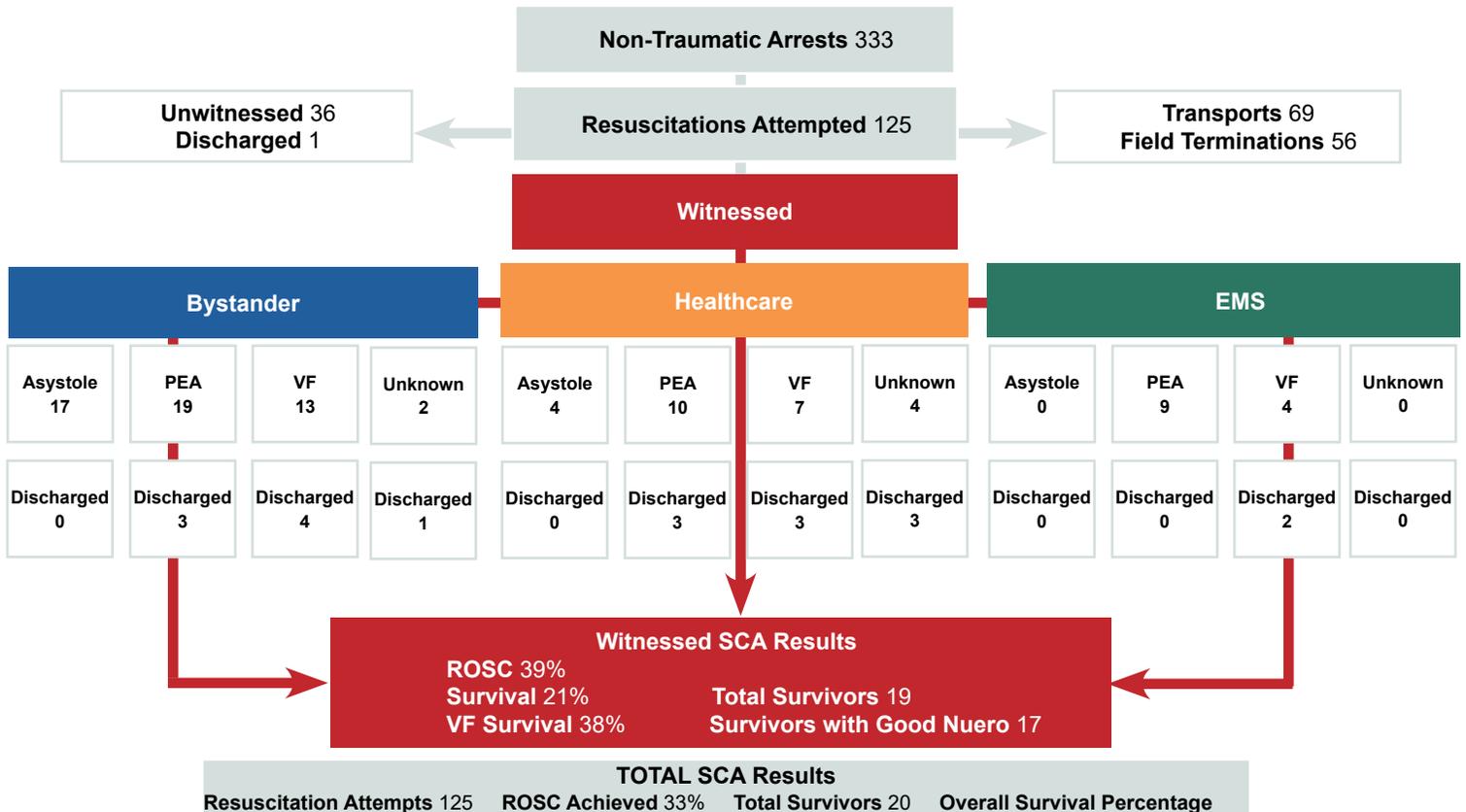
#### **Medical Director, Malvern/Hot Spring County**

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.

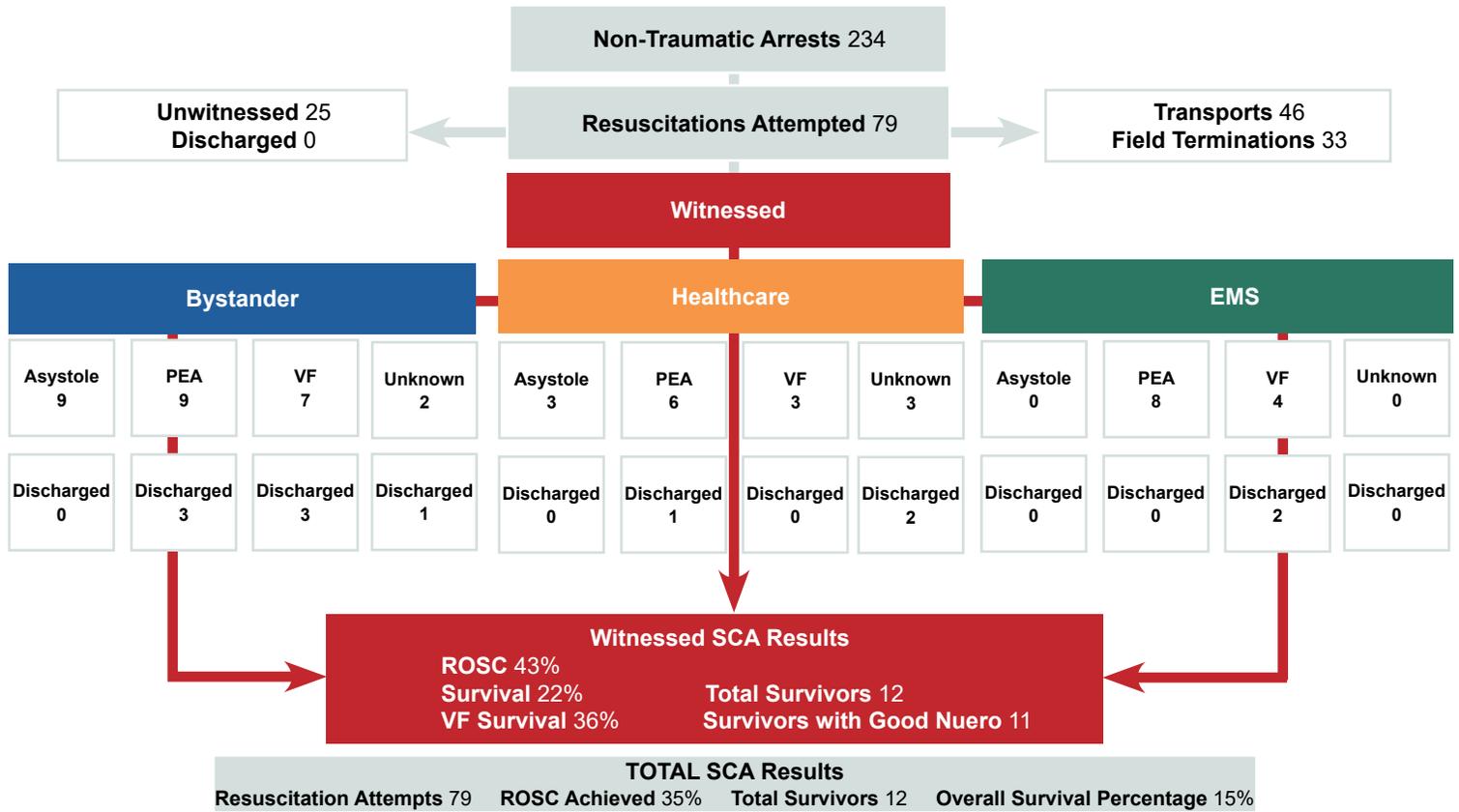
### System Wide (Adult - Medical)



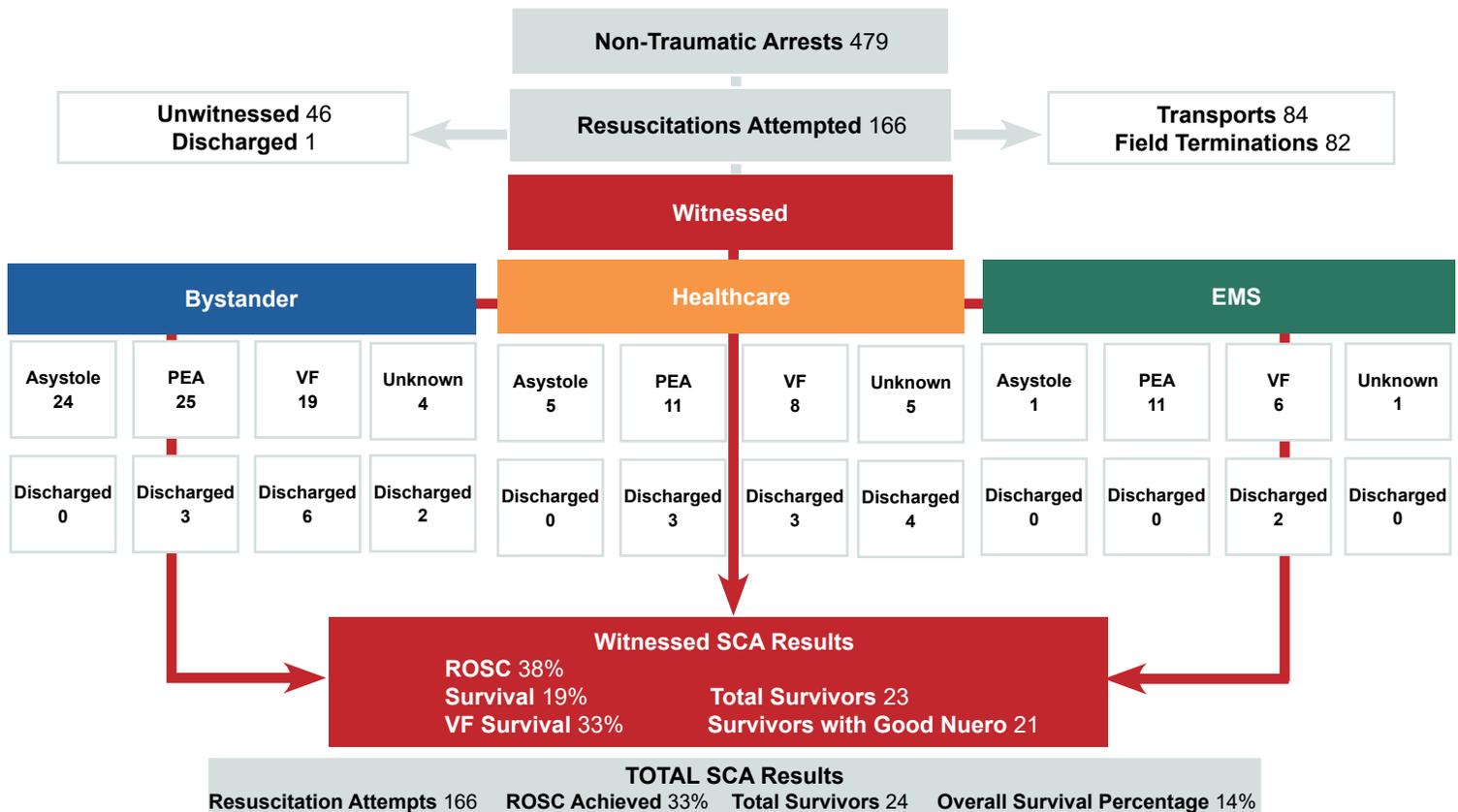
### Texarkana, USA (Adult - Medical)



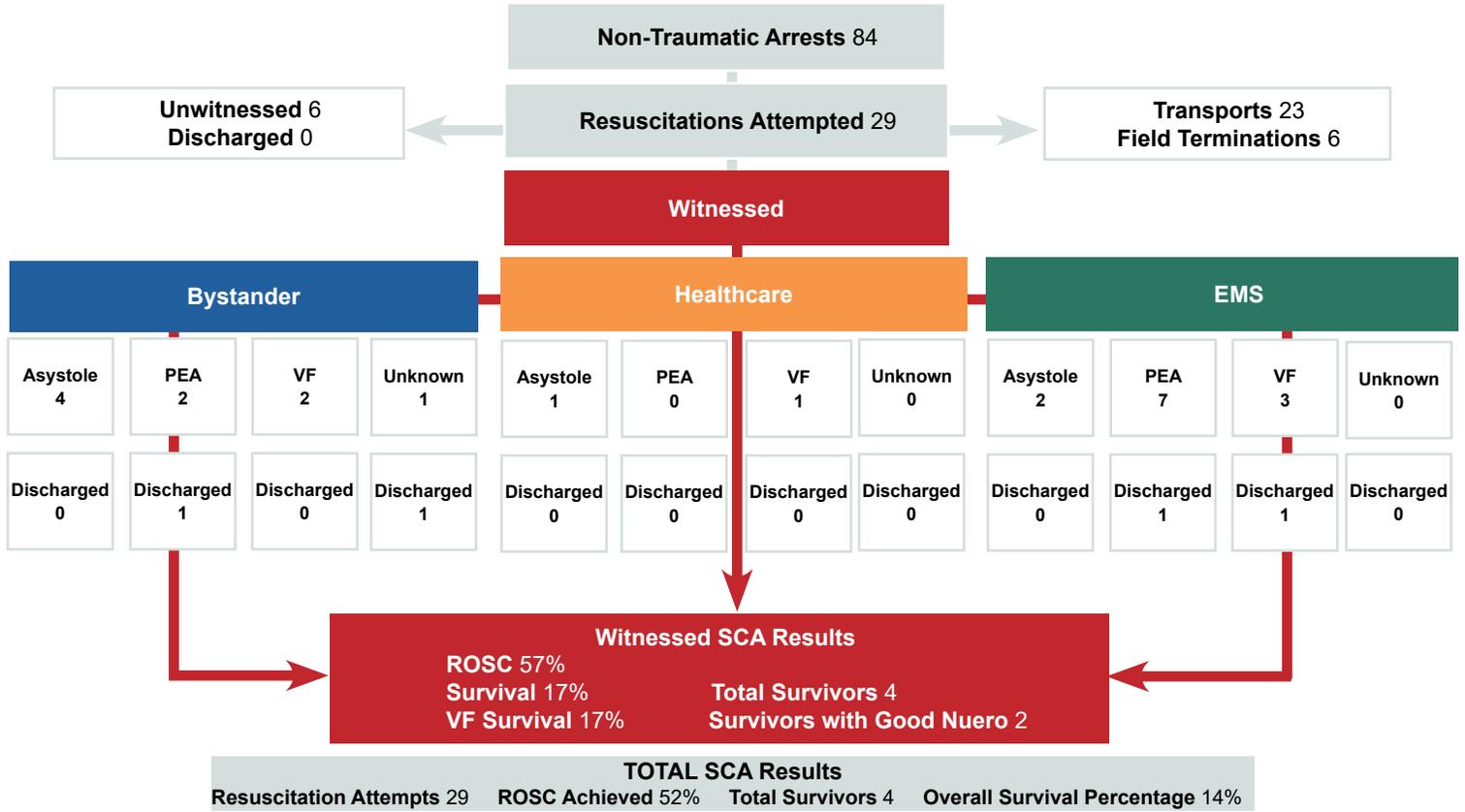
## Texarkana, Texas (Adult - Medical)



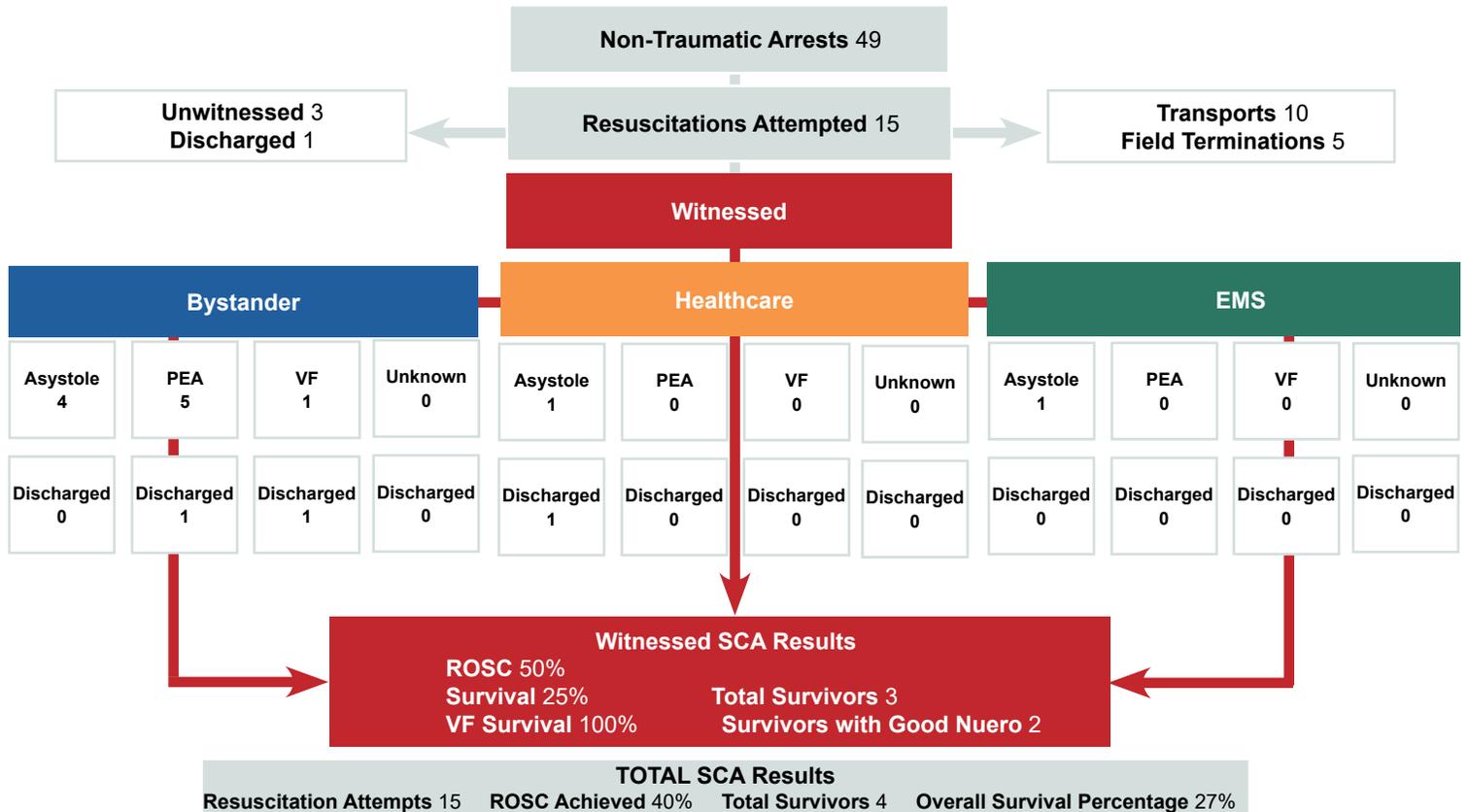
## Texarkana Division (Adult - Medical)



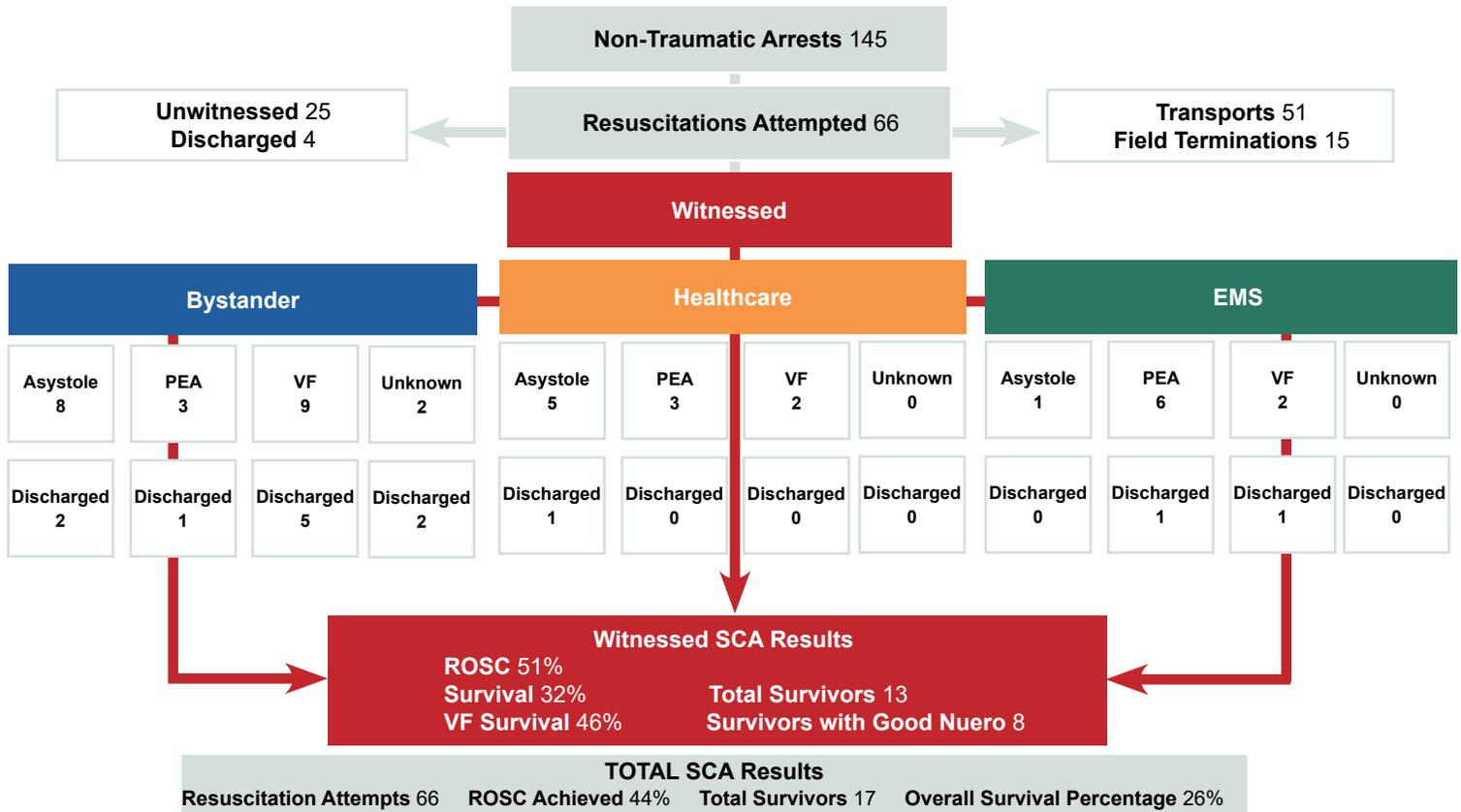
### Hot Springs Village, Arkansas (Adult - Medical)



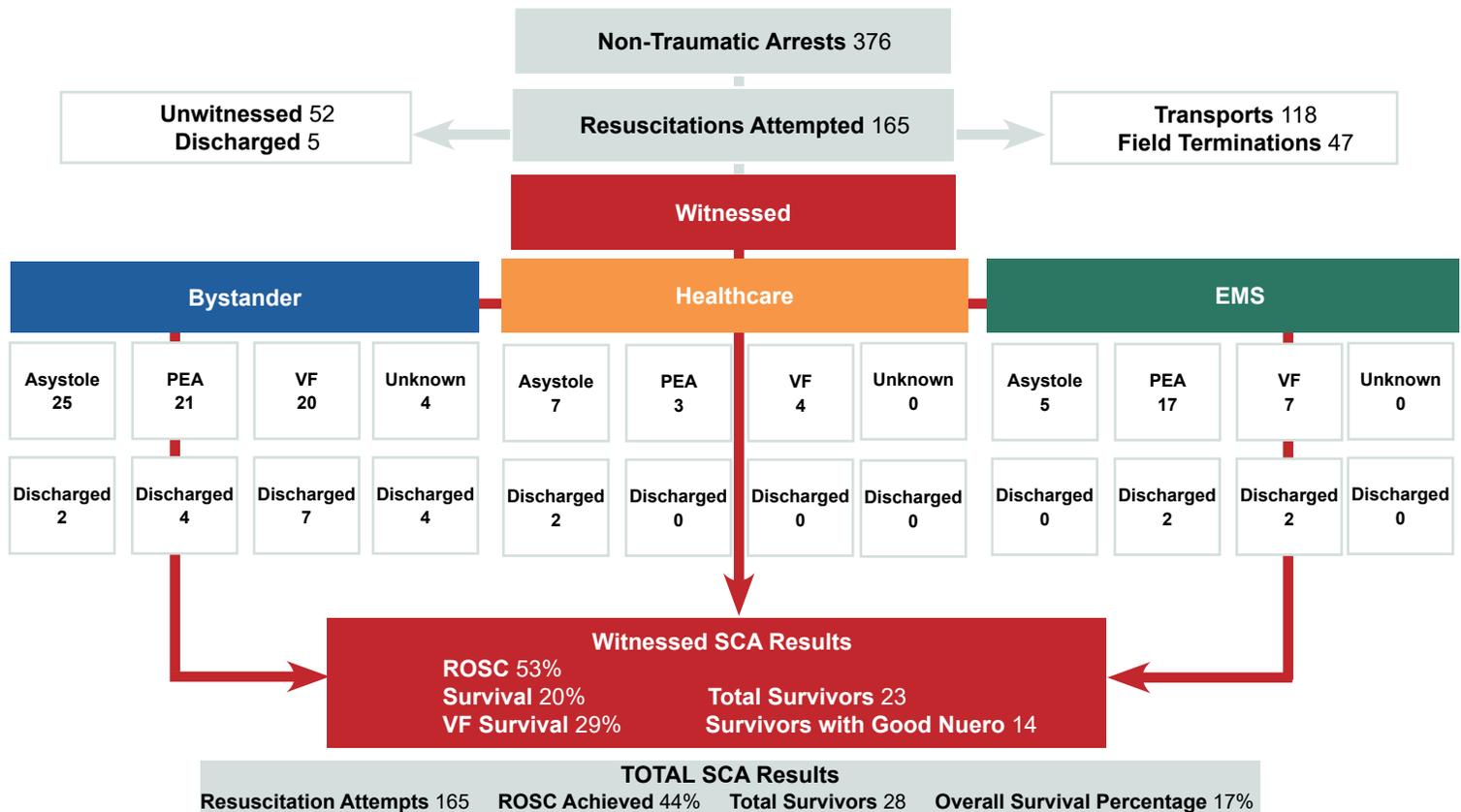
### Malvern, Arkansas (Adult - Medical)



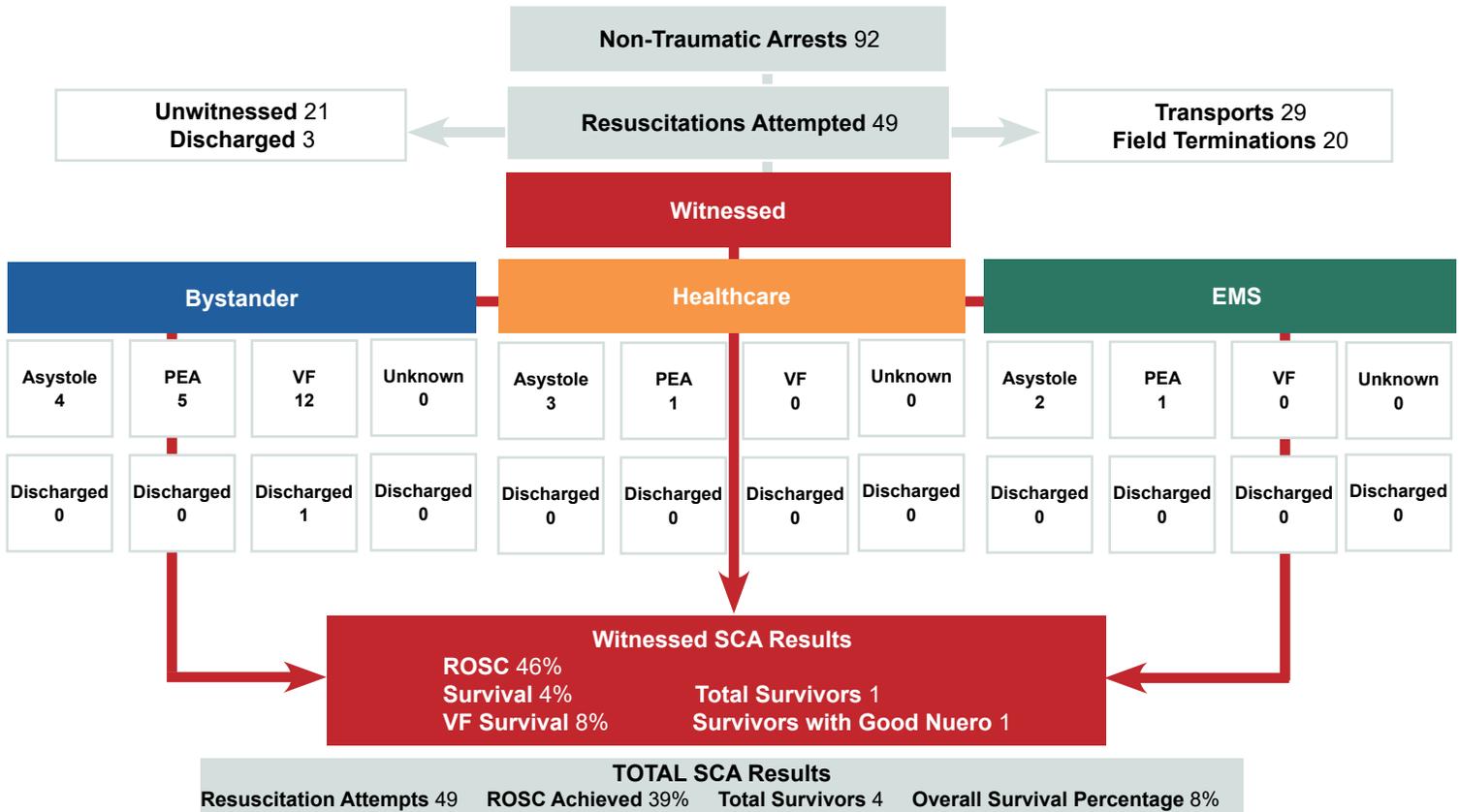
## Hot Springs, Arkansas (Adult - Medical)



## Hot Springs Division (Adult - Medical)



### Stillwater Division (Adult - Medical)



### 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.

#### 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.

## 2018 Sudden Cardiac Arrest Survivor Data

Run Date	Jurisdiction	Response Time	Pt Age	Gender	Witnessed	AED Defib	Presenting Rhythm	Transport Destination	Neuro
1/12/2018	Hot Springs Village	0:16	83	M	Lay Person/Family	Y, w/Defib	OLR, Unk	Natl Park - HS	Good
1/13/2018	Texarkana	0:03	71	F	Healthcare Provider	No	PEA	Wadley - TXK	Good
1/19/2018	Hot Springs	0:09	62	F	Lay Person/Family	Y, w/Defib	Asystole	CHI St. Vincent	Good
2/1/2018	Texarkana	0:02	37	M	Healthcare Provider	Y, w/Defib	AED Shock Rhythm	Christus St. Michael	Good
2/1/2018	Stillwater	0:08	27	F	Not Witnessed	No	OLR, Unk	Stillwater Med Center	Good
2/2/2018	Texarkana	0:04	58	M	Healthcare Provider	No	PEA	Wadley - TXK	Good
2/6/2018	Texarkana	0:07	70	F	Lay Person/Family	Y, no Defib	AED N-Shock Rhythm	Wadley - TXK	Good
2/6/2018	Texarkana	0:01	88	M	Lay Person/Family	No	PEA	Christus St. Michael	Good
2/20/2018	Hot Springs	0:07	68	F	Lay Person/Family	No	Asystole	CHI St. Vincent	Poor
3/3/2018	Texarkana	0:03	47	M	Healthcare Provider	No	VF	Christus St. Michael	Good
3/9/2018	Texarkana	0:06	54	M	Healthcare Provider	No	PEA	Christus St. Michael	Good
3/11/2018	Hot Springs	0:04	47	M	Lay Person/Family	No	VF	CHI St. Vincent	Good
3/17/2018	Malvern	0:15	43	F	Lay Person/Family	No	PEA	Natl Park - HS	Good
3/18/2018	Hot Springs	0:07	70	F	LifeNet EMS	No	VF	CHI St. Vincent	Good
3/27/2018	Texarkana	0:04	74	M	Healthcare Provider	Y, no Defib	AED N-Shock Rhythm	Christus St. Michael	Good
4/15/2018	Hot Springs	0:08	56	M	Not Witnessed	Y, w/Defib	VF	CHI St. Vincent	Poor
4/29/2018	Texarkana	0:05	56	M	Healthcare Provider	Y, w/Defib	VF	Christus St. Michael	Good
4/30/2018	Maud	0:15	60	F	Lay Person/Family	No	AED N-Shock Rhythm	Christus St. Michael	Good
4/30/2018	Malvern	0:06	35	M	Not Witnessed	Y, no Defib	VF	Baptist Malvern	Fair
4/30/2018	Texarkana	0:08	36	F	Lay Person/Family	Y, w/Defib	PEA	Christus St. Michael	Good
5/13/2018	Hot Springs	0:09	37	M	LifeNet EMS	No	PEA	Natl Park - HS	Good
5/18/2018	Malvern	0:11	72	F	Lay Person/Family	No	VF	Baptist Malvern	Poor
5/22/2018	Garland Co.	0:16	34	M	Lay Person/Family	Y, w/Defib	VF	CHI St. Vincent	Good
5/25/2018	Hot Springs	0:07	38	F	Not Witnessed	No	Asystole	Natl Park - HS	Fair
5/29/2018	Hot Springs	0:03	60	M	Lay Person/Family	No	VF	CHI St. Vincent	Fair
6/13/2018	Stillwater	0:06	49	M	Not Witnessed	No	VF	Stillwater Med Center	Good
6/26/2018	Hot Springs	0:13	48	M	Lay Person/Family	No	PEA	Natl Park - HS	Fair
6/29/2018	Texarkana	0:04	23	F	Lay Person/Family	No	VF	Wadley - TXK	Unk
7/1/2018	Hot Springs	0:08	51	M	Lay Person/Family	Y, w/Defib	VF	Natl Park - HS	Good
7/14/2018	Hot Springs	0:07	77	M	Lay Person/Family	Y, w/Defib	OLR, Unk	Natl Park - HS	Good
7/25/2018	Texarkana	0:07	32	M	LifeNet EMS	No	VF	Christus St. Michael	Good
7/31/2018	Texarkana	0:07	77	F	Healthcare Provider	Y, no Defib	AED N-Shock Rhythm	Wadley - TXK	Good
8/4/2018	Hot Springs Village	0:10	66	F	LifeNet EMS	No	VF	Natl Park - HS	Poor
8/5/2018	Texarkana	0:03	27	F	Lay Person/Family	No	VF	Christus St. Michael	Fair
8/14/2018	Garland Co.	0:10	68	M	Lay Person/Family	No	OLR, Unk	Natl Park - HS	Good
8/14/2018	Texarkana	0:05	50	M	Lay Person/Family	No	VF	Wadley - TXK	Good
8/16/2018	Texarkana	0:04	58	M	Lay Person/Family	Y, w/Defib	VF	Christus St. Michael	Good
8/17/2018	Texarkana	0:05	58	M	Healthcare Provider	No	VF	Wadley - TXK	Good
8/26/2018	Texarkana	0:04	67	F	Lay Person/Family	No	PEA	Wadley - TXK	Good
8/27/2018	Hot Springs Village	0:08	73	F	Lay Person/Family	No	PEA	Natl Park - HS	Good
9/16/2018	Garland Co.	0:09	17	F	Lay Person/Family	No	PEA	CHI St. Vincent	Poor
9/21/2018	Hot Springs	0:05	38	M	Lay Person/Family	Y, w/Defib	VF	CHI St. Vincent	Good
9/22/2018	Malvern	0:07	42	M	Healthcare Provider	Y, no Defib	Asystole	Natl Park - HS	Good
10/7/2018	Hot Springs Village	0:04	81	F	LifeNet EMS	No	PEA	CHI St. Vincent	Fair
10/7/2018	Hot Springs	0:06	44	M	Healthcare Provider	No	Asystole	CHI St. Vincent	Fair
10/20/2018	Hot Springs	0:04	55	M	Lay Person/Family	No	VF	Natl Park - HS	Poor
10/29/2018	Hot Springs	0:06	29	F	Not Witnessed	No	VF	Natl Park - HS	Fair
11/3/2018	Maud	0:12	42	F	Lay Person/Family	No	VT	Christus St. Michael	good
11/7/2018	Stillwater	0:04	35	F	Not Witnessed	No	VF	Stillwater Med Center	Good
11/14/2018	New Boston	0:04	83	M	Lay Person/Family	No	VF	Christus St. Michael	Good
11/21/2018	Perkins	0:11	70	M	Lay Person/Family	Y, w/Defib	VF	Landing Zone	Good
11/28/2018	Hot Springs	0:06	61	M	Lay Person/Family	Y, w/Defib	OLR, Unk	CHI St. Vincent	Good
12/17/2018	Texarkana	0:04	60	M	LifeNet EMS	No	VF	Christus St. Michael	Good
12/21/2018	Fouke	0:20	65	M	Healthcare Provider	Y, w/Defib	AED Shock Rhythm	Landing Zone	Good
12/27/2018	Texarkana	0:04	85	M	Not Witnessed	Y, no Defib	AED N-Shock Rhythm	Wadley - TXK	Poor
12/27/2018	Hot Springs	0:02	55	M	Not Witnessed	No	VF	CHI St. Vincent	Poor

A close-up photograph of a person's hands performing CPR on a medical training mannequin. The mannequin is lying on a blue mat, and the person's hands are positioned on its chest. The background is slightly blurred, showing other people in a training environment.

# **LIFENET**

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