

AU InforMed

Volume 17 Number 6 (Issue 308)

Monday, September 23, 2019

Guest Editors: Alex Gonzalez, Ruthie Jager, Pharm.D. Candidates, Bernie Olin, Pharm.D.



SUDDEN CARDIAC ARREST AWARENESS MONTH



Key Inforbits

- ♥ Fast Facts
- ♥ Heart Attack vs SCA
- ♥ What to Do
- ♥ Prevention
- ♥ Future Drugs and Technology

Sudden Cardiac Arrest (SCA)¹:

A life-threatening emergency that occurs when the heart unexpectedly stops beating. It can occur at any age and in people without heart disease.

It is not the same as a heart attack.

PUSH HARD AND PUSH FAST!

Fast Facts²

Reversible if treated within the first few minutes		Responsible for 350,000 deaths per year
	95% of SCAs are fatal	
The chances of survival decrease by 10% every minute without CPR		More deaths due to SCA than breast cancer, lung cancer, or AIDS each year
	65% of Americans do not know the difference between a Sudden Cardiac Arrest and a Heart Attack	
Only 1 in 10 victims survive. 5 in 10 could survive if bystanders gave CPR and used AEDs immediately		When SCA occurs, the person collapses and becomes unresponsive. They may appear to be gasping, snoring, or having a seizure



Risk Factors¹

- ♥ Ischemic heart disease
- ♥ Personal history of arrhythmias
- ♥ Family history of SCA
- ♥ Previous heart attack
- ♥ Drug or alcohol abuse
- ♥ Heart failure
- ♥ Obesity

Heart Attack vs Sudden Cardiac Arrest

Heart Attack	Sudden Cardiac Arrest
<ul style="list-style-type: none"> 🔦 Also called Myocardial Infarction 🔦 “Plumbing Problem”³ 🔦 When arterial plaque builds up/breaks off, damaging the wall of the artery, a clot can form and completely block the flow of oxygen-rich blood to the heart. 🔦 Symptoms of the heart attack may progress slowly over hours, days, or weeks^{4,6} 🔦 Warning Signs⁴ <ul style="list-style-type: none"> ⚡ Chest pain/pressure ⚡ Pain in the arm, back, neck, jaw, stomach ⚡ Shortness of breath 	<ul style="list-style-type: none"> 🔦 Also called Sudden Cardiac Death 🔦 “Electrical Problem”³ 🔦 When the heart suddenly stops beating, cutting off blood flow to the brain and other vital organs usually due to an arrhythmia or scar tissue causing poor electrical conduction.⁵ 🔦 Occurs suddenly and without warning⁵ 🔦 Warning Signs^{1,5,6} <ul style="list-style-type: none"> ⚡ Sudden loss of consciousness ⚡ Gasp for air or no breathing ⚡ No pulse

What to Do

1. Call 9-1-1
2. Find and use an automated external defibrillator (AED) ASAP
3. Start cardiopulmonary resuscitation (CPR); continue until emergency medical services arrive

If help is available, one person should immediately start CPR while the other calls 9-1-1 and finds the AED.

Adult CPR Reminders⁷

- ♥ CPR for health care professionals: chest compressions + mouth-to-mouth breathing
 - 🔦 30:2 compressions-to breath
 - 🔦 Compression Rate: 100-120 BPM
 - 🔦 Compression Depth: 2 inches
- ♥ CPR for the general public: compression-only
 - 🔦 Call 9-1-1
 - 🔦 Push hard and fast in the center of the chest

Songs that Don't Skip a Beat⁸

- ♪ "Stayin' Alive" –Bee Gees (103 BPM)
- ♪ "Dancing Queen" –ABBA (100 BPM)
- ♪ "Can't Stop the Feeling" – Justin Timberlake (113 BPM)
- ♪ "Girls Just Want to Have Fun" – Cyndi Lauper (120 BPM)
- ♪ "Rumor Has It" –Adele (120 BPM)
- ♪ "Man in the Mirror" – Michael Jackson (100 BPM)

Tips for Successful CPR⁷

- 🍷 Keep interruptions to a minimum during compressions
- 🍷 Ensure adequate rate, depth, and hand placement
- 🍷 Avoid excess ventilation
- 🍷 Avoid leaning on the victim between compressions

Find a CPR class near you by clicking [HERE!](#)⁹

You Can Save A Life FROM SUDDEN CARDIAC ARREST



CALL

911 to Get
Help



PUSH

To Triple
Chance of Survival



SHOCK

To Restart
Heart

Available from <https://callpushshock.org/>¹⁰

Prevention¹¹

Many times, SCA leads to sudden cardiac death (SCD), which is defined as unexpected death due to cardiac causes. Due to primary and secondary prevention, SCD has declined over the years. In children and young adults, SCA is estimated to be 1 per 100,000. Causes include primary arrhythmia syndromes due to congenital channelopathies, inherited dilated, hypertrophic or arrhythmogenic right ventricular cardiomyopathies, as well as coronary artery anomalies. In adults and older adults, SCA is estimated to be 1 per 1,000. Causes include underlying structural heart disease, coronary artery disease, non-ischemic structural heart disease, channelopathies and ventricular fibrillation.

Guideline Statements

Primary Prevention¹¹

Guideline-directed medical therapy (GDMT) is recommended in patients with:

- Heart failure with reduced ejection fraction
 - GDMT includes: beta-blockers, mineralocorticoid receptor antagonists, and angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), or angiotensin receptor–neprilysin inhibitors

An implantable cardioverter-defibrillator (ICD) is recommended* in patients with

- >40 days after MI and at least >90 days after revascularization in patients with
 - New York Heart Association (NYHA) class II or III heart failure despite GDMT with left ventricular ejection fraction (LVEF) < 35% due to ischemic heart disease
 - NYHA class I heart failure symptoms despite GDMT with LVEF ≤30% due to ischemic heart disease
- Nonischemic cardiomyopathy, NYHA class II to III symptoms, and LVEF ≤35% despite GDMT

Secondary Prevention¹¹

An ICD is recommended in patients who survive SCA due to ventricular tachycardia (VT) or Ventricular Fibrillation (VF) with:

- Ischemic heart disease
- Nonischemic cardiomyopathy

** if expected survival is >1 year*

Living a healthy lifestyle by...

- ♥ Eating a diet low in saturated and trans fats, and high in fibers, fruits, and vegetables
- ♥ Exercising regularly
- ♥ Managing stress
- ♥ Smoking cessation
- ♥ Maintaining a healthy weight

...is the best approach to prevention!

Advancements in Technology and Drugs

Detection devices

Hundreds of thousands of people die every year from unwitnessed cardiac arrest without any chance of survival. One key diagnostic element of cardiac arrest is agonal breathing, a brainstem reflex due to severe hypoxia, which appears in approximately half of cardiac arrest cases reported to 911. It indicates that the person hasn't been in cardiac arrest for long and is associated with "gasping" breaths. A recent study conducted by Chan, developed a system that could be used on a smart device (eg, smart phones) that would identify this breathing.¹² This study wanted to develop a contactless cardiac detection device and determine how accurate it was. They collected 83 hours of agonal breathing and found a mean detection accuracy of 99.29% in identifying agonal breathing.¹² The researchers hope that one day, this technology could be utilized in unmonitored health facilities (hospital wards), EMS dispatch and in people who have greater than average risk for cardiac arrests.



Drones

One of the biggest issues with sudden cardiac arrests is ensuring AEDs are readily available. Cardiac arrest is reversible in most victims if it's treated within a few minutes. Performing CPR and using an AED immediately increases a person's chance of survival by 40%. A study conducted by Boutilier JJ, et al, looked at optimizing a drone network to deliver AEDs in the Toronto region.¹³ AEDs are rarely available to patients who experience an out-of-hospital cardiac arrest. Drones are an emerging technology that can help deliver AEDs to the scene of a cardiac arrest for bystanders to use.

They have the potential to improve patients' survivability.

Drones can be available 24/7, can deliver AEDs at heights via a



balcony, and can quickly reach private locations.¹⁴ They also have cameras, which can be used by 911 dispatchers to visually assess the patients and support bystander CPR and AED application. Drone delivery AEDs will make it possible for AEDs to become more readily available and will improve patient outcomes.

Novel Drug Therapy

The National Institutes of Health (NIH) recently granted \$2.8 million to researchers at the University of Illinois at Chicago to evaluate the efficacy of two drugs that could potentially improve survival rates in victims of sudden cardiac arrest. The two new drugs, called TAT-PHLPP9c and TAT-PIF, mimic the effects of rapid cooling on the body.¹⁵ Pre-clinical studies have shown that decreasing the body's internal temperature is highly protective against SCA injury.¹⁵ The goal is to administer these two drugs intravenously during CPR, the time the investigators consider would be most beneficial for these patients. Mouse studies have shown TAT-PHLPP9c, a novel biological inhibitor of PHLPP phosphatase, and TAT-PIF, a novel biological activator of PDK1, improves SCA survival.¹⁵ Currently, more studies are being done on the effectiveness of these two novel agents.



Summary:

It is vital that people recognize the signs and symptoms of a Sudden Cardiac Arrest. Agonal breathing, which is "gasping sounds", is a key diagnostic element. It is important to quickly perform CPR on these patients to improve a patient's survivability. Push hard and fast to the beat of "Stayin' Alive" until emergency services arrive. Using an Automated External Defibrillator enhances a patient's survivability further, and drones are a potential technology that can improve the delivery of them. By remembering "CALL-PUSH-SHOCK" you may potentially save a person's life.

References:

1. Sudden Cardiac Arrest: Overview [Internet]. Cleveland Clinic; c1921-2019. Sudden Cardiac Arrest; 2019 May 14 [cited 2019 Sept 16]; [about 2 screens]. Available from: <https://my.clevelandclinic.org/health/diseases/17522-sudden-cardiac-death-sudden-cardiac-arrest>
2. HSR: restoring the rhythm of life [Internet]. Washington DC: The Heart Rhythm Society; c2019. Sudden cardiac arrest (SCA) awareness; [cited 2019 Sept 17]; [about 5 screens]. Available from <https://www.hrsonline.org/sudden-cardiac-arrest-sca-awareness#targetText=October%20is%20Sudden%20Cardiac%20Arrest,done%20to%20help%20save%20lives.>
3. Cleveland Clinic: every life deserves world-class care [Internet]. Cleveland: Cleveland Clinic; c2019. Heart attack vs. cardiac arrest: why they're not the same; 2019 Sept 17 [cited 2019 Sept 17]; [about 2 screens]. Available from <https://health.clevelandclinic.org/heart-attack-vs-cardiac-arrest-theyre-not/>
4. NIH: turning discovery into health [Internet]. Bethesda: National Institutes of Health. Heart attack: also known as myocardial infarction; 2019 [cited 2019 Sept 17]; [about 8 screens]. Available from <https://www.nhlbi.nih.gov/health-topics/heart-attack#targetText=Coronary%20Heart%20Disease&targetText=Most%20heart%20attacks%20occur%20as,inside%20of%20the%20coronary%20arteries.>
5. NIH: turning discovery into health [Internet]. Bethesda: National Institutes of Health. Sudden cardiac arrest: also known as cardiac arrest, sudden cardiac death; 2019 [cited 2019 Sept 17]; [about 8 screens]. Available from [https://www.nhlbi.nih.gov/health-topics/sudden-cardiac-arrest#targetText=Sudden%20cardiac%20arrest%20\(SCA\)%20is,it's%20not%20treated%20within%20minutes.](https://www.nhlbi.nih.gov/health-topics/sudden-cardiac-arrest#targetText=Sudden%20cardiac%20arrest%20(SCA)%20is,it's%20not%20treated%20within%20minutes.)
6. AHA: life is why [Internet]. Dallas: American Heart Association; c2019. Heart attack or sudden cardiac arrest: how are they different; 2015 Jul [cited 2019 Sept 17]. [about 4 screens]. Available from <https://www.heart.org/en/health-topics/heart-attack/about-heart-attacks/heart-attack-or-sudden-cardiac-arrest-how-are-they-different#targetText=A%20heart%20attack%20is%20when,is%20an%20E%20%80%9CElectrical%20%80%9D%20problem.>
7. AHA: life is why [Internet]. Dallas: American Heart Association; c2019. CPR & first aid emergency cardiovascular care: What is CPR; cited 2019 Sept 17; [about 5 screens]. Available from https://cpr.heart.org/AHA/ECC/CPRECC/AboutCPRECC/WhatsCPR/UCM_499896_What-is-CPR.jsp
8. ProCPR: training for people who care [Internet]. US: ProTrainings LLC; c 2019. Chest Compressions: At What Rate do you perform cpr compressions?; 2018 Oct 19 [cited 2019 Sept 17]; [about 4 screens]. Available from <https://www.procpr.org/blog/training/cpr-chest-compression-rate>
9. AHA: life is why [Internet]. Dallas: American Heart Association; c2019. CPR & first aid emergency cardiovascular care: find a course; [cited 2019 Sept 17]; [about 2 screens]. Available from https://ahainstructornetwork.americanheart.org/AHA/ECC/classConnector.jsp?pid=ahaecc.classconnector.home&_ga=2.231069407.155262657.1568640432-1140133497.1568314421
10. You can save a life from sudden cardiac arrest [Internet]. In: Call Push Shock; c2018. [cited 2019 Sept 17]. Available from <https://callpushshock.org/>
11. Al-Khatib SM, Stevenson WG, Ackerman MJ, et al. 2017 AHA/ACC/HRS guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Circulation [Internet]. 2018 Sept [cited 2019 Sept 16];138:e272-e391. Available from: <https://www.ahajournals.org/doi/10.1161/CIR.0000000000000549>
12. Chan J, Rea T, Gollakota S, et al. Contactless cardiac arrest detection using smart devices. NPJ Digit Med [Internet]. 2019 Jun [cited 2019 Sept 16];2:52. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6584582/>
13. Boutilier JJ, Brooks SC, Janmohamed A, et al. Optimizing a drone network to deliver automated external defibrillators. Circulation [Internet]. 2017 Jun [cited 2019 Sept 16];135(25):2454-2465. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5516537/>
14. Sanfridsson J, Sparrevik J, Hollenberg J, et al. Drone delivery of an automated external defibrillator – a mixed method simulation study of bystander experience. Scan J Trauma Resusc Emerg Med [Internet]. 2019 Apr [cited 2019 Sept 16];27(1):40. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5516537/>
15. Project Information [Internet]. NIH: Research Portfolio Online Reporting Tools; c2019. Project Information 1R01HL147031-01; 2019 Apr [cited 2019 Sept 16]; [about 3 screens]. Available from: https://projectreporter.nih.gov/project_info_description.cfm?aid=9714641&icde=0



The last “dose” ...

“Ah, ha, ha, ha, stayin' alive, stayin' alive; Ah, ha, ha, ha, stayin' alive”

-Bee Gees 1958 – 2003, 2009 – 2012



Health Professional with a Question? Drugs – Therapeutics – Pharmacy Practice?

Please contact us. We can help resolve your issue.

Please call **344-844-4400** Monday-Friday 8:00 to 5:00 pm (some holidays excepted)

or visit our website, 24/7 at: <http://www.auburn.edu/academic/pharmacy/dilrc/overview.html>

An electronic bulletin of drug and health-related news highlights, a service of ...

Auburn University, Harrison School of Pharmacy, Drug Information Center

• Phone 334-844-4400 • <http://www.auburn.edu/academic/pharmacy/dilrc/overview.html>

Bernie R. Olin, Pharm.D., Director

Archived issues are available at: <http://www.auburn.edu/academic/pharmacy/dilrc/au-informed.html>