Sooner to the Ballooner: Going Straight to the Cath Lab with Refractory VF/VT

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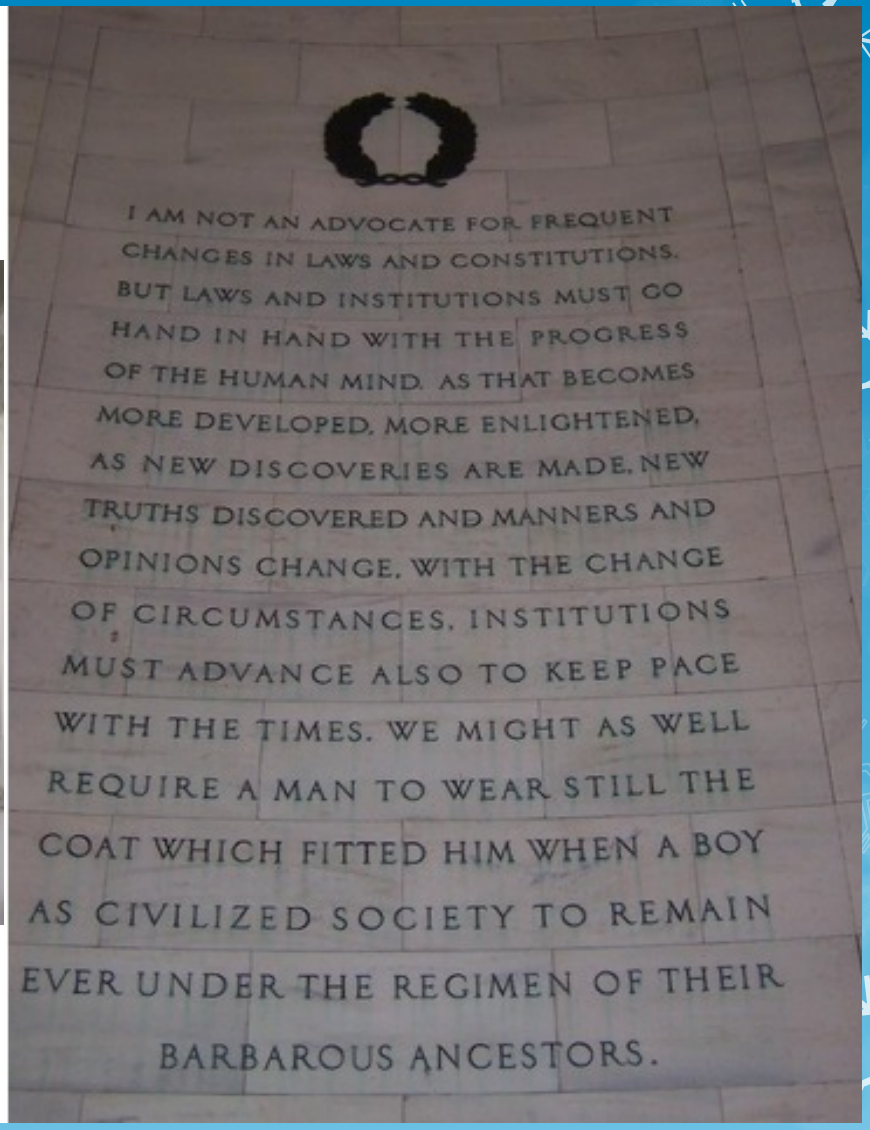
NMAS and the HC EMS Council/Minnesota Resuscitation Consortium

DISCLOSURE STATEMENT

- CME Speaker for ZOLL Circulation/Alsius Corp
- Specializing in Resuscitative Hypothermia and Emergency Medicine related issues

Greetings from MN


I AM NOT AN ADVOCATE FOR FREQUENT
CHANGES IN LAWS AND CONSTITUTIONS.
BUT LAWS AND INSTITUTIONS MUST GO
HAND IN HAND WITH THE PROGRESS
OF THE HUMAN MIND. AS THAT BECOMES
MORE DEVELOPED, MORE ENLIGHTENED,
AS NEW DISCOVERIES ARE MADE, NEW
TRUTHS DISCOVERED AND MANNERS AND
OPINIONS CHANGE, WITH THE CHANGE
OF CIRCUMSTANCES, INSTITUTIONS
MUST ADVANCE ALSO TO KEEP PACE
WITH THE TIMES. WE MIGHT AS WELL
REQUIRE A MAN TO WEAR STILL THE
COAT WHICH FITTED HIM WHEN A BOY
AS CIVILIZED SOCIETY TO REMAIN
EVER UNDER THE REGIMEN OF THEIR
BARBAROUS ANCESTORS.

QUESTIONS

- Are we achieving ROSC in more patients in cardiac arrest?
- What is the survival rate for patients in refractory VF/ VT?
- How do we manage these refractory VF/VT patients in the field?
- Who feels “good” about leaving these patients in the field, with a potentially correctable rhythm?

CURRENT PRACTICE:
In the field

- The patient in VF/VT receives standard ACLS care per first responders and EMS, including cardiac defibrillation, epinephrine, sodium bicarbonate and antidysrhythmics.
- The resuscitation proceeds for thirty minutes, and despite interventions, the patient remains in refractory VF/VT.

CURRENT PRACTICE: In the field

- What are the next options:
  - Continue resuscitation in the field (How long?)
  - Double defibrillation (How many times?)
  - Other medications (Beta-blockers, Ca-Channel blockers, IV Intra-lipid therapy?)
  - Transport to the nearest ED with CPR in progress?

Then what?

ED Treatment of Refractory VF/VT: What can they do differently?

- All of the previously listed interventions
- Possibly more resources (Staff, Specialists)
- Cardiac bypass/ECMO capability (Highly specialized and needs specially trained staff)
- Cardiac cath lab intervention with automated CPR in progress (Highly specialized and needs specially trained staff)

ED Treatment of Refractory VF/VT: What are the problems?

- Lack of a common approach and treatment
- Disparate facility capabilities
- Knowledge gaps
- Institutional resistance

Recent paper published in JAHA

J Am Heart Assoc. 2016;5:originally published January 7, 2016, doi: 10.1161/JAHA.115.002670

Early Access to the Cardiac Catheterization Laboratory for Patients Resuscitated from Cardiac Arrest due to a Shockable Rhythm: The Minnesota Resuscitation Consortium Twin Cities Unified Protocol

Garcia S, et al: The Minnesota Resuscitation Consortium organized approach to post-resuscitation care after out of hospital cardiac arrest

Santiago Garcia, MD[1], Todd Drexel, MD[2], Wobo Bekwelem MD[2], Ganesh Raveendran MD[2], Emily Caldwell, RN[2], Lucinda Klann[2], Qi Wang, MS[3], Selcuk Adabag, MD[1], Brian Mahoney, MD[4], Ralph Frascone, MD[5], Gregory Helmer, MD[6], Charles Lick, MD[7], Marc Conterato, MD[8], Kenneth Baran, MD[9], Bradley Bart, MD[10], Fouad Bachour, MD[10], Steven Roh, MD[11], Carmelo Panetta, MD[12], Randall Stark, MD[13], Mark Haugland, MD[14], Michael Mooney, MD[15], Keith Wesley MD[16], Demetris Yannopoulos, MD[2]

MN Resuscitation Consortium
University of Minnesota
Driven to Discover℠
HeartRescue Project

Protocol penetration in the Twin Cities:

313/370 (85%) patients got early access to the cath lab after resuscitated VF/VT

Of the patients with early access to the cath lab:

- 235/313 (75%) were discharged alive
- 222/235 (95%) had CPC 1 and 2
- 147/313 (46%) had PCI
- 5% had CABG and 38% had ICD placed

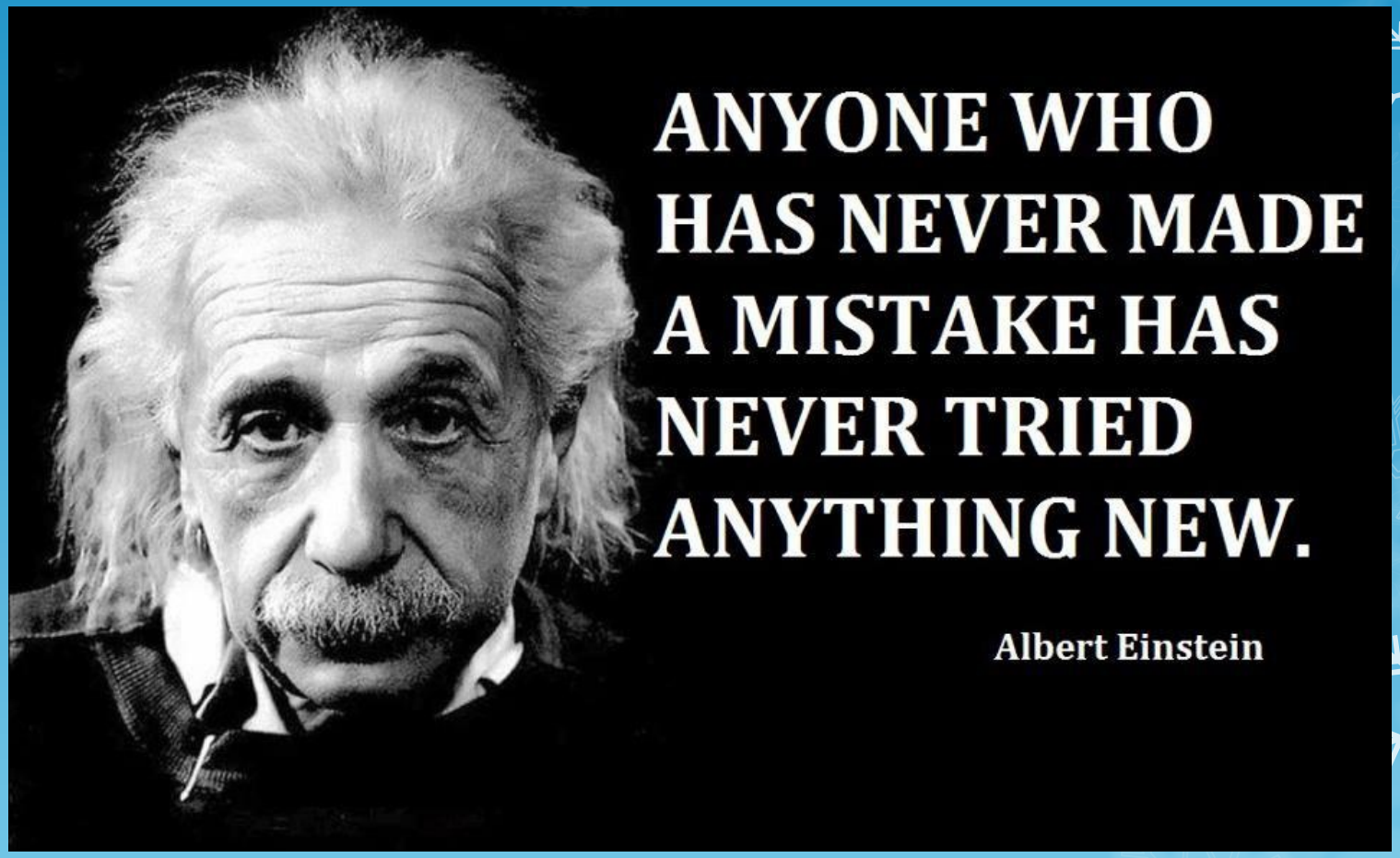
Patient that did not get access to the cath lab :

- 24/56 (42%) were discharged alive
- 19/24(79%) had CPC 1 and 2

Conclusions

- Early access to the cardiac catheterization for resuscitated patients from VF/VT is feasible, can be organized in a large metro area with close communication and collaboration of EMS directors and cath lab directors.
- Expected survival for this population is >75% and >95% are neurologically intact. Long term outcomes are stable, and multiple studies have shown this.
- PCI is expected in about 50% of the patients and a smaller proportion will undergo CABG.
- Patients that do no get access to the cath lab have a poor outcome with expected survival of ~40%.

The Next Step



The MRC Refractory VF/VT Initiative:

The Plan Framework

- Our premise is that early access to the CCL with perfusion access and on going CPR till either a coronary lesion is found and treated, or futility is identified, may allow survival in up to 40-50% of these patients.
- Per CARES data, we estimate this would affect @ 100-120 patients/year in the Hennepin County area.
- The University of Minnesota made a commitment to provide 24/7 access to those patients until their ECMO beds are filled.
- U of M provides feedback after every 10 patients and will evaluate the pathophysiology of persistent VF/VT based on the simple inclusion criteria and the protocol

The MRC Refractory VF/VT Initiative

- All patients receive the standard ACLS treatment for VF/VT in cardiac arrest, airway management and ITD placement.
- Patients are placed onto automated CPR as soon as feasible.
- After three unsuccessful cardioversions by any combination of first responders (AED) or ALS crew, the patient is loaded into the ambulance and anti-dysrhythmic is administered.
- Any patient that has VF/VT as presenting rhythm, and then remains in VF/VT and requires amiodarone or lidocaine is considered to have refractoryVF/VT.

The MRC Persistent VF/VT Initiative

- Patients that present with VF/VT and receive amiodarone have <8% survival rate currently compared to 48% of resuscitated VF /VT as a whole.
- AGE 18-75 . Presumed cardiac etiology
- No DNR/DNI or active bleeding.
- Patient can degenerate to PEA or asystole at any point after the initial diagnosis of VF/VT and get back to VF/VT after requiring an antiarrhythmic and they are still included
- At that point EMS mobilizes the patient with automated CPR in progress if they are within a 60 minute window from 911 dispatch to arrival at the single designated ***"Resuscitation Center"***, (the University of Minnesota Hospital).

REFRACTORY VF/VT EARLY ACCESS TO THE CCL MRC PROTOCOL

Patient with on going CPR after refractory VF/VT field activation enters the CCL

- Arterial and venous access under US and CPR.
- Pigtail in the descending aorta
- Angiogram of the left and right iliac and femoral arteries

Do you think a 17-19Fr ECMO arterial cannula (~5.6-6.0 mm diameter) can fit in the groin?

NO

- **Proceed with IABP insertion under CPR and synchronize to LUCAS Aortic pressure trigger.**
- **Angiography**

YES

- **Place AV ECMO with 25FR venous and 17-19 arterial**
- **Angiography**

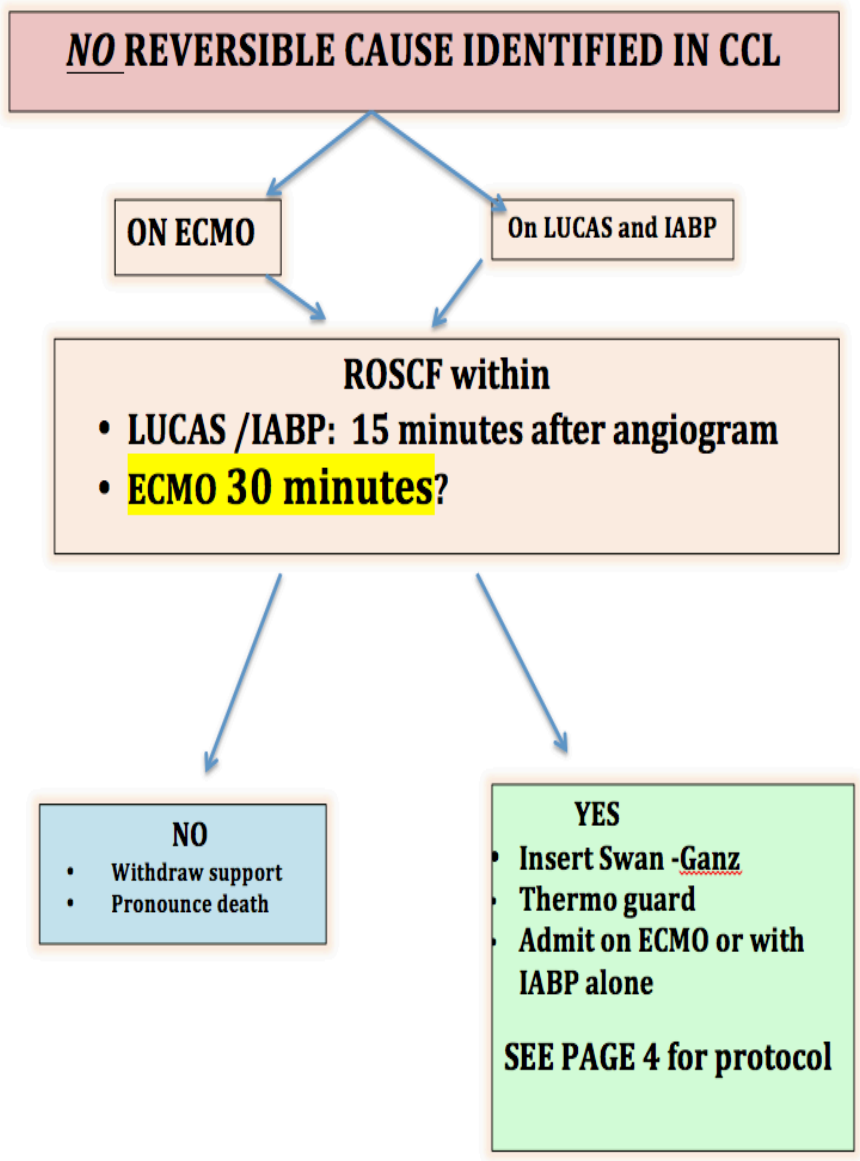
Is a reversible cause identified and PCI has been successful?

NO

- **SEE page 2.**

YES
SEE Page 3.

REFRACTORY VF/VT EARLY ACCESS TO THE CCL MRC PROTOCOL



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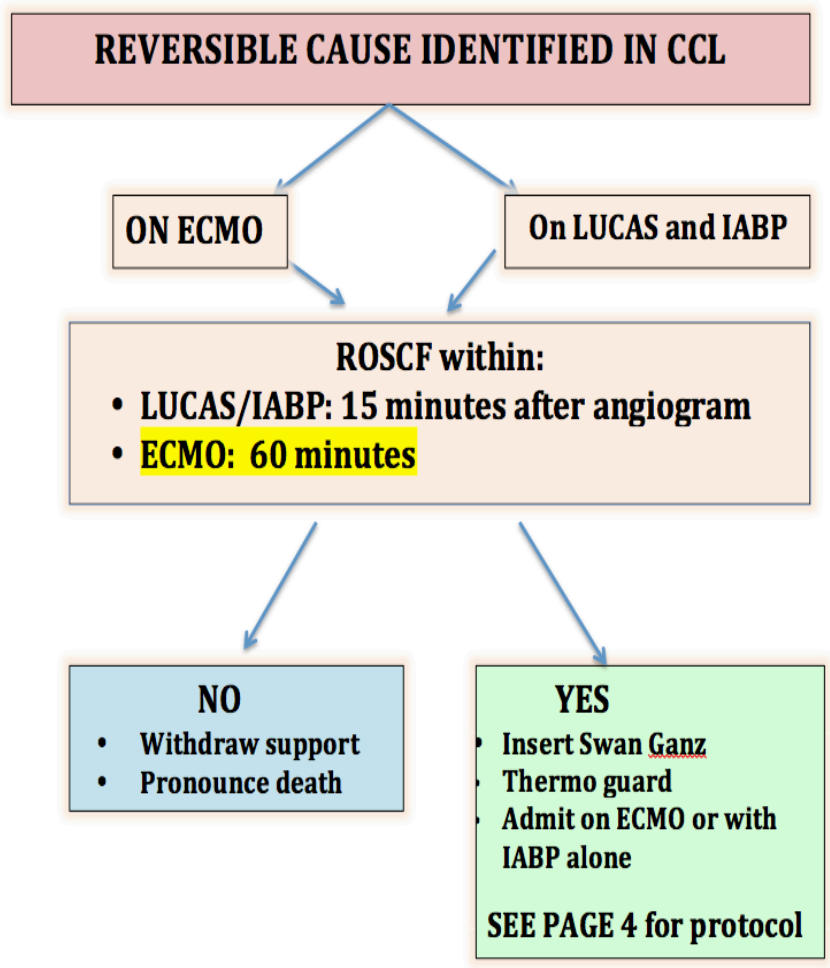


REFRACTORY VF/VT EARLY ACCESS TO THE CCL MRC PROTOCOL

ADMISSION

ECMO TEAM

- CHF attending
- SICU attending
- Interventional Cardiology
- Neurology
- Interventional Cards and CCC (Jason) fellow
- CHF fellow

Management

- 24 hour TTM at 33C
- After rewarming and after 48 hours (if on ECMO) an ECMO turn down evaluation will be performed by CHF and CV surgery.
- If adequate for explant will be transferred to CHF team after the explant (See below criteria for explant)
- If no independent cardiac function is present and patient is not conscious, the ECMO will be stopped and comfort care will be provided till patient's passing.
- If the patient is conscious or awake (possible but unlikely) LVAD will be considered if feasible.
- If not a candidate for LVAD /transplant, comfort care will be ordered.

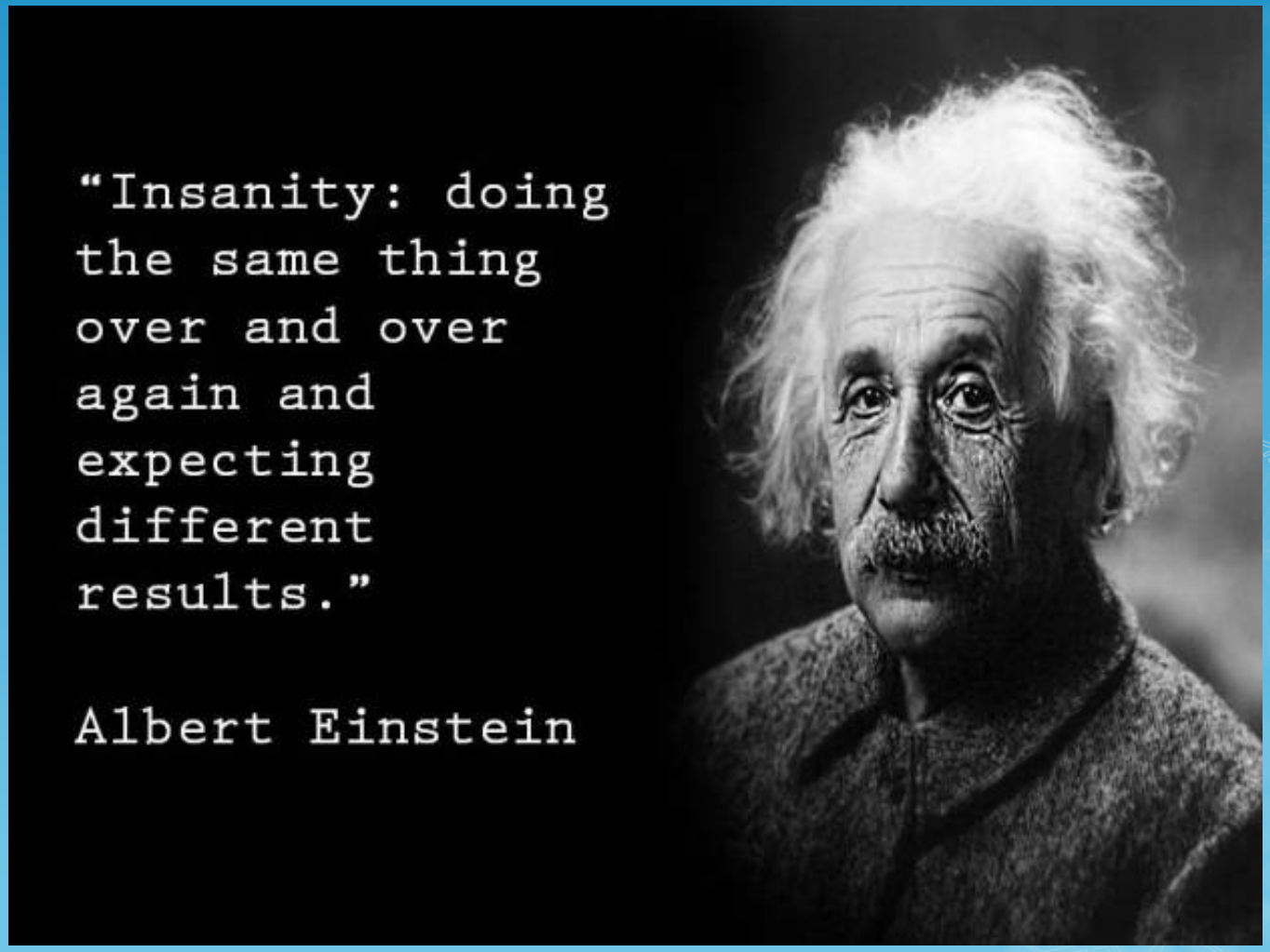
Goal of the Initiative

- To ultimately enroll between 40-60 patients in this protocol
- To act as the basis for a multi-center prospective randomized controlled trial comparing this protocol in treating refractory VF/VT patients with other advanced treatments provided both in the field and in the ED.
- This is a “labor intensive” approach that requires coordination between Dispatch, EMS field providers, the receiving facility and the CCL.

Initiative Results

- Ten patients have met criteria and have been enrolled so far.
- Four patients have survived to discharge with CPC scores of 1 or 2.
- One patient currently status post protocol and expected to recover and be discharged.
- 40% survival so far and potential to go to 50%.

The Premise


“Insanity: doing
the same thing
over and over
again and
expecting
different
results.”
Albert Einstein

The Premise

- While we have greatly improved our resuscitation rates over the last five years, those patients who remain in refractory VF/VT have dismal outcomes.
- The only current options are to transport the patient with ongoing CPR to an ED, or try prolonged resuscitation in the field with limited resources, or terminate the resuscitation in the field with the patient remaining in VF/VT.
- IT'S TIME TO TRY A NEW APPROACH!!!

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