Shocking Results: How Accurate is Paramedic ECG Analysis in Cardiac Arrest?

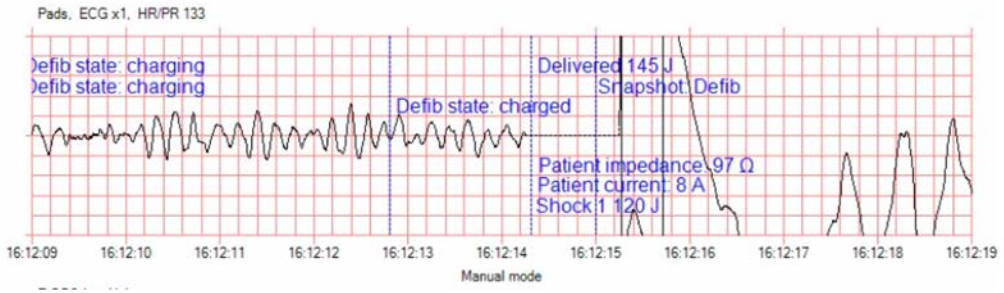
Scott T. Youngquist, MD, MS, FACEP, FAEMS, FAHA

Medical Director

Salt Lake City Fire Department

KeyBank
ZIONS BANK
us bank

HIGHEST IMPACT CARDIAC ARREST INTERVENTIONS



Inter-Rater Agreement of Paramedic Rhythm Labeling

[redacted]

Ronald G Pirrallo, MD, MHSA*
Robert A Swor, DO, FACEP*
Ronald F Maio, DO, MS, FACEP†

From the Department of Emergency Medicine, William Beaumont Hospital, Royal Oak, Michigan; and Section of Emergency Medicine, Department of Surgery, University of Michigan, Ann Arbor.†*

Received for publication August 18, 1992. Revision received December 14, 1992. Accepted for publication January 7, 1993.

Presented at the Society for Academic Emergency Medicine Annual Meeting in Toronto, Ontario, Canada, May 1992.

This study was supported by the SAEM Physio-Control EMS Fellowship.

Study hypothesis: Substantial inter-rater agreement is present in the labeling by paramedics of ventricular fibrillation and asystolic rhythms.

Design: Prospective, cross-sectional study.

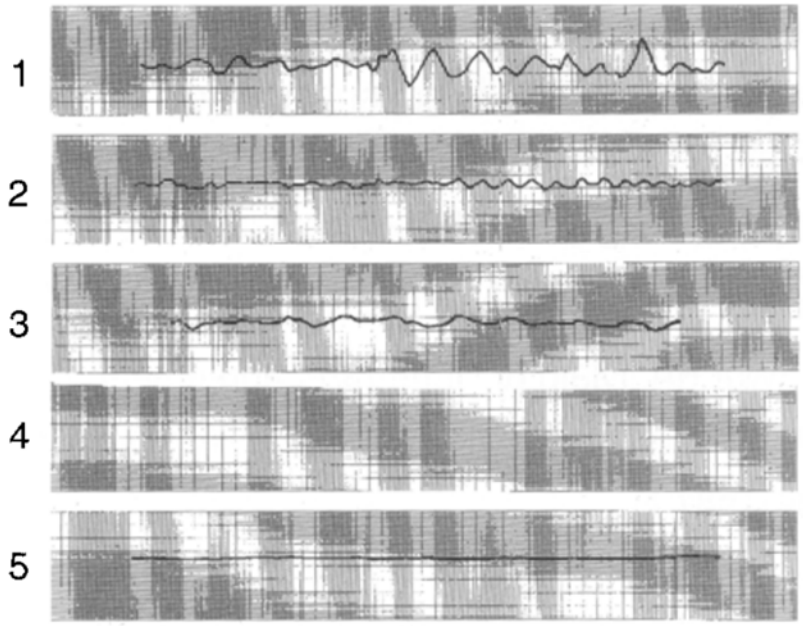
Type of participants: One hundred five practicing paramedics from nonvolunteer agencies who are advanced cardiac life support certified.

Methods: Five static cardiac arrest rhythm strips, classified by Cummins' average peak amplitude method, were arranged into five different orders of presentation and placed into five booklets. The paramedics were instructed to label each rhythm ventricular fibrillation or asystole based on rhythm recognition, not on treatment plan.

Results: The overall κ value for labeling the five rhythms was .63, indicating a moderate degree of inter-rater agreement. However, as the rhythm's amplitude decreased, the amount of

Figure.

The five study rhythms



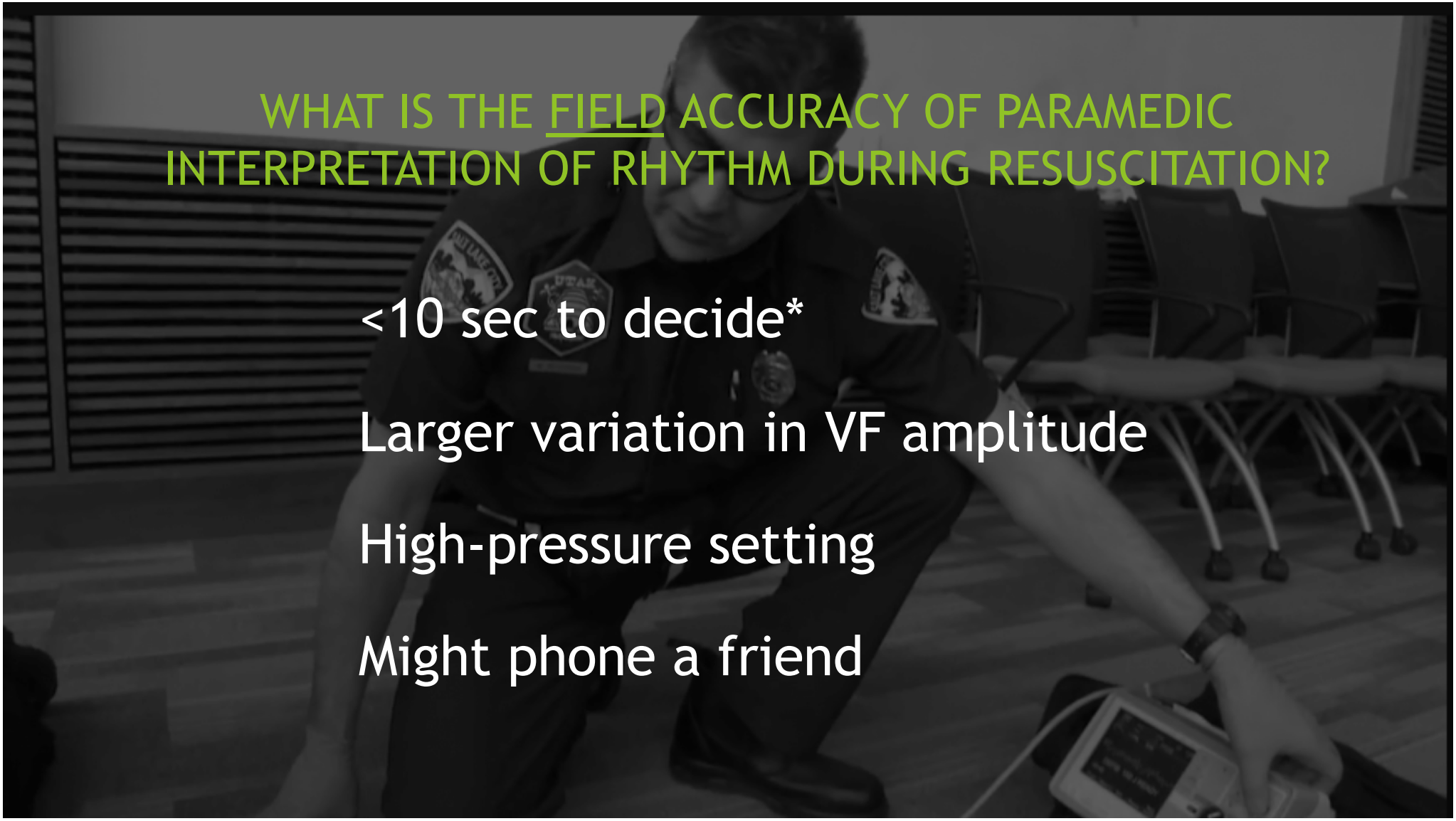
93% SENSITIVITY FOR VF

Table 2

Results of paramedic rhythm labeling

Strip	Average Peak Amplitude (mm)	No. Labeled Ventricular Fibrillation	No. Labeled Asystole	Proportion Labeled Ventricular Fibrillation (95% CI)	κ
1	3 to < 7	104	1*	0.99 (.97, 1.0)	≈1
2	1 to < 3	104	1*	0.99 (.97, 1.0)	
3	1 to < 3	85	20	0.81 (.73, .89)	.13
4	< 1	48	57	0.46 (.36, .56)	
5	0	0	105	0 (0, .04)	NA
All rhythms					.63

*Not the same individual.



WHAT IS THE FIELD ACCURACY OF PARAMEDIC INTERPRETATION OF RHYTHM DURING RESUSCITATION?

<10 sec to decide*

Larger variation in VF amplitude

High-pressure setting

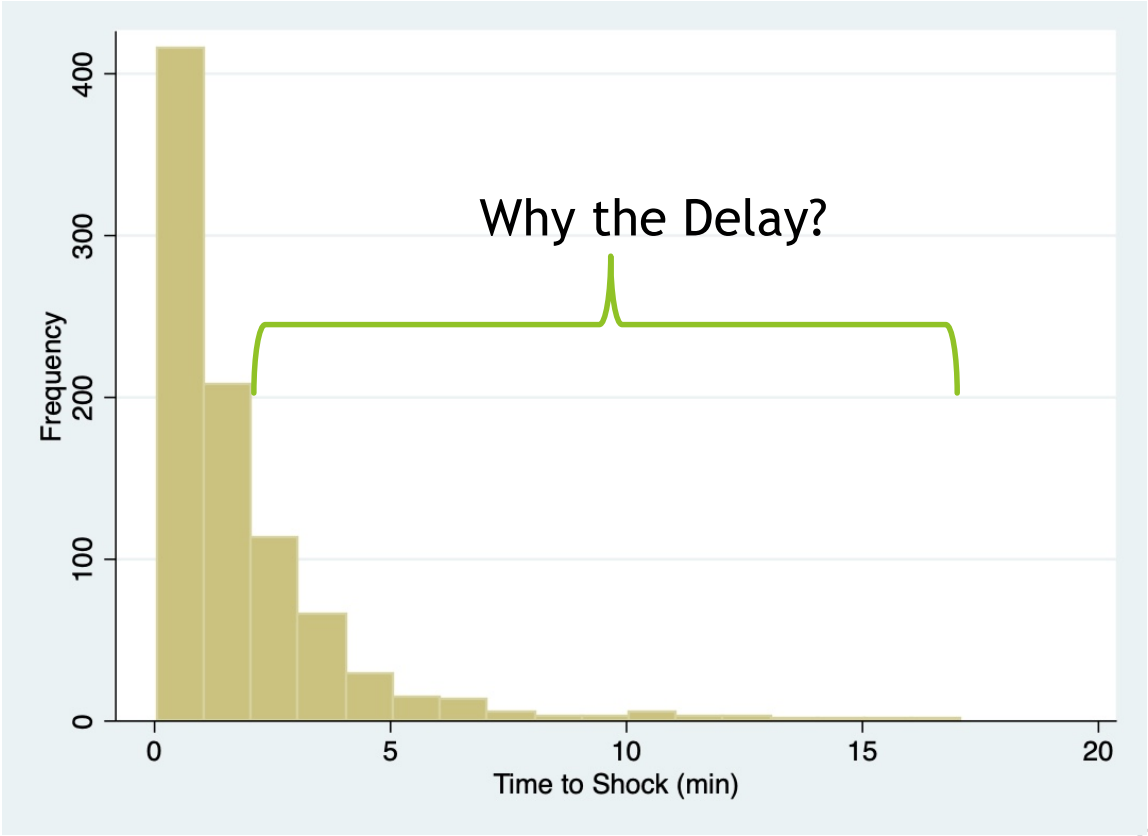
Might phone a friend

SENSITIVITY = WHAT PROPORTION OF VF CASES GIVEN SHOCK?

	≥1 Shock Delivered	No Shocks Delivered	
Shockable	222 (98%)	4 (2%)	226
Non-Shockable	254 (44%)	325 (56%)	579
			805

BY CASE ANALYSIS

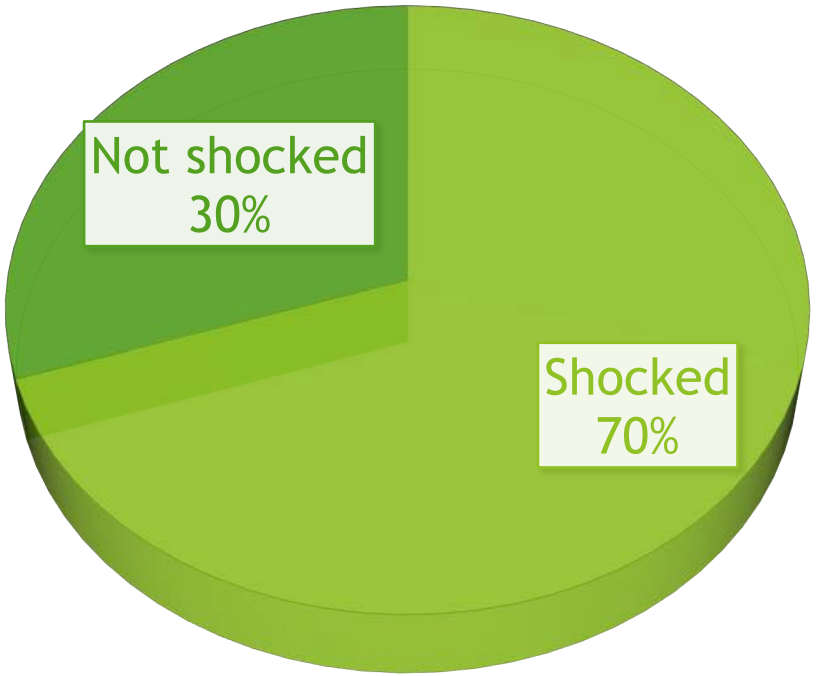
HOW FAST ARE APPROPRIATE SHOCKS DELIVERED?



N=648 arrests
n=880 shocks

MEDIAN 70 sec (IQR 30-145)

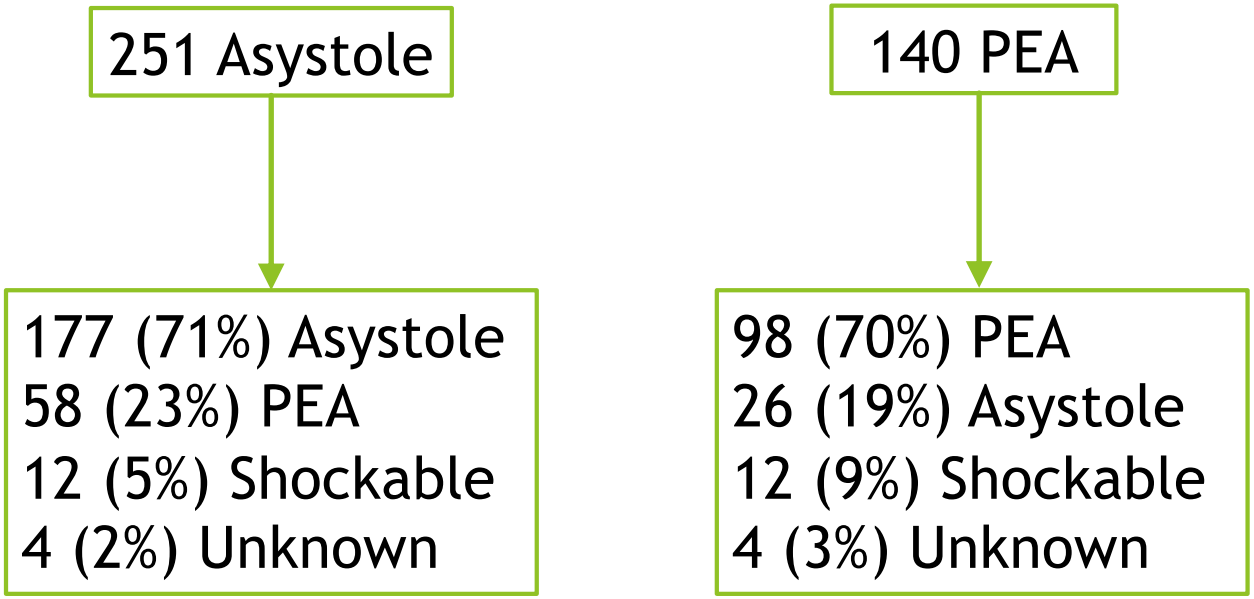
ANALYSIS BY 2 MIN EPOCH IN VF



Excludes 4 cases in which no shock ever delivered

n=880 shocks

SHOCKING THE NON-SHOCKABLE:
Immediate Post-Shock Rhythms



SUMMARY

- Paramedics have high case sensitivity for shockable rhythms
  - Consider empiric shock for perceived asystole
- Delayed defibrillation is frequent and occurred ~30% of the time in ALS care
- Our future areas of focus:
  - limiting delays in defibrillation

In a setting of continuous review and feedback

Those who cannot learn from history are doomed to repeat it.

-George Santayana

CAVEATS

- Gold Standard is single reviewer (me!)
- Paramedics instructed to monitor filtered rhythm for VF recurrence and administer shock without waiting
- Pit Crew approach with 6-8 hands
- Includes period in which empiric shock of asystole protocolized
- Excluded epochs in which rhythm couldn't be determined
- Used interpolation of last visualized rhythm in some cases