

“No Pause” Should Be Your Cause

Cardiac Arrest Resuscitation Analytic Discoveries

Jeffrey M. Goodloe, MD, NRP, FACEP

Medical Director, Medical Control Board

EMS System for Metropolitan Oklahoma City & Tulsa

Professor & EMS Section Chief, Department of Emergency Medicine

University of Oklahoma School of Community Medicine

Medical Director, Special Response Teams, Oklahoma Highway Patrol



Should we...

define resuscitation success by outcome alone?

expect peri-shock pauses less than 10 seconds?

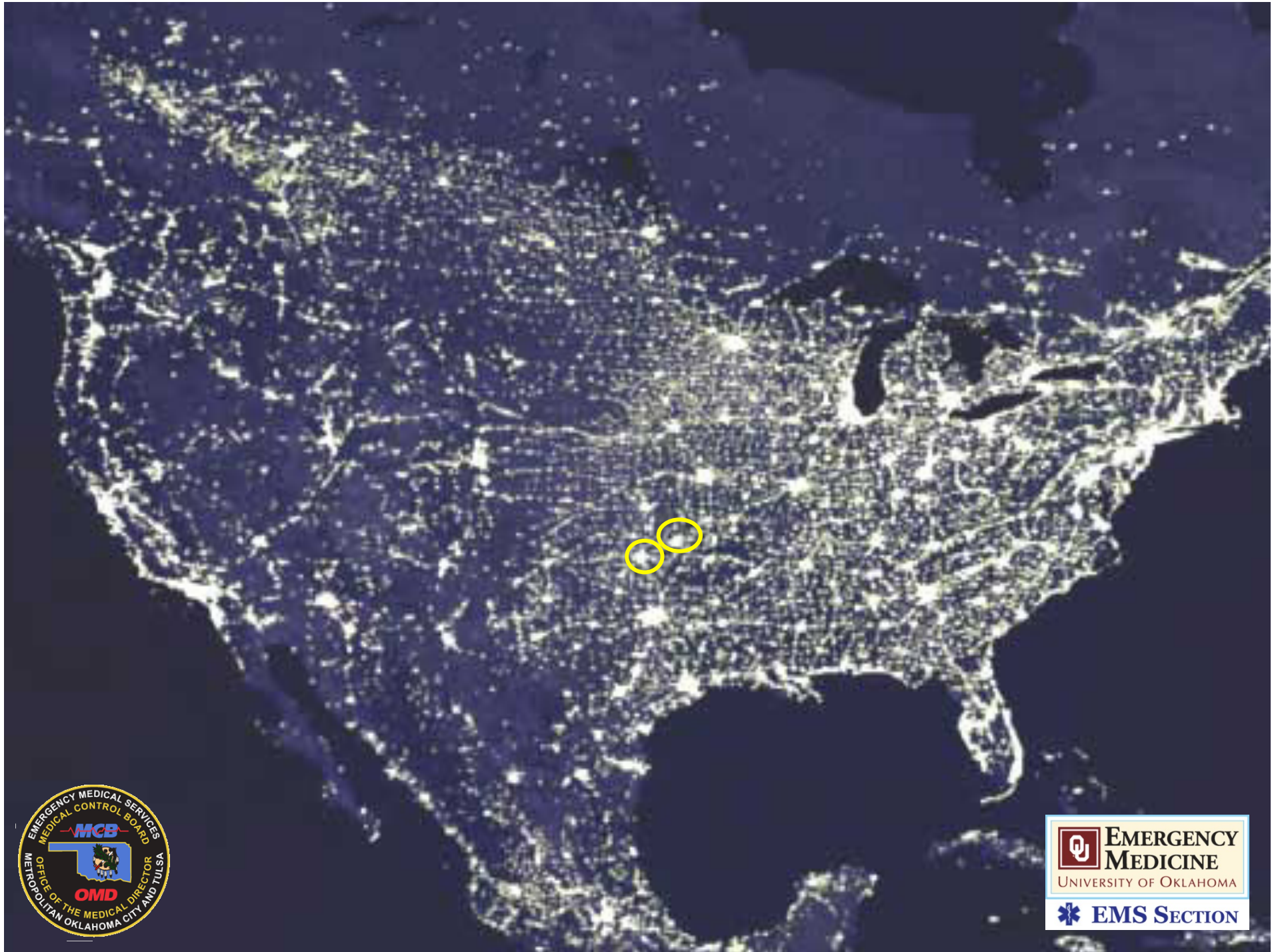
expect compression fractions greater than 96%?

look for the “silver bullet” to increase survival?



Difference Maker Lessons Taught by the Clinically Dead





EMS System for Metropolitan Oklahoma City & Tulsa



1,100 square miles

Population

- 1.6 million day
- 1.2 million night

191,658 calls (2014)

146,193 transports (2014)

76 % transports



Cardiac Arrests in OKC & Tulsa - 2013

- 1271 attempted resuscitations
- 868 (68%) acute coronary etiology
- 317 (37% of AC) witnessed
- 181 (57% of AC witnessed) bystander CPR
- 78 (43% if AC/witness/CPR) VF on EMS arrival

Bystander witnessed + CPR & VF on EMS arrival:

31 % survival (92%+ CPC 1 or 2)



Fundamentals ALWAYS Matter



It's the little details that are vital. Little things
make big things happen.

(John Wooden)



Vascular Pressure (mm Hg)

110

50

4 seconds

Ao

RA

Ao

RA

Berg RA et al. Circulation.2001; 104: 2465-2470

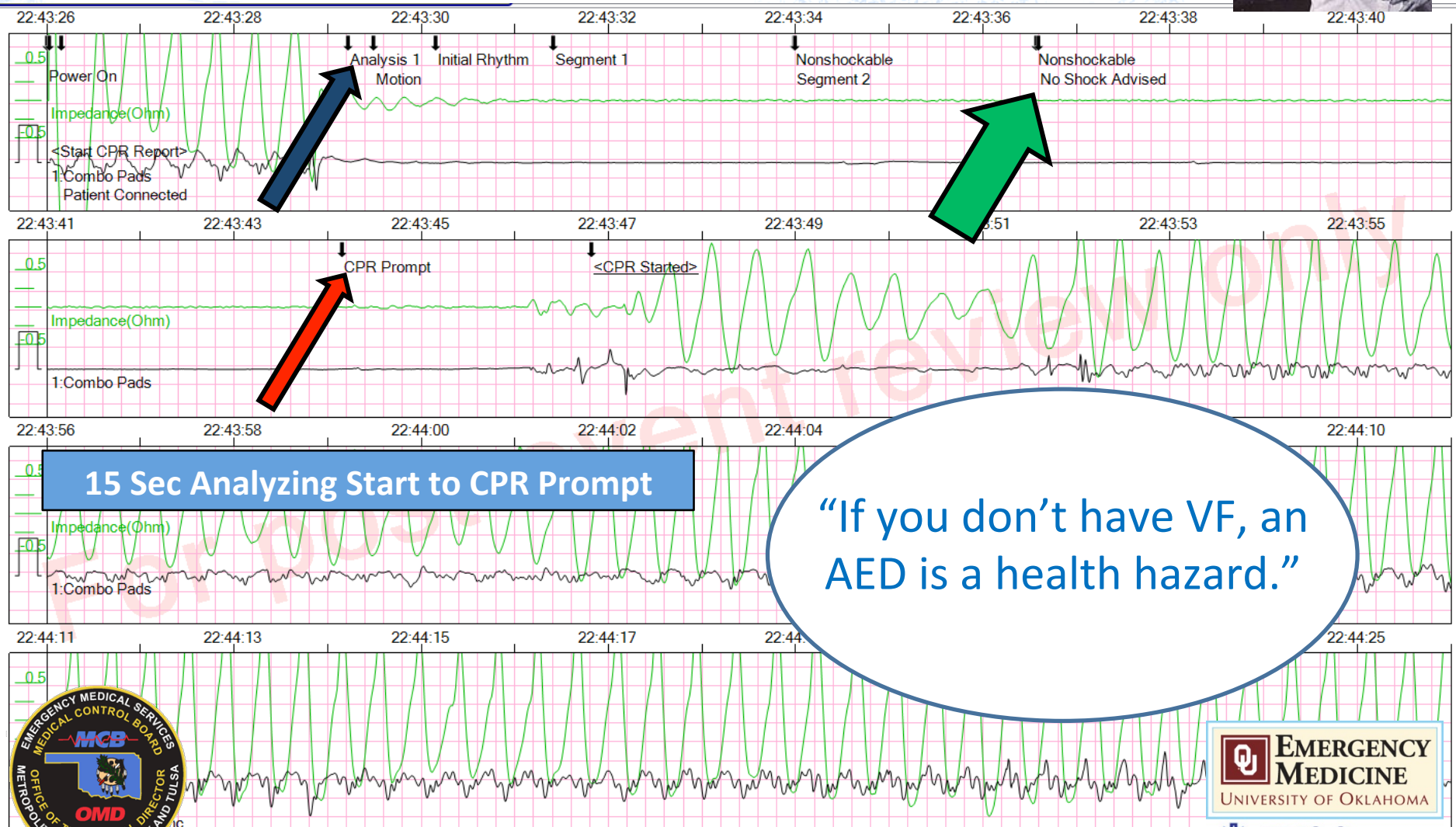
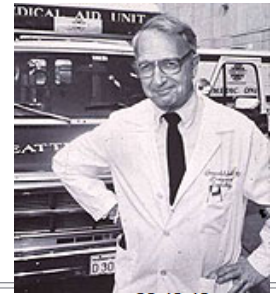


-10



EMS SECTION

The Rule of Leonard Cobb



Shockingly Very Good* Success

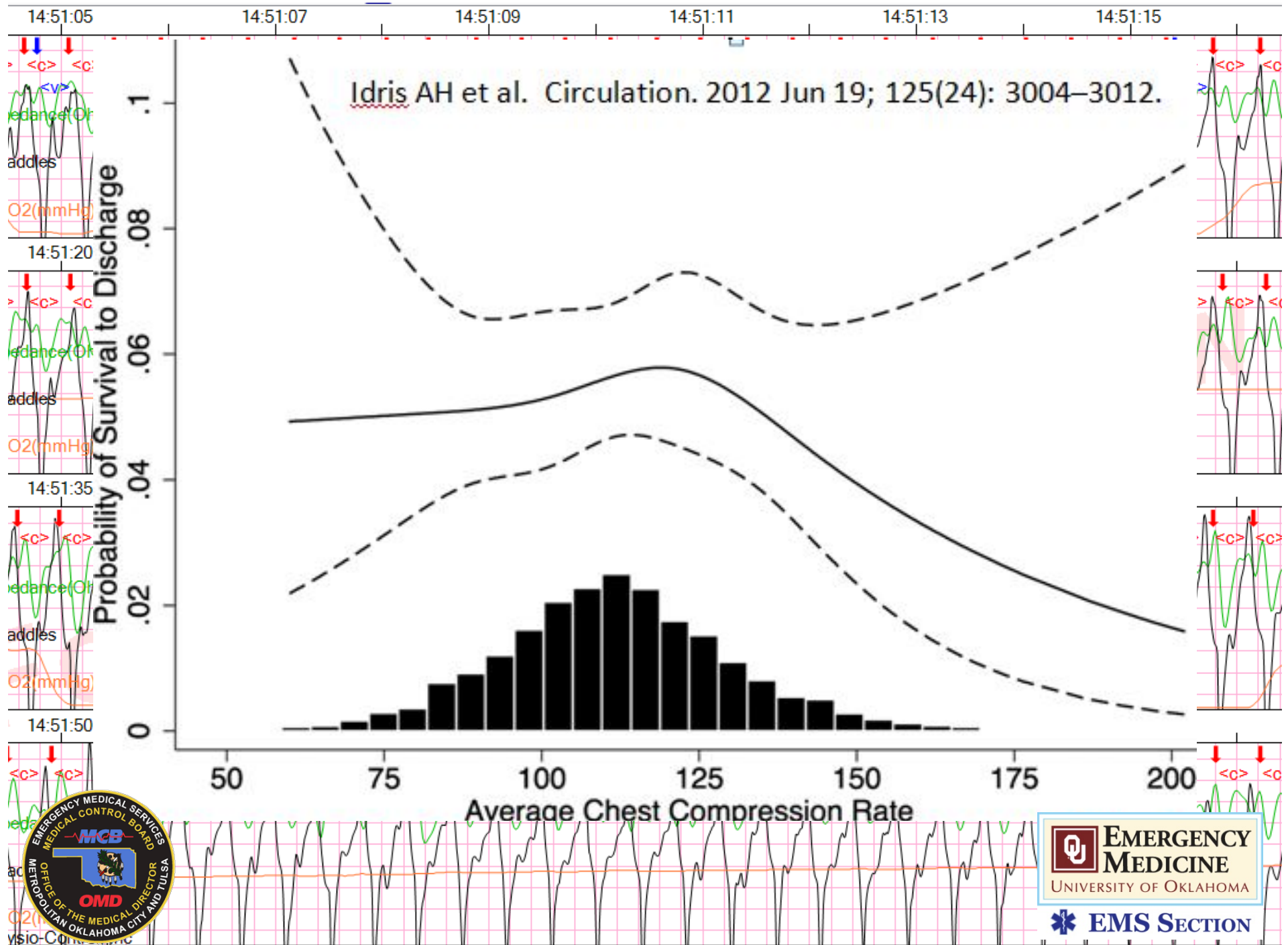
Shock	Time	Energy	Pre-shock CPR pause	Post-shock CPR pause
⚡1	1:31	200J	0:06	0:02
⚡2	5:56	300J	0:07	0:03
⚡3	8:01	300J	0:08	0:02
⚡4	9:59	300J	0:05	0:08
⚡5	12:07	360J	0:05	0:03
⚡6	13:56	360J	0:08	0:02
⚡7	15:58	360J	0:08	0:18
⚡8	18:00	360J	0:09	0:04
⚡9	19:59	360J	0:05	0:02
⚡10	22:04	360J	0:04	0:03
⚡11	24:45	360J	0:06	0:02
⚡12	27:11	360J	0:06	0:03
⚡13	28:52	360J	0:05	0:02
⚡14	31:35	360J	0:08	0:03



***The Enemy of Great is Not Suck
(It's Very Good)***

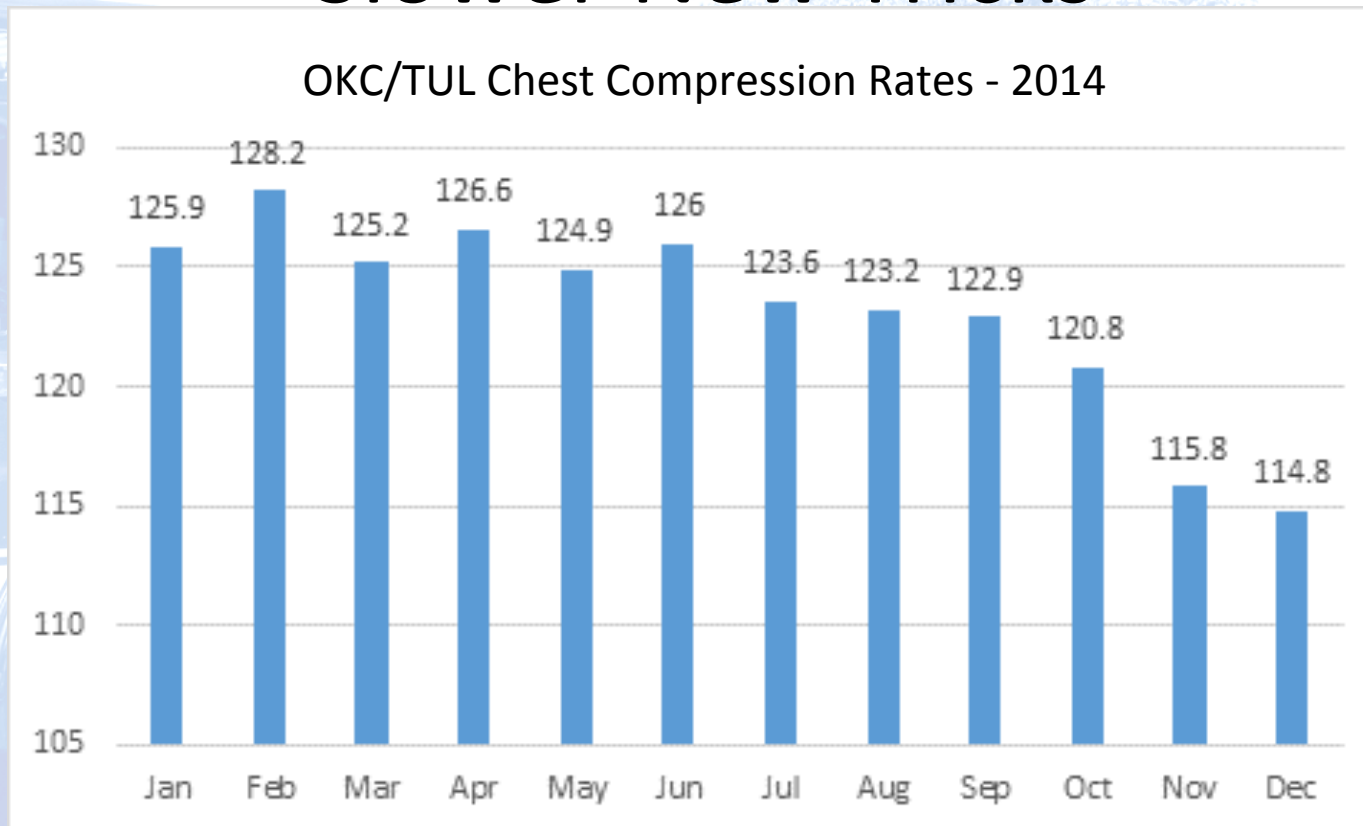
Pre-shock CPR Pause	Post-shock CPR Pause
0:01	0:03
0:01	0:03





You Can Teach “Old Dogs” New Tricks...

Slower New Tricks



The Sound of Metronomes

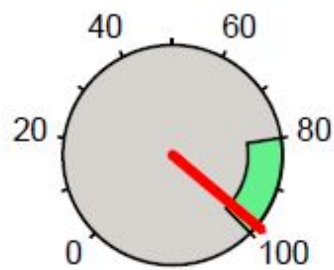


Ace Photography by David S. Howerton, NRP



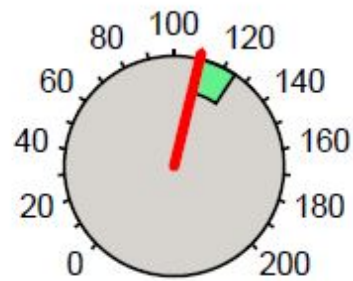
Perfection Isn't 100%, But It Is 96%

Compressions Ratio
(/total time)



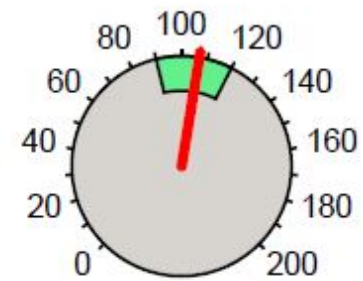
$19:59 / 20:22 = 98 \%$

Compression Rate



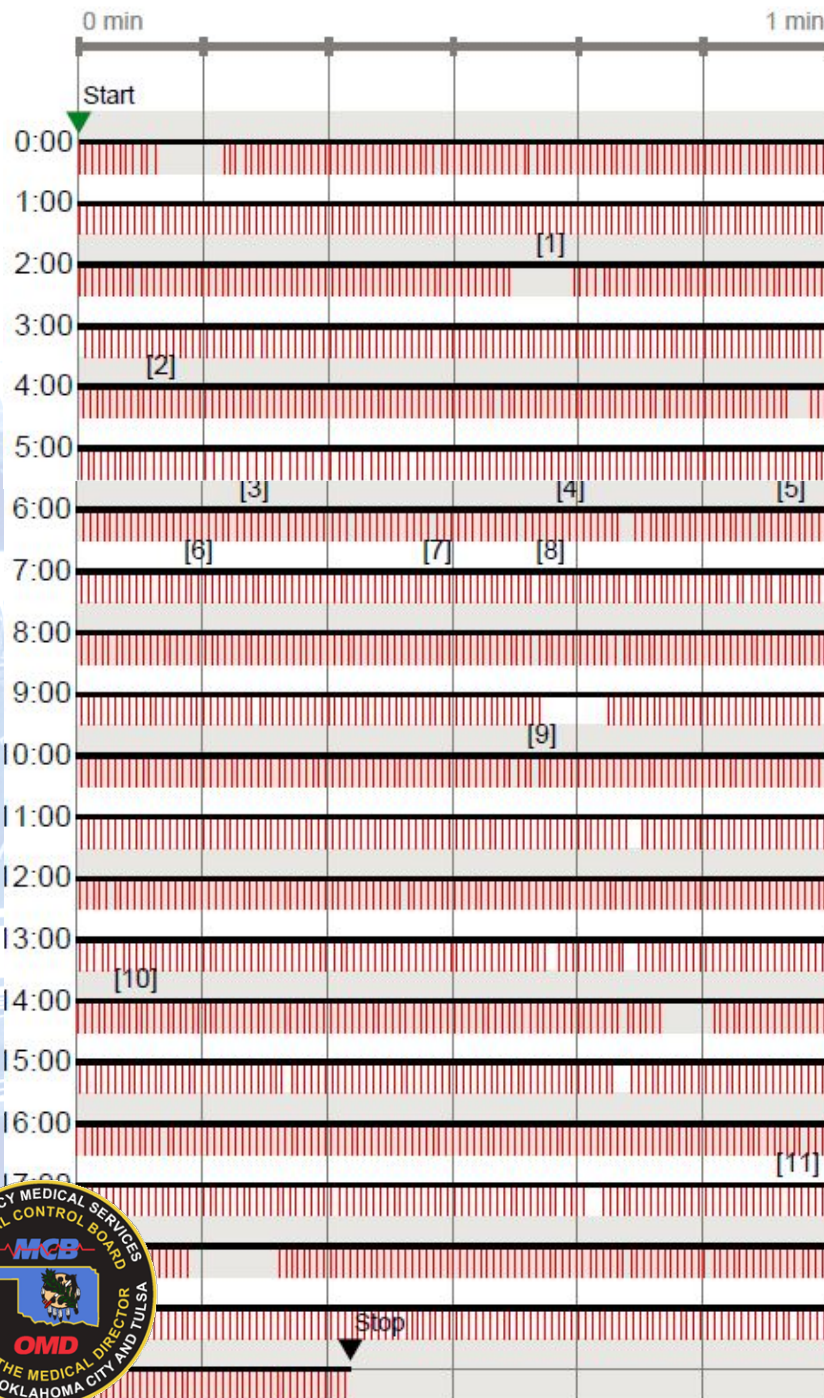
110/minute

Compressions/minute



107/minute





Compr.
Ratio,
%

Compr.
Rate

Compr.
/min

93

110

101

100

110

110

93

110

102

100

111

110

100

110

107

100

105

103

100

106

105

100

110

110

100

111

110

92

110

101

100

110

110

100

110

109

100

111

111

100

110

108

94

112

105

100

111

108

100

110

110

100

110

108

89

111

100

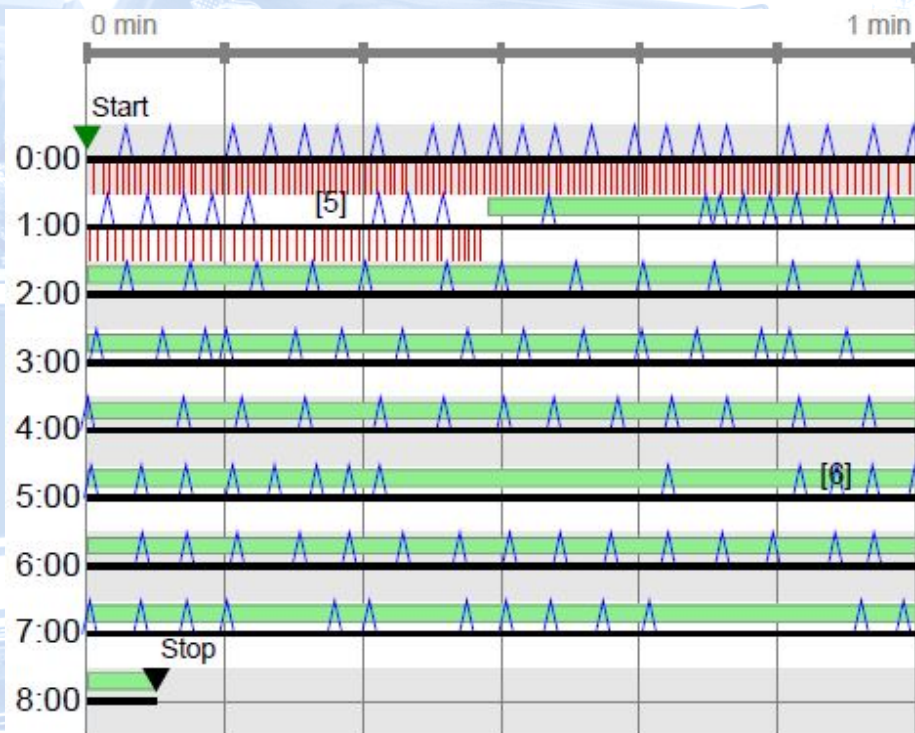
110

100

110



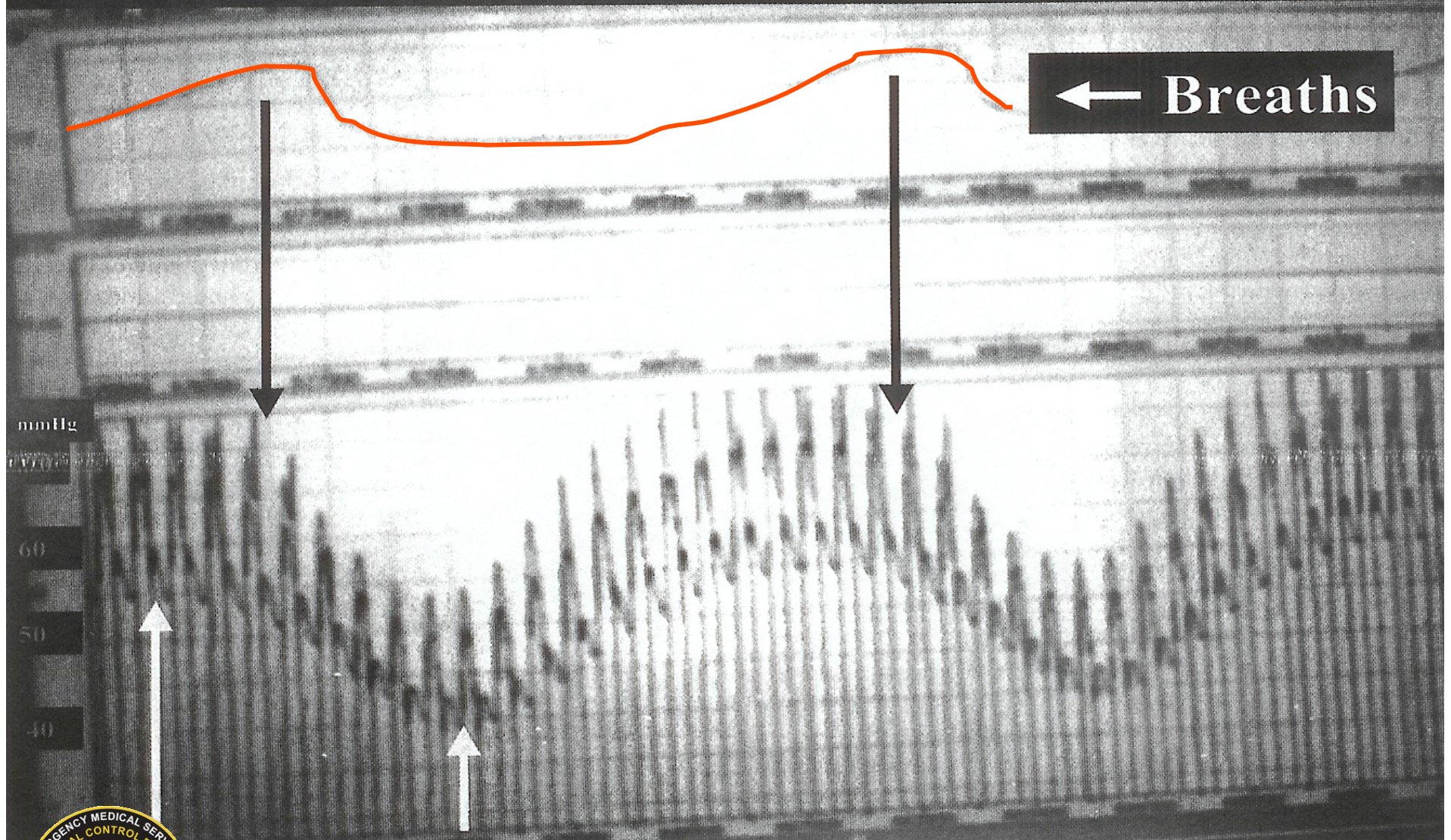
It's Not Just the Compressions to Count (that Counts!)



Compr. ratio, %	Compr. rate	Vent. /min
100	133	21
100	96	16
--	--	12
--	--	15
--	--	13
--	--	13
--	--	15
--	--	13
--	--	--



Breath by Breath Falls in Coronary Perfusion Pressure



Pepe P et al. Crit Care Med. 2004 Sep;32(9 Suppl):S414-20.



PEA Really is a Health Hazard

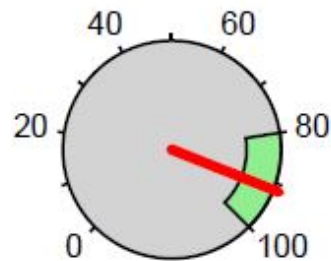


A Good “P4” Will Get You More (Survival)



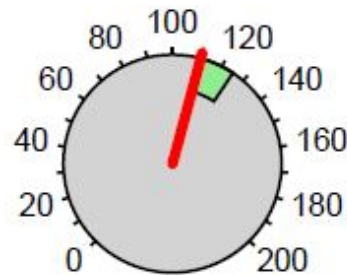
P4 = An Experienced, Good Leader (But it doesn't have to be with a plan)

Compressions Ratio
(/total time)



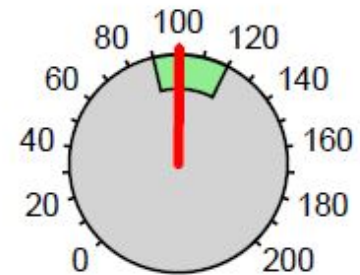
22:41 / 24:50 = 91 %

Compression Rate



111/minute

Compressions/minute



100/minute





It's More Than The Final Outcome

“...This is high praise, well described by Howard Reed below. Please share with the involved personnel with my gratitude for their dedicated efforts. Please also factor any appropriate recognition your agency can share with these fine EMS professionals. – Dr. G”

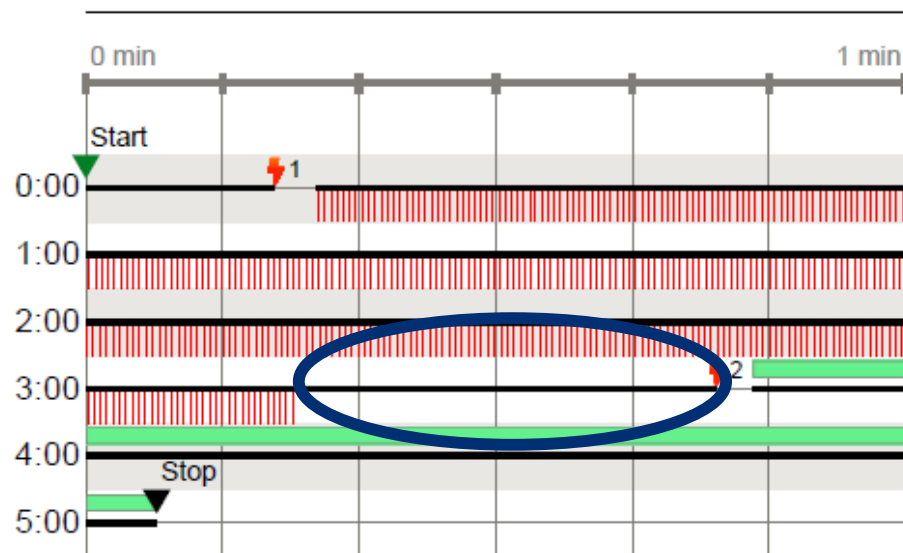
Pt outcome: persistent asystole, field termination of resuscitation with OLMC consult



It's More Than The Final Outcome

CPR QUIK-VIEW

Interval Statistics



Compr. ratio, %	Compr. rate	Vent. /min
76	130	--
100	127	--
100	128	--
34	129	--
--	--	--
--	--	--

Shock	Time	Energy	Pre-shock CPR pause	Post-shock CPR pause
⚡ 1	0:14	200J	--	0:03
⚡ 2	3:46	300J	0:30	0:03



Sunday Afternoon Game Films Are Best Screened Sunday Night & Viewed on Sunday/Monday



*Howard Reed, NRP
CPR Analytics Magician
Chilean National Defense Drone Commander*



Take Homes

1. Minimize chest compression pauses.
2. Compress the chest while AED/defib charges & get rid of post-defib rhythm/pulse checks.
3. Slow compressions down to 100-120/min.
100-110 with ITD; 120 without ITD
4. Use compression AND ventilation metronomes.
5. Don't let PEA (or anything else) distract.



Take Homes

6. Remember this is about team:

Plans, Evaluation, Feedback, & Recognition

7. The outcome is only part of the equation

Praise good fundamentals

Luck might be better than skill – on one case

8. Fundamentals ALWAYS matter.

9. You can't find what you don't seek. Seek data.



Achieving Success

“There is no
‘silver bullet’.
There is just
hard work.”

Michael K. Copass, MD



Should we...

define resuscitation success by outcome alone?

No. Fundamentals always matter.

expect peri-shock pauses less than 10 seconds?

No. Expect less than 5 seconds.

expect compression fractions greater than 96%?

No. 96% is as “good” as it gets (in 2015)

look for the “silver bullet” to increase survival?

No. There’s just hard work.





TULSA



OKLAHOMA CITY

Contact Info:
jeffrey-goodloe@ouhsc.edu
Office of the Medical Director
405-297-7173