

Big Chill in the Big Apple: Why FDNY is Not Getting the Cold Shoulder



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Complexities of Cardiac Arrest



February 20, 2008

Survival From In-Hospital Cardiac Arrest During Nights and Weekends

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Complexities of Cardiac Arrest

	Weekends	Weekends / Nights	Weekday Daytime
# of arrests	458		
ROSC	18.22%		
Mean Response Time	04:22.8		
Response Time Standard Dev	02:23.5		



Complexities of Cardiac Arrest

	Weekends	Weekends / Nights	Weekday Daytime
# of arrests	458	720	
ROSC	18.22%	20.56%	
Mean Response Time	04:22.8	04:31.7	
Response Time Standard Dev	02:23.5	02:19.8	



Complexities of Cardiac Arrest

	Weekends	Weekends / Nights	Weekday Daytime
# of arrests	458	720	910
ROSC	18.22%	20.56%	25.05%
Mean Response Time	04:22.8	04:31.7	04:42.2
Response Time Standard Dev	02:23.5	02:19.8	02:51.5



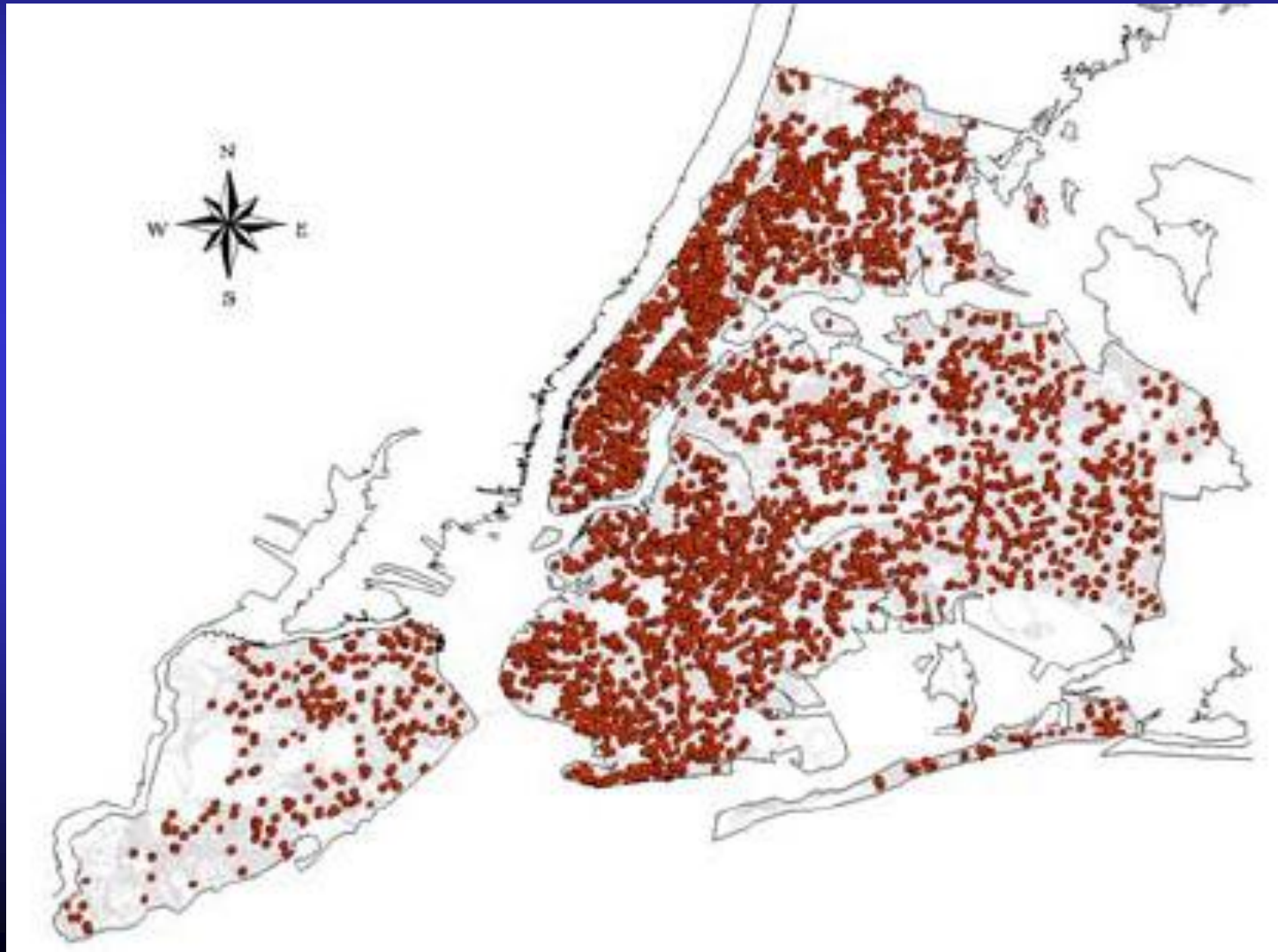
No question – No one is perfect.



And there are some things we can't control – including bad luck...



But we can all strive to do better...



Cardiac Arrest Survival



Cardiac Arrest Survival

EMERGENCY MEDICAL SERVICES/ORIGINAL RESEARCH

Cardiac Arrest Resuscitation Evaluation in Los Angeles: CARE-LA

Marc Eckstein, MD

From the Departments of Emergency Medicine (Eckstein, Chan), Pediatrics (Chan), and
Surgery (Phan), Keck School of Medicine of the University of Southern California, Los Angeles, California.

Table. Comparison of survival from witnessed ventricular fibrillation in Los Angeles with systems.*

Location (Year)	Population (Millions)/ Population per Square Mile	No. of Witnessed VF Arrests	No. Survived (%)
Los Angeles (2000)	3.7/7,900	275	19 (6.9)
New York City (1990)	7.3/22,000	415	22 (5.3)
Chicago (1987)	2.7/11,800	371	15 (4.0)
Seattle (1999-2000)	0.56/6,400	303	97 (32.0)
Miami (1999)	1.2/660	96	23 (24.0)
Ontario, Canada (1997)	2.7/NA	424	61 (14.4)

VF, Ventricular fibrillation; NA, not available.

*Other cities are listed in descending order by population density.

†Using Los Angeles survival as the reference.



Cardiac Arrest Survival



Cardiac Arrest Survival

PHENYCS

- repeat of PHASE
- post-merger (FDNY and EMS)
 - \$\$\$
 - enhanced AED delivery
 - reduced response times
- year-long examination of OOHCA survival
- joint project: FDNY, NYAM, AHA



Cardiac Arrest Survival



PHENYCS Cardiac Arrest Study Results

- ▶ 134 victims of cardiac arrest were saved from April 2002 to March 2003
- ▶ Your chances of surviving a cardiac arrest in New York City increased 40% from 1990 figures
- ▶ Survival rates increased due to:
 - Reduction in response times by nearly 50%
 - Implementation of first-responder defibrillation for 200 fire apparatus
 - Doubled the amount of defibrillators available citywide
 - Nearly doubled the amount of ambulance tours citywide
- ▶ More CPR education needed in our communities



Cardiac Arrest is characterized by a complete loss of heart function.

Outcome

Survival- overall

Survival- OOCHA prior

Survival- OOCHA prior

PHENYCS adjusted to
race population structure

Survival- EMS witnesses

Survival- bystander witnesses

Survival- bystander witnesses

Hospital admission- to

ROSC- bystander witnesses

VF- bystander witnesses

PHASE (1990-1991)

2.2% (95% CI: 1.7-2.9)

1.4% (95% CI: 1.0-2.1)

8.5% (95% CI: 5.3-12.9)

2.1% (95% CI: 1.4-3.1)

5.3% (95% CI: 3.3-8.0)

15.5% (95% CI: 13.5-17.7)

28.2% (95% CI: 25.7-30.8)

33.5% (95% CI: 30.9-36.3)

-New York City (NYC) geographically diverse diverse population, in and/or high traffic area
-New York City has a population age 65 and over
-NYC 911 Emergency consisting of Ambulance and Fire Department (FDNY)
-Municipal and volunteer dispatched and open Department (FDNY)
-In 1990-1991, the Pre six-month prospective of 1,400 from out-of-hospital cardiac arrest (OCHA) 5.8 million
-Over the past decade aging, and a number of EMS systems

-To measure OCHA a first responder only CPR and additional 911 ambulances all of which are data
-To compare results

-Design: One year pre patients with OCHA
-Dates: April 1, 2002 -
-Data collected from 2 telephone interviews
-Patient demographic with outcome survival Medical Affairs - OCHA
-Data collected on 6.9 who were of pretest

n-cardiac
21: 33.3%

second
1.7%

system
4.5%

in CPR
26.1%
66.5%

red
1.4%

Discharged,
lived >30 days
62: 26.5%

rate of Out of
694, 271: 67.6-68.3
hanging incidence
00: 1444: 2002

out of hospital
also 1586: "Lancet"

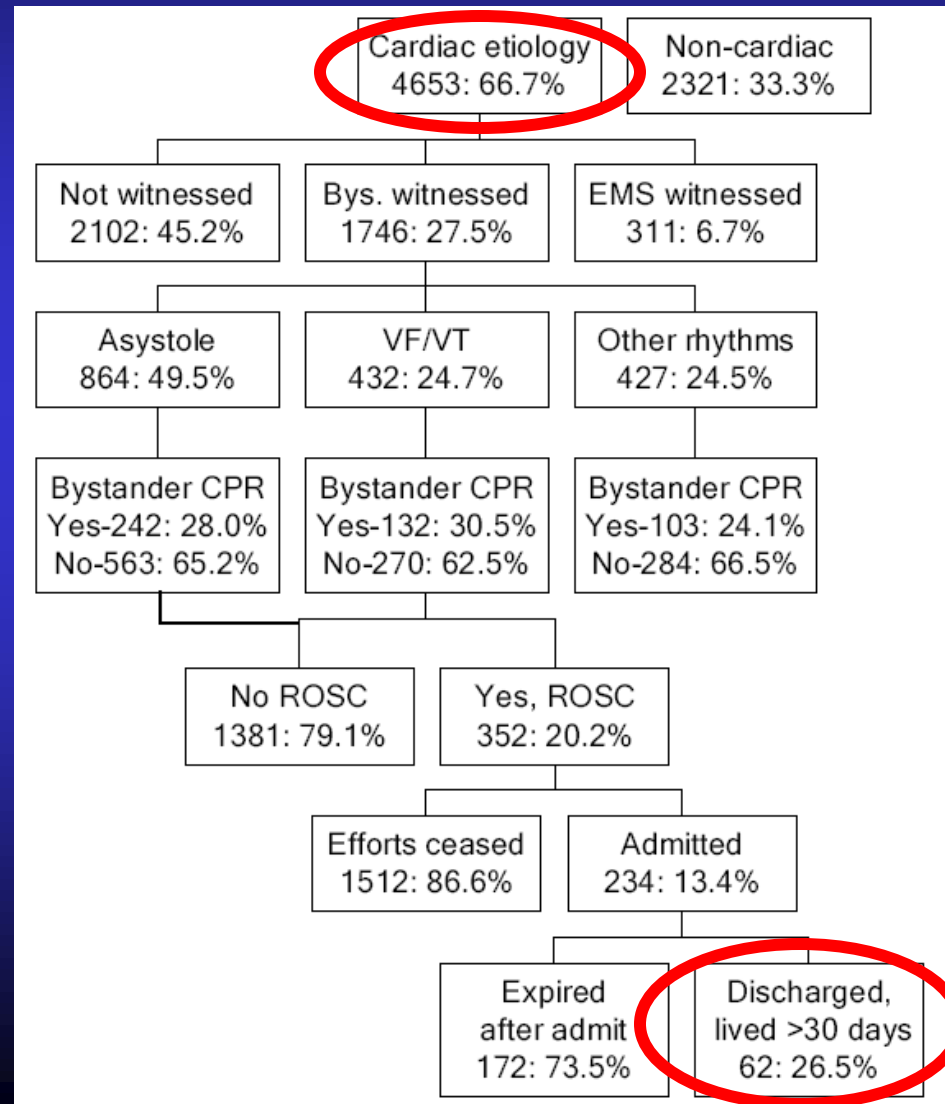
Outcome of
on area where are



Cardiac Arrest Survival

The reality:

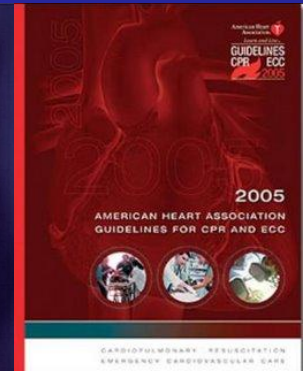
**THERE IS ALWAYS
ROOM
FOR
IMPROVEMENT**



Improving OOHCA Outcomes

2003 – 2006

- compressions-only pre-arrival instructions
- international trial of waveform-based AED algorithm
- adult AED use allowed for pediatrics
- 2005 AHA guidelines implemented
- supervisor response to every arrest
- Lyfetymer
- alternative airway
- vasopressin over epinephrine



Improving OOHCA Outcomes

FDNY Medics	2002	2003	2004	2005	2006	2007
# of arrests	1537	1636	1555	1688	1801	
% VF	12.88%	13.99%	13.69%	12.26%	12.66%	
ROSC - overall	15.81%	17.60%	15.31%	15.40%	16.49%	
ROSC – nonVF	14.04%	16.13%	13.71%	14.04%	15.44%	
ROSC – VF/VT	27.78%	26.64%	25.35%	25.12%	23.25%	
Sustained ROSC	11.13%	12.78%	10.03%	11.32%	11.94%	



Improving OOHCA Outcomes

FDNY Medics	2002	2003	2004	2005	2006	2007
# of arrests	1537	1636	1555	1688	1801	1735
% VF	12.88%	13.99%	13.69%	12.26%	12.66%	14.72%**
ROSC - overall	15.81%	17.60%	15.31%	15.40%	16.49%	23.69%**
ROSC – nonVF	14.04%	16.13%	13.71%	14.04%	15.44%	18.32%**
ROSC – VF/VT	27.78%	26.64%	25.35%	25.12%	23.25%	54.88%**
Sustained ROSC	11.13%	12.78%	10.03%	11.32%	11.94%	n/a



Improving OOHCA Outcomes

But we can't stop there...



Improving OOHCA Outcomes

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MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP*

INDUCED HYPOTHERMIA AFTER OUT-OF-HOSPITAL CARDIAC ARREST

TREATMENT OF COMATOSE SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST WITH INDUCED HYPOTHERMIA

STEPHEN A. BERNARD, M.B., B.S., TIMOTHY W. GRAY, M.B., B.S., MICHAEL D. BUIST, M.B., B.S.,
BRUCE M. JONES, M.B., B.S., WILLIAM SILVESTER, M.B., B.S., GEOFF GUTTERIDGE, M.B., B.S., AND KAREN SMITH, B.Sc.



EMS and Therapeutic Hypothermia



“Unconscious adult patients with spontaneous circulation after out-of-hospital VF cardiac arrest should be cooled to 32-34°C. Cooling should be started as soon as possible and continued for at least 12-24 hours.”

Nolan JP, Deakin CD, Soar J, et al. European Resuscitation Council Guidelines for Resuscitation 2005 Section 4. Adult advanced life support. Resuscitation 2005; 67 (Suppl 1): S39-S86.



Improving OOHCA Outcomes

Beneficial effects of hypothermia

1. Preserve ATP stores.
2. Improve glucose utilization.
3. Mitigate neuronal calcium mobilization.
4. Reduce excitatory neurotransmitter release.
5. Reduce production of superoxide anions and attenuate free-radical damage.
6. Inhibit the accumulation of lipid peroxidation products.
7. Reduce production of NO.
8. Reduce lactate production and tissue acidosis.
9. Attenuate post-ischemic disturbances in CBF.
10. Reduce ICP.
11. Reduce amount of neutrophil migration into ischemic areas.
12. Reduce post-ischemic cytotoxic and vasogenic edema.
13. Decrease expression of heat shock proteins.
14. Accelerate expression of early genes hypothesized to participate in neuronal recovery.
15. Attenuate injury of microtubule-associated protein 2 needed for cross-linking of the neuronal cytoskeleton.
16. Protect fluidity of the plasma lipoprotein membranes.



Improving OOHCA Outcomes

Barriers / Considerations for EMS in NYC

- large number of providers (~900 paramedics just within FDNY)
- paralytics are currently not utilized
- short transport times
- temperatures are currently not checked
- currently lacking waveform capnography
- lacking refrigerators
- issue of whether hypothermia would be continued in the hospital

Alternatives for EMS in NYC to Consider

- EMS Officer utilization
 - still presents above issues
 - not all supervisors are paramedics
- Selective transport to hypothermia centers



Improving OOHCA Outcomes

Proposal #1: Beginning July 1, 2008, all OOHCA patients achieving ROSC in New York City will only be transported to facilities actively employing therapeutic hypothermia.

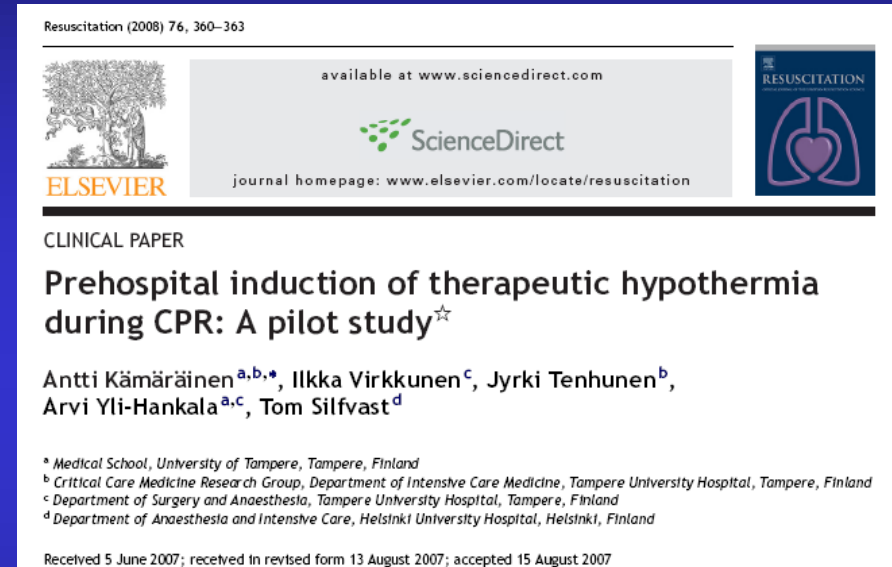


Improving OOHCA Outcomes

Proposal #2

Beginning January 1,
2009, the treatment
for all OOHCA
patients in New York

City will include the induction of therapeutic
hypothermia during the first minutes of the
resuscitation.



But how?





Avoiding the cold shoulder

1. Make this a partnership to improve outcomes.
 - recognize that none of us work in isolation
 - be willing to give credit
 - work constructively, not critically



Avoiding the cold shoulder

2. Involve the players in the game plan from the beginning.

- ICU Directors
- ED Directors
- CEOs
- Regional oversight
- State oversight
- hospital corporations
- DOH
- (IRB)



Avoiding the cold shoulder

3. Take ownership without implementing a dictatorship.
 - don't force it down their throats
 - provide a framework, but be willing to compromise



4. Ensure a two-way exchange of data.

Data Collection Field Number		1 Identifier	
2. Subid 1			
3. Subid 2			
4. Subid 3			
5. Subid 4			
6. CAD Number			
7. Location			
8. Borough			
9. Unit Number			
10. Station/Hospital Number of Unit			
11. ACR Number			
12. ACR Information for CTR <input type="checkbox"/> Yes <input type="checkbox"/> No			
13. Disposition <input type="checkbox"/> 1002 (P) <input type="checkbox"/> 1094 <input type="checkbox"/> 1003			
14. Initial Call Type			
15. Final Call Type			
16. PD Camp Time			
17. Transmitted EMT/EMT <input type="checkbox"/> Yes <input type="checkbox"/> No			
18. Sub-Unit <input type="checkbox"/> Yes <input type="checkbox"/> No			
19. First arrival time			
20. Second time			
21. Third time			
22. Fire assignment			
23. First location time			
24. CTRD response time			
25. CTRD response <input type="checkbox"/> 1007 <input type="checkbox"/> 1094 <input type="checkbox"/> 1002 <input type="checkbox"/> 1003			
26. CTRD response			
27. CTRD response			
28. CTRD response			
29. CTRD response			
30. CTRD response			
31. CTRD response			
32. CTRD response			
33. CTRD response			
34. Time of arrival			
35. Second time			
36. Third time			
37. Interval between arrival times (min)			
(b) 42 - 1			
(c) 43 - 1			
38. Name			
39. Age			
40. Gender <input type="checkbox"/> M <input type="checkbox"/> F			
41. Race <input type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Hispanic <input type="checkbox"/> Asian <input type="checkbox"/> Other <input type="checkbox"/> Unknown			
42. Date of birth			
43. Social Security Number			
44. Mailing address			
45. City			
46. State			
47. ZIP code			
48. Site description <input type="checkbox"/> Private home <input type="checkbox"/> Tenement <input type="checkbox"/> Residential complex <input type="checkbox"/> Office complex <input type="checkbox"/> Office house <input type="checkbox"/> Residential house			
49. Floor number for patient			
50. Number of floors in building			
51. Method of ascending			
52. Description of condition			
53. Type of condition			
54. Difficult cases <input type="checkbox"/> Yes <input type="checkbox"/> No			
55. Time of arrival			
56. Time of arrival			
57. Time of arrival			
58. Time of arrival			
59. Time of arrival			
60. Time of arrival			
61. Reason condition occurred (if not on scene)			
62. Interval time since collapse			
63. Witnessed by bystander <input type="checkbox"/> Yes <input type="checkbox"/> No			
64. Person who witnessed collapse <input type="checkbox"/> Spouse <input type="checkbox"/> Parent <input type="checkbox"/> Child <input type="checkbox"/> Neighbor <input type="checkbox"/> Unknown <input type="checkbox"/> Left PEA <input type="checkbox"/> N/A			
65. Method of identification <input type="checkbox"/> Identification tag <input type="checkbox"/> Identification tag			
66. Primary cardiac arrest <input type="checkbox"/> Yes <input type="checkbox"/> No			
67. Bystander CPR <input type="checkbox"/> Yes <input type="checkbox"/> No			
68. Type of bystander CPR <input type="checkbox"/> ABC <input type="checkbox"/> CCO			
69. CPR by first responder <input type="checkbox"/> Yes <input type="checkbox"/> No			
70. Duration of CPR prior to EMS arrival (minutes)			
71. Level of training of individual providing CPR prior to EMS arrival <input type="checkbox"/> CPR trained, certification complete <input type="checkbox"/> CPR trained, certification incomplete <input type="checkbox"/> CPR trained, certification incomplete <input type="checkbox"/> Non-training, AED instructions			
72. Time of arrival			
73. Time of arrival			
74. Time of arrival			
75. Complaints prior to arrival / contributing factors			
76. Medication List			
77. Duration of chest pain <input type="checkbox"/> N/A <input type="checkbox"/> (hours, minutes)			
78. Duration of chest pain <input type="checkbox"/> N/A <input type="checkbox"/> (hours, minutes)			
79. Use of ECG, NIBP <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
80. Use of defibrillator <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
81. Ventilation method by first responder <input type="checkbox"/> BVM <input type="checkbox"/> Mouth-to-mouth <input type="checkbox"/> Mouth-to-mouth			
82. Respiratory arrest after EMS arrival <input type="checkbox"/> Yes <input type="checkbox"/> No			
83. Initial AED use <input type="checkbox"/> Yes <input type="checkbox"/> No			
84. Initial AED use <input type="checkbox"/> Yes <input type="checkbox"/> No			
85. Alternative airway established <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
86. Secondary cardiac arrest <input type="checkbox"/> Yes <input type="checkbox"/> No			
87. If yes, color change noted <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
88. End-tidal CO2 monitoring <input type="checkbox"/> Yes <input type="checkbox"/> No			
89. If yes, initial CO2 reading			
90. PAD home AED use prior to ALS arrival <input type="checkbox"/> Yes <input type="checkbox"/> No			
91. If yes <input type="checkbox"/> Mouthpiece <input type="checkbox"/> Bypass <input type="checkbox"/> Unknown			
92. Initial PAD home AED analysis time			
93. PAD analysis <input type="checkbox"/> Shock <input type="checkbox"/> No shock advised			
94. Number of PAD home AED defibrillation attempts			
95. CTRD AED use <input type="checkbox"/> Yes <input type="checkbox"/> No			
96. CTRD AED mode number			
97. CTRD AED assignment <input type="checkbox"/> Standard algorithm <input type="checkbox"/> CPR first algorithm			
98. Initial CTRD AED analysis time			
99. Number of CTRD AED defibrillation attempts			
100. BLS AED use <input type="checkbox"/> Yes <input type="checkbox"/> No			
101. BLS AED mode number			
102. BLS AED assignment <input type="checkbox"/> Standard algorithm <input type="checkbox"/> CPR first algorithm			
103. Initial BLS AED analysis time			
104. Number of BLS AED defibrillation attempts			
105. BSCC advised by any PAD CTRD BLS defibrillation <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
106. BSCC maintained on PAD CTRD BLS defibrillation <input type="checkbox"/> N/A <input type="checkbox"/> Yes <input type="checkbox"/> No			
107. ALS initial rhythm <input type="checkbox"/> VF <input type="checkbox"/> VT <input type="checkbox"/> PEA <input type="checkbox"/> Asystole <input type="checkbox"/> Other			
108. ALS final rhythm <input type="checkbox"/> VF <input type="checkbox"/> VT <input type="checkbox"/> PEA <input type="checkbox"/> Asystole <input type="checkbox"/> Other			
109. ALS defibrillation <input type="checkbox"/> Yes <input type="checkbox"/> No			
110. If yes <input type="checkbox"/> Mouthpiece <input type="checkbox"/> Bypass			
111. Initial ALS defibrillation time			
112. Number of ALS defibrillation attempts			
113. If yes <input type="checkbox"/> Yes <input type="checkbox"/> No			
114. If yes <input type="checkbox"/> Yes <input type="checkbox"/> No			
115. If yes <input type="checkbox"/> Yes <input type="checkbox"/> No			
116. 30 successful <input type="checkbox"/> Yes <input type="checkbox"/> No			
117. Initial end-tidal CO2 reading			
118. End-tidal CO2 reading			
119. ALS medications used			
120. Total resuscitation time			
121. Initial temperature			
122. Hypothermia registered <input type="checkbox"/> Yes <input type="checkbox"/> No			
123. Total volume infused			
124. Sodium bicarbonate <input type="checkbox"/> Yes <input type="checkbox"/> No			
125. Shivering noted <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
126. Pulse absent (initial) <input type="checkbox"/> Yes <input type="checkbox"/> No			
127. Time of BSCC			

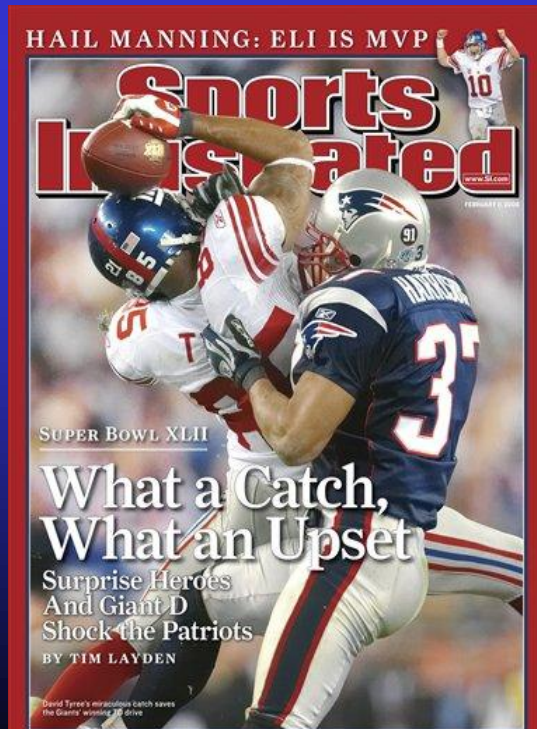
Avoiding the cold shoulder

5. Keep your personnel interested and informed.



Avoiding the cold shoulder

6. Most importantly - always keep your eye on the ball.





Thank you.