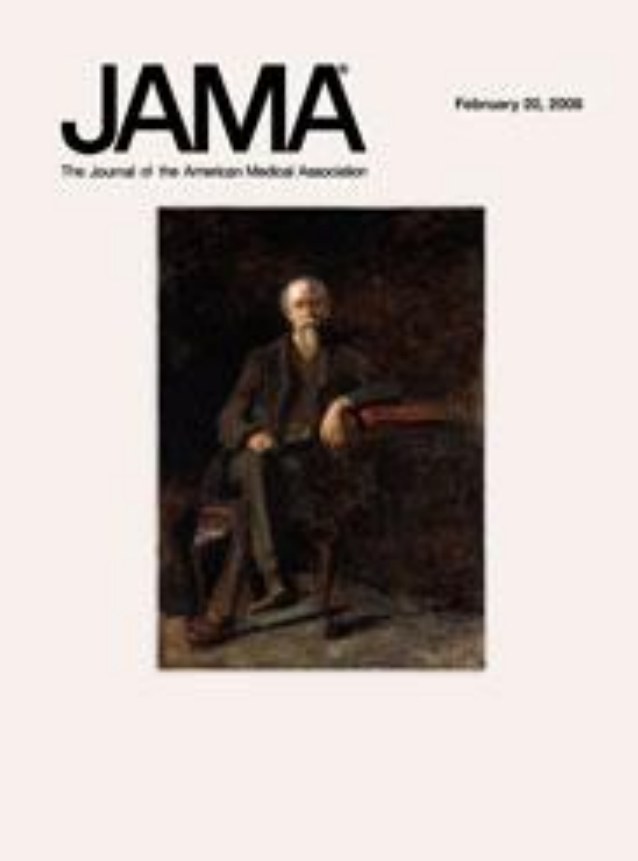
Big Chill in the Big Apple: Why FDNY is Not Getting the Cold Shoulder

John Freese, MD
Medical Director of Training
Director of Prehospital Research
OLMC Medical Director
New York City Fire Department

Complexities of Cardiac Arrest



February 20, 2008

Survival From In-Hospital Cardiac Arrest During Nights and Weekends

Mary Ann Peberdy, MD; Joseph P. Ornato, MD; G. Luke Larkin, MD, MSPH, MS; R. Scott Braithwaite, MD; T. Michael Kashner, PhD, JD; Scott M. Carey; Peter A. Meaney, MD, MPH; Liyi Cen, MS; Vinay M. Nadkarni, MD, MS; Amy H. Praestgaard, MS; Robert A. Berg, MD; for the National Registry of Cardiopulmonary Resuscitation Investigators

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

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

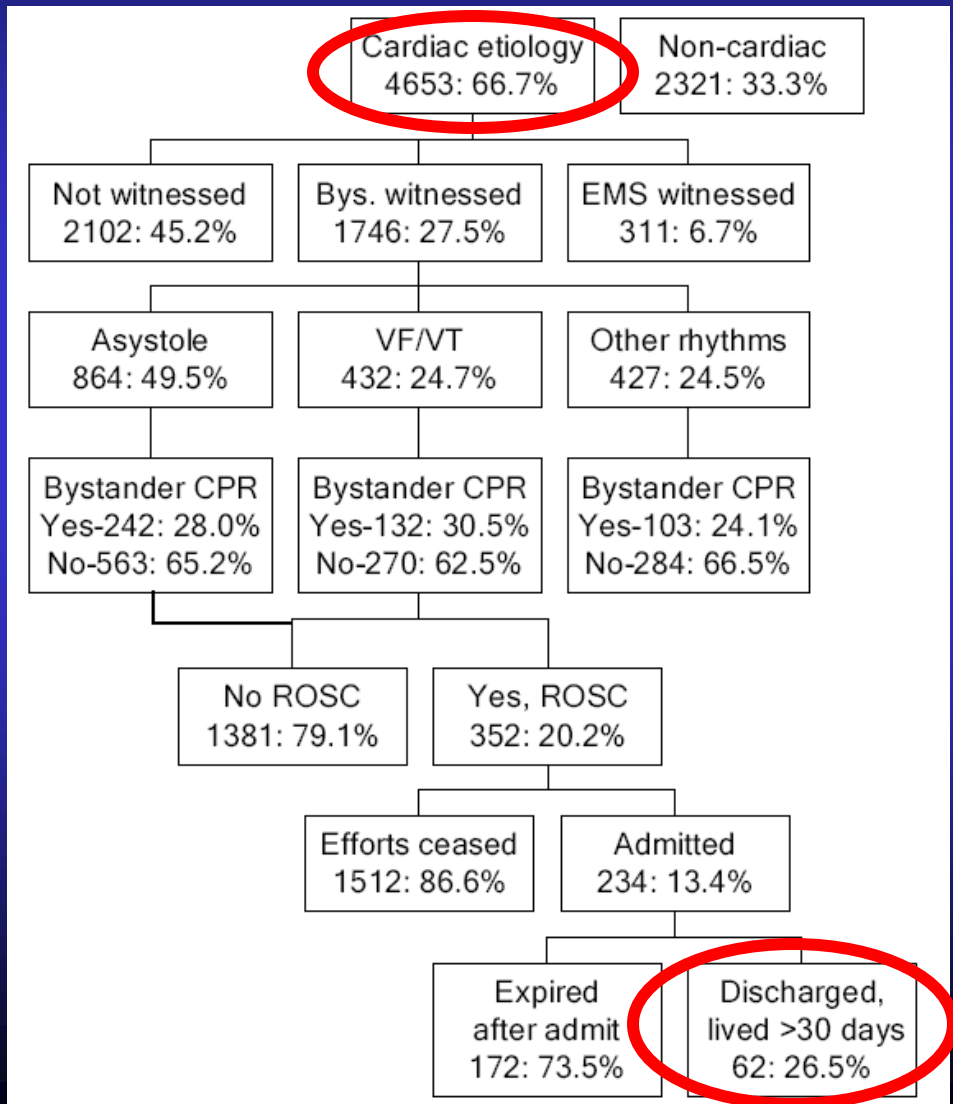
Cardiac Arrest is characterized by a complete loss of heart function.

Outcome	PHASE (1990-1991)
Survival- overall	2.2% (95% CI: 1.7-2.9)
Survival- OOCHA pric	1.4% (95% CI: 1.0-2.1)
Survival- OOCHA pric PHENYCS adjusted t race population struct	
Survival- EMS witnes	8.5% (95% CI: 5.3-12.9)
Survival- bystander w	2.1% (95% CI: 1.4-3.1)
Survival- bystander w	5.3% (95% CI: 3.3-8.0)
Hospital admission- b	15.5% (95% CI: 13.5-17.7)
ROSC- bystander witr	28.2% (95% CI: 25.7-30.8)
VF- bystander witnes	33.5% (95% CI: 30.9-36.3)

Cardiac Arrest Survival

The reality:

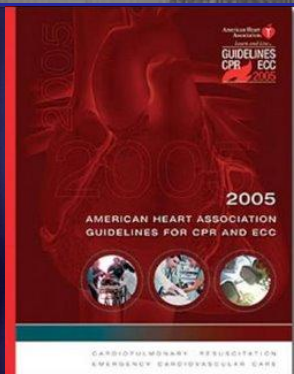
THERE IS ALWAYS ROOM FOR IMPROVEMENT



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

The New England
Journal of Medicine

VOLUME 346 FEBRUARY 21, 2002 NUMBER 8

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 32-34ºC. 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 acculumulation 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

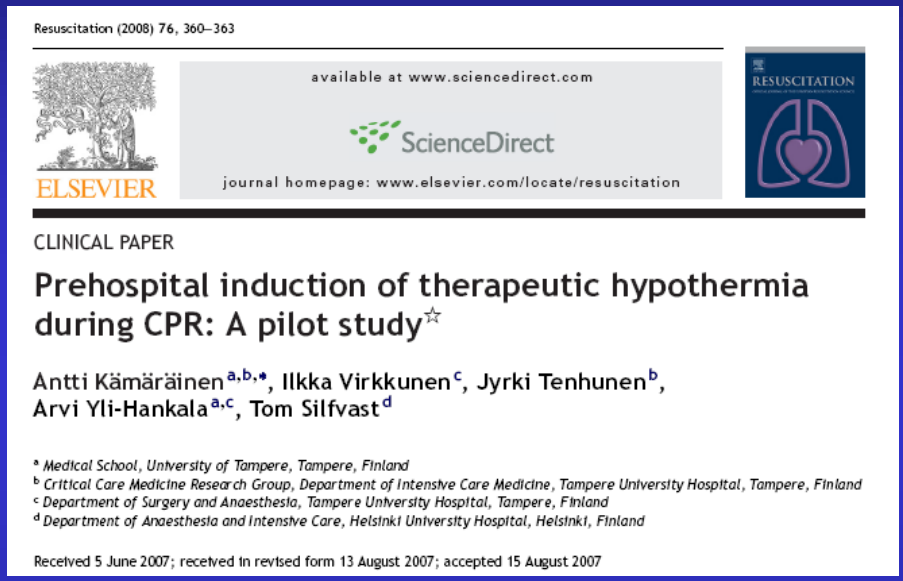
Improving OOHCA Outcomes

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.



Resuscitation (2008) 76, 360–363

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/resuscitation

ELSEVIER

RESUSCITATION

CLINICAL PAPER

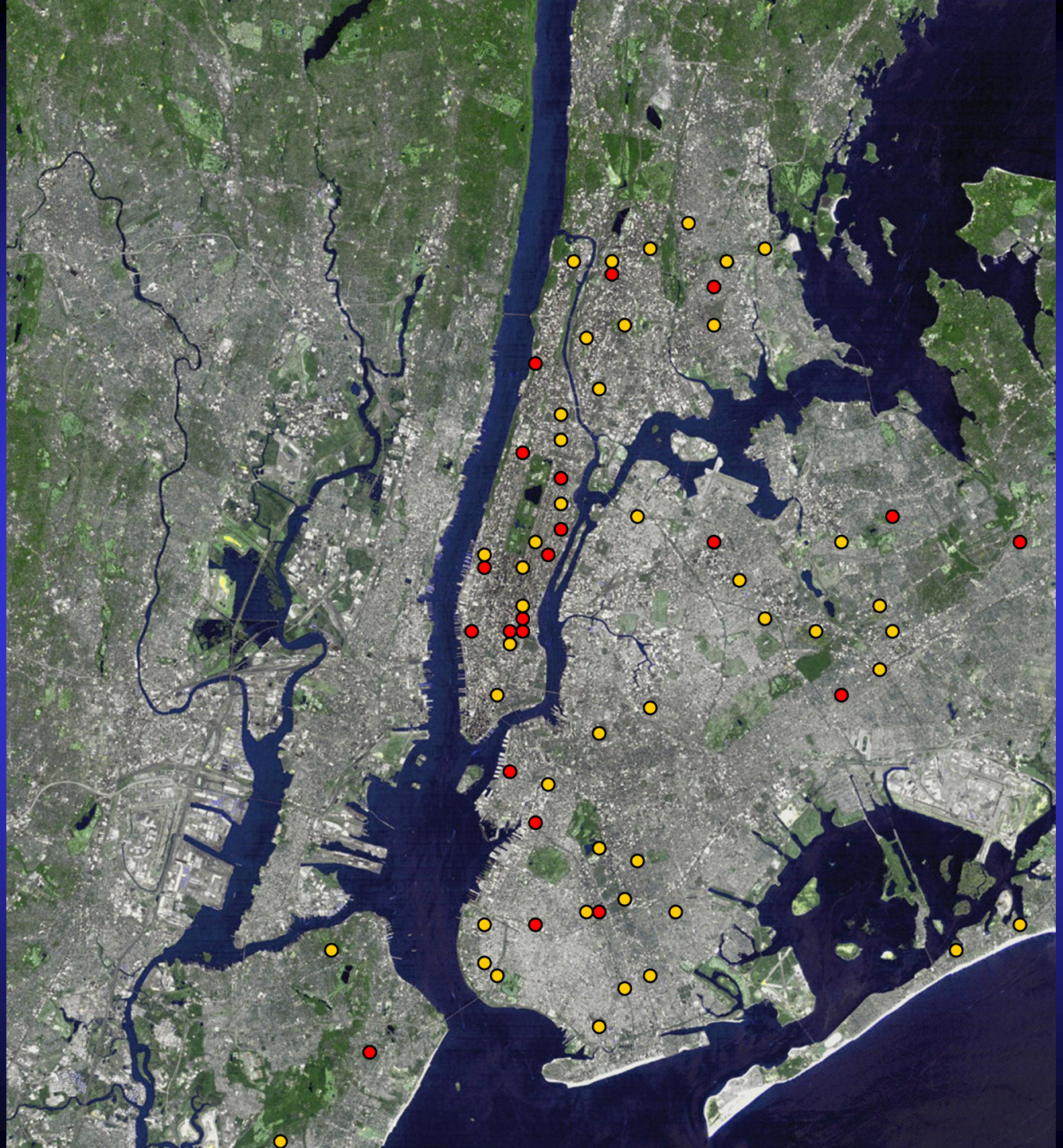
Prehospital induction of therapeutic hypothermia during CPR: A pilot study☆

Antti Kämäräinen[a,b,*], Ilkka Virkkunen[c], Jyrki Tenhunen[b], Arvi Yli-Hankala[a,c], Tom Silfvast[d]

[a] Medical School, University of Tampere, Tampere, Finland
[b] Critical Care Medicine Research Group, Department of Intensive Care Medicine, Tampere University Hospital, Tampere, Finland
[c] Department of Surgery and Anaesthesia, Tampere University Hospital, Tampere, Finland
[d] Department of Anaesthesia and Intensive Care, Helsinki University Hospital, Helsinki, Finland

Received 5 June 2007; received in revised form 13 August 2007; accepted 15 August 2007

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

Avoiding the cold shoulder

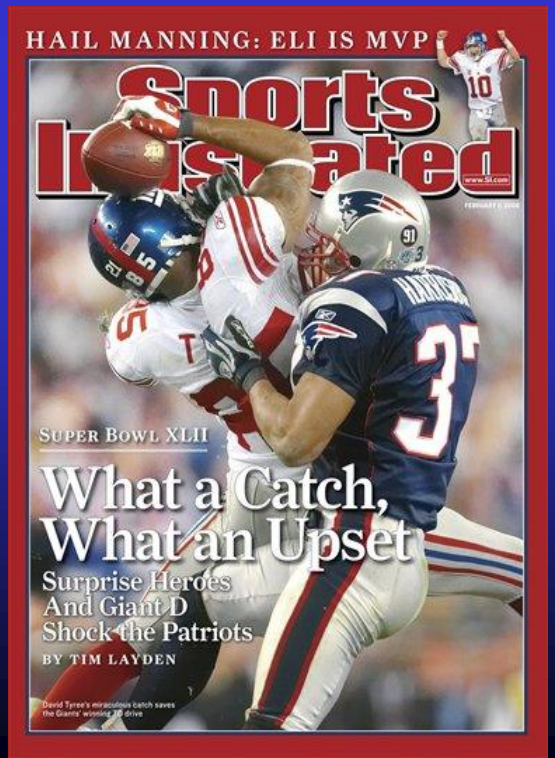
4. Ensure a two-way exchange of data.

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.