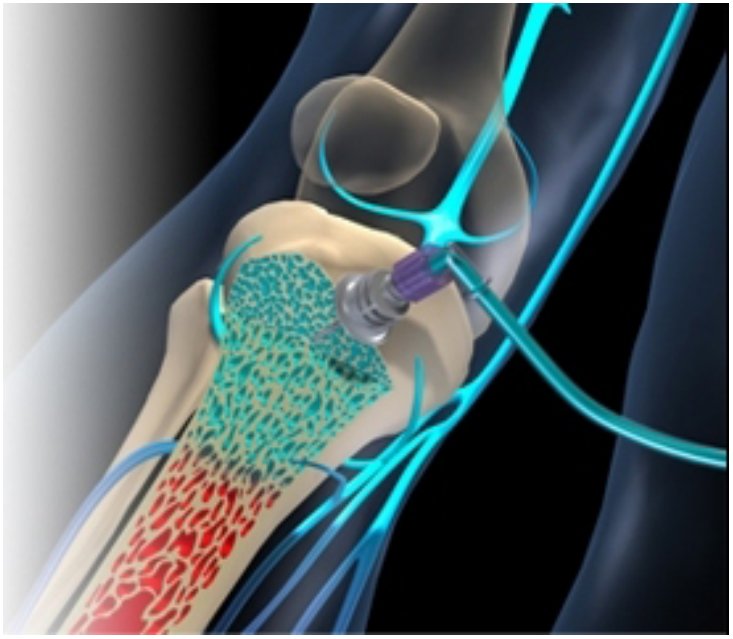
Bone Voyage' Administrating ALS Medications via the Intra-Osseous Route

- Jon Jui MD, MPH

Do ALS Medications lead to Improved Survival in Out of Hospital Cardiac Arrest?



Intravenous drug administration during out-of-hospital cardiac arrest: a randomized trial

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- Olasveengen TM, Sunde K, Brunborg C, Thowsen J, Steen PA, Wik L. JAMA. 2009 Nov 25;302 (20):2222-9.

MCEMS Cardiac Arrest

- Does the **combination** of recent changes in resuscitation techniques lead to increased survival of patient presenting with cardiac arrest?

MCEMS Changes in Resuscitation Management 2008-2009

- CPR
  - Aggressive continuous CPR including following ETCO2 during CPR
  - Asynchronous ventilation via King Airway /ET tube
- Medications
  - EZIO
  - Vasopressin/Epinephrine
- Induced hypothermia in area hospitals

Data source

- Data presented is primarily from 2 sources, MCEMS AMR dataset and the ROC Epistry. (Resuscitation Outcomes Consortium)

Multnomah County EMS. Oregon City of Portland and Gresham

- Population 700,000
- Single 911 Dispatch Center (Fire/EMS)
- ALS Fire first response :
  - 7 minutes 90%
- Single 911 EMS (AMR) :
  - 8 minutes 90%
- Bystander CPR
  - 30%

MCEMS Cardiac Arrest : January to October 2009 **Field Disposition**

	Number	Percent
Dead at Scene No resuscitation	152	28%
Dead at Scene Resuscitation Terminated	115	21%
Transported	278	51%
Total	**545**	100%

Clarification: Definitions

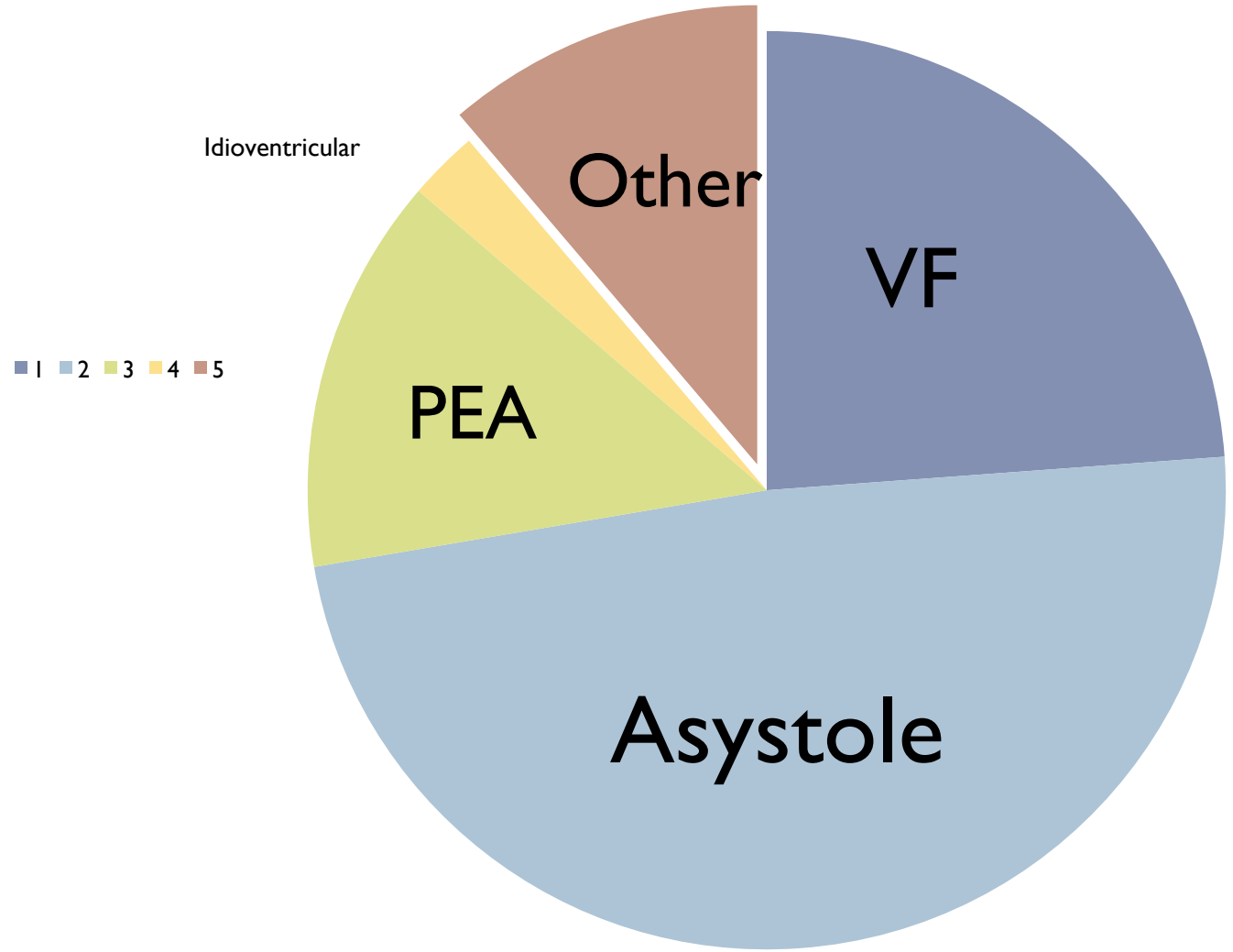
- Initial Presenting Rhythm
  - Initial Rhythm of the patient upon arrival of Fire/EMS

- Initial arrest rhythm
  - Presenting cardiac arrest rhythm
    - (VF/VT, PEA, Aystole)

Definition

- "Organized rhythm"
  - Narrow QRS (< 0.120)
  - E.g. (normal sinus, sinus tachycardia, bradycardia, AF, nodal rhythms).

Multnomah County EMS
Initial Rhythm Presentation



Cardiac Arrest ALS procedures

Procedure	Number
Advanced Airway	296
EZIO	160
Medication	338
Total	393

Survival by Initial Presenting Rhythm

MCEMS Cardiac Arrest Survival Initial Rhythm : VF / VT

	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Percent Survival
#	63	58	5	24	6	18	28%

MCEMS Cardiac Arrest Survival Initial Rhythm: PEA

	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Percent Survival
#	52	39	13	15	18	3	3%

MCEMS Cardiac Arrest Survival: Initial Rhythm : Asystole

	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Percent Survival
#	177	49	139	17	27	4	2%

MCEMS Cardiac Arrest Survival: Initial Rhythm : Organized Rhythms

Presenting Rhythm	Total	Transported	Died ED	Died Hospital	Survived to DC	Outcome unknown	Percent Survival
Totals	68	66	19	12	29	6	42%

Survival of “Organized Rhythm”

Survival of "Organized rhythms" which changed to VF/ VT

- 68 patients in our cardiac arrest cohort
- 27 of the 68 patients (39%) were defibrillated.
- 9 of the 27 were discharged alive for a survival rate of 33%

Survival of "Organized rhythms" which changed to PEA or Asystole

- Total Cohort was 41 patients

- Of these 41 patients, 21 (51%) survived to DC from the hospital

Survival by Arrest Rhythm

Survival by arrest rhythm: VF / VT

Presenting rhythm	Number of survivors	Number Defibrillated over total cohort	Survival with Defibrillation
Organized rhythm	9	27/68 (39%)	9/27 (33%)
VT /VF	18	63/63 (100%)	18/63 (28%)
Total Survival	27	90	27/90 (30%)

Survival by Arrest Rhythm: PEA

	Total	Survived to DC	Percent Survival
Initial	52	3	3%
Secondary	41	21	59
Total	93	24	25%

Survival by Arrest Rhythm : Asystole

	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Percent Survival
#	177	49	139	17	27	4	2%

Survival by hospital

Cardiac Arrest: Survival by Hospital

	Alive	Total	%
Hospital_A	18	83	22
Hospital_B	5	28	18
Hospital_C	2	8	25
Hospital_D	5	21	24
Hospital_E	2	11	18
Hospital_F	13	57	23
Hospital_G	6	33	18
Hospital_H	2	9	22
Hospital_I	1	2	50
Null	1		
	55	252	

Summary : Overall Survival in Multnomah County 2009 (Jan-Oct)

Presenting rhythm	Survival to DC	Number of survivors
Survival of attempted resuscitation (N=393)	14%	55
Total of entire cohort (n=518)	10.6 %	55

Summary

- Survival from Sudden Cardiac Death appears to be improving since 2007-2008 in Multnomah County in spite of a marked decrease in percentage of VF arrests

Summary

- The primary change (improvement) from 2007 -2008 appears to be in patients who had "organized rhythm" upon presentation.

- Possible causes for this increase of survival may be better CPR, ?? medications (vasopressin and epinphrine), and induced hypothermia.

Summary

- Defibrillation remains key component but ONLY in 27 of the 55 survivors of OHCA in Multnomah County

- 90 / 393 (22%) of patients in whom resuscitation was attempted received defibrillation
- **The remainder of the survivors (28/55 50%) survived with "only CPR, ALS care and medications"**.

Summary

- There appears to be a significant number of patients presenting with PEA responding to field resuscitation.

Summary

- Other strategies need to be implemented for patients who have clinical presentations which are not responsive to defibrillation.

IHI: Rapid Response Teams

Summary

- Cardiac arrest survival appears to be multi-factorial and involves out of hospital interventions in conjunction with hospital interventions.

Summary

- It is unclear at this time the impact on the interventions, but it may require a combination of interventions including
- CPR (continuous)
- Defibrillation (when appropriate)
- Early ALS medications (EZIO) ??
- Rapid response times
- Hospital Care (induced hypothermia etc)

The END!

- Questions?

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Summary

- More timely outcomes are sorely needed to better assess the outcomes of the interventions we make in the field

Summary

- The good news is that it appears that we are moving in the right direction.

Intravenous drug administration during out-of-hospital cardiac arrest: a randomized trial.

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Do advanced cardiac life support drugs increase resuscitation rates from in-hospital cardiac arrest? The OTAC Study Group.

- We found no association between standard ACLS medications and improved resuscitation from in-hospital cardiac arrest. Randomized clinical trials are needed to determine whether other therapies can improve resuscitation from cardiac arrest when compared with the presently used ACLS drugs.
- van Walraven Ann Emerg Med. 1998 Nov;32(5):544-53.

THE CHANGING INCIDENCEOF VENTRICULAR FIBRILLATIONIN MILWAUKEE, WISCONSIN (1992--2002)

- Incidence of out-of-hospital VF/VT arrests decreased steadily from 37.1per100,000 in 1992 to 19.4 per 100,000 in 2002.
- Incidences of pulseless electrical activity and overall cardiac arrest remained unchanged ,the incidence of asystole during the study period Increased from 27.3/100,000 to 44.9/100,000.

- MarkS.Polentini,MD,MS Prehospital Emerg Care 2006;10:52–60

Beta-blocker Use and the Changing Epidemiology of Out-of-Hospital Cardiac Arrest Rhythms

- There appears to be an association between beta blockers and the changing epidemiology of arrest rhythms, which may account for the increasing incidence of PEA and concomitant decrease in VF.

- Scott Youngquist, MD, MS Resuscitation. 2008 March ; 76 (3): 376–380.

MCEMS Cardiac Arrest 2009: Survival to Discharge: VF / VT (pulseless)

Presenting Rhythm	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Percent Survival
Ventricular Fibrillation	55	50	5	24	6	17	34%
Ventricular Tachycardia (pulseless)	6	6	0	3	2	1	17%
Total	61	56	5	27	8	18	29%

MCEMS Cardiac Arrest 2009
Initial Rhythm vs Final **Field** Rhythm

	Initial #	Organized Rhythm	%
VF /VT	60 (20%)	26	43
Asystole	177 (59%)	28	16
PEA	51 (17%)	18	35
Idioventricular	9 (3%)	1	11
Summary	297	73	24

MCEMS Cardiac Arrest 2009: Survival to Discharge: Organized Rhythms

Presenting Rhythm	Total	Transported	Died Field	Died ED	Died Hospital	Survived to DC	Outcome unknown	Percent Survival
Sinus	17	17	1	8	4	5	3	28%
Bradycardia	16	14	2	4	1	6	1	38%
Tachycardia	22	22	0	2	7	11	1	50%
Junctional	7	7	0	4	0	3	0	43%
AFib	6	6	0	1	0	4	1	67%
Totals	68	66	3	19	12	29	6	42%

Cardiac Arrest: Survival by Hospital

	Alive	Total	%
Adventist	18	83	22
Prov	5	28	18
PW	2	8	25
OHSU	5	21	24
GS	2	11	18
EM	13	57	23
MH	6	33	18
SV	2	9	22
KS	1	2	50
Null	1		
	55	252	

Cardiac Arrest : Defibrillation and Outcome by Presenting Rhythm

		Outcome							
			Died prehospital	Died, no location	Discharged Alive	Expired in ED	Expired post Admission	outcome not currently known	Total
First_Rhythm	Asystole	0	2	0	0	0	4	0	6
	Atrial Fibrillation	0	0	0	1	0	0	0	1
	Idioventricular Rhythm	0	2	0	0	0	0	0	2
	Junctional Tachycardia	0	0	0	0	0	1	0	1
	Narrow Complex Tachycardia	0	0	0	1	0	0	0	1
	NULL	0	2	0	1	5	3	0	11
	Paced Rhythm	0	1	0	0	0	0	0	1
	Pulseless Electrical Activity	0	0	0	1	0	0	0	1
	Sinus Bradycardia	0	0	0	2	0	0	0	2
	Sinus Rhythm	0	0	0	3	1	1	0	5
	Sinus Tachycardia	1	0	0	0	0	0	1	2
	Ventricular Fibrillation	0	1	1	5	12	5	0	24
	Ventricular Tachycardia	0	0	0	0	0	1	0	1
Total		1	8	1	14	18	15	1	58

MCEMS Cardiac Arrest 2009: Survival to Discharge: Organized Rhythms

Presenting Rhythm	Total	Transported	Died ED	Died Hospital	Survived to DC	Outcome unknown	Percent Survival
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