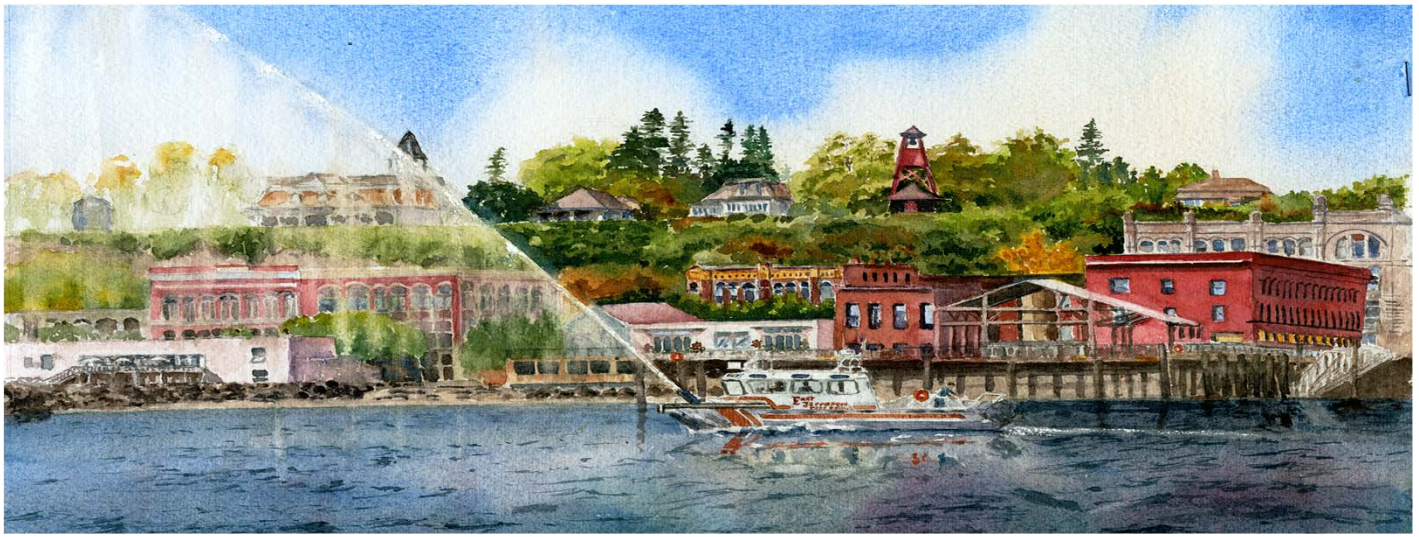
The Implementation and Delivery of Pre-Hospital Thrombolytics in Jefferson County



Sandra Smith-Poling, MD, PhD

Medical Program Director EMS for East Jefferson County, West Olympic Peninsula and Navy Northwest

Gordon Pomeroy, Chief (Retired)

East Jefferson Fire Rescue

VISION STATEMENT

JOINING RESOURCES TO SAVE HEART MUSCLE.

A partnership between:

- East Jefferson Fire Rescue
- Port Ludlow Fire Rescue
- Jefferson Healthcare
- Harrison Medical Center
- The Doctors Clinic
- Kitsap Cardiology Consultants

PRIOR HISTORY

• Pre-hospital-Initiated vs Hospital-Initiated Thrombolytic Therapy “The Myocardial Infarction Triage and intervention Trial” (MITI Study).

• A double-blind study conducted in 1993 by King County and Seattle Medics.

• Results: “Between the two treatment groups there was no difference in infarct size, nor was there a difference in complication rates or missed diagnosis. In the ‘time to treatment’ analysis, patients treated early (less than 70 minutes) did better – in fact, many had no residual damage on follow-up scans.” (Weaver, 1993).

BEFORE COLLABORATION

Six organizations are working to give the best care possible to their patients, but without understanding the effects on each other or the possibilities for improvement.

AFTER COLLABORATION

Six different organizations working collaboratively to provide the best STEMI care possible.

QUESTIONS

- Can EMS and hospital personnel in a rural critical access hospital collaborate to save lives through the use of thrombolytic medications delivered in the field by Paramedics?
- Will the collaboration decrease potential cardiac arrests in the field or during long transports to tertiary care hospitals where PCI can be performed?
- Training concerns for both EMS and ED staff.
- Documentation issues.
- The following Medic One video is used by permission of the patient

MEDIC ONE FOUNDATION

https://www.youtube.com/watch?v=_Ltm9oqA_s0

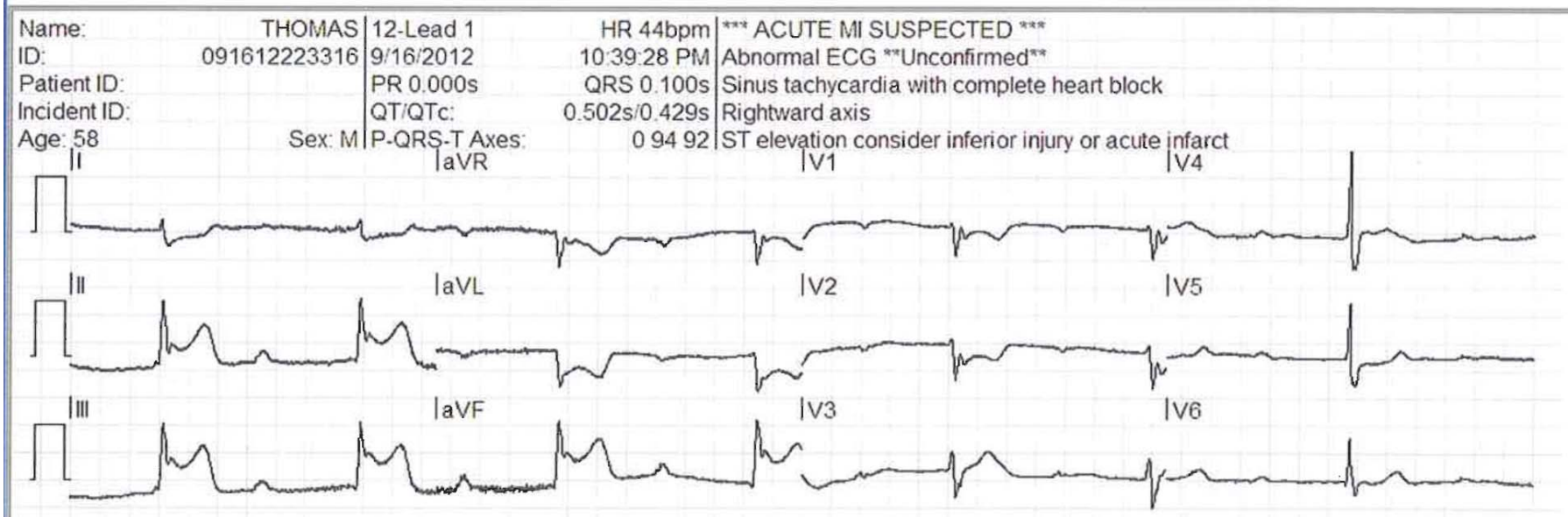

BIZARRO.COM
Facebook.com/BizarroComics
Dist. by King Features
I'm afraid we're too late... he's already much better.
AMBULANCE
©DAN PIRARO 3
12·15·15

POST CARDIAC ARREST TNKase

- In the previous Alan Thomas video…
  - Witnessed cardiac arrest
  - Shock given
  - No need for extended aggressive compressions
- Classic STEMI on post-resuscitation EKG.
  - Pt was flown to Swedish.
    - We received a lot of feedback from them.

Waveform View

File Edit View Help



Device	Device ID	New	Report	*	Time Adjustment
LP12	M-15		Continuous Complete		00:01:49
LP12	M-15		Start Trend Data		00:01:49
LP12	M-15		Initial Rhythm		00:01:49
LP12	M-15		12-Lead 1		00:01:49
LP12	M-15		12-Lead 2		00:01:49
LP12	M-15		Print 1		00:01:49
LP12	M-15		12-Lead 3		00:01:49
LP12	M-15		Print 2		00:01:49
LP12	M-15		Print 3		00:01:49
LP12	M-15		12-Lead 4		00:01:49
LP12	M-15		12-Lead 5		00:01:49
LP12	M-15		Print 4		00:01:49
LP12	M-15		12-Lead 6		00:01:49
LP12	M-15		12-Lead 7		00:01:49

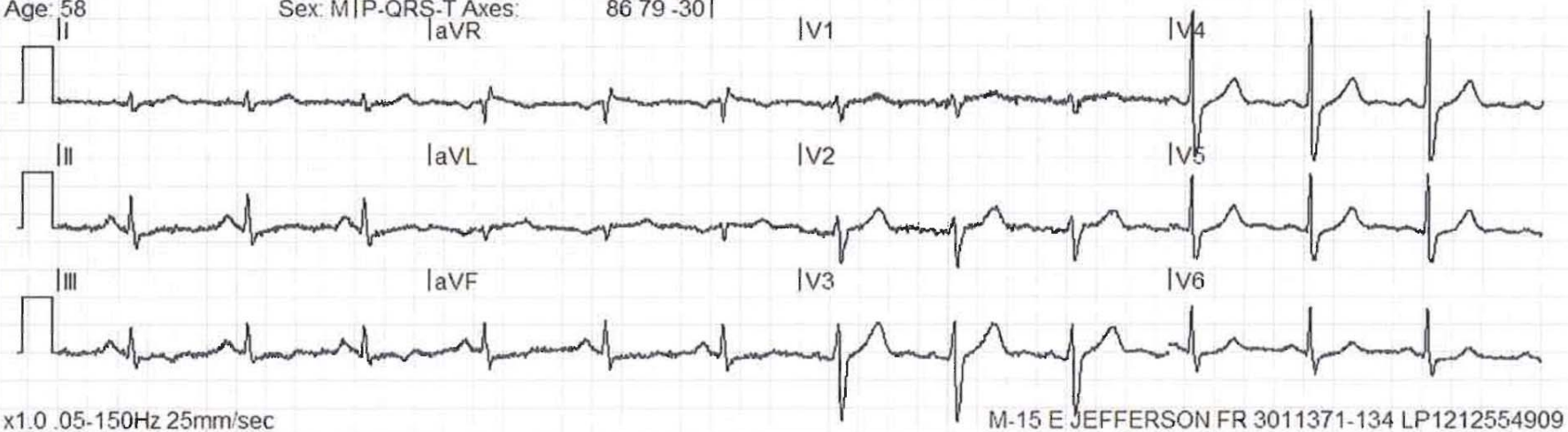
Time	Elapsed Time	Event Type	*	Note	HR	SpO2*PR	SpCO	SpMet	EtCO2(mmHg)*R
22:35:05	00:00:00	Power On							
22:35:05	00:00:00	Start Trend Data							
22:36:49	00:01:44	Initial Rhythm							
22:39:28	00:04:23	12-Lead 1							
22:39:46	00:04:41	NIBP			44				
22:39:54	00:04:49	Transmit ROSETTA			45				
22:40:03	00:04:58	Vital Signs			45				
22:41:23	00:06:18	NIBP			42	--*--			
22:43:54	00:08:49	NIBP			45	--*--			
22:46:34	00:11:29	NIBP			--	--*--			
22:51:29	00:16:24	Vital Signs			--	--*--			
22:53:22	00:18:17	12-Lead 2							
22:53:39	00:18:34	Transmit ROSETTA			50	--*--			

Patient ID: 2012091622331600-LP1212554909 | Incident ID: 2012091622331600-M-15 | Patient Name: THOMAS | File Attachments | 10/9/2012 | 8:35 AM

Waveform View

File Edit View Help

Name:	THOMAS	12-Lead 7	HR 75bpm	Abnormal ECG **Unconfirmed**
ID:	091612223316	9/16/2012	11:50:04 PM	Normal sinus rhythm
Patient ID:		PR 0.146s	QRS 0.100s	Nonspecific ST abnormality
Incident ID:		QT/QTc:	0.400s/0.446s	Abnormal QRS-T angle, consider primary T wave abnormality
Age: 58	Sex: M	P-QRS-T Axes:	86 79 -30	



x1.0 .05-150Hz 25mm/sec

M-15 E JEFFERSON FR 3011371-134 LP1212554909

Physio-Control, Inc. Comments:

Post TNK

Device	Device ID	New	Report	*	Time Adjustment
LP12	M-15		Continuous Complete		00:01:49
LP12	M-15		Start Trend Data		00:01:49
LP12	M-15		Initial Rhythm		00:01:49
LP12	M-15		12-Lead 1		00:01:49
LP12	M-15		12-Lead 2		00:01:49
LP12	M-15		Print 1		00:01:49
LP12	M-15		12-Lead 3		00:01:49
LP12	M-15		Print 2		00:01:49
LP12	M-15		Print 3		00:01:49
LP12	M-15		12-Lead 4		00:01:49
LP12	M-15		12-Lead 5		00:01:49
LP12	M-15		Print 4		00:01:49
LP12	M-15		12-Lead 6		00:01:49
LP12	M-15		12-Lead 7		00:01:49

Time	Elapsed Time	Event Type	*	Note	HR	SpO2*PR	SpCO	SpMet	EtCO2(mmHg)*R
23:32:51	00:57:46	12-Lead 6							
23:33:14	00:58:09	Transmit ROSETTA			76	100*79			
23:34:24	00:59:19	NIBP			78	100*79			
23:39:23	01:04:18	NIBP			80	100*78			
23:44:08	01:09:01	NIBP			74	100*76			
23:49:10	01:14:05	NIBP			77	100*76			
23:50:04	01:14:59	12-Lead 7							
23:50:28	01:15:23	Transmit ROSETTA			77	100*77			
23:54:36	01:19:31	NIBP			75	--*--			
23:58:40	01:23:35	NIBP			--	--*--			
00:03:35	01:28:30	Vital Signs			--	--*--			
00:08:35	01:33:30	Vital Signs			--	--*--			
00:10:27	01:35:22	Power Off							

Patient ID: 2012091622331600-LP1212554909 | Incident ID: 2012091622331600-M-15 | Patient Name: THOMAS | File Attachments | 10/9/2012 | 8:35 AM

NEED FOR COLLABORATION

- Long commute to a “heart hospital”
- Started with talks with Kitsap Cardiology and Harrison Memorial Hospital (now CHI Franciscan).
- Brought in Jefferson Healthcare ED providers and hospital administration.
- East Jefferson Fire Rescue Chief provided the EMS input including Port Ludlow Fire and Rescue personnel serving the communities of Quilcene and Brinnon
- Approved protocols by the DOH

BEFORE & AFTER

Before:

Paramedics did not give Thrombolytics that could save heart muscle

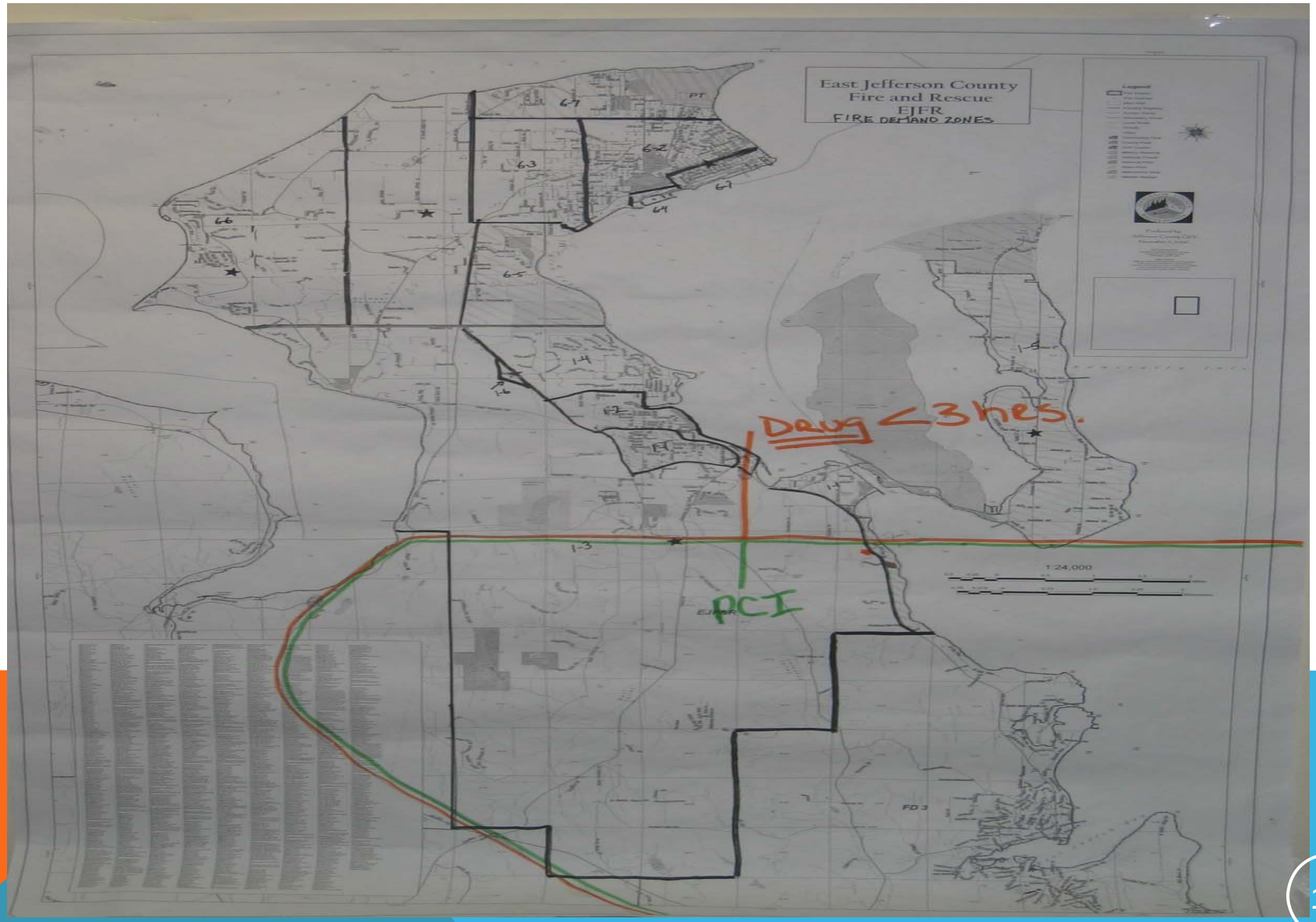
After:

TNKase protocols developed and implemented in May 2009

TEAM WORK SESSION

TEAM WORK SESSION, CONT…

TEAM WORK SESSION, CONT…



TEAM WORK SESSION, CONT…

INCLUSION CRITERIA

Patients who receive the greatest benefit from early administration of thrombolytics:

•“Early Presenters” – less the twelve hours since symptom onset

- Large infarcts
- Anterior ST elevation
- Pronounced reciprocal changes
- Clear EKG evidence of STEMI

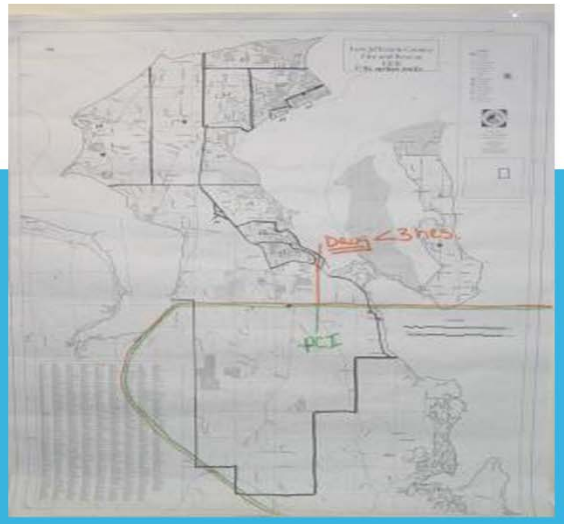
BEFORE & AFTER

Before:

No clear boundary for when patients go to Harrison for PCI or when they require thrombolytics.

After:

Clear boundaries for PCI and thrombolytics were developed and eventually redefined due to geography.



BEFORE & AFTER

Before:

Many treatable STEMI patients were transported to Jefferson Healthcare, delaying possible PCI treatment.

After:

Patients with treatable STEMI now go directly to Harrison from the ED or field based on algorithm

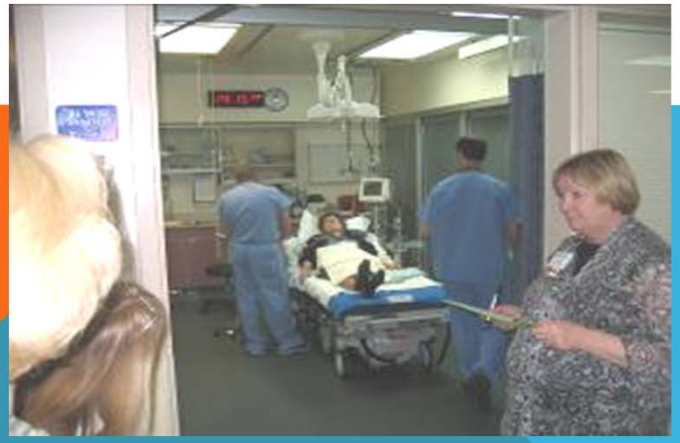
BEFORE & AFTER

Before:

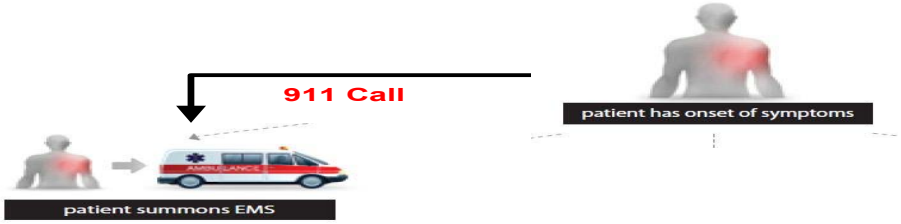
Patients that walked into Jefferson Healthcare with STEMI stayed an average of 165 minutes.

After:

- ED length of stay less than 20 minutes.
- Jefferson Healthcare to Harrison Bremerton catherization lab within 60 minutes.
- Patients receive thrombolytics when indicated during transport.



East Jefferson Fire Rescue Paramedic in field STEMI protocol and algorithm



EKG

Transmit the 12 Lead EKG to base station

Dx STEMI

LBBB

Call Base Station MD

NEW

OLD

Dx Non-STEMI

Call Base Station MD

Transport to Jefferson Healthcare (or pt preference)

< 3 Hours Onset Sx

3-12 Hours Onset Sx

> 12 Hours Onset Sx

Call Base Station MD

Call Base Station MD

North of Center Road

YES

Transport HMC (Harrison)

Transport to JHC or HMC (Pt. Preference)

Perform Thrombolytic Check List - Contraindications

YES

NO

Call Base Station MD

NO

Call Base Station MD

Transport HMC (Harrison)

Thrombolytics

JHC ED Fax Information Demographic, X-Rays, EKG

BIG WINS

- Getting all organizations together to solve problems.
- We impressed cardiologists from hospitals in Seattle.
- Decision makers participated and decisions were made.
- No egos!
- Getting quick sign off on cost of thrombolytics.
  - How? Who? Prior experience in Dade County.

BIG WINS, CONT…

- Extension tubing (dial-a-flow) in field helped eliminate pumps.
- Patient is the big winner in this process, we are treating patient where it is needed.
- Struck good balance between the complex system and kept it simple.
- Did it in a week!
- Significantly reduced patient time in ED prior to transport.
  - Best time to date since inception of program is 14 minutes from ED door to hand off to medics for transport.

LESSONS LEARNED

- More involved than we thought.
- Algorithms like this don’t just happen.
- Color really helps us.
- Ownership is important.
- Lead Cardiologist, Dr. Tinker was dazzling as changes were made (and dazzled).
- Dispatch (911) can be tweaked and was.

LESSONS LEARNED, CONT…

- Learned not to talk while others are talking. Or, kept necessary multiple chattering softer.
- More help and support (typing/charting).
- Just by having varied agencies come together can see what's out there/ how we can help/enable each other.
- Pre-work done to get others here was helpful.
- Bringing the right people together led to success.
- Almost 9 years of looking at thrombolytics in the field
  - Our rural setting is perfect for field administration.

2017 STEMI DATA

STEMI Data 2017 - Jefferson

	Jefferson Healthcare	JHC Txfr. Via East Jefferson Fire	East Jefferson Fire	Port Ludlow Fire	Quilcene/Brinnon Fire
# Patients	5 pts.	4 pts.	6 pts.	4 pts.	2 pts
Male vs Female	Male= 100% Female= 0%	Male= 100% Female= 0%	Male= 67% Female= 33%	Male= 100% Female= 0%	Male= 100% Female=0%
Median Age	58 years	63.5 years	65.5 years	76.5 years	67 years
Received TNKase	3 pts.	4 pts.	3 pts	4 pts.	2 pts
Received No TNKase	2 pts.	0 pts.	3 pts.	0 pts.	0 pts.
Required Rescue PCI	2 pts. (66%)	3 pts. (75%)	2 pts. (66%)	2 pts. (50%)	1 pt. (50%)
ALNW	1 pt.	0	0	0	0
Mortalities	0	0	0	0	0
Reason no TNK	**1** - Barrett's Esophagitis Hx **2** - Brain Aneurysm Hx		**1** - Transient ST elevations **2** - Short distance to Harrison when ST ↑ **3** - r/o PE vs Cardiac		

2016 STEMI DATA

STEMI Data 8/4/2016 - 12/31/2016 Jefferson

	Jefferson Healthcare	JHC Txfr. East Jefferson Fire w/lytics given	East Jefferson Fire	Port Ludlow Fire	Quilcene/Brinnon Fire
# Patients	5 pts	2 pts	3 pts	3 pts	3 pts
Male vs Female	Male-60% Female-40%	Male-50% Female-50%	Male-100% Female-0%	Male-66% Female-34%	Male-100% Female-0%
Median Age	65 years	64.5 years	65 years	73 years	74 years
Received TNKase	4 pts.	2 pts	2 pts	1 pt	2 pts
Received No TNKase	1 pt	0 pts	1 pt	2 pts	1 pt
Required Rescue PCI	50% (2 pts)	50% (1 pt)	100% (2 pts)	100% (1 pt)	100% (2 pts)
ALNW					
Mortalities			1 pt. (Late reocgniton of anterior STEMI)		
Reason no TNK	**1** - Worked up for gallbladder noted EKG changes			**1** - Edge of "time zone" FMC to device was 110 mins.(within time limit) **2**-Within "time zone"	**1** - Pt refused all medical care

OTHER CONSIDERATIONS

- Storage of the TNKase:
  - if stored too warm it is inactive.
  - Kits on five different ambulances were relegated to ambient temperatures.

SUMMARY

- So what have we actually accomplished?
  - Harrison Memorial Hospital is about 1+ hour from Port Townsend.
    - Quilcene and Brinnon are even further…
    - ~ 45-60 min from Port Ludlow (Hood Canal bridge dependent!)
- We have used TNKase post-cardiac arrest resuscitation as in the HMC Medic One Foundation video.
- Not all data is available from patients who are airlifted, but we have had several each year.
  - Allen flew to Swedish and we were provided updated data.

SUMMARY, CONT…

- We buy time, we save heart muscle.
  - Most of the STEMI EKGs have reverted to normal by the time they reach Harrison Medical Center or Harborview Medical Center.
- More area facilities included in agreements to satisfy EMTALA issues and the retrieval of TNKase used in field.
- There may still be a need for rescue PCI, but patients have been given the chance.

MISCELLANEOUS

- A PDF will be available in a drop box for the protocol we use.
- Important to know that the initial cost of the TNKase to equip each rig was donated by Jefferson Health Care (local base hospital) ($6000/dose).
- Currently when a patient arrives at Harrison, the pharmacy is allowed to give the medics a fresh box of TNKase to replace the used one and Harrison will bill the patient.
- Written agreements are in progress with Seattle hospitals for reimbursement of the TNKase.

STEMI KIT CONTENTS PREPARED BY BASE STATION HOSPITAL

- TNKase 50 mg with dosing tools
- 81 mg ASA 4 pill blister pak
- Plavix 4 x 75 mg total dose 300 mg
- 3 Vials Metoprolol IV (3 x 5mg vials)
- 1 Heparin 5000 unit/mil vial and TB syringe
- 1 Heparin Premixed IV 250ml bag (50 units/ml) with hospital policy guideline
- 1 NTG 0.4 SL Tablets in bottle
- 1 NTG Premixed IV 250ml bottle (100 mcg/ml) with hospital policy guideline

STEMI KIT CONTENTS PREPARED BY BASE STATION HOSPITAL, CONT…

- 2 IV Pump infusion set – VENTED for hospital use
- 2 Microdrip infusion sets VENTED for hospital use ***
- 2 EASYDROP dial-a-flow regulator ***
- 1 EASYDROP package insert ***
- 3 10 ml syringes with needle ***
- 1 Heparin and Nitro rate Calculator tool ***
- 1 set of fire department Stemi Guidelines, Order Set, Algorithm, Drip rate calculators, Patient Advisory, Thombolytic's check list, TNKase Informed Consent Form ***

- *** = Fire department provided items.

CLOPIDOGREL DISCONTINUED

Clopidogrel (Plavix) was discontinued in July 2015 because of several long cooling off periods of up to 5 days before CABG could be performed if indicated. The drug was reintroduced back into the protocols at a later date but at a lower dose.

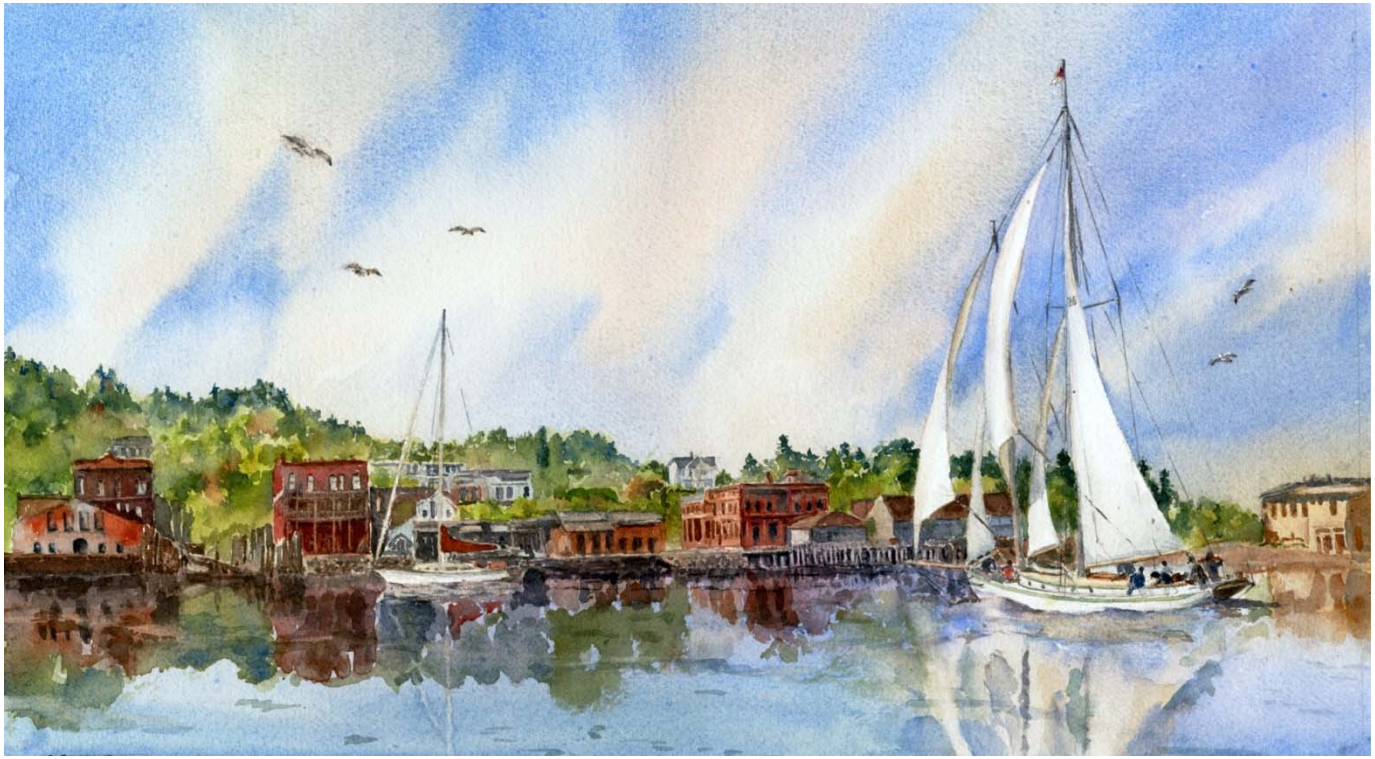
JEFFERSON HEALTHCARE WALK-INS

- A certain percentage of patients do not call 911, but arrive at our local hospital by private vehicle.
- The ED starts the same protocol and calls East Jefferson Fire and Rescue.
- Average time from ED calling 911 to being wheeled out the door and protocol underway is 17 minutes
- EJFR continues the protocol from where the ED left off and are usually the ones to actually give the TNKase

AREAS OF CONCERN

- Sometimes difficulty in calling a STEMI by either the medics or the medical control doctor
- Many new or inexperienced ED physicians are uncomfortable with calling the STEMI and using the TNKase in the field without hands on the patient
- When the patient looks terrible, diaphoretic, crushing pain, etc and suggests STEMI, it is probably wise to treat with TNKase and not hold back if there are no contraindications
- Recent case hx where no TNKase given:
  - Patient coded in ED and resuscitated;
  - 100% occluded LAD opened in the cath lab;
  - Pt expired (TNK was asked for by field medics, but denied)

THANK YOU!



Schooner Martha Sailing Along the Port Townsend Waterfront
Artist: Dr. Smith-Poling

CREDITS

John Nowak & Co
Sandra Smith Poling, MD, PhD, EMS MPD, (Col, USAF, retired)
Kim Petersen RN, BSN AMI/STEMI Program Coordinator, Harrison Medical Center
Joan Wellman & Associates graphics from a prior Jefferson Healthcare presentation

Link for STEMI order sets and talk

https://www.dropbox.com/home/STEMI%20talk

QUESTIONS OR COMMENTS?