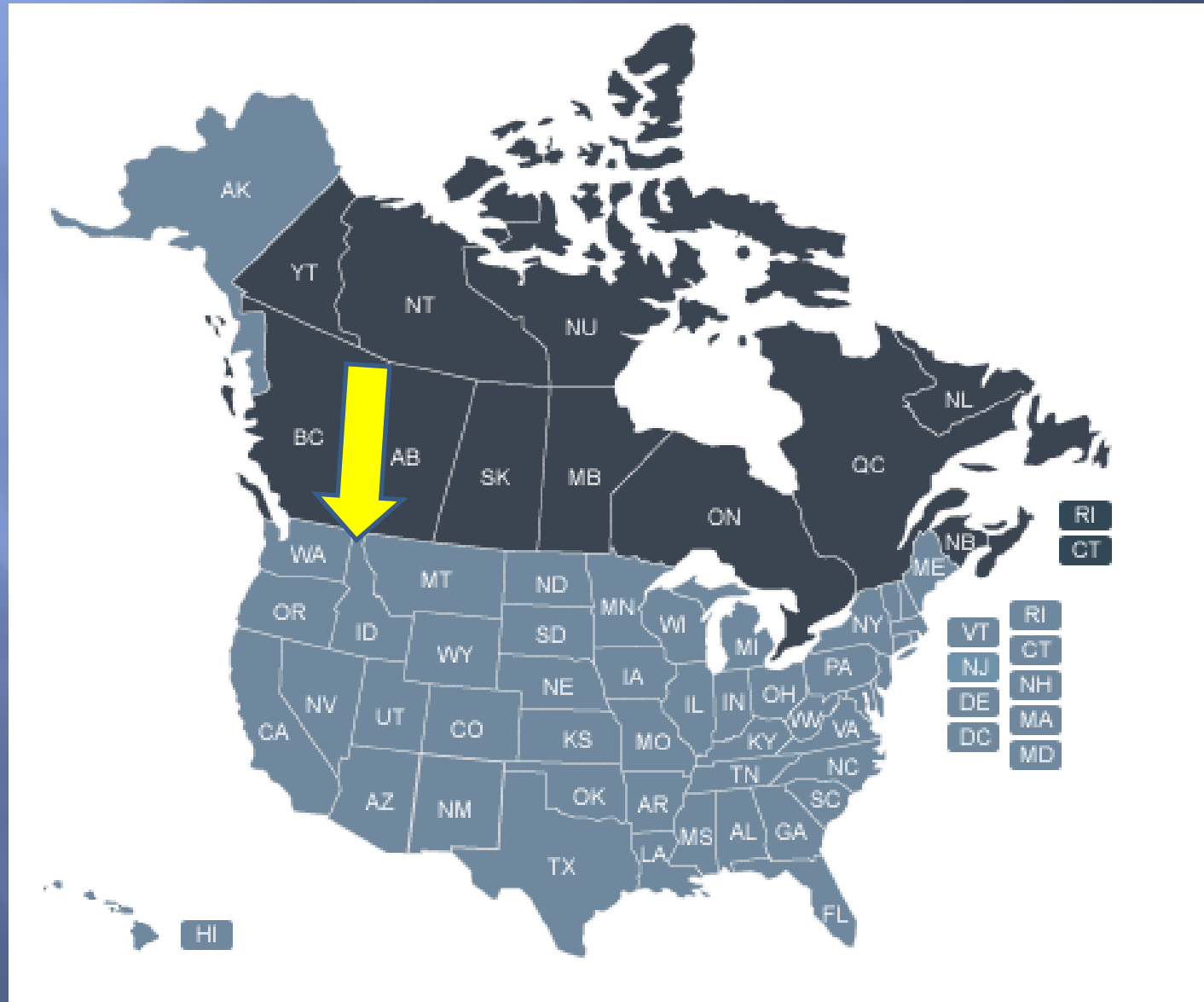


MANAGEMENT OF ST ELEVATION MI IN NORTH IDAHO: 2012

A PARADIGM SHIFT

Mark Zandhuisen, ACP, Captain of Clinical Operations

Where is Bonner County?



CHARACTERISTICS OF BONNER COUNTY IDAHO EMS SYSTEM

- ▣ Lead Agency Bonner County EMS
- ▣ Provides Advanced and Critical Care Paramedics for entire county
 - Provides training support for all other EMS agencies in county.
 - Primary Facilitator of EMS in Bonner County through a variety of modalities utilizing volunteer, FD and private ambulances.
 - Call volume approx 4,000

THE WAY WE WERE 2005– 2010

SPEED

We were unable to transport STEMI patients quickly to a STEMI Center for heart cath.

- KMC Heart Center opened in 2004; 75 Km distant
- Local EMS was not an effective partner with local hospital
- CCT transport 100 Km by Helo only for STEMI patients at local hosp.

MORBIDITY

More frequent use of thrombolytic therapy and slower patient transport

- early bleeding, reinfarction and frequent rescue heart cath.
Poor outcome: increased heart damage, heart failure and arrhythmia
Longer hospital stay and in turn cost.

MORTALITY

It appeared to us that mortality might be increased

- Relationship of door to balloon or door to needle time and mortality.

STEMI ALERT PLAN 2010

- Direct ground transportation of STEMI patients to a regional STEMI center cath lab, ideally not stopping in any local or regional ER for those presenting to EMS, and minimizing local ED time for those presenting in the local ED.
- Transmission of EKGs by smart phones to Medical Control (ED) physicians and the Interventional Cardiologist on call.

STEMI ALERT PLAN 2010

- Training of local paramedics to the Critical Care Transport level, allowing drips, ventilators, and safe management of cardiac patients.
- Providing protocols for cardiac medications to be administered en route and direct discussion with the receiving cardiologist.

EVALUATION OF THE STEMI ALERT PLAN

- We compared the following measurements of quality and outcome in 32 patients presenting with STEMI from 1/1/09 through 10/31/10, and the next 18 patients presenting with STEMI under the new STEMI Alert plan (11/1/10-11/1/11):
 - 30 day mortality
 - 30 day incidence of reinfarction, stroke, major bleed (requiring transfusion)
 - Prolonged hospital stay (>5 days)
 - Composite frequency of any of the above

EVALUATION OF THE STEMI ALERT PLAN

- ▣ EMS to balloon time (E2B)
- ▣ ED to balloon time at the regional STEMI center (D2B)
- ▣ Scene time
- ▣ ED time
- ▣ Transport time
- ▣ Procedure time
- ▣ Length of hospital stay (LOS)

COMPARISON GROUPS

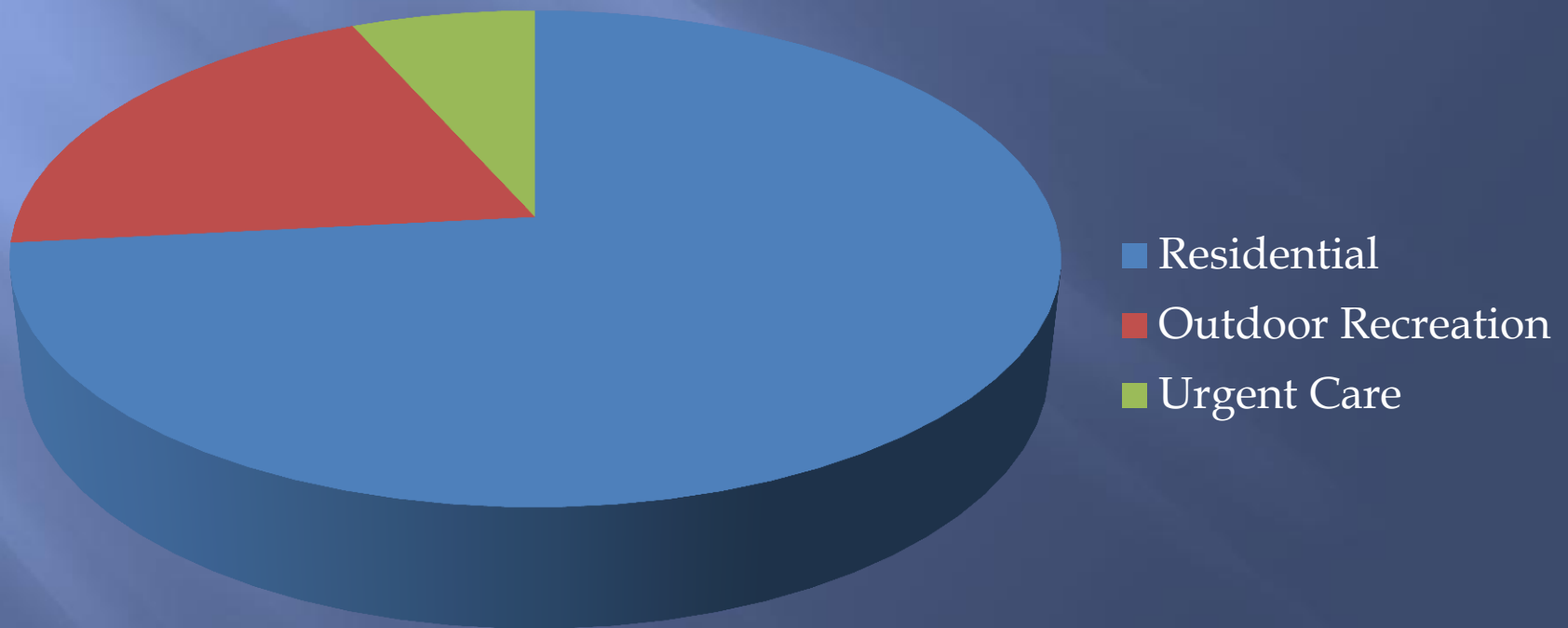
- ▣ **We included patients with clear-cut STEMI criterion:**
 - Chest pain with ST elevation >2 mm in 2 contiguous leads
- ▣ **We excluded patients with additional STEMI criterion:**
 - Chest pain with LBBB, or ventricular paced rhythm
- ▣ **Group A (1/1/10-10/31/10) n = 32**
- ▣ **Group B (11/1/10-11/1/11) n = 18**

PATIENT CHARACTERISTICS

	Group A 1/1/2009-10/31/2010	Group B 11/1/2010-11/1/2011
Number	32	18
Average age	68	63
Sex	26 M, 6 F	16 M, 2 F
Infarct location	17 Anterior/ Anterolateral 12 Inferior 3 Inferolateral /Posterior	7 Anterior/ Anterolateral 5 Inferior, 6 Inferolateral /Posterior

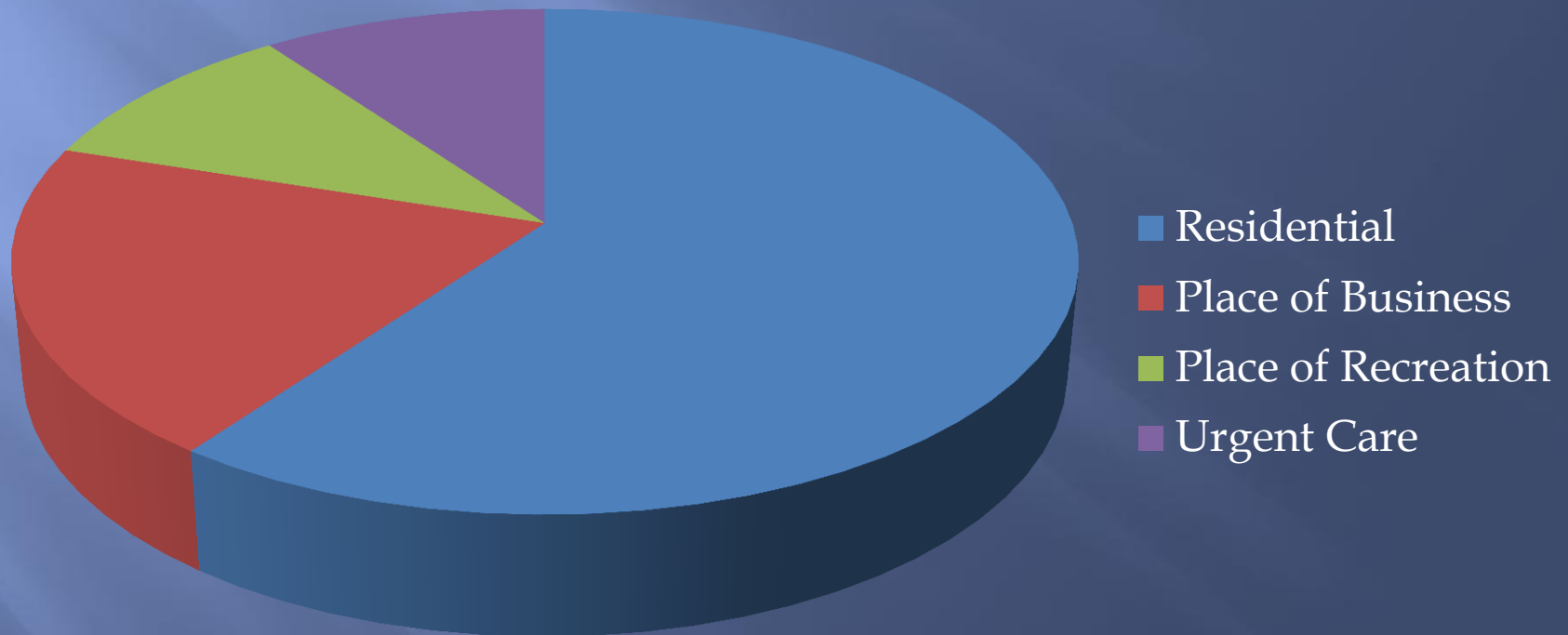
PATIENT PRESENTATION

Presentation of Group A patients calling 911-EMS

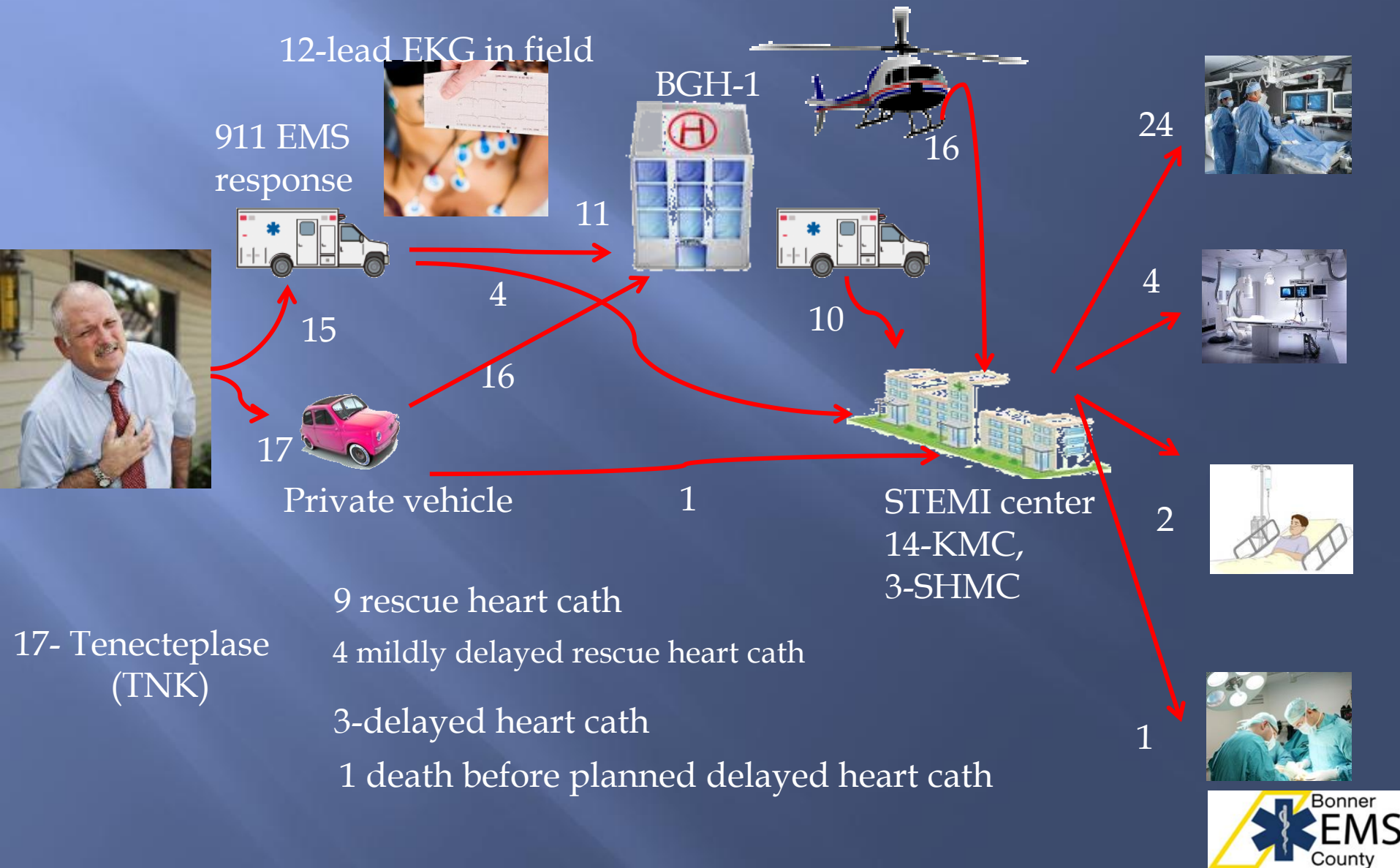


PATIENT PRESENTATION

Presentation of Group B patients calling 911-EMS



GROUP A STEMI MANAGEMENT



GROUP B STEMI MANAGEMENT

12-lead EKG in field

911 EMS
response



BGH-9



10

1

9

9

0

16

0

2

0

8

0

Private vehicle



8

STEMI center
18-KMC,

16 immediate PCI

0 TNK

2 with anatomy not suitable for PCI

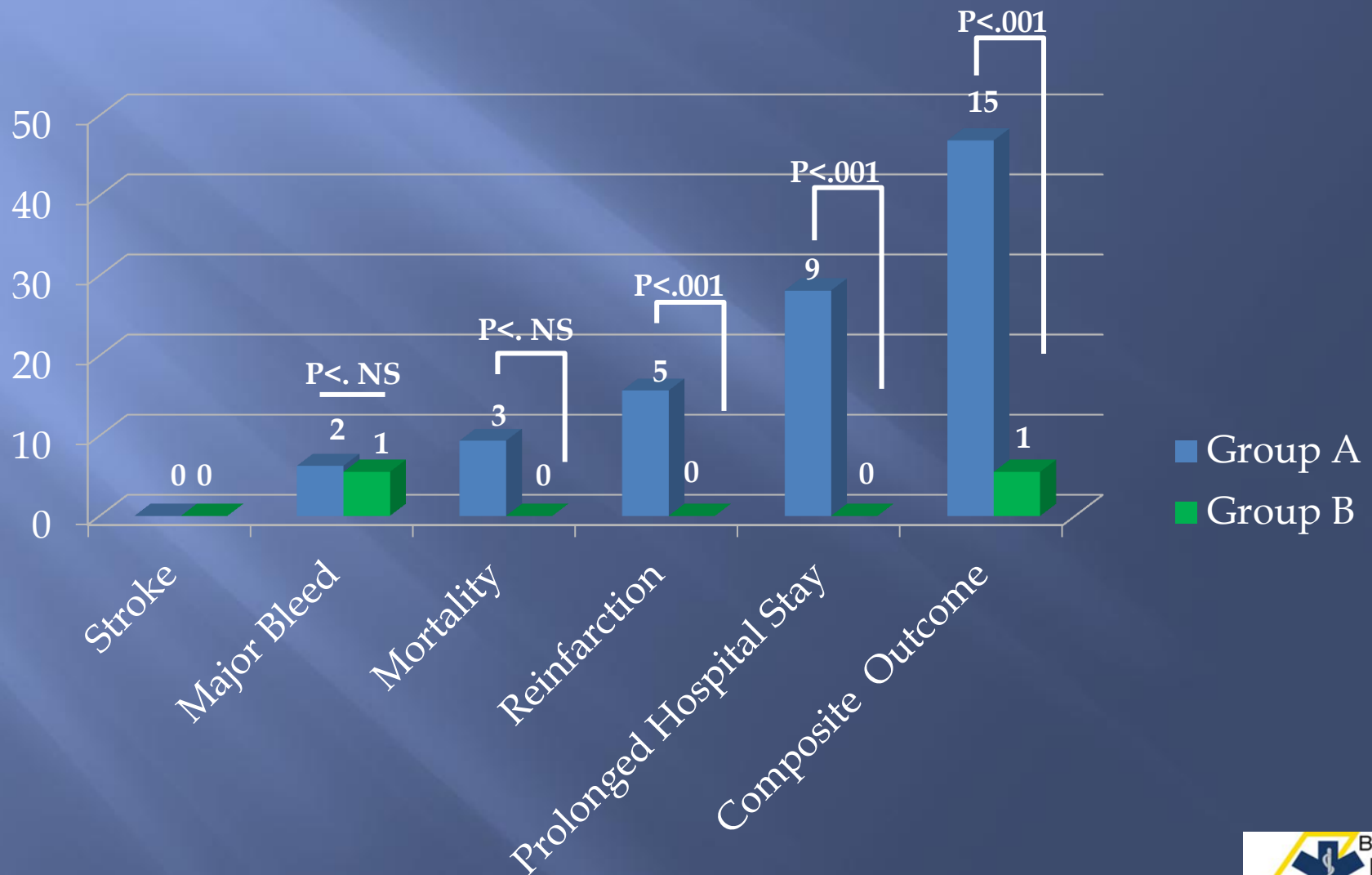
18 patients



PATIENT MANAGEMENT AND TRANSPORT TIMES

*= p<.05	Group A (n = 32)	Group B (n = 18)
Scene time	11 min (3-25 min)	12 min (1-23 min)
Scene to ER transport	10 min(2-33 min)	1 min (one patient)
ER time	80 (28-159 min)	30 min (22-47 min)*
Transport time to PCI ctr.	40 min (25-58 min)	47 min (38-86 min)
PCI procedure time	24 min (12-40 min)	22 min (13-35 min)
EMS contact to balloon(E2B)	173 min via local hospital 95 min for direct transport (n=5)	106 min (77-128 min)*
Local ER door to balloon at regional Center (D2B)	214 min (151-310 min)	104 min (86-119min)*
Average hospital stay	4.5 days (1-14 days)	2.7 days (1-5 days)*

FREQUENCY OF ADVERSE OUTCOME



OPPORTUNITIES FOR IMPROVEMENT

- ▣ SCENE TIME: 12 min (1-23 min)
 - Already quite excellent:
 - **ideal <15 min**
- ▣ ER TIME: 30 min (22-47 min)
 - Need to minimize drips and testing
 - **ideal <15 min**
- ▣ TRANSPORT TIME 47 min (38-86 min)
 - Already good for ground transport
 - Need helicopter in Bonner County
 - **ideal <45 min**
- ▣ PROCEDURE TIME 22 min (13-35 min)
 - Already quite excellent:
 - **ideal <20 min**

TIME MANAGEMENT ISSUES FOR THE PARAMEDIC

- EKG (first 3 minutes)
- Patient evaluation (first ten minutes)
- Early Medication
 - Oxygen, Nitrates (first 5 minutes)
- IV access and draw labs (once in ambulance)
- Medication Priority once IV access is secured
 - IV heparin (50 U/kg, $\leq 5,000$ units)
 - IV Narcotics (Morphine or Fentanyl)
 - IV beta blocker (IV Metoprolol for BP >110, P>70)
 - Oral thienopyridine (Plavix 600 or Effient 60 mg po)
 - Proposal to give Effient for all patients > 60 KG, <65 yrs without prior MI/ CABG, not on coumadin, no prior CVA
- Consider starting IV drips and calling cardiologist

CHARACTERISTICS OF BONNER COUNTY IDAHO STEMI PROGRAM

▣ NON PCI CAPABLE HOSPITALS

- BONNER GENERAL HOSPITAL
 - Critical access (25 beds) Hospital at Center of County
 - 24 hour ED, physician staffed
 - Medical Control for County EMS System
- NEWPORT HOSPITAL
 - Small Community Hospital on Western Edge of County
 - 24 hour ED, PA Staffed

▣ PCI CAPABLE HOSPITALS

- KOOTENAI HEALTH
 - 200 bed Regional Hospital (75 Kilometers Out-of-County)
 - 24-hour ED and Cath Lab Availability
 - On-Site Heart Surgery

ER TIME ISSUES

- ▣ Essential tasks
 - Early EKG
 - Early EMS Activation
 - IV access and labs
 - Hemodynamic and electrical stabilization
- ▣ Helpful management techniques
 - Fixed protocols and paper work
 - Avoidance of starting drips
 - Don't wait for labs
 - Call cardiologist after patient is out the door

CONCLUSIONS

- Management of STEMI patients presenting in rural communities using conventional thrombolytic therapy with delayed or rescue PCI (drip and ship), is associated with a relatively high frequency of adverse events.
- Primary PCI for STEMI patients presenting in rural communities can be accomplished using cellular EKG transmission, early activation of the PCI team, pre-hospital care provided by critical care transport (CCT) trained paramedics in communication with a cardiologist, and direct transport to a STEMI center catheterization lab while bypassing or minimizing ED care.
- There were no adverse events occurring in STEMI patients during critical care transport (CCT) of STEMI patients who bypassed a local ED en route to a regional STEMI center for primary PCI.

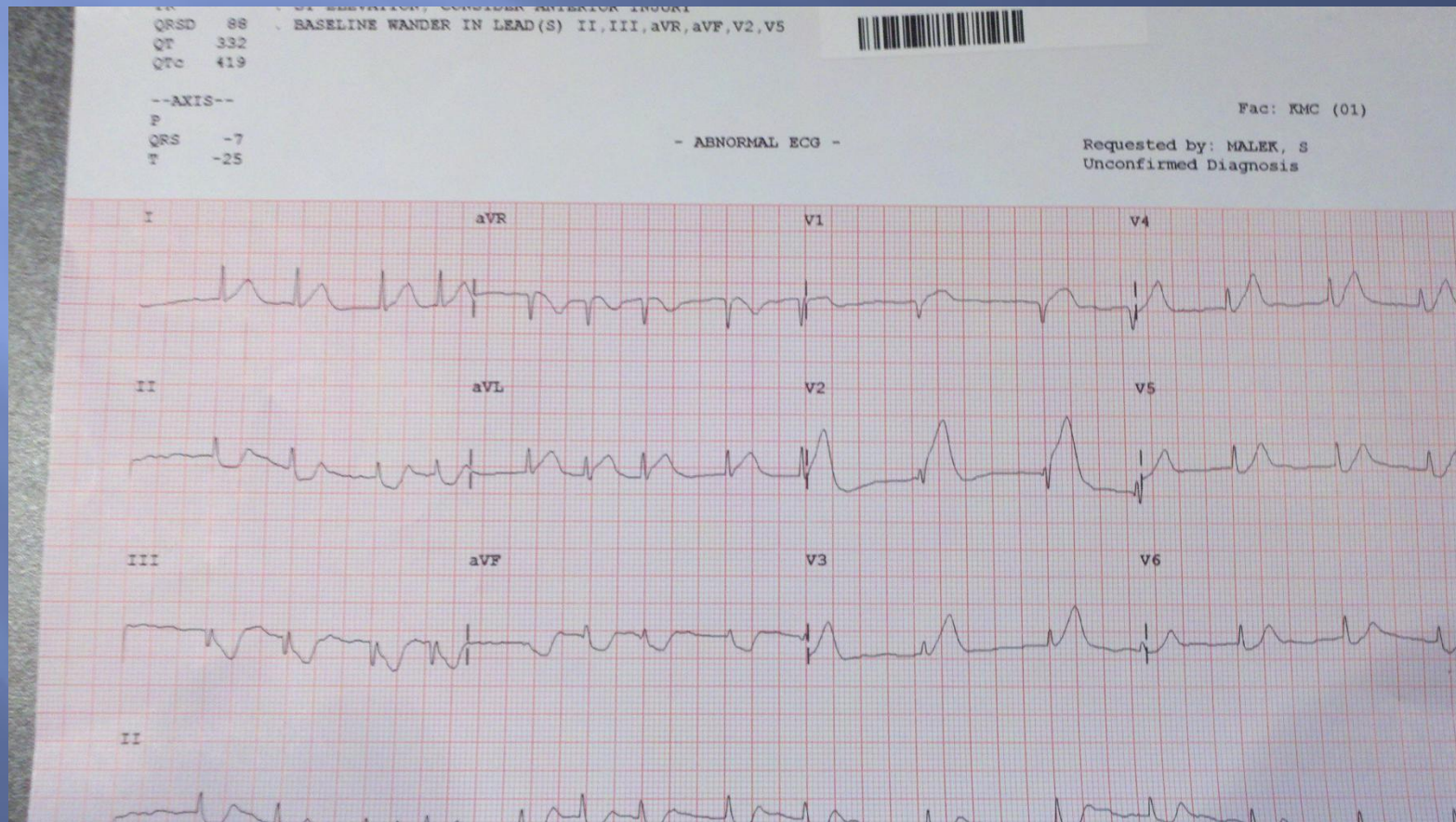
CONCLUSIONS

- Both door to balloon (D2B) times and EMS to balloon times (E2B) were markedly reduced when using a progressive STEMI Alert plan utilizing direct ground CCT from either the local ED or the scene of presentation.
- These reductions were primarily due to spending less time in the local or regional ED, as transport and procedure times were not significantly different.
- This STEMI Alert plan for a rural North Idaho community is associated with a markedly decreased frequency of adverse events and length of hospital stay.

Acute Anterior Infarction



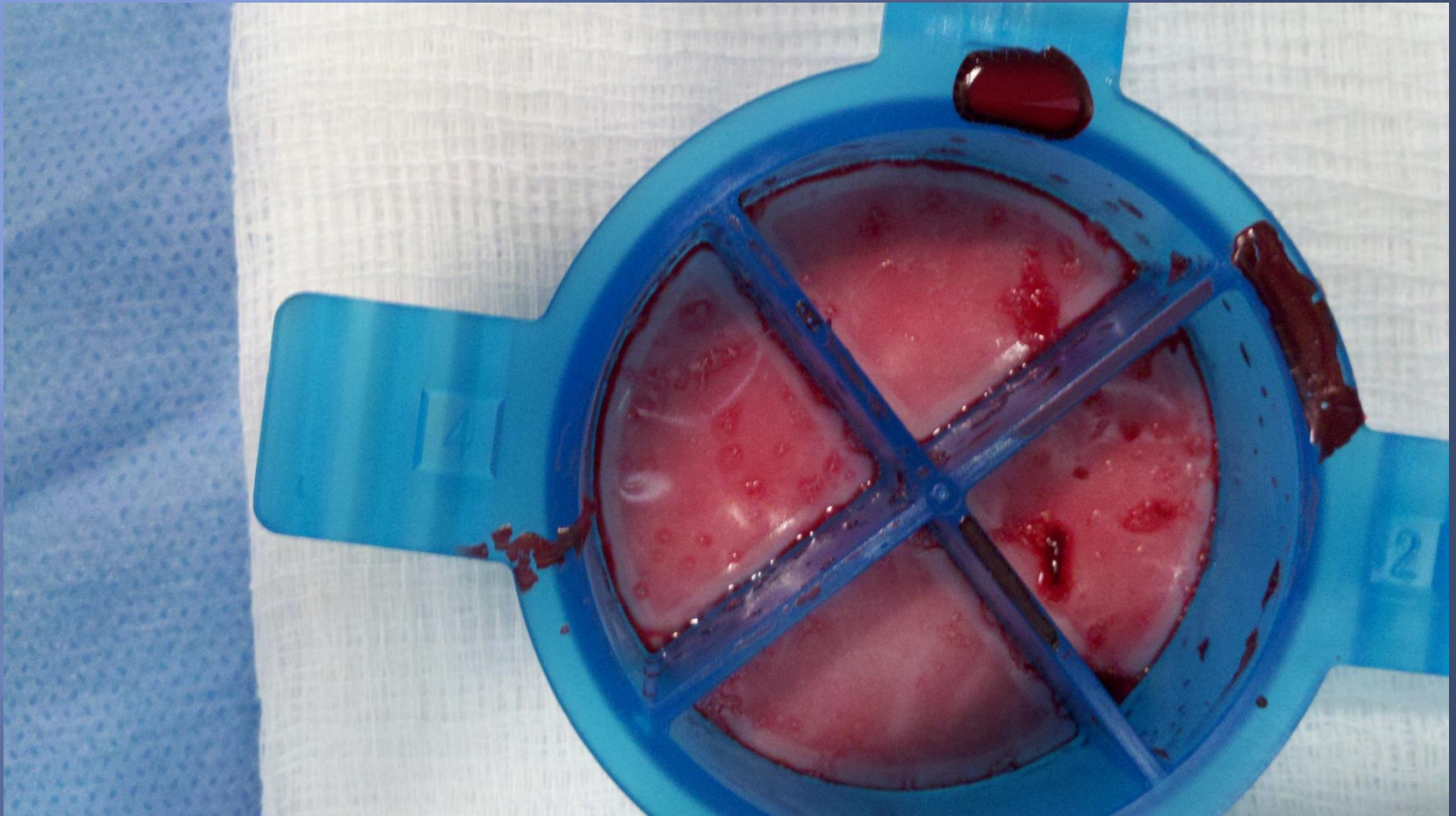
EKG showing acute anterior MI



Arrival to the cardiac cath lab



Thrombus from catheter thrombectomy



Post cath review of angiogram



Recovery



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