The HEART Pathway: Bridging the Gap between Operations, Research, and Education.

Simon A. Mahler MD, MS, FACEP
Department of Emergency Medicine,
Wake Forest School of Medicine

Wake Forest™
School of Medicine

The Problem

- 8-10 million patients with chest pain present to an ED annually in the US.

- To avoid missing the diagnosis of acute coronary syndrome (ACS), physicians use a liberal testing strategy.

- Current care patterns for acute chest pain fail to focus health system resources, such as hospitalization and cardiac testing, on patients most likely to benefit.

The Problem: Acute Chest Pain

- >50% of ED patients with acute chest pain are hospitalized for a comprehensive cardiac evaluation (serial cardiac biomarkers and stress testing or angiography).
- <10% of these patients are ultimately diagnosed with ACS.
- over-triage costs an estimated $10-13 billion annually.

Inefficient Risk Stratification

- Despite high admission rates and costs, roughly 2-5% of patients with AMI are inappropriately discharged from the ED every year.
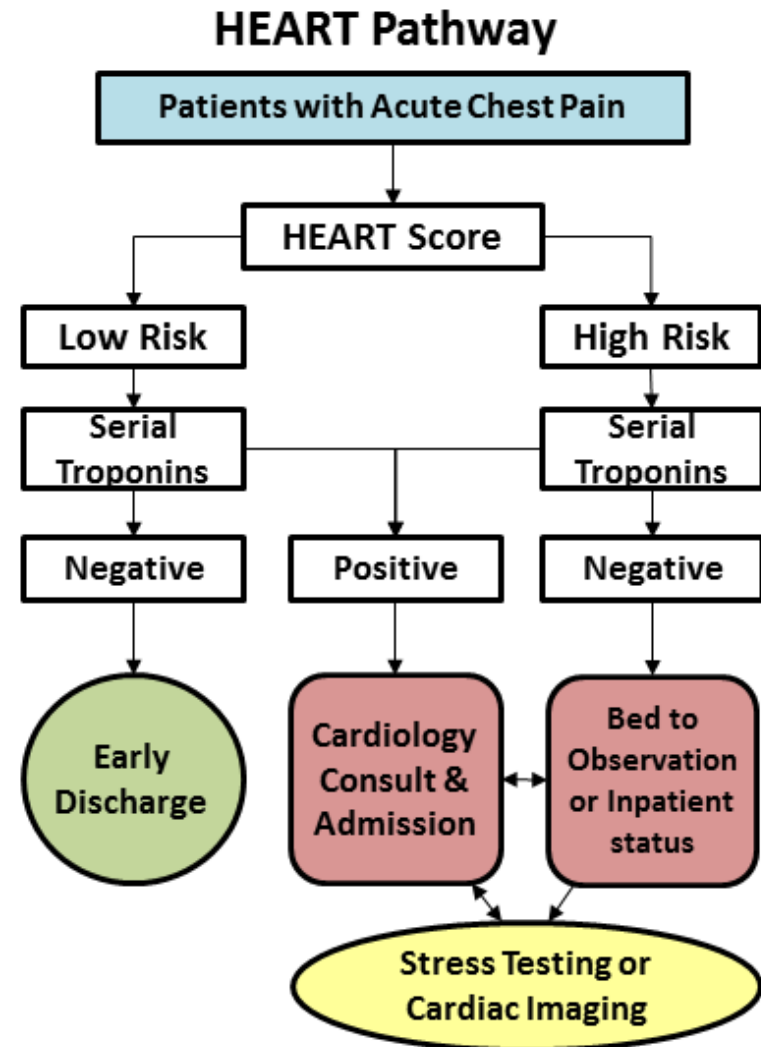- Missed ACS is a top cause of malpractice claims.

The Solution?

- The Chronic Care Model
  - Identifies the use of decision-support systems as a way to improve healthcare delivery

- An accurate ACS risk stratification care pathway, the HEART Pathway, used for decision-support and designed to eliminate unnecessary testing could improve quality by decreasing:
  - False positive and non-diagnostic testing
 - Radiation
  - Costs

The HEART Pathway

- Combines a clinical decision aid (the HEART score) with two serial troponin measurements
- Developed to identify patients with chest pain who can safely be discharged from the ED without objective cardiac testing (stress testing or angiography).

HEART Pathway

Patients with Acute Chest Pain

HEART Score

Low Risk | High Risk

Serial Troponins | Serial Troponins

Negative | Positive | Negative

Early Discharge | Cardiology Consult & Admission | Bed to Observation or Inpatient status

Stress Testing or Cardiac Imaging

HEART Score

- The originators of the HEART Score produced 3 studies
- Derivation study
- Retrospective validation (910 patients)
- Prospective observational validation study (2,440 patients)
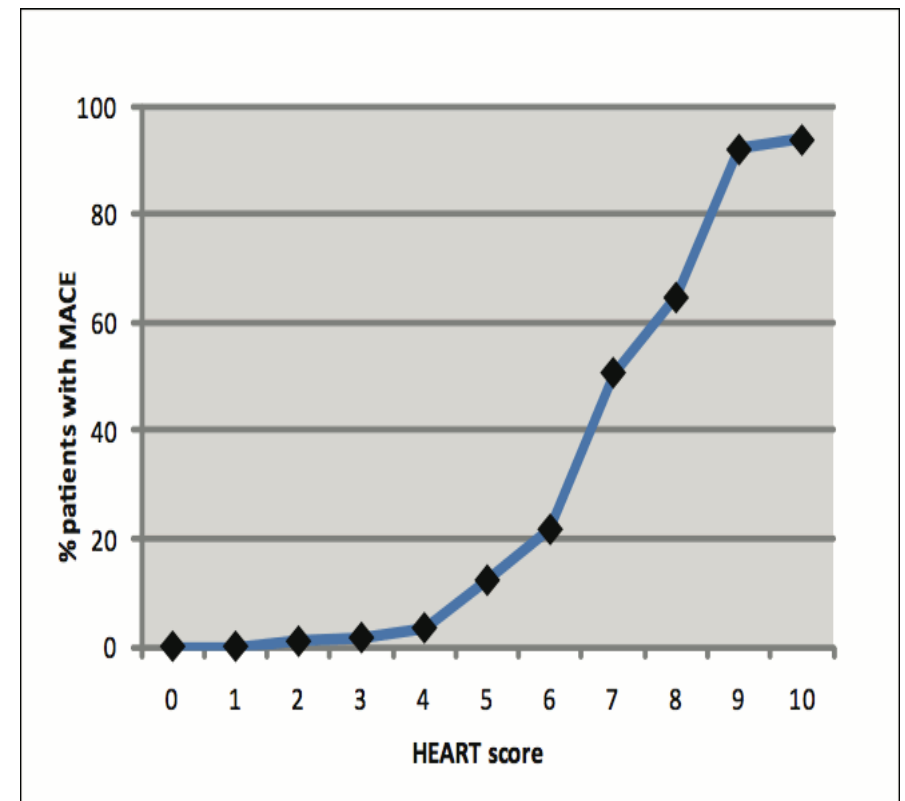
HEART Pathway

- Addition of a serial troponin at 3 hours
- Increases sensitivity for ACS
  - A missed event rate below 2% is considered acceptable for HEART score implementation in Europe
  - A missed event rate above 1% is unacceptable in the US.

HEART Pathway: OU cohort

- Registry data from 1,070 low risk chest pain patients (1.1% incidence of MACE) in our OU.
- The HEART Pathway had 100% sensitivity
- The HEART Pathway would have identified 82% for early discharge without objective testing

HEART Pathway: ED Cohort

- Secondary data of the MIDAS trial
- 1005 patients (22% ACS rate) from 18 US EDs
- HEART pathway
  - 99% sensitive for ACS within 30 days
  - Identified 20% for early discharge

- Considering the results of these studies:
  - The HEART pathway can have a large impact in avoiding testing in low-risk patients, yet retains high sensitivity when applied to a higher risk population.

HEART Pathway RCT

- Single center RCT
- Designed to determine if real-time use of the HEART Pathway can safely identify patients for early discharge

- RCT arms
  - HEART Pathway
  - Usual Care: ACC/AHA guidelines
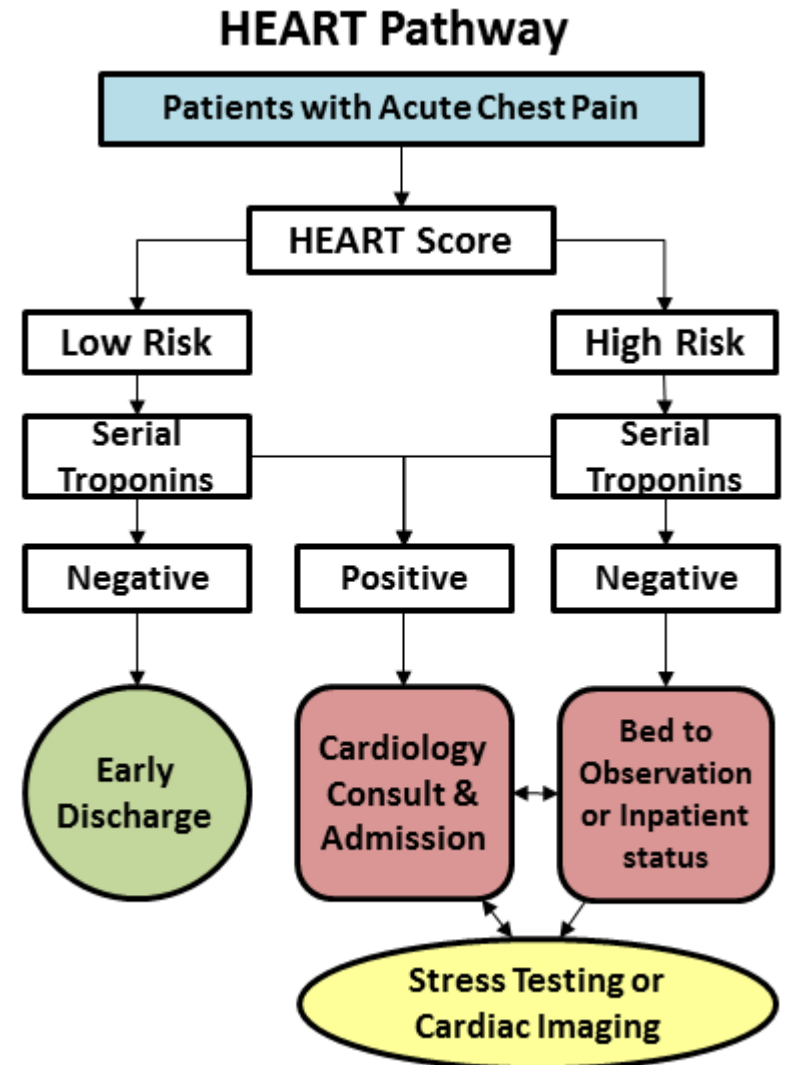
HEART Pathway

HEART Pathway RCT: Preliminary Data

- Interim analysis: 200 pts (101 HEART, 99 usual care)
- HEART Pathway
  - 41% early discharge rate from ED w/o objective testing
  - 20% absolute increase in early discharge from usual care (p=0.003)
  - 10 hour reduction in median LOS (p=0.032)
- No missed adverse cardiac events

HEART Pathway: Summary

- The HEART Pathway safely decreases utilization
  - Identifies patients for early discharge
  - Decreases LOS
  - Acceptable missed adverse event rate
- What is needed now is implementation
  - Test effectiveness
  - Confirm safety

# Knowledge Translation Problem

- Slow uptake of research findings and evidence based medicine into daily clinical practice.
- Disconnect between research, educators, and health system leaders

Researchers	
Educators	
Administrators	

?

Change in Clinical Practice
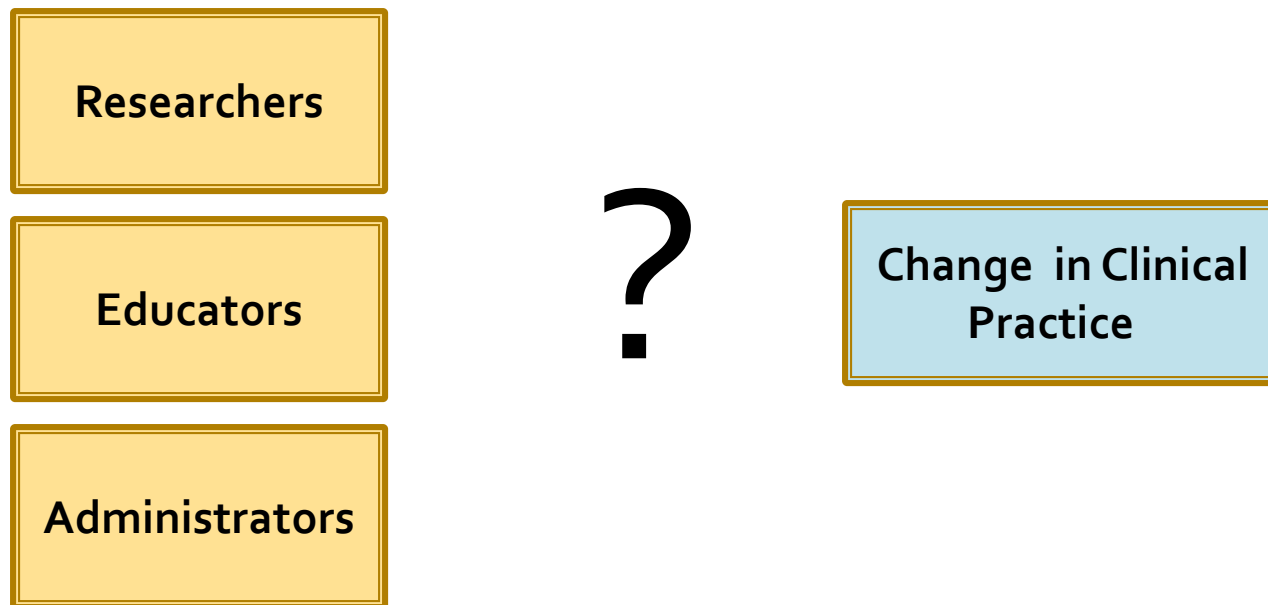
Association of American Medical Colleges and Donaghue Foundation

Advancing Effectiveness Research and Implementation Science in our Own Backyards:

- Goal: "Developing and implementing evidence-based solutions for improving health to enhance activities that <u>facilitate collaboration</u> across multidisciplinary research teams and educators and that engage clinical and health system partners."
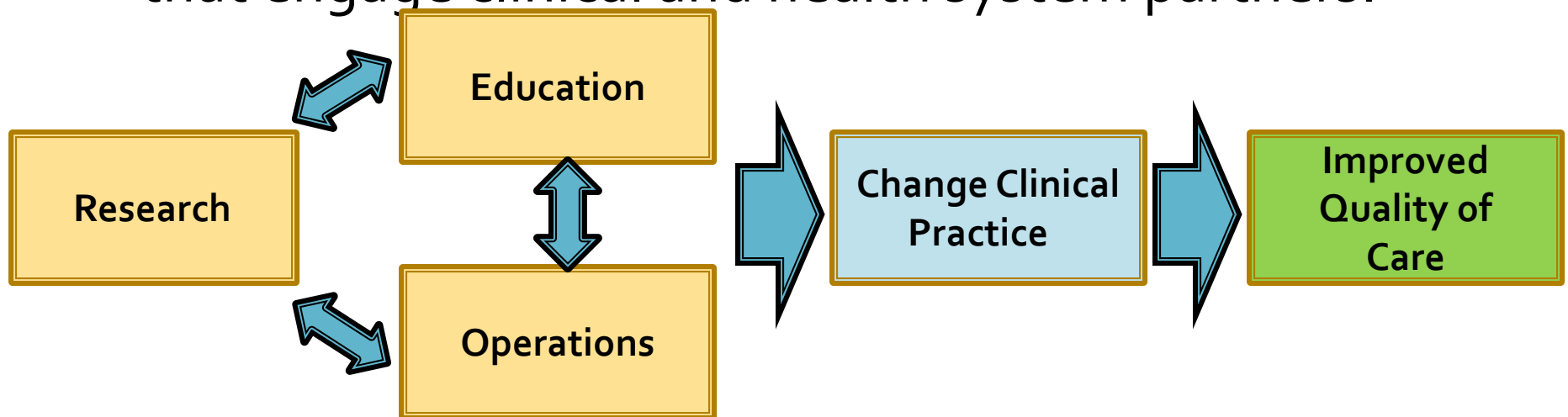
Broad Goal of this Project

- **To build a transformative collaboration bridging the gap between research, education, and health systems operations to more effectively and efficiently provide patient care.**
- The vanguard for this collaboration seeks to improve quality of care for patients with acute chest pain by implementing the HEART Pathway
- Collaboration should build framework for QI and knowledge translation.

Aims: Operations

Integrate the HEART Pathway into cardiovascular care delivery at WFBH.

- Engage key stakeholders within the health system

  - Across the disciplines of cardiology, primary care, nursing, and emergency medicine

Integrate the HEART Pathway

- Into EPIC EMR

BestPractice Advisory - Discharge,Cyn

You have ordered a troponin and an ECG in a patient with a chief complaint consistent with ACS. Unless this is a STEMI patient, please follow the link to the Research Navigator to complete your risk assessment of the patient. If this is a STEMI patient, push the STEMI button and then 'Accept.'

Acknowledge reason:

STEMI

☐ Add new contraindication:
▷ Enter details
↰ Research Navigator

Accept & Stay   Accept   Cancel

Integrate the HEART Pathway

- Into EPIC EMR

Aims: Education

- **Develop and test an inter-professional educational platform, spanning the spectrum of learners, to bridge the work of researchers, health system leaders, and educators.**

Aims: Education

- **2a)** Build an educational framework to support integration of inter-professional quality improvement interventions, beginning with the HEART Pathway, into health system operations at WFBH.
- **2b)** Develop and implement focused problem-solving sessions for undergraduate and graduate learners on team-based interventions to improve health system quality, safety, equity, and effectiveness.

Educational Framework Supporting Implementation

- Dynamic e-learning modules to ensure new content acquisition

- Pre-learning phase: Assure all learners enter the next stage with the same knowledge
- Tailor presentation to the learner (medical student, nurse, non-physician provider, resident, or faculty
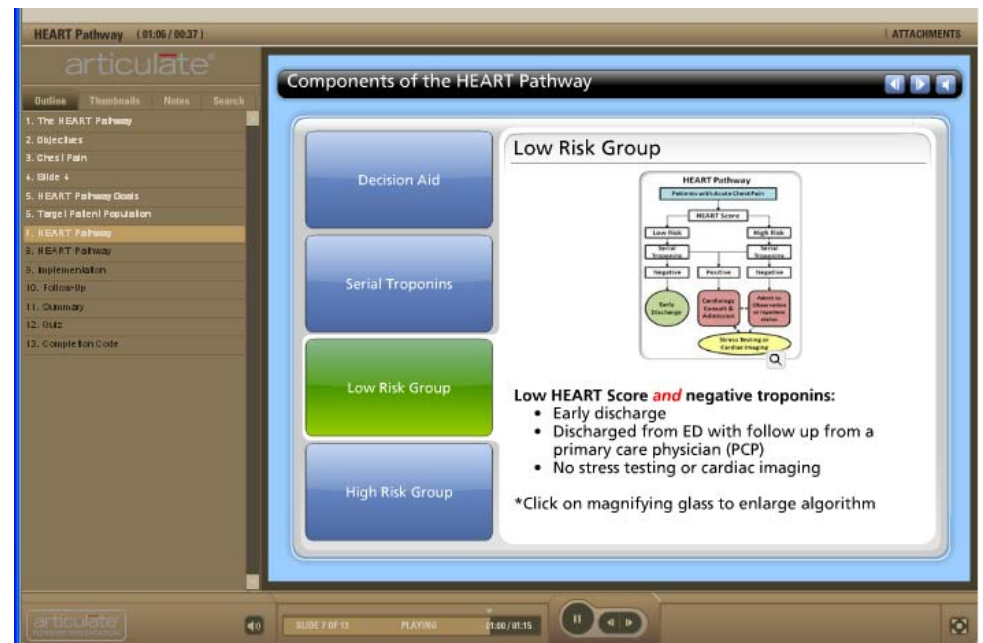
Educational Framework Supporting Implementation

- Dynamic e-learning modules to ensure new content acquisition

  - Articulate software
  - Responses to quizzes used for formative feedback and module improvement
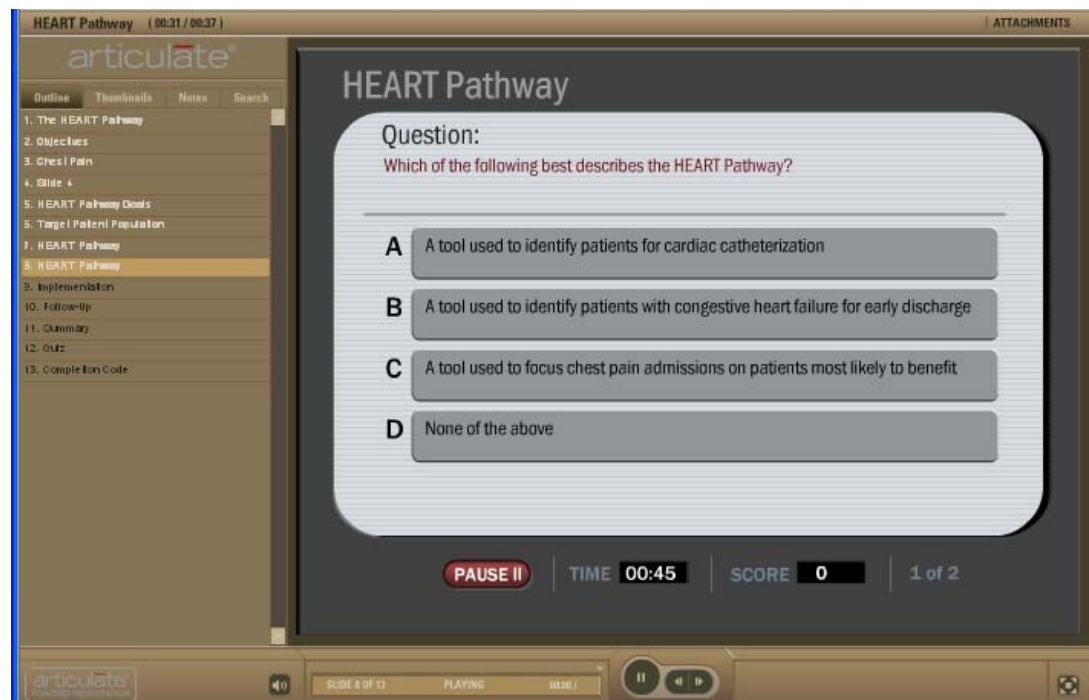
Educational Framework Supporting Implementation

- Small group inter-professional collaborative practice small group sessions
  - Case scenarios: modified problem-based learning (PBL) approach
  - Group response questions used to facilitate discussions
  - Discuss the benefits of the intervention, to both the learner and the patient

Teaching Team-Based QI

- Focused problem-solving sessions
- Engage learners across multiple disciplines
- Educators experienced in team-based quality improvement initiatives
- Discuss how to develop and implement quality improvement initiatives for other symptoms or disease processes.

Teaching Team-Based QI

- Focused problem-solving sessions
- Brainstorm about possible quality measurements and initiatives
- Review the current practice and literature
- Develop a quality improvement
- Present proposals
- Best proposals refined by the learners and presented to the Wake HIT operations team which will provide feedback and consider the proposals for implementation.

Aims: Research

Test the safety and effectiveness of the HEART Pathway

Integrate the HEART Pathway into the EHR and leverage the EHR and insurer claims data to perform quality assurance surveillance among patients with acute chest pain.

Study design

- Pre-post study of the HEART Pathway intervention at Wake Forest Baptist Medical Center (WFBMC),
- Pre- and post-intervention cohorts will each accrue patients with acute chest pain for 1 year
- with a 3-month wash out/in period

Study design

- Quality assurance surveillance data will be collected electronically from all patients using the EHR and insurers' claims data will be used on a subset of patients insured by BCBS, MedCost, or Medicaid.
- Pre- and post-HEART Pathway cohorts will be compared for safety and healthcare utilization outcomes.

Outcomes

Assessed at 30 days and 1 year

- <u>Safety</u>
  - Death
  - Myocardial infarction

- <u>Effectiveness/ Healthcare Utilization</u>
  - Hospitalizations
  - Objective cardiac testing (stress testing and advanced cardiac imaging)
  - Recurrent ED visits
  - Index hospital length of stay
  - Cost

Timeline

Year 1		Year 2		Year 3	
2013	2014		2015	2016	
Multidisciplinary collaboration to integrate the HEART Pathway into WFBH system.		Wash-in phase for HEART Pathway intervention	Identify post-implementation cohort	Study Close Out Data cleaning	Data Analysis Manuscript Preparation
Identify pre-implementation cohort					
E-surveillance for pre-implementation cohort			E-surveillance for post-implementation cohort		
Develop inter-professional educational platform		Education/Training to support HEART Pathway Integration; e-learning lectures, small group PBL			
		Focused problem-solving sessions focused on team based interventions to improve health system quality, safety, equity, and effectiveness			
		Test effectiveness of education			

WAKE HIT: <u>Wake</u> Forest <u>H</u>EART Pathway <u>I</u>ntegration <u>T</u>eam

```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│  Operations  │◄─►│  Education   │◄─►│   Research   │
│    Group     │   │    Group     │   │    Group     │
└──────────────┘   └──────────────┘   └──────────────┘
```

- Wake HIT will convene on a regular basis
  - Progress reports will be presented.
    - Operations, education, scientific (research/quality surveillance findings)pertaining to health system integration of the HEART Pathway.
- Each Group will have separate regular meetings

WAKE HIT: Operations Group

- **Plan the HEART Pathway Implementation**
  - Integrate into WFBMC clinical workflow
  - Integrate into EHR
  - Data capture from EHR and claims data

Operations Group	
Executive Leaders Russell Howerton Pamela Duncan Jennifer Houlihan	**E-Surveillance Leaders** Ronald Gaskins (NWCC) Susan Jackson (BCBS) Sharon Lambros (MedCost)
Performance Improvement Leaders Hannah Shipton	**Clinical Leaders** Nursing: Susan Bachmeier Cardiology: David Zhao David Herrington Primary Care: Richard Lord Emergency Medicine: Chadwick Miller
Finance Leaders William Bryant	
Informatics Leaders Scott Leddy John McCullough Brian Hiestand	

WAKE HIT: Education Group

- Build the educational framework to support HEART Pathway implementation
- Develop and implement focused problem-solving sessions for team-based QI

Education Group	
Undergraduate Leaders	**Graduate Leaders**
Marcia Wofford	Christopher Godshall
Sonia Crandall	Mary Lou Voytko
William Applegate	Marcia Wofford
David Miller	Sonia Crandall
Kim Askew	Carolyn Scott
Cynthia Burns	Hal Atkinson
	Mitchell Sokolosky
Consultant	
Sheila Chauvin	

WAKE HIT: Research Group

- Study design
- Data managment
- Pre-post Implementation surveillance

Research Group	
Cardiovascular Outcomes Gregory Burke Chadwick Miller Simon Mahler David Herrington Robert Riley	**Health Services** Pamela Duncan Simon Mahler
	Comparative Effectiveness William Applegate
Biostatistics Douglas Case	

Questions and Comments?

Wake Forest Baptist Health

Wake Forest University