

BUSINESS IN MEDICINE

HOW ARE WE USING TELEMETRY?

Asad Qasim MD, MPH – PGY2

Background - Telemetry

- Telemetry—from the Greek words *tele* (remote) and *metron* (measure)—for cardiac monitoring was developed in the mid-1960s by Spacelabs Medical for use in spaceflight. The system was later adopted in hospitals to detect life-threatening arrhythmias.
- The use of telemetry in non-ICU units is widespread but imposes significant increases in cost and manpower to the healthcare system
- Few studies have been done to evaluate the clinical usefulness of telemetry in terms of patient management and outcomes
- UCI Medical Center
 - Tower: 56 beds
 - Douglas: 60 beds (if needed)



The Project

- The Question: Is Telemetry used Appropriately, and cost-effectively, on the UCI Internal Medicine Ward Services?
- Researched the published Guidelines for the use of Inpatient non-ICU cardiac monitoring
- Literature Search on Telemetry Monitoring
- Surveyed 4 UCI Internal Medicine Ward Teams
 - Number of Patients on Telemetry
 - Reason why each Patient needed Telemetry
- Compared Guidelines to Actual use of Telemetry
- Estimated Cost Analysis at UCI

Researching the Guidelines

- Guidelines for the use of telemetry were first published in 1991 by the American College of Cardiology (ACC) in response to concerns raised by its increasing use in noncritical care settings. The latest revision of the guidelines was published in 2004 by the American Heart Association (AHA).
 - The Guidelines classify patients into 3 risk-based classes
 - I: Telemetry indicated for nearly all patients
 - II: Telemetry MAY be indicated in SOME patients
 - III: Telemetry is NOT indicated
 - These guidelines were based mostly on expert opinion

Jaffe AS, Atkins JM, Field JM, et al. Recommended guidelines for in-hospital cardiac monitoring of adults for detection of arrhythmia. *J Am Coll Cardiol* 1991; 18:1431–1433.

Drew BJ, Califf RM, Funk M, et al. Practice standards for electrocardiographic monitoring in hospital settings: an American Heart Association scientific statement from the Councils on Cardiovascular Nursing, Clinical Cardiology, and Cardiovascular Disease in the Young: endorsed by the International Society of Computerized Electrocardiology and the American Association of Critical-Care Nurses. *Circulation* 2004; 110:2721–2746.

American Heart
Association® 
Learn and Live™



Guidelines: Class I

Class I: **Cardiac monitoring is indicated for nearly all patients...**

In the early phase of acute coronary syndromes, including "rule-out" myocardial infarction (MI)

In the postoperative period after cardiac surgery

Resuscitated recently from cardiac arrest

With indications for intensive care

During acute management of poisoning with drugs or chemicals at doses known or suspected to have cardiac arrhythmic toxicity

During initiation and loading of type I or type III antiarrhythmic drugs for potentially life-threatening arrhythmias in patients clinically prone to proarrhythmic effects

Immediately after percutaneous transluminal coronary angioplasty for patients with complications of the procedure

With high-risk coronary artery lesions who are candidates for urgent mechanical revascularization

With a temporary pacemaker or transcutaneous pacing pads

Who have undergone implantation of an automatic defibrillator lead or a pacemaker lead and are considered pacemaker-dependent

With Mobitz type II or greater atrioventricular block, advanced second-degree atrioventricular block, complete heart block, or new-onset left bundle branch block in the setting of acute MI

With acute heart failure, pulmonary edema, or receiving intra-aortic balloon counterpulsation

Undergoing diagnostic or therapeutic procedures requiring conscious sedation or anesthesia

With long-QT syndrome and associated ventricular arrhythmias or any other hemodynamically unstable arrhythmia

Guidelines: Class II

Class II: Cardiac monitoring may be indicated in some patients...

More than 3 days after an acute myocardial infarction

With chest pain syndromes

With a potentially lethal arrhythmia several days after control of the arrhythmia

At risk of cardiac arrest, respiratory arrest, or development of hypotension

Who are receiving an antiarrhythmic drug or who require adjustment of drugs for rate control with chronic atrial tachyarrhythmias

With suspected or proven hemodynamically significant paroxysmal tachyarrhythmia or bradyarrhythmia

With subacute heart failure or in the acute phase of pericarditis

With unexplained syncope or other transient neurologic signs or symptoms that might be due to cardiac arrhythmias

After uncomplicated nonurgent percutaneous transluminal coronary angioplasty or uncomplicated ablation of an arrhythmia

Who have had a pacemaker implanted within the last 48–72 hours and who are not pacemaker-dependent

In stable condition after cardiac surgery

With do-not-resuscitate orders with symptomatic arrhythmia

Who have undergone routine coronary angiography

Guidelines: Class III

Class III: Cardiac monitoring is not indicated in patients...

At low risk after surgery

Without significant medical conditions during labor and delivery

With terminal illness who are not candidates for treatment of arrhythmias that might be detected

With chronic stable atrial fibrillation

With stable asymptomatic premature ventricular contractions or nonsustained ventricular tachycardia hospitalized for reasons other than cardiac or hemodynamic compromise

Who have underlying cardiac disease that has been stabilized and who have had no arrhythmias on 3 consecutive days of monitoring

Literature Review

- Few studies have looked at the effectiveness of Cardiac Monitoring
 - 8 Studies from 1995 - 2011
 - All were prospective cohort or retrospective observational studies
 - Most looked at Chest Pain Admissions from the ED
 - 3 Studies recommended further revision of the current Guidelines based on their results

Literature Highlights

- 1994 - Outcomes of patients hospitalized to a telemetry unit. Am J Cardiol. 1994 Aug 15;74(4):357-62.
 - Prospective Cohort Study [N=467]
 - In 462 patients, telemetry added no significant information
 - 38 patients (8.1%) were transferred to an ICU, only 5 (1%) were because of information contributed by telemetry
- 1995 - Role of telemetry monitoring in the non-intensive care unit. Am J Cardiol. 1995 Nov 1;76(12):960-5.
 - Prospective Cohort Study [N=2240]
 - Telemetry led to direct modifications in management in 156 patients (7%)

Literature Highlights

- 2000 - Evaluation of Guidelines for the Use of Telemetry in the Non-Intensive-Care Setting. J Gen Intern Med. 2000 January; 15(1): 51–55.
 - Based on the prior study subanalysis
 - Telemetry led to a change in management for 3.4% of the class I patients, 12.7% of the class II patients, and 4% of the class III patients ($p < .001$)
- 2009 - Telemetry monitoring guidelines for efficient and safe delivery of cardiac rhythm monitoring to noncritical hospital inpatients. Critical Pathways in Cardiology. 2009;8(3):125-126.
 - Retrospective [N=562]; compared high (class 1-2) vs low (class 3) risk
 - “Telemetric monitoring neither affects how patients at low risk are managed nor improves their clinical outcomes.”

THE PROJECT

- Surveyed 4 UCI Internal Medicine Ward Teams, anonymously
 - Number of Patients on Telemetry
 - Reason why each Patient needed Telemetry
- Classified each patient based on the 2004 AHA Guidelines into Class I, II, or III indications
 - Most Common Reasons to be on Telemetry
 - 1. Stable GI Bleed
 - 2. Chest Pain “Rule Out”
 - 3. Respiratory Compromise (hypoxia, PNA)
 - 4. Acute Decompensated Heart Failure
- Calculated the % of patients on telemetry that were not indicated (Class III patients)
 - Class I and II - Indicated (or can make an argument for "at risk for cardiac arrest, respiratory arrest, or hypotension", a Class II indication)

The Data

	Pts on Telemetry / Total Pts	Class I	Class II	Class III	% Not Indicated
Team 1	7 / 15 (46%)	0	5	2	(28%)
Team 2	8 / 13 (61%)	2	4	2	(25%)
Team 3	13 / 15 (86%)	2	3	8	(61%)
Team 4	5 / 11 (45%)	1	3	1	(20%)
Totals	33 / 54 (61%)	5	15	13	(39%)

Results

- 39% of the sampled patients were inappropriately on telemetry. (Class III Indications)
- This is likely an UNDERESTIMATE as not all Class II patients require cardiac monitoring
- Most common overuse of Telemetry
 - Low Risk Chest Pain after ACS ruled out
 - Chronic stable arrhythmia (eg A.fib)

What Does all this Cost??

- Estimated Average Bill at UCIMC for 2012 ytd
 - General Med/Surg Bed: **\$5,359 /day**
 - Monitored (Tele) Bed: **\$9,108 /day**
 - **Excess Cost per day: \$3,750**
- This does not account for additional costs incurred due to work-up / treatment of telemetry findings
 - Clinical Consequences of electrocardiographic artifact mimicking VT. N Engl J Med 1999; 341:1270-1274.
 - Misdiagnosis based on Telemetry Artifact can lead to Unnecessary work-up and Invasive Procedures

What Does all this Cost??

- Extrapolating the data, on any given day at UCIMC ~ 39% of telemetry patients may be innapropriately on telemetry.
 - **Excess Cost per Day ~ \$67,500**
Assume 80% telemetry occupancy
- Back-log of patients in the ED waiting for telemetry beds
- Potential "over-work up" of non-significant telemetry findings



Discussion

- Why is there so much overuse?
 - People don't know the indications
 - People don't use the indications
 - Residents have less clinical experience
 - Just to use the better nursing ratio
 - Not reassessing patient's daily for those that no longer meet criteria
- 2009 - Is telemetry overused? Is it as helpful as thought?
Cleveland Clinic Journal of Medicine June 2009 vol. 76 6 368-372.
 - Need for New / Updated Guidelines
 - Integration into Medical Education
 - Assure ED Physicians Triage Appropriately

Discussion

- What can we do at UCI?
 - Make the guidelines known, prominently, both on the medicine wards but also in the ED
 - Make telemetry orders self-expiring q72hrs
 - 3 days is the recommended time period for a patient to be considered “stable” if they have not had any events on telemetry
 - Make it part of the “prophylaxis” section of the progress note

Discussion

- Project Flaws
 - Small Sample Size
 - Classification Bias (by me)
 - Recall (and Fear) Bias (from ward seniors)
 - No category for " Clinical Judgement"
 - "Snap-Shot"
 - Assume 80% telemetry use (could be underestimate)
 - Assume the billed amount is what is paid (unlikely)

Thank You! Questions?

