Improving Utilization of Telemetry in a University Hospital
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Abstract

- **Objective:** To create a set of indications for the use of telemetry on a general medical floor and to assess the effect of the guideline on reducing inappropriate utilization and costs.

- **Methods:** A literature review identified several position papers containing recommendations for the use of telemetry. These were translated into a handout for third-year medicine residents that was presented during orientation and posted in the resident area. The indications were reviewed at multidisciplinary rounds 3 times per week. Data regarding patient diagnosis and number of patients on telemetry were obtained from the telemetry log book. Cost analysis was provided by the department of planning, network development, and managed care. Data were collected prior to intervention from July to December 2003, with the intervention encompassing the resident blocks of January and February 2004.

- **Results:** The percentage of patients on telemetry for guideline-based indications was 49.7% before the intervention and 52.5% after the intervention. Total cost for telemetry per month as well as the percentage of total charges increased. The average number of patients on telemetry per month increased from 33.8 to 39.5, and the telemetry charges per person decreased.

- **Conclusion:** Our telemetry guideline intervention led to more appropriate utilization through improvement in indications for telemetry and increased the number of patients on telemetry a month while decreasing the cost per person of telemetry.

The use of cardiac monitoring, initially employed in cardiac care units in the 1950s and 60s, has seen significant expansion into noncritical care settings. Telemetry monitoring provides a higher level of care than can be provided on a general ward. However, the value of telemetry in non-intensive care unit settings has been questioned. Durairaj et al found that of 1033 patients admitted through an emergency department to telemetry, only 0.9% had a major complication (including 2 fatal cardiac arrests) [1]. Estrada et al found that cardiac monitoring led to no change in management in 93% of 2240 patients admitted to telemetry. Only 5.5% had any cardiac complication within 72 hours of admission and there were no major complications in low-risk chest pain patients (negative predictive value of 100%) [2]. These and other [3] data suggest that cardiac monitoring in low-risk patients has little impact on care.

As telemetry is a finite and expensive resource, it is important that it be used efficiently. Durairaj et al found that patients who required telemetry were being denied beds, while up to a third of the beds were being used for patients at low risk for major cardiac complications [1]. As monitoring all inpatients is neither practical nor cost-effective, criteria have been developed that identify high-risk subsets of patients for whom cardiac monitoring is considered beneficial [4,5].

At the University of Connecticut, there were no guidelines or recommendations in place for the utilization of telemetry on a general medical floor. We conducted a quality improvement project to create a set of indications for the use of telemetry on a medical ward and to determine if application of the guidelines reduced the number of patients inappropriately receiving telemetry. We also wanted to see if such an intervention would result in cost savings for the institution.

Methods

A literature review was performed using Ovid, PubMed, and Google from 1966 to the present using the terms telemetry, telemetry utilization, cardiac monitoring, and arrhythmia monitoring. There were no published randomized trials on the proper utilization of telemetry in a hospital setting. However, several position papers were identified and reviewed. These were the London Health Sciences Centre physiologic monitoring policy [4] (Table 1), the American College of Cardiology’s recommended guidelines for in-hospital cardiac monitoring of adults for detection of arrhythmias [5], and the Joint Commission on Accreditation of Healthcare...
Organizations’ guidelines [6]. Relevant material was taken from each of these guidelines to develop a set of noncritical care, general medicine ward telemetry indications (Table 2).

The indications were printed on a yellow handout and presented to third-year residents rotating in internal medicine during orientation and also were posted on a corkboard in the resident lounge hallway. The indications were reviewed at orientation by the chief resident at the beginning of each ward rotation and reviewed by the chief resident during multidisciplinary rounds 3 times per week on all patients on telemetry on the general medicine floor.

Data were collected from the telemetry log book located

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**Table 1. London Health Sciences Centre Telemetry Implementation Policy**

**Category 1: High Priority**

CANDIDATES: Patients known or suspected to be at high immediate risk for a life-threatening cardiac arrhythmia. Examples of Category 1 candidates:
- CCU candidates while waiting for a CCU bed to be available (ie, unstable angina with ECG changes; cardiac arrhythmias associated with myocardial ischemia)
- Recurrent syncope
- Recent onset AV block or symptomatic bradarrhythmia
- Resuscitated ventricular tachycardia or fibrillation
- Nonsustained ventricular tachycardia
- Potentially cardiotoxic drug overdose with abnormal ECG or arrhythmia
- Other medical conditions known to be associated with serious cardiac arrhythmias (eg, severe electrolyte imbalance)

MONITORING DURATION: Up to 48 hours. Renew if life-threatening event demonstrated; otherwise, patient progresses to Category 2. Reassessment of indication and renewal decision may best be routinely done during daily patient rounds. After completing initial monitoring period, or at any time during monitoring if the initial diagnosis leading to ECG monitoring is changed to an established diagnosis not requiring high priority monitoring.

**Category 2: Low Priority**

CANDIDATES: Follow-up of Category 1 patients.

Patients at low risk for or have documented non–life-threatening dysrhythmia for whom medical management is facilitated by ECG monitoring. Examples of Category 2 candidates:
- Symptomatic, non–life-threatening dysrhythmias (eg, controlled atrial fibrillation)
- Low-grade AV block (eg, first-degree or type 1 second-degree AV block)
- Undiagnosed chest pain with normal ECG and cardiac enzymes
- Congestive heart failure
- Drug overdose with normal ECG, no arrhythmia
- Postelective cardioversion
- Postelectronic cardiac pacemaker implant
- Postcoronary angioplasty

MONITORING DURATION: Up to 24 hours. Renew only if significant events requiring immediate action were demonstrated; otherwise, discontinue monitoring or consider Holter test or event recorder if further rhythm analysis is desired.

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**Table 2. Telemetry Guidelines Handout Given to Residents**

**INITIATION**

**Class 1 indication** (all patients admitted should be placed on telemetry)

- Cardiac
  - Rule out MI
  - Symptomatic bradarrhythmia
  - New onset atrial fibrillation/flutter
  - Recent arrest
  - Mobitz type 2 second-degree or third-degree heart block
  - Unstable angina
  - Initiation of antiarrhythmic medications

- Medical
  - Acute myocarditis
  - Toxic or metabolic disturbance (eg, hyperkalemia)
  - Drug overdose (eg, TCAs, phenothiazines, digitalis, antiarrhythmic medications)
  - Recurrent syncope

**Class II indication** (may be beneficial but not essential for all)

- Cardiac
  - AMI after 3 days
  - Symptomatic controlled atrial fibrillation
  - Acute pericarditis

- Medical
  - Unexplained syncope
  - Transient neurologic signs or symptoms
  - Drug overdoses without ECG changes

**Class III indication** (not needed at all)

- DNR with no treatment for arrhythmias

**DISCONTINUATION**

- 48 hrs
  - Stable ventricular arrhythmias
  - Uncomplicated MI
  - Unstable angina that is pain free
  - Syncope with no evidence of arrhythmia
  - Myocarditis/pericarditis

- 24 hrs
  - Stable supraventricular arrhythmias
  - Reversal of toxic or metabolic disturbances
  - Controlled atrial fibrillation
  - Drug overdose without ECG changes
  - Chest pain with normal ECG and cardiac enzymes
on the general medicine floor. Entries were made by the unit secretary for all patients initiated on telemetry with indications determined by admission diagnoses. The log book data were used to determine telemetry indication and number of beds utilized. Documented indications were divided into 7 categories: cardiac, infectious, neurologic, pulmonary, electrolyte, gastroenterology, and other/unknown. Data on cost of telemetry were provided by the department of planning, network development, and managed care at the University of Connecticut Health Center. Data were collected for a pre-intervention time period (July through December 2003) and during the intervention period (2 resident rotation blocks totaling 8 weeks).

Results

Table 3 shows the breakdown for documented indications before and after the intervention. Following the intervention, there was an increase in use of telemetry for cardiac, infectious, electrolyte, and gastroenterology diagnoses and a decrease in use for neurologic and other/unknown categories.

Following the intervention, there was a small increase in appropriate utilization of telemetry: 49.7% of patients with appropriate indications (those listed in the handout) before the intervention versus 52.5% after the intervention. The total hospital costs for the month were estimated as were the charges for telemetry on the general medicine floor. Thus, the telemetry charges per month as a percentage of the total hospital charges were calculated. After the intervention, the total cost for telemetry per month as well as the percentage of total charges increased. However, the average number of patients on telemetry per month had increased from 33.8 to 39.5; thus, the telemetry charges per person actually decreased.

Discussion

Our telemetry guideline intervention led to improved utilization of a finite resource. Appropriate use slightly increased and there was an increased number of patients on telemetry per month while per person costs decreased.

We did not extrapolate from the log information. If we had, our results would have been slightly different. For example, a documented diagnosis of acute renal failure, not an indication for telemetry, could be extrapolated to represent hyperkalemia, which is an appropriate indication. Using these types of assumptions (looser criteria), the appropriate indication rate was 51.1% before the intervention and 56.3% after the intervention (versus 49.7% and 52.5% when stricter criteria were used).

Our study was limited in that only medical house staff rotating on the general medicine floor were instructed on the guidelines; other physicians admitting patients to telemetry on the general medicine floor were not. We did not collect data on the number of days each patient was on telemetry. It is possible that the guidelines’ discontinuation parameters may have had an influence on proper telemetry discontinuation practices. This is an area that needs further investigation. The diagnoses for indications came from a general log book that typically used admitting diagnoses rather than consistently logging the particular diagnosis for telemetry, and this could lead to skewing of the data. There were also a large percentage of unknown indications that might have illustrated a more significant improvement if properly documented. With regard to the financial data, the charges were only estimates, as most insurance companies do not pay separately for telemetry and not all charges are reimbursed at the same rate. Further studies are needed to better determine proper telemetry guidelines and how best to implement them.

Other institutions have conducted quality improvement projects in this area. At Hackensack University Medical Center, an advanced practice nurse carried out concurrent monitoring and intervened with the attending physician for any patient on telemetry longer than 48 hours who did not meet local guidelines. This led to a decrease in the number of hours patient were on telemetry by 34% \( (P < 0.001) \), which allowed for an increase in the number of patients per month put on telemetry [7].

Telemetry use has expanded in many hospitals. There are no published guidelines that indicate which patients should be on telemetry and for how long. The adoption of proper telemetry utilization guidelines may help more patients have access to this resource without an increase in cost per patient.

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References


