Telemetry Outside Critical Care Units: Patterns of Utilization and Influence on Management Decisions

CHITTUR A. SIVARAM, M.D., JOHN H. SUMMERS, M.D., NAVEED AHMED, M.D.

Department of Veterans' Affairs Medical Center and University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, USA

Summary

Background: Guidelines for the use of telemetry in hospitalized patients have been proposed by the American College of Cardiology (ACC). However, there have been only a few studies which have investigated the usefulness of these guidelines in clinical practice.

Hypothesis: This study assessed the role of telemetry in the decision making process outside the critical care units.

Methods: The observational study, lasting 4 weeks, was conducted in the telemetry unit of a tertiary care teaching hospital and included 61 male patients (age range 40–61 years). They had been directly admitted to the telemetry unit or transferred from a critical care unit and were followed for as long as telemetry was active. Indication for telemetry and the contribution of telemetry to management decisions were assessed by a physician not involved in the care of the patient.

Results: Cumulative number of telemetry days was 379 with a mean of 6.2 days per patient. Total number of telemetry events was 297. According to the ACC classification, 14 patients (22.9%) had class I indication, 21 patients (34.4%) had class II indication, and 26 patients (42.6%) had class III indication. Telemetry events were seen in 18.2% of class I patients, in 39.7% of class II patients, and in 42.1% of class III patients. Only 12 telemetry events (4%) resulted in patient management, with none belonging to class III.

Conclusion: Telemetry findings in patients outside the critical care units are not usually responsible for major therapeutic changes. The value of telemetry in such patients may be overrated.

Introduction

Use of telemetry monitoring occurs frequently in hospitalized patients. Continuous rhythm monitoring is considered essential for patients admitted to the critical care units. However, the role of telemetry monitoring in patients outside the critical care units is less clear, even though improvement in patient care, decrease in medicolegal risk, and greater labor saving are believed to result from telemetry. The American College of Cardiology (ACC) in conjunction with the Emergency Cardiac Care Committee has published guidelines for the use of cardiac rhythm monitoring.[1] However, there have been only a few studies that have investigated the value of telemetry monitoring in clinical decision making.[2,3] The aim of the present study is to assess the pattern of utilization of telemetry in the teaching hospital setting and to ascertain the specific role of telemetry in clinical management decisions. With the increasing emphasis on cost containment and cost effectiveness, there is a need for clarifying the role of technology such as telemetry in medical care.

Material and Methods

The study was conducted at the Department of Veterans' Affairs Medical Center, Oklahoma City, which has 285 inpatient beds. This medical center is a tertiary care hospital with a teaching program, including internal medicine residency and cardiology fellowship training. The number of telemetry beds at the time of the study was 30. A Mennen Horizon 5180 XL (Mennen Medical, Inc., Clarence, N.Y.) system is used for telemetry in this center. Monitoring of telemetry patients is performed continuously by trained technicians. Admissions to the telemetry unit occur directly from the emergency room or the clinics and as transfers from the coronary care, medical intensive, or surgical intensive care units. This study was a prospective, observational study extending over a 4-week period. Inclusion criterion for the study was admission to the noncritical care telemetry bed. Patients admitted for direct medical and surgical care and those transferred from the critical care units were included in the study. All patients were followed for

as long as they were on telemetry monitoring. For the classification of indications for telemetry, the ACC classification was used.[1] Class 1 refers to situations in which cardiac monitoring is indicated in most if not all patients; class II indicates that cardiac monitoring may be of benefit in some patients, but is not considered essential for all; class III signifies that cardiac monitoring is not of benefit because the risk of a serious arrhythmia is low. For this study, the class assigned was that at the time of discharge from the unit. Thus, a patient who might have been classified as class I at the time telemetry was initiated, subsequently might become class III if telemetry was continued beyond the period of appropriateness. Follow-up was complete in all patients.

Demographic data (age, gender, race, diagnosis, and indication for telemetry) were collected within 24 h of admission. Prospective daily analysis of the telemetry strips and chart review were done by one of the investigators (N.A.) who was not involved in the care of any patient. All management changes were noted, and the relationship of the decisions to arrhythmias detected by telemetry was determined by noting a direct cause and effect relationship in the progress notes. If a treatment decision could have been made without input from telemetry, telemetry was considered not to have contributed to the management. Positive impact on management was defined as a therapeutic change, such as medication initiation or discontinuation, cardioversion, pacemaker implantation, or transfer to a critical care unit bed. The cost of telemetry was calculated by using the average daily charge for telemetry in three area hospitals at the time of the study, since our institution is a nonprofit federal organization.

Results

The total number of patients studied (all male, mean age 59 years, range 40–96 years) was 61. The study was completed in all patients. The cumulative number of telemetry days for the entire group was 379, with a mean of 6.2 days per patient. The underlying diagnoses in the study population are shown in Table I. Total number of telemetry events was 297, which

occurred in 56 of the 61 patients (91.8% of the total number of patients).

The indications for telemetry classified according to the ACC recommendations were as follows: 14 patients (22.9%) had class I indication, 21 patients (34.4%) had class II indication, and 26 patients (42.6%) had class III indication. The common class I indications were suspected acute myocardial infarction, recent resuscitation or at risk for cardiac arrest secondary to new onset high-degree heart block (Mobitz II or greater), runs of nonsustained ventricular tachycardia, new onset of intraventricular conduction defects, proven acute myocardial infarction during early hospital phase, and unstable angina. The common class II indications were high risk for cardiac or respiratory arrest, or hypotension because of their underlying disease state, stable condition after cardiac surgery, evaluation of syncope or other transient neurological events attributable to arrhythmia, and suspected or documented significant tachy- or bradyarrhythmias. The common class III indications were routine coronary arteriography, do-not-resuscitate status, and chronic stable atrial fibrillation. Eleven patients who were in class III had their monitoring continued after exclusion of myocardial infarction.

The types of abnormalities seen during telemetry monitoring are shown in Table II. The mean number of telemetry finding per patient class were as follows: 3.8 per patient in class I, 5.6 per patient in class II, and 4.8 per patient in class III. Of all the telemetry events, 18.2% were seen in class I patients, 39.7% in class II patients, and 42.1% in class III patients.

Only 12 telemetry events (4% of all telemetry findings) resulted in patient management changes directly ascribed to monitoring of the rhythm. These occurred in seven patients (11.4% of the total group). Changes in therapy are listed in Table III. Medication changes were the most common (start, stop, or dose modification). Of the total of 297 telemetry findings, 5.6% (3/54) in class I led to direct management changes, and 7.6% (9/118) in class II led to management changes; however, no telemetry findings in class III (0/125) resulted in any management change.

Cost analysis was based on the community average of 110 dollars per day for noncritical care cardiac monitoring, since our hospital does not bill or charge for services. The total cost of cardiac monitoring for 379 days of telemetry was projected

TABLE I Patient characteristics

Diagnosis	n (%)
Coronary artery disease	44 (72)
Diabetes mellitus	16 (26)
Hypertension	31 (51)
Cardiomyopathy	2 (3)
Atrial fibrillation	12 (20)
Cerebral ischemic events	5 (8)
Ventricular arrhythmias	3 (5)
Syncope	1 (2)
Valvular heart disease	4 (7)
Cardiac transplantation	2 (3)
Lung surgery	1 (2)

TABLE II Frequency of telemetry findings

PVCs	30.8%
Sinus tachycardia	11.8%
PACs	10.8%
Sinus bradycardia	10.4%
Atrial fibrillation with rapid ventricular response	7.7%
Ventricular bigeminy	7.4%
Nonsustained ventricular tachycardia	5.7%

Abbreviations: PVC = premature ventricular contraction, PAC = premature atrial contraction.

TABLE III Management changes based on telemetry

Total number of management changes	12/297 (4%)
Patients with management changes	7/61 (11%)
Medication changes	8/12 (67%)
Cardioversion for unstable atrial flutter	1/12 (8%)
Pacemaker for sinus pause	1/12 (8%)
Electrophysiologic study for ventricular tachycardia	2/12 (17%)

to be $41,690. The cost per patient was $683 and the cost per event influencing patient management was $3,474.

Discussion

Our study demonstrates that the value of telemetry monitoring outside the critical care units may be less than what is perceived by many physicians. Earlier studies assessing the role of telemetry monitoring had stressed the value of rhythm monitoring as an extension of critical care unit services while raising some doubts about its role in patients with syncope and in patients without coronary artery disease.[4,5] However, since the time of these earlier studies telemetry systems have undergone changes with superior techniques of arrhythmia detection and alarm technology. At the time of publication of the ACC recommendations for cardiac monitoring of adults for detection of arrhythmias,[1] there were no studies evaluating the existing technology of telemetry monitoring. Subsequently, Estrada *et al.* found that, in a large teaching hospital, 7% of patients on telemetry monitoring had management changes directly attributable to telemetry findings.[3] Objective measures of usefulness in that study included transfers to intensive care units, cardiac interventions such as pacemaker insertion, cardiac resuscitation, and medication changes. Transfer to intensive care unit occurred in only 0.8% of patients as a direct result of detection of an arrhythmia by telemetry.

The present study included patients typically seen in most telemetry units, including direct admissions as well as transfers from other critical care units after a period of stabilization. Thus, this study population is representative of telemetry floor patients. Previous studies had excluded patients post myocardial infarction, post cardiac surgery, and those transferred from critical care units.[3] The most important finding from our study is that the ACC guidelines for telemetry use are not widely practiced in our institution. This implies that telemetry is used in patients at low risk for serious arrhythmias since physicians overrate the value of telemetry in such patients. Failure to discontinue monitoring in patients with chest pain after exclusion of myocardial infarction, and the use of telemetry in patients awaiting coronary arteriography as well as in those with do-not-resuscitate status, are examples of inappropriate use of telemetry in our experience. While the frequency of telemetry findings was the highest in class III patients (42.1%), these findings did not lead to therapeutic decisions based on them. This observation, in fact, confirms that the ACC guidelines are able to identify patients in whom telemetry is not helpful. In this study, the management changes based on telemetry occurred in both class I and class II groups, suggesting that the value of telemetry was present in some patients where the indication for telemetry may have been debatable based on the ACC guidelines. Unlike in previous studies,[2,3] the appropriateness of telemetry and its role in decision making in each patient in our study was evaluated by a physician not involved in the care of the patient to deal with the inherent bias physicians might have in justifying telemetry in their patients during the course of a review. While this increases the objectivity of assessment of benefit from telemetry, it might underestimate the value of diagnostic information in patient care in real time for the treating physician.

This study has certain limitations. Since the value of telemetry was assessed by a nontreating physician based on information from the chart, the role of arrhythmia detection in helping the treating physician in decision making may have been underestimated. Moreover, this study was an observational study. The effect of not providing telemetry to patients who required monitoring was not evaluated by this study.

Conclusions

Our study shows that physicians overutilize telemetry outside the critical care units. The value of telemetry in such patients toward significant clinical decisions is small. Physicians might reduce the use of telemetry if they realize that telemetry leading to significant findings that alter therapy is expensive. Randomized trials of telemetry are indicated in patients with class II indications for telemetry monitoring since the value of telemetry in that group might be underestimated by current guidelines.

References

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