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TELEMETRY BED USAGE FOR PATIENTS WITH LOW-RISK CHEST PAIN: REVIEW OF THE LITERATURE FOR THE CLINICIAN

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□ **Abstract—Background: Telemetry monitoring in patients with low-risk chest pain is highly utilized, despite the lack of quality data to support its use. Study Objectives: To review the medical literature on the utility of telemetry monitoring in patients with low-risk chest pain and to offer evidence-based recommendations to emergency physicians. Methods: A PubMed literature search was performed and limited to human studies written in English language articles with keywords of "telemetry" and "chest pain." Studies identified then underwent a structured review from which results could be evaluated. Results: There were 114 paper abstracts on telemetry monitoring screened; 30 articles were considered relevant. Twelve appropriate articles were rigorously reviewed and recommendations given. Conclusions: Insufficient data exist to support telemetry use in low-risk chest pain patients. Telemetry monitoring is unlikely to benefit low-risk chest pain patients with a normal/nondiagnostic electrocardiogram, a normal first set of cardiac enzymes, and none of the following: hypotension, rales above the bases, or pain worse than baseline angina.** © **2014 Elsevier Inc.**

□ **Keywords—telemetry; chest pain; Goldman criteria; low-risk chest pain**

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INTRODUCTION

Every year, more than 8 million Americans present to the emergency department (ED) with chest pain, making it the second most common complaint in the ED (1). Although < 5% of low-risk chest pain patients are found to have an acute myocardial infarction (MI), many are admitted to the hospital for further evaluation (2). Telemetry monitoring in patients with low-risk chest pain is highly utilized despite the lack of quality data to support its use. In fact, it rarely detects clinically meaningful dysrhythmias, may lead to unnecessary tests and procedures, is expensive, and significantly increases ED boarding due to patients awaiting inpatient telemetry beds (3,4).

The 2004 American College of Cardiology (ACC)/American Heart Association (AHA) guidelines for inpatient telemetry monitoring provide screening recommendations for dysrhythmias, ischemia, and QT-interval abnormalities in adults and children (5). These guidelines are based almost exclusively on expert opinion due to the dearth of pertinent clinical trials. The vague and confusing nature of these guidelines is highlighted in the Class I recommendation to keep all "rule-out MI" patients on telemetry until 24 h after they are pain free. However, "Chest Pain Syndromes," which may include "rule-out MI" patients, is a separate subject in the

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Table 1. The Definitions of the Grades of Evidence of the Articles

Grade A	Randomized clinical trials or meta-analyses (multiple clinical trials) or randomized clinical trials (smaller trials), *directly* addressing the review issue
Grade B	Randomized clinical trials or meta-analyses (multiple clinical trials) or randomized clinical trials (smaller trials), *indirectly* addressing the review issue
Grade C	Prospective, controlled, nonrandomized, cohort studies
Grade D	Retrospective, nonrandomized, cohort or case-control studies
Grade E	Case series, animal/model scientific investigations, theoretical analyses, or case reports
Grade F	Rational conjecture, extrapolations, unreferenced opinion in literature, or common practice

guidelines under Class II recommendations. Such ambiguity has undoubtedly facilitated the common practice of admitting all chest pain patients to telemetry.

Low-risk chest pain is defined by the ACC/AHA as those patients with a normal or "near-normal" electrocardiogram, (ECG; unchanged from prior or no ST or T-wave changes in contiguous leads), normal cardiac enzymes, normal cardiac rhythms, and normal hemodynamics (6). Although various risk prediction scores exist, the one most commonly utilized is the Goldman risk-scoring system, whose components include: 1) ischemic changes on ECG; 2) systolic blood pressure < 100 mm Hg; 3) bilateral pulmonary rales above the bases; and 4) pain worse than baseline angina (7). According to Goldman et al., a normal ECG and ≤ 1 of these risk factors is categorized as "low risk," meaning the patient has a ≤ 5% chance of a major cardiac event (e.g., coronary artery bypass grafting, MI, death) at 30 days (7). For the purposes of this statement, we will utilize the above-referenced Goldman criteria to define "low risk" chest pain. However, based on the following data, we believe a negative first set of cardiac enzymes should be included in this definition.

This work was done at the request of and published as a clinical practice statement by the American Academy of Emergency Medicine (AAEM) Clinical Practice Committee.

MATERIALS AND METHODS

For this structured review of the topic of chest pain and telemetry monitoring, a literature search of the National Library of Medicine's MEDLINE database's PubMed system was performed and limited to articles written in the English language. A keyword search of "telemetry AND chest pain" was used to identify potential articles. Two reviewers independently examined all of the abstracts and selected relevant articles for full review. If either of the reviewers felt an abstract should be pulled for full review, it was selected. All of the references of the selected articles were then reviewed to determine if additional papers should be considered for review. Inclusion criteria for articles for final review were those that were randomized controlled trials, clinical trials, prospective cohort studies, and meta-analyses in human subjects. Case reports, case series, general review articles, and guideline statements were not included for the selection criteria for formal rigorous review. Studies targeting differences between specific populations, such as males vs. females, were excluded.

Two emergency medicine physicians independently conducted a structured review of the identified telemetry monitoring studies, and each study was individually classified based on a Grade of Evidence Review. If there was a discrepancy between the grades by the two reviewers, a third reviewer was available to serve as a tie-breaker. The levels of the evidence were assigned grades using the definitions as noted in Table 1, and were based on reference focus, specific research design, and methodology. Each of the selected articles was also subjected to detailed review and assigned a Quality Ranking based on a critical assessment with regards to quality of the design and methodology. This includes Design Consideration (e.g., focus, model structure, presence of controls) and Methodology Consideration (actual methodology utilized). The definitions of the Quality Ranking scores are included in Table 2.

Independent review of the articles, as well as discussion and joint review by the authors were undertaken to answer the clinical question. The references were sorted into three categories: supportive, neutral, and opposed. A table was constructed to assign the supportive references to the appropriate location using both the Grade of Evidence and the Quality of Evidence. Finally, based on the review of the literature, articles were assigned levels of recommendation, which are defined in Table 3.

Table 2. The Definitions of the Quality Ranking Scores of the Articles

Ranking	Design Consideration Present	Methodology Consideration Present	Both Considerations Present
Outstanding	Appropriate	Appropriate	Yes, both present
Good	Appropriate	Appropriate	No, either present
Adequate	Adequate with possible bias	Adequate	No, either present
Poor	Limited or biased	Limited	No, either present
Unsatisfactory	Questionable/none	Questionable/none	No, either present