Off ECG Monitor Intrahospital Transport of Telemetry Patients
A Literature Review of the Evidence
October 2014

Clinical Question: “What is the quantity, quality, and consistency of the evidence for off ECG monitor intrahospital transport of telemetry patients, including adverse events during transport?”

Background: The notion that patients with possible ischemic chest pain should be admitted to a monitored unit stems from research studies in the 1960s.5 Recent studies have questioned the need for telemetry monitoring in non-ICU patients admitted for rule-out acute coronary syndrome (ACS).3;5;6 Despite this evidence, it is still commonplace for low risk patients to require telemetry monitoring when admitted for rule-out ACS.1;3 In most institutions, the clinical practice and standard of care mandates that all patients on telemetry be accompanied by an RN with a monitor/defibrillator during transport.6 Patient safety concerns and fear of litigation continue to drive this clinical issue, despite mounting evidence that telemetry monitoring is of limited use in low risk patient populations.3;5;6

Low-risk patients with chest pain from emergency department (ED) and monitoring units are often transported by nurses, diverting valuable resources, equipment, and personnel, as well as delaying transportation.4;5 Nurses may consider transporting low-risk patients to tests and treatments as an activity that places high-risk patients remaining on the unit in jeopardy.2;3;6 Because of the systems and nursing effort required to take care of increasing ill patients, it is necessary to use evidence-based literature to support the use of patient care resources.3;6

Conclusions: The 2004 American Heart Association (AHA) guidelines provide little direction for off ECG monitor during intrahospital transport of low risk patients.1 There is scant literature describing the transport of patients within the hospital environment without a monitor or a registered nurse.2;4 Most of the evidence cited in this review was ED based and involved the safe intrahospital transport of both off monitored5 and monitored patients3;6 by a non-nurse such as an ED tech, resulting in reduced ED wait times, improved hospital flow, and increased staff satisfaction.3;5;6 Various outcome measures included nursing hand offs,4 nursing time spent for transport,3;5 nursing time off unit,4 any intervention by transporting nurse,3 dysrhythmias,3;5;6 hypotension,5 syncope,5 new chest pain/dyspnea,3 cardiac arrest,5;6 and death.5 Two studies validated that <1% of patients transferred to an inpatient bed with ACS and potential ACS had a life threatening ventricular dysrhythmia or died.3;5 The evidence articulated typical transport time from the ED to an inpatient unit as ranging from 13 to 30 minutes per transport.3;6 Estimated time saved using a transport guideline/protocol was found to be equivalent to 2.5 hours per day (10 patients admitted from ED),3 with one study’s authors suggesting accumulated hours could eventually represent potential FTEs.5 Two unit-based patient safety projects incorporated the use of an off ECG monitor algorithm. Although one project did not collect nursing time,2 the second project reported a significant reduction in nurse hours off unit, which fell from 96.4 hours pre-algorithm to 34.25 hours 3 months post-implementation.4 Additionally, one project verified that the algorithm was used 10 to 15 times in a 24 hour period.2 Algorithm/protocol development demands interpersonnel expertise and consensus, as based on the clinical evidence.2;3;5

Limitations: The quality of the evidence is limited by several factors. Only 6 articles fit the inclusion criteria (See Pages 9 and 10 for Search Methodology). No evidence was sourced from randomized control trials. The evidence consisted of 1 literature review,6 1 expert consensus guideline,1 two performance improvement projects2;4 and supplemented by 1 prospective cohort study,3 and 1 secondary analysis of a prospective observational study,5 both with small sample sizes (See Page 11). It must be noted that the above evidence and conclusions regarding off ECG monitoring without a skilled registered nurse are a departure from 2004 AHA guidelines on continuous monitoring.2;6 However, the information presented provides the best evidence to date for clinicians reexamining the indications and criteria for safe off ECG monitor intrahospital transport of patient on telemetry units.2;5

Clinical Options: Based on the reviewed evidence, the following options are offered for consideration:

- Using interprofessional expertise and consensus, consider developing and implementing an evidence-based off ECG monitor protocol or algorithm for telemetry unit patients (See Appendices A and B, Pages 7 and 8). The advantages of these types of guidelines include:
  - Transportation of low risk patient by specially trained non-nursing staff2;5
  - Earlier patient transportation3;5 with decreased transport wait times6
  - Decreased transport time3;5 and nursing time off unit4
  - Nurses are not diverted from their unit-based patient care responsibilities, particularly for high risk patients2;3;6
  - Embeds critical thinking skills processes for knowledge-based nursing care, rather than task-based nursing care2

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1. (Drew, Califf, Funk, et al., 2004). 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.

a. 2004 update of 1991 AHA scientific review and statement
   - Provide successful practices and guidelines for hospital ECG monitoring
   - Expert opinions based upon clinical experience and related research in the field of electrocardiography
   - Randomized clinical trials in this area are almost nonexistent
   - Consensus document encompasses all areas of hospital cardiac monitoring in both children and adults
   - Emphasis on information clinicians need to know to monitor patients safely and effectively
   - Recommendations made with regard to indications, timeframes, and strategies to improve the diagnostic accuracy of cardiac arrhythmia, ischemia, and QT-interval monitoring

b. Results:
   - Under Cardiac Arrhythmia Monitoring section (page 2723), Class I patients, for patients in the early phase of ACS, second paragraph: “Because of the possibility of malignant reperfusion arrhythmias, all patient who receive early reperfusion therapy should undergo uninterrupted ECG monitoring, including intrahospital transport.”
   - This is the only statement directly discussing intrahospital transport of monitored patients.

c. Conclusions: The 2004 AHA guidelines provide little direction for ECG monitoring during intrahospital transport of low risk patients.


a. Transforming Care at the Bedside (TCAB) quality improvement and patient safety project to enhance the process for transporting low risk hospitalized patients on step down unit

b. Aim: Develop a transportation algorithm to continue the current 2 year patient safety record of no untoward clinical events during transport

c. Algorithm: Flow chart uses traffic light colors to signify critical thinking directions (See Appendix A, Page 7)
   - Embeds critical thinking skills processes for knowledge-based nursing care rather than task-based nursing care
   - Consensus of nurse algorithm designer, CNO, cardiologist, pulmonologist, interprofessional critical care committee, and unit staff
   - Essential Step: Nurse’s decision must be verified by resource or charge nurse

d. Limitation:
   - Nursing time not quantified or measured during project, as baseline data was not available for comparison

e. Results:
   - Algorithm used 10 to 15 times in every 24 hour period
   - 2 years without clinical events (not defined) or arrests in patient being transported off unit
   - Copies of algorithm shared and/or adapted across healthcare system and units

f. Conclusions:
   - Voice of nursing resulted in a changed that accomplished 3 TCAB goals:
     • Improving safety and reliability of care
     • Enhancing nurse vitality and teamwork
     • Improving value added processes

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a. Prospective cohort study of patients admitted from the ED with acute and potential ACS in an urban tertiary-care ED with 55,000 annual visits
   - Subjects = Adult patients admitted from ED to inpatient beds (intensive care unit or floor telemetry) with ACS and rule out ACS
     - N = 315 total admissions involving 310 patients
       1. 42 (13.5%) admitted to ICU; remainder 268 (86.5%) admitted to telemetry beds
   - End points = life threatening ventricular dysrhythmias requiring intervention + duration of transport

b. Study Aims: Hypothesized that
   - <1% of patients transferred to an inpatient bed with ACS and potential ACS would have a life threatening ventricular dysrhythmia
   - Telemetry transport monitoring for patients with acute and potential ACS is of limited utility

c. Outcome Measures:
   - Development of life threatening ventricular dysrhythmias or new onset chest pain/dyspnea during transport
   - Any intervention by transporting nurse
   - Total transport time

d. Limitations:
   - All eligible patients not enrolled, with possible selection bias
   - Not all forms were returned if the nurse forgot, was too busy, or chose not to fill out the form
     - Charts were abstracted and absent data were treated as negative
     - Possible misclassification bias (population may have been more ill than suggested)
   - In addition, this experience may not reflect distance and time of transfer from ED to nursing unit in other institutions.
   - Another limitation of this study is that data was not collected on actual patient outcomes (final diagnosis, rule-in rate, or mortality rate) beyond arrival on the inpatient unit

e. Study Results:
   - No patients developed life threatening ventricular dysrhythmias, needed transport interventions, or developed new chest pain or dyspnea during transfer (0%; 95% confidence interval 0–0.95%)
   - Mean transport time from ED to floor for all admissions was 6.2 minutes (SD 3.2, range 1–20)
   - Total nurse time out of ED spent transporting was 13.6 minutes (SD 5.2, range 4–40)
     - In a hospital admitting 10 patients a day for rule-out ACS = 2.5 hours of nursing time/day

g. Conclusions:
   - See Appendix B (Page 8) for transport guidelines for patient admitted to floor telemetry units
   - Routine use of nurses accompanying patients admitted with acute and potential acute coronary syndromes is of limited utility
   - Patient transportation without nurses may help alleviate ED overcrowding by saving almost 15 minutes of nursing time currently being used for transport without measurable benefit
   - Study supports that a subset of patients (i.e., low-risk patients) admitted to floor telemetry beds are safe to go without nursing transport
   - NOTE: These conclusions are a departure from 2004 AHA guidelines on continuous monitoring

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a. PowerPoint presentation describing a performance improvement/patient safety project that incorporated the algorithm developed by Mayer (2009) (See Appendix A, Page 7).

b. **Objective:**
   - Increase the understanding of a safe intrahospital transport method for PCU patient
   - Ensure patients traveling for testing and procedures are accompanied by appropriate personnel
   - Increase availability of critical personnel and equipment
   - Decrease number of hand off reports throughout the day

c. **Results:**
   - Utilization of an Off Monitor Transport Algorithm (Mayer, 2009).
   - Data collection for RN hours off PCU
     - Pre-algorithm: 96.4 hours
     - 1 week post implementation: 64.18 hours
     - 3 month post implementation: 34.25 hours

d. **Conclusions:**
   - Successful implementation with 100% compliance
   - Decreased number of hand off reports (no data reported)
   - Increased availability of critical equipment and personnel (no data reported)
   - Increased staff satisfaction (no data reported)
   - Decreased need for additional FTEs (no data reported)

5. (Singer et al., 2005). Telemetry monitoring during transport of low-risk chest pain patients from the emergency department: Is it necessary?
   a. Secondary data analysis of a prospective observational cohort study to determine whether transportation by nonmedical personal of low-risk ED patients with chest pain off ECG monitoring was safe
      - **Hypothesis:** Fewer than 1% of low-risk ED patients admitted and transported off monitor to a telemetry unit would develop adverse events during transport
      - Suburban university based ED with annual census of 75,000 visits
        - N=322 low risk patients who presented during September to October 2004
          - Mean age = 58.3 (+ 16.0); 48.1% female; 82.3% white
        - Sample size of 300 patients = 95% CI with upper limit of 1%
        - Low risk = Definition by 2002 ACC/AHA: No active chest pain at time of transport, normal/nondiagnostic ECG, and normal initial troponin I below 0.15 ng/ml
      - **Study Protocol:** Protocol developed in 2003 that allowed transportation of low risk ED patients with chest pain to a hospital telemetry unit off cardiac monitor by a nurse’s aide or nonmedical transporter
        - Transporters trained in BLS
        - Daily ongoing log prospectively documenting all off monitor transports
   b. **Outcome Measures:** Adverse events requiring treatment during transport or immediately on arrival to floor
      - Dysrhythmias, hypotension, syncope, cardiac arrest, and death
   c. **Limitations:**
      - Secondary analysis of a prospectively collected cohort of ED patients
      - Ultimate diagnosis unknown for substantial number of patients
      - Some patients may have experienced undocumented dysrhythmias during transport
        - Unlikely such dysrhythmias were clinically significant, considering study results
      - Small sample size
Formal cost-effectiveness analysis to determine actual cost savings of protocol was not performed

d. **Results:**
   - During transport from ED to telemetry unit and immediately after arrival to telemetry and placing the patient on the monitor, *no patient had any adverse event requiring treatment and no patient died* (95% CI = 0% to 0.93%)
   - Protocol was instituted 2 years prior, with no cardiac arrests and 1 syncope episode not needing treatment

e. **Conclusions:**
   - Transportation of low-risk ED chest pain patients off telemetry monitoring by nonclinical personnel to then on-ICU telemetry unit appears safe
   - Adoption of this process may reduce diversion of ED nurses away from the ED, helping to alleviate nursing shortages and speed the admission process, leading to shortening of the ED length of stay
   - Typical transport from ED to hospital unit with an accompanying nurse = estimated 3 nursing FTEs during peak times of admission
   - Findings are consistent with large body of evidence suggesting that monitoring of low risk patients with chest pain is of low yield, as low risk patients rarely develop dysrhythmias

   a. Literature review to identify the necessity of RN’s transporting telemetry patients (Note: Conference abstract only; unable to contact author)
   b. **Design:** Database search conducted using MEDLINE, CINHAl, Google Scholar, and Pub Med using key search terms ED overcrowding, telemetry monitoring, and indications for cardiac monitoring.
      - To validate use of RN’s during transport of all patients admitted with telemetry orders
   c. **Outcome Measures:**
      - Emergency treatment of life threatening arrhythmia that would activate the code blue team or rapid response team
   d. **Results:**
      - Supports that the transport of low risk chest pain patients (as defined by the AHA Scientific Statement), by non-clinical staff is a safe practice.
      - Based on the evidence, a new policy for the transport of all telemetry patients was drafted and initiated in August 2010.
      - Patients meeting the following criteria may be transported by an ED tech with a remote telemetry box:
         - Admission to a medical bed with remote telemetry
         - Permanent, rate controlled atrial fibrillation
         - Stable with chronic PVC’s
         - Terminally ill who are not candidates for arrhythmia therapy
         - Respiratory ailments such as asthma or pneumonia without underlying cardiac disease.
   e. **Implications:** Approximately 20 minutes per admission is required for an RN to transport telemetry patients, often leaving sicker patients in the ED without a nurse.
      - Change in practice improved patient flow, reduced ED wait times, and improved staff satisfaction
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References


Appendix B
Transport Guidelines For Cardiac Patients Admitted To Floor Telemetry Units

1. One or more sets of negative cardiac markers in the ED
2. Diagnostic impression of the treating physician is not Unstable Angina or Myocardial Infarction
3. Does not demonstrate a new cardiac arrhythmia or any clinically significant ectopy while in the ED
4. If they meet any of the following low-risk criteria:
   a. Have a thrombolysis in myocardial infarction (TIMI) risk score of 0 or 1.
   b. They are greater than 6 hours from onset of symptoms regardless of TIMI risk score.
5. Addendum: Any provider taking care of the patient may change this policy and require nurse attendance during transfer if they believe the patient to be at risk for a transport dysrhythmia.
Off Monitor Intrahospital Transport of Telemetry Patients

*A Literature Review of the Evidence*

October 2014

**Electronic Database Search Methodology**

**Date(s):** September 25, 2014

**Literature search topic/clinical question:** What is the quantity, quality, and consistency for off ECG monitor intrahospital transport of telemetry patients, including adverse events during transport?

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*Controlled vocabulary (subject terms, MESH terms, tagged terms specific to database)

*Use the first database as the main comparison for subsequent database searches and identifying duplicate articles

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* Use the first database as the main comparison for subsequent database searches and identifying duplicate articles.

**Total Articles Included in Literature Review: Database (6) + Contextual Links (0) = 6**

* Additional articles/information found in references lists and/or article review.

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Clinical Question

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<th>Comparison Intervention (Often current practice)</th>
<th>Outcome</th>
<th>Time Period (If Applicable; Optional)</th>
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<td>O: Adverse events during transport</td>
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Final Clinical Question: What is the quantity, quality, and consistency for off ECG monitor intrahospital transport of telemetry patients, including adverse events during transport?

Searchable Question

Key Search Terms: Telemetry patients; adults, non-ICU patients; low risk patients; intrahospital transport; transport*; without monitoring, without RN, NOT critical, NOT pediatric

Inclusion Criteria: Adult telemetry patient, hospitalized patients, acute care setting

Exclusion Criteria: Pediatric, emergency department (however, ED included in final review due to scarce literature on this topic)

Limitors: English language, Open year

Databases: PubMed, CINAHL

Web Browser: Yahoo

Websites: American Association of Critical Care Nurses (AACN); Agency for Healthcare Research and Quality (AHRQ); Institute for Healthcare Improvement (IHI); Virginia Henderson Library/Global Nursing e-Repository

Evidence Search Strategies: A comprehensive search strategy was used to identify published English written evidence for opens year (not limits) due to scarcity of evidence. The initial search was conducted via PubMed and CINAHL using key words(s) and/or controlled vocabulary of “transporting telemetry,” “patients without monitoring,” “telemetry,” “low risk patients,” “patients without RN OR monitoring” and “intrahospital transport,” either alone, mixed, or in combination. The above websites were also searched using the open ended term of “intrahospital transport of telemetry patients,” “low risk patients OR nonICU patients,” and “transporting telemetry patients.” To ensure that the search results were comprehensive, a final search using the web browser Yahoo was conducted using the same key search terms.

220 total references were identified. Relevant articles were then retrieved and 11 were initially selected for inclusion. The criteria for inclusion for more detailed analysis were (a) telemetry monitoring, (b) adult hospitalized patients, (c) off ECG monitoring, and (d) intrahospital transport. Five duplicate articles were excluded, with 6 articles included for review. No contextual articles were added. Therefore, 6 articles were included in the final literature review. The evidence consisted of 1 literature review, 1 expert consensus guideline, 2 performance improvement projects, and supplemented by 1 prospective cohort study and 1 secondary analysis of a prospective observational study, both with small sample sizes (See Page 11).
### CCIRES Evidence Leveling System (ELS)

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<td>Meta-analysis of multiple large sample or small sample* randomized controlled studies, or meta-synthesis of qualitative studies with results that consistently support a specific action, intervention, or treatment</td>
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<td>B</td>
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<td>Peer-reviewed professional organizational standards, with clinical studies to support recommendations</td>
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Purpose/intended Audience

Because we want everyone in our communities to have the healthiest lives possible, we are making our evidence reviews available to the communities we serve to help Californians and others lead healthier lives.

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Limitations On Use

These documents have been developed to assist clinicians by providing an analytical framework for the effective evaluation and treatment of selected common problems encountered in patients. These documents are not intended to establish a protocol for all patients with a particular condition. While evidence reviews provide one approach to evaluating a problem, clinical conditions may vary significantly from individual to individual. Therefore, clinicians must exercise independent professional judgment and make decisions based upon the situation presented.

Kaiser Permanente's documents were created using an evidence-based process; however, the strength of the evidence supporting these documents differs. Because there may be differing yet reasonable interpretations of the same evidence, it is likely that more than one viewpoint on any given healthcare condition exists. Many reviews will include a range of recommendations consistent with the existing state of the evidence.

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